Hydrock

Havant RFC

Proposed New Artificial Grass Pitch

Rugby 365

Flood Risk Assessment and Drainage Strategy

Report for:

England Rugby

ENGLAND RUGBY

December 2017

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Issued by: Hydrock Consultants Limited
First Floor
5 Castlebridge
5-19 Cowbridge Road East
Cardiff
CF11 9AB

Tel: 02920 023665
www.hydrock.com

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Issue Number:	**1**	**Name**	**Signature**
Prepared		Richard Baker *Principal Infrastructure Engineer*	[redacted]
Checked		Ryan James *Senior Engineer*	
Approved		Richard Baker *Principal Infrastructure Engineer*	

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1.0 Introduction and Purpose of Report

1.1 Project overview

England Rugby (RFU) propose to provide a new artificial grass pitch (AGP) at the existing rugby ground at Havant RFC, to provide a high quality play surface that is suitable for year-round play.

Hydrock, as the appointed Civil Engineering Consultant, have assessed the potential flood risk at the site and have proposed a suitable surface water drainage strategy that suits the requirements of the proposed pitch works. This considers the topographical, ground condition and drainage constraints that apply to the site and demonstrates that the proposed development is compliant with flood risk and environmental policy and relevant drainage legislation.

1.2 Scope and purpose of report

The purpose of this report is to support a planning application for the proposed pitch development by presenting a viable, proven drainage solution for the proposed pitch development that is complaint with flood risk policy.

This report shall also be used by the specialist pitch designer during their detailed design work for the under-pitch drainage

1.3 Objective

The objective of this report is to demonstrate that the proposed pitch site is not at adverse risk of flooding and that the pitch can be effectively drained and not increase the potential flood risk on or off site.

2.0 Proposed Development and Drainage Requirements

2.1 Description

The proposed development is for the construction of a new "3G" artificial grass pitch (AGP) within the grounds of the existing rugby club with associated perimeter path and link paths for access.

2.2 Site Location

The location of proposed pitch development at the existing rugby club site is as follows:

Address:

37 Fraser Rd, Havant, PO9 3EJ

Description of Proposed Pitch Location:

The location of the proposed artificial grass pitch is in place of the existing grass pitch, to the North of the existing clubhouse

Description of Boundaries:

The existing grass pitch has a perimeter timber post and rail spectator fence. A dense line of mature conifer trees bound the existing pitch to the West, North and East boundaries beyond which are further playing fields. A surfaced access road behind the fence runs along the southern boundary along which is the existing clubhouse, fenced sports courts and some residential properties.

The site location plan is provided in Appendix A

2.3 Site History

The site has been historically used for recreational purposes and was undeveloped green field before this use.

2.4 Proposed areas

The proposed pitch, including the dead-ball area and runoff area is a total of 9500m^2, which includes the perimeter tarmac path and storage container area.

2.5 Associated proposed non-pitch works

Other areas that are part of the pitch development that lie outside the footprint of the pitch playing surface are a perimeter tarmac path and a small tarmac hardstanding for a storage container.

2.6 Pitch drainage requirements

The proposed artificial grass pitch requires effective sub-surface drainage in order for it to function as required. The design of drainage for artificial grass sports pitches is covered by its own specific guidance documentation and standards.

A typical under-pitch drainage system comprises lengths of sub-surface perforated land drainage pipes (80mm diameter) laid at 10m centres, all connected to a 150mm diameter collector drain before its discharge to the discharge pipework, which is described in Section 7.0.

Under the entire pitch area infiltration drainage into the underlying ground will occur where ground conditions allow, up to the percolation limit of that soil. Beyond this limit a piped drainage system is required, to discharge to a suitable watercourse or sewer

The detailed design of this under-pitch drainage lies outside the scope of this drainage strategy report, but it is considered within the wider discharge flow and potential water storage and flow control requirements covered in section 7.0

The specialist pitch designer will follow the drainage design requirements that are calculated and summarised within this report during their detailed design works.

3.0 Feasibility and Investigation Work

3.1 Initial feasibility report by specialist pitch supplier

A feasibility review has been completed by a specialist sports pitch designer and supplier on behalf of England Rugby, to review the existing site conditions, requirements, constraints and likely pitch design. Some information within that report has been used as useful background information to accompany this drainage strategy report. This feasibility review report is not included with this report, but aspects that are relevant to drainage and site conditions are extracted and used within the text of this report.

3.2 Topographic survey

A topographic survey of the existing site has been carried out to determine the existing site levels and to inform the required site level strategy for the new pitch which has strict level criteria to meet. The existing site levels are presented within Appendix B.

3.3 Ground condition and infiltration investigation

A ground investigation exercise has been carried out at the site to inform the preliminary and final design for the pitch levels, sub-grade improvement and pitch drainage. A summary of the relevant ground condition information is provided in section 5.4

This ground condition criteria is considered in the surface water drainage strategy and particularly in the pre and post development surface water runoff calculations within section 7.6 of this report.

3.4 Services survey

A review of existing below ground services has been carried out by others to identify any below ground constraints that could affect the placement of the pitch and to also identify the potential electrical connection point for the proposed lighting. The findings of the existing services survey is considered within the drainage strategy and placement of the associated drainage infrastructure within Section 7 of this report.

The rugby club has reported existing floodlighting power cables and a redundant iron pipe within the vicinity of the proposed pitch.

3.5 Existing drainage assessment

An assessment of the existing drainage regime at the existing site has been carried out to determine the existing means of drainage from the site to the receiving pitch/land drainage system. This has been based on record information and reports from the ground representatives and specialist pitch supplier

3.6 Existing site layout

The existing site layout and its relation to the existing adjacent developments and sports facility is included within Appendix C. The description was presented in Section 2.2.

3.7 Proposed pitch layout

The proposed pitch site layout is included within Appendix D which has been produced by the specialist pitch designer / supplier.

4.0 Site Flood Risk

4.1 Introduction

4.2 Flood risk vulnerability

With reference to Table 2 of the Planning Practice Guidance (PPG) to the National Planning Policy Framework (NPPF), the proposed development would be classed as Water Compatible development.

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

4.3 Flood zone definitions

Table 1 of the Planning Practice Guidance for 'Flood Risk and Coastal Change' to the National Planning Policy Framework defines Flood Zones.

Table 1 - Flood Zone Definitions

Flood Zone	Definition
Zone 1: Low Probability	**Land having a less than 1 in 1,000 annual probability of river or sea flooding.**
Zone 2: Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Zone 3a: High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Zone 3b: The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.

Source: Planning Practice Guidance – 2014

4.4 Flood risk assessment

4.4.1 Fluvial and tidal flood risk

An extract of the Environment Agency's Flood Map for Planning (Rivers and Sea) is provided in Appendix E, Figure E1.

The map indicates that the development site is located within Flood Zone 1, (Low Probability) and as such, the report considers the development to be at a low risk of flooding from rivers or the sea.

4.4.2 Surface water flood risk

An extract of the Environment Agency map 'Risk of Flooding from Surface Water' is provided in Appendix E, Figure E2. The map shows that the site is not affected by reported surface water flood risk, but some of the wider areas off-site are affected along low-spot flow paths which do not affect the site.

The risk level is considered to be acceptable for the proposed use of the site.

4.4.3 Flooding from groundwater

An extract of the Environment Agency map 'Risk of Flooding from Ground Water' is provided in Appendix E, Figure E3. Based ON the ground water flood maps no groundwater flooding is expected at this location. During the ground investigation works the ground water level was encountered at a depth of 2.0m below ground level, therefore the probability of flooding on the site from ground water is considered low.

4.4.4 Flooding from sewers

We are not aware of any sewers located within the site application boundary. As a result, sewer flooding within the vicinity of the proposed development that would directly impact the proposed pitch development is not expected, therefore the risk of flooding from sewers is considered low

4.4.5 Flooding from reservoirs

An extract of the Environment Agency map 'Risk of Flooding from Reservoirs' is provided below in Appendix E, Figure E4. According to the flood risk maps there are no reservoirs or artificial water sources that may result in direct flooding of this site.

It can therefore be concluded that the risk of flooding from reservoirs and other artificial sources is low.

4.4.6 Flood volume compensation

The proposed development site lies outside of flood risk zone (In Flood Zone 1), therefore there is no loss of flood storage volume.

Additionally, re-providing lost flood storage volume within the identified flood zone will not be not be required as the proposed pitch development located constructed at or below existing ground levels, thus ensuring there is no loss of flood storage.

4.4.7 Site access and egress

The access and egress route through to/from the proposed pitch development site lies outside the flood risk zone (Flood Zone 1), therefore it is not affected.

4.4.8 Flood risk vulnerability and flood zone compatibility

The proposed development site is located within Flood Zone 1 and also classified as a Water Compatible Development, and with reference to the table below (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". In this case a sequential test is not required, and an exception test will not be required.

Table 3 – Flood Risk Vulnerability and Flood Zone Compatibility

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatibility	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	x	Exception test required	✓
Zone 3b	Exception test required	✓	x	x	x
✓ = Development is appropriate			x = Development should not be permitted		

Source: Planning Practice Guidance – 2014

4.5 Flood Risk Summary and Conclusion

Considering the various forms of flood risk and its location with Flood Zone 1, the proposed development of the new artificial grass pitch, being a water compatible development is acceptable in terms of flood risk.

5.0 Existing Site Conditions and Drainage Regime

5.1 Description of existing site

A description of the existing site and the boundary conditions are included in Section 2.2

5.2 Existing drainage regime and infrastructure

Pitch drainage reportedly runs laterally across the pitch and discharges to a carrier drain along the Southern edge. This discharges to a (buried) chamber at the SE corner of the existing pitch before discharging to an existing land drainage system. The exact route of this off-site drain is not known.

The exact position, line, level and condition of the existing pitch drainage is not fully detailed at this stage of the project. The proposal to utilise some of the downstream parts of the existing pitch/land drainage for the new pitch drainage will need to be supported by some additional survey work to confirm exact connection points and levels. At construction stage there is a requirement to jet clean the existing pitch/land drainage lines downstream of the proposed connection point, through to the outfall to ensure that it is in effective working order.

5.3 Existing site levels

Existing pitch levels almost uniformly fall approximately 500mm from North to South boundaries (gradient 1:138). Lowest point is South East corner.

These falls and slopes are considered within the drainage requirements design in Section 7.0 as the slope must be considered in the design of the under-pitch water storage volume.

5.4 Ground conditions

A summary of the ground investigation works and identified conditions is below. These findings are considered within the drainage design process in Section 7.

- Ground investigation carried out by: Soiltechnics Ltd (original report not received – information taken from SIS Feasibility report and summary)
- Date: October 2017
- Type of investigation:
- Trial holes (assumed, quantity and location unknown)
- DCP / CBR testing (assumed, quantity and location unknown)
- Infiltration testing (assumed, quantity and location unknown)
- Topsoil summary: Topsoil (made ground) depth ranges between 50 and 400mm
- Subgrade summary: Made ground up to 1.4-metres in depth. Subsoil consisting of sandy gravelly clay (up to 1.4-metres). Made ground overlying London clay.
- Infiltration characteristics: Limited permeability noted during investigation. Groundwater encountered at 2-metres.
- Anticipated design CBR: 5%

5.5 Infiltration characteristics and potential

The ground investigation works carried out on the site indicate that the underlying ground conditions on the site are able to support some level of infiltration drainage to dispose of residual surface water collected by the proposed pitch drainage, up to a limit of the measured infiltration rate.

The result of drainage calculations are presented in section 7.4.1.

Where infiltration rates vary across the footprint of the proposed pitch an assessment has been made to derive a reasonable design infiltration rate to use within the drainage calculations. The variation is considered by applying reduction factors to the infiltration rate within the calculations that reduce the actual effective area under the pitch that is available for infiltration purposes at the measured rate.

For example, where half the pitch has a good infiltration rate and the other half a lower rate a reduction factor is applied to the infiltration rate to a more appropriate effective infiltration rate. This avoids over-counting the infiltration ability of the soil due to the variation across the footprint. This is achieved within the calculations with the Factor of Safety Value within Microdrainage Source Control.

Once the limit of the infiltration drainage under the pitch is reached, the pitch drainage needs to rely on a positive, but restricted piped drainage discharge to the receiving pitch / land drainage system that serves the existing pitch area.

Refer to the ground investigation summary in Section 5.4 for details of soil conditions and infiltration rates.

5.6 Existing runoff rate and volume

Based on the proposed site area of 9500m^2, the existing site runoff has been calculated using the ICP SUDS method, within the Microdrainage Source Control Module software.

The applicable site and rainfall criteria are shown in the calculation summary in Appendix F. In this case the Green Field QBAR (average annual runoff rate) from the proposed development site is 3.4l/s.

Therefore, the existing surface water runoff rate from the site is <u>3.4l/s</u>

This flow rate will be used as the maximum allowable discharge rate for the final pitch drainage system, which will be equal to the existing discharge rate from the existing site, with further protection against flooding being achieved by limiting the outflow to this rate for all storms up to the worst case duration 1 in 100 year storm plus 40% climate change factor, not just the average annual flow rate.

6.0 Drainage Constraints and Compliance

6.1 Effect of proposed levels on existing drainage and the proposed drainage strategy

The existing and proposed pitch levels have been considered within the drainage design and calculations to ensure that the available storage is not over-counted as some of the volume under the pitch is not able to be utilised due to the level being higher than the lowest point of the pitch.

6.2 Ground conditions

The pitch designer has provisionally allowed for some ground improvement which may reduce the degree of permeability within the underlying soil. This has been reflected within the proposed drainage calculations by an increase in the reduction factor that applies to the design infiltration rate. This is represented within the Microdrainage software as an increased “factor or safety”.

7.0 Proposed Pitch Drainage Strategy

7.1 General Objective

The objective is to provide the under-pitch land drainage system with an effective, robust and compliant means of discharge.

The primary means of discharge will be to the underlying ground via infiltration, up to the limit available in that soil and then a secondary restricted piped overflow discharge to the receiving land drainage system that is serving the existing pitch.

The proposed discharge rate from the new drained pitch is to be equal to that of the existing site, but with a significant increase in flood risk protection during medium to extreme rainfall events.

7.2 Proposed under-pitch drainage

This drainage system will rely on a combination of infiltration drainage into the underlying ground, up to the limit of the soil and a single collector drain under one edge of the pitch, into a final overflow manhole before a piped "off-site" restricted discharge to the outfall.

As stated in section 2.6, the proposed under-pitch drainage is to be design and detailed by the specialist pitch designer, but based on the conclusions of this drainage strategy report. This is generally the need to include within the pitch construction design a provision for a minimum thickness of permeable sub-base under the pitch to enable water to be stored as it wait to discharge to the underlying ground and/or the discharge pipework.

7.3 Drainage requirements for non-pitch areas

The additional non-pitch areas, such as the tarmac path around the pitch are considered within the drainage strategy and calculations. These areas are also drained via the same drainage system and outlet as the pitch. Impermeable paths to the side of the pitch will be drained into the permeable pitch itself or to a French drain to the side of the path, before it connects to the main drainage outlet.

7.4 Sustainable drainage options

7.4.1 Infiltration

Utilising infiltration drainage for collected surface water runoff from the pitch is the preferred and primary means of drainage for the proposed pitch.

The proposed pitch surface itself is permeable, so the underlying ground will drain the majority of surface water falling on it. The presence of pitch drainage will prevent surface water ponding during extreme rainfall.

Section 5.5 reviewed the possibility of utilising the underlying ground for infiltration and the conclusion for this site was that the ground is suitable for infiltration drainage up to the limit of the soil infiltration characteristics. The thickness of permeable sub-base under the pitch to store water before it infiltrates into the ground is given in the drainage requirements summary in Section 8.0

7.4.2 Positive drainage outfall to drainage system

The infiltration potential of the ground under the pitch is maximised to reduce the off-site discharge volume and to reduce the volume of storage required under the pitch.

Infiltration alone is not able to perform the full role of disposing of all the surface water runoff generated by the proposed pitch during the 1 in 100 year + 40% storm event.

In addition to the infiltration drainage provision, the under-pitch drainage requires a positive piped discharge through to a receiving land drainage system. The discharge rate from the pitch drainage will be limited to a maximum rate which is equal to the existing green field runoff rate to prevent increasing flood risk on and off-site.

There will be no discharge to a foul, combined or public highway sewer

7.5 Proposed positive discharge drainage

7.5.1 Pitch drainage collection

Any excess water that is unable to infiltrate into the underlying ground is stored within the permeable sub-base layer and then discharged into the collector drain under the low edge of the proposed pitch. This pipe will then discharge to a single manhole before entering the off-site discharge route at a restricted rate.

7.5.2 Off-Site Discharge route

In this case “off-site” means any area outside the footprint of the proposed pitch.

The positively drained gravity drainage pipe will extend from the end of the pitch drainage through to the existing pitch / land drainage system / discharge point.

At the end of the proposed off-site drainage route a form of outfall will be required. In this case a new catchpit manhole, flow control device (e.g. hydrobrake) and connection to the existing land drainage pipe is required.

The drainage strategy proposals are shown on the plan within Appendix H.

7.6 Flow Reduction

7.6.1 Objective

The objective is to limit the final surface water discharge rate from the proposed pitch drainage to a rate equal to the existing green field discharge rate, in order to prevent increasing the on and off-site flood risk.

7.6.2 Flow rate attenuation

7.6.2.1 Existing surface water runoff rate

As calculated in section 5.6, the existing surface water runoff rate from the site through to the receiving existing pitch/land drainage system is calculated to be 3.4l/s. This rate has been set as the maximum discharge limit from the proposed drainage system for the new pitch.

7.6.2.2 Means of flow control and storage

In order to limit the surface water discharge rate from the proposed pitch drainage to the receiving land drainage system a vortex flow control device (such as a hydrobrake) will be set downstream of the pitch drainage, which will limit the forward flow to the maximum discharge rate set, which is 3.4l/s. A below-ground water storage volume will be required to hold back ("attenuate") the excess flow so that the maximum limit set can be complied with.

For typical pitch developments this is most cost effectively done in the form of a permeable sub-base stone as one of the founding layers for the pitch construction. The relatively large size of the pitch in comparison to its permeability means that a substantial storage volume can be achieved. This is also the same storage that is used to support the infiltration drainage into the underlying ground.

7.6.2.3 Calculations

Based on the proposed site area, the proposed site runoff has been calculated using the Microdrainage Source Control Module software. The storage structure has been modelled as a porous car park as the pitch is similar in form, with a permeable surface and a layer of permeable stone below the surfacing layers which can be used for storage.

The applicable site and rainfall criteria are shown in the calculation summary in Appendix G, with the maximum discharge rate being set at the rate confirmed in section 7.6.2.1.

Whilst the proposed surface of the pitch is permeable, there is still an element of impermeability to it (green field runoff). To ensure that a representative run-off rate is considered in hydraulic modelling terms the drained area is input into the "time area diagram" part of the calculations, which equals the total drained area considered within the design.

From that point the hydraulic calculations allow for a reasonable infiltration rate and appropriate reduction factor (termed factor of safety within the calculation output), which will discharge some water to the ground, up to the limit of the underlying soils. The permeable sub-base volume below the pitch provides storage to support this function (with 30% voids).

This has the benefit of reducing the final drainage outflow rate from the pitch and to reduce the overall storage requirement.

The effect of the pitch slope has been considered as this limits the amount of the permeable sub-base that is "effective", i.e. as the pitch slope rises there will be a point where the stored water cannot rise above a certain level and as such does not use the permeable sub-base in that area.

Once the infiltration drainage provision is fully utilised there is a need for a positive piped discharge to the identified outfall. A flow control is set at the maximum allowable discharge rate with a design head that matches that of the depth of the permeable sub-base stone under the pitch, which acts as the storage reservoir for the flow control.

The calculations show that for a proposed pitch development area of 9500m^2 a storage volume of 376m^3 is required in order to limit the outflow to the required maximum discharge rate of 3.4l/s. This storage volume can be provided within the construction of the pitch by providing a minimum thickness of Type 3 sub-base (Type 1X) of 300mm, in the effective area confirmed in Section 7.7

The depth of storage utilised (indicated by the maximum water level value) accounts for the slope of the pitch, which provides an additional depth of storage to be counted within the calculations before water reaches the lowest finished ground level of the pitch.

An allowance has been made within the calculations to include the volume of storage that is available within the pitch drainage pipe work, the trenches in which the drainage is laid and some notional storage within the active part of the upper pitch construction layers, such as the shockpad and carpet. Whilst not offering a great deal of storage the inclusion is considered reasonable.

7.6.2.4 Summary of final discharge

The maximum discharge from the pitch drainage system will be 3.4l/s during all storm events up to the worst case 1 in 100 year storm event plus 40% climate change factor, which is equal to the existing runoff rate from the existing site.

7.7 Summary of Drainage Requirements for Pitch Design

This drainage requirements summary informs the pitch designer of the required drainage measures for the pitch. This is based on an assessment of existing drainage, ground conditions, soil infiltration rates and restricted discharges to watercourse or drainage and supporting calculations

- This drainage requirements summary states the minimum depth of Type 3 sub-base that is required under the pitch for drainage purposes.
- This depth of stone is required for water storage for infiltration drainage purposes and also storage for the restricted pipe discharge storage.
- Due to the slope of the pitch, only a portion of this Type 3 sub-base is available to use as a useful "active" storage volume, the remainder would not be used for storage due to levels.
- Therefore the depth of the Type 3 sub-base stated in the summary only applies to a length from the low edge of the pitch towards the high end of the pitch.
- Any areas of Type 3 sub-base outside of this active storage zone and the Type-3 sub-base can be reduced back to the minimum depth required by the pitch designer.

PITCH DRAINAGE DESIGN SUMMARY

- Existing suite surface water runoff rate = 3.4l/s
- Primary means of discharge = Infiltration
- Secondary means of discharge = Piped (150mm dia.) restricted discharge to existing land drainage, with hydrobrake flow control limited to 3.4l/s
- Drained area = 9500m^2
- Infiltration area = 8660m^2
- Storage volume required within the Type 3 sub-base= 376m^3
- Storage depth required of Type 3 sub-base = 300mm
- Storage gradient = 1:147 across width (maximum gradient)
- Length to the end of active (effective) Type 3 storage from the lowest edge of the pitch = 65.3m. The remainder can be the minimum required by the pitch designer

The drainage strategy proposals are shown on the plan within Appendix H.

7.8 Overland exceedance flows

There is a potential risk of overland flood lows being generated by the pitch drainage during storms above the Q100+40% event. During these events the storage within the pitch construction will be fully utilised, the flow control will be in operation and still maintaining the maximum allowable discharge rate, but water is likely to emerge out at the low point of the pitch and overland flows shall be directed to follow a route through to the discharge point along a route that does not put local properties or key access routes at risk.

7.9 Water Quality

Runoff water from the pitch drainage is not expected to contain any contaminants that would put the receiving local watercourses at risk. However, to maximise water quality improvements measures to reduce silt, sand and grit entering the discharge pipework through the use of catch pits on the outlet drainage routes should be included within the detailed design of the drainage system.

7.10 Foul Drainage

No foul water drainage proposals are included within this proposed development.

7.11 Maintenance responsibility

The pitch and its associated drainage will be subject to routine maintenance as part of normal operations at the rugby ground by the appointed maintenance team and sub-contractors.

None of the proposed drainage can be offered for adoption by the water company is it is essentially land drainage, which is not adoptable.

8.0 Detailed Design Actions for Final Approval and Construction

8.1 Scope and responsibilities

Detailed design of the proposed pitch will be completed by the specialist pitch designer for construction purposes. The depth of the porous stone within the make-up of the pitch required for drainage and storage purposes shall be as set out in Section 7.7.

8.2 Under-pitch drainage design

The construction stage detailed design of the pitch drainage will be completed by the specialist pitch designer.

8.3 Discharge drainage from pitch to outfall

The strategic requirements for the drainage discharge ("off-site discharge") are set out within this report, up to a level that is appropriate to this planning stage. The detailed design for the construction of the surface water drainage from the pitch through to the discharge point will be completed by a suitability qualified civil engineering consultant in coordination with the pitch designer. It is likely that some additional survey work to confirm exact positions, depths and condition of receiving pitch drainage will need to be carried out in advance of the issue of the construction drawings in order to fully validate the design.

9.0 Approvals and Consents

9.1 Discharge consent to receiving land drainage, watercourse or sewer

As the proposed discharge is a direct, but improved, version of an existing land drainage discharge, further consent to make a new connection into another drainage system or watercourse is not required.

9.2 Planning Consent

This drainage strategy report is intended to support a planning application for the proposed pitch and also to satisfy the LLFA that the development is acceptable in terms of flood risk policy up to a point where a planning condition relating to drainage is not included within the planning consent based on the information provided within this report. Any comments and questions raised during the planning process, or after consent is given relating to any aspect of this report will be dealt with by Hydrock.

10.0 Conclusion

England Rugby propose to construct an artificial grass pitch at Havant RFC in place of an existing grassed rugby pitch.

The surface water runoff discharge rate from the existing pitch site has been calculated as 3.4l/s.

The proposed pitch drainage and the final discharge to the existing land drainage system shall be restricted to 3.4l/s, by maximising infiltration drainage under the pitch and by providing a means of restricted discharge flow rate equal to that of the existing greenfield runoff rate. The necessary flow control and attenuation storage measures are proposed.

Therefore, the surface water discharge rate from the proposed pitch is to equal to the existing runoff rate from the existing site, which does not increase flood risk to areas on and off site.

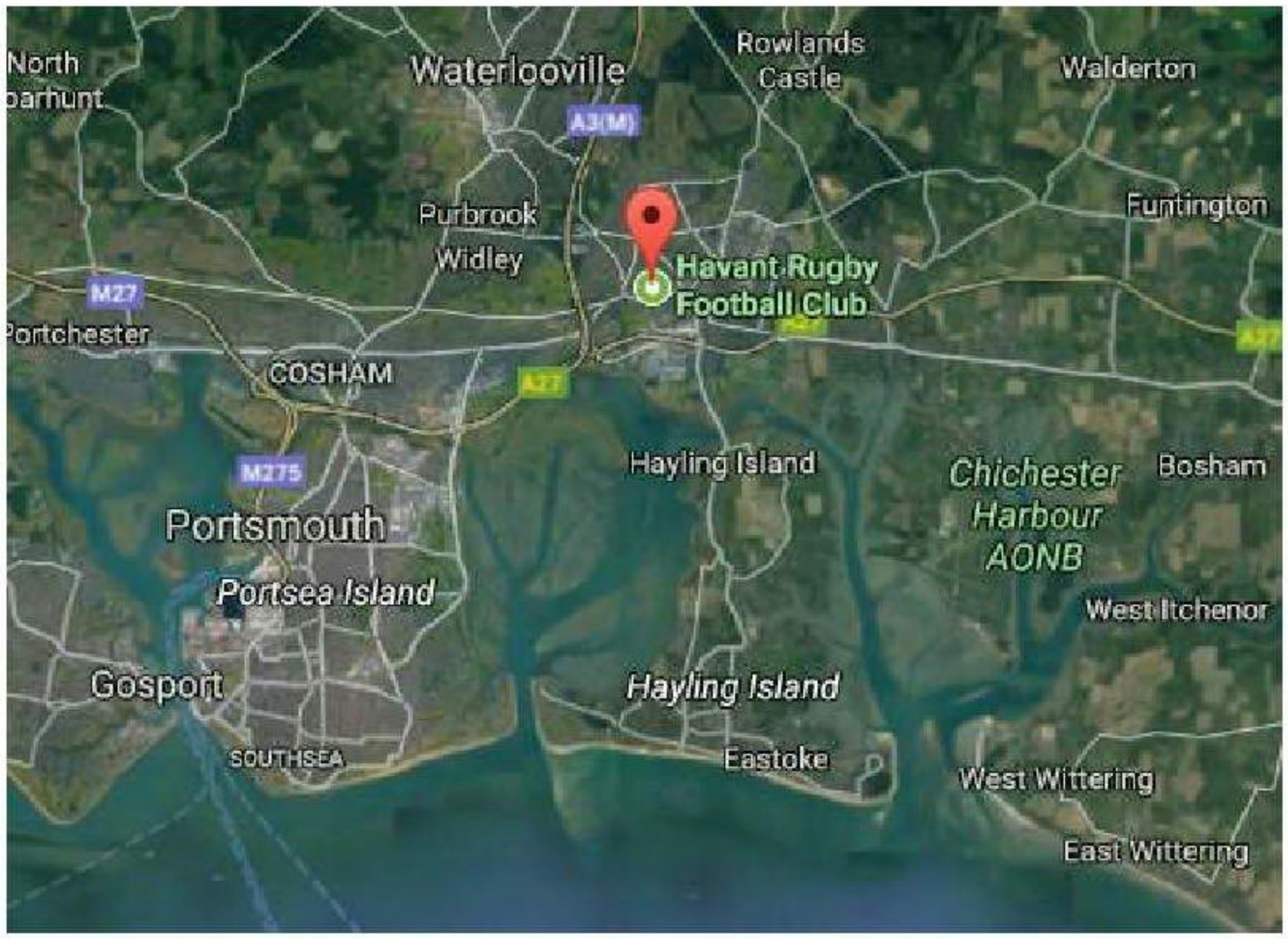
The maximum surface water discharge from the proposed pitch is equal to the average annual greenfield runoff, but during all storms up to the worst case duration 1 in 100 year storm event plus 40% climate change factor, therefore the level of flood risk protection is far greater than at present.

The site is not at risk of flooding from other sources.

Appendix A – Site Location Plan

Havant RFC
37 Fraser Rd
Havant
PO9 3EJ

OS X (Eastings) 470779
OS Y (Northings) 106912
Nat Grid SU7077906912



Appendix B – Existing Site Levels

Date of Survey: 11/09/2017

Havant RFC
Topography - 10cm Contours

N

1:500 @A3

470800 470900

106900

Legend

- 14.35 - 14.40
- 14.41 - 14.50
- 14.51 - 14.60
- 14.61 - 14.70
- 14.71 - 14.80
- 14.81 - 14.90
- 14.91 - 15.00
- 15.01 - 15.10
- 15.11 - 15.20
- 15.21 - 15.30
- 15.31 - 15.33
- 10cm Contours
- ICH
- Benchmark
- Spot Levels
- Access
- Drain Cover
- Outfall
- Floodlights
- Tree Line
- Canopy
- Tree Trunk
- Stand
- Post Line
- Path
- MUGA
- Gate
- Fence
- Rugby Pitch
- Concrete Pad

Appendix C – Existing Site Layout

NOTES: –

SIS Pitches

RFU 365 PROJECT

JOB TITLE

HAVANT RFC

CLIENT

PROPOSED LOCATION PLAN

DRAWING TITLE

1:500 SCALE	NJM DRAWN
18-09-17 DATE	APPROVED

SIS (UK) Ltd
Tavistock Works
Glasson Industrial Estate
Maryport
Cumbria
CA15 8NT
Tel : 01900 817837
philb@sisp itches.com

REV	AMENDMENT	DRAWN	CHECKED

PROJECT No.	DRG No.	REV
MUK1853	01	D

Appendix D – Proposed Site Layout