Leek Town FC – 3G Artificial Grass Pitch (AGP)

Flood Risk Assessment

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Client	Leek Town FC
Site Address	Harrison Park Macclesfield Road Leek Staffordshire ST13 8LD
Project	11v11 3G AGP
Type	1no. New Build 11v11 3G AGP – Stadia conversion





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Introduction

Planning permission is sought to install a new Artificial Grass Pitch (AGP) to the location of a current natural turf stadia football pitch.

This Flood Risk Assessment (FRA) demonstrates how flood risk will be managed, including the effects of climate change and identifies and assesses the risk of all forms of flooding to and from the development including, where appropriate, provision of features for flood resistance, and construction techniques for structures which are flood resilient.

The proposed development is located within an Environment Agency identified Flood Zone 2 and, as such, should be accompanied by a site specific FRA in accordance with the National Planning Policy Framework (NPPF) and Article 34 of the Town and Country Planning (Development Management Procedure) Order 2015.

The proposed development is located at:

Harrison Park
Macclesfield Road
Leek
Staffordshire
ST13 8LD



This FRA explains how the development reduces flood risk by recharging groundwater through the use of Sustainable Urban Drainage Systems (SUDS) for the discharge of rainwater runoff or by ensuring that the rates and volumes of discharge are kept, or reduced, to the existing rates (i.e the rates before development)

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Policy Context

National Planning Policy Framework (Feb 2019)
Section 14 – Meeting the Challenge of Climate Change, Flooding and Coastal Change

Policy extract:

163. When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:
a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
b) the development is appropriately flood resistant and resilient;
c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
d) any residual risk can be safely managed; and
e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

164. Applications for some minor development and changes of use51 should not be
subject to the sequential or exception tests but should still meet the requirements
for site-specific flood risk assessments. Site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

Department for Environment, Food and Rural Affairs Sustainable Drainage Systems Non-statutory technical standards for sustainable drainage systems March 2015

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

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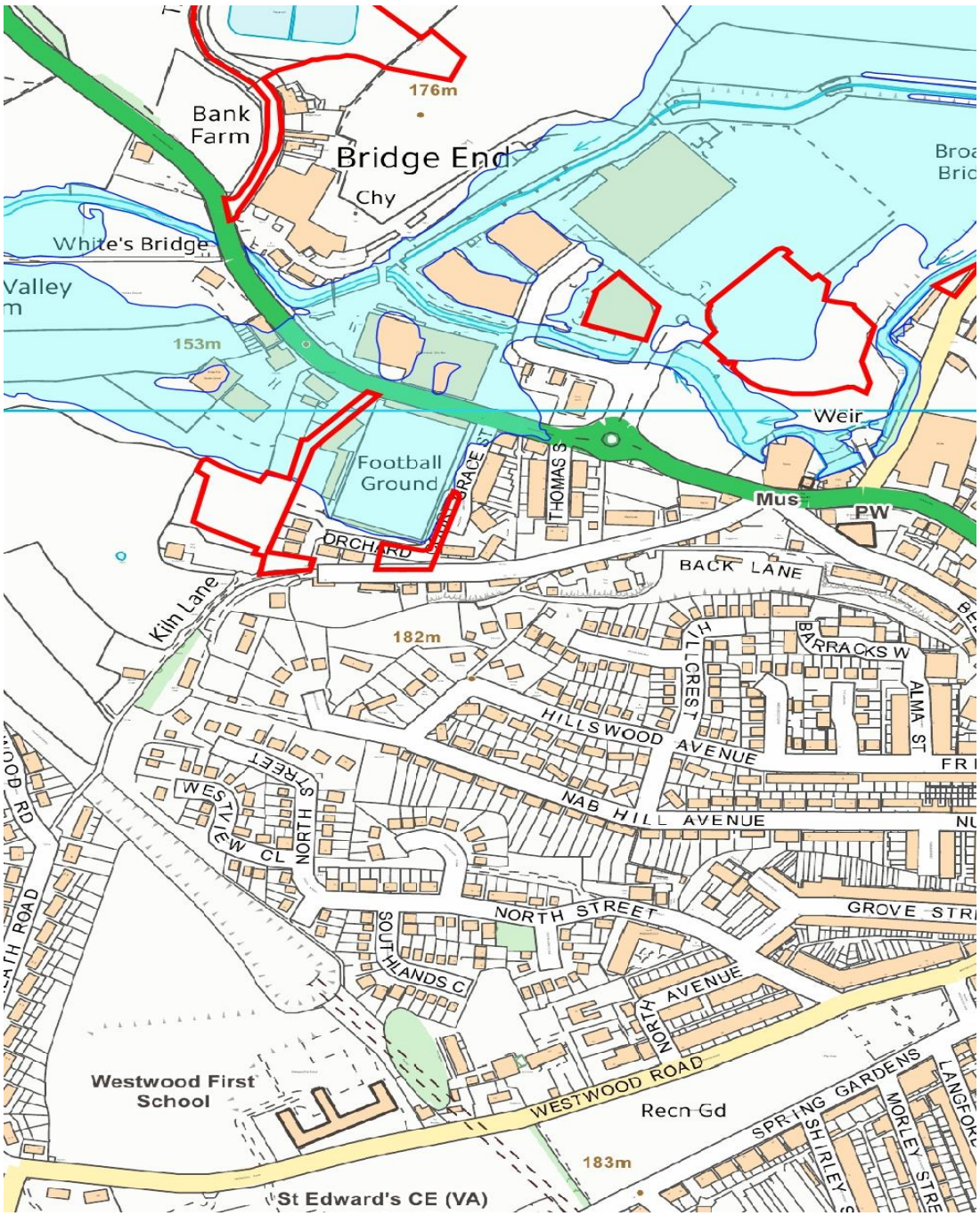

The above illustration captured from the Interactive Planning Map on the Staffordshire Moorland District Council website illutrates that the proposed development area is located within a Flood Zone 2.

This is land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.

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Development Proposals and Flood Risk Vulnerability

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

An extract from Table 2 of the PPG for Flood Risk and Coastal Change is replicated below in Table 2.4 with the proposed development type highlighted:

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 Defense 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	

Flood Risk Vulnerability and Flood Zone Compatibility

Based on the above assessment of the site being located within a flood zone 2 and classified as a 'water compatible development' and with reference to Planning Practice Guidance for 'Flood Risk and Coastal Change' to the National Planning Policy Framework (Table 3), the proposed development of this site would be considered "**appropriate**".

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

No exception test is required.

Flood risk vulnerability and flood zone compatibility					
Flood risk vulnerability classification	**Essential infrastructure**	**Water compatible**	**Highly vulnerable**	**More vulnerable**	**Less vulnerable**
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test required	✓	✓
Zone 3A	Exception Test required	✓	×	Exception Test required	✓
Zone 3B	Exception Test required	✓	×	×	×
Key: ✓Development is appropriate ×Development should not be permitted					
Source: Technical Guide to the National Planning Policy Framework, March 2012					

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Sequential Test

The Sequential Test ensures that a sequential approach is followed to steer new development to areas with the lowest probability of flooding. A Sequential test is not required if any of the following is correct;

1. One has already been carried out for a development of the type you're planning (eg a residential development) for your site.
2. The development is a minor development (i.e. less than one hectare)
3. The development involves a change of use (eg from commercial to residential) unless your development is a caravan, camping chalet, mobile home or park home site
4. The development is in flood zone 1 (unless there are flooding issues in the area of your development).

As this site does not exceed one hectare, a sequential test is not required.

Current Conditions

The development site is to replace the current grassed football pitch with a new artificial synthetic turf pitch.

Exerts from Project Specific Site Surveys

A geotechnical survey has been carried out on the site, which included infiltration testing. Relevant exerts from the geotechnical report are outlined as follows;

A RAG (Red/Amber/Green) status approach has been is presented to convey the relative risk assessed against each item and / or issue, as follows:

RED	Immediate action needed as the issue(s) deemed to constitute a direct and significant threat to the project or present a risk to one or more party
AMBER	Issues identified that have the potential to develop into red alert status
GREEN	Items that are compliant, agreed, acceptable and present no risk to the project or the key parties

Aspect	Result	Risk Rating
Ground conditions / strata	Exploratory excavations generally encountered the following soils: • In the northern part of site (within HP03 and HP04), reworked Topsoil between 0.15-0.2m depth was present, overlying sandy Made Ground in the northeast and sandy reworked Alluvium in the northwest, both with similar organic content to the overlying reworked Topsoil and both present to 0.4m depth. Below 0.4m depth, possible reworked clays of the Alluvium were present, extending beyond the limit of our investigations. • To the centre of the pitch (within HP05), reworked Topsoil to 0.12m depth was present, overlying sandy Made Ground to 0.3m. Reworked Alluvium was present below. • In the southern part of the pitch (within HP01 and HP02), approximately 0.05-0.12m of Topsoil was present overlying strata considered to be weathered Chester Formation.	Design/project budget allowance should be accommodated as the project develops
Groundwater	No groundwater inflows were observed in any of the exploratory excavations.	No perceived risk to the project.
Infiltration	The reworked Alluvium was encountered as a sandy clay which was considered generally impermeable. An indicative infiltration test was undertaken in HP03, with some infiltration observed over the course of 110 minutes. Only one test cycle	Drainage strategy to be confirmed as the project develops

	was performed. The test data has been extrapolated to provide an approximate infiltration rate for such deposits, which has been calculated at 3.35 x 10-6 m/s. Based on the above, whilst such soils potentially exhibit a degree of permeability, it is likely this would be variable at best, given the cohesive nature of soils. Furthermore, due to the likelihood that such soils have been reworked, we do not recommend the disposal of stormwater into reworked Alluvium, which may otherwise lead to collapse settlement of air voids and compaction of soils around the soakaway chamber.	

Surface Water Disposal Requirements

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

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

A. Into the ground (infiltration);

B. To a surface water body;

C. To a surface water sewer, highway drain, or another drainage system;

D. To a combined sewer.

This is necessary to promote sustainable development, secure proper drainage and to manage the risk of flooding and pollution. This condition is imposed in light of policies within the NPPF and NPPG.
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Surface Water Disposal Options

A. Soakaway

Reworked Alluvium was encountered during the geotechnical report. This was a sandy clay which was considered generally impermeable. An indicative infiltration test was undertaken in HP03, with some infiltration observed over the course of 110 minutes. Only one test cycle was performed. The test data has been extrapolated to provide an approximate infiltration rate for such deposits, which has been calculated at 3.35 x 10-6 m/s.

Based on the above, whilst such soils potentially exhibit a degree of permeability, it is likely this would be variable at best, given the cohesive nature of soils. Furthermore, due to the likelihood that such soils have been reworked, it is generally not recommended to dispose of surface water into reworked Alluvium, which may otherwise lead to collapse settlement of air voids and compaction of soils around the soakaway chamber.

There is an existing soakaway chamber onsite, which serves the existing football pitch. Providing suitable investigations are undertaken to determine the strata into which the chamber is draining into, and if appropriate completion of performance tests to determine its efficiency, the existing drainage outfall could be reused (subject to capacity checks, permissions etc).

B. Surface Water Body

The River Chunet watercourse approximately 75m to the North. A direct connection into this watercourse would unlikely to be feasible.

C. Surface Water Sewer

A public surface water sewer is located along the main road to the north of the site (as identified in the Services checks). This could potentially be an option to connect into, although permission would be required from Severn Trent Water.

D. Combined Sewer

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A public combined sewer is located along the main road to the north of the site (as identified in the Services checks). This is only ever considered as a last resort and, given the possibilities referred to in options A to C above, it is not anticipated this option will be needed for this project.

Surface Water Drainage Strategy

The proposed artificial grass pitch is permeable, and is classified as a 'water compatible' form of development.

It is intended that, following the site levelling operation, a new positive drainage scheme (pipe drainage); shall be installed beneath the 3G pitch area comprising UPVC perforated carrier and lateral pipe drains.

Surface water collected from the Artificial Grass Pitch will be disposed of via the current outfall arrangement (subject to capacity checks, permissions etc as referred to in section A above) .

Surface water discharge rates will be restricted to greenfield equivalent runoff rates to ensure that the rate of surface water runoff from the new 3G pitch does not provide an increase on the existing situation with the natural turf pitch.

The new synthetic pitch will incorporate attenuation (water storage) within the pitch substrate (commonly consisting of Type 3 unbound (SHW 800 Series) to comply with BSEN 13285) which will ensure that excess volumes (which would be experienced during a critical storm event, or alternative storm event) do not bypass the control system. The new 3G pitch will in effect offer a significant increase on the attenuation of this site due to the properties of the aggregate base that will be installed.

System Performance

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

The designed surface water drainage solution should be based upon the following criteria, to maintain satisfactory system performance:

- Provide adequate functionality over a period of twenty years.
- Ensure that surface water is removed from the surface area at a rate necessary to prevent surface flooding experienced during acute rain storms and to ensure the facility will not be lost through rain at the highest intensity which may be expected to occur either once every five years or through continuous rainfall of 50mm over a 24 hour period.
- Ensure that surface water is effectively removed from the facility construction to ensure that load bearing capacity of the substrate is not weakened by an increase in moisture content or becomes more susceptible to frost damage.
- Protect the installation from influences of groundwater or surface water from surrounding areas.
- Comply with all applicable Sustainable Urban Drainage System (SUDS) requirements with attenuated flows (containment within the granular pitch sub-base) incorporated wherever necessary, without affecting the performance of the pitch.

Overland Flows

Subject to local authority preference, proposals would normally be to design surface water drainage to accommodate a 1-in-30 year storm event.

Foul Water Drainage Strategy

There is no foul water drainage strategy associated with this development.

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Flood Risk Assessment (FRA) and Drainage Proposals Conclusions

A water drainage strategy is necessary to control, manage and dispose of surface water experienced during a critical storm event.

Surface water will be attenuated to Greenfield equivalent rates and discharge to existing site surface water drainage system.

The proposed development will increase the attenuation capacity of the site before surface water enters the outfall.. This is due to the granular pitch substrate (typically consisting of Type 3 unbound (SHW 800 Series) which is needed to create the appropriate base on which to construct the new synthetic turf pitch.

The drainage system should be designed to minimise maintenance requirements with maintenance operations to be carried out by the applicant in perpetuity post development.

Providing the agreed strategy is implemented, this proposed development should not contribute further to flood risk. The developed site will improve flood risk status to the development area. thus satisfying the principles of the National Planning Policy Framework.

End of document

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