CONSULTING ENGINEERS

[CONSULTING CIVIL & STRUCTURAL ENGINEERS]

New Artificial Grass Pitch
Horsham YM Football Club
Horsham

Surface Water Design

R - 00421 – 001 – SWD – 0
October 2026

Report Originator(s)

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Revision Record

Revision	Date	Description	Written	Approved
0	29.10.26	First Issue	WRA	WRA

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1.0 Introduction

1.1 Design Brief

1.1.1 The client, McArdle SportTec, requires a surface water drainage design for the installation of a new Artificial grass pitch (AGP) at Horsham YM Football Club in Horsham.

1.1.2 This report provides design proposals to ensure surface water is managed adequately, along with a SUDS assessment and maintenance schedule and is to be used to discharge condition 5 of planning approval reference DC/22/2257.

1.1.3 This report has been prepared by SEA Consulting Engineers Ltd. With the benefit limited to our instructing Client.

1.2 Site Location

1.2.1 Horsham YMCA football ground is situated on the southern outskirts of Horsham, surrounded by open, undeveloped land to the south and residential properties on all other sides. A small tributary of the River Arun runs along the southern site boundary. The site is accessed from Gorings Mead to the northeast.

1.3 Current Land Use

1.3.1 The existing site comprises a natural turf pitch used by the football club.

1.4 Proposed Development

1.4.1 The proposed development will comprise the construction of a new artificial grass pitch. A site layout is presented in Appendix A.

2.0 Surface Water Drainage

2.1 Existing Surface Water Drainage

2.1.1 A full underground utility survey has been undertaken; it has been proven that there are existing surface water drains serving the site, which outfall to an existing ditch to the south-west corner of the development. A copy of this utility survey is presented in Appendix B.

2.2 Proposed Storm Drainage Discharge

2.2.1 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 manner.

2.2.2 The National standards for sustainable drainage systems (SuDS) (2025) clearly outline 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:

- Priority 1 – Collected for non-potable use;
- Priority 2 – Infiltrated to ground;
- Priority 3 – Discharged to an above-ground surface water body;
- Priority 4 – Discharged to a surface water sewer, highway drain, or other piped system;

Each of these is considered separately below.

Priority 1 – Collected for non-potable use

2.2.3 There is no significant or continuous on-site water demand, and therefore there is no scope for the reuse of surface water within the site, and so rainwater re-use is not proposed.

Priority 2 – Infiltrated to ground

2.2.4 A ground investigation has been carried out by Soiltechnics, and they have concluded that the use of soakaways is not viable due to the cohesive nature of the soils beneath the site. Extracts of the ground investigation are presented in Appendix C.

Priority 3 – Discharged to an above-ground surface water body

2.2.5 As per section 2.1.1, the site's existing surface water drainage outfalls to an existing ditch located to the south-west of the site.

Priority 4 – Discharged to a surface water sewer, highway drain, or other piped system

2.2.6 As an outfall to an above-ground surface water body is viable, this option has not been explored

2.3 Proposed Surface Water Drainage Strategy

2.3.1 Proposals are to drain the new AGP to the existing ditch outfall that the site currently drains too.

2.3.2 The design will use FEH22 rainfall parameters and will be for all drained areas of the site to accommodate storms up to the 1 in 100-year event and allow for an increase in storm intensities up to 45%. This is based on the Environment Agency updates of May 2022, which base peak rainfall climate change allowance on river management catchment areas. An extract from the EA website based on the site location is presented in Appendix D. The site's drained areas are presented in Appendix E and equate to a total area of 7940m^2.

2.3.3 Proposals are to restrict the pitches' surface water to as close to greenfield runoff rates as possible. The online greenfield runoff tool by HR Wallingford has been used to assess the greenfield runoff rates, based on the site's drained areas. The calculations are presented in Appendix F and show that the Qbar value is 3.2l/s. Therefore, flows will be restricted to 3.2l/s for all storm events.

2.3.4 Proposals will utilise check dams and orifice flow control chambers to ensure efficient use of the 300mm type 3 permeable subbase for attenuation, along with providing additional attenuation via geo-modular tanks located beneath the pitch.

2.3.5 The new artificial grass pitch (AGP) will consist of a 35mm synthetic surface, 12mm porous shockpad, 40mm porous macadam and 300mm permeable type 3 subbase, which will allow water to infiltrate through the pitch make-up to a series of new lateral drains which will collect surface water before outfalling via 3no. orifice plate flow control chambers and 1no. HydroBrake flow control device with attenuation provided within the pitch makeup and geo-modular tanks.

2.3.6 The system has been modelled using Causeway Flow for all storm durations up to 10,080mins. The calculations are presented in Appendix G

2.3.7 A drainage layout is presented in Appendix H.

2.4 SUDS

2.4.1 The use of SUDS and pollution control measures have been assessed using the Simple Index Approach set out within the CIRIA SUDS Manual 2015. Based on Table 26.2 of the SUDS Manual, the pollution indices for the site are set out in Table 2.1 below.

Pollution Hazard Indices for Different Land Use Classifications				
Land use	**Pollution Hazard Level**	**Total Suspended Solids (TSS)**	**Metals**	**Hydrocarbons**
Residential Roofs	Very Low	0.2	0.2	0.05

Table 2.1 – Extract of Table 26.2 of the SUD manual.

2.4.2 Residential roofs are considered to be the most appropriate category, due to the minimal pollution hazard associated with the proposed AGP, which will have no vehicle movements within its extent.

2.4.3 Surface water from the area will pass through the permeable subbase. Therefore, it acts very similar to permeable paving.

2.4.4 Table 26.3 of The SuDS Manual shows the mitigation indices for a range of SuDS components for discharges to surface waters. An extract of this is provided in Table 2.2 below for the components relevant to the proposed development.

Indicative mitigation indices			
Type of SUDS Component	**Mitigation Indices**		
	Total Suspended Solids (TSS)	**Metals**	**Hydrocarbons**
Permeable Paving	0.7	0.6	0.7

Table 2.2 – Extract from table 26.3 of the SUDS Manual

2.4.5 Based on the above, it can be seen that the permeable subbase will provide adequate treatment for the site's surface water.

2.5 Maintenance

2.5.1 All new surface water will remain private, and maintenance will be the responsibility of the landowner. The following maintenance plan shall be implemented.

Pitch and Permeable Subbase

Maintenance Schedule		
Maintenance Category	**Required Action**	**Frequency**
Regular Maintenance	Brushing (Standard cosmetic sweep over all areas)	Once a year, after the autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturers' recommendations. Particular attention to be paid to areas where water flows into pervious areas from adjacent impermeable areas, as this area is most likely to collect sediment
Occasional maintenance	Stabilise and mow adjacent contributing areas	As required
	Removal of weeds or management using an appropriate weed killer, applied directly into the weeds by an applicator rather than spraying	As required
Remedial Actions	Remediate any landscaping which, through vegetation maintenance strip, has been raised to within 50mm of the finished surface	As required
	Remedial work to any depressions, rutting and cracked surfacing considered detrimental to the performance or hazardous to users	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10-15 years, or as required (if infiltration performance is reduced due to significant clogging
Monitoring	Initial inspection	Monthly for 3 months after installation
	Inspect for areas of poor operation and/or weed growth – if required, take remedial action	3-monthly, 48 hours after large storms for the first 6 months
	Establish slit accumulation rates and establish appropriate brushing frequencies.	Annually
	Monitor Inspection chambers	Annually

3.0 **Pipe systems, Inspection chambers, manholes, Hydrobrake and Orifice FCCs**

Maintenance Schedule		
Maintenance Category	**Required Action**	**Frequency**
Regular Maintenance	Inspect and identify area that are not operating correctly, if required, take remedial action	Monthly (for the first 3 months) then six monthly
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
Remedial Actions	Remove Blockages	As required
	Cleaning/Jetting	As required
	Repair/rehabilitation of system	As required
Monitoring	Inspect/check all parts of the piped system and inspection chambers to ensure that they are in good condition and operating as required.	Annually and after large storm

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4.0 Conclusion

4.1.1 Based on the above, and providing the above strategies are adopted, the developed site will not contribute further to flood risk and therefore satisfying the requirements of the National Planning Policies Framework.

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Client	McArdle SportTec
Project	New Artificial Grass Pitch, Horsham YM FC
Title	Surface Water Design

Appendix A

Proposed Site Plan



1.2m high fencing with 200mm high infill retaining boards

4.5 high fencing with infill retaining boards where appropriate

1.5m ball stop netting behind goals

6m ball stop netting adjacent to 40 Goring mead

SG Single Gate

DG Double Gate

FL Floodlight column

GSA Goal Storage Area

Rev	Amendment	Date	By
-	Initial Issue		

Client
HORSHAM YMCA FOOTBALL CLUB

Project
3G FA FRAMEWORK STADIUM PROJECT

Drawing
PROPOSED GENERAL LAYOUT

McARDLE SPORT TEC

Drawn	Date	Scales		
NJM	09-06-21	1:250		
Checked	Plot No	Prelim	Check	Final
	01			

Job No	Drawing No	Rev
	MCA-MUK2566-01	K

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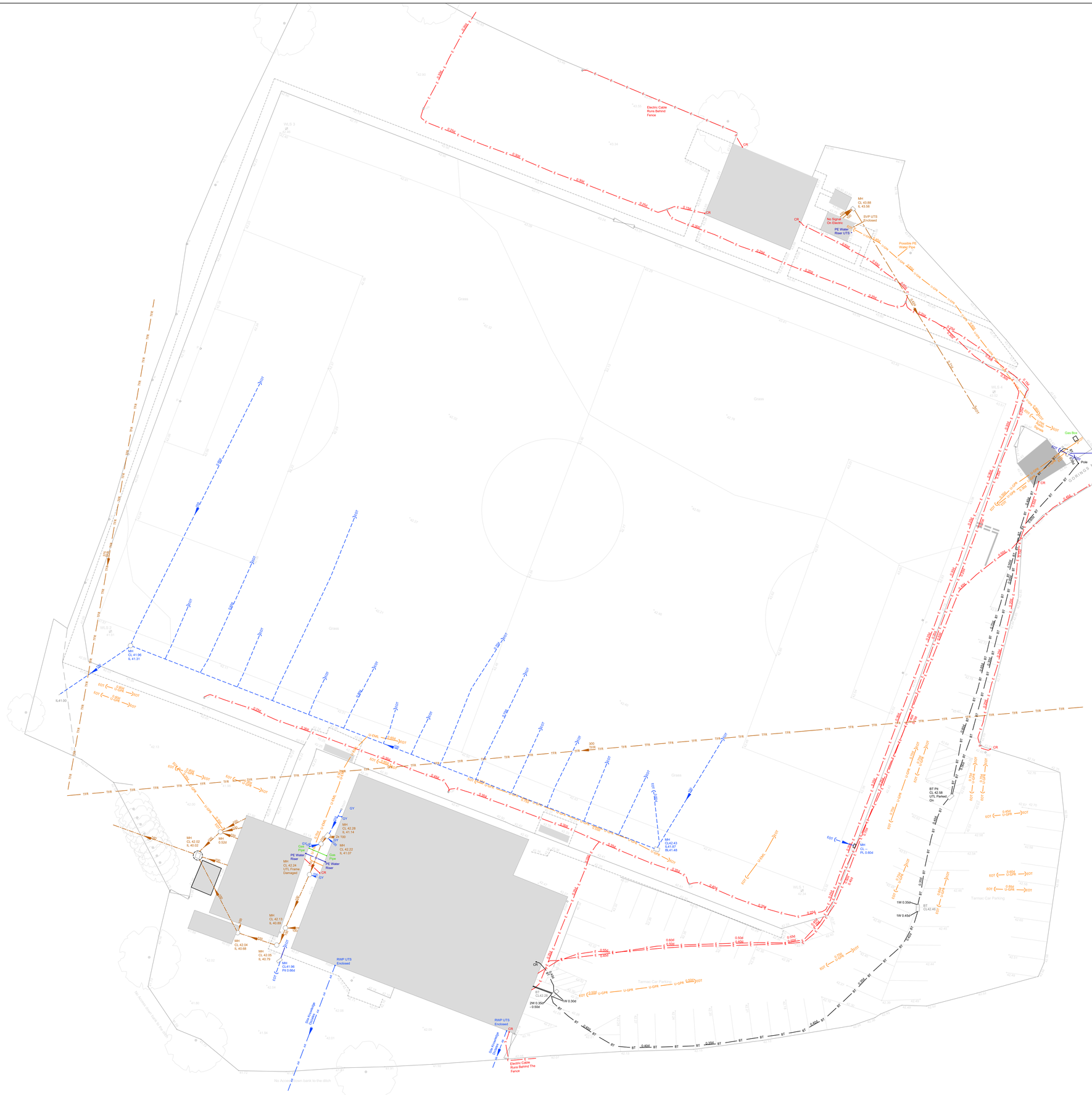
Appendix B

Underground Utility Survey



KEY FOR UNDERGROUND SERVICES

- Foul Water Drain
- Foul Water 300ø and above
- Surface Water Drain
- Surface Water Drain 300ø and above
- Combined Water Drain
- Combined Water Drain 300ø and above
- End of trace — EOT
- Electric cables
- HV cables
- Gas
- Water
- Telephone
- Catv
- CCTV
- Comms
- Fibre Optics
- Pipe
- Vents
- Fuel
- Offsets
- Vapour Recovery
- Gauge Lines
- Unidentified GPR
- Unidentified EML
- Token From Records
- Assumed Routes
- Empty Ducts
- Earth Rod
- Rising Main
- Overhead
- Heating Pipes
- Traffic Signals
- Multi User
- Trench Scar
- Service Duct

Where chamber extents are significantly greater than the cover size, their approximate extents are shown thus;

ABBREVIATION KEY

AR	assumed route
BD	base bend
BD	backdrop
CP	cable pit
CL	chamber level
CR	cable riser
DP	down pipe
EOT	end of trace
EP	electricity pole
FH	fire hydrant
G	gully
GV	gas valve
HOR	head of run
HL	high level
IC	inspection chamber
IL	invert level
MH	manhole
PR	pipe riser
RE	road entry
RWP	rainwater pipe
SV	stop valve
SVP	soil vent pipe
TE	trapped exit
TFR	taken from records
TP	telegraph pole
UTF	unable to find
UTL	unable to lift
UTS	unable to survey
UT	unable to trace
VP	vent pipe
WL	water level
WM	water meter
WO	wash out valve

UTILITY SURVEY NOTES

Electromagnetic and/or ground penetrating radar techniques have been used to locate and map underground utilities and features on this drawing. We have made every endeavour to make sure that the information contained within this drawing is accurate and of the highest quality. However, the results from these types of surveys are not infallible and should the location or depth of services/features be of particular importance to a project, then it is strongly advised that trial excavations should be undertaken to confirm survey results.

We have used all record drawings that were available to us by the client or by the statutory utility providers at the time of the survey. Any information taken from these drawings (ie pipe sizes, material) is not guaranteed. Services located from record drawings will be shown and annotated as taken from records (TFR). Historic record information is often incomplete/inaccurate and cannot be relied upon.

A single line indicating a utility may indicate the presence of multiple services within close proximity to each other. Where a single line type is shown we recommend hand digging within 0.5m, to expose hidden services.

Where quoted, depth information of underground services/features is stated. Depths are generally within +/- 10% accurate, but cannot be guaranteed. Any depths shown are usually to the top of the service/feature. Gravity sewers and drains are usually to invert (base of drainage channel) unless otherwise stated.

We use skilled staff and modern calibrated equipment to perform our surveys. However, the completeness of any underground survey cannot be 100% guaranteed and we cannot be held responsible for any inaccuracies beyond those that could be reasonably expected by a competent company.

Contractors utilising our drawings for intrusive work should take all reasonable measures to work safely in accordance with HSG47 guidelines "avoiding danger from underground services".

General notes

Background survey information taken from Brightsurv Ltd. survey drawing no. BRI403 T01 dated April 2021.

This plan should only be used for its original purpose. JPP accepts no responsibility if supplied to any other party than the original client.

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Client	McArdle Sport
Project	Horsham YMCA FC
Title	Utility Survey

Scale at A1	1:250	Drawn by	JG	Checked by	TB	Date	Oct 2026
Status		Project ref	32601Y	Drawing no.	01	Revision	

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Appendix C

Ground Investigation Extracts

7.4.4 Treatment of formation

7.4.4.1 It should be noted that the formation is likely to span both natural and Made Ground deposits, with Made Ground materials anticipated to exhibit a degree of variability and compaction. Topsoil should be removed from the pitch formation. Once formation levels have been established it is recommended that the formation be trimmed and rolled following current requirements of the Highways Agency Specification for Highways Works (clause 616) (refer www.dft.gov.uk/ha/standards/ mchw/vol1). Such a process will identify any soft areas, which we recommend be either excavated out and backfilled with a suitable well compacted material similar to those exposed in the sides of the resulting excavation, or large cobbles of a good quality stone rolled into the formation to stabilise the 'soft' area.

7.4.4.2 Alternatively, consideration should be given to compaction of Made Ground to achieve consistent levels of compaction across the pitch footprint and minimising the potential effects of differential settlement. Further, the use of a geosynthetic reinforcement would minimise the impact of variation across the pitch.

7.4.5 Subgrade frost susceptibility

7.4.5.1 The fact that the clay subgrade soils are likely to be deemed frost susceptible will probably be the overriding criteria for pavement foundation design purposes. It should also be noted that the thickness of the pavement foundation also relates to the amount and loading from construction traffic, which is discussed in detail in the Transport and Road Research Laboratory (TRRL) Report LR1132 'Structural design of Bituminous Roads'

7.4.6 Moisture susceptibility

7.4.6.1 The cohesive nature of the clay soils will render them moisture susceptible with small increases in moisture content giving rise to a rapid loss of support to construction plant. We therefore recommend, as soon as formation is trimmed and rolled, that sub-base is laid in order to avoid deterioration of the subgrade in wet or frosty conditions.

7.5 Drainage and Infiltration Potential

7.5.1 The Upper Tunbridge Wells Sand were encountered as a cohesive material, which typically exhibit low permeability. Indicative infiltration testing was undertaken in WLS02 between depths of 0.7m and 4m. During the test, the water level dropped by ~0.5m in the first 33minutes and then significantly slowed down. Test results are indicated in Appendix C. In summary, the ground conditions do not appear conducive to soakaways. Further, we understand the existing pitch is artificially drained (see 7.5.2 below), further indication that ground conditions are not conducive to soakaways.

7.5.2 It should be noted that testing has not been strictly carried out in accordance with BRE Digest 365 (2016) "*Soakaway Design*". However, on review of the results and ground conditions encountered, the testing is considered to be sufficient to inform the drainage strategy.

7.5.3 A drainage pipe was observed discharging into a ditch, ~3m away from the southwest corner of the pitch. The groundsman believes there are gravel beds below the existing pitch that run northeast to southwest at an angle of 7 degrees. Water collected by the gravel beds is then discharged to the ditch via a drainage pipe.

7.5.4 A series of manholes were observed running in an east-west orientation approximately parallel to the south of the proposed pitch area. One of these covers is believed to connect to the foul system, with the others assumed to be storm water drainage covers.

7.6 Aggressiveness of the ground to buried concrete

7.6.1 The aggressiveness of the ground with respect to buried concrete has been assessed in accordance with British Research Establishment Special Digest 1: Concrete in Aggressive Ground Third Edition (2005).

7.6.2 The site is interpreted to be a greenfield site where pyrite is unlikely to be present.

7.6.3 The Upper Tunbridge Wells Sand has the concrete classification of DS-1 and AC1s.

7.7 Recommendations for further works

7.7.1 In view of preliminary findings, the further works detailed below may be required to inform detailed design:

- Determination of the lateral and vertical extent of deep (>2m) Made Ground in the southeast, to inform floodlight foundation design.
- Should floodlights be proposed in areas of deep Made Ground, then an additional cable and tool percussive borehole with associated testing will be required to inform pile design.
- Further testing to determine concentration and potential extent of hydrocarbon impacted soils encountered in WLS01.
- Waste Acceptance Criteria testing for any Made Ground proposed for disposal off site.



N

Key

WLS	Windowless sampling borehole
TRL	Dynamic cone penetration
DP	Dynamic Probing
	Infiltration testing performed
	Site boundary
P	Photographic record

Notes

1. Base drawing provided by Client
2. Exploratory locations are approximate

REV	DESCRIPTION	PRODUCED BY	CHECKED BY	REVIEWED BY	DATE
A	First issue	KD			00.00.2021

soiltechnics
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PROJECT
Horsham YMCA Football Club

TITLE
Exploratory hole plan (current layout)

PROJECT NO.	SCALE AT A3	DRAWING NO.
STT5292	1:500	02

Horsham YMCA FC
STT5292

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INSTALL	STRATA: DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND	WATER STRIKES	DYNAMIC PROBING (0 10 20 30 40 50)	SPT TESTING: TYPE / DEPTH (m)	SPT TESTING: RESULT	SPT TESTING: CASING DEPTH (m)	SPT TESTING: WATER LEVEL (m)	OTHER IN SITU TESTING: TYPE / DEPTH (m)	OTHER IN SITU TESTING: RESULT	SAMPLING: FROM (m)	SAMPLING: TO (m)	SAMPLING: TYPE
	Grass onto loose brown slightly gravelly clayey SAND. Gravel is fine to coarse angular to subrounded flint. (TOPSOIL)	0.40											0.20		ES
	Soft to firm light brown CLAY. (MADE GROUND)	0.80									PP 0.50	PP=125	0.40		ES
	Medium dense dark brown slightly clayey gravelly SAND. Gravel is fine to coarse angular to subrounde d flint. (MADE GROUND)	0.90									PP 0.70	PP=92			
	Firm light grey slightly gravelly CLAY. Gravel is fine to coarse angular to subrounded flint and bla ck. (MADE GROUND)	1.50									PP 1.10	PP=108	1.20		ES
	...from 1.4m depth, becoming dark grey.	1.60											1.40		ES
	Medium dense dark brown slightly sandy GRAVEL of fine to coarse concrete. (MADE GROUND)										PP 1.80	PP=83			
	Firm light grey slightly gravelly CLAY. Gravel is fine to coarse angular to subrounded mudstone. (MADE GROUND)						C 2.00 - 2.45	(1) 5	1.00						
											PP 2.50	PP=67	2.50		D
											PP 2.70	PP=58			
	Black soft slightly gravelly CLAY. Gravel is fine to coarse mudstone and brick. (Driller reported hydrocarbon odour) (MADE GROUND)	2.80											2.80		ES
	Soft grey CLAY. (MADE GROUND)	3.55											3.60		ES
	BOREHOLE TERMINATED AT 4.00m	4.00					C 4.00 - 4.45	(5) 18	1.00						

Notes
Collapse of borehole from 3.5m after SPT at 4m depth.

Groundwater observations
No groundwater encountered.

Title
Driven tube sampler record

Date(s)
12/04/2021

Recovery details	
Range (m)	Recovery (%)
0.00 - 1.00	100
1.00 - 2.00	75
2.00 - 3.00	70
3.00 - 4.00	45

Method
Windowless sampling

Logged by
OW

Level (m OD)
-

Compiled by
KD

Co-ordinates
-

Checked by
ID

Sheet number
Sheet 1 of 1

Revision

WLS01

Horsham YMCA FC
STT5292

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INSTALL	STRATA DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND	WATER STRIKES	SPT TESTING TYPE / DEPTH (m)	SPT TESTING RESULT	SPT TESTING CASING DEPTH (m)	SPT TESTING WATER LEVEL (m)	OTHER IN SITU TESTING TYPE / DEPTH (m)	OTHER IN SITU TESTING RESULT	SAMPLING FROM (m)	SAMPLING TO (m)	SAMPLING TYPE
	Grass onto loose brown slightly clayey slightly gravelly SAND. Gravel is fine to coarse angular to subrounded flint. (TOPSOIL)											0.30		ES
	Medium dense dark brown slightly clayey slightly gravelly SAND. Gravel is fine to coarse angular to subrounded brick and flint. (MADE GROUND)	0.40										0.50		ES
	Firm light grey slightly sandy slightly gravelly CLAY. (MADE GROUND)	0.65								PP 0.80	PP=100	0.90		ES
	Firm brown slightly sandy slightly gravelly CLAY with roots. Gravel is fine to coarse angular to subrounded mudstone and coal. (MADE GROUND)	1.20								PP 1.30	PP=83			
										PP 1.70	PP=58			
	Firm orangish brown slightly gravelly CLAY. Gravel is fine to coarse angular to subrounded mudstone. (UPPER TUNBRIDGE WELLS SAND)	1.80										1.90		ES
										PP 2.20	PP=150			
	...from 2.5m depth, becoming stiff.											2.50		ES
										PP 2.80	PP=167			
												3.60		ES
										PP 3.70	PP=217			
	BOREHOLE TERMINATED AT 4.00m	4.00				C 4.00 - 4.38	(19) 69/225mm	1.00						

Notes
Borehole terminated due to SPT refusal at 4m depth.

Groundwater observations
No groundwater encountered.

Title
Dynamic windowless sampling record

Date(s)
12/04/2021

Recovery details	
Range (m)	Recovery (%)
0.00 - 1.00	90
1.00 - 2.00	85
2.00 - 3.00	90
3.00 - 4.00	100

Method
Windowless sampling

Logged by
OW

Sheet number
Sheet 1 of 1

Level (m OD)
-

Compiled by
KD

Revision

Co-ordinates
-

Checked by
ID

WLS02

Horsham YMCA FC
STT5292

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INSTALL	STRATA				WATER STRIKES	SPT TESTING				OTHER IN SITU TESTING		SAMPLING		
	DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	CASING DEPTH (m)	WATER LEVEL (m)	TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE
	Grass onto loose brown slightly clayey slightly gravelly SAND. Gravel is fine to coarse angular to subrounded flint. (TOPSOIL)											0.20		ES
	Stiff to very stiff orangish grey sandy CLAY. (UPPER TUNBRIDGE WELLS SAND)	0.50				C 1.00 - 1.23	(38) 38/75mm	1.00		PP 0.85	PP=125	0.80		ES
												1.30		ES
						C 2.00 - 2.38	(13) 61/225mm	1.00		PP 1.80	PP=217	1.90		ES
	BOREHOLE TERMINATED AT 2.00m	2.00												

Notes
Borehole terminated due to SPT refusal at 1 and 2m depth. Rig struggled to remove liner from ground.

Groundwater observations
No groundwater encountered.

Title
Dynamic windowless sampling record

Recovery details	
Range (m)	Recovery (%)
0.00 - 1.00	100
1.00 - 2.00	100

Method
Windowless sampling

Logged by
OW

Level (m OD)
-

Compiled by
KD

Co-ordinates
-

Checked by
ID

Date(s)
12/04/2021

Sheet number
Sheet 1 of 1

Revision

WLS03

Horsham YMCA FC
STT5292

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INSTALL	STRATA				WATER STRIKES	SPT TESTING				OTHER IN SITU TESTING		SAMPLING		
	DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	CASING DEPTH (m)	WATER LEVEL (m)	TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE
	Grass onto loose brown slightly clayey slightly gravelly SAND. Gravel is fine to medium subangular to subrounded flint. (TOPSOIL)											0.30		ES
	Stiff grey brown sandy CLAY. (UPPER TUNBRIDGE WELLS SAND)	0.50				C 1.00 - 1.45	(23) 53	1.00		PP 0.70 PP 1.25 PP 1.80	PP=75 PP=150 PP=225	0.80 1.40		ES ES
	BOREHOLE TERMINATED AT 3.00m	3.00												

Notes
Borehole terminated due to SPT refusal at 2 and 3m depth.

Groundwater observations
No groundwater encountered.

Title
Dynamic windowless sampling record

Recovery details

Range (m)	Recovery (%)
0.00 - 1.00	100
1.00 - 2.00	100
2.00 - 3.00	100

Method
Windowless sampling

Logged by
OW

Level (m OD)
-

Compiled by
KD

Co-ordinates
-

Checked by
ID

Date(s)
12/04/2021

Sheet number
Sheet 1 of 1

Revision

WLS04

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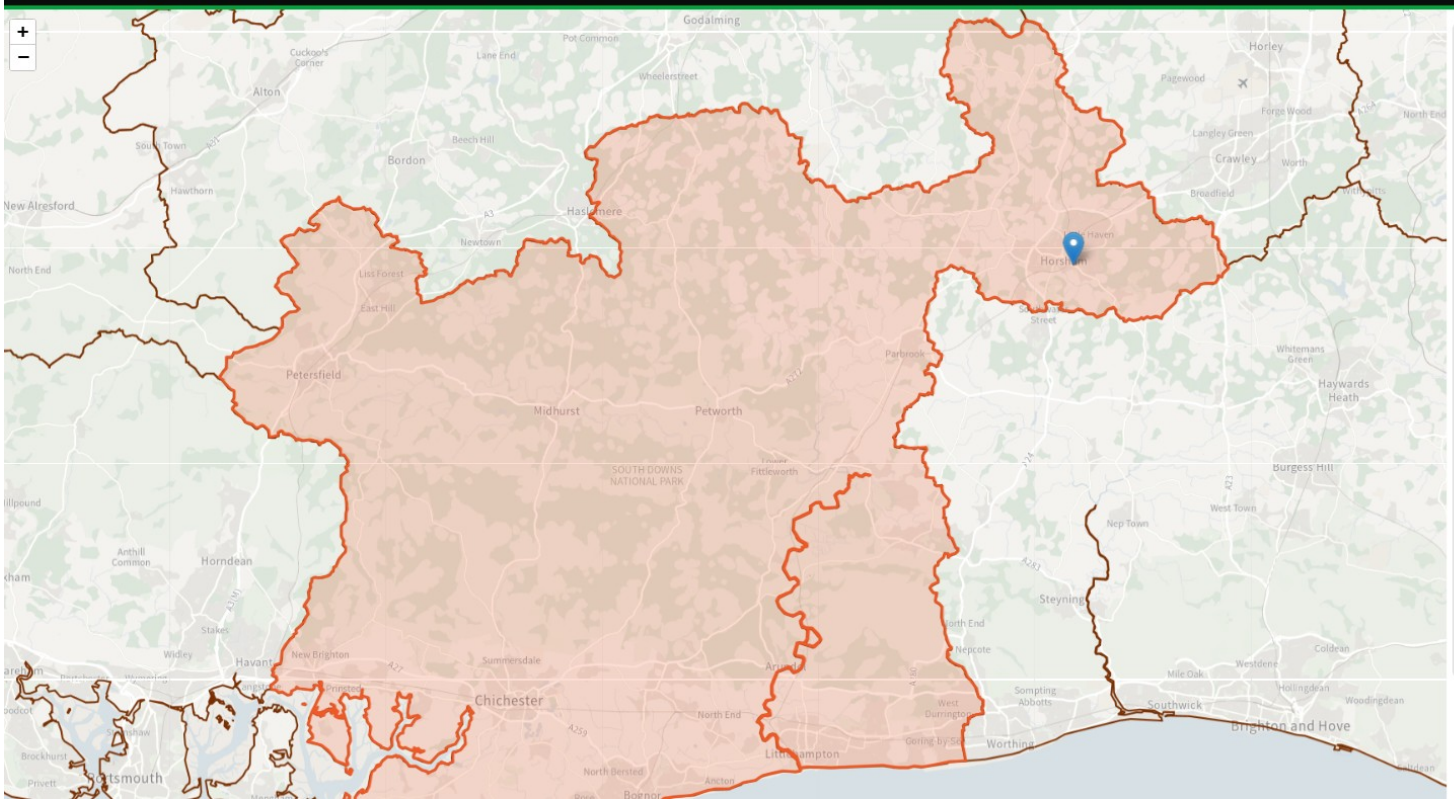
Client	McArdle SportTec
Project	New Artificial Grass Pitch, Horsham YM FC
Title	Surface Water Design

Appendix D

Environment Agency Climate Change Allowances



Arun and Western Streams Management Catchment peak rainfall allowances

3.3% annual exceedance rainfall event

Epoch

	Central allowance	Upper end allowance
2050s	20%	35%
2070s	25%	40%

1% annual exceedance rainfall event

Epoch

	Central allowance	Upper end allowance
2050s	20%	45%
2070s	25%	45%

*Use '2050s' for development with a lifetime up 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125.

This map contains information generated by Met Office Hadley Centre (2019): UKCP Local Projections on a 5km grid over the UK for 1980-2080. Centre for Environmental Data Analysis, 2022

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Appendix E

Proposed Drained Areas
SEA Drawing 00421/E01

GENERAL

Do not scale from this drawing.

All dimensions are in millimetres unless noted otherwise.

All setting out to architects drawings.

Drawing to be read in conjunction with all other SEA drawings and architects drawings.

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Significant unusual residual risks are identified below, beside the measures which have been adopted to eliminate and/or reduce them:

N/A

DRAWING KEY:

Proposed Drained Area = 7940m²

42.620
42.890
43.160
42.570
41.980
42.250
42.520
Grass
Tarmac Car Parking
WLS 1
WLS 2
WLS 3
WLS 4
WO
SU
40
59
No Access down bank to the ditch
River

Rev. Date By Description

SEA
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PROJECT
NEW AGP
HORSHAM YM FC

DRAWING
PROPOSED DRAINED AREAS

SCALE: 1:250@A1 DATE: 29.10.2026
DRAWN BY: WRA REV: -
STATUS: FOR APPROVAL

DWG No: 00421/E01 -

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Title	Surface Water Design

Appendix F

Greenfield Runoff Calculations

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

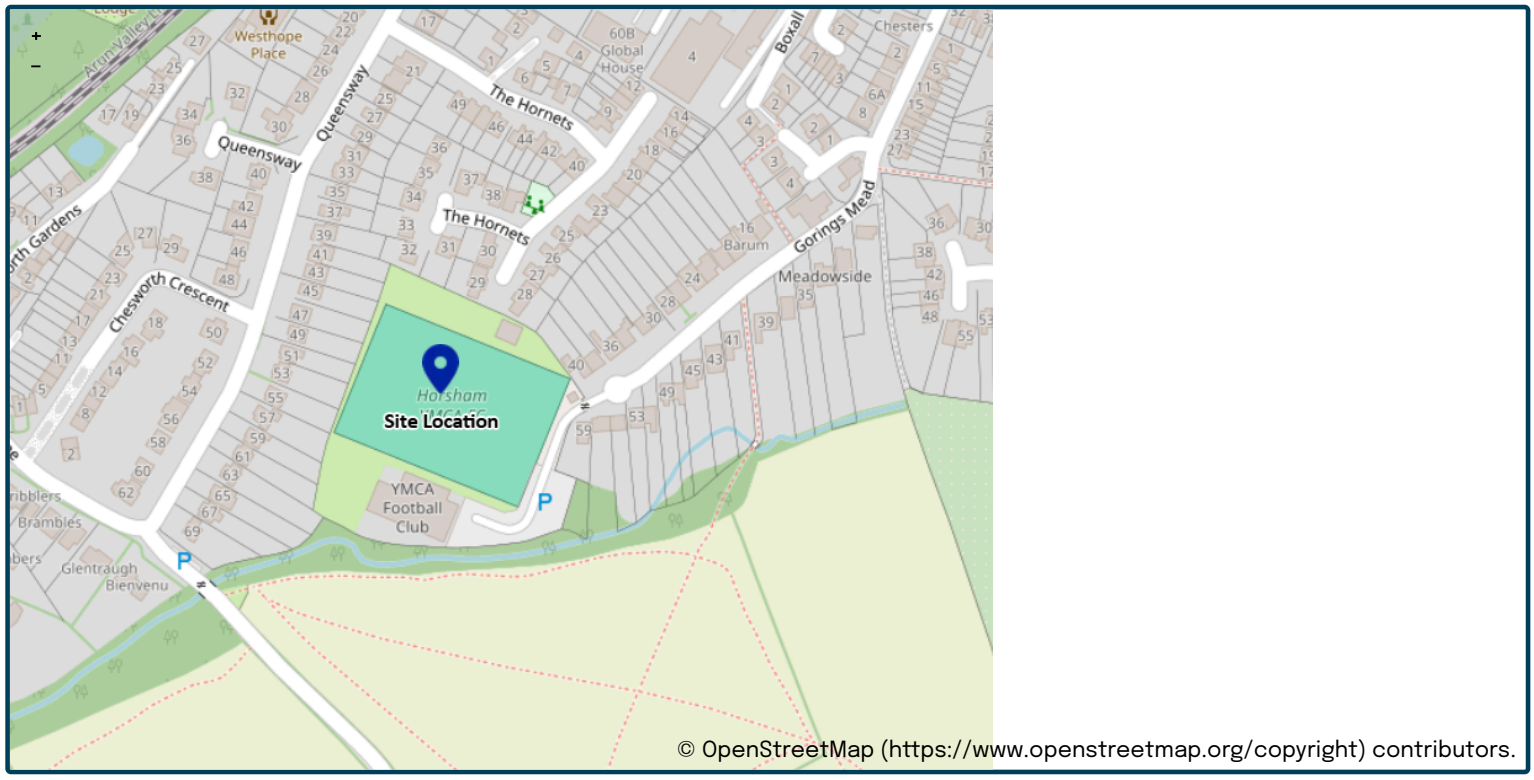
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	27/10/2026
Calculated by	Warren Allsopp
Reference	00421
Model version	2.2.3

Location

Site name	New AGP
Site location	Horsham YM FC



Site easting (British National Grid)	517554
Site northing (British National Grid)	130033

Site details

Total site area (ha)	0.794 ha

Greenfield runoff

Method

Method	FEH statistical (2025)

FEH statistical (2025)

	My value		Map value
SAAR9120 (mm)	816 mm		
BFIHOST19scaled	0.522		
QMed-QBar conversion	1.136		1.136
QMed (l/s)	2.8 l/s		
QBar (FEH statistical 2025) (l/s)	3.2 l/s		

Growth curve factors

	My value		Map value
Hydrological region	7		7
1 year growth factor	0.85		
2 year growth factor	0.88		
10 year growth factor	1.62		
30 year growth factor	2.3		
100 year growth factor	3.19		
200 year growth factor	3.74		

Results

Method	FEH statistical (2025)
Flow rate 1 year (l/s)	2.7 l/s
Flow rate 2 year (l/s)	2.8 l/s
Flow rate 10 years (l/s)	5.2 l/s
Flow rate 30 years (l/s)	7.4 l/s
Flow rate 100 years (l/s)	10.3 l/s
Flow rate 200 years (l/s)	12.1 l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.3) developed by HR Wallingford and available at uksuds.com (https://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 uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

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Client	McArdle SportTec
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Title	Surface Water Design

Appendix G

Surface Water Calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.000
CV	0.750	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	8.00	Include Intermediate Ground	x
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)	Invert Level (m)
1	0.198	8.00	42.315	450	0.775	41.540
2	0.200	8.00	42.200	450	0.835	41.365
3	0.200	8.00	42.085	450	0.895	41.190
4	0.196	8.00	42.030	1200	0.930	41.100
5			42.000	450	1.000	41.000

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	25.656	0.600	41.540	41.365	0.175	146.6	150	8.52	42.4
1.001	2	3	25.656	0.600	41.365	41.190	0.175	146.6	150	9.03	41.1
1.002	3	4	12.941	0.600	41.190	41.100	0.090	143.8	150	9.29	40.6
1.003	4	5	15.000	0.600	41.100	41.000	0.100	150.0	150	9.60	39.9

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	0.750	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	0.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	45	0	0

Node 1 Online Orifice Control

Flap Valve	x	Invert Level (m)	41.540	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.035		

Node 2 Online Orifice Control

Flap Valve	x	Invert Level (m)	41.365	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.050		

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Node 3 Online Orifice Control

Flap Valve	x	Invert Level (m)	41.190	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.095		

Node 4 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	41.100	Product Number	CTL-SHE-0087-3200-0880-3200
Design Depth (m)	0.880	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.2	Min Node Diameter (mm)	1200

Node 1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	41.928	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	2.0	Width (m)	55.610	Inf Depth (m)	
Porosity	0.30	Length (m)	30.860		

Node 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	41.813	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	2.0	Width (m)	55.610	Inf Depth (m)	
Porosity	0.30	Length (m)	30.860		

Node 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	41.698	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	2.0	Width (m)	55.610	Inf Depth (m)	
Porosity	0.30	Length (m)	30.860		

Node 4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	41.593	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	2.0	Width (m)	55.610	Inf Depth (m)	
Porosity	0.30	Length (m)	30.860		

Node 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	41.570
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	200.0	200.0	0.400	200.0	220.1	0.401	0.0	220.1

Node 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	41.395
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

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Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	260.0	260.0	0.400	260.0	282.9	0.401	0.0	282.9

Node 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	41.220
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	300.0	300.0	0.400	300.0	324.6	0.401	0.0	324.6

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.86%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	1	360	41.682	0.142	3.2	21.3311	0.0000	OK
480 minute winter	2	376	41.494	0.129	3.9	24.5117	0.0000	OK
480 minute winter	3	368	41.350	0.160	4.6	37.2084	0.0000	SURCHARGED
15 minute winter	4	13	41.591	0.491	14.1	0.5554	0.0000	SURCHARGED
60 minute summer	5	36	41.048	0.048	3.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	1	1.000	2	0.9	0.165	0.060	0.2307	
480 minute winter	2	1.001	3	1.6	0.267	0.110	0.2634	
480 minute winter	3	1.002	4	3.1	0.222	0.207	0.2272	
15 minute winter	4	1.003	5	3.2	0.649	0.221	0.0738	24.7

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	352	41.936	0.396	10.3	69.7183	0.0000	SURCHARGED
720 minute winter	2	720	41.790	0.425	7.1	97.6868	0.0000	SURCHARGED
480 minute winter	3	464	41.747	0.557	14.7	116.3734	0.0000	SURCHARGED
30 minute winter	4	29	41.756	0.656	51.4	22.8393	0.0000	FLOOD RISK
15 minute winter	5	48	41.048	0.048	3.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	1	1.000	2	1.2	0.173	0.080	0.4517	
720 minute winter	2	1.001	3	1.9	0.268	0.130	0.4517	
480 minute winter	3	1.002	4	-4.9	-0.281	-0.335	0.2278	
30 minute winter	4	1.003	5	3.2	0.650	0.221	0.0739	49.5

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	1	930	42.227	0.687	8.6	150.8833	0.0000	FLOOD RISK
1440 minute winter	2	1380	42.110	0.745	8.1	172.5514	0.0000	FLOOD RISK
1440 minute winter	3	1410	41.998	0.808	9.0	189.1936	0.0000	FLOOD RISK
1440 minute winter	4	1410	41.978	0.878	9.6	119.5821	0.0000	FLOOD RISK
60 minute winter	5	10	41.048	0.048	3.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	1	1.000	2	1.1	0.169	0.078	0.4517	
1440 minute winter	2	1.001	3	1.9	0.264	0.127	0.4517	
1440 minute winter	3	1.002	4	3.6	0.206	0.246	0.2278	
1440 minute winter	4	1.003	5	3.2	0.650	0.221	0.0739	282.8

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Project	New Artificial Grass Pitch, Horsham YM FC
Title	Surface Water Design

Appendix H

Proposed Drainage Layout
SEA Drawing 00421/E02

GENERAL

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All setting out to architects drawings.

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N/A

DRAWING KEY:

- Proposed 150mm perforated pipeworkj
- Proposed 150mm solid outfall pipe
- Proposed Check Dam
- Proposed extent of permeable type 3 subbase, 300mm deep
- Proposed Geo-Modular attenuation

42.620

42.890

43.160

42.570

42.250

42.520

41.980

Rodding Eye

WLS 3

WLS 2

WLS 4

WLS 1

Grass

Tarmac Car Parking

100mm Perforated land rn laster rmin 1:150

Geo-modular Tank
20m x 15m x 0.4m
IL = 41.520
Volume provided 114m³
with 95% voids

Geo-modular Tank
20m x 15m x 0.4m
IL = 41.990
Volume provided 98.8m³
with 95% voids

Geo-modular Tank
20m x 10m x 0.4m
IL = 41.570
Volume provided 74m³
with 95% voids

Existing ditchoutfall to be re-used
New 150mm pipe to be
provided to ensure adequate
drainage cover
IL = 41.000

150mm @ 1:150

S4
Proprietary Flow Control Chamber
HydroBrake Chamber or similar approved
CL = 42.030
IL = 41.100
Design Head 0.880m
Restricting flows to 3.2l/s
Hydrobrake Ref. SHE-0061-3200-0940-3200

S3
Orifice flow control chamber
Orfice size = 35mm
CL = 42.085
IL = 41.190

S2
Orifice flow control chamber
Orfice size = 50mm
CL = 42.200
IL = 41.365

S1
Orifice flow control chamber
Orfice size = 35mm
CL = 42.315
IL = 41.540

No Access down bank to the ditch

40

59

517500.00 | 517520.00 | 517540.00 | 517560.00 | 517580.00 | 517600.00 | 517620.00

130100.00 | 130080.00 | 130060.00 | 130040.00 | 130020.00 | 130000.00 | 129980.00

Rev.	Date	By	Description

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PROJECT
NEW AGP
HORSHAM YM FC

DRAWING
PROPOSED DRAINAGE LAYOUT

SCALE: 1:250@A1	DATE: 29.10.2026
DRAWN BY: WRA	REV: -
STATUS: FOR APPROVAL	

DWG No: 00421/E02 -