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FLOOD RISK ASSESSMENT REPORT FOR 260020- UNSWORTH CC PADEL COURT

Prepared for:

On Padel Ltd

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1 EXECUTIVE SUMMARY

- EDGE Consulting Engineers have been instructed by Ashton Hale to undertake a Flood Risk Assessment (FRA) in support of a planning application for the proposed development of a padel court at Unsworth Cricket & Tennis Club. The proposals comprise the construction of a new outdoor recreational facility and associated surfacing works.
- The site is located within the existing sports grounds at Unsworth Cricket & Tennis Club, in an established urban area of Bury, Greater Manchester. The site is currently greenfield in nature, comprising grassed recreational land with no formal drainage infrastructure present within the development footprint.
- The nearest watercourse is Castle Brook, located to the east of the site. However, the site is not hydraulically connected to this watercourse and is situated within Flood Zone 1, indicating a low probability of fluvial flooding.
- This assessment considers flood risk to the site from all potential sources, including fluvial, pluvial (surface water), groundwater, artificial drainage systems, and infrastructure failure.
- Environment Agency flood mapping confirms that the site lies entirely within Flood Zone 1, with an annual probability of flooding from rivers and the sea of less than 0.1%. As such, the site is considered appropriate for the proposed development, and the Sequential Test is satisfied. The Exception Test is not required.
- Environment Agency flood mapping identifies surface water flooding as the primary source of flood risk affecting the site, with localised ponding for the 1 in 30-year rainfall event. The extent of flooding increases to larger flooded areas of the site during higher return period storm events.
- The site is not currently served by a formal surface water drainage system. A new drainage network will therefore be implemented as part of the proposed development to manage runoff from the impermeable padel court surface.
- A sustainable drainage strategy has been developed in accordance with the drainage hierarchy. Infiltration has been discounted at this stage due to the presence of low permeability Devensian till, subject to confirmation through site-specific testing. Discharge to a nearby watercourse is not considered feasible, therefore, surface water will be discharged to the existing sewer network at a controlled rate.
- Surface water runoff will be restricted to the greenfield Qbar rate of 1.6 l/s, with on site attenuation provided via an underground geocellular storage tank designed to accommodate flows up to and including the 1 in 100-year storm event plus 45% climate change allowance.
- The proposed drainage strategy incorporates Sustainable Drainage Systems (SuDS) principles and includes attenuation, controlled discharge, and exceedance flow routing to ensure the site remains safe during extreme rainfall events.
- The development will not generate foul flows and therefore does not require a foul drainage connection.
- This assessment concludes that the proposed development will not increase flood risk on-site or elsewhere. The site is suitable for the proposed use, and the development is considered to be safe for its lifetime, taking into account the effects of climate change and all relevant sources of flooding.

2 INTRODUCTION

EDGE Consulting Engineers have undertaken a Flood Risk Assessment (FRA) in line with National Planning Policy Framework (NPPF, December 2024) and the main aims of this report are:

- To determine whether the proposed development is likely to be affected by current or future flooding from any source.
- To determine whether it will increase flood risk elsewhere.
- To determine whether the measures proposed to deal with these effects and risks are appropriate.
- To assess under SUDS Guidance the best way of reducing the flow rates from site to an acceptable rate of discharge.

2.1 SITE DESCRIPTION

The site is located within Unsworth Cricket & Tennis Club, situated on Pole Lane in Unsworth, within the Metropolitan Borough of Bury, Greater Manchester. The site lies approximately 8.5km north of Manchester city centre and around 4.5 km south of Bury town centre within a predominantly suburban area characterised by residential development with areas of recreational open space.

The cricket club occupies a relatively large recreational site comprising a maintained cricket pitch, outfield areas, tennis facilities, pavilion buildings, parking areas and associated hardstanding. The proposed padel court would be located within the existing sports grounds, which are currently used for outdoor recreational purposes.

The surrounding land uses are primarily residential, with housing located to the west and south of the site, educational facilities to the north, and additional open space and sports facilities in the immediate vicinity of the proposed padel court. The club is accessed from Pole Lane, which provides the primary vehicular and pedestrian access to the site.

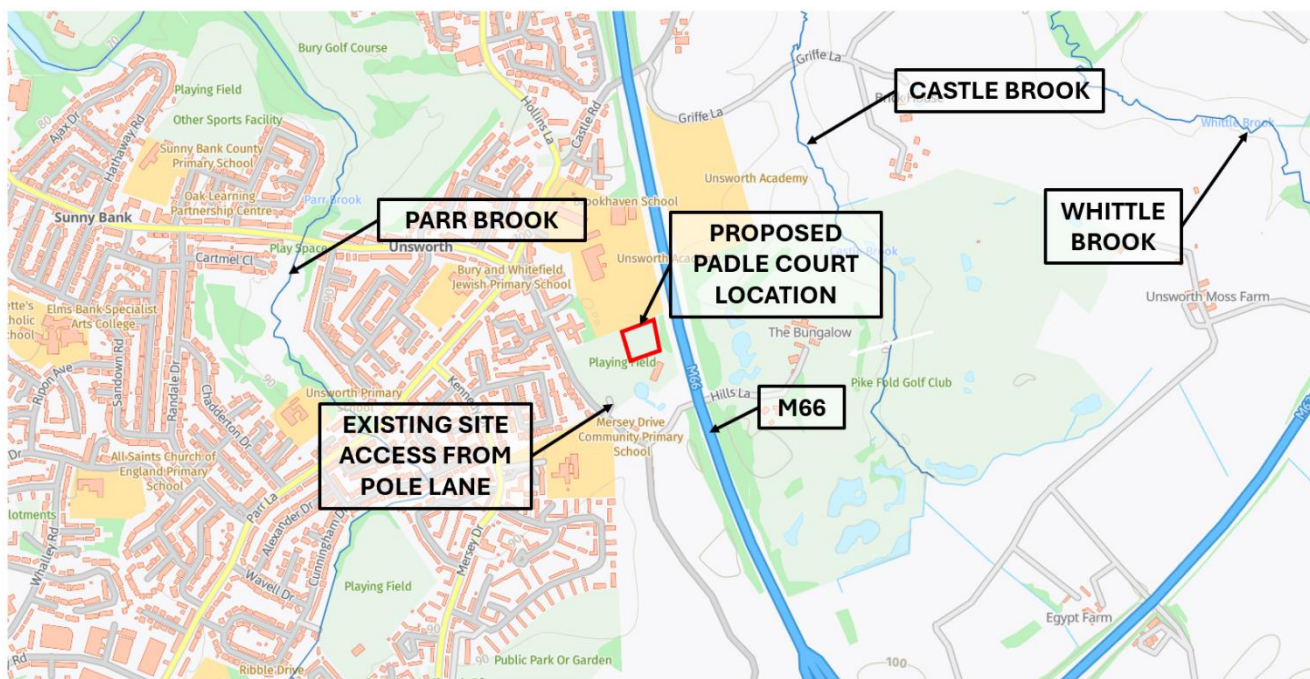
The site sits between several local watercourses that ultimately drain toward the River Roch catchment. Parr Brook, which originates in Unsworth and flows towards the River Roch, forms part of the local drainage network. Whittle Brook, another tributary of the River Roch, flows through the wider Unsworth area and associated valley landscapes. These watercourses contribute to the wider fluvial catchment but are not immediately adjacent to the application site.

The closest mapped watercourse to the site is Castle Brook, which flows to the east of the site and forms part of the wider River Roch catchment. The brook flows generally northwards through the Unsworth area before ultimately joining the River Roch. Whilst Castle Brook represents the nearest fluvial feature within the wider hydrological catchment, it is located some distance from the site and is separated from the site by existing urban development, local roads such as M66.

The site benefits from existing vehicular and pedestrian access from Pole Lane and is located within an established developed area with existing drainage infrastructure, presents a rectangular shaped parcel of land, spanning approximately 0.28 hectares. It is classified as greenfield land, as it's current use is for outdoor recreational purposes.

The site and surrounding boundary conditions are shown on the Aerial Image in Figure 2.1.

FIGURE 2.1 – SITE LOCATION



2.2 DRAINAGE POLICY AND REGULATORY FRAMEWORK

The proposed development is subject to a range of national and local policies and guidance relating to flood risk management and surface water drainage.

At the national level, planning policy relating to flood risk is set out within the National Planning Policy Framework and associated Planning Practice Guidance. These documents require development to be directed to areas of lowest flood risk through the application of the Sequential Test and ensure that developments are safe for their lifetime without increasing flood risk elsewhere. The NPPF also promotes the use of sustainable drainage systems to manage surface water runoff from new developments.

Surface water drainage design should also accord with the Non Statutory Technical Standards for Sustainable Drainage Systems, which set out the requirements for the design, construction, maintenance and operation of SuDS features in England. These standards emphasise controlling runoff at source, managing extreme rainfall events, improving water quality and incorporating amenity and biodiversity benefits where possible.

At the regional level, flood risk within Greater Manchester is informed by the Greater Manchester Strategic Flood Risk Assessment, which provides an evidence base for planning decisions and identifies flood risk from all sources including fluvial, surface water, groundwater and reservoirs. The SFRA provides guidance on runoff management and indicates that developments should be designed such that there is no flooding to the site during the 1 in 30-year rainfall event and no property flooding during the 1 in 100-year rainfall event including an allowance for climate change.

At the local level, Bury Council acts as both the Local Planning Authority and the Lead Local Flood Authority responsible for managing flood risk from surface water, groundwater and ordinary watercourses. The Council's Local Flood Risk Management Strategy sets out the approach to reduce flood risk and improve resilience to flooding events.

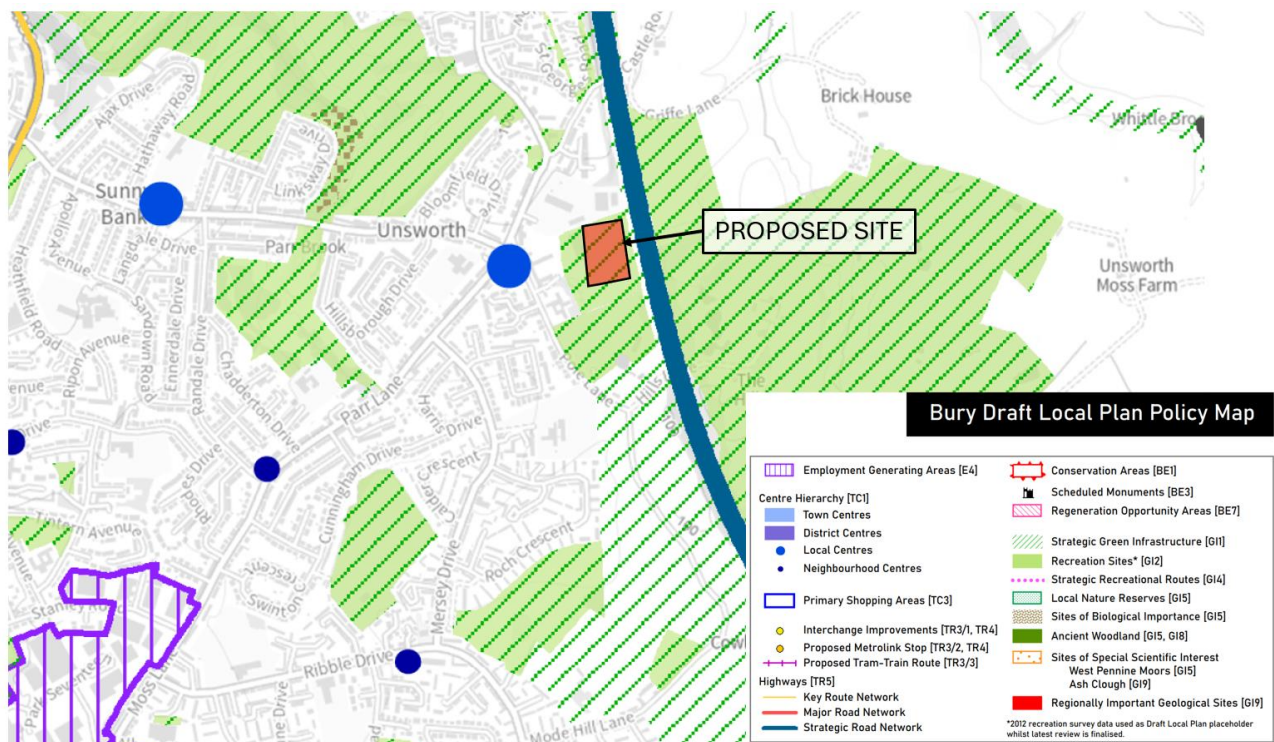
Bury Council promotes the use of SuDS to control runoff as close to the source as possible and to mimic natural drainage processes. Surface water drainage proposals submitted as part of planning applications are expected

to demonstrate compliance with national SuDS standards and ensure that runoff rates and volumes do not increase compared to existing conditions.

Together, this framework establishes the requirement for developments to manage surface water runoff sustainably, minimise flood risk to surrounding land and property, and ensure appropriate consideration of drainage infrastructure within the planning process.

The Bury Draft Local Plan Policy Map locates the site within the Strategic Green Infrastructure [G11] and part of the recreation Sites [G12] of the area, as shown in Image 2.2.

FIGURE 2.2 – BURY DRAFT LOCAL PLAN POLICY MAP.



3 NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

The National Planning Policy Framework (NPPF) clearly identifies flood risk as a specific material consideration in the Planning Process and in the allocation and release of sites for development or re-development.

NPPF encourages local planning authorities to use their existing powers to guide, regulate and control development in relation to flooding and flood risk. The framework expects local authorities to adopt a risk-based approach at all levels of planning, through the application of the Sequential Test detailed in Table 1 and 2, of the Technical Guidance to NPPF document, a copy of which is attached in Appendix A.

The aim of the sequential test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. The Strategic Flood Risk Assessment (SFRA) will provide the basis for applying this test. A sequential approach should be used in areas known to be at risk from any form of flooding.

The Water Resources Act 1991 [Section 105] also requires the Environment Agency to exercise a general supervision over all flood defence matters, including flood plains and wash lands which accommodate waters during periods of flood. In discharging their functions, the Agency from time to time carries out comprehensive surveys and flood studies, largely of 'main rivers' within its jurisdiction.

A Section 105 Study involves the Agency topographically surveying the subject watercourse (or parts of it) and obtaining details of the flow mechanics within the watercourse. This data then enables them to generate a comprehensive hydraulic computer model for the watercourse.

From this hydraulic model the EA can define the approximate extent of fluvial flood-plain associated with the 1 in 100-year (1% annual probability) flooding event or the extent of tidal floodplain associated with the 1 in 200-year (0.5% annual probability) flooding event.

The extents of the modelled floodplain are then provided to Local Planning Authorities, to enable them to make more informed decisions when considering proposed development in flood susceptible areas. If development is proposed in a flood susceptible area, or in an area where there is a history of flooding, the EA, as a statutory consultee in the Planning Process, will generally recommend that the risk of flooding be formally assessed, in accordance with the NPPF, and that a Flood Risk Assessment report be produced to support the Planning Application.

The broader modelled flood extents are also indicated on the EA's Flood Zone Maps, available through their website (Figure 5.1).

4 STRATEGIC FLOOD RISK ASSESSMENT (SFRA), THE SEQUENTIAL TEST AND EXCEPTION TEST

4.1 STRATEGIC FLOOD RISK ASSESSMENT

Local planning authorities are required to produce local development frameworks, which are a portfolio of local development documents [LDDs] that collectively deliver the spatial planning strategy for the authority area. The LDD's undergo a sustainability appraisal which assists planning authorities in ensuring their policies fulfil the principles of sustainability.

Strategic Flood Risk Assessments are one of the documents to be used as the evidence base for planning decisions and are a component of the Sustainability Appraisal process.

To assist Local Planning Authorities in their strategic land-use planning, SFRA's should present enough information to enable Local Authorities to apply the Sequential Test to their proposed development sites:

“Decision makers should use the SFRA to inform their knowledge of flooding, refine the information on the Flood Map and determine the variations in flood risk from all sources of flooding across and from their area. These should form the basis for preparing appropriate policies for flood risk management for these areas.”

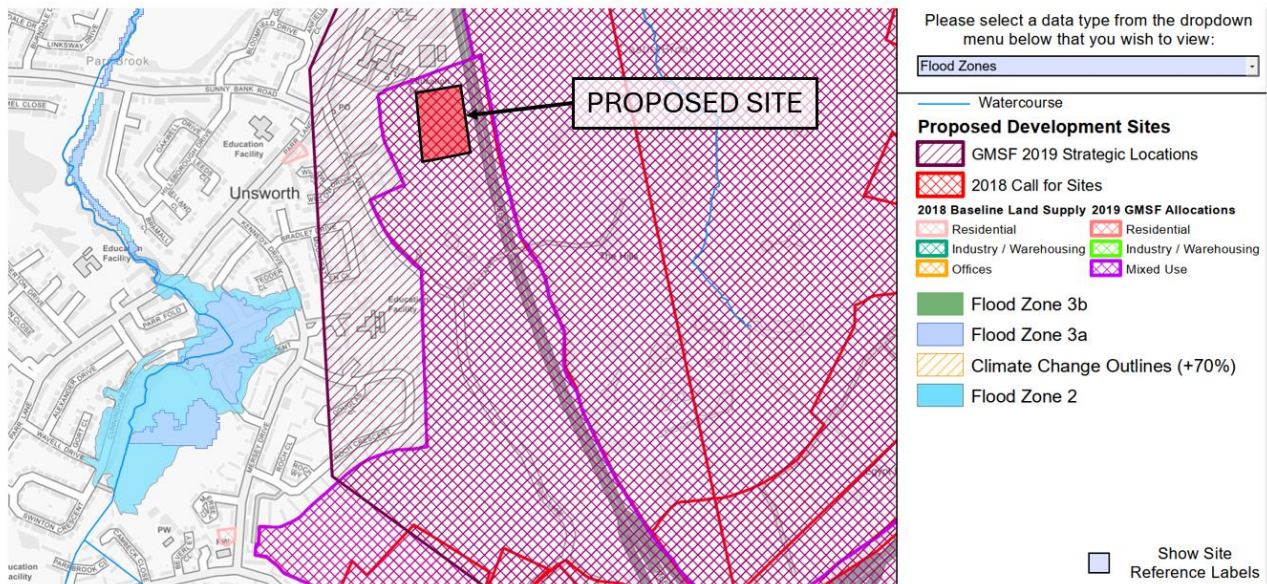
In October 2020 Greater Manchester Combined Authority produced a Level 2 Strategic Flood Risk Assessment. The SFRA provides a strategic overview of flood risk from all sources across the borough and is used by the Local Planning Authority and developers to guide development toward areas with the lowest probability of flooding and ensure appropriate mitigation measures are incorporated within new developments.

The SFRA identifies that flood risk within the borough arises from a combination of fluvial flooding, surface water runoff, groundwater emergence, sewer flooding, reservoir flooding and interactions between these sources, and these sources must be considered when preparing a site specific Flood Risk Assessment.

The closest watercourse to the application site is Castle Brook, which forms part of the wider River Roch drainage network. Mapping presented within the SFRA and the Environment Agency Flood Map for Planning indicates that the application site lies within Flood Zone 1, defined as land with a low probability of flooding from rivers (less than 0.1% annual probability), as shown in image 4.1 below. As such, the site is considered suitable for development in accordance with national planning policy and the Sequential Test principles.

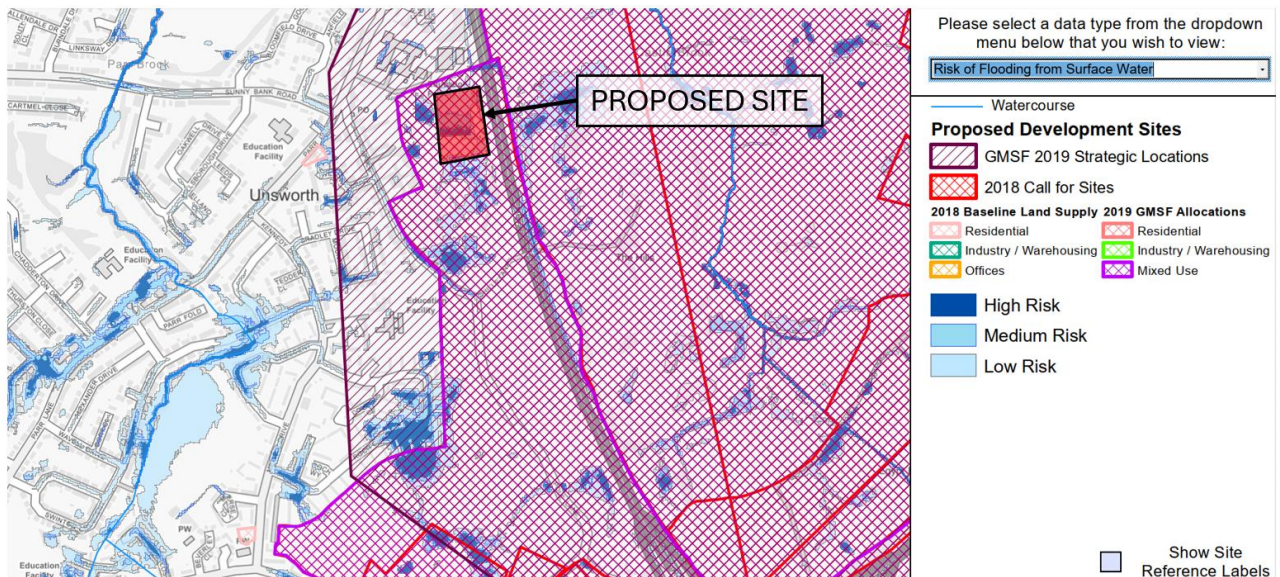
Although the site is not directly affected by fluvial flood zones, the SFRA highlights that watercourses within urban catchments can experience rapid increases in flow during intense rainfall events due to urban runoff and constrained channel capacity. Consequently, development proposals should ensure that surface water runoff is appropriately managed to avoid contributing to increased flows within downstream watercourses such as Castle Brook.

FIGURE 4.1 – FLOOD ZONES AFFECTING THE SITE. SOURCE: SFRA.



The SFRA identifies surface water flooding as one of the most significant sources of flood risk within Greater Manchester, particularly within urban areas where impermeable surfaces and existing drainage networks can become overwhelmed during high-intensity rainfall events. Surface water flood mapping indicates that parts of the site are affected by areas of surface water flood risk, with isolated locations showing a higher probability of flooding during extreme rainfall events. These areas generally represent localised ponding or overland flow routes that may occur when rainfall exceeds the capacity of the existing drainage network or when the ground becomes saturated. The extent of the mapped surface water flood risk affecting the site is shown in Figure 4.2.

FIGURE 4.2 – SURFACE WATER FLOOD RISK AFFECTING THE SITE. SOURCE: SFRA.



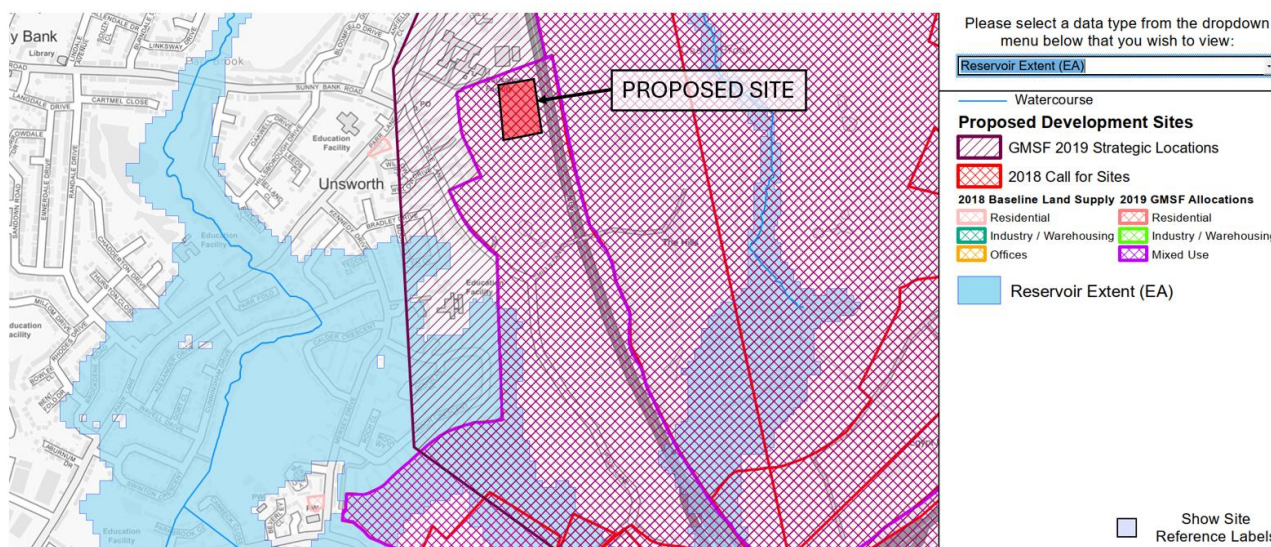
The SFRA and local flood management strategy for Bury highlight that these types of events can occur rapidly and may affect areas outside of mapped fluvial flood zones. Given the existing sports ground contains a combination of permeable grassed areas and localised hardstanding, the introduction of new impermeable surfacing associated with the proposed padel court has the potential to alter runoff characteristics. As such, the drainage strategy should ensure that surface water runoff is managed through sustainable drainage systems and that discharge rates do not exceed existing conditions.

In terms of groundwater flooding, the SFRA mentions the potential for groundwater emergence within certain parts of Greater Manchester, particularly where superficial deposits or shallow groundwater levels are present. Groundwater flooding can occur following prolonged periods of rainfall where soils become saturated and groundwater levels rise to the surface. The SFRA advises that developments should consider the potential influence of local ground conditions on drainage performance, particularly where infiltration-based drainage solutions are proposed.

The SFRA does not identify any historic flooding across the site or its immediate vicinity. However, the SFRA recognises that flooding from the public sewer network can occur when sewer capacity is exceeded during extreme rainfall events. The proposed site is located within an established urban area where drainage infrastructure is already present. Consequently, the proposed development should ensure that the additional runoff generated by new impermeable surfaces does not adversely affect the capacity of the existing drainage network.

The SFRA also considers the potential risk associated with reservoir failure, which is mapped and included in Image 4.3 below. Reservoir flooding is categorised as a residual risk event with a very low probability but potentially significant consequences should it occur. The reservoir inundation mapping indicates the site will not be affected by the uncontrolled release of water from large raised reservoirs.

FIGURE 4.3 – RESERVOIR FLOODING AFFECTING THE SITE. SOURCE: SFRA.



The SFRA highlights that climate change is expected to increase the frequency and intensity of rainfall events, which may lead to increased surface water flooding and higher peak flows within local watercourses. Development proposals should therefore ensure that drainage infrastructure is designed to accommodate future rainfall scenarios, including allowances for climate change in accordance with national planning guidance.

4.1 THE SEQUENTIAL TEST AND EXCEPTION TEST

The application site is located within Flood Zone 1, which represents land with a low probability of flooding from rivers or the sea. National planning policy requires the Sequential Test to be used to steer development toward areas with the lowest flood risk. However, where development is proposed within Flood Zone 1, this requirement is generally considered to be satisfied as the site already lies within the lowest flood risk category.

The Exception Test is only required for certain types of development located within Flood Zones 2 or 3, where the Sequential Test alone cannot demonstrate that development should proceed. As the application site is located within Flood Zone 1, the Exception Test is not required.

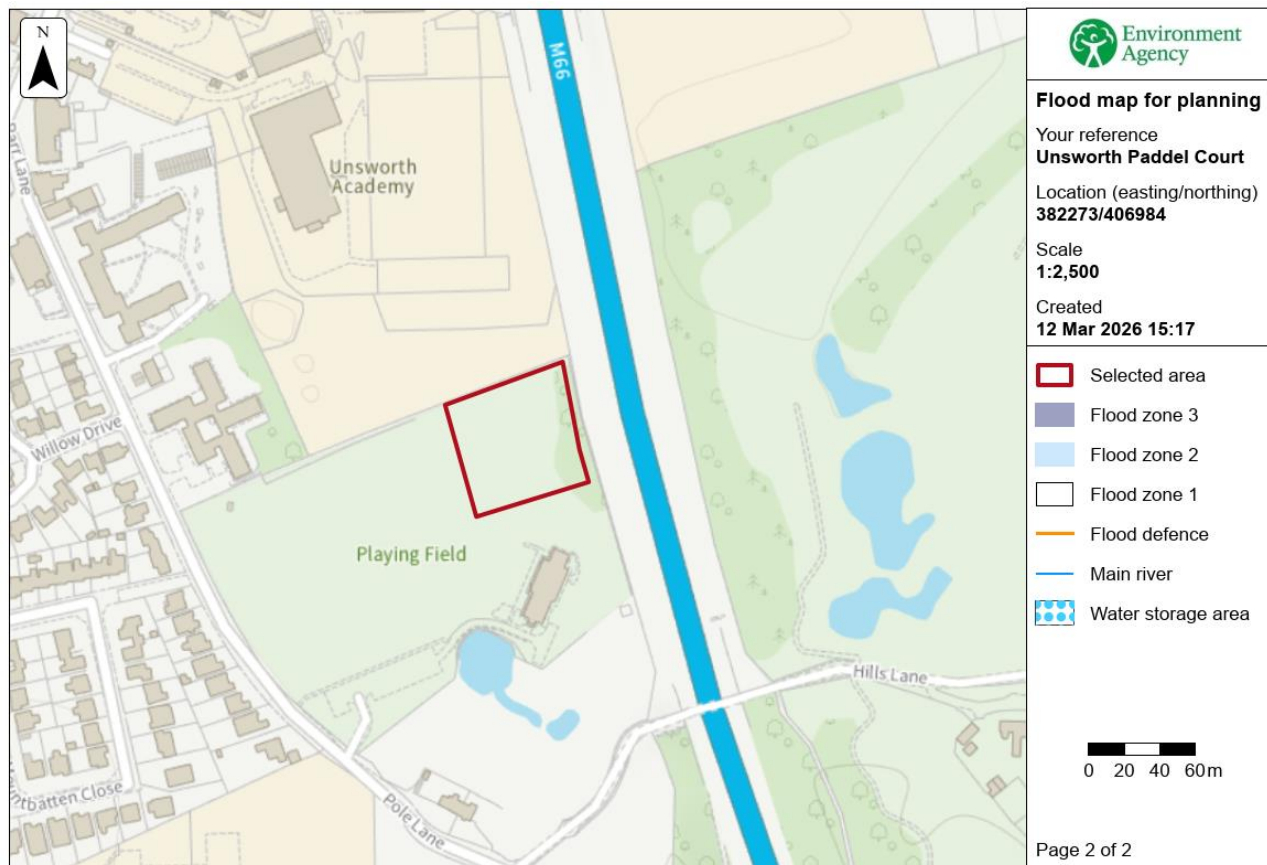
5 FINDINGS OF A FLOOD RISK ASSESSMENT

EDGE Consulting Engineers have carried out a Flood Risk Assessment (FRA) in line with National Planning Policy Framework.

The Environment Agency's flood zone maps, now available on the GOV.uk website, indicate that the site is located within Flood Zone 1 (Ref Figure 5.1). This area is defined as:

"Land having a less than 1 in 1,000 annual probability of river or sea flooding (i.e., a less than 0.1% chance in any given year). It is categorized as having a low probability of flooding"

FIGURE 5.1 – FLOOD ZONE MAP



Development within this zone is considered appropriate in accordance with national planning policy, provided that other sources of flooding are appropriately assessed and managed.

Key characteristics of Flood Zone 1 include:

1. **Low Fluvial Flood Risk:** Flood Zone 1 encompasses areas that have a very low likelihood of flooding from rivers or the sea. As such, these areas are generally considered suitable for most forms of development, subject to appropriate consideration of flood risk from other sources such as surface water, groundwater and drainage infrastructure.
2. **Planning and Development Considerations:** Although Flood Zone 1 represents the lowest level of fluvial flood risk, developments may still be required to undertake a Flood Risk Assessment where other potential flood mechanisms are present, such as surface water flooding or where development could affect existing drainage patterns. The purpose of the FRA is therefore to ensure that the proposed development remains safe for its lifetime and does not increase flood risk elsewhere.

3. **Surface Water Management:** Within Flood Zone 1, the principal flood risk consideration is typically associated with surface water runoff generated during intense rainfall events. Development proposals should therefore ensure that surface water runoff is appropriately managed using sustainable drainage techniques, with discharge rates controlled to avoid increasing runoff to surrounding drainage networks or watercourses.
4. **Climate Change Considerations:** Climate change is expected to increase the intensity and frequency of rainfall events in the future. As a result, drainage systems must be designed to accommodate more extreme rainfall events, including appropriate allowances for climate change within surface water drainage calculations.

Current planning guidance indicates that developments within Flood Zone 1 should ensure that flood risk from all sources is appropriately assessed and that surface water drainage is designed to ensure that the proposed development does not increase flood risk elsewhere. As such, the Flood Risk Assessment should demonstrate that appropriate drainage measures are implemented and that runoff generated by the development is managed effectively.

This assessment should therefore include:

- Information about the existing drainage characteristics of the site.
- An assessment of the potential increase in surface water runoff resulting from the proposed development.
- Details of the proposed surface water drainage strategy.
- Consideration of climate change impacts on rainfall intensity and drainage performance.

5.1 FLOOD RISK

5.1.1.1 Assessment of Fluvial Flood Risk

Flooding from rivers occurs when water levels rise above the capacity of a river channel or when defences are overtopped, allowing water to flow onto the surrounding floodplain.

The proposed Paddle Court is located within Flood Zone 1 according to the Environment Agency Flood Map included in Figure 5.1. This confirms that the site is at low probability of flooding from rivers or the sea, with an annual probability of flooding of less than 0.1%.

The closest mapped watercourse to the site is Castle Brook, which forms part of the wider River Roch catchment. However, the application site is located at a sufficient distance from this watercourse and lies outside the associated floodplain.

Based on available Environment Agency mapping and SFRA information, flooding from rivers is therefore not considered to pose a significant risk to the site.

Given the low probability of fluvial flooding affecting the site, no specific flood defence measures are required.

5.1.1.2 Assessment of Surface Water Flood Risk

Surface water flooding may occur when intense rainfall causes the ground to become saturated and its capacity is exceeded. The surface water flood map available on the EA's website, Figure 5.2 below, indicates that some localised flooding is identified in the central portion of the site, as well as along the northern and southern boundaries, during the 1 in 30-year storm event. For more extreme events, the extent of flooding increases. The 1 in 100-year storm event shows a larger area affected, shown in Figure 5.3, and the 1 in 1000-year event

indicates that surface water could temporarily occupy most of the site, refer to Figure 5.4. These areas of ponding generally correspond with low-lying portions of the site and represent temporary overland flow routes rather than active flow paths.

FIGURE 5.2 – SURFACE WATER FLOOD RISK FOR 1 IN 30-YEAR

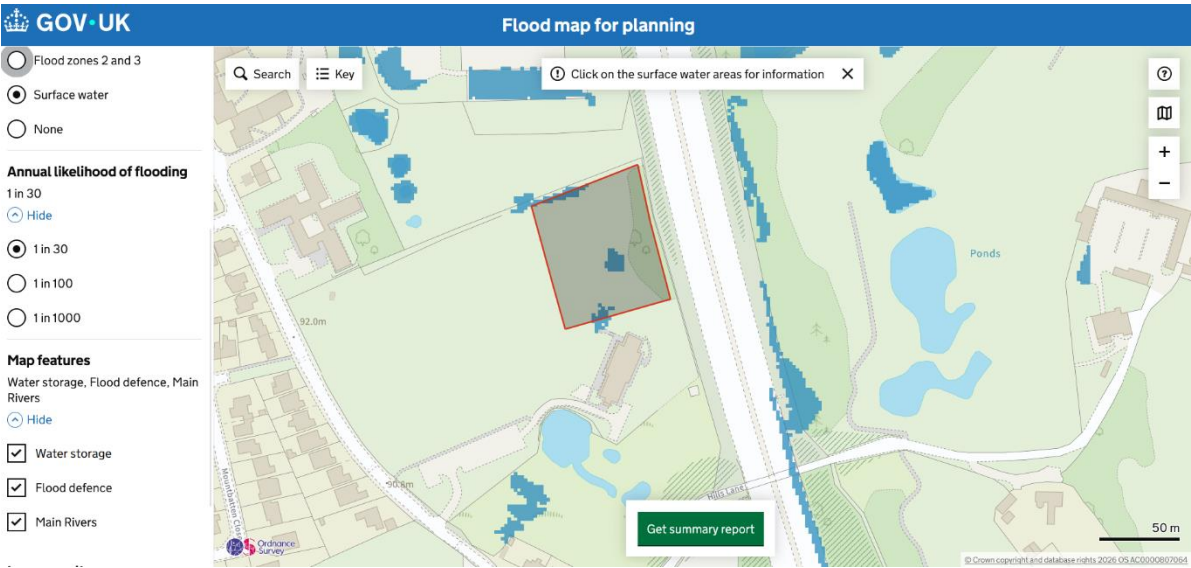


FIGURE 5.3 – SURFACE WATER FLOOD RISK FOR 1 IN 100-YEAR

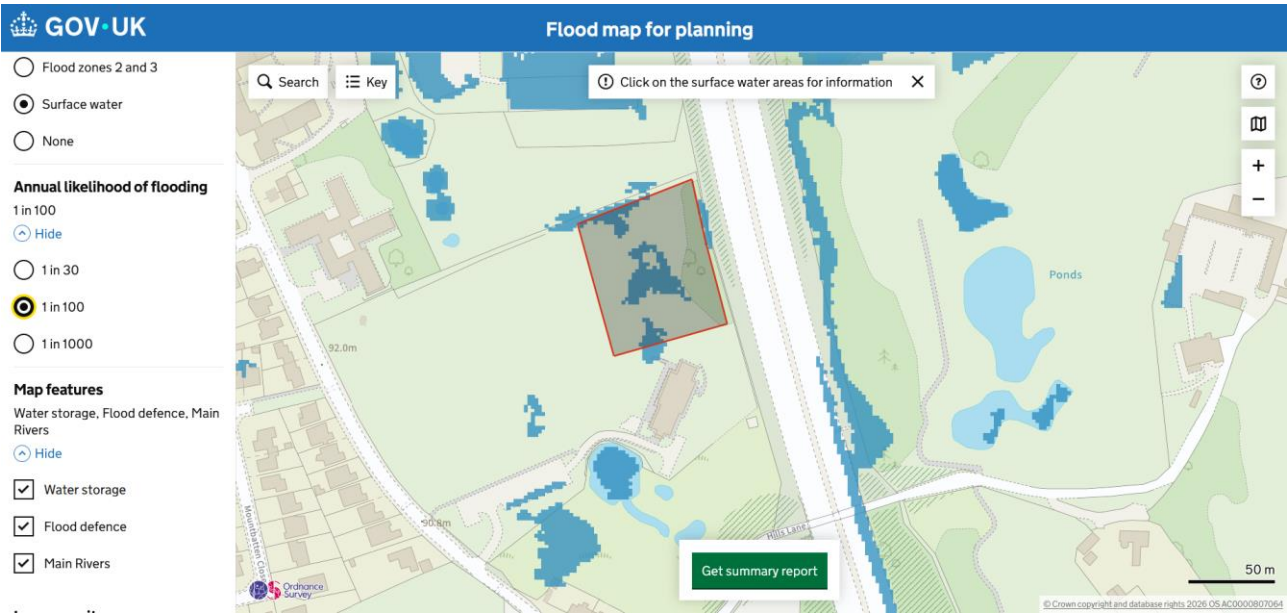
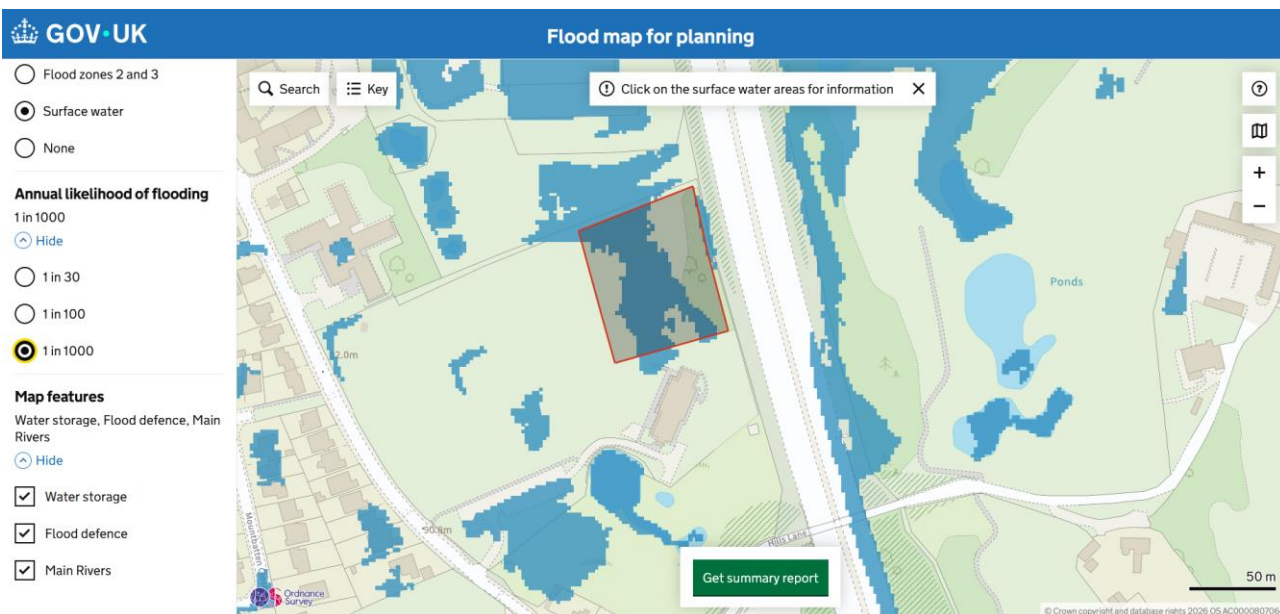


FIGURE 5.4 – SURFACE WATER FLOOD RISK FOR 1 IN 1000–YEAR



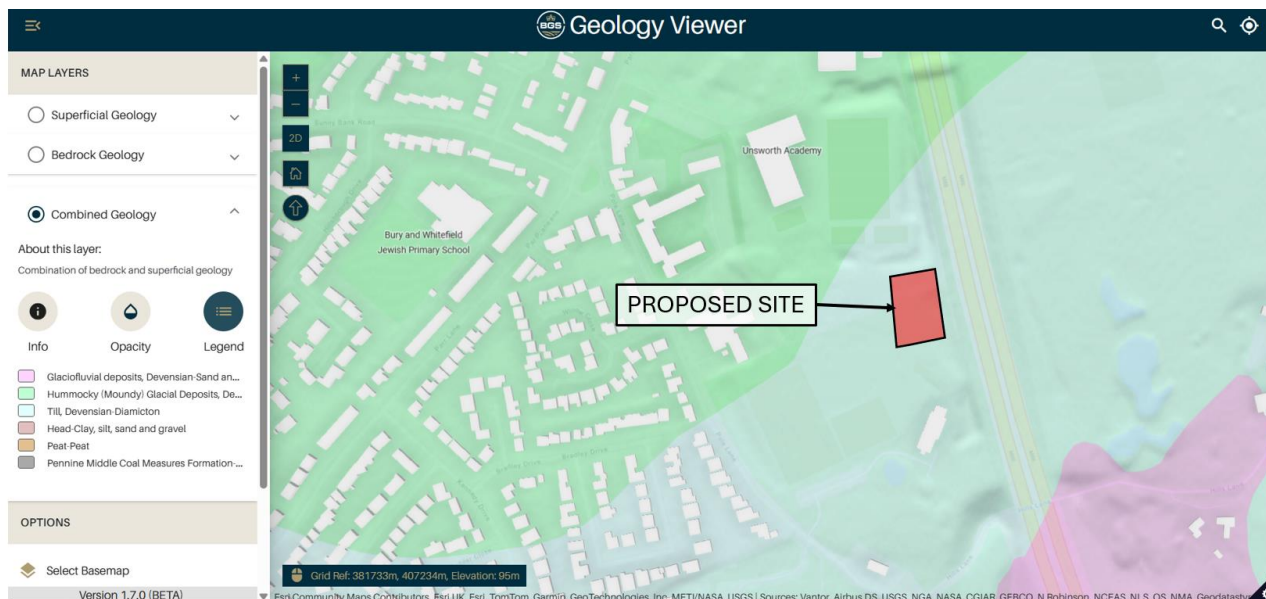
Given the proposed development introduces new impermeable surfacing associated with the padel court, the drainage strategy has been designed to ensure that surface water runoff generated by the development is appropriately managed. This will include the implementation of sustainable drainage measures designed to attenuate runoff and restrict discharge rates to ensure that the development does not increase flood risk elsewhere.

5.1.1.3 Assessment of Ground Water Flood Risk

Groundwater flooding generally occurs as a result of long duration rainfall events, when the associated recharge of permeable geological deposits raises the water table until it is above ground level. Groundwater flooding is generally of longer duration than fluvial or surface water flooding and may take weeks or months to recede as groundwater flow is much slower. Flooding of subsurface structures can also occur where groundwater levels rise to just below ground. Groundwater flooding can be associated with both permeable bedrock and superficial deposits.

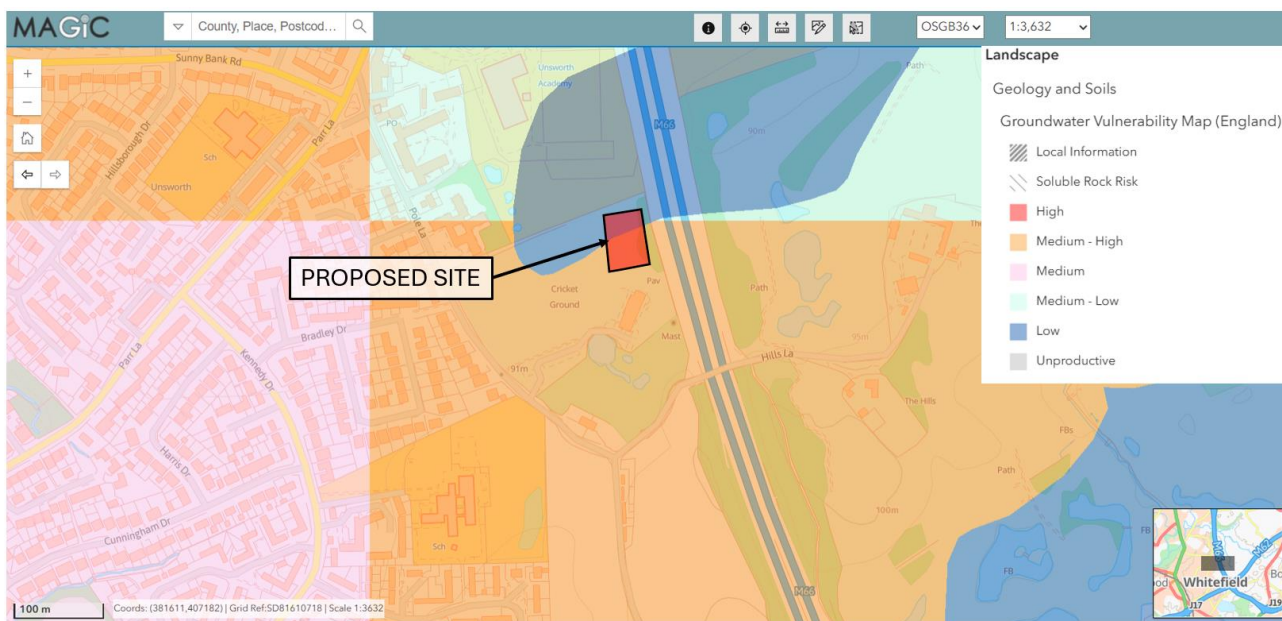
A review of the British Geological Survey (BGS) mapping indicates that the site is underlain by till deposits (Devensian Diamicton) at superficial level. These deposits are typically characterised by a low permeability clay-rich composition, which restricts infiltration and limits the movement of groundwater through the subsurface.

FIGURE 5.5 – COMBINATION OF BEDROCK AND SUPERFICIAL GEOLOGY FOR THE SITE.



The groundwater vulnerability mapping classifies the site as having a medium-high groundwater vulnerability. It is noted that this dataset relates to the sensitivity of groundwater to pollution, as such, it does not provide a direct indication of flood risk but is relevant when considering the suitability of infiltration based drainage solutions.

FIGURE 5.6 – GROUNDWATER VULNERABILITY MAP FOR THE SITE.



Given the low permeability characteristics of the underlying geology, rainfall is more likely to result in surface water runoff and localised ponding, rather than significant infiltration to groundwater or groundwater emergence at the surface. While groundwater levels may fluctuate during prolonged rainfall events, the potential for groundwater flooding at the site is considered to be limited.

The geological conditions at the site may constrain the use of infiltration-based sustainable drainage systems (SuDS), and therefore infiltration testing should be undertaken to confirm feasibility.

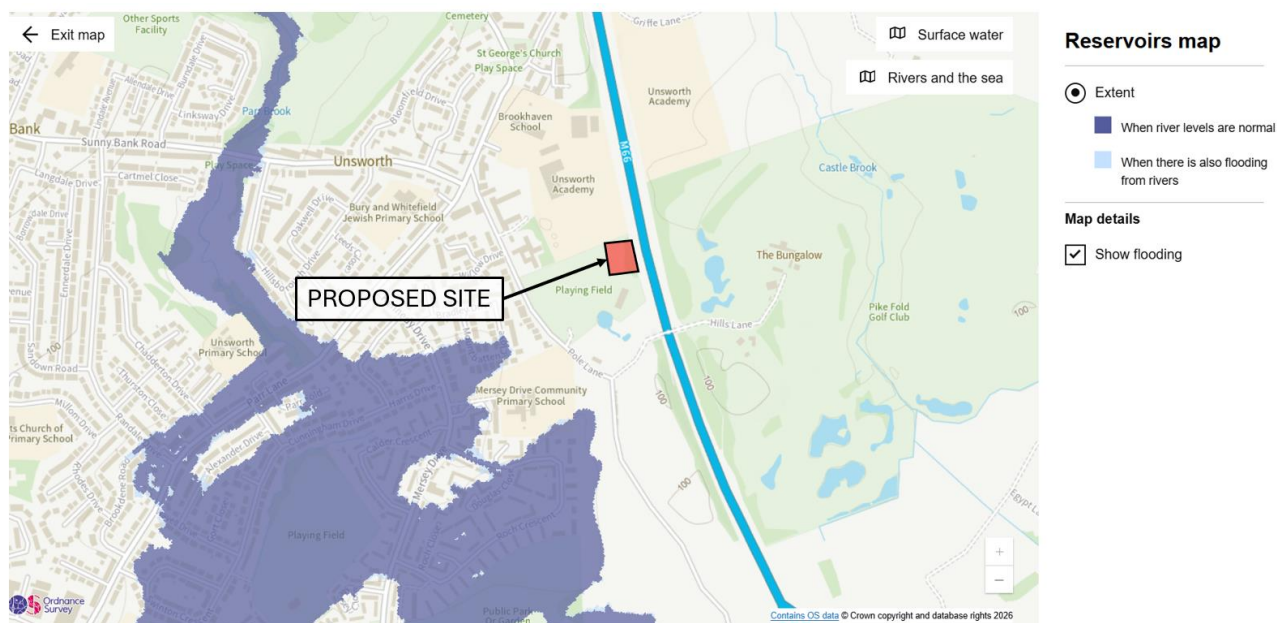
Overall, taking into account the geological conditions and available mapping, groundwater flooding is not considered to represent a significant risk to the proposed development, and the primary implication of the underlying ground conditions relates to drainage design rather than flood risk.

5.1.1.4 Assessment of Reservoirs and Canals Flood Risk

Reservoir flooding represents a residual risk associated with the unlikely failure of a large raised reservoir.

A review of the Environment Agency reservoir flood mapping indicates that the site is not located within an area identified as being at risk of flooding from reservoir failure. Consequently, reservoir flooding is not considered a significant risk to the site and does not impose any design constraints on the proposed development.

FIGURE 5.8 – RESERVOIRS AND CANALS FLOOD RISK.



5.1.1.5 Assessment of Sewers Flood Risk

Flooding from the public sewer network can occur where sewer capacity is exceeded during extreme rainfall events.

The application site is located within an established urban area where drainage infrastructure is already present. While the SFRA does not identify any historic flooding associated with the site, the possibility of sewer surcharge during extreme rainfall events cannot be entirely ruled out.

The proposed development will therefore ensure that additional surface water runoff generated by the padel court is appropriately managed through the proposed drainage system. This will ensure that discharge rates are controlled and that the capacity of the existing drainage network is not adversely affected.

5.1.1.6 Assessment of Proposed Sewers Flood Risk

The proposed development will incorporate a surface water drainage strategy designed to manage runoff generated by the padel court. Surface water will be collected and conveyed via the proposed drainage network and attenuated where required to ensure that discharge rates do not exceed existing conditions.

The drainage design will ensure that runoff generated by the development during storm events, including the 1 in 100-year rainfall event with an allowance for climate change, is appropriately managed.

As a result, the proposed development will not increase flood risk elsewhere and will ensure that surface water generated by the development is safely managed.

The proposed drainage system is shown in Appendix C.

5.2 DRAINAGE STRATEGY

Proposed Foul Drainage

The proposed padel court development will not generate any foul flows as part of the scheme, as no buildings or pavilion facilities are included within the proposed infrastructure. As such, no new foul drainage system is required.

Existing Surface Water Drainage

The site is currently greenfield and forms part of the existing recreational grounds associated with the cricket and tennis club. The site comprises predominantly permeable grassed surfaces, with no evidence of a formal positive surface water drainage system within the footprint of the proposed development.

Surface water runoff from the existing site is therefore assumed to drain naturally via infiltration and overland flow in accordance with the existing topography.

Proposed Surface Water Drainage

The proposed development will introduce new impermeable surfacing associated with the padel court. As such, a new surface water drainage system will be implemented to collect, manage and discharge runoff generated by the development.

In accordance with national and local policy, the drainage strategy has been designed to mimic greenfield runoff conditions and ensure that the development does not increase flood risk elsewhere.

Drainage Hierarchy

A site specific review of the drainage hierarchy has been undertaken:

- Infiltration (soakaways): Based on the underlying geology (Devensian till), infiltration is anticipated to be limited due to low permeability soils. As such, soakaways have been discounted at this stage, pending confirmation through site-specific infiltration testing.
- Discharge to watercourse: The nearest watercourse is Castle Brook, however, it is located at a distance from the site and there is no direct hydraulic connection. Discharge to this watercourse would require off-site infrastructure and third-party land agreements, and is therefore not considered feasible for this development.
- Discharge to surface water sewer: In accordance with the drainage hierarchy, discharge to the existing surface water sewer network is therefore considered the most appropriate solution.

Runoff Rates

Surface water discharge from the site will be restricted to greenfield runoff rates in line with best practice and LLFA requirements.

The greenfield runoff rate has been calculated using the HR Wallingford Greenfield Runoff Estimation Method for a contributing catchment area of approximately 0.217 hectares.

The calculated runoff rates are as follows:

	GREENFIELD RUNOFF RATE
Qbar	1.6 l/s
1 IN 30 YEARS	1.7 l/s
1 IN 100 YEARS	2.08 l/s

Simulation summary of the Greenfield runoff calculation can be found in Appendix D.

Attenuation and Storage

Due to the restriction of discharge rates to greenfield conditions, attenuation storage is required to accommodate runoff during storm events.

The proposed strategy includes the provision of an underground attenuation tank, designed to store surface water runoff generated by the development during storm events up to and including the 1 in 100-year rainfall event, plus 45% allowance for climate change.

Preliminary calculations undertaken using MicroDrainage source control software indicate that a storage volume of approximately 156m³ will be required.

Preliminary attenuation calculations are included in Appendix E.

Proposed Drainage Layout

Surface water runoff from the proposed padel court will be collected via a network of drainage channels and pipework and conveyed to the proposed attenuation system. Flows will then be discharged at a controlled rate to the existing surface water sewer network.

Any landscaped areas within the development will remain permeable and will continue to allow natural infiltration where possible, maintaining greenfield characteristics across these areas.

Exceedance flows, in the event of system surcharge or extreme rainfall events, will be directed overland away from sensitive areas and managed within the site boundary to prevent off-site flooding.

A preliminary drainage concept outlining the proposals is included within Appendix C.

6 RESIDUAL RISKS

The table below outlines the initial qualitative assessment of risk posed by each potential source of flooding, the mechanisms for flooding and the likely consequences. The Table also includes a review of possible mitigation measures and what effect, if any, the mitigation measures are likely to have on the residual risk posed by each potential flood source. Categories of risk have been qualitatively defined as:

- High Risk: Flooding is likely to result in significant damage to property and pose a significant risk to life.

- Medium Risk: Flooding is likely to result in possible minor damage to property, but flood progress would allow adequate time for residents to be warned and safely evacuated to higher ground or appropriate places of safety.
- Low Risk: Flooding is unlikely to result in any damage to property and pose little or no risk to life

Source	Flood Mechanism & Consequences	Assessment of Risk	Recommended Mitigation Measures	Residual Risk
Fluvial flooding	Flooding from nearby watercourses, principally Castle Brook, during extreme rainfall events. The site is located within Flood Zone 1 with no direct hydraulic connectivity.	Low	• No mitigation required due to Flood Zone 1 location. • Development to remain outside of any functional floodplain. • Ensure no increase in runoff to surrounding catchment.	Very Low
Pluvial flooding	Risk of flooding from overland flows in extreme events. Ponding of surface water due to ground being saturated and capacity being exceeded.	Medium	• Restrict discharge to greenfield rate (1.6 l/s) • Provide attenuation storage for 1 in 100-year + 45% climate change. • Design exceedance flow routes away from the padel court and surrounding areas.	Low
Surcharging of artificial drainage systems	Drainage systems operating above design capacity, resulting in: • surcharging of manholes / drainage systems. • over-land flow through development. • ponding in low-lying areas of site. • no over-land flow route for flood waters accumulating in low-lying areas.	Medium	• Appropriate design of SW drainage system to provide sufficient storage. • Provision of overland flood flow routes through proposed development. • Avoid infiltration SuDS unless BRE365 testing confirms suitability	Low
Infrastructure failure	Water main burst resulting in: • Possible over-land flows through / adjacent to the site and possible inundation of property. • Possible ponding in low-lying areas.	Low	• Safe access/egress available to adjacent highway. • Flood flow route through development.	Very Low

7 SuDS EVALUATION

Re-development of the site will result in impermeable areas and therefore corresponding run-off volumes. The use of SuDS techniques to discharge the additional surface water will be evaluated in this section of the report.

The storm water drainage system for the proposed development will be designed in accordance with the DCG, which requires that any surface water drainage system, should not surcharge during the 1 in 2-year storm

event, and should not flood during a 1 in 30-year storm event (i.e., all run-off contained wholly within the sewerage system during the 1 in 30-year event).

Whilst the DCG requires there be no surface flooding during the 1 in 30-year storm event. It is generally accepted that a degree of surface flooding can be permitted during extreme storm events i.e., 1 in 100 year + climate change. This will be subject to specific areas being designated as flood susceptible and subject to flooding of these areas posing little or no risk to human life and damage to property. Examples of surface areas which might be permitted to flood in such events are:

- Agricultural land
- Recreational land (playing fields etc.)
- Landscaped areas
- Highways
- Car parks
- Other non-inhabited, designated areas

In all cases where surface flooding might be permitted or designed into a scheme, due diligence needs to be given to the NPPF and the need to make potential users of such areas aware of their functionality and purpose, and the requirement to maintain safe egress and access at all times.

The Building Regulations Approved Document H outlines a hierarchy of potential methods of disposing surface water from a site:

- A soakaway: or where that is not practicable.
- A watercourse or river; or where that is not practicable,
- A sewer.

The viability of each has been assessed below:

- Soakaway: Regarding the consideration of infiltration methods for the disposal of surface water, soakaways are not considered to be feasible as per the SFRA and BGA findings, subject to further testing.
- Watercourse: No existing watercourses are found in close proximity to the site.
- Sewers: In accordance with the drainage hierarchy, discharge to the existing surface water sewer network is therefore considered the most appropriate solution.

The proposed surface water attenuation for the development will be provided via a geocellular attenuation tank. This solution has been selected as the most appropriate for the site due to the limited available space within the existing sports facility and the need to maximise the usable playing area for the proposed padel court. Geocellular systems provide a high storage volume within a relatively small footprint and can be installed below ground, thereby avoiding any loss of surface area or conflict with the operational use of the site.

In addition, given the anticipated low permeability of the underlying strata, a sealed attenuation system with controlled discharge is considered more appropriate. The use of a geocellular tank allows surface water runoff to be effectively attenuated and discharged at greenfield rates, ensuring compliance with the drainage hierarchy and preventing any increase in flood risk elsewhere

8 CONCLUSIONS AND RECOMMENDATIONS

- This Flood Risk Assessment has been prepared in accordance with relevant and current national and local planning policy and guidance, including the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance.
- The most up to date Environment Agency flood risk mapping identifies that the site is within Flood Zone 1, defined as having a low probability of flooding from rivers or the sea, with an annual probability of flooding of less than 0.1%.
- The Strategic Flood Risk Assessment and EA flood mapping identify surface water flooding as the principal source of flood risk affecting the site, with localised ponding for the 1in30 year that increases to large flooded areas for higher rainfall events.
- The proposed development will not increase fluvial flood risk and is appropriately located in accordance with the aims of the Sequential Test, which is considered satisfied for development within Flood Zone 1. The Exception Test is therefore not required.
- A sustainable surface water drainage strategy has been developed in accordance with the drainage hierarchy. Infiltration has been discounted at this stage due to the presence of low permeability Devensian till, subject to confirmation through site investigation.
- Surface water runoff from the development will be restricted to the greenfield Qbar rate of 1.6 l/s, ensuring that the scheme mimics existing greenfield conditions and does not increase runoff to the wider catchment.
- Attenuation storage will be provided via an underground geocellular attenuation tank, designed to accommodate all rainfall events up to and including the 1 in 100-year storm event plus a 45% allowance for climate change.
- The drainage strategy incorporates appropriate exceedance flow routing to ensure that, in the event of system surcharge or extreme rainfall, flows are managed safely within the site and do not increase flood risk to third parties.
- The development will not introduce any foul flows and therefore does not require a foul drainage connection.

In conclusion the scheme has been designed to ensure that it does not increase flood risk, it reduces surface run-off. Moreover, the scheme design will also ensure that the development is resistant and resilient to any flood risk event and safe for users throughout its lifetime. As such, the scheme is in compliance with relevant national and local guidance regarding flood risk and there are no planning reasons for withholding planning permission on flood risk grounds.

APPENDICES

Appendix A – Extract from chapter 14 of NPPF February 2025

National Planning Policy Framework

From: Ministry of Housing, Communities and Local Government

(/government/organisations/ministry-of-housing-communities-local-government)

Published 27 March 2012

Updated: 27 March 2012 - [See all updates](#)

[Back to contents](#)

14. Meeting the challenge of climate change, flooding and coastal change

Paragraphs 161 to 186

161. The planning system should support the transition to net zero by 2050 and take full account of all climate impacts including overheating, water scarcity, storm and flood risks and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.

Planning for climate change

162. Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating and drought from rising temperatures ⁶¹. Policies should support appropriate measures to ensure the future health and resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.

163. The need to mitigate and adapt to climate change should also be considered in preparing and assessing planning applications, taking into account the full range of potential climate change impacts.

164. New development should be planned for in ways that:

a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through incorporating green infrastructure and sustainable drainage systems; and

b) help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings in plans should reflect the government's policy for national technical standards.

165. To help increase the use and supply of renewable and low carbon energy and heat, plans should:

(a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, and their future re-powering and life extension, while ensuring that adverse impacts are addressed appropriately (including cumulative landscape and visual impacts);

(b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

(c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

166. In determining planning applications, local planning authorities should expect new development to:

(a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and

(b) take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

167. Local planning authorities should also give significant weight to the need to support energy efficiency and low carbon heating improvements to existing buildings, both domestic and non-domestic (including through installation of heat pumps and solar panels where these do not already benefit from permitted development rights). Where the proposals would affect conservation areas, listed buildings or other relevant designated heritage assets, local planning authorities should also apply the policies set out in chapter 16 of this Framework.

168. When determining planning applications for all forms of renewable and low carbon energy developments and their associated infrastructure, local planning authorities should:

a) not require applicants to demonstrate the overall need for renewable or low carbon energy, and give significant weight to the benefits associated with renewable and low carbon energy generation and the proposal's contribution to a net zero future;

b) recognise that small-scale and community-led projects provide a valuable contribution to cutting

greenhouse gas emissions;

c) in the case of applications for the repowering and life-extension of existing renewable sites, give significant weight to the benefits of utilising an established site.

169. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas.

Planning and flood risk

170. Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

171. Strategic policies should be informed by a strategic flood risk assessment, and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards.

172. All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:

a) applying the sequential test and then, if necessary, the exception test as set out below;

b) safeguarding land from development that is required, or likely to be required, for current or

future flood management;

c) using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding, (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and

d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.

173. A sequential risk-based approach should also be taken to individual applications in areas known to be at risk now or in future from any form of flooding, by following the steps set out below.

174. Within this context the aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test.

175. The sequential test should be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk).

176. Applications for some minor development and changes of use ⁶² should also not be subject to the sequential test, nor the exception test set out below, but should still meet the requirements for site-specific flood risk assessments set out in footnote 63.

177. Having applied the sequential test, if it is not possible for development to be located in areas

with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3.

178. The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that:

a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and

b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

179. Both elements of the exception test should be satisfied for development to be allocated or permitted.

180. Where planning applications come forward on sites allocated in the development plan through the sequential test, applicants need not apply the sequential test again. However, the exception test may need to be reapplied if relevant aspects of the proposal had not been considered when the test was applied at the plan-making stage, or if more recent information about existing or potential flood risk should be taken into account.

181. 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 assessment⁶³. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

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

182. Applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. Sustainable drainage systems provided as part of proposals for major development should:

- a) take account of advice from the Lead Local Flood Authority;
- b) have appropriate proposed minimum operational standards; and
- c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.

Coastal change

183. In coastal areas, planning policies and decisions should take account of the UK Marine Policy Statement and marine plans. Integrated Coastal Zone Management should be pursued across local authority and land/sea boundaries, to

ensure effective alignment of the terrestrial and marine planning regimes.

184. Plans should reduce risk from coastal change by avoiding inappropriate development in vulnerable areas and not exacerbating the impacts of physical changes to the coast. They should identify as a Coastal Change Management Area any area likely to be affected by physical changes to the coast, and:

- a) be clear as to what development will be appropriate in such areas and in what circumstances; and
- b) make provision for development and infrastructure that needs to be relocated away from Coastal Change Management Areas.

185. Development in a Coastal Change Management Area will be appropriate only where it is demonstrated that:

- a) it will be safe over its planned lifetime and not have an unacceptable impact on coastal change;
- b) the character of the coast including designations is not compromised;
- c) the development provides wider sustainability benefits; and
- d) the development does not hinder the creation and maintenance of a continuous signed and managed route around the coast ⁶⁴.

186. Local planning authorities should limit the planned lifetime of development in a Coastal Change Management Area through temporary permission and restoration conditions, where this is necessary to reduce a potentially unacceptable level of future risk to people and the development.

(61) In line with the objectives and provisions of the Climate Change Act 2008

(<http://www.legislation.gov.uk/ukpga/2008/27/contents>).



(62) This includes householder development, small non-residential extensions (with a footprint of less than 250m²) and changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the sequential and exception tests should be applied as appropriate. ↩

(63) A 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. ↩

(64) As required by the Marine and Coastal Access Act 2009.↩



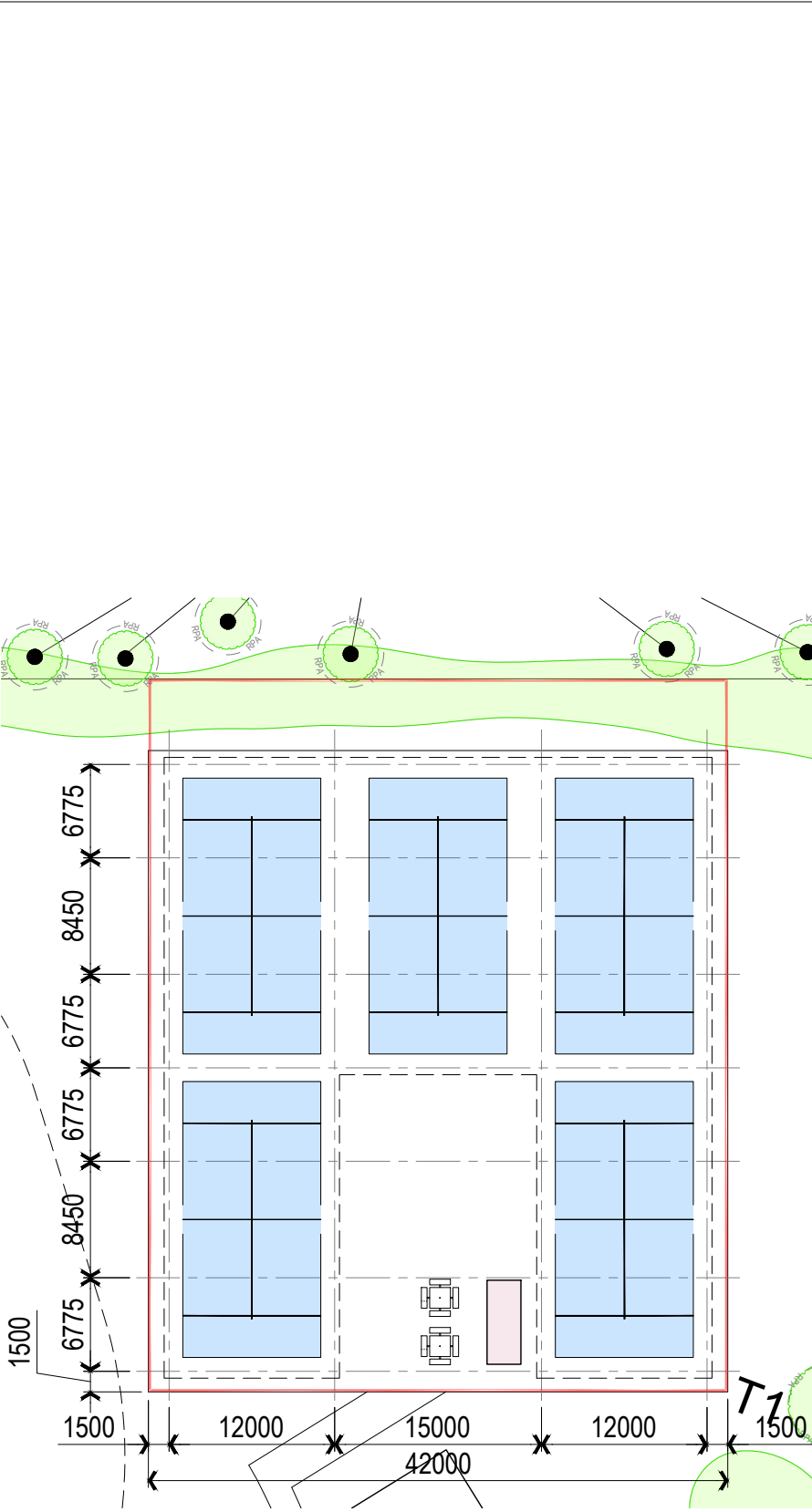
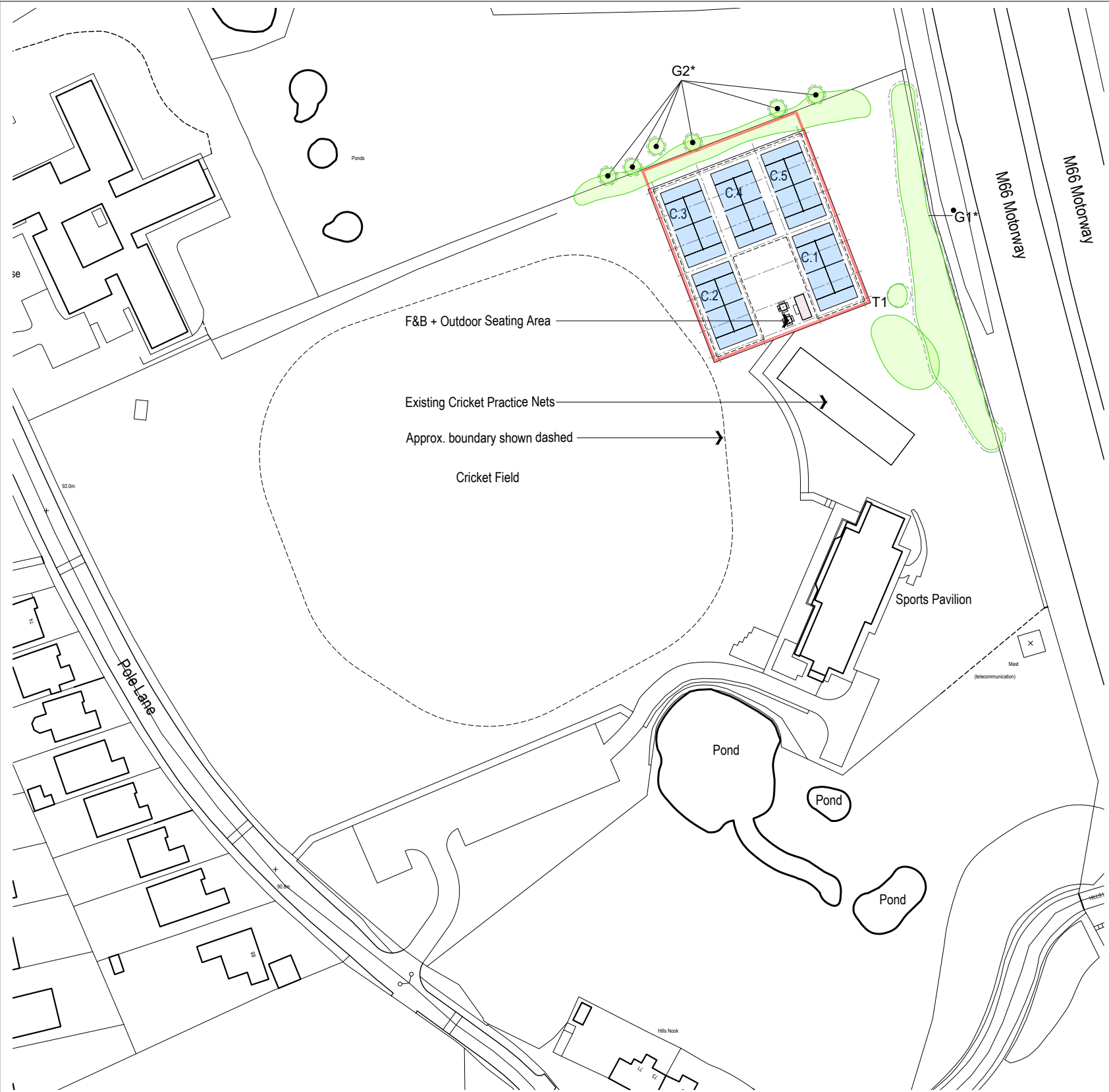
OGL

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Appendix B – Proposed site layout



All dimensions and levels are to be checked on site.

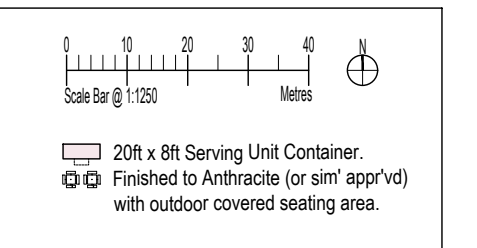
Any discrepancies are to be reported to Cube Architecture and Design before any work commences.

This drawing shall not be scaled to ascertain any dimensions. Work to figured dimensions only.

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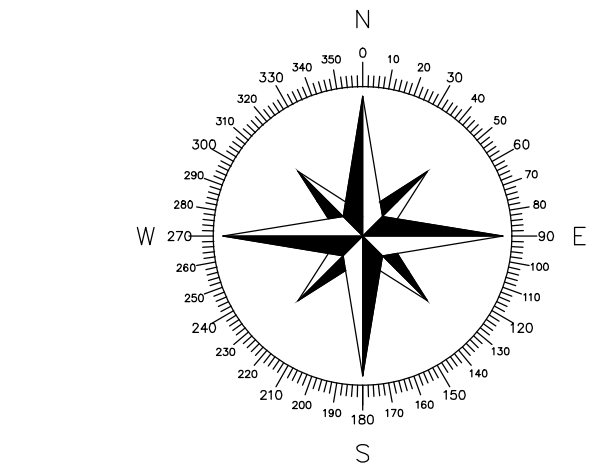
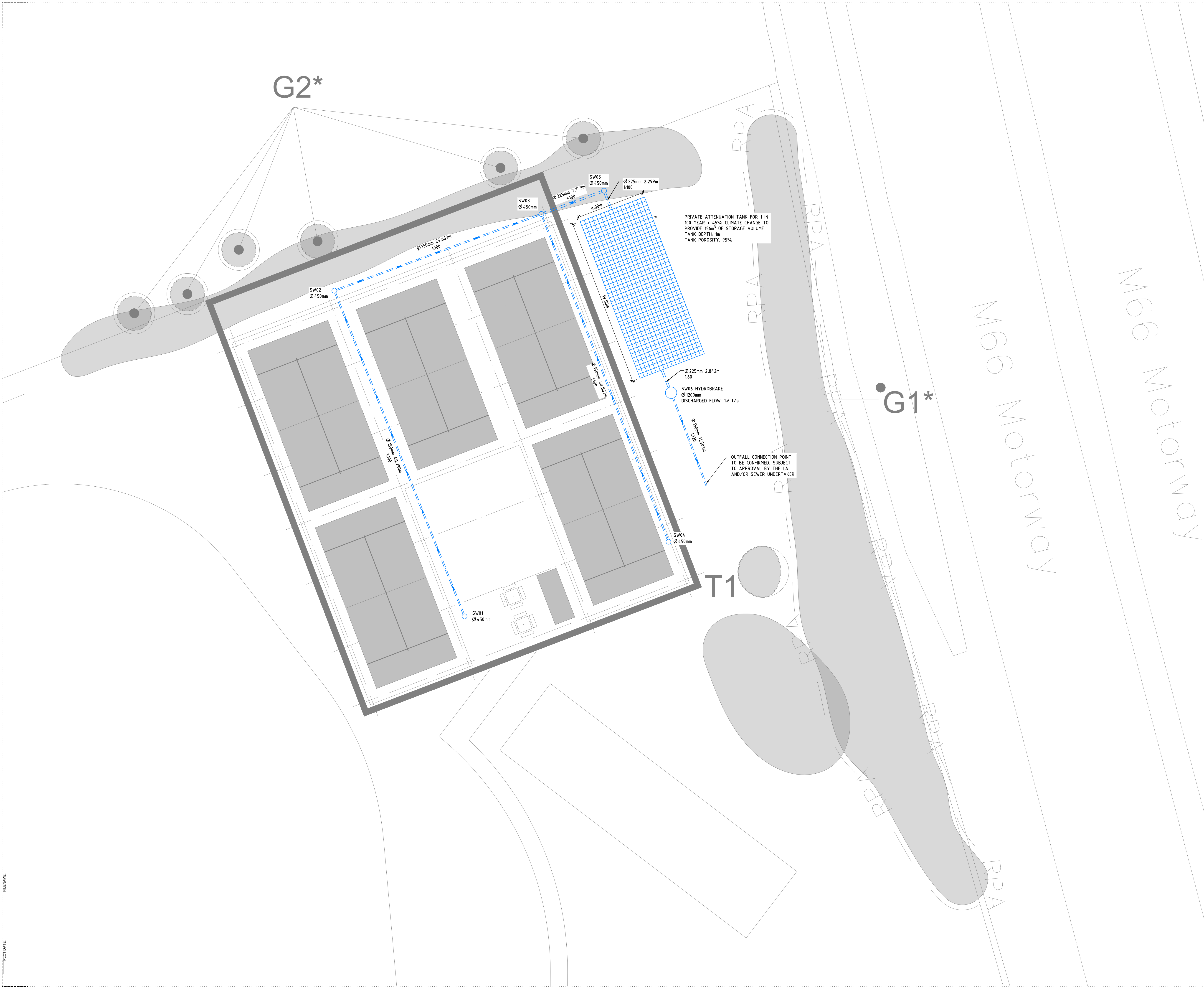


A	Revised following clients comments	04.03.26	DMR
Rev	Description	Date	By
Status: COMMENT			
Client: ON PADEL			

Contract:
PROPOSED PADEL FACILITY
UNSWORTH CRICKET CLUB
POLE LANE, BURY

Drawing: PROPOSED SITE FEASIBILITY PLAN OPTION 3		
Drawing No: AS893-SK03	Revision: A	Scales: VAR@A3
Drawn: DMR	Checked:	Date: FEB '26

Appendix C – Proposed drainage schematic



KEY:
PROPOSED SURFACE WATER SEWER

- NOTES:
- THIS DRAWING IS NOT FOR CONSTRUCTION AND THE INFORMATION PROVIDED IS FOR FEASIBILITY PURPOSES.
 - PROPOSED SEWERS SHOWN ARE INDICATIVE. ALL LENGTHS, SIZES AND PROPOSED LEVELS SHOWN ALONG WITH STORAGE VOLUMES QUOTED SHOULD BE CONFIRMED AT DETAILED DESIGN STAGE.
 - CONNECTION TO THE EXISTING PIPE TO BE IN STRICT ACCORDANCE WITH LLFA/00 WITH ALL RELEVANT PERMITS TO BE OBTAINED PRIOR TO WORKS COMMENCING.
 - THE SURFACE WATER DISCHARGE RATE FROM THE PROPOSED PADDE COURT TO THE EXISTING SEWER IS TO MIMIC THE GREENFIELD RATE OF THE SITE 1.6 l/s.

P01 25.03.26 PRELIMINARY - Issued for Information		M.A.	R.A.
Rev	Date	Description	By
EDGE CONSULTING ENGINEERS www.edgece.com			
Manchester . UK 3rd Floor, Cornovan Court, 12 Blackfriars Street, Manchester, M3 9BQ, United Kingdom T: +44 (0) 161 834 1938 E: manchester@edgece.com			
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Project Name: UNSWORTH CC PADEL COURT			
Client: ON PADEL LTD			
Designed	Drawn	Checked	Scale @ A1
M.A.	M.A.	R.A.	1:200
Drawing Title: SCHEMATIC DRAINAGE LAYOUT			
Project No. 260020		PRELIMINARY NOT FOR CONSTRUCTION	
Drawing No. 260020-EDGE-XX-XX-DR-C-2001		Revision P01	

Appendix D – Greenfield runoff calculations

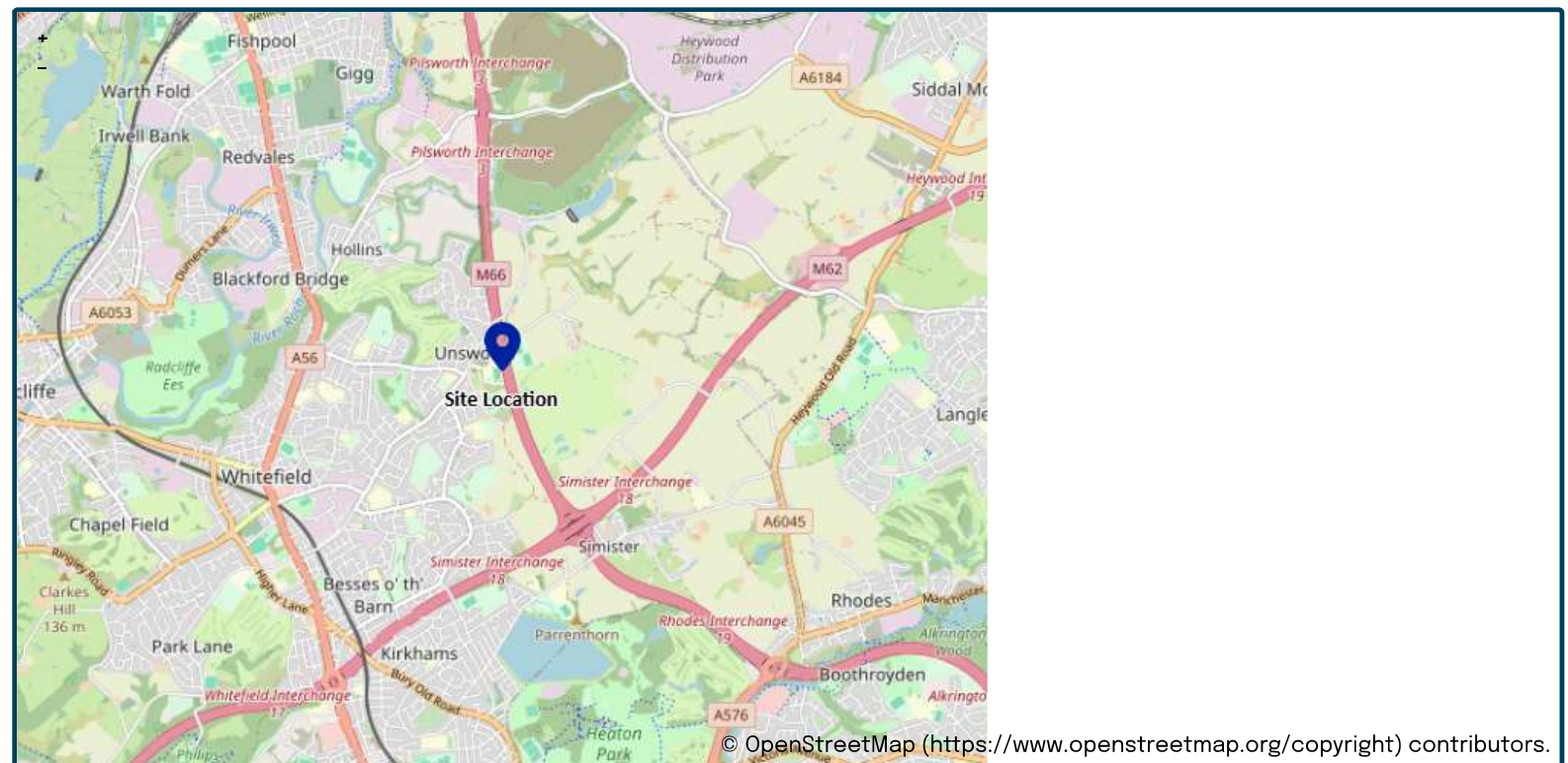
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). 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	17/03/2026
Calculated by	
Reference	
Model version	2.2.3

Location

Site name	Unsworth, Tennis and Cricket Club
Site location	



Site easting (British National Grid)	382260
Site northing (British National Grid)	406990

Site details

Total site area (ha)	0.2171	ha
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Greenfield runoff

Method

Method	IH124
--------	-------

IH124

	<u>My value</u>		<u>Map value</u>
SAAR (mm)	1012 mm	☐	1012
How should SPR be derived?	WRAP soil type		
WRAP soil type	4	☐	4
SPR	0.47		
QBar (IH124) (l/s)	1.6 l/s		

Growth curve factors

	<u>My value</u>		<u>Map value</u>
Hydrological region	10	☐	10
1 year growth factor	0.87		
2 year growth factor	0.93		
10 year growth factor	1.38		
30 year growth factor	1.7		
100 year growth factor	2.08		
200 year growth factor	2.37		

Results

Method	IH124	
Flow rate 1 year (l/s)	1.4	l/s
Flow rate 2 year (l/s)	1.5	l/s
Flow rate 10 years (l/s)	2.2	l/s
Flow rate 30 years (l/s)	2.7	l/s
Flow rate 100 years (l/s)	3.4	l/s
Flow rate 200 years (l/s)	3.8	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) (<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) (<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.

Appendix E – Attenuation volume calculations

Quick Storage Estimate

Variables

FSR Rainfall: Return Period (years)

Region: Map

M5-60 (mm): Ratio R:

Cv (Summer): Cv (Winter):

Impervious Area (ha): Maximum Allowable Discharge (l/s):

Infiltration Coefficient (m/hr): Safety Factor:

Climate Change (%):

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

Quick Storage Estimate

Variables

FSR Rainfall: Return Period (years)

Region: Map

M5-60 (mm): Ratio R:

Cv (Summer): Cv (Winter):

Impervious Area (ha): Maximum Allowable Discharge (l/s):

Infiltration Coefficient (m/hr): Safety Factor:

Climate Change (%):

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

Quick Storage Estimate

Results

Global Variables require approximate storage of between 55 m³ and 83 m³.

These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

Quick Storage Estimate

Results

Global Variables require approximate storage of between 128 m³ and 183 m³.

These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Enter Climate Change between -100 and 600