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Symmetry Park, Bicester Phase 3

Drainage Strategy Report

For *Tritax Big Box Developments
(TBBD)*

Date 20 November 2024

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<i>Prepared by</i>	M Chmurska/ A Badek	
<i>Checked by</i>	A Badek	
<i>Approved by</i>	C Koorts	

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1. INTRODUCTION

1.1 Overview

This Drainage Strategy has been prepared by Hydrock now Stantec on behalf of Tritax Big Box Developments (TBBD) in support of a full planning application for land at Symmetry Park, Bicester Phase 3 (here in referred to as the site).

The proposed development includes the demolition of 5no agricultural barns/buildings and the construction of 2no. units, together with associated access, along with administration offices, car and cycle parking, ancillary and external amenity spaces, landscaping, pedestrian access modifications, and associated works.

The Site is identified in the Cherwell Local Plan Review 2042 (Regulation 19) Proposed Submission Plan, which was published on 4th November 2024, and is due to go out for public consultation in December 2024. The Site is identified as a preferred employment site allocation and an extension to the successful Symmetry Park Phases 1 and 2. The allocation is for employment uses E(g)(i)/(ii)/(iii)/B2/B8 floorspace (Site Reference BIC 5).

Phase 3 is part of the larger Symmetry Park, Bicester site, which to date consists of;

- » Zone 1, comprising of Units A1 (Medline), A2 (Bentley) and DPD Unit, These drain in an easterly direction to the existing ditch along the eastern boundary of zone 1.
- » Zone 2, comprising of Unit B (Ocado) and plot C which drain to the NW corner of zone 2 to an existing ditch.
- » Current phase 3, comprising Units E and F, drain south west to existing ditch on western boundary (between Zone 1 and phase 3).

The proposed drainage strategy for phase 3 closely follows the same drainage strategy principles as the previously approved and constructed phases. The key drainage elements, drainage in the roadway, proposed attenuation limiting discharge to greenfield runoff, inclusion of SuDS elements including swales and foul design are consistent with the previously approved schemes. Previous consultation responses from Oxfordshire County Council (OCC) & Environment Agency (EA) have been accounted for in the design of the current phase 3 site with improvements made in line with current guidelines and regulations.

The following sections detail the proposed drainage strategy in compliance with the requirements of Oxfordshire County Council (OCC) 'Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire'.

This report has also been prepared in accordance with Sustainable Drainage Systems CIRIA C753, the non-statutory technical standards for sustainable drainage systems (DEFRA, March 2015), industry best practice, and the requirements of the Internal Drainage Board (IDB) with regards to the permitted surface water discharge into an existing watercourse.

This Drainage Strategy is to be read in conjunction with the following Hydrock engineering drawings and reports;

Flood Risk Assessment from the previous Phase of development (DPD):

- Flood Risk Assessment by Peter Brett Associates, doc ref 32765-4001 dated December 2015
- Flood Risk Assessment, doc reference 22281-HYD-XX-XX-RP-WENV-0002

Geotechnical reports from the previous Phase of development:

- Geotechnical Investigation Report, doc reference 10942-HYD-XX-XX-RP-GE-1001
- Geotechnical Design Report, doc 10942-HYD-XX-XX-RP-GE-4001
- Desk Study and Technical Note

Drainage layout design drawings:

- Drainage Strategy drawings, 22281-HYD-XX-XX-DR-C-0500-0502
- Drainage Standard details, 22281-HYD-XX-XX-DR-C-0550-0554
- Catchment plan drawing, 22281-HYD-XX-XX-DR-C-0530
- Flood exceedance plan drawing, 22281-HYD-XX-XX-DR-C-0540

Microdrainage Calculations, doc reference:

- 22281-HYD-XX-XX-CA-C-0001_Surface Water Phase 3 Drainage Model (FSR)_RevB
- 22281-HYD-XX-XX-CA-C-0002_Surface Water Phase 3 Drainage Model (FEH)_RevB

Proposed Demolition Plan drawing, doc reference 4036-X3-SK040 P01 by pHp Architects

1.2 Non-technical Summary

The proposal involves the development of a predominantly greenfield site located off the A41 in Bicester. This development represents Phase 3 of the ongoing project and is part of Symmetry Park, Bicester.

The proposed development includes two units with access, office spaces, car and cycle parking, outdoor areas, landscaping, pedestrian access changes, and related works.

This report details the proposed drainage measures, which comprises of a piped system, with the inclusion of sustainable drainage measures including below-ground attenuation tanks and attenuation basins/bio-retention basins alongside catch pits and interceptors to address Oxfordshire County Council (OCC) drainage requirements for surface water volume, discharge, and quality control.

Surface water drainage from each unit will drain to individual attenuation tanks, before discharging, via pumps, into the existing ordinary watercourse in the northwestern part of the site.

This in combination with the proposed SuDS elements mitigates against polluting waterways and negative effects on the environment. All of the OCC drainage requirements are met.

The proposed foul strategy for the site, is proposed to discharge treated foul flows from Unit E and Unit F to the surface water system discharging to the ditch.

For more information, please refer to section 9. The solution proposed provides appropriate measures for the foul discharge and connection point, with foul drainage runs via gravity maximised as much as possible to suit site constraints.

2. EXISTING SITE

Located off A41, Bicester, the site is an existing greenfield site. The site's approximate ordnance survey grid reference is SO 60678 20615, and the site address is Symmetry Park, Bicester, OX26 6GF.

See Figure 1 showing the location below.

Nearby structures include the existing phases of the Symmetry Park development along near the northwestern boundary and the Bicester Caravan and Leisure Centre situated in the southeastern part of the site.

Please refer to 'Proposed Demolition Plan' drawing, doc reference 4036-X3-SK040 P01 for further details of the 5 No. barns/agricultural buildings to be demolished.

Levels across the existing site are relatively flat and range from approximately 64.000m AOD to 66.8m AOD and slope towards the southwestern part of the site.

The ground investigation as proven by investigations detailed by Hydrock now Stantec has determined that uncontaminated natural soils (Kellaways Sand Member and the Kellaways Clay Member) are present beneath the areas of cut. Please refer to the geotechnical investigation report 10942-HYD-XX-XX-RP-GE-1001-S2-P01 dated 16/03/2020 and the geotechnical design report 10942-HYD-XX-XX-RP-GE-4001 P03 dated 22/04/2020 for more details.

With reference to geotechnical investigation report 10942-HYD-XX-XX-RP-GE-1001-S2-P01 groundwater levels were observed at around 0.3mbgl (64.96mOD) to 2.6mbgl (62.22mOD).

A falling head analysis was performed on the adjacent section of the site during the previous phase of development, with results indicating negligible infiltration. Please refer to section 5.2.2 of the Ground Investigation Report for further details.

Please also refer to Site Location Plan 4036-X3-SK030 by pHp Architects.

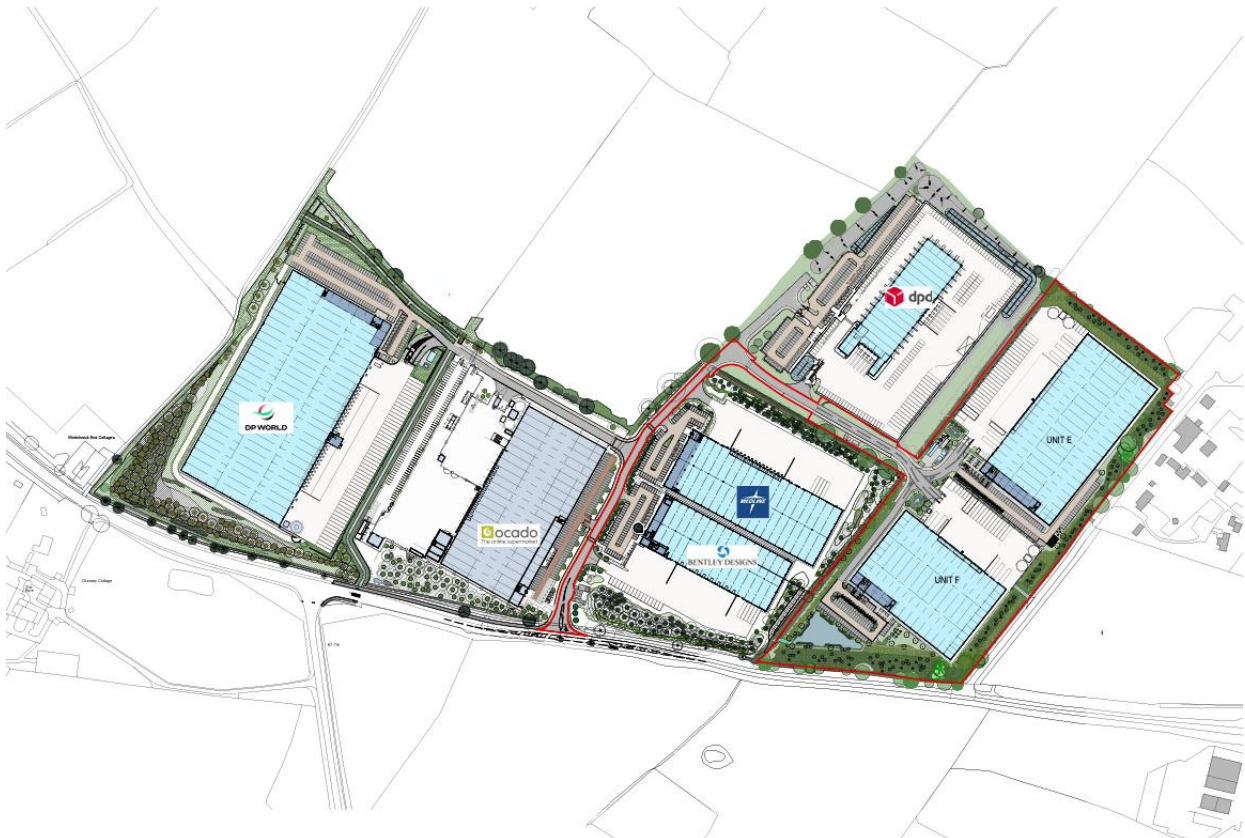


Figure 1: Site Location

3. DRAINAGE DISCHARGE METHOD

3.1 Hierarchy

In accordance with the Oxfordshire County Council (OCC) Drainage Hierarchy the drainage hierarchy and reasoning for using or not using each level is as follows:

Table 3.1: Drainage Hierarchy

Level	Hierarchy Description	Included?
1	Store rainwater for later use	No. Rainwater harvesting is not proposed due to the commercial/industrial nature of the site
2	Discharge to ground (infiltration)	No. Please refer to the geotechnical investigation report 10942-HYD-XX-XX-RP-GE-1001-S2-PO1 dated 16/03/2020 by Hydrock dated 16/03/2020 section 5.2.2 noting that following falling head test results, infiltration on site was negligible.
3	Discharge to a surface water body	Yes. As infiltration is not possible and there are no surface water sewers available near our site, it is proposed that the site discharges to the existing ordinary watercourse. Subject to approval with the LLFA (Oxfordshire County Council) and EA (Environmental Agency).
4	Discharge to a surface water sewer	No. The site is proposed to connect to the existing surface water body.
5	Discharge to combined sewer.	No, not applicable.

It is proposed to comply with level 3.

4. PEAK DISCHARGE RATES (FLOW CONTROL)

4.1 Proposed Discharge & Calculations

Surface water from each unit of the site will be collected via rainwater pipes, channels, and road gullies to separate below-ground attenuation systems. The site lies adjacent to an existing watercourse which is within the control of the Lead Local Flood Authority (Oxfordshire County Council). It is proposed to discharge to this watercourse at a restricted rate.

The surface water drainage attenuation has been modelled using Microdrainage for a range of events including the 1 in 1year, 1 in 30year and 1 in 100year + 40% climate change event.

To prevent further impact on the watercourse and account for current flooding, a discharge rate corresponding to a 1 in 1-year event is proposed, rather than QBAR (2.3year event).

To limit discharge from each unit to the greenfield run-off 1 in 1-year events shown in section 4.2, a total of 2540.6m³ for Unit E and 1987.8m³ for Unit F attenuation storage has been provided, as calculated using MicroDrainage. Please refer to drawing 22281-HYD-XX-XX-DR-C-0530 contained within Appendix C for catchment details.

Due to ground conditions, this system will be a lined system. Water is restricted to the proposed discharge rates via pumps (MH S25 and MH S52).

Please refer to the drainage layout and standard details, contained within Appendix C showing the proposed surface water strategy for the site.

4.2 Greenfield Runoff

Greenfield runoff rates for the site were calculated using the UK SuDS drainage tool, which utilises the Wallingford procedure. Full results are contained within Appendix A, Table 4.2 below summarises the greenfield runoff rates for the site.

Table 4.1: Greenfield Runoff Rates

Storm Event	UNIT E (2.65ha)	UNIT F (2.08ha)
	Greenfield Runoff Rate (l/s)	
1yr Event	9.38	7.36
QBAR (approx 2.3yr event)	11.04	8.66
30yr Event	25.39	19.93
100yr Event	35.21	27.64

Proposed discharge rates of 9.4l/s and 7.4l/s for Unit E and Unit F respectively are considered appropriate for the site.

5. VOLUME CONTROL

Source control measures have been considered as part of the drainage strategy for the site, with the aim of reducing the rate and volume of surface water runoff from the site. As previously described in section 3, the site is not considered suitable for soakaway or infiltration drainage.

In accordance with The Defra Non-Statutory Technical Standards (NSTS), the volume of stormwater runoff from a site should be limited to the greenfield runoff volume as per the following clauses S4, S5, and S6;

'S4 Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer, or surface water body in the 1 in 100 year, 6-hour rainfall event should never exceed the greenfield runoff volume for the same event.

S5 Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer, or surface water body in the 1 in 100-year, 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.

S6 Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer, or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk'

Therefore, to address volume control the site discharge for events up to and including the 100yr + 40% CC event should be limited to 9.4l/s for Unit E and 7.4l/s for Unit F.

6. FLOOD RISK & EXCEEDANCE EVENTS WITH THE DEVELOPMENT

6.1 Site Drainage

As required by Paragraph S7 of the Defra Non-Statutory Standards, the attenuation volume and the piped network has been sized to ensure there is no flooding up to and including the 1 in 30-year event.

Ideally, a pipe network system should also not have any surcharge or flood risk in the minor (1-2year) design storm event however, due to site constraints this is not possible. Generally, the proposed system complies with this requirement, with the exception of the pipe runs in close proximity to the ponds or pumps.

Please refer to the MicroDrainage results and data contained in Appendix B.

In accordance with DEFRA's Non-Statutory technical Standards for SUDS Design Part S8

'The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100-year rainfall event in any part of a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development'

As part of the design, the pipe network has been designed to ensure any flooding in the 1 in 100yr event will be safely contained on site and will not increase flood risk elsewhere. Please refer to the Flood exceedance plan drawing, 35208-HYD-XX-XX-DR-C-0540 within Appendix C showing overland flow routes and surface water flood extents. The attenuation tanks have been sized so that minimal flooding occurs during a 1 in 100 year +40% CC event which is therefore in compliance with Paragraph S8.

During an exceedance event, additional flooding would occur within landscaped areas, car parking areas, loading docks, and the roadway. In compliance with Paragraph S9, there is additional storage capacity within these areas, which shall retain further volumes.

6.2 Local flood risk

The site is subject to flood risk from the existing ditch and culvert along the western boundary of the site. Refer to flood risk assessment by Hydrock, number 22281-HYD-XX-XX-RP-WENV-0002.

The ditch drains in a south westerly direction to an existing 300mm culvert under the A41, located near the southwestern part of the site. During the 100yr plus 15% climate change flood event part of the Unit F site would be subject to flooding, up to a flood level of 64.75m AOD.

To mitigate against the local flooding, the following measures have been incorporated:

1. The minimum finished floor level (FFL) required for Unit F is 65.35m (64.75+600mm freeboard). As the FFL of Unit F (65.50m) is above the recommended FFL we are protected from potential flooding.
2. The drainage strategy includes a flood compensation basin, sized to temporarily hold any flood waters from the ditch before draining to the swale once the storm subsides. Please refer to the levels and drainage layout showing the proposed flood compensation basin alongside the Flood extents plan drawing within Appendix C.

Please also note the extent of flooding indicated on the flood mapping in the FRA. Due to these conditions, it is not feasible to install an above-ground basin for attenuation near Unit F. Additionally, with flood depths reaching up to 0.6 meters, placing a rain garden in this area is not advisable.

7. WATER QUALITY

7.1 Water Quality

With reference to the SUDS Manual 2016, the water treatment benefits offered by the components provided within the proposed network have been considered in parallel with the risk of pollution imposed by the nature of the site and its usage. As such, the runoff from this warehouse and distribution development has a low to medium pollution hazard level.

In reference to the OCC Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire, the proposed drainage strategy includes a treatment train for water quality.

The surface water runoff from external areas shall be collected by means of external gullies or drainage channels, which shall have sumps for the removal of litter, coarse particles, and silts providing primary at source treatment.

Where possible attenuation basins have been added to the SuDS treatment train for water quality and to reduce the volume of runoff, as the water will be filtrated through the biodiverse planting and soil layers.

In accordance with the Simple Index Approach and the mitigation indices detailed in Appendix D, runoff from the external areas will pass through the interceptor, providing adequate mitigation for Total Suspended Solids (TSS), metals, and hydrocarbons.

While roof runoff from Unit E will be treated for the above pollutants via the small attenuation basin/bio-retention area, this solution is not feasible for Unit F. Instead, roof runoff from Unit F will be directed through a Spel Smartceptor, or similar approved, which offers sufficient mitigation for these pollutants.

Further silt retention shall be provided within the site by the use of catch pits.

8. PROPOSED SUSTAINABLE DRAINAGE (SuDS) FEATURES

The following SUDS features have been considered during the design process, the table states which features have been incorporated and which have been excluded and reasons for their exclusion.

Table 8.1: Suitability of SuDS Features

SuDS Feature	Incorporated within design	Reasoning
Green Roofs/Blue Roofs	No	Due to the development type and pitching of the roof, green/blue roofs are not suitable.
Brown roofs	No	As above.
Attenuation Pond (above ground)	No	Due to the lack of space outside the flood risk zone, it is not feasible to provide a large above-ground basin.
Rainwater Harvesting	No	Rainwater harvesting is not effective for warehousing where there are a limited number of toilets/ uses for harvested water.
Infiltration methods	No	Infiltration has been considered following site investigation and ground conditions.
Raingardens/Bio-retention areas	Yes	Small attenuation basins/bio-retention areas are provided for each unit. Please refer to the drainage layout drawings for further details.
Filter strips and swales	No	Rain gardens are provided instead.
Permeable paving	No	No, raingarden/bio-retention ponds are proposed instead.
Below-ground attenuation system	Yes	Attenuation tank system to provide volume control for each unit.

9. FOUL DRAINAGE

With no Thames Water foul drainage infrastructure within a reasonable distance of the site, the previous Phases of the Symmetry Park development discharge to foul package treatment works.

As the current site (Phase 3) is a greater distance away from the existing foul drainage infrastructure, it is proposed to discharge treated foul flows from Unit E and Unit F to the surface water system discharging to the ditch.

The foul water system for Unit E is designed to drain primarily by gravity, whilst Unit F's network will rely on a combination of gravity drainage and a foul water pumping station.

During instances of surcharging or flooding in the surface water system, a non-return valve will close on the foul inlet to the pump chamber to prevent the treatment facility from surcharging.

For Unit F, foul water will be treated by a dedicated treatment plant and will then drain by gravity to manhole S26 before being discharged into the watercourse.

Similarly, Unit E foul water will be treated by a dedicated treatment plant and will then drain on to pump manhole S52, before discharging into the watercourse via the small attenuation/bio-retention pond.

To accommodate the need for foul treatment before discharge, a suitably sized effluent treatment facility will be used. This facility will include adequate storage to handle flow fluctuations up to and including peak rates, with the treatment works discharging treated foul water at an approximate rate of 1l/s.

10. DRAINAGE MAINTENANCE

To ensure the drainage strategy operates as designed, each element within the drainage network shall require maintenance. The maintenance strategy and responsibilities are as set out in table 10.1 below.

Table 10.1: Maintenance Strategy

Component to be maintained	Actions	Frequency	Responsibility of:
Site wide external areas	Site to be generally kept free from litter and debris which may enter the drainage system.	On-going	Site management team/Tenants/owners
Roof gutters	Check roof gutters for sediment, plant debris etc and clean as necessary	Annually	Site management team/Tenants/owners
On site below ground attenuation tank	Check inlets/outlets for sediment/debris build up and clear if needed	Annually	Site management team/Tenants/owners
	Check and maintain tanks and base of tanks. Ensure there are no blockages, geo membrane and lining is intact and there is no other damage.	Annually	
	Survey and inspect the below ground tanks, remove sediment and any litter as required	Every 5 years	
General network inc. pipes/ manholes/ gullies & channels	Manholes covers to be lifted and inspected for sediment build up, remove as required	Annually	Site management team/Tenants/owners
Flow control manhole	Manhole cover to be lifted and inspected, remove litter/ debris and sediment. Manhole base, sump, any debris screen, orifice opening, hydrobrake control to be cleaned as required. Check operation of pivoting by-pass door/remote access cable and fix if required.	6 monthly	Site management team
	Check operation and mechanics of flow control device(s) in accordance with manufacturer specifications	Annually	
Small attenuation basins/bio-retention areas	Plants and shrubs to be watered and maintained in accordance with landscaping requirements. Surface to be inspected regularly with any sediment, weeds and litter removed. Check inspection chambers and perforated pipe for sediment/debris build up and clear if needed.	Annually	Site management team

11. CONCLUSION

In summary, the drainage strategy complies with Oxfordshire County Council (OCC) requirements, 'Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire', CIRIA C753, Non-statutory technical standards for sustainable drainage systems (DEFRA, March 2015), and has been designed in accordance with industry best practice.

Below-ground attenuation has been provided to ensure the discharge from the site is limited to 7.4L/s from Unit F and 9.4L/s for Unit E to connect to the existing ordinary watercourse, which is in line with the greenfield 1 in 1-year rate for the site.

Little to no pollutants are expected, and water quality requirements are met by the inclusion of trapped gullies, channels, catch pits, attenuation basins/bio-retention areas, and smartceptors.

The solution for discharging foul water from the site is by incorporating wastewater treatment and discharge to the adjacent watercourse.

Appendix A - Greenfield Run-Off Calculations

Appendix B - Microdrainage Data & Results

Appendix C - Drawings

Appendix D – Simple Index Approach