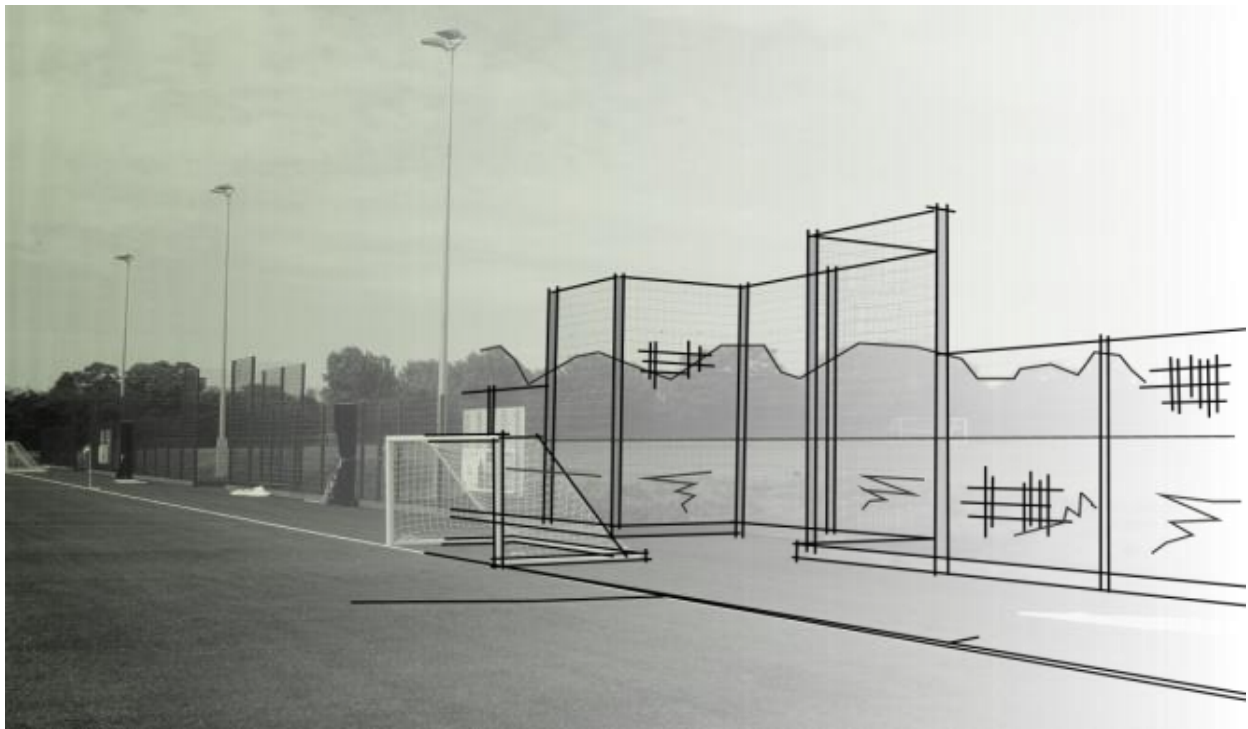


Burgess Hill Town FC

Conversion of a natural grass pitch to a 3G Artificial Grass Pitch (AGP) with perimeter fencing, replacement floodlights, acoustic barrier and hardstanding areas

Drainage Strategy



Client	Burgess Hill Town Football Club Maple Drive Burgess Hill West Sussex RH15 8DL		
Project	Conversion of a natural grass pitch to a 3G Artificial Grass Pitch (AGP) with perimeter fencing, replacement floodlights, acoustic barrier and hardstanding areas		
SSL project code	SS3402		
Document title	Drainage Strategy		
Document control	Revision	By	Date
	First Issue	LS	10 th January 2025

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SSL project code	SS3402	1
Client	Burgess Hill Town FC	
Document Title	Drainage Strategy	

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1. Introduction

Surfacing Standards Limited has been appointed to consider and develop an application for full planning permission for the conversion of a natural grass pitch to a 3G Artificial Grass Pitch (AGP) with perimeter fencing, replacement floodlights, acoustic barrier and hardstanding areas

The assessment has been carried out in accordance with the guidance set out in the National Planning Policy Framework (NPPF).

2. Site Details

2.1. The Proposal

The proposed development will include the creation of an Artificial Grass Pitch (AGP) with new fencing and hard standing pathways as shown within table 1.

Table 1 – Area of pitch and associated development

Aspect	Area
3G artificial grass pitch area	7,420m ²
Macadam surfaced areas including goal storage areas and spectator areas	333m ²
Total Development Area	7,753m²

2.2. Subject Area

The proposed development is situated at Burgess Hill Town Football Club, Maple Drive, Burgess Hill, West Sussex, RH15 8DL



Figure 1 – Site Location

2.3. Site Description

The site is the home ground of Burgess Hill Town Football Club, situated to the north of the town with vehicular access off Maple Drive. The site currently has parking and clubhouse facilities. The main playing area subject to the proposed development has existing floodlighting as well as a main spectator stand to the south and dugouts to the north of the playing area. Surrounding the site there are residential properties to the south and east with further grass playing pitches to the west. To the north of the site is a thick area of woodland forming part of Bedelands Nature Reserve.

2.4. Site History

Historical mapping from the late 1890s shows the site to be agricultural land, listed as next to Cooper's Shaw. In 1945 maps show how the surrounding area of the site was still undeveloped, however beyond the immediate vicinity the first houses were being built to the south of the site, in Leylands park. By the time of the first aerial satellite images in 2001 the surround housing area to the south had been constructed, as well as the grass pitch still currently occupying the site. In addition, two pitches have been created at the west of the site. Little significant change has occurred since 2001 on site.

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2.5. Site Topography

The topography over the pitch area shows a fall from the south to north by approximately 0.6m. Further information on existing levels can be seen within SSL3402 01 - Existing Site Plan.

2.6. Local Watercourses

The nearest surface water feature appears to be a stream located to the west of the site, the stream flows across the Bedelands Nature Reserve

2.7. Existing Drainage

There is currently no existing field drainage.

2.8. Source Protection Zone

The site is not located within a Source Protection Zone.

2.9. Coal Mining

Coal Authority mapping data shows the site does not lie within a Coal Mining Reporting area.

2.10. Ground Conditions Encountered

Topsoil was encountered in all exploratory borehole positions and generally comprised light brown sandy clay that extended to a maximum depth of 0.30mbgl. The topsoil was noted to be underlain by a thin layer of suspected made ground comprising black ashy sand in WS03 and WS05. The topsoil and made ground was immediately underlain by firm to stiff light yellow mottled light grey silty sandy clay. These deposits were recorded to extend to depths of between 1.50m and 1.90mbgl. The clay was immediately underlain by weak light yellow mottled light grey mudstone. The base of the mudstone was not encountered in any of the boreholes due to shallow refusals within it. The natural clay and mudstone are considered to be representative of the Weald Clay Formation that's is recorded to underlie the site.

2.11. Groundwater

Groundwater was not encountered in any of the exploratory boreholes during our investigation.

2.12. Infiltration Potential

Soakaway testing targeted within the natural deposits was undertaken in WS01. Insufficient drainage was recorded to extrapolate any form of infiltration rate and therefore the natural deposits have been determined to be impermeable. Therefore, soakaway drainage is not considered to be suitable, and an alternative drainage strategy should be sought.

2.13. Assessment Context

The proposed pitch development area is approximately 0.77ha.

2.14. Flood Map

The Government websites confirm the proposed development area is located within a flood zone 1.

Flood zone 1 - This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%). The likelihood of flooding from the rivers or the sea at the proposed development site is very low.

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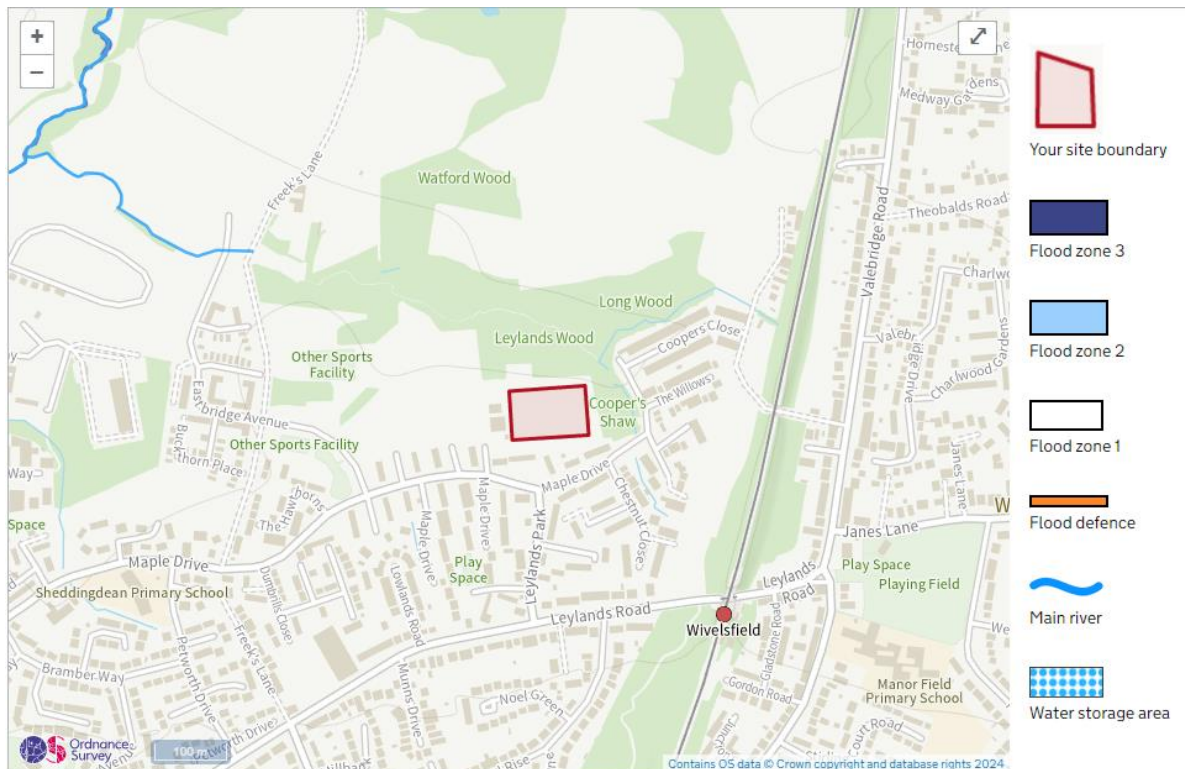


Figure 2 – Flood map for planning

2.15. Risk of Flooding from Rivers and Sea

The Government website confirms the proposed development area is at no risk of flooding from rivers or sea, which happens when there are high tides and stormy conditions.

2.16. Risk of Flooding from Surface Water

The Government website confirms the proposed development area is at very low risk of flooding from surface water, which happens when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead.

Very low risk means that each year this area has a chance of flooding of less than 0.1%.

Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

2.17. Development Proposals and Flood Risk Vulnerability

Whilst the proposal is situated within a flood zone 1, a comparison of the proposal against flood risk vulnerability classifications is required as the development site is larger than 1ha.

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3. Framework & Flood Risk Policy

3.1. National Planning Policy Framework (2023)

Section 14 – Meeting the Challenge of Climate Change, Flooding and Coastal Change

Policy extract:

Paragraph 167:

When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment⁵⁵. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

- a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*
- b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;*
- c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*
- d) any residual risk can be safely managed; and*
- e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.*

Department for Environment, Food and Rural Affairs

Sustainable Drainage Systems

Non-statutory technical standards for sustainable drainage systems

March 2015

The surface water drainage scheme must be in accordance with the Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacement national standards and unless otherwise agreed in writing by the Local Planning Authority, no surface water shall discharge to the public sewerage system either directly or indirectly.

To assist the application for full planning permission and to facilitate the satisfactory implementation and delivery of the project; an assessment of flood risk and a sustainable drainage proposal is required in accordance with national policies.

With reference to Table 2 of Planning Practice Guidance to the National Planning Policy Framework, the proposed development for an outdoor sports facility would be classified as Water Compatible Development.

Table 2 - Extract from Table 2 of the PPG for Flood Risk and Coastal Change is replicated below in Table 2.

Flood Risk Vulnerability Classification	
Vulnerability	Development types
Water Compatible Development	Flood control infrastructure Water transmission infrastructure and pumping stations Sewage transmission infrastructure and pumping stations Sand and gravel working Docks, marinas and wharves Navigation facilities Ministry of Defence defence installations Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location Water-based recreation (excluding sleeping accommodation) Lifeguard and coastguard stations Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan

Source: Planning Practice Guidance - 2014

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3.2. Flood Risk Vulnerability and Flood Zone Compatibility

Based on the above assessment of the site being located within a flood zone 1 and classified as a 'water compatible development' and with reference to Planning Practice Guidance for 'Flood Risk and Coastal Change' to the National Planning Policy Framework (Table 3), the proposed development of this site would be considered "appropriate".

A copy of Table 3 is presented below to confirm the assessment above.

Table 3 - No exception test

Flood risk vulnerability and flood zone compatibility					
Flood risk vulnerability classification	Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test required	✓	✓
Zone 3A	Exception Test required	✓	✗	Exception Test required	✓
Zone 3B	Exception Test required	✓	✗	✗	✗
Key:					
✓Development is appropriate					
✗Development should not be permitted					

3.3. Sequential Test

As the site is located within a flood zone 1, a sequential test is not required and it is worth noting the site is used (and historically designated) as a sports complex (active playing field) the development can be deemed to have passed the sequential test.

3.4. Current Conditions

The proposed development will replace part of an existing playing field.

3.5. Surface Water Disposal Requirements

In accordance with the National Planning Policy Framework (NPPF) and the National Planning Practice Guidance (NPPG), the site should be drained in the most sustainable way. No foul sewage will be created as part of this development.

The NPPG clearly outlines the hierarchy to be investigated by the developer when considering a surface water drainage strategy. As such, the developer must consider the following drainage options in the following order of priority:

- A. Into the ground (infiltration);
- B. To a surface water body;
- C. To a surface water sewer, highway drain, or another drainage system;
- D. To a combined sewer.

This is necessary to promote sustainable development, secure proper drainage and to manage the risk of flooding and pollution. This condition is imposed considering policies within the NPPF and NPPG.

3.6. Flood Compensation

Flood compensation measures will not be required as finished (floor) levels will not affect current flood plain storage onsite.

3.7. Overland Flows

There is a risk of the critical storm event being exceeded, albeit this risk is considered very low.

In such an event the proposed drainage systems will become overwhelmed and overland flows could occur.

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4. Surface Water Drainage Strategy

4.1. Surface Water Disposal Solution

In accordance with the National Planning Policy Framework (NPPF) and the National Planning Practice Guidance (NPPG), the site should be drained on a separate system with foul water draining to the public sewer and surface water draining in the most sustainable way.

The NPPG clearly outlines the hierarchy to be investigated by the developer when considering a surface water drainage strategy in the following order of priority:

- A. Into the ground (infiltration);
- B. To a surface water body;
- C. To a surface water sewer, highway drain, or another drainage system;
- D. To a combined sewer.

4.2. Surface Water Disposal Options

A. Soak away

The near surface soils across the pitch are not considered amenable to the use of soakaway type systems, thus an alternative drainage solution will need to be considered.

B. Surface Water Body

The nearest surface water body is over 230m to the southwest making a connection unfeasible.

C. Surface Water Sewer

The proposal is to connect into the school surface water sewers.

D. Combined Sewer

Not required due to Option C being possible.

4.3. Surface Water Drainage Strategy

FIFA's Quality Concept for Football Turf (Handbook of Requirements January 2015 Edition) requires a 3G artificial turf to provide water permeability (for outdoor uses) >180mm/hr and advises that to ensure adequate drainage of a field, all individual elements of the football turf should satisfy this requirement.

A positive drainage scheme (land drainage); shall be installed beneath the Artificial Grass Pitch (AGP) 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 the proposed surface water connection.

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.
- 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.

This is achieved through the surface water being attenuated / stored within the construction make up of the artificial turf pitch that has 37% void space acting as the surface water drainage and the drainage system attenuation an additional 70m³.

As shown below the calculated volume for storage to meet a 1 in 30-year storm event + 40% climate change is 337m³. The attenuation calculated within the base of the pitch and proposed drainage system allows the controlled storage onsite up to 408m³ as detailed within SSL3402 08 – Proposed AGP Drainage Strategy.

For the 1:100 year event the attenuation requirement is lower than the 1:30 year + 40% CC and therefore this event is catered for. The 1:100 year + 45% CC storm event will utilise overland attenuation and flood the ground to the north of the AGP within the confines of the site.

The proposed development and associated surface drainage strategy from this site is such that the surface water will be managed and disposed of within the existing surface water drainage, thus complying with the Technical Guidance to the National Planning Policy Framework.

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Surface water management and disposal performance will be achieved by the following physical implications to the development (the Artificial Grass Pitches):

1. Adequate attenuation (water storage) within pitch bases (comprising a permeable granular sub-base) to ensure that excess volumes, which would be experienced during a critical storm event, does not bypass the control system;
2. Restricted flow rate to 4.47 l/s before discharging into the existing site drainage system, as calculated by the HR Wallingford method.

The drainage solution is designed to ensure no above ground flooding occurs up to and including the 1 in 30-year event plus a 40% allowance for climate change, with the 1 in 100 year + 45% CC event being attenuated within the confines of the site.



Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by: Myles O'Hanlon

Site name: Burgess Hill Town FC

Site location: Burgess Hill

Site Details

Latitude: 50.96720° N

Longitude: 0.1246° W

Reference: 558177300

Date: Nov 15 2024 11:47

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.7625

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	826	826
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	4.47	4.47
1 in 1 year (l/s):	3.8	3.8
1 in 30 years (l/s):	10.28	10.28
1 in 100 year (l/s):	14.25	14.25
1 in 200 years (l/s):	16.71	16.71

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use

Figure 3 – HR Wallingford Greenfield Runoff Rate Estimates

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Minimum Storage Required: **82 m³** incl cc allowance

FACTOR	VALUE	SOURCE
Return Period (yrs):	2	Environment Agency, Water Authority, etc.
Limiting Discharge (l/s):	4.47	Environment Agency, Water Authority, etc.
Contributing Area (ha):	0.7625	Site plans
Impervious, PIMP (%):	100	Site plans
M5-60min (mm):	20	Volume 3 maps and site location
SAAR (mm/yr):	826	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:	94	SAAR and Volume 1, Figure 9.7
Calculated PR	80.81	
Percentage Runoff =	80.81	

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

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 M2	M2-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	0.34	6.8	0.79	5.4	5.4	0.76	81	33.1	0.0	33.1	0.27	1.3	31.8
10	20	0.50	10.0	0.79	7.9	7.9	0.76	81	48.7	0.0	48.7	0.27	2.7	46.0
15					7.8	7.8	0.76	81	48.1	0.0	48.1	0.27	4.0	44.0
30					10.2	10.2	0.76	81	62.9	0.0	62.9	0.27	8.0	54.8
60					12.9	12.9	0.76	81	79.5	0.0	79.5	0.27	16.1	63.4
120					18.0	18.0	0.76	81	110.9	0.0	110.9	0.27	32.2	78.7
240					23.7	23.7	0.76	81	146.2	0.0	146.2	0.27	64.4	81.9
360					27.3	27.3	0.76	81	168.2	0.0	168.2	0.27	96.6	71.7
480					29.9	29.9	0.76	81	184.1	0.0	184.1	0.27	128.7	55.4
600					32.0	32.0	0.76	81	196.9	0.0	196.9	0.27	160.9	36.0
720					33.7	33.7	0.76	81	207.7	0.0	207.7	0.27	193.1	14.6
840					35.3	35.3	0.76	81	217.2	0.0	217.2	0.27	225.3	-8.1
1440					41.1	41.1	0.76	81	253.5	0.0	253.5	0.27	386.2	-132.7
2160					46.6	46.6	0.76	81	287.1	0.0	287.1	0.27	579.3	-292.2
2880					51.3	51.3	0.76	81	316.2	0.0	316.2	0.27	772.4	-456.2

Figure 4 – 1 in 2-year attenuation volumes to: 4.47 l/s

Minimum Storage Required: **243 m³** incl cc allowance

FACTOR	VALUE	SOURCE
Return Period (yrs):	30	Environment Agency, Water Authority, etc.
Limiting Discharge (l/s):	4.47	Environment Agency, Water Authority, etc.
Contributing Area (ha):	0.7625	Site plans
Impervious, PIMP (%):	100	Site plans
M5-60min (mm):	20	Volume 3 maps and site location
SAAR (mm/yr):	826	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:	94	SAAR and Volume 1, Figure 9.7
Calculated PR	80.81	
Percentage Runoff =	80.81	

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

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 M30	M30-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	0.34	6.8	1.45	9.9	9.9	0.76	81	60.8	0.0	60.8	0.27	1.3	59.5
10	20	0.50	10.0	1.49	14.9	14.9	0.76	81	91.8	0.0	91.8	0.27	2.7	89.1
15					20.5	20.5	0.76	81	126.0	0.0	126.0	0.27	4.0	122.0
30					27.2	27.2	0.76	81	167.8	0.0	167.8	0.27	8.0	159.7
60					34.6	34.6	0.76	81	213.0	0.0	213.0	0.27	16.1	196.9
120					41.8	41.8	0.76	81	257.4	0.0	257.4	0.27	32.2	225.3
240					49.8	49.8	0.76	81	306.9	0.0	306.9	0.27	64.4	242.6
360					54.9	54.9	0.76	81	338.2	0.0	338.2	0.27	96.6	241.6
480					58.7	58.7	0.76	81	361.4	0.0	361.4	0.27	128.7	219.7
600					61.7	61.7	0.76	81	380.4	0.0	380.4	0.27	160.9	232.5
720					64.4	64.4	0.76	81	396.8	0.0	396.8	0.27	193.1	203.7
840					66.8	66.8	0.76	81	411.3	0.0	411.3	0.27	225.3	186.0
1440					76.1	76.1	0.76	81	469.2	0.0	469.2	0.27	386.2	83.0
2160					85.1	85.1	0.76	81	524.5	0.0	524.5	0.27	579.3	-54.8
2880					92.7	92.7	0.76	81	570.9	0.0	570.9	0.27	772.4	-201.5

Figure 5 – 1 in 30-year attenuation volumes to 4.47 l/s

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SSL project code	SS3402
Client	Burgess Hill Town FC
Document Title	Drairage Strategy

Minimum Storage Required: **377 m³** incl cc allowance

FACTOR	VALUE	SOURCE
Return Period (yrs):	30	Environment Agency, Water Authority, etc.
Limiting Discharge (l/s):	4.47	Environment Agency, Water Authority, etc.
Contributing Area (ha):	0.7625	Site plans
Impervious, PIMP (%):	100	Site plans
M5-60min (mm):	20	Volume 3 maps and site location
SAAR (mm/yr):	826	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:	94	SAAR and Volume 1, Figure 9.7
Calculated PR	80.81	
Percentage Runoff =	80.81	

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

Climate Change Allowance **40**

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 M30	M30-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	0.34	6.8	1.45	9.9	13.8	0.76	81	85.2	0.0	85.2	0.27	1.3	83.8
10	20	0.50	10.0	1.49	14.9	20.9	0.76	81	128.5	0.0	128.5	0.27	2.7	125.9
15					20.5	28.6	0.76	81	176.4	0.0	176.4	0.27	4.0	172.4
30					27.2	38.1	0.76	81	234.9	0.0	234.9	0.27	8.0	226.9
60					34.6	48.4	0.76	81	298.2	0.0	298.2	0.27	16.1	282.1
120					41.8	58.5	0.76	81	360.4	0.0	360.4	0.27	32.2	328.2
240					49.8	69.7	0.76	81	429.7	0.0	429.7	0.27	64.4	365.3
360					54.9	76.8	0.76	81	473.4	0.0	473.4	0.27	96.6	376.9
480					58.7	82.1	0.76	81	506.0	0.0	506.0	0.27	128.7	377.2
600					61.7	86.4	0.76	81	532.6	0.0	532.6	0.27	160.9	371.7
720					64.4	90.1	0.76	81	555.5	0.0	555.5	0.27	193.1	362.4
840					66.8	93.5	0.76	81	575.8	0.0	575.8	0.27	225.3	350.5
1440					76.1	106.6	0.76	81	656.8	0.0	656.8	0.27	386.2	270.6
2160					85.1	119.2	0.76	81	734.3	0.0	734.3	0.27	579.3	155.0
2880					92.7	129.7	0.76	81	799.3	0.0	799.3	0.27	772.4	26.8

Figure 6 – 1 in 30-year + 40% CC attenuation volumes to 4.47 l/s

Minimum Storage Required: **325 m³** incl cc allowance

FACTOR	VALUE	SOURCE
Return Period (yrs):	100	Environment Agency, Water Authority, etc.
Limiting Discharge (l/s):	4.47	Environment Agency, Water Authority, etc.
Contributing Area (ha):	0.7625	Site plans
Impervious, PIMP (%):	100	Site plans
M5-60min (mm):	20	Volume 3 maps and site location
SAAR (mm/yr):	826	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:	94	SAAR and Volume 1, Figure 9.7
Calculated PR	80.81	
Percentage Runoff =	80.81	

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

Climate Change Allowance **0**

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	Area C (ha)	PR (%)	Runoff (m3)	Add. Runoff (m3)	Total Runoff (m3)	Limiting Discharge (m3/min)	Limiting Runoff (m3)	Storage Required (m3)
5	20	0.34	6.8	1.84	12.5	12.5	0.76	81	77.0	0.0	77.0	0.27	1.3	75.7
10	20	0.50	10.0	1.91	19.1	19.1	0.76	81	117.7	0.0	117.7	0.27	2.7	115.0
15					26.0	26.0	0.76	81	160.2	0.0	160.2	0.27	4.0	156.2
30					34.8	34.8	0.76	81	214.5	0.0	214.5	0.27	8.0	206.5
60					44.7	44.7	0.76	81	275.5	0.0	275.5	0.27	16.1	259.4
120					52.9	52.9	0.76	81	325.8	0.0	325.8	0.27	32.2	293.6
240					62.2	62.2	0.76	81	383.4	0.0	383.4	0.27	64.4	319.0
360					68.4	68.4	0.76	81	421.2	0.0	421.2	0.27	96.6	324.6
480					73.1	73.1	0.76	81	450.3	0.0	450.3	0.27	128.7	321.6
600					77.1	77.1	0.76	81	474.9	0.0	474.9	0.27	160.9	314.0
720					80.6	80.6	0.76	81	496.5	0.0	496.5	0.27	193.1	303.4
840					83.8	83.8	0.76	81	516.3	0.0	516.3	0.27	225.3	291.0
1440					96.9	96.9	0.76	81	597.2	0.0	597.2	0.27	386.2	210.9
2160					109.4	109.4	0.76	81	674.0	0.0	674.0	0.27	579.3	94.7
2880					119.4	119.4	0.76	81	735.9	0.0	735.9	0.27	772.4	-36.6

Figure 7 – 1 in 100-year attenuation volumes to 4.47 l/s

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SSL project code	SS3402
Client	Burgess Hill Town FC
Document Title	Drairage Strategy

Minimum Storage Required: **528 m³** incl cc allowance

FACTOR	VALUE	SOURCE
Return Period (yrs):	100	Environment Agency, Water Authority, etc.
Limiting Discharge (l/s):	4.47	Environment Agency, Water Authority, etc.
Contributing Area (ha):	0.7625	Site plans
Impervious, PIMP (%):	100	Site plans
M5-60min (mm):	20	Volume 3 maps and site location
SAAR (mm/yr):	826	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:	94	SAAR and Volume 1, Figure 9.7
Calculated PR	80.81	
Percentage Runoff =	80.81	

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	Area C (ha)	PR (%)	Runoff (m3)	Add. Runoff (m3)	Total Runoff (m3)	Limiting Discharge (m3/min)	Limiting Runoff (m3)	Storage Required (m3)
5	20	0.34	6.8	1.84	12.5	18.1	0.76	81	111.7	0.0	111.7	0.27	1.3	110.3
10	20	0.50	10.0	1.91	19.1	27.7	0.76	81	170.7	0.0	170.7	0.27	2.7	168.0
15					26.0	37.7	0.76	81	232.3	0.0	232.3	0.27	4.0	228.3
30					34.8	50.5	0.76	81	311.0	0.0	311.0	0.27	8.0	303.0
60					44.7	64.8	0.76	81	399.5	0.0	399.5	0.27	16.1	383.4
120					52.9	76.7	0.76	81	472.4	0.0	472.4	0.27	32.2	440.2
240					62.2	90.2	0.76	81	555.9	0.0	555.9	0.27	64.4	491.6
360					68.4	99.1	0.76	81	610.7	0.0	610.7	0.27	96.6	514.1
480					73.1	106.0	0.76	81	653.0	0.0	653.0	0.27	128.7	524.2
600					77.1	111.8	0.76	81	688.6	0.0	688.6	0.27	160.9	527.7
720					80.6	116.8	0.76	81	720.0	0.0	720.0	0.27	193.1	526.9
840					83.8	121.5	0.76	81	748.6	0.0	748.6	0.27	225.3	523.4
1440					96.9	140.5	0.76	81	865.9	0.0	865.9	0.27	386.2	479.7
2160					109.4	158.6	0.76	81	977.3	0.0	977.3	0.27	579.3	398.0
2880					119.4	173.2	0.76	81	1067.0	0.0	1067.0	0.27	772.4	294.6

Figure 8 – 1 in 100 year + 45% CC attenuation volumes to 4.47 l/s

A hydraulic model has not been developed to simulate the flows within and flooding from the piped drainage network. It is not possible to simulate the pitch drainage within the hydraulic modelling software to accurately simulate the flow within a perforated pipe network which uses the pitch sub-base as attenuation and storage, as is the case with this particular drainage network.

The design of the pitch sub-base and the associated drainage network is such that additional surface water flows that cannot be accommodated within the piped drainage network will enter the pitch sub-base via the perforated pipe network, and will be attenuated in the sub-base until such a time and the flows within the piped network have subsided to a level which will allow the surface water to re-enter the piped network and discharge downstream into the drainage ditch.

As such, in the case of surface water networks for pitches, which use the sub-base as a storage area, it is accepted that confirming that there is adequate storage within the pitch to accommodate any flooding, is an acceptable work-around for the shortfall.

Further information on the design and attenuation volumes within such events can be seen within:

SSL3402 07 – Proposed AGP Drainage Layout
SSL3402 08 – Proposed AGP Drainage Strategy

4.4. Foul Water Drainage Strategy

There will be no foul water produced as part of the site development.

4.5. Surface Drainage Maintenance

The drainage system will be designed to minimise maintenance requirements; however, a full maintenance scheme will be established for those elements not being offered for adoption.

Maintenance operations will be carried out by Burgess Hill Town FC in perpetuity post development and the 5. Drainage Management & Maintenance is displayed below within **section 5**.

4.6. Site Drainage Proposals Conclusions

- The proposed development includes the creation of a new external artificial grass pitch with perimeter ball-stop fencing, and clean accesses.
- The proposed development area will occupy land and replace an existing sports area.

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- Surface water is to be disposed of into a surface water feature;
- Adequate attenuation within pitch base and upper surface (comprising a permeable granular sub-base) to ensure that excess volumes, which would be experienced during a critical storm event, does not bypass the control system.
- This drainage strategy is designed to ensure no above ground flooding occurs up to and including the 1 in 30-year event + 40% allowance for climate change.
- The surface water drainage from this site, post development, is such that the surface water will be managed and disposed of within the site boundary, thus complying with the Planning Practice Guidance for 'Flood Risk and Climate Change' to the National Planning Policy Framework.
- Based on the above and providing the above strategies are adopted; the developed site will not contribute further to flood risk thus satisfying the principles of the National Planning Policy Framework.

4.7. Construction Surface Water Management

The existing surface is permeable, and the principal of the sports pitch uses the pitch sub-base as attenuation and storage.

Due to the nature of the construction works, little onsite material storage is required. During the processes when it is required it will be for relatively short periods of time.

Below is a brief description of the key construction works for an Artificial Grass Pitch and associated activities:

- Once the base is put into place the new drainage system shall be installed with the process taking approximately 3 days to complete. The materials largely involve the delivery of pea shingle material stockpiled within the development footprint with 80mm and 150mm Ø UPVC perforated corrugated plastic carrier drainage pipes to EN1401-1:1998 laid into geotextile lined, gravel-filled trenches. The UPVC perforated corrugated plastic carrier pipes shall be stored onsite within the designated fenced and enclosed storage areas prior to being securely laid and covered within the ground.
- The boundary of the development shall be lined with PCC kerb edging detail and the necessary fence posts, floodlighting foundations that involves concrete foundations. These materials will be stored within the designated storage area in bulk delivery with each being heavily weighted with minimal risk of movement.
- At this stage the fencing system shall be erected and in place around the development footprint and any/all materials within the development will be safely secured.
- The development area shall then be surfaced with tarmacadam. The process of tarmac surfacing requires material to be delivered and laid at set temperatures and therefore no materials will be storage onsite for this process and works and shall take approximately 5 days to complete.
- Upon completion of the base works the artificial surfacing shall be delivered in bulk to the pitch base within the secure fenced area. The material is rolled out and laid with the boundary of the surfacing being clamped and secured to the edging detail so that the material stays insitu and cannot be removed during any flood event or otherwise.

The development location itself acts as a sediment trap / barrier that retains surface water within the site boundary with any/all surface water run off going through the existing infrastructure of the hard-standing surfacing, stone foundation, geotextile membrane and entering into the existing and proposed drainage network that is lined with a geotextile membrane, pea shingle and drainage channels that each connect to a silt trap inspection chamber. This process will adequately trap and retain sediment throughout the construction process.

The existing and proposed levels and gradients of the site lead across the sports pitch. Whilst travelling across the development through the natural fall of levels the surface water will infiltrate through the stone foundation, geotextile membrane and entering into the existing and proposed drainage network that is lined with a geotextile membrane, shingle and drainage channels that each connect to a silt trap inspection chamber. This process will adequately trap and retain sediment throughout the construction process. Any run off that travels through the site prior to naturally infiltrating through the base would be retained within the development boundary. Surface water would sit within the development area until it naturally infiltrates through the existing hard-standing surfacing, stone foundation, geotextile membrane and entering into the existing and proposed drainage network that is lined with a geotextile membrane, shingle and drainage channels that each connect to a silt trap inspection chamber.

Throughout the development works the areas and development footprint will be cleared, cleaned and jet washed with the silt traps collecting all sediment and being emptied as / when required until all construction works are completed.

Run-off rates from the site will be managed so they are no greater than pre-development or in keeping with the best practice guidance to minimise risk of blockage.

Run-off control will include provision of appropriate levels / grading to direct any water from the construction site to remain on site.

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5. Drainage Management & Maintenance

GULLIES, PIPEWORK, INSPECTION CHAMBERS AND CONTROLS	
<u>Required Action</u>	<u>Frequency</u>
Regular Maintenance	
Remove cover and inspect chambers and pipework ensuring water is flowing freely and that the exit route for water is unobstructed.	Annually
Undertake inspection after leaf fall in autumn, remove leaves from gullies, chambers and pipes	Every autumn
Inspect silt traps and clear of silt	Every 6 months or as required
Inspect catchpits and clear of silt	Every 6 months or as required
Remedial work	
Remove debris, silt and leaves from inspection chambers and flow control chambers.	As required
Remove debris and silt from pipework through high pressure jet washing.	As required
Repair physical damage if necessary	As required
Monitoring	
CCTV survey to establish condition of pipe runs. Cleansing or repair of physical damage to be conducted if necessary	Every 5 years or as required

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PERMEABLE AND POROUS SURFACES	
<u>Required Action</u>	<u>Frequency</u>
Regular Maintenance	
Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Tasks	
Stabilise and mow contributing and adjacent areas	As required
Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required and in accordance with manufacturer's recommendations
Remedial Work	

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Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost material.	As required
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Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required
If efficiency of water percolating to the sub-base drops, jet washing and suction cleaning could substantially reinstate paving to 90% efficiency (as per recent experience).	As required
Monitoring	
Initial inspection	Monthly for three months after installation
Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48h after large storms in first six months
Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
Monitor inspection chambers	Annually

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