Flood Risk Assessment and Drainage Strategy

Symmetry Park, Ardley

Date:	March 2024	**Issue:**	V3
Reference:	10364407	**Status:**	Planning

Prepared by:	JJ
Authorised by:	NDH/PWE
Issuing office:	BKM

DOCUMENT CONTROL

Issue	Date	Status	Author	Approval	Notes
V1	09/11/2023	Planning	JJ	NDH/PWE	
V2	22/12/2023	Planning	JJ	NDH/PWE	Various updates
V3	27/03/2024	Planning	JJ	NDH/PWE	Drainage strategy and drawing updated.

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APPENDICES

1.0 INTRODUCTION

1.1 REPORT PURPOSE

1.1.1 HDR Consulting Limited has been commissioned by Tritax Symmetry, to produce a Flood Risk Assessment and Drainage Strategy to support a planning application for the development known as Symmetry Park, Ardley.

1.1.2 The scheme proposes erection of buildings comprising logistics (Use Class B8) and ancillary office (Use Class E(g)(i)) floorspace, external service yards, HGV and car parking, and areas of hard and soft landscaping. Refer to Appendix A for Architect's Site plan.

1.1.3 This assessment has been prepared in accordance with the UK National Planning Policy Framework (NPPF), the associated Planning Practice Guidance (PPG) website, and other applicable technical guidance as detailed below.

1.1.4 The NPPF sets out the criteria for development and flood risk by stating that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. The key definitions are:

- "areas at risk of flooding" means land within Flood Zones 2 and 3; or land within Flood Zone 1 which has critical drainage problems, and which has been notified to the local planning authority by the Environment Agency.
- "flood risk" means risk from all sources of flooding - including from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources.

1.2 PREVIOUS FRA AND PLANNING CONSULTEE REPSONSES

1.2.1 An FRA was produced for this site in April 2022 by Tier Consult Ltd (document ref. T/2503/FRA revision 1.3) in connection with an outline planning application for a similar development to that now being proposed. Comments in respect of flood risk and drainage aspects of that application were received from Oxfordshire County Council, as lead local flood authority (LLFA), Cherwell District Council, and the Environment Agency. These can be summarised as follows:

- The Environment Agency stated that there are no constraints with regards to its planning remit and therefore it had no objections to the application.
- Cherwell District Council noted that the site lies in the catchment of the Padbury Brook and one or more of its minor tributaries, and that within the application site the watercourses are all "Ordinary Watercourses" falling within the purview of the Council as Land Drainage Authority. The Flood Risk Assessment and Surface Water Management Plan were accepted in principle, and the council noted that the superficial geology may be suitable for infiltration, which should be confirmed through BRE 365 testing.

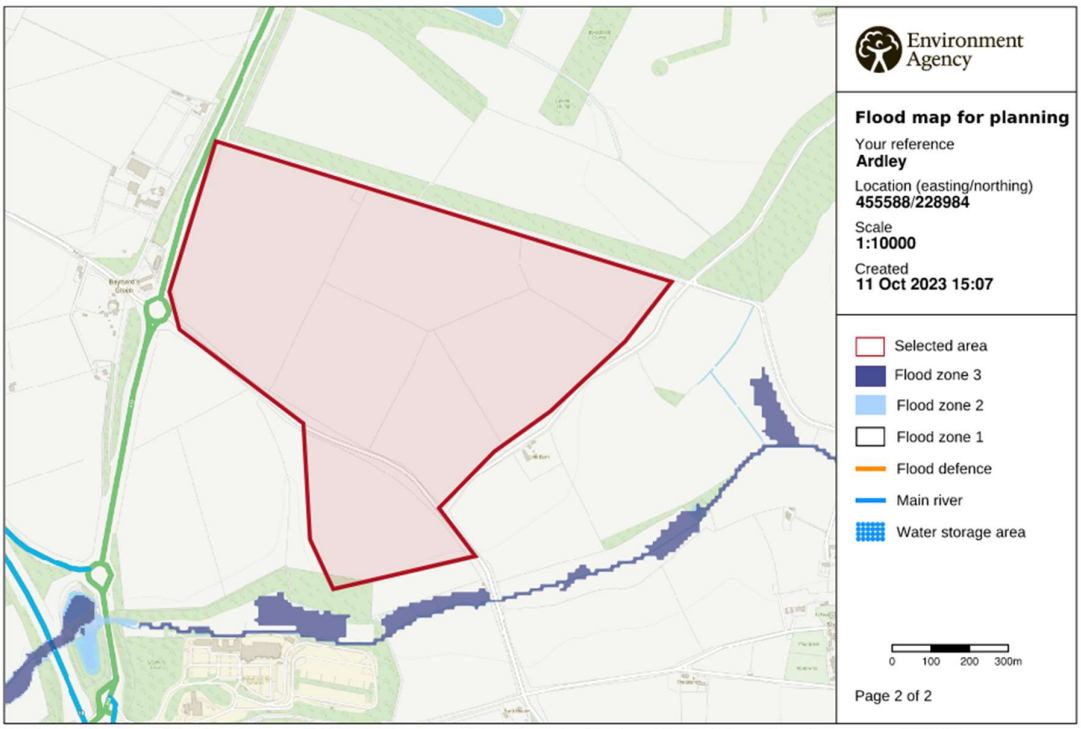
- The Oxfordshire County Council drainage engineer provided a series of comments requesting that specific additional information be provided in connection with the proposed drainage arrangements.

This FRA by HDR Consulting is consistent with that produced by Tier and incorporates additional items, including the requested BRE 365 testing, and the information listed in the OCC response.

1.3 FLOOD ZONE

1.3.1 The Environment Agency's indicative flood map for planning (see below) shows the entire site to be located within flood zone 1, indicating a low risk of fluvial flooding (less than 1 in 1000 annual probability).

Figure 1: Environment Agency Flood Map for Planning



2.0 PROJECT DETAILS AND SETTING

2.1 LOCATION AND DESCRIPTION

2.1.1 The Symmetry Park development is proposed to be located adjacent to Junction 10 of the M40 and east of the A43. The site is located approximately 1km to the north of Ardley, Oxfordshire. It is accessed via the B4100 and its indicative post code is OX27 7SG. It can be approximately centred on Ordnance Survey grid reference SP 552291. The site is currently 'greenfield' and is used for agriculture. Refer to Appendix B for site location plan.

2.1.2 The nearest surface watercourse is located at the southeastern boundary known as Padbury Brook (Ordinary watercourse), a Tributary of the River Great Ouse, with levels of approximately 2m below the site ground levels. There is a drainage ditch located on the western side of the boundary with depths varying between 0.5m and 1.0m, the ditch discharges into Padbury brook does not carry substantial flows.

2.1.3 There are no public sewers identified within or around the site boundary. Two surface water attenuation ponds are situated southwest of the site, close to Junction 10 of the M40, and are assumed to provide drainage attenuation for the public road network.

2.2 TOPOGRAPHY

2.2.1 A 2021 topographical survey (see Appendix C) shows that site levels generally range between about 110.0m and 119.0m AOD.

2.3 GEOLOGY AND HYDROGEOLOGY

2.3.1 Based on published mapping the geology of the site is anticipated to comprise:

Made Ground

- A small, localised area of artificial ground in the north-western part of the Site
- Localised Made ground may be present elsewhere due to agricultural land uses and a former groundwater well.
- A former potentially infilled 'old quarry' in the far southeast of the site.

Superficial Deposits

- The majority of the site is not shown to be underlain by natural superficial deposits; however, there is a small section of the far southern part of the site shown to be underlain by Head Deposits – comprising clay and silt.

Bedrock Geology

- White Limestone Formation - Limestone.
- Forest Marble Formation - Interbed Limestone and Mudstone.
- Bladon Member - interbedded Limestone and Mudstone.

2.4 GROUNDWATER AND SOURCE PROTECTION ZONE

2.4.1 The superficial deposits are designated a Secondary A aquifer, and the bedrock is either a Principal aquifer (White Limestone Formation) or a Secondary aquifer (Forest Marble and Bladon Member).

2.4.2 The site is not located within a groundwater Source Protection Zone, according to the Environment Agency's latest groundwater designation maps.

3.0 POLICY AND GUIDANCE

3.1 NATIONAL PLANNING POLICY FRAMEWORK

3.1.1 In determining an approach for the assessment of flood risk for the development proposal there is a need to review the policy context. Government guidance requires that consideration be given to flood risk in the planning process. The National Planning Policy Framework (NPPF) was last updated in December 2023 and outlines the national policy position on development and flood risk assessment.

3.1.2 The Framework states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. Where development is necessary in flood risk areas, it can be permitted provided it is made safe without increasing flood risk elsewhere.

3.1.3 The essence of NPPF is that:

- Local Plans should be supported by Strategic Flood Risk Assessment and develop policies to manage flood risk from all sources, taking advice from the Environment Agency and other relevant flood risk management bodies, such as lead local flood authorities and internal drainage boards.
- Polices in development plans should outline the consideration, which will be given to flooding issues, recognising the uncertainties that are inherent in the prediction of flooding and that flood risk is expected to increase as a result of climate change.
- Planning authorities should apply the precautionary principle to the issue of flood risk, using a risk-based search sequence to avoid such risk where possible and managing it elsewhere;
- The vulnerability of a proposed land use should be considered when assessing flood risk;
- Opportunities offered by new developments should be used to reduce the causes and impacts of flooding;
- Planning authorities should recognise the importance of functional floodplains, where water flows or is held at times of flood, and avoid inappropriate development on undeveloped and undefended floodplains; and
- The concept of Flood Risk Reduction, particularly in circumstances where development has been sanctioned on the basis of the “Exception Test”.

3.2 FLOOD AND WATER MANAGEMENT ACT 2010

3.2.1 Combined with the Flood Risk Regulations 2009 (‘the Regulations’), (which enact the EU Floods Directive in the England and Wales) the Flood and Water Management Act 2010 (‘the Act’) places significantly greater responsibility on Local Authorities to manage and lead on local flooding issues.

3.2.2 The Act and the Regulations together raise the requirements and targets Local Authorities need to meet, including:

- Playing an active role leading Flood Risk Management;

- Development of Local Flood Risk Management Strategies (LFRMS);
- Implementing requirements of Flood and Water Management legislation;
- Development and implementation of drainage and flooding management strategies;
- Responsibility for first approval, then adopting, management and maintenance of Sustainable Drainage System (SuDS) where they service more than one property.

3.2.3 The Flood and Water Management Act also clarifies three key areas that influence development:

1. Sustainable Drainage Systems (SuDS) - the Act makes provision for a national standard to be prepared on SuDS, and developers will be required to obtain local authority approval for SuDS in accordance with the standards, likely with conditions. Supporting this, the Act requires local authorities to adopt and maintain SuDS, removing any ongoing responsibility for developers to maintain SuDS if they are designed and constructed robustly.
2. Flood risk management structures - the Act enables the EA and local authorities to designate structures such as flood defences or embankments owned by third parties for protection if they affect flooding or coastal erosion. A developer or landowner will not be able to alter, remove or replace a designated structure or feature without first obtaining consent from the relevant authority.
3. Permitted flooding of third party land - The EA and local authorities have the power to carry out work which may cause flooding to third party land where the works are deemed to be in the interest of nature conservation, the preservation of cultural heritage or people's enjoyment of the environment or of cultural heritage.

3.3 PLANNING PRACTICE GUIDANCE FLOOD RISK AND COASTAL CHANGE

3.3.1 The Planning Practise Guidance (PPG) for Flood Risk and Coastal Change (last updated August 2021) sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow. Where these tests are not met, national policy is clear that new development should not be allowed. A key aspect of the guidance is that if there are better sites in terms of flood risk, or a proposed development cannot be made safe, it should not be permitted.

3.3.2 The document provides guidance on how local planning authorities should:

- Assess flood risk;
- Avoid flood risk; and
- Manage and Mitigate flood risk and coastal change.

3.3.3 There is also information on the requirements to consult the Environment Agency, on the role of lead local flood authorities and on flood risk in relation to minor developments.

3.3.4 The latest update provides additional guidance on SuDS, including:

- The importance of SuDS;
- When SuDS should be considered;
- The SuDS discharge hierarchy;

- Factors a local authority will address when considering SuDS as part of a planning application;
- When SuDS are inappropriate and relevant flood risk consultees;
- Applicability of Defra's Non-statutory Technical Standards for Sustainable Drainage Systems;
- Design and construction cost considerations;
- Operation and maintenance considerations; and
- Where to go for further SuDS advice.

3.4 SUDS MANUAL, CIRIA C753 (2015)

3.4.1 The CIRIA SuDS Manual provides advice on the implementation of sustainable drainage techniques in the UK. It provides guidance on:

- Initial planning;
- Design through to construction;
- The management of SuDS in the context of the current regulatory framework; and
- Advice on landscaping, waste management, cost, and community engagement.

3.5 CHERWELL DISTRICT COUNCIL – LOCAL PLAN (2011-2031)

3.5.1 The Cherwell District Council states the policy below to indicate the planning guidance on sustainable flood risk management specified in the NPPF. The council assess development proposals based on the sequential approach and exception tests as stated in the NPPF. Applications will also be evaluated considering the Environment Agency's ongoing flood risk recommendations.

"The Council will manage and reduce flood risk in the district through using a sequential approach to development; locating vulnerable developments in areas at lower risk of flooding. Development proposals will be assessed according to the sequential approach and where necessary the exceptions test as set out in the NPPF. Development will only be permitted in areas of flood risk when there are no reasonably available sites in areas of lower flood risk and the benefits of the development outweigh the risks from flooding.

In addition to safeguarding floodplains from development, opportunities will be sought to restore natural river flows and floodplains, increasing their amenity and biodiversity value. Building over or culverting of watercourses should be avoided and the removal of existing culverts will be encouraged.

Existing flood defences will be protected from damaging development and where development is considered appropriate in areas protected by such defences it must allow for the maintenance and management of the defences and be designed to be resilient to flooding.

Site specific flood risk assessments will be required to accompany development proposals in the following situations:

• All development proposals located in flood zones 2 or 3

• Development proposals of 1 hectare or more located in flood zone 1

• Development sites located in an area known to have experienced flooding problems

• Development sites located within 9m of any watercourses.

Flood risk assessments should assess all sources of flood risk and demonstrate that:

• There will be no increase in surface water discharge rates or volumes during storm events up to and including the 1 in 100 year storm event with an allowance for climate change (the design storm event)

• Developments will not flood from surface water up to and including the design storm event or any surface water flooding beyond the 1 in 30 year storm event, up to and including the design storm event will be safely contained on site.

Development should be safe and remain operational (where necessary) and proposals should demonstrate that surface water will be managed effectively on site and that the development will not increase flood risk elsewhere, including sewer flooding."

3.6 OXFORDSHIRE COUNTY COUNCIL

3.6.1 The Oxfordshire County Council Level 1 SFRA has the following policies relevant to flood risk:

NE.12: Groundwater Flow

- Prevention methods will be applied where required to assure ground water flow will not be impeded.

NE.13: Water Quality

- In order to protect and enhance water quality, all development proposals must demonstrate that proposed development will not cause a deterioration in surface or ground water quality. Pollution measures will be applied to suit along with a submission of site investigation details and precautionary measures to achieve planning permission.

NE.14: Water and Sewerage Infrastructure

- Planning permission will only be approved developments that would result in a rise in demand for on- and off-site service infrastructure where existing capacity is adequate or additional capacity can be provided to aid the development, ensuring both the environment and amenities of local residents will not be impacted.

3.7 OXFORDSHIRE COUNTY COUNCIL – LOCAL STANDARDS AND GUIDANCE FOR SURFACE WATER DRAINAGE ON MAJOR DEVELOPMENT IN OXFORDSHIRE (V1.2 DECEMBER 2021)

3.7.1 The stated purpose of this guide is to assist developers in the design of surface water drainage systems, and to support Local Planning Authorities in considering drainage proposals for new developments within Oxfordshire.

4.0 FLOOD PROBABILITY AND HAZARD

4.1 FLUVIAL FLOOD RISK AND EA FLOOD ZONE

4.1.1 Fluvial flooding occurs when the amount of water exceeds the flow capacity of the channel. Most rivers have a natural floodplain into which the water spills in times of flood.

4.1.2 Environment Agency Flood Zone Maps shows that all of the site lies within Flood Zone 1, which is described as having a “Low Probability" of flooding. Flood Zone 1 is defined as: “Land having a less than 1 in 1,000 annual probability of river or sea flooding.”

4.1.3 The proposed development comprises light industrial units and as such is considered to fall under the classification of ‘less vulnerable’ based on Table 2 of Planning Practice Guidance Flood Risk and Coastal Change. Table 3 Flood Risk Vulnerability and Flood Zone compatibility of the same document, states that this land use is compatible in Flood Zone 1.

4.2 FLOODING FROM LAND (PLUVIAL FLOOD RISK)

4.2.1 The increase in impermeable surfaces resulting from the proposed development has the potential to increase the rate of surface water runoff compared with the site’s current Greenfield condition. Post-development flow routes have been considered during the drainage design, with the below-ground sewer network and on-site attenuation, as described in more detail below, allowing for a gravity fed system. In essence, overland flow will be collected by the positively drained sewer system and directed to a combination of above- and below-ground soakaways and storage systems.

4.3 FLOODING FROM THE SEA

4.3.1 On the coast, storm surges and high tides can threaten low lying areas and can sometimes be large and rapid enough to overtop defences. However tidal flooding is not considered a risk to the site, due to its inland location upstream of any tidal influence.

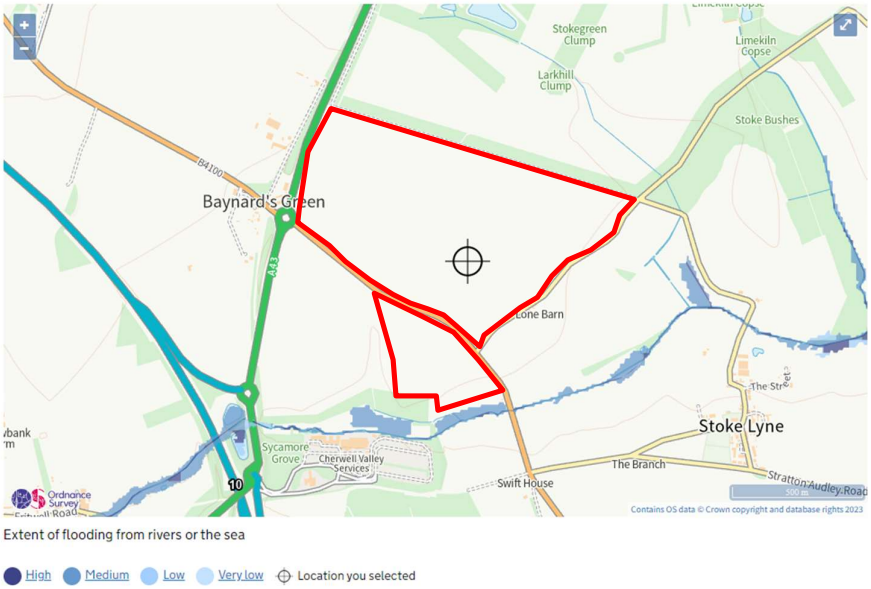


Figure 2: Environment Agency Flood Map from Rivers or Sea

4.4 FLOODING FROM LAND (PLUVIAL FLOOD RISK)

4.4.1 If intense rain is unable to soak into the ground or be carried through manmade drainage systems, for a variety of reasons, it can run off over the surface causing localised floods before reaching a river or another watercourse.

4.4.2 Generally, where there is impermeable surfacing or where the ground infiltration capacity is exceeded, surface water runoff will occur.

4.4.3 The Environment Agency's surface water flood map, reproduced below, shows that the majority of the site is at very low risk of flooding from pluvial sources:

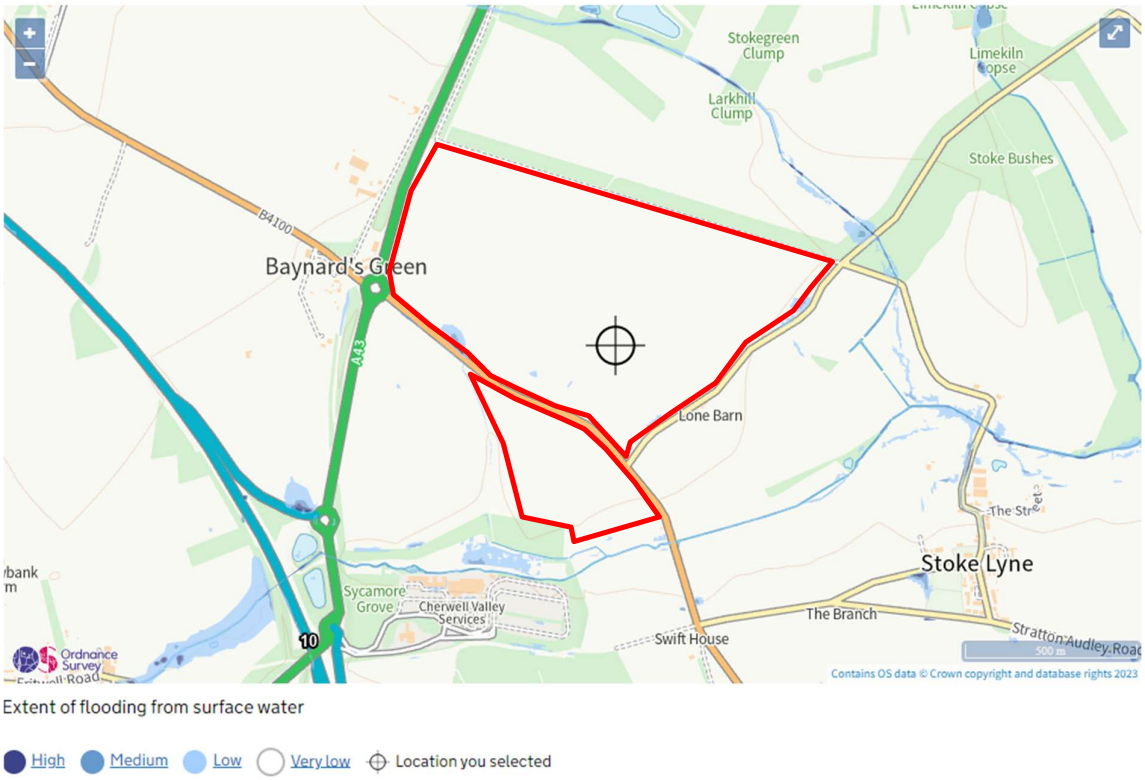


Figure 3: EA Map of Flood Risk from Surface Water

4.4.4 It is recognised that the impermeable surfacing associated with the proposed development will increase the rate of surface water runoff (compared with its undeveloped greenfield condition), and so lead to a greater rate of surface water flow. A drainage strategy has been developed to mitigate the associated flood risk, as described in Section 5 below.

4.5 GROUNDWATER

4.5.1 Groundwater flooding tends to occur after prolonged periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas, the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

4.5.2 The geological conditions of the site are such that the potential for groundwater flooding is minimal. There are no documented cases of groundwater flooding either at or near the site, thus demonstrating the lack of significant groundwater flooding risk.

4.6 FLOODING FROM SEWERS

4.6.1 Flooding from artificial drainage occurs when flow entering the system exceeds its conveyance capacity, the system becomes blocked, or it cannot discharge due to a high-water level in the receiving watercourse.

4.6.2 The proposed development will lead to a significant increase in impermeable area (compared with a greenfield condition) and therefore an associated increase in surface water runoff rates and volumes.

4.6.3 In this context, a surface water drainage scheme has been designed to accommodate the projected runoff, the details of which are set out in section 5 of this report.

4.7 FLOODING FROM ARTIFICIAL SOURCES

4.7.1 Artificial sources of flooding include reservoirs, canals, lakes and mining abstractions. EA mapping (below) indicates the site is not situated within an area at risk of flooding from reservoir failure:

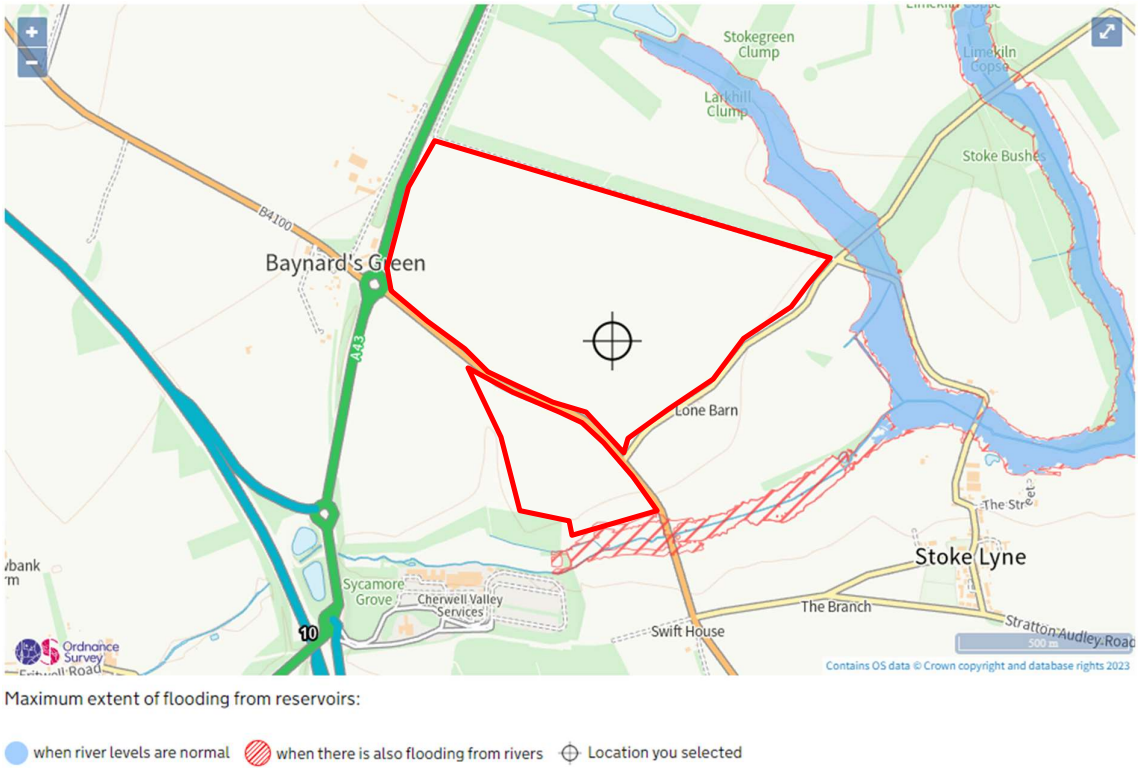


Figure 4: EA Map of Flood Risk from Reservoirs

4.7.2 There are no known canals or artificial water channels in the site vicinity. Similarly, the site is not at risk of flooding from lakes and there are no recorded nearby mining abstractions – any associated risk of flooding is negligible.

5.0 DRAINAGE STRATEGY AND SUDS

5.1 INTRODUCTION

5.1.1 This section of the report describes the site's existing drainage status and considers the appropriateness of various SuDS options. It then describes the proposed surface and foul water drainage arrangements for the new development.

5.2 EXISTING RUNOFF

5.2.1 At present it is assumed the south side of the site (south of the B4100) infiltrates into the ground and partially discharges at an unrestricted rate into the existing ditch located along the southwestern boundary. The north side of the development is also assumed to be partially infiltrating into the ground and the remaining runoff currently discharges into a number of ditches within the site area before finally discharging into a ditch located south of the boundary as well as a ditch located north east of the boundary.

5.3 GREENFIELD RUNOFF RATES

5.3.1 The theoretical greenfield run-off rate has been calculated for the site based on the FSR method, with a pro-rata value to account for the actual site area.

5.3.2 The runoff calculations (provided in Appendix G) indicate:

- QBAR (mean maximum annual flow rate) = 4.5l/s/ha

5.4 SOIL INFILTRATION

5.4.1 A series of machine-excavated exploratory trial pits (SA01 to SA07) were formed at the site in March 2022 by Tier Consult (see Appendix I). These extended to a maximum depth of 1.6 m below existing ground level. Topsoil was encountered from ground level to 0.3m depth in every location. Locally, a thin band of sandy and/or gravelly clay was encountered below the topsoil, up to about 0.6 m thick. Below this, or directly below the topsoil, weathered White Limestone was reached. This was recovered from the trial pits as limestone cobbles.

5.4.2 Soil infiltration rate testing was undertaken in each of the trial pit (see Appendix J). The following table summarises the results:

Location	Infiltration rate (m/s)
SA01 – test 1	Negligible
SA01 – test 2	Negligible
SA02 – test 1	Negligible
SA02 – test 2	Negligible
SA03 – test 1	Negligible
SA03 – test 2	Negligible
SA04 – test 1	6.20 x 10-4
SA04 – test 2	4.41 x 10-4
SA04 – test 3	3.93 x 10-4
SA04 – test 4	2.70 x 10-4
SA05 – test 1	3.13 x 10-5

Location	Infiltration rate (m/s)
SA05 – test 2	3.86 x 10-5
SA05 – test 3	3.27 x 10-5
SA06 – test 1	1.32 x 10-5
SA06 – test 2	5.48 x 10-6
SA06 – test 3	1.36 x 10-5
SA06 – test 4	1.34 x 10-5
SA07 – test 1	5.09 x 10-6
SA07 – test 2	4.54 x 10-6
SA07 – test 3	8.22 x 10-6

5.4.3 Based on these results it is proposed that all surface water runoff be discharged into soakaway basins/swales, where the surface water will be able to pass through the soil substrate, with the overflow discharging into an existing drainage ditch.

5.5 BASINS

5.5.1 Several basins will be utilised mainly on the eastern area of the north side of the development, due to poor infiltrations rates. The stored surface water will be discharged into an existing ditch by gravity.

5.6 GREEN ROOFS

5.6.1 The site is proposed to be developed for new steel-framed industrial / commercial units. By their nature such buildings span wide areas and are of lightweight and economic construction. The adoption of green roofs would require significant and costly modifications to the structural design including significantly upgraded foundations and more extensive use of structural steelwork. It has been determined that such an option is not compatible within the proposed development.

5.7 CLIMATE CHANGE ALLOWANCE

5.7.1 The latest EA guidelines for climate change allowances, most recently updated 27th May 2022, for peak rainfall intensity have been used. A copy of the peak rainfall allowance map can be found in Appendix E. This shows the site falls within the Upper and Bedford Ouse management catchment.

5.7.2 It has been deemed appropriate to assume a design life of 40 years which using the above EA guidelines means the central allowance for the 2070s epoch should be selected. This would result in adding 25% climate change allowance to the 1 in 30 year event, and 25% allowance to the 1 in 100 year return period.

5.7.3 It is recognised however that Oxfordshire County Council drainage design guidance states that for development with a design life to 2060-2115, the Council expects that all developers should design the surface water attenuation on site to accommodate the upper end +40% climate change allowance. This has therefore been incorporated into the design.

5.8 DRAINAGE STRATEGY

5.8.1 The surface water drainage strategy for the development is provided on the drawings in Appendix F.

5.8.2 It is proposed that all surface water flow will be attenuated in a series of basins (combination of soakaways and impermeable basins) and below ground storage prior to discharging at QBAR Greenfield run off rate of 4.5l/s/ha. The surface water strategy is to divide the site into 3 catchment areas (See Appendix F).

5.8.3 Catchment 1 utilises a hybrid system of attenuation basins and soakaways, in addition to below ground storage. Surface water will infiltrate into the ground for majority of design storms. During more extreme storms surface water will rise to a level of 113.150m and then overflow from the attenuation systems discharging into an existing ditch located south of catchment 1 at a controlled greenfield runoff rate. It is assumed the existing ditch is culverted beneath the B4100 and flows further south into another existing ditch.

5.8.4 Catchment 2 will attenuate the surface water flows entirely within a series of attenuation basins prior to discharging into an existing pipe east of catchment 2 which further connects into an existing ditch. Due to the low permeability of the existing strata in this area, the attenuation basins will not act as soakaways. Due to the existing 300 diameter pipe size, the flow will be restricted to a maximum of 90l/s, reducing the discharge rate from the greenfield run off rate.

5.8.5 Catchment 3 located south of the development site is proposed to drain entirely through a soakaway basin due to the permeability of the underlying strata.

5.8.6 Permeable paving is proposed to be installed to all external car parking areas. This will be a ‘Type B’ system (after CIRIA 735), where the proportion of rainfall that exceeds the infiltration capacity of the subsoil will flow into the engineered drainage network.

5.8.7 The whole of the drainage network has been designed to accommodate the critical storm event up to and including the 1 in 100-year return period plus a 40% allowance for climate change, whilst still preventing off-site flooding.

5.8.8 The drainage system will be designed in accordance with the requirements of BS EN 752:2017. No surcharging occurs during a critical storm event of 1 in 1 years return period and no exceedance flooding occurs during a critical storm event of 1 in 30 years return period. Refer to Appendix G for calculations.

5.8.9 All foul effluent from the north side of the development will be directly discharged into an on-site main pumping station located on the north eastern side of the development (see Appendix F). It is proposed that the foul flows from the south side of the development discharge into a private pumping station located within the southern area, pumping the foul water into the main pumping station via a rising main. The main pumping station will then pump all the foul water drainage into an existing Anglian Water manhole (Ref:5301) in Stoke Lyne village located east of the site. Refer to Appendix D for public sewer record drawings.

5.8.10 An assessment of the proposed foul flows can be found in Appendix H.

5.9 SURFACE WATER RUNOFF DURING CONSTRUCTION PERIOD

5.9.1 As part of the new development works, consideration will be made to manage surface water runoff during the construction period, to ensure this does not impact on the offsite watercourses in terms of maintaining flows or increasing site runoff, and minimising pollution risk.

5.9.2 Temporary bunds or berms are to be formed where required to prevent runoff off site, and facilitate discharge into surrounding watercourse infrastructure.

5.9.3 During the main construction phase, the Main Contractor may be required to make allowance for providing temporary cut off trenches or retention ditches downstream of the site gradient to collect runoff water. These trenches are to be suitably sized and have restricted downstream overflows to minimise discharge off site and include sediment pits and/or straw bales to ensure any runoff water is clear of debris and pollution. Consideration can made to pump runoff water into temporary holding areas if formed early during the works.

5.9.4 Consideration should be given to placement of straw bales at outfalls into the downstream offsite watercourse(s) to provide an additional stage of pollution prevention. Temporary fine metal mesh grating should be placed on the downstream outfall pipes on completed manholes to ensure debris entering the new drainage system is contained until the whole drainage system is completed.

5.9.5 In the event that any groundwater is encountered during the construction phase, appropriate dewatering will be undertaken to mitigate flood risk and direct discharge into the temporary ditches.

5.9.6 The management of the surface water runoff will be regularly inspected, monitored and adapted to suit the stages of construction and changes in weather conditions. Where temporary drainage provisions are not working effectively additional measures are to be put in place.

5.9.7 Final measures to be considered will be developed by the appointed Main Contractor(s) as part of their Surface Water Management plan to be included in their final CEMP.

6.0 DRAINAGE MAINTENANCE AND OWNERSHIP

6.1 GENERAL PRINCIPLES

6.1.1 In general, sewers, manholes and drainage channels are unlikely to require maintenance other than periodic inspections, unless a blockage occurs. Sewers, manholes, drainage channels and silt pits should be inspected at 6 monthly intervals and cleaned out at 12 monthly intervals. A full CCTV survey should also be carried out at 10 yearly intervals.

6.1.2 In conjunction with HDR Consulting Final Construction Issue drainage layout and detail drawings, reference should also be made to the manufacturer's information and maintenance requirements for recommended intervals and safe methods of cleaning for the following proprietary systems:

- storm water storage systems
- drainage channels
- oil separators
- flow controls

6.1.3 In all instances, inspection and cleaning is to be carried out only by a suitable Specialist Contractor, following the guidelines given in BE EN 752:2008 "Maintenance Considerations" and "Safe Working in Sewers and at Sewage Works", published by the National Joint Health and Safety Committee for the Water Services.

6.1.4 All underground and under-floor drains and manholes (including oil separators) represent confined spaces. Appropriate precautions should be taken before entering drains and manholes. Access should only be undertaken by appropriately trained personnel.

6.2 GENERAL INSPECTION

6.2.1 A comprehensive inspection of all readily accessible drainage systems is to be carried out as detailed in the below schedule, to confirm the system is operating satisfactorily and to highlight if any blockages are present or beginning to develop. This will include all sewer runs, inspection chambers, manholes, drainage channels, silt pits and any proprietary items.

6.3 GATIC SLOTDRAIN

6.3.1 Gatic Slotdrains should always be maintained in accordance with the manufacturer's recommendations and guidance.

6.3.2 Regular inspection, as detailed in the below schedule, for any damage or blockages together with cleaning of the Slotdrain throat is to be undertaken to ensure uninterrupted flows into the channel. Routine cleaning of the Slotdrain channel using high pressure hose jetting through access units along the channel is to be carried out as detailed.

6.4 PETROL INTERCEPTORS

6.4.1 To prevent pollution and minimise running costs the petrol interceptors are to be regularly maintained as detailed in the below schedule. All parts of the separator requiring regular maintenance must always be accessible. Experienced personnel should:

- Physically inspect the integrity of the separator and all mechanical parts.
- Assess the depth of accumulated oil and silt.
- Service all electrical equipment such as alarms and separator management systems.
- Check the condition of any coalescing device and replace it if necessary.
- Keep a detailed log of when the separator is inspected, maintained, emptied and serviced. Also record specific events relating to the separator system such as cleaning, repairs, accidents and incidents.

6.4.2 Separators should be emptied as soon as a significant quantity of oil and/or silt has built up. The retained waste, including the silt, must be removed and the separator must be refilled with clean water before being put back in to service to prevent damage and to prevent oil passing through it. In addition to normal emptying of the separator, it will also need to be emptied right away if oil or silt levels exceed 90 per cent of the storage volume of the separator and the alarm is activated. When the oil or silt reaches this level or after a spillage, employ a registered waste removal company to empty the separator. For all waste removal operations it should be checked that the waste removal company has experience in emptying separators and that they do not allow any of the contents to escape from the outlet during emptying.

6.4.3 Every five years it is recommended that separators be emptied and given a general inspection to test the integrity and performance of the system. The separator must be refilled with clean water following such an inspection.

6.4.4 All waste must be handled, stored and disposed of correctly to avoid pollution. Waste oil is designated as hazardous / special waste and disposal must comply with the Hazardous Waste (England and Wales) Regulations 2005.

6.4.5 As a producer of hazardous / special waste the disposer must follow the Duty of Care Code of Practice which requires the disposer to make sure that the waste oil:

- Does not escape from the control of the disposer.
- Is transferred only to a registered waste carrier to be sent for recycling or disposal at a suitably licensed facility.
- Is accompanied by an appropriate transfer note with a full written description of the waste.

6.5 SCHEDULE OF MAINTENANCE

Ref.	Item	Activity	Frequency
1	General Inspection	Visual inspection and report of accessible drainage systems, to determine items 2, 3 and 4 below.	Every 6 months
2	General Cleaning	Cleaning of drainage system to include all pipework, inspection chambers, manholes, silt pits etc.	Yearly
3	Gatic Slotdrain	Inspection for damage / blockage and cleaning of slotdrain throat.	Monthly

		High pressure hose jetting of slotdrain channel. Carry out any additional maintenance requirements if required by manufacturer.	Yearly Manufacturer to advise
4	Petrol Interceptors	Inspect integrity of petrol interceptor and all mechanical parts. Assess and record depth of accumulated oil and silt. Service all electrical equipment. Checking condition of coalescing device. Emptying of any significant oil and / or silt build ups ensuring any waste is suitably disposed. Complete emptying of the petrol interceptor to allow full testing of the integrity and performance of the system followed by refilling with clean water. Maintain a detailed log of petrol interceptor servicing, cleaning, repair, accidents and incidents. Maintaining a maintenance service agreement with an approved petrol interceptor servicing specialist. Carry out any additional maintenance requirements if required by manufacturer.	Every 6 months Every 6 months Every 6 months Every 6 months As necessary Every 5 years As necessary Full life cycle Manufacturer to advise
6	CCTV Survey	Full CCTV survey of site wide drainage system and reviewed by a suitably qualified person.	Every 10 years

7.0 SUMMARY AND CONCLUSIONS

7.1 This report is intended to support a planning application for Symmetry Park in Ardley, Oxfordshire.

7.2 The whole of the site is located in Flood Zone 1, with a low probability of flooding from fluvial, tidal and pluvial sources. Flood risk both to the site and to neighbouring property from site generated run off has been addressed through a detailed surface water drainage strategy.

7.3 This strategy comprises use of below-ground storage, attenuation basins and soakaways, with off-site runoff being attenuated to the QBAR greenfield rate. Where infiltration is not possible, runoff is to be directed into adjacent surface watercourses, subject to the necessary consents. The drainage arrangements are designed to accommodate runoff up to the 1 in 100 year storm event plus a 40% allowance for climate change.

7.4 This FRA has been produced to demonstrate that the proposed redevelopment can be brought forward without increasing the risk of flooding to either the site or adjacent properties. The surface water drainage strategy has been designed to incorporate appropriate SuDS techniques and accommodate the critical 1 in 100 year plus 40% climate change storm event. Flood risk at the site from all sources is therefore considered to be acceptable and the development will not increase flood risk to others.

APPENDIX A

ARCHITECT'S PROPOSED DEVELOPMENT PLAN

Symmetry Park, Ardley

Illustrative Masterplan

Rev	Date	By	Description
P08	18/03/24	KM	Access Updated

Unit 01
1,041,000 sq.ft.

Unit 02
471,000 sq.ft.

Unit 03
204,000
sq.ft.

Unit 04
237,000
sq.ft.

Unit 05
252,000
sq.ft.

Unit 06
332,000
sq.ft.

Unit 07
145,000
sq.ft.

Unit 08
381,000 sq.ft.

ENERGY CENTRE

Lorry Park

M1 J15A

A43

M40 J10

B4100

B4100

B4100 to Bicester

111.3m

80.2m

46.8m

45.1m

46.7m

75.1m

201.9m

138.3m

0 50 100 200 250
Metres at scale 1:2000

Key:

Indicative Park Trail

Indicative Activity Hub

TRITAX SYMMETRY
A TRITAX BIG BOX COMPANY

SGP
Architects + Masterplanners

Waterfront House
2a Smith Way
Grove Park
Enderby
Leicester LE19 1SX

t: +44 (0)116 247 0557

www.stephengeorge.co.uk

Symmetry Park,
Ardley
M40 Junction 10

Drawing Name:
Illustrative Masterplan - Option 3 - NSA

Drawing Stage:	PRELIMINARY
Suitability:	S0 - Work In Progress
SGP File Ref:	14-019-SGP-XX-XX-DR-A-001010-P8 Planning Issue.dwg

SGP Project No:	Date:	Drawn:	Team:	Scale:	Rev:
14-019	01/2023	KM	MMS	1:2000 @ A1	P8

Drawing Number:
14-019 - SGP - XX - XX - DR - A - 001010
Project Code | Originator | Volume | Level | Type | Role | Number

APPENDIX B

SITE LOCATION PLAN

Redline Area:
83.279Ha / 205.786Ac

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Symmetry Park, Ardley
M40 Junction 10

Drawing Name:
LOCATION PLAN

Drawing Stage:	PLANNING
Suitability:	S0 - Work In Progress
SGP File Ref:	14-019-SGP-XX-XX-DR-A-131001-P2-Location Plan.dwg

SGP Project No:	Date:	Drawn:	Team:	Scale:	Rev:
14-019	11/2021	mms	MMS	1:2500 @ A1	P2

Drawing Number:
14-019 - SGP - XX - XX - DR - A - 131001
Project Code | Originator | Volume | Level | Type | Role | Number

0 50 100 200 250
Metres at scale 1:2500