

University of Southampton

Wide Lane Sports Centre

Flood Risk Assessment

Reference: 293368-ARUP- ZZ-XX-RP-C-001

P02 | 28 March 2023



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This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 293368

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1. Introduction

Ove Arup and Partners Ltd (Arup) have been commissioned by the University of Southampton (UoS) to design upgrades for the Wide Lane sports pitches and fencing. The work comprises creation of two new external artificial grass pitches constructed over existing grass playing fields with associated fencing, security fencing and gates.

1.1 Aims

The Wide Lane site covers an area of approximately 3.4ha and is located in Flood Zone 1. According to NPPF, a site-specific flood risk assessment is required for all development greater than 1ha.

In support of the above, this Flood Risk Assessment Report (FRA) is prepared to assess and summarise the risk of flooding to and from the development in line with the requirements of the National Planning Policy Framework (NPPF) and supporting National Planning Policy Guidance (NPPG). In accordance with the guidance for an FRA in flood zone 1, it should demonstrate:

- whether the proposed development is likely to be affected by current or future flooding from any source with the consideration of climate change;
- whether the proposed development will increase flood risk elsewhere; and
- whether the measures proposed to deal with these effects and risks are appropriate.

2. Sources of Information

The key reports/documents reviewed as part of this study are listed in **Table 1:** - Key Reports and Documents below:

Title	Author	Date
Eastleigh Surface Water Management Plan	Hampshire County Council	Dec 2012
Eastleigh Hydrological Sensitivity Study	Eastleigh Borough Council	May 2018
Hampshire County Council Preliminary Flood Risk Assessment	Hampshire County Council	Apr 2011
Topographical Survey – Southampton Uni Sports Ground	CADMap	Feb 2023
Factual report on ground investigation at Wide Lane, report No. 40688	Structural Soils	Jun 2004
Geological Survey Map of Great Britain	NA	Feb 2023
Flood Mapping Data for Fluvial and Pluvial Sources	Environment Agency	Feb 2023
Geotechnical and Geo-environmental desk study	Arup	March 2023

Table 1: - Key Reports and Documents

3. Site Description

3.1 Site Location

The Wide Lane Sports Facility is located in the northern outskirts of the city of Southampton. It is located to the east of Southampton Airport and Southampton Airport Parkway railway station, and to the west of Monks Brook. The site is accessed from the east via the A335, Wide Lane. The pavilion building and all-weather sports pitches are bounded by grass playing fields to the north and west. The Wide Lane Sport Facility site ownership boundary is shown in **Figure 1** below in red line.

The site boundary for planning is shown by the blue line in **Figure 1** below. Drawing Nos. 293368-ARUP-ZZ-XX-DR-L-0200 and 0201 in **Appendix A** provide the entire Wide Lane and site location overview plan.



Figure 1 - Works Site Boundary of Wide Lane Upgrading Works – Google Maps accessed 26.02.2023

3.2 Topography

Topographical survey of the site has been provided by the client. To the west of the Wide Lane Sport Facility is Monks Brook which runs parallel to Stoneham Lane. In between Monks Brook and the Wide Lane Sport Facility is a small ditch feature which has been partially identified on the topographical survey. The survey shows the entire Wide Lane site sloping from the northeast side at 12.3mAOD to the southwest side at 10.0mAOD towards Monks Brook.

3.3 Geology

The geotechnical and geo-environmental desk study carried out for the site describes the expected ground conditions to comprise topsoil overlying sandy clayey gravel of the River Terrace Deposits.

3.4 Existing Rivers

The Monks Brook is located approximately 30m - 100m to the west of the site. It is a tributary of the River Itchen. The brook continues to flow south, parallel to Stoneham Lane, and then passes under the A335 close to Southampton Airport and under the M27 motorway just to the east of Junction 5.

3.5 Existing Drains and Sewers

The record plan from Southern Water has been received. No sewers are found in proximity of the site. Two surface water sewers run along Doncaster Drive to the north of the Wide Lane site discharging flow to Monks Brook. The existing drainage and sewerage networks are shown in **Figure 2** below.

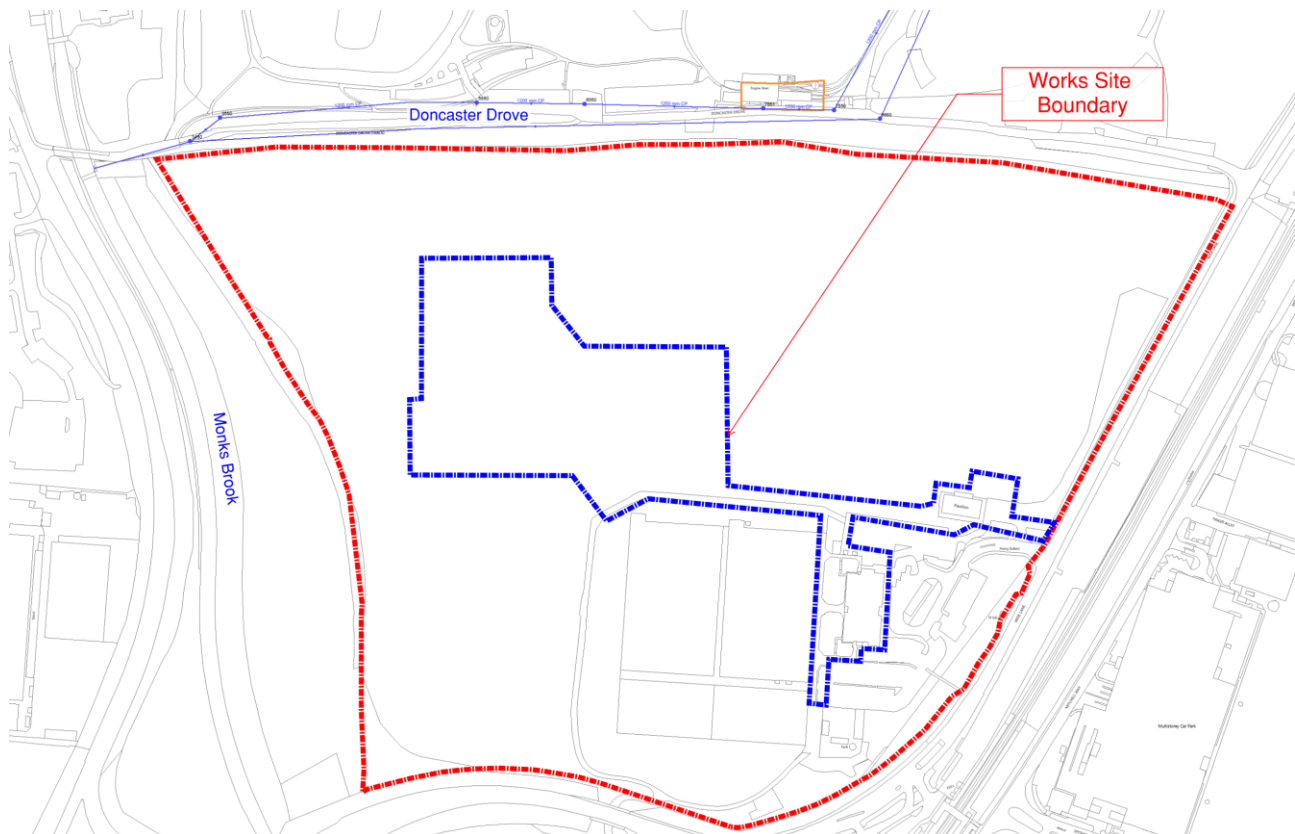


Figure 2 - Existing Drains and Sewers surrounding the Wide Lane site

Pitch drainage, comprising a network of 150mm diameter filter pipes installed in trenches between 400 and 1000mm deep has been installed to three pitches. Refer to **Figure 3** below. The two proposed artificial grass pitches will be partly located over the top of “Football 4 and Rugby 4”.

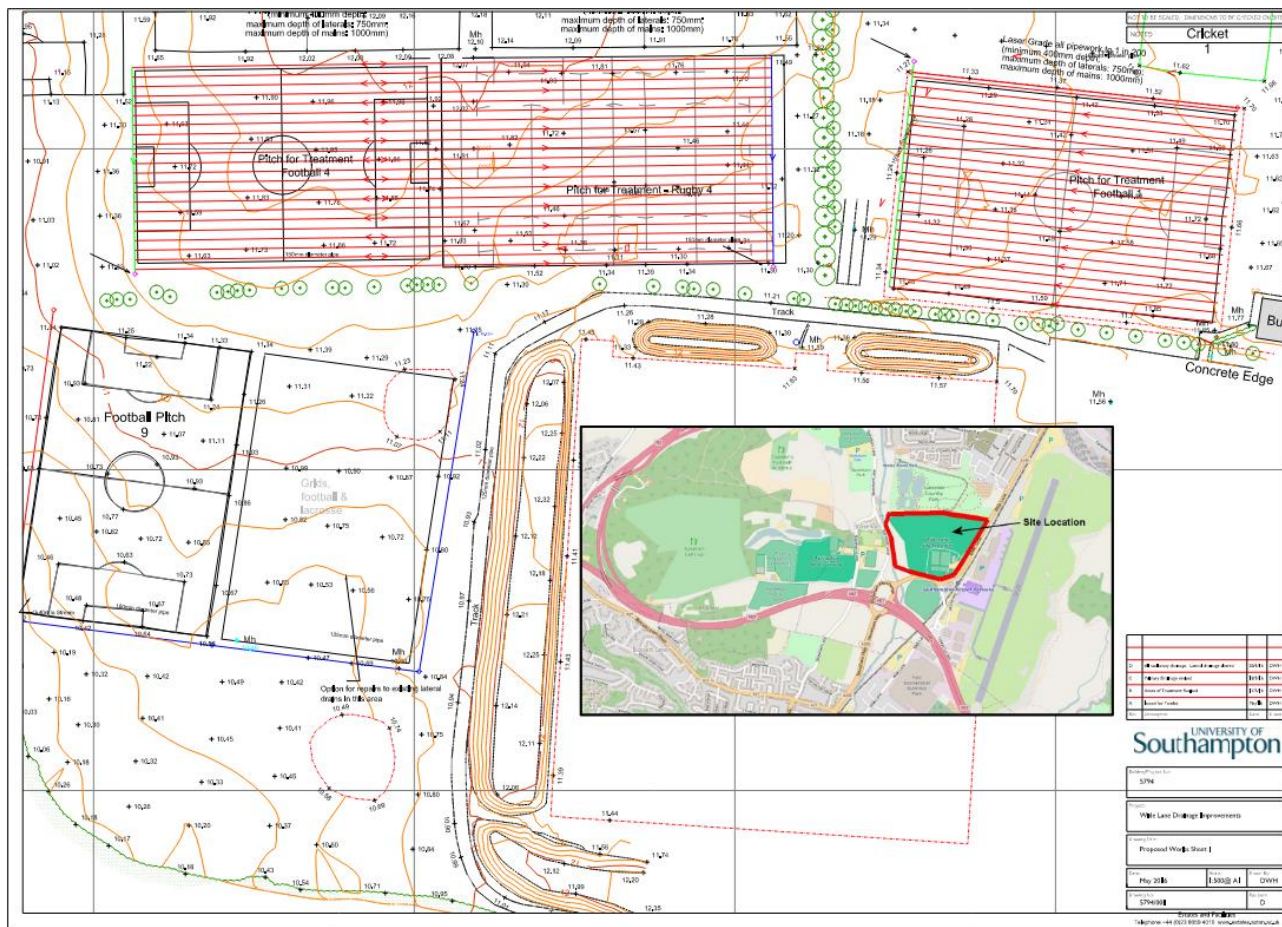


Figure 3 - Existing Pitch Drainage

Three soakaways have been identified on utility surveys providing an outlet for drainage from each of the three existing pitches. Two of these are within the red line boundary of the proposed site and could be re-used.

In the southern part of the wider site, a 150mm diameter pipe has been identified flowing towards the ditch on the western boundary.

4. Development Proposals

4.1 Proposed Drainage Strategy

As mentioned in Section 1, there is no significant built development proposed, and therefore no change to the foul drainage from the site.

The two proposed artificial grass sports pitches are to be located on the existing grassed playing field area. The new pitches will be located partly over the existing pitches that have land drains.

Typically, the artificial surfacing is permeable and will allow the water to percolate into permeable layers beneath. Pitch construction is anticipated to comprise 65mm porous asphalt with 50mm or 60mm artificial turf installed on top. Pitch construction details will be developed by a pitch specialist. It is possible that the new pitches could reuse the existing grass pitch drainage, alternatively a series of filter drains could be installed beneath the pitches to allow water to infiltrate.

The proposed sports pitches are considered “greenfield”, similar to the existing situation, therefore, there will be no overall increase in run off from the pitches. Footpaths installed to the proposed pitches will be constructed with an aggregate finish to match existing and a permeable build up. Therefore, there will be no increase in run off from these paths compared to the existing situation.

4.2 Greenfield Runoff Rates

An assessment has been made of the pre-development surface water flows and volumes based on the following rainfall and site characteristics in **Table 2**.

Variable	
Total Site Area (ha)	3.4
SAAR (mm)	792
Soil Type	4
SPR	0.47
Region	7

Table 2 - Development Characteristic

Greenfield runoff rates have been obtained for the site in accordance with IH124 method using the www.uksuds.com greenfield runoff estimation tool. Rates are provided for the 1 in 1-year, 1 in 30-year and 1 in 100-year return period events Table 3. The greenfield runoff calculation is shown in **Appendix B**.

Flow Condition	Greenfield Runoff Rate (l/s)
Q _{Bar}	18.97
1 in 1-year	16.12
1 in 30-year	43.62
1 in 100-year	60.5

Table 3 - Greenfield Runoff Rates

4.3 Filter drains

A geotechnical and geo-environmental desk study (293368-ARUP-ZZ-XX-RP-CG-001) has identified a permeability of 1×10^{-3} m/s could be expected on the site. An initial assessment indicates trenches 100mm wide, 500mm deep filled with material with 30% void ratio, installed at 5m centres along the length of the pitches, would provide sufficient infiltration for 1 in 100 year return period events, with allowance for

climate change. Refer to **Figure 4** below. Filter drains would extend beyond the edge of the playing areas to enable inspection points to be installed for maintenance.



Figure 4 - Indicative pitch drainage layout

Calculations are provided in **Appendix B**.

4.4 Drainage Ownership and maintenance

Maintenance of the on-site drainage network will be the responsibility of the University of Southampton. Generally maintenance will comprise regular inspection (at least annually) of the pitches for evidence of failure of the drainage system and, if necessary, jetting of the filter drains.

5. Flood Risk Assessment

In accordance with the Technical Guidance of the NPPF, flood risk from the following sources is assessed in this FRA:

- Fluvial and Tidal sources (flooding from rivers and the sea);
- Groundwater sources;
- Artificial sources, canals, reservoirs etc; and,
- Pluvial sources (flooding resulting from surface water/overland flows);
- It also requires the risk from increases in surface water discharge to be assessed (surface water management).

Thus, the following sections will assess each source for the proposed development. The possible flooding mechanisms at the site are identified as follows:

5.1 Fluvial and Tidal Flooding

An extracts of the Environment Agency's Flood Map for Planning (Rivers and Seas) is provided in **Figure 5** - Flood Map for Planning (EA Mapping Extract). It shows the site is located within a Flood Zone 1 (FZ1) defined as land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%). Based on the above, the risk of flooding from fluvial and tidal sources is **low**.

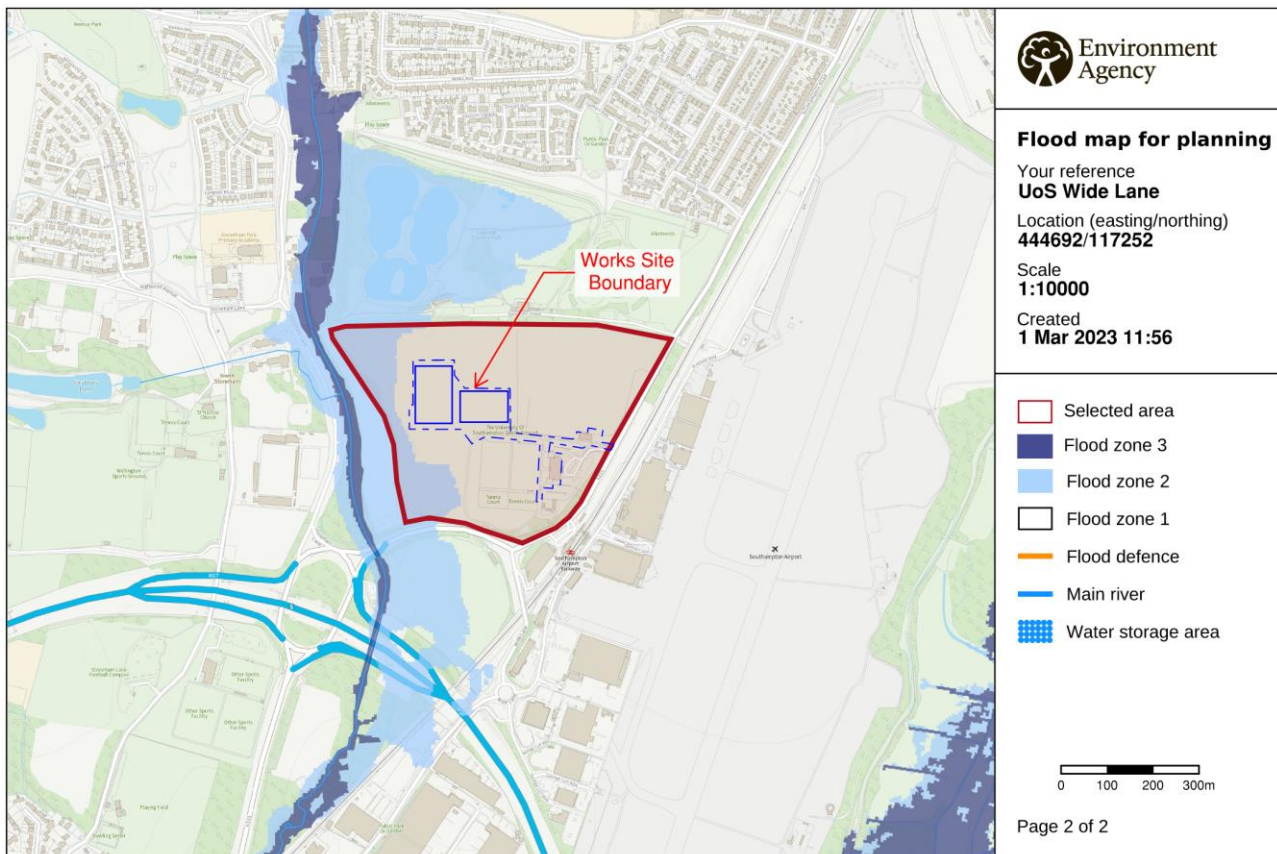


Figure 5 - Flood Map for Planning (EA Mapping Extract)

5.2 Groundwater Flooding

Groundwater flooding typically occurs in areas underlain with aquifers or permeable rock/superficial deposits that permits groundwater to rise to the surface during high/long rainfall events. Low lying areas are particularly susceptible given that the water table is usually at a much shallower depth.

Given the existing site characteristics and no evidence of present or historic groundwater flooding highlighted in Hampshire County Council Preliminary Flood Risk Assessment (PFRA), the risk of flooding from a ground water is **low**.

5.3 Flooding from Artificial Sources

Extracts of the Environment Agency's Flood Map from reservoirs is provided in **Figure 6** - Flood Map from Reservoirs (EA Mapping Extract). It is shown that the site is not at risk of reservoir flooding and there are no canals or other artificial sources which will influence flooding at the site. Given the above, the risk of flooding from canals and artificial sources is **low**.

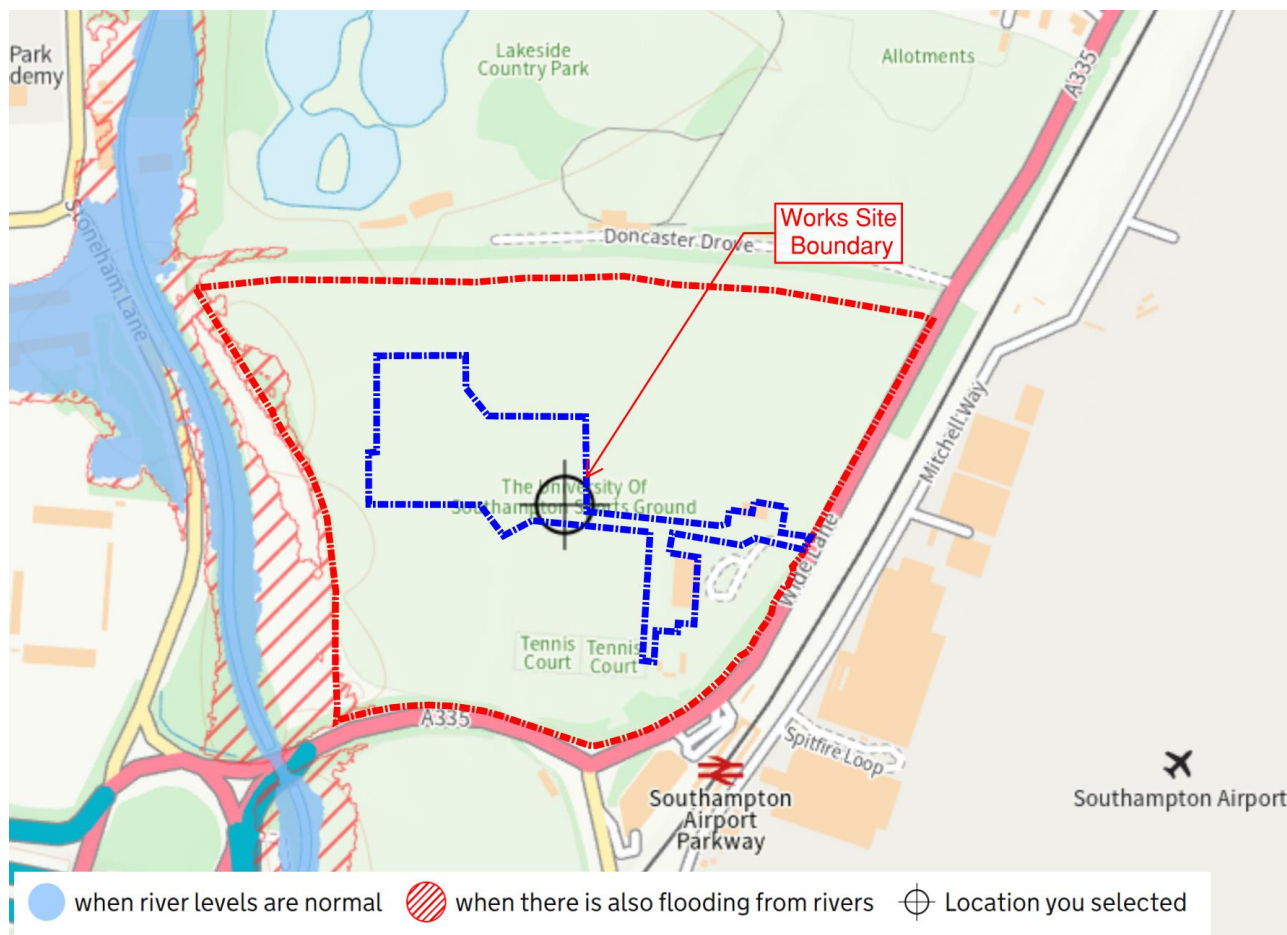


Figure 6 - Flood Map from Reservoirs (EA Mapping Extract)

5.4 Pluvial Flooding

Extracts of the Environment Agency's Flood Map from Surface Water (pluvial) is provided in **Figure 7**. It shows the extent of surface water flooding at site boundary for the 1 in 30-year annual probability (high risk), between 1 in 30-year and 1 in 100-year annual probability (medium risk), between 1 in 100-year and 1 in 1000-year probability (low risk) and then in excess of the 1 in 1000-year probability (very low). Areas shown to be at very low to low risk level for the site.

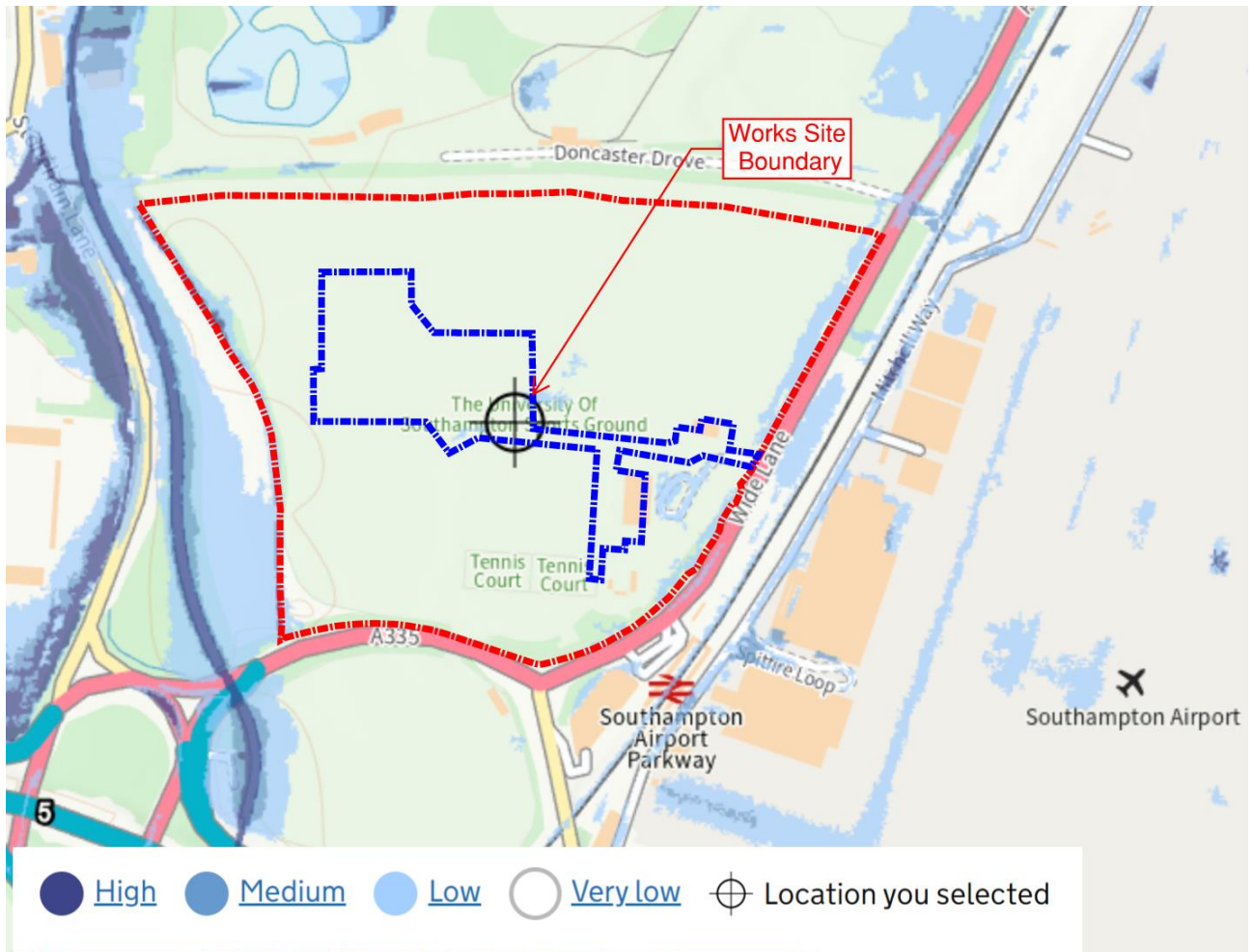


Figure 7 - Flood Map from Surface Water (EA Mapping Extract)

Extracts of the Environment Agency's water depth mapping in a low-risk scenario is provided in **Figure 8**. Area in the proximity of the site shown the water depth is found less than 300mm locally.

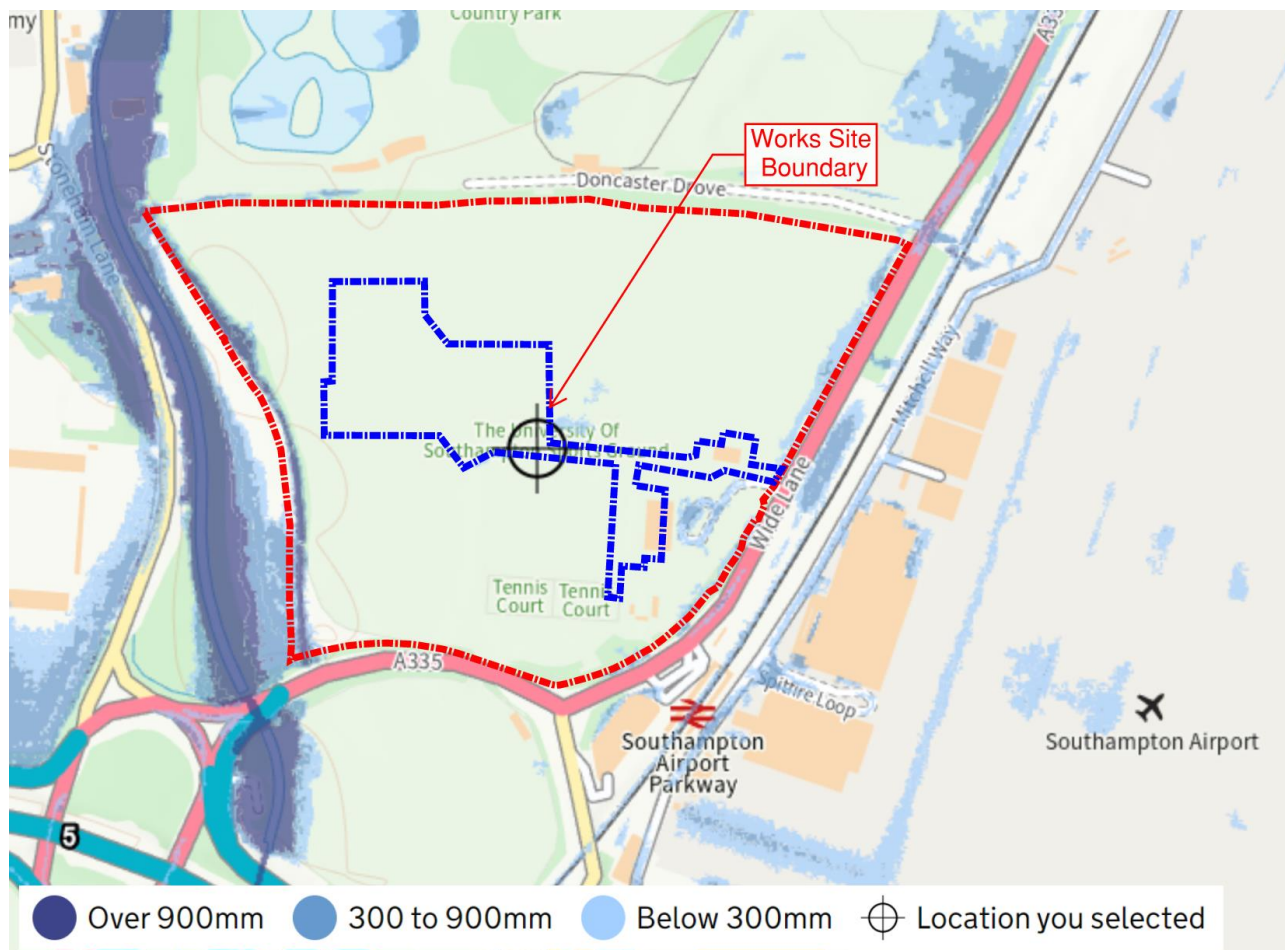


Figure 8 - Water Depth Mapping in a low-risk scenario from Surface Water (EA Mapping Extract)

5.4.1 Overland Flow

Overflow flow may occur resulting from the inability of unpaved ground to infiltrate rainfall or due to inadequacies of drainage systems in paved areas to accommodate flow directed to gullies, drainage downpipes or similar. In minor cases, local ponding may occur. In more extreme events, flows accumulate and may be conveyed across land following the topography. Based on the topographical profile slopping towards Monks Brook, it presents a minor risk in terms of available overland flow paths.

5.4.2 Sewer Flooding

As mentioned in Section 3.5, Southern Water asset mapping identifies no combined sewers within the site. Initial investigations provide no evidence of present or historic sewer flooding at the site.

Given the above, the risk of flooding from pluvial source is **low**.

5.5 Impacts on Local Flood Regime

It is proposed to infiltrate surface water on site with no discharge off site. The new drainage network will be designed to the flowing standards:

- No surcharging within the network for the 1 in 1-year storm event;
- No flooding on site from a 1 in 30-year storm event;
- No flooding which may pose a significant risk to people and property from a 1:100-year storm + 40 % Climate Change.

The system of infiltration will eliminate discharge from the site to alleviate off site flood risk and ensure that surface water within the development is managed to appropriate levels (including climate change).

6. Summary of flood risk

A summary of flood risk is provided below in **Table 4**, following the above assessment from all sources. The level of risk is defined as low, medium or high and as described by the following:

Low: Probability of flooding is low-negligible and risk to people or property should not form a material consideration for development. There is little or no residual risk.

Medium: Whilst probability of flooding is low, residual risk to people or property may be severe and require the development proposals to consider mitigation or further investigation. Mitigation may include flood resilience measures or protection of key infrastructure.

High: Flooding is likely to occur and should be specifically addressed as part of the development proposals. There is a significant risk to people or property and a flood management plan, evacuation plan/safe refuge plan or permanent flood prevention measures should be provided. May require further modelling, investigation, survey or consultation with LLFA/EA/Drainage Authority.

Source	Risk	Significance	Comment
Fluvial	Low	No	The site is located within Flood Zone 1. The site is not at risk from flooding of Monks Brook which runs along the west of Wide Lane.
Groundwater	Low	No	No evidence of groundwater flooding in PFRA. No proposed development below existing ground levels. Groundwater to be assessed on a site-specific basis and sufficient mitigation during construction to be implemented.
Artificial Sources	Low	No	No impact.
Pluvial	Low	No	The site is at low-very flow risk of flooding from pluvial sources.

Table 4 - Summary of Flood Risk Sources

7. Conclusion

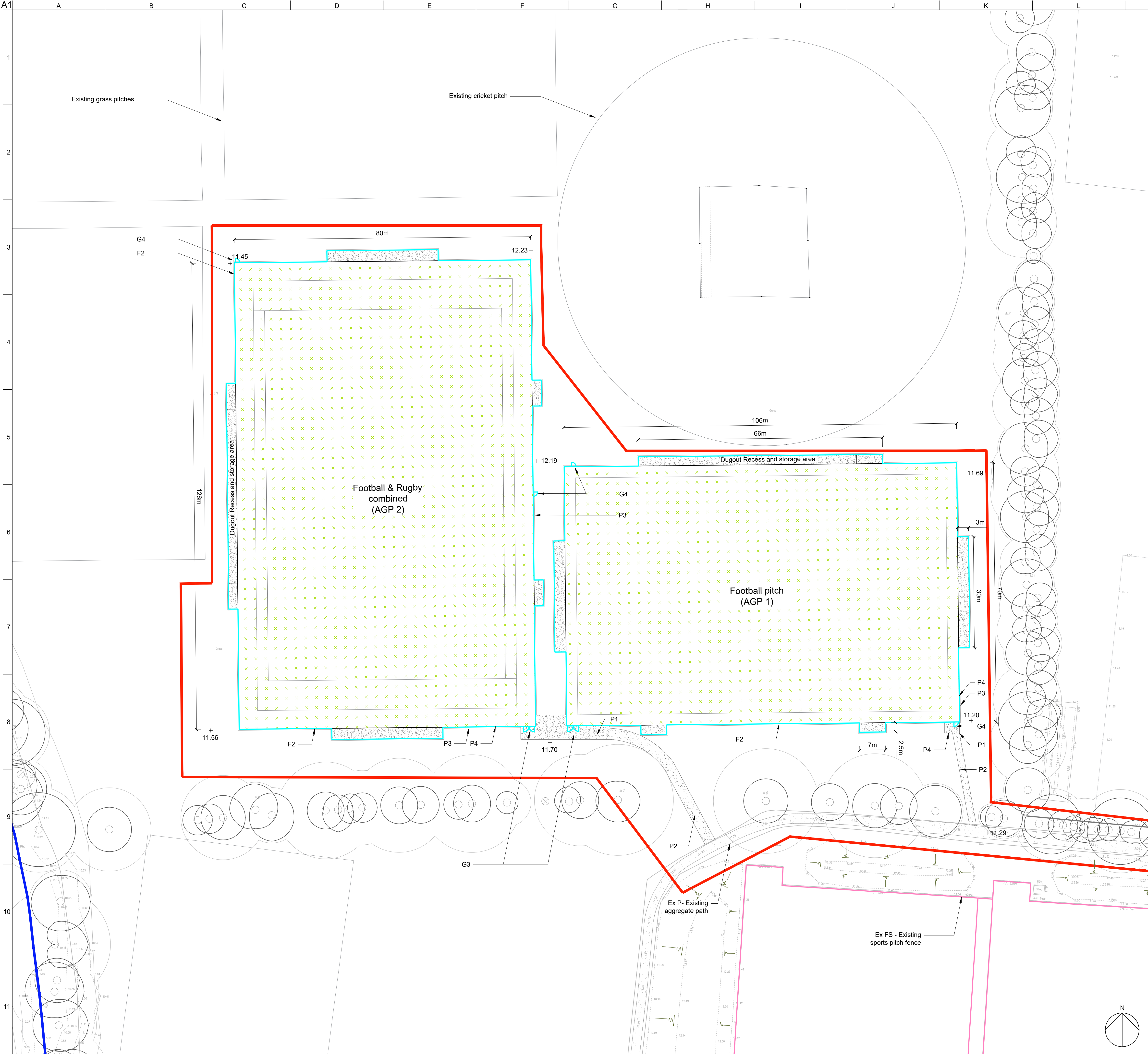
This FRA has been undertaken as a desk-based study using publicly available information as noted throughout the report. It has been prepared based on the requirement of the NPPF. The following conclusions have been drawn:

- The site is located within Flood Zone 1.
- Flood risk from fluvial, tidal, groundwater, artificial sources and pluvial sources are all considered to be **low**.
- Based on the site setting and the proposed development, it is considered that the development proposals, which are within the existing footprint, can be constructed and operated safely and will not increase flood risk elsewhere.
- Surface water will infiltrate within the site boundary with a series of filter drains installed beneath the pitch build up. These will be designed to accommodate storm events up to and including the 1 in 100 year event + 40% allowance for climate change.

This report has demonstrated that the proposed development will be safe, in terms of flood risk, for its design life and will not impose any flood risk elsewhere.

Appendix A

Site location overview plans



- Artificial Grass Pitch 1 (AGP 1)
'Football Pitch'
106 x 70 m
- Outline specification notes:
- Principal playing area: 100 x 64m
 - Principal playing area plus run offs: 106 x 70m (does not include the goal recesses and dug-out areas)
 - Goal recess areas and dug-outs (2.5 / 3m deep) as shown on the layout.
 - Space in recesses to accommodate the following size goals:
2 x 11-aside [24ft x 8ft / 7.32m x 2.44m]
4 x 9-aside [16ft x 7ft / 4.88m x 2.13m]
8 x 5-aside [16ft x 4ft / 4.88m x 1.22m]
 - Sports pitch to include over markings (to be determined at detailed design)
 - For excavation depths, build ups, formation and drainage refer to Civil Engineer / Specialist Contractor information (to be developed at detailed design).
 - Ensure single plane gradient not exceeding 1%
 - 65mm depth of porous asphalt (tbc Specialist Contractor details)
 - 50mm or 60mm artificial turf installation on porous asphalt base. 'Football only' 3G turf system - 'LigaTurf RS+R 260 18/4' by *Polytan* or equivalent and approved to meet current NGB performance requirements.
 - 'Super Rebound 8' double wire mesh fencing (5.08m high) with integrated rebound mesh by *Zaun* or equivalent and approved. Fence to be RAL 6005 - Moss Green. *Additional ball stop netting by Zaun or equivalent and approved behind the goals at either end (height tbc detailed design).*
 - Single pedestrian gate (min. 1.2m wide) and double vehicle gates (3m wide) incorporated to match adjacent fence. Gate access control / requirements tbc detailed design.
 - PC concrete edging to perimeter of pitch
 - PC concrete slab mowing strip to the outside of the perimeter fence line (300mm)
 - Boot wash area (with water supply and local drainage) to the main point of entry.
 - Column floodlighting system to Specialist contractor / MEP information.
 - Pitch line marking layout to be approved by Client and to meet NGB requirements at the detailed design stage.
 - Space for storage container to be located in 'dugout and storage' recess area (tbc detailed design)

- Artificial Grass Pitch 2 (AGP 2)
'Football and Rugby Pitch combined'
126 x 80 m
- Outline specification notes:
- Principal playing area: 100 x 70m
 - Principal playing area plus run off and in-goal area: 126 x 80m (does not include the goal recesses and dug-out areas)
 - Goal recess areas and dug-outs (2.5m / 3m deep) as shown on the layout
 - Space in recesses would accommodate the following size goals:
2 x 11-aside [24ft x 8ft / 7.32m x 2.44m]
4 x 9-aside [16ft x 7ft / 4.88m x 2.13m]
8 x 5-aside [16ft x 4ft / 4.88m x 1.22m]
 - Sports pitch to include over markings for (to be determined at detailed design)
 - For excavation depths, build ups, formation and drainage refer to Civil Engineer / Specialist Contractor information (to be developed at detailed design).
 - Ensure single plane gradient not exceeding 1%
 - 65mm depth of porous asphalt (tbc Specialist Contractor details)
 - 50mm artificial turf (dual yarn) installation on in situ shock pad (25mm). 'Football and Rugby combined' 3G turf system - 'LigaTurf Cross R 250 13/8' by *Polytan* or equivalent and approved to meet current NGB performance requirements.
 - 'Super Rebound 8' double wire mesh fencing (5.08m high) with integrated rebound mesh by *Zaun* or equivalent and approved. Fence to be RAL 6005 - Moss Green. *Additional ball stop netting by Zaun or equivalent and approved behind the goals at either end (height tbc detailed design).*
 - Single pedestrian gate (min. 1.2m wide) and double vehicle gates (3m wide) incorporated to match adjacent fence. Gate access control / requirements tbc detailed design.
 - PC concrete edging to perimeter of pitch
 - PC concrete slab mowing strip to the outside of the perimeter fence line (300mm)
 - Boot wash area (with water supply and local drainage) to the main point of entry of proposed pitches.
 - Column floodlighting system to Specialist contractor / MEP information.
 - Pitch line marking layout to be approved by Client and to meet NGB requirements at the detailed design stage.
 - Space for storage container to be located in 'dugout and storage' recess area (tbc detailed design)

Legend

- Site ownership boundary
- Site boundary
- Existing buildings
- External existing levels

Boundaries / Fences

- Ex F - Existing fence
- Ex FS - Existing sports fence to be retained
- F1 - Proposed security fence
- G1 - Proposed security gate (vehicular)
- G2 - Proposed security gate (pedestrian)
- F2 - Proposed sports pitch fence (5m)
- G3 - Proposed sports pitch gate (vehicular) to match adjacent fence
- G4 - Proposed sports pitch gate (pedestrian) to match adjacent fence

Surfaces and Paving

- AGP 1 - Artificial Grass Pitch area (Football only)
- AGP 2 - Artificial Grass Pitch area (Football and Rugby combined)
- P1 - Porous asphalt
- P2 - Proposed aggregate path (to match existing)
- P3 - PC paving (min. 300mm) mowing strip to perimeter of AGP
- P4 - PC Edging (50mm)
- Ex P- Existing aggregate paths

Soft Landscape

- Existing trees
- Tree root protection areas

- Notes:
- To be read in conjunction with Tree Condition Survey & Report, document ref: EAS-026-WL-01
 - To be read in conjunction with New Sports Pitches and Security Fence DAS.
 - To be read in conjunction with Typical fencing detail drawing: 293368-ARUP-ZZ-XX-DR-L-0600 and 293368-ARUP-ZZ-XX-DR-L-0601

P01	20/03/23	NA	SB	JW
Issue	Date	By	Chkd	Appd

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Client
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Job Title
Wide Lane Sports Centre

Drawing Title
Proposed General Arrangement Plan
Sheet 1 of 2

Scale at A1
1:500

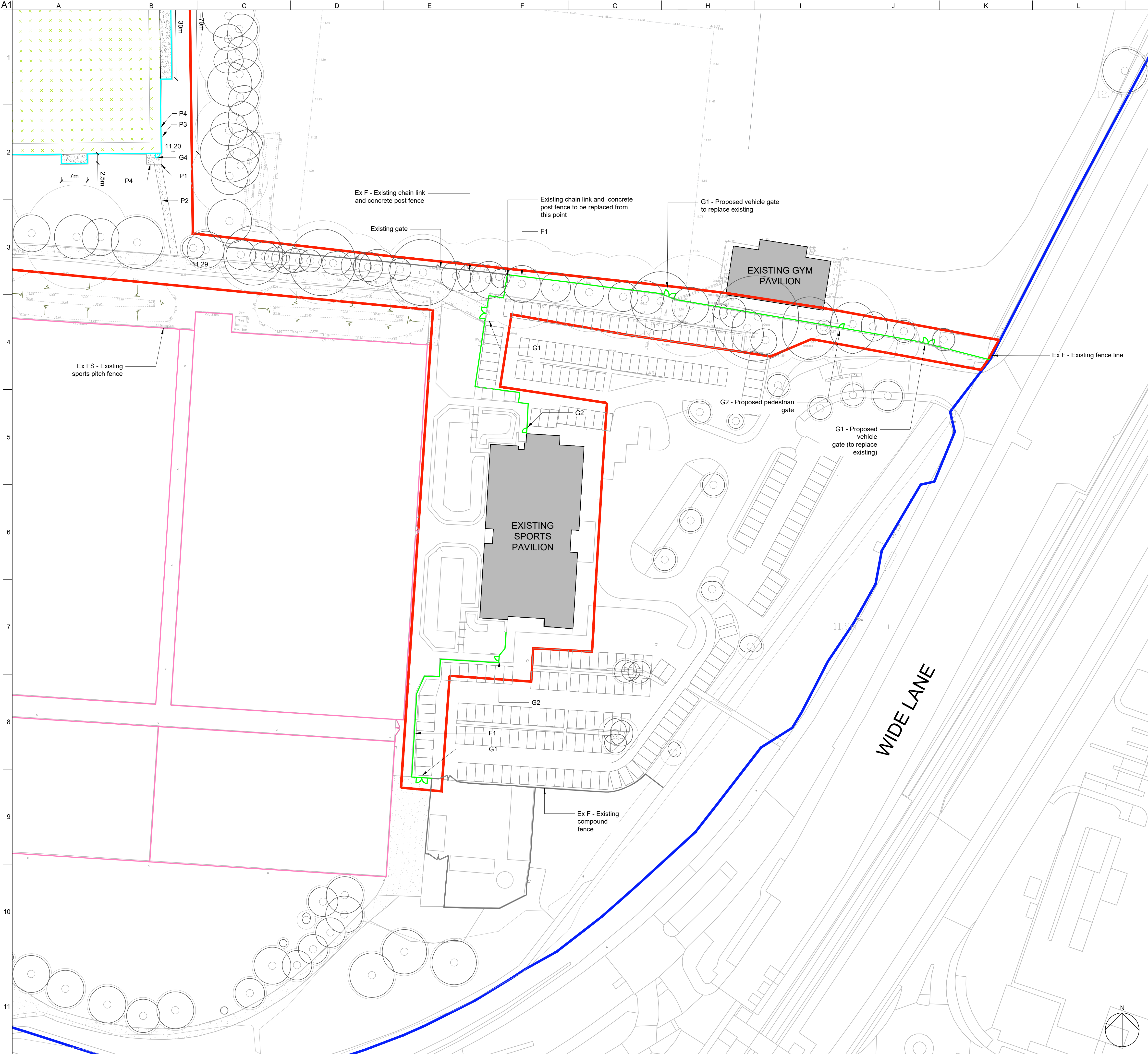
Discipline
Landscape Architect

Job No
293368

Drawing Status
S1

Drawing No
293368-ARUP-ZZ-XX-DR-L-0200

Issue
P01



New Security Fence

Outline specification notes:

1. "Duo 8 SR1" perimeter security fencing (2.03m high) by Zaun or equivalent and approved.
2. To be read in conjunction with Typical fencing detail: 293368-ARUP-ZZ-XX-DR-L-0600 and 293368-ARUP-ZZ-XX-DR-L-0601
3. Security fence and gates to be RAL 9005 - Jet black (tbc detailed design)
4. Single pedestrian gate (min. 1.2m wide) and double vehicle gate (min. 3.1m wide) incorporated to match adjacent fence. Gate access control / requirements tbc detailed design.

Legend

- Site ownership boundary
- Site boundary
- Existing buildings
- External existing levels

Boundaries / Fences

- Ex F - Existing fence
- Ex FS - Existing sports fence to be retained
- F1 - Proposed security fence
- G1 - Proposed security gate (vehicular)
- G2 - Proposed security gate (pedestrian)
- F2 - Proposed sports pitch fence (5m)
- G3 - Proposed sports pitch gate (vehicular) to match adjacent fence
- G4 - Proposed sports pitch gate (pedestrian) to match adjacent fence

Surfaces and Paving

- AGP 1 - Artificial Grass Pitch area (Football only)
- AGP 2 - Artificial Grass Pitch area (Football and Rugby combined)
- P1 - Porous asphalt
- P2 - Proposed aggregate path (to match existing)
- P3 - PC paving (min. 300mm) mowing strip to perimeter of AGP
- P4 - PC Edging (50mm)
- Ex P - Existing aggregate paths

Soft Landscape

- Existing trees
- Tree root protection areas

Notes:

1. To be read in conjunction with Tree Condition Survey & Report, document ref: EAS-026-WL-01
2. To be read in conjunction with New Sports Pitches and Security Fence DAS.
3. To be read in conjunction with Typical fencing detail drawing: 293368-ARUP-ZZ-XX-DR-L-0600 and 293368-ARUP-ZZ-XX-DR-L-0601

P01	20/03/23	NA	SB	JW
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Job Title
Wide Lane Sports Centre

Drawing Title
Proposed General Arrangement Plan
Sheet 2 of 2

Scale at A1

1:500

Discipline
Landscape Architect

Job No
293368

Drawing Status
S1

Drawing No
293368-ARUP-ZZ-XX-DR-L-0201

Issue
P01

Appendix B

Runoff Rate Calculation

Infiltration Trench Calculation

[Print](#)[Close Report](#)

Greenfield runoff rate estimation for sites

www.ukstds.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

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

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

Default

Edited

SOIL type:

HOST class:

SPR/SPRHOST:

Hydrological characteristics

Default

Edited

SAAR (mm):

Hydrological region:

Growth curve factor 1 year:

Growth curve factor 30 years:

Growth curve factor 100 years:

Growth curve factor 200 years:

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.

(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.

(3) Is $SPR/SPRHOST \leq 0.3$?

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):

1 in 1 year (l/s):

1 in 30 years (l/s):

1 in 100 year (l/s):

1 in 200 years (l/s):

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 of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Pitch Drainage Infiltration Trenches

Likely infiltration rate 1×10^{-3} m/s

Pitch length 126 m
Trench Length 80 m
Trench Width 0.1 m
Trench Depth 0.5 m
Porosity 0.3
Trench centres 5 m
No of trenches 26

1/2 trench side infiltration

Ground permeability 0.0001 m/s Assume worst case

Storm duration 30 min
1800 s

Storage within trenches 31.2 m3
a50 1041.3 m2
Infiltration area 2082.6 m2
Outflow during storm 187.4 m3
Allowable inflow during storm 218.6 m3
Allowable flow rate Q_{out} 121.5 l/s
Pitch area 10080 m2

Surface area of half trench depth

30 min 1 in 30 year run off volume

C 0.7
i 49.53 mm/hr
A 1.008 ha
 Q_{in} 34.95 l/s

OK

30 min 1 in 100 year + 40% climate change

C 0.7
i 90.58 mm/hr
A 1.008 ha
 Q_{in} 63.91 l/s

OK

