

SURFACE WATER DRAINAGE STATEMENT

JBA Project: 2024s0098
Contract: Former Poultry Units Rockfield Road
Client: The Trustees of the Morspan Pension Scheme
Date: January 2024
Author: George Williams BSc (Hons) MSc MCIWEM
Reviewer: Faye Tomalin BSc (Hons) MSc C.WEM MCIWEM
Subject: Candidate site Preliminary Conceptual Drainage Strategy

1 Terms of Reference

JBA Consulting have been commissioned by the Trustees of the Morspan Pension Scheme to prepare a high-level preliminary drainage strategy for a proposed development site at the 'Former Poultry Units' on Rockfield Road, Monmouth. The client is in the process of promoting the site as a candidate site for inclusion as an Employment Land Allocation within the revised Local Development Plan (LDP) for Monmouthshire County Council. This Technical Note will be used to understand the appropriateness of the development in accordance with the statutory standards for SuDS in Wales.

2 The Site

2.1 Site Description

The proposed development site is located off Rockfield Road (B4233), Monmouth, as shown in

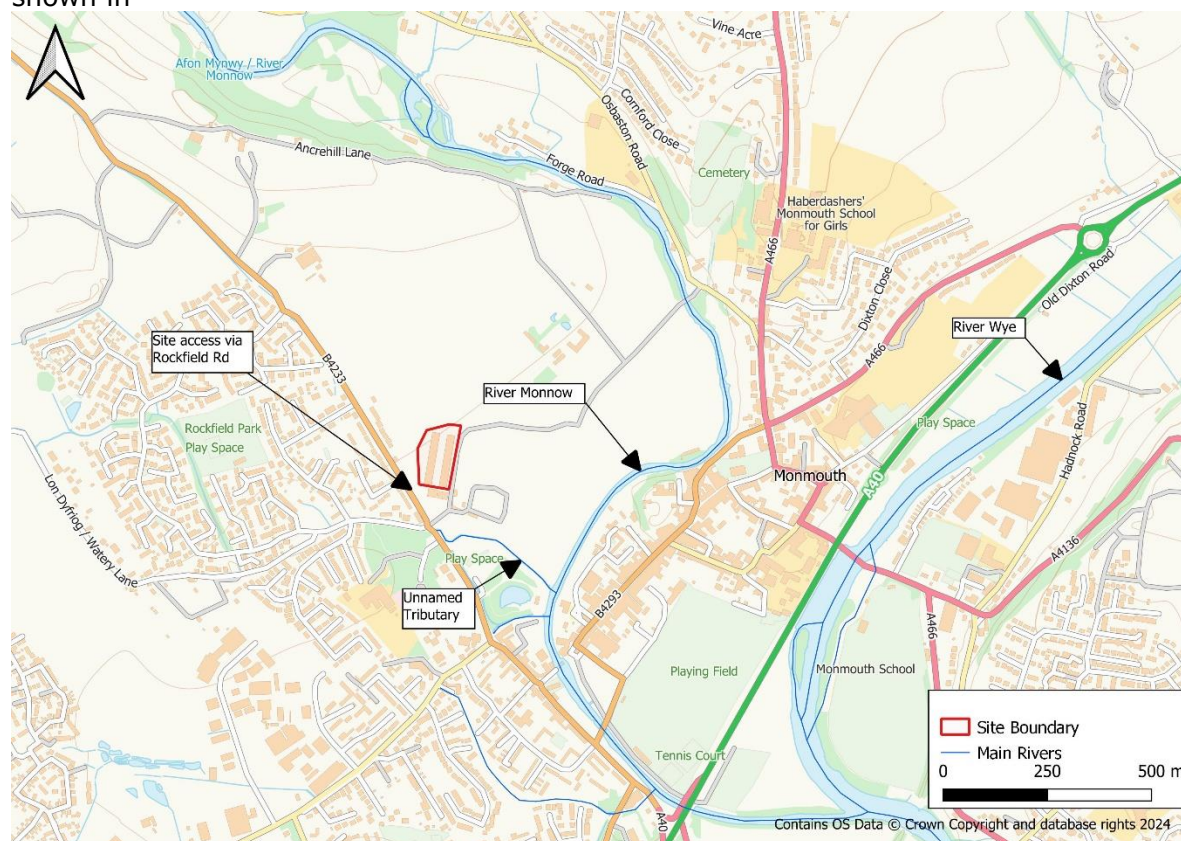


Figure 2-1. The site is approximately 1.27ha and comprises disused poultry sheds, which have been derelict for several years. The proposed use for the site is for employment purposes (category B1). The site is bound by greenfield land to the north and west, a small retail development to the south that was constructed in circa 2017 (Planning Ref: DC/2014/01065) and Watery Lane to the east. The site is currently accessed from the southern boundary via the small retail development off Rockfield Road.

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Three watercourses are located within close proximity to the site, as shown in Figure 2-1. An unnamed ordinary watercourse is located approximately 100m to the south of the site and flows in an easterly direction. This unnamed ordinary watercourse flows into the River Monnow, which is a Natural Resources Wales (NRW) designated Main River, approximately 300m to the east of the site. The River Monnow flows in a south-easterly direction towards its confluence with the River Wye, an NRW Main River, which is located approximately 1km to the east of the site.

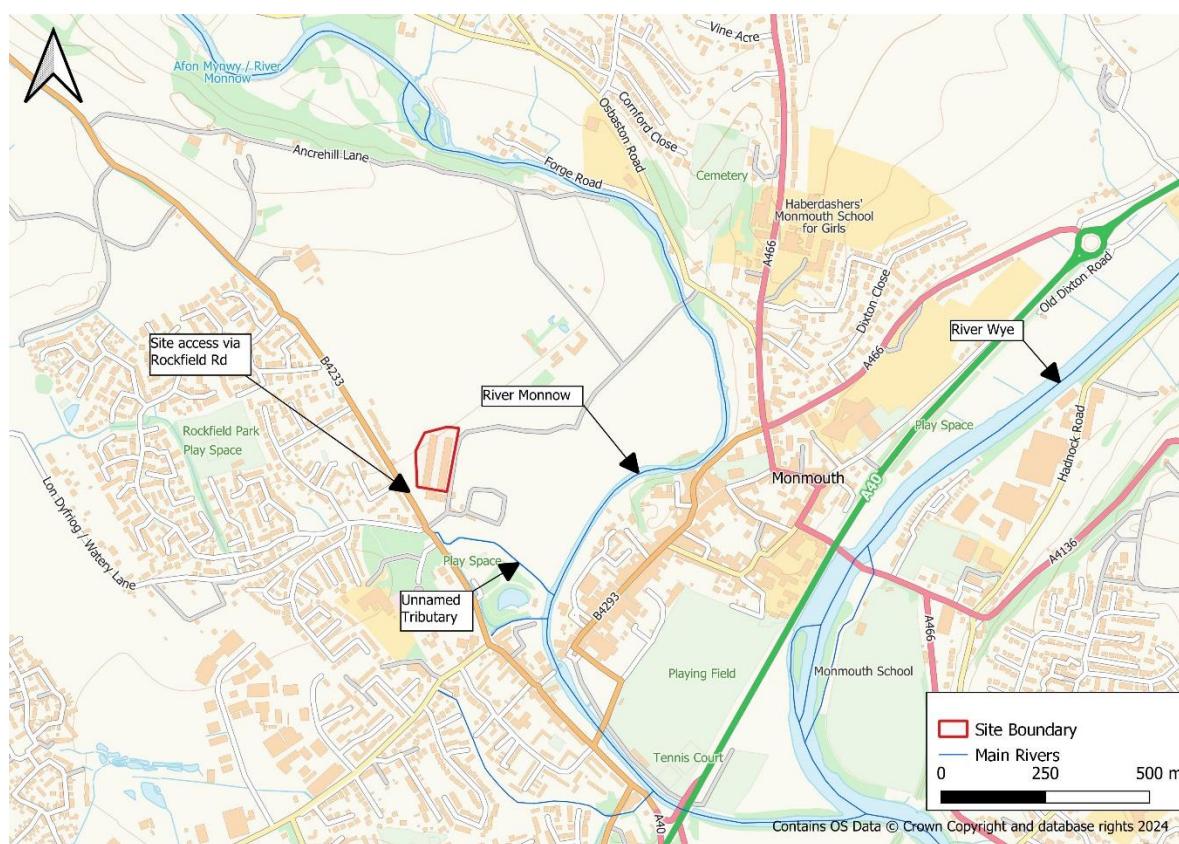


Figure 2-1 Site overview

2.2 Site Topography and Existing Land-use

The site is bounded to the south by the B4233 road as well as two retail units, constructed in 2017 (planning reference DC/2014/01065). Previously the site was used for poultry farming, but the remaining sheds have been derelict for some years. In 2017 the development of the neighbouring retail units involved the shortening of the poultry sheds by ~25m with the land being used as part of the retail development. The remaining footprint of the former poultry sheds have remained derelict. Figure 2-2 shows the change in the sites use prior to, and post development, of the nearby retail units.

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Figure 2-2 Google Earth imagery of the site

A 2018 topographic survey of the site undertaken by PM Consultants (UK) Ltd can be found in Appendix A. The topographic survey demonstrates that the site levels fall to the south-east from the northern boundary. Ground levels fall from 20.4mAOD at the northern boundary, to 19.3mAOD at the south-eastern corner of the site.

There are raised earth bunds to the east and south of the site which are at a level of 20.0-20.25mAOD. The south bund which was constructed between the site of the proposed development and the adjacent retail development.

1m Light Detection and Ranging (LiDAR) data has been used to visually represent the topography of the site as seen in Figure 2-3.

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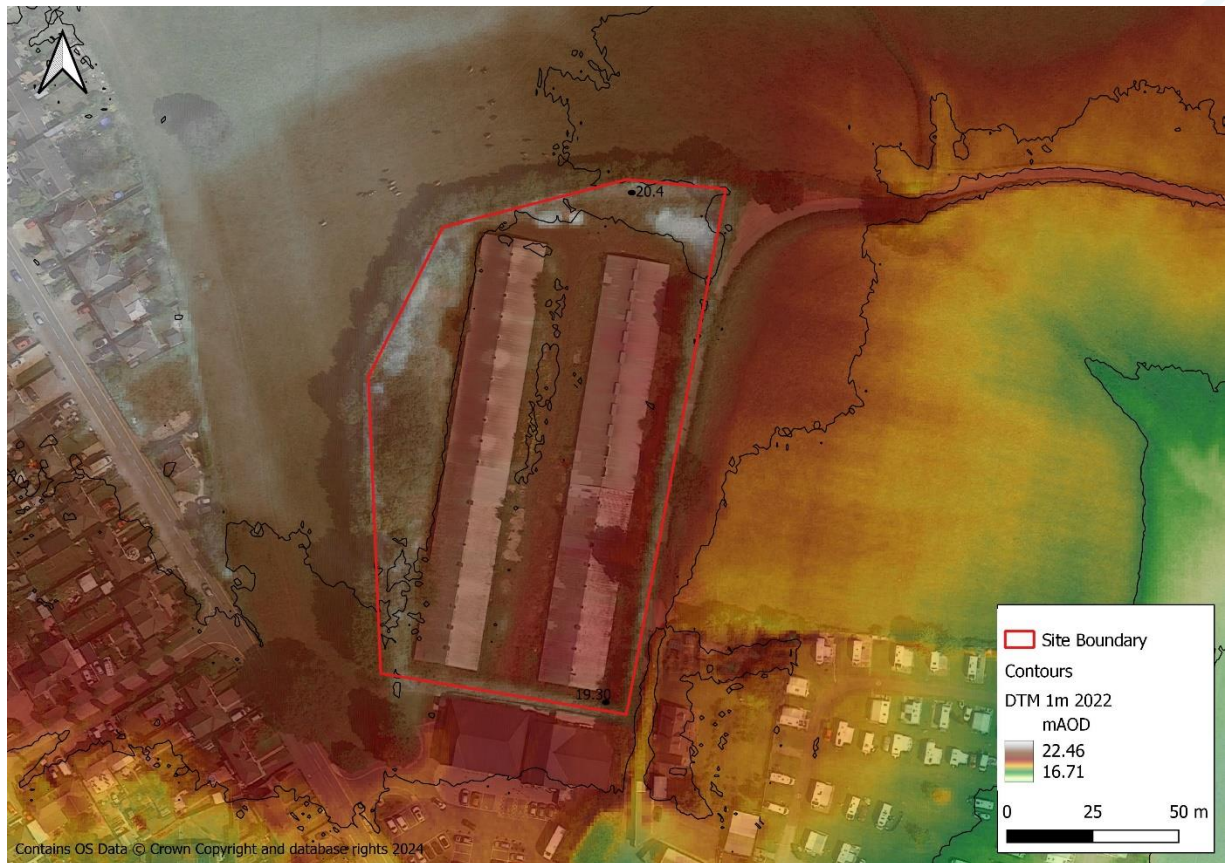


Figure 2-3 Site Topography (1m DTM LiDAR)

2.3 Proposed Development

The proposed development is for the proposed construction of two commercial units for commercial use, use class 'Business B1', likely to be light industrial and office. Each individual unit will have a gross internal floor area of 1630m². Associated car parking will be located to the northeast, south and centrally of the proposed units. A proposed development plan can be found in Appendix B.

The proposed development will lead to an increase in impermeable area, due to the proposed tarmac surfaces, proposed for car parking spaces, along with pedestrian walkways and store rooms.

2.4 Flood Risk from Rivers.

The Flood Map for Planning - Flood Risk from Rivers shows the site to be entirely within Flood Zone 2 as seen in Figure 2-4 below. This represents a between 0.1% (1 in 1000 year) and 1% (1 in 100 year) chance of flooding in any given year including an allowance for climate change. The site is not at risk of tidal flooding and as such this hasn't been represented on the NRW FMfP.

In July 2021 JBA produced a Flood Risk Statement assessing all forms of flood risk. The predominant risk of flooding to the proposed development site is from fluvial sources, with a different in risk from Wye and Monnow dominant fluvial events.

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Detailed modelling demonstrated that the site is predicted to be flood free in the 1% AEP plus climate change event from both rivers. In the 0.1% AEP Monnow dominant event, the site is predominantly flood free, with flood waters restricted by the bunds to the south and east of the site. In the 0.1% AEP Wye dominant event, shall flooding of up to 600mm is predicted to the eastern extent of the site.

For further information please refer to the 2021 Flood risk Statement .

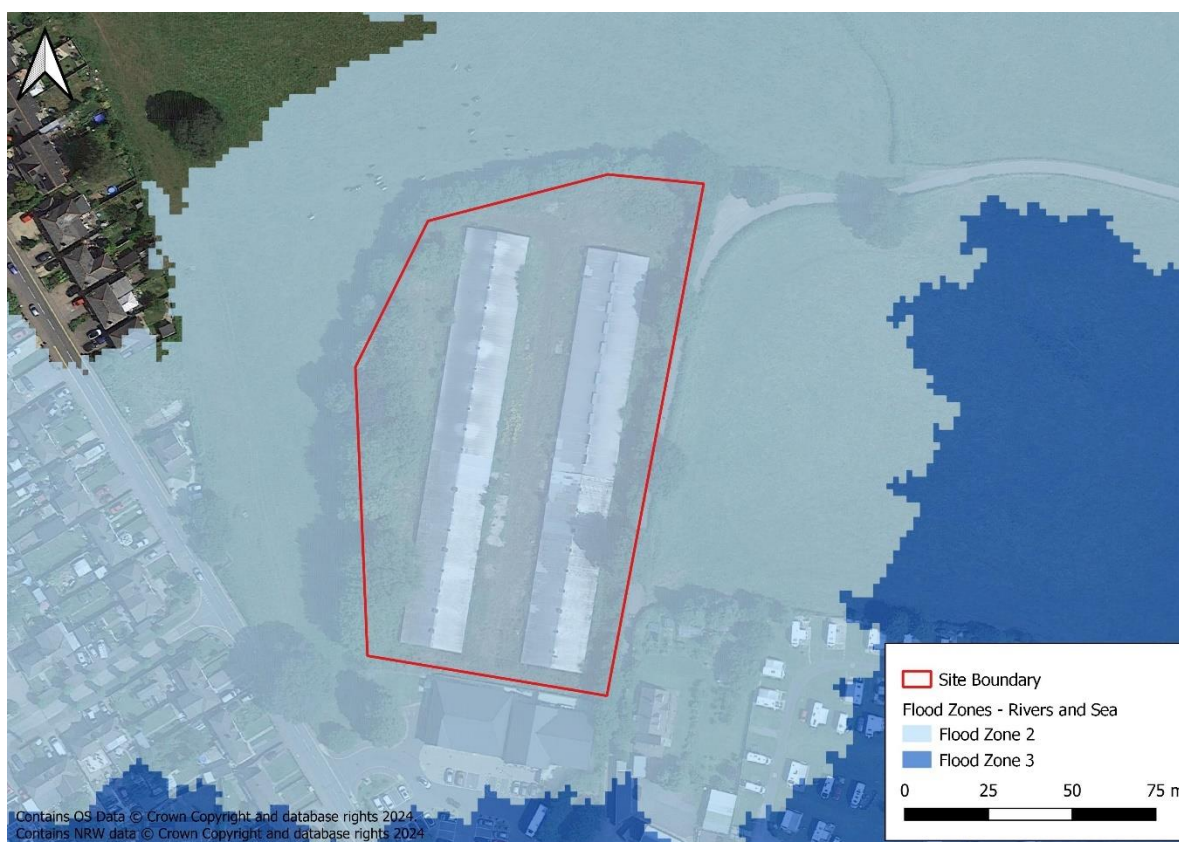


Figure 2-4 Flood Risk from Rivers

2.5 Flood Risk from Surface Water and Small Watercourses

The Flood Map for Planning- Flood Map for Surface Water and Small Watercourses shows the site to be located predominantly outside of areas at risk, as can be seen in Figure 2-5 below. An isolated area of ponding is located to the west of the existing poultry shed, classified as Flood Zone 2. This represents a between 1% (1 in 100 year) and 3.3% (1 in 30 year) chance of flooding in any given year.

Via the use of an adequate surface water drainage strategy, the risk of surface water flooding can be managed at this development incorporating SuDS to attenuate, treat and convey flows across the site.

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Figure 2-5 Flood Risk From Surface water and Small watercourses

2.6 Site Geology and Soil types

By referring to the British Geological Survey (BGS) Geology viewer¹, the site's bedrock geology forms part of the St Maughans Formation, which consists of argillaceous rocks and interbedded sandstones. The superficial deposits consist of sands and gravels which are categorised as River Terrace Deposits.

According to Cranfield Universities Soil Scape viewer² the proposed candidate site is underlain by freely draining floodplain soils (soilscape 12).

It is thought that the underlying geology will be conducive to infiltration methods of surface water discharge due to sand and gravel present in the River Terrace deposits and the 'freely draining soils'. This will need to be confirmed via a BRE 365 Soakaway test.

¹ [BGS Geology Viewer - British Geological Survey](#)

² [LandIS - Land Information System - Soilscape soil types viewer](#)

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3 Surface Water Management Approach

3.1 Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) aim to mimic the natural processes of Greenfield surface water drainage by allowing water to flow along natural flow routes and aims to reduce the runoff rates and volumes during storm events, whilst providing water treatment benefits. SuDS also have the advantage of providing Blue and Green Infrastructure as well as ecological and amenity benefits when designed and maintained properly.

Schedule 3 of the Flood and Water Management Act 2010 was enacted in Wales in January 2019, leading to the requirement for all new developments to incorporate the four pillars of SuDS design, shown in Figure 3-1.

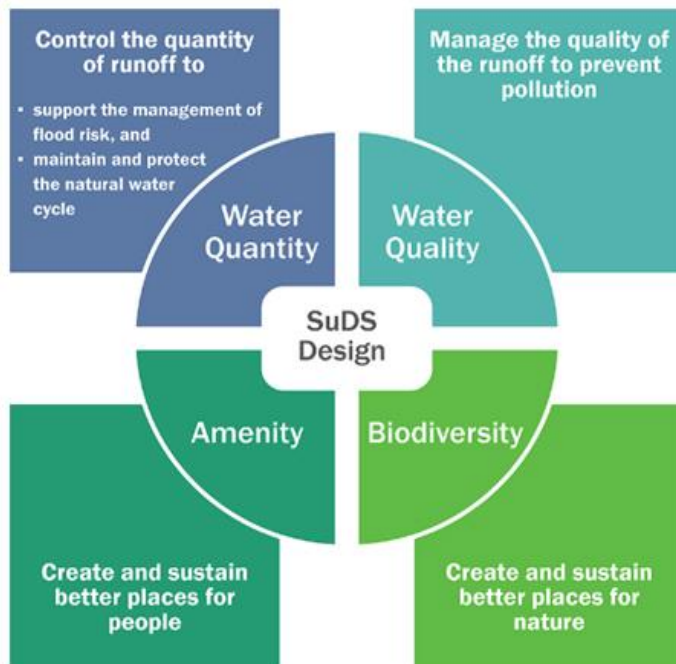


Figure 3-1 The Four Pillars of SuDS Design (CIRIA 2015)

3.2 Design Criteria

The following national guidance documents and design standards have been considered when developing this preliminary surface water drainage strategy.

- The CIRIA SuDS Manual C753 (CIRIA 2015)
- Statutory Standards for Sustainable Drainage Systems – designing, constructing, operating, and maintaining surface water drainage systems (Welsh Government 2018).
- Planning Policy Wales - Edition 11, February 2021
- The Building Regulations 2010 Part H: Drainage and Waste Disposal
- Water UK Sewage Sector Guidance- Appendix C- Design and Construction Guidance (DCG), version 2.3 November 2023.

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Monmouthshire County Council (MCC) does not have any specific guidance related to SuDS development. Should any such guidance be developed during the outline or detailed drainage design this should be consulted and considered.

3.3 Existing discharge location

Given the underlying geology and assumed soil type for the site, it is assumed that currently surface water mostly drains via evapotranspiration losses, slow infiltration into the underlying soils, and runoff towards the ordinary watercourse to the south of the site which flows towards the River Monnow. Currently the site appears to be overgrown with the vegetation providing an infiltration and interception benefit to the site.

Currently there is no publicly available information that describes how surface water is drained from the site. It is therefore assumed that there is currently no existing surface water drainage system at the site that could be utilised by the proposed development.

Figure 3-2 indicates indicative flow paths of the proposed development site.

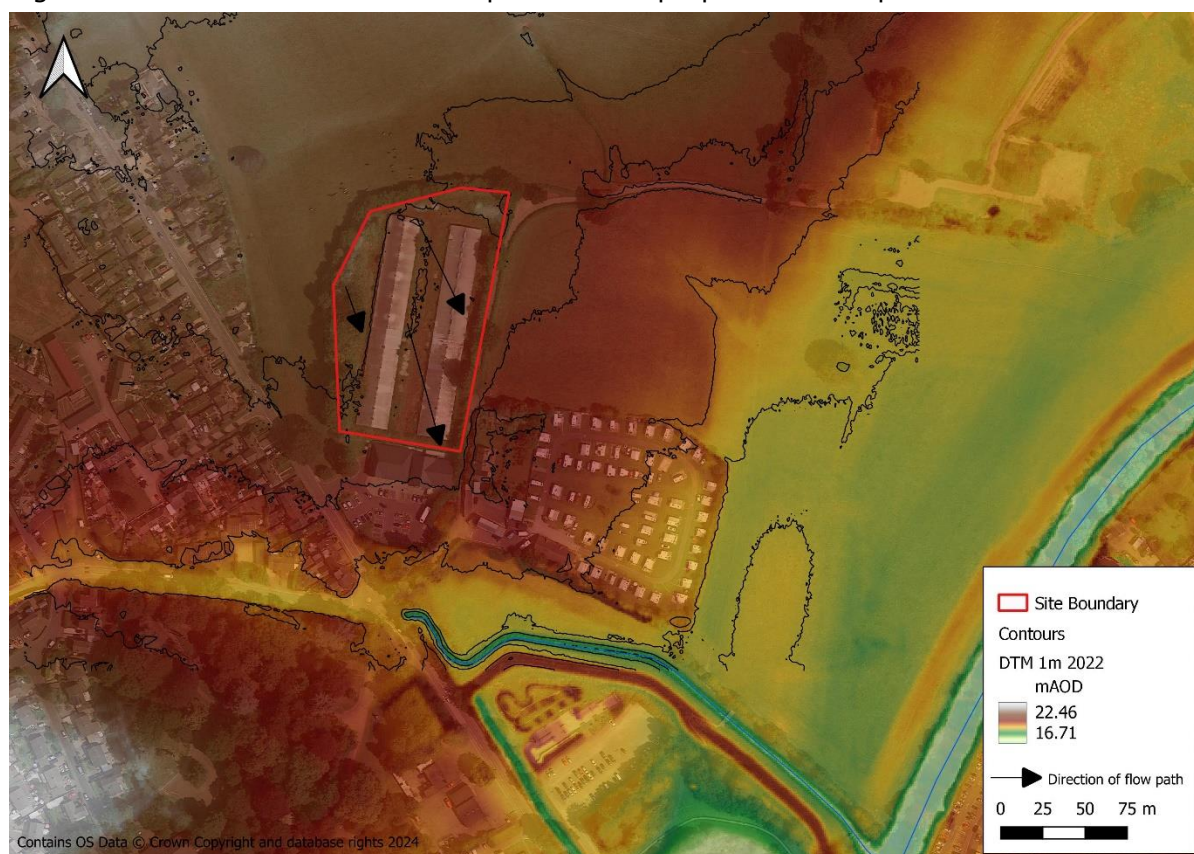


Figure 3-2 Existing Flow Paths

3.3.1 Greenfield Runoff Rates

Table 24.1 of Ciria C753 The SuDS Manual indicates that the FEH methods (FEH Statistical and REFH) should be the preferred methods of calculating peak Greenfield Runoff Rates. This is supported by Natural Resources Wales GN008 Flood Estimation: Technical Guidance and Environment Agency Research by Faulkner et al which concluded

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that FEH methods are applicable across a range of catchment sizes and that they should be used in place of outdated methods such as IH124 and ADAS 345 where possible.

The UKSuDS Tool was used to calculate peak Greenfield runoff rates for the site. Catchment descriptors were extracted from the FEH Web Service and are displayed in Table 3-1. The calculated Greenfield runoff rates are shown in Table 3-2 below and the UKSuDS calculations are contained in Appendix C.

Table 3-1 Catchment Descriptors

Characteristic	Value
Site Area (ha)	1.22
BFI Host	0.589
SAAR (mm)	934

Table 3-2 Greenfield Runoff Rates

Return Period	Specific Runoff (l/s/ha)	Peak Runoff Rate (l/s)
QBAR	4.57	5.58
100	9.98	12.17

3.3.2 Greenfield Runoff Volume

Greenfield runoff volumes were calculated for a six-hour storm event at the site using the FSSR16 method as shown in Equation 1 below:

Equation 1: Site Area x Rainfall Depth x Percentage Runoff

Percentage runoff was calculated using the FSSR16 methodology which accounts for soil type, catchment wetness and storm intensity. The rainfall depth for a six-hour 100-year storm events were extracted from the FEH Web Service and are summarised in Table 3-5 with calculated Greenfield runoff volumes.

Table 3-3 Greenfield Runoff Volumes

Return Period	Rainfall Depth (mm)	Greenfield Runoff Volume (m3)	Greenfield Runoff Volume (m3/ha)
30	47.90	214	175
100	64.3	305	250

3.4 S1 Surface Water Runoff Destination (Drainage Hierarchy)

The statutory standards for SuDS in Wales address the use of surface water by the development and where it should be discharged. It has developed a destination hierarchy which sets out the preferred routes for discharge of runoff from the site:

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- Priority Level 1: Surface water runoff is collected for use.
- Priority Level 2: Surface water is infiltrated to ground.
- Priority Level 3: Surface water runoff is discharged to a surface water body.
- Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system.
- Priority Level 5: Surface water runoff is discharged to a combined sewer.

Priority Level 1 is the preferred (highest priority) and 4 and 5 should only be used in exceptional circumstances. The following outlines how the proposed development adheres to the drainage hierarchy.

Priority Level 1 - water for reuse

As per the principles of the statutory Standards for SuDS in Wales, the surface water runoff from the proposed development site should primarily be collected for re-use - Priority Level 1 of the discharge hierarchy. Given the commercial nature of the site, the possible inclusion of rainwater harvesting systems should be considered. However, the yield: use ratio may not be sufficient for this site to allow for disposal of surface water via rainwater harvesting alone.

Priority Level 2 - infiltration

Priority Level 2 of the drainage hierarchy is to dispose of surface water via infiltration. Ground Investigations have not yet been undertaken at the site; however, the underlying bedrock is comprised of St Maughan's Formation – argillaceous rocks and sandstone, interbedded. The soils are shown to be 'freely draining' flood plain soils suggesting they may be conducive to infiltration. However, within the desktop study borehole records available on the BGS GeoIndex were consulted. These indicate that groundwater levels in the region can vary, with some locations recording groundwater being struck 2-3 mbgl. In addition, whilst no records of infiltration testing is available on the planning portal, the adjacent development (reference DC/2014/01065) discharges surface water via a connection to the public sewer, suggesting that infiltration was not a viable means of surface water disposal.

Consequently, it is considered unlikely that infiltration shall be a viable method of surface water discharge for the development site. However, infiltration testing, in accordance with BRE Digest 365, shall be required to demonstrate the suitability of infiltration methods across the site prior to outline and detailed design.

Priority Level 3 - discharge to a surface water body

Should infiltration be an unsuitable method of surface water discharge, Priority Level 3 of the discharge hierarchy is to discharge to a surface water body.

There is an unnamed ordinary watercourse, which is a tributary to the River Monnow, located approximately 100m to the south of the site that could be used as a location for surface water discharge. However, a connection into this unnamed ordinary watercourse could be challenging due to the need to cross third-party land. The potential for a surcharged outfall would also need to be considered, which would be likely to increase the storage provision needed across the site.

If it is not feasible to connect to this unnamed tributary, then Priority Level 4 - Discharge to an existing surface water sewer would need to be considered.

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Priority Level 4 - Discharge to an existing surface water or highway drain

Discharge of surface water into a public network has been considered.

Dŵr Cymru Welsh Water (DCWW) records have been obtained and contained in Appendix D. These indicate that an existing public surface water sewer is located within Rockfield Road. It is proposed that a connection to this sewer could be made to provide a viable method of surface water discharge from the site, providing that further investigation concludes that the Priority Levels 1-3 are unsuitable.

In addition, it is noted that the adjacent recent development site (reference DC/2014/01065) provides a proposed connection point for foul and surface water for the proposed site. Surface water drainage plans have been obtained from the planning portal, and extract of which is shown in Figure 3-3, with the full plan contained in Appendix E. As-built drawings are not currently available. Consequently, should any connection be proposed to this site, further investigation shall be required as to the form, condition, and suitability of the system to receive additional flows.

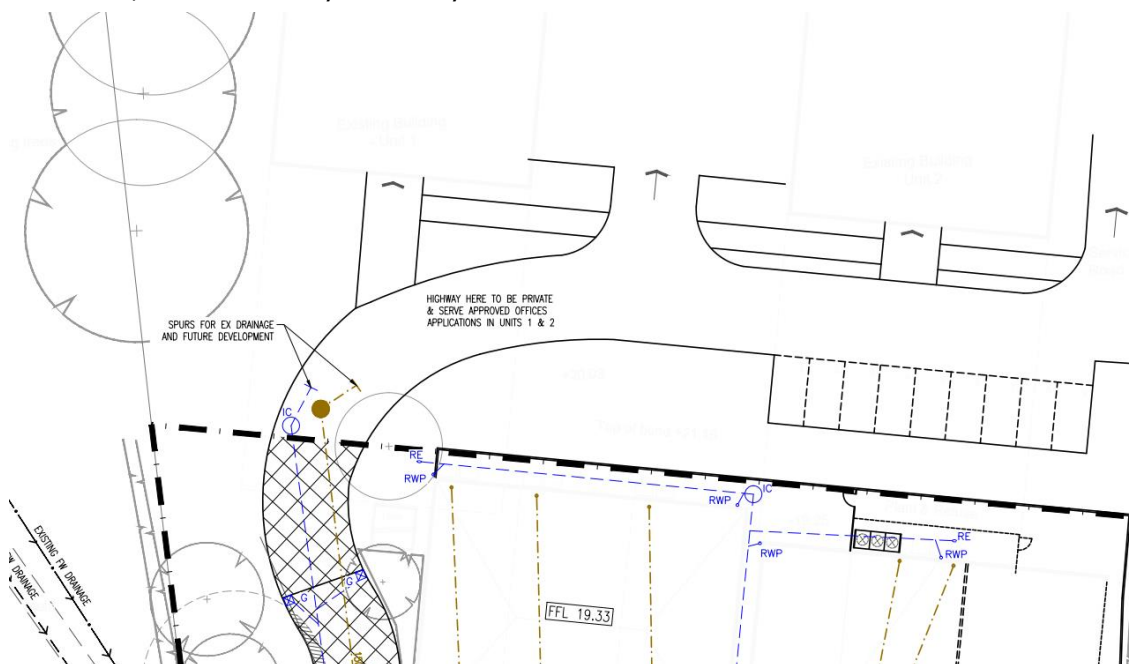


Figure 3-3 Surface Water Drainage Plan from Development reference DC/2014/01065

3.5 S2: Surface Water Runoff Hydraulic Control

There are typically three design storm events which should be considered when designing the SuDS system for managing flows and volumes:

- A 1 in 1-year event, on sloping sites without basements, where surcharging above soffits of any surface water drainage pipe is not permitted.
- 1 in 30-year event, where surface water flooding of the site is not permitted at this frequency.

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- 1 in 100-year storm event with allowances for future climate change, where runoff should be managed within the extents of the development or surrounding development.

3.5.1 Allowance for Climate Change

The Welsh Government has produced Adapting to Climate Change guidance which contains indicative sensitivity ranges for peak rainfall intensity. As the proposed site is for business use (Class B1), the assumed lifetime of the development is 75 years and as such the 2071-2115 estimate should be used. The recommended climate change factor for small catchments using the Central estimation for the 2070-2115 epoch is 20%. However, a sensitivity check should be undertaken on the upper estimate value of 40%.

From previous engagement with MCC SAB, it is understood that a climate change allowance of 40% shall be required to be applied.

3.5.2 Discharge Limits and Attenuation Volume

Should infiltration not be viable, the discharge limit for the site should be set to the Greenfield QBAR rate of 4.57 l/s/ha.

Attenuation should be considered at all stages of master planning and site design to facilitate the implementation of SuDS across the site through Blue-Green Corridors and source control techniques wherever possible. At this high level stage, an accurate calculation of required storage volumes and how to distribute these volumes across the site has not been undertaken. However, an indicative site impermeable area has been determined from the site masterplan provided and the UKSuDS tool utilised to determine an indicative storage volume required for the site.

The indicative impermeable area was calculated to be 0.76ha which equates to 62% of the total site area. A storage volume of 768m³ was calculated for the site. The UKSuDS tool record is contained in Appendix F Please note this is indicative at this stage and further calculations will be provided at outline and detailed design.

3.6 S3: Water Quality

A certain level of water quality treatment is expected from drainage systems to prevent pollution of the receiving waterbody. During the water treatment design event (5mm rainfall across the entire site) no runoff should leave the site. This can be achieved through source control measures such as permeable paving or rain gardens.

Table 4.3 of the SuDS Manual advocates the use of the "simple index approach" to determine an appropriate level of pollution mitigation for the development sites. This splits pollution into three contaminant types (Total Suspended Solids, Metals and Hydrocarbons) and assigns a "Pollution Hazard Index" to each type. Different SuDS features are then assigned a "SuDS Mitigation Index" and sufficient treatment is deemed to be provided if the "SuDS Mitigation Index" is equal to or greater than the "Pollution Hazard Index" for each pollutant type. When more than one SuDS component is required a multiplication factor of 0.5 is applied to mitigation indices for secondary and tertiary components to account for reduced performance.

The proposed development is for business use (Class B1) with low traffic roads. Low traffic roads have a "low" pollution hazard level. The "Pollution Hazard Indices" for a low pollution hazard site is given in Table 3-4 below.

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Table 3-4 Pollution Hazard Indices for low pollution Roads

Total Suspended Solids (TSS)	Metals	Hydrocarbons
0.5	0.4	0.4

3.7 S4: Amenity & S5: Biodiversity

The design of the surface water management system should maximise amenity benefits across the site. SuDS components can enhance the provision of high quality, attractive public space which can help to provide health and well-being benefits, they improve the liveability of local communities, and they contribute to improving the climate resilience of new developments.

The aim of Standard 4 is to ensure that wherever possible and having regard to the need to prioritise drainage, the SuDS scheme makes the best contribution towards maximising the benefits for amenity.

Across the development, SuDS components such as rain gardens and vegetated swales/rills would provide area of enhanced amenity and biodiversity, creating a pleasant place to work and promote wellbeing across the site. Rain gardens and swales can also assist in climate resilience of the development, promoting carbon sequestration, and permeable paving could provide amenity benefits from its multifunctionality.

The surface water drainage system should seek to enhance habitats within the site and complement neighbouring habitats. The ecological potential of the SuDS system can be maximised by utilising local planting, locating SuDS adjacent to existing features and utilising the known surface water flow paths across the site. The strategy should create a range of habitats and provide varied water depths within the SuDS features, which should be sustained by ensuring that an effective management regime is implemented.

3.8 S6: Design of Drainage for construction, operation, and maintenance

The national SuDS standards state that components must be designed to ensure the structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the life of the development, considering the requirement for reasonable levels of maintenance.

3.8.1 Health and safety

The surface water drainage system should be designed so that it minimises health and safety risks to the sites occupants. SuDS are sometimes perceived as unsafe structures with fears of drowning and overturning cars, but with the correct design, these risks can be mitigated. A CDM Designers Risk Assessment should be undertaken demonstrating that any proposed surface water drainage system is fit for purpose, with risks designed out of the proposal, or mitigated wherever necessary.

Adoption and Maintenance

Schedule 3 of the Flood and Water Management Act 2010 was implemented in Wales on the 7th January 2019. Under this legislation, SuDS that serve multiple properties must

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be approved and adopted by the SuDS Approval Body (SAB) - a function performed by the Lead Local Flood Authority (LLFA), at Monmouthshire County Council. However, as this site is anticipated to be retained under single ownership. Consequently, the proposed surface water drainage system shall not be adoptable

During the detailed design phase, a detailed maintenance plan should be developed to demonstrate the maintenance required to ensure the proposed drainage system functions to optimal capacity in perpetuity whilst ensuring the safety of the future occupants of the site.

As the proposed site is assumed not to be adoptable, the developer/ future owner of the site will be responsible for the maintenance of the system.

3.9 Site Opportunities and Constraints

A range of SuDS components should be used within the development site in an interconnected system designed to manage, treat, and make the best use of surface water runoff. The proposed development site provides many opportunities and constraints for the disposal of surface water via the use of SuDS.

As discussed in Section 3.4, There are numerous options for discharge locations for the development site, with the most suitable yet to be determined. Rainwater harvesting should be considered for the site to determine if there is sufficient yield: use ratio. Whilst it is unlikely that infiltration shall be a viable means of surface water disposal, this should be confirmed via infiltration testing prior to outline design being undertaken. A small, ordinary watercourse is located within close proximity of the site, though further investigation as to the viability of a connection through third party land should be explored. Ultimately, a DCWW surface water sewer is located within Rockfield Road into which surface water can be discharged at greenfield runoff rates. This may be via a new connection, or via the existing connection provided by the adjacent development that was constructed in 2017 (Planning application reference DC/2014/01065).

It is understood that the SAB have previously requested that there are multiple outfalls and no single discharge point for the development site. Our desktop assessment of the proposals suggests that this is unlikely to be viable should infiltration not be utilised across the site. Given site topography towards the south-eastern corner, and the proximity of the watercourse at that location, should a connection be proposed it is conducive that a single discharge location should be proposed. The same is likely for any connection to a surface water sewer. However, in this instance, it is recommended that drainage catchments are considered across the site, and the suitability of using both the existing and a new connection into the existing system is explored. In all circumstances, source control SuDS should be applied across the site and not just focused on the area of discharge.

As the site is located outside of the 1% AEP plus climate change flood extent, there are no limitations for the siting of SuDS assets across the site.

Space for SuDS across the development site with the current masterplan are limited, with large areas of impermeability through the proposed units and associated parking. The current masterplan indicates that there will be an increase in impermeable area in comparison to the existing site usage. Consequently, areas for large attenuation features, such as basins, are limited. This in turn, promotes the use of source control features such as Green Roofs, permeable paving and rain gardens.

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The shallow fall in ground levels from the north to south-east of the site also promotes the need for surface level features to store, treat and convey flows to ensure that an appropriate connection can be made to the proposed discharge location. Should a connection be proposed to the south-east of the site, consideration should be given to the practicality of the connection given the presence of the earth bunds to the south and east of the site. All surface water should be conveyed by gravity where possible, with the need for pumping avoided.

The current site plan indicates that there are some areas designated for soft landscaping and an area of proposed new tree planting to the west of the proposed units. Areas of landscaping could be incorporated into any SuDS methods such as rain gardens into the proposed areas for landscaping or utilising any stored surface water for watering during periods of low rainfall.

The current site plan also shows a significant area of the site designated for car parking spaces. The use of permeable paving at these locations could be a way in which to utilise SuDS at the site. Permeable paving will provide both amenity through its multifunctional use and water quality improvements.

3.10 Summary of SuDS Viability

Given the design criteria above, and the opportunities and constraints across the site, consideration has been given to various SuDS components and their viability for use across the proposed development site. Table 3-5 provides a summary of the SuDS component and their viability, along with an indication of the additional benefits they can provide, such as amenity, biodiversity, and water quality benefits. This demonstrates that there is a wide range of SuDS options that could potentially be deployed at the site. Such SuDS options would be deployed in combination to form a SuDS 'management train' to achieve the multiple requirements and objectives of the SuDS standards.

Table 3-5 Viability of SuDS components onsite

SuDS component	Site Viability	Amenity Benefits	Biodiversity Benefits	Water Quality Benefits	Comments
Rainwater Harvesting	✓	✓	✗	✗	Options for rainwater harvesting should be explored across the site.
Green Roofs	✓	✓	✓	✓	Given the space limitations across the site, the opportunity for source control SuDS should be explored. A Green Roof would provide interception, along with amenity, biodiversity and water quality benefits.

SURFACE WATER DRAINAGE STATEMENT

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 Reviewer: Faye Tomalin BSc (Hons) MSc C.WEM MCIWEM
 Subject: Candidate site Preliminary Conceptual Drainage Strategy

Infiltration Systems and Soakaways	TBC	x	x	✓	There is potential for infiltration to be a viable option for the site. Testing is required to determine whether infiltration rates are suitable.
Filter Strips	✓	✓	✓	✓	Opportunities for small filter strips located close to the access roads and car parking areas.
Filter Drain	✓	x	x	✓	. Opportunities for filter drains located close to access roads and car parking areas will be an effective way of conveying and treating flows
Swale	✓	✓	✓	✓	Some potential opportunities for swales on the site. These should be incorporated into the proposed landscape strategy.
Bioretention Systems and Rain Gardens	✓	✓	✓	✓	Beneficial for use within treatment trains and for implementation of SuDS at source. Proposed for enhancement of the site.
Pervious Pavements	✓	✓	x	✓	Pervious pavements can be utilised for attenuation purposes on the proposed carparking areas of the site.
Attenuation Storage Tanks	✓	x	x	x	Above ground SuDS should be considered prior to the use of

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					below ground storage.
Detention Basin	x	✓	✓	✓	Due to the small site area it is unlikely that there is enough space to accommodate basins within the site
Ponds and Wetlands	x	✓	✓	✓	Insufficient area within the redline boundary to accommodate for ponds or wetlands.

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4 Conclusion

JBA Consulting were commissioned by The Trustees of the Morspan Pension Scheme to prepare a high-level preliminary drainage study, in support of a candidate site submission at the 'Former Poultry Units' at Rockfield Road, Monmouth, Monmouthshire for inclusion within the revised Local Development Plan (LDP) for Monmouthshire County Council.

The proposed candidate site is approximately 1.22ha in size and is currently occupied by two disused poultry sheds. An unnamed watercourse is located approximately 100m to the south of the site with the River Monnow, a NRW Main River located approximately 300m to the east of the site.

The proposed employment allocation would include the construction of two new units for commercial use, use class 'Business B1'. Each individual unit will have a gross internal floor area of 1630m². Associated car parking will be located to the northeast, south and centrally of the existing sheds. The proposed development will lead to an increase in impermeable area, due to the proposed tarmac surfaces, proposed for carparking spaces as well as pedestrian walkways.

The current surface water infrastructure across the proposed development site is currently unknown, and it is therefore assumed that surface water is partially discharged via evapo-transpiration, and predominantly runs off in a general south-easterly direction towards the River Monnow and its tributary to the southeast of the site. Due to the site's current overgrown nature, it is anticipated that interception and infiltration of surface water by vegetation also controls surface water runoff at the site currently.

The soil type beneath the site is described as 'Freely Draining'. As a result, it is likely that the site will have sufficient infiltration rates to discharge surface water via infiltration. Local borehole records indicate that groundwater may be present 2-3 mbgl, resulting in infiltration being an unviable means of achieving priority two as per the statutory standards of SuDS in Wales. However, infiltration testing will be required to confirm this assumption, and it is advised that this is completed prior to outline design.

There may be potential to discharge surface water to the unnamed water course located close to the site. However, further investigation would be required to establish the feasibility given it is likely that third party land will need to be transgressed. There is an existing surface water sewer located in Rockfield Road that runs in a south easterly direction. The outfall point of this sewer is currently unknown and further investigation is required. However, should infiltration methods and discharging to the unnamed watercourse prove to not be viable then a connection to this sewer could be a viable alternative. It would be proposed a connection is made to this sewer as close as possible to the site. Permission would be required by DCWW.

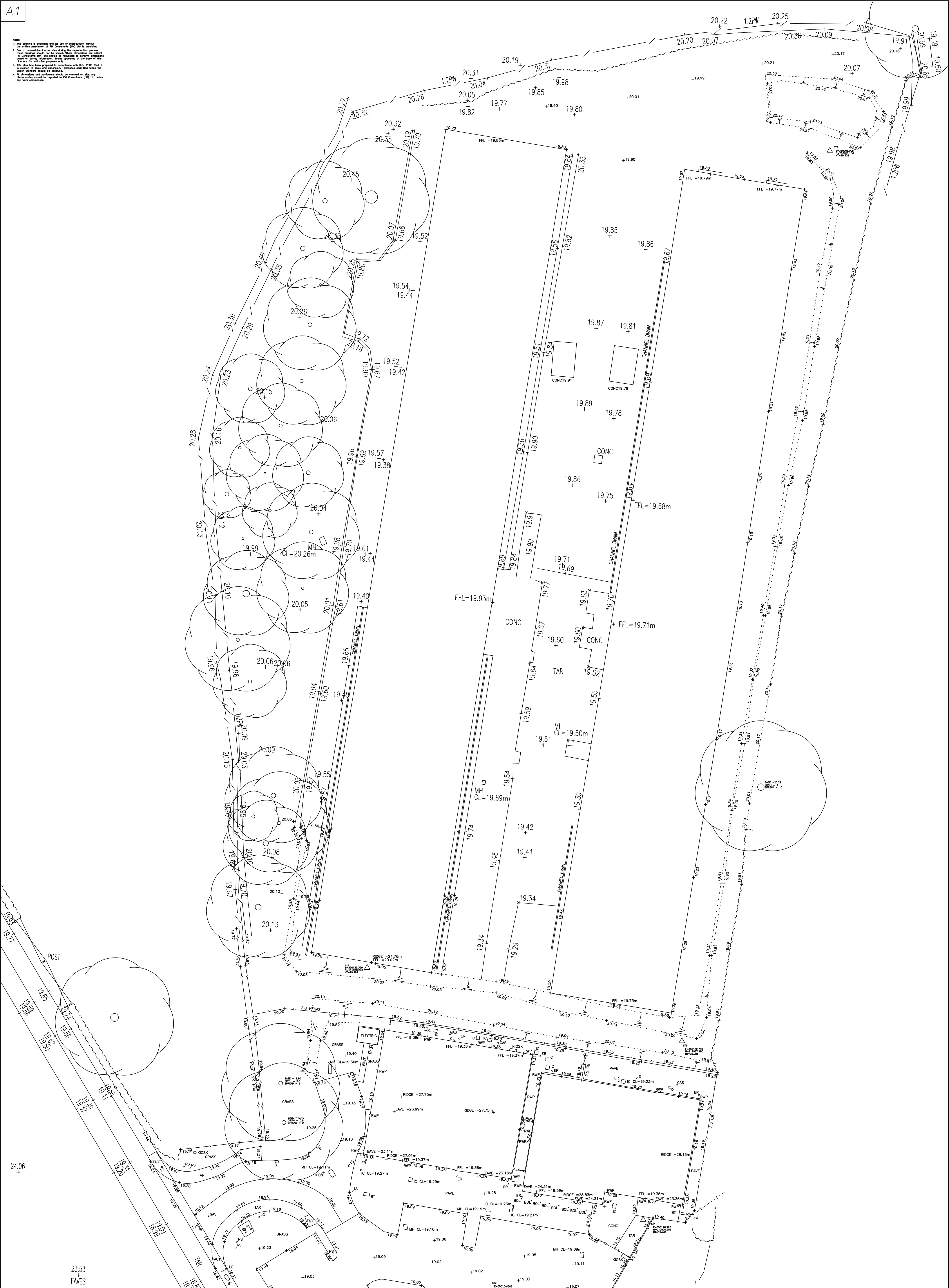
Greenfield runoff rates have been calculated as 4.57 l/s/ha for a QBAR event. Indicative surface water storage volumes of 768m³ were also calculated for this site, based off 62% of the site's total area being impermeable. The surface water drainage system should reduce post development runoff rates and volumes as close to Greenfield runoff rates as possible, in line with the statutory standards for SuDS in Wales. The drainage strategy should provide multiple benefits and ensure water quality downstream is not adversely affected as a result of the proposed development.

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Appendix A: Topographic Survey

Notes:
1. This drawing is copyright and its use or reproduction without the written permission of the Consultants (UK) Ltd is prohibited.
2. Due to unavoidable discrepancies arising from multiple surveys, there is a warning that not all points shown on this drawing are correct. The Consultants (UK) Ltd shall be responsible for any discrepancies arising from survey information. Some points shown at the base of this plan are for reference purposes only.
3. This plan has been prepared in accordance with BS: 1191, Part 1 in relation to site plan drawings. Dimensions pertained with the plan should be used.
4. All dimensions and particulars should be checked on site. Any discrepancies should be reported to the Consultants (UK) Ltd before any work commences.

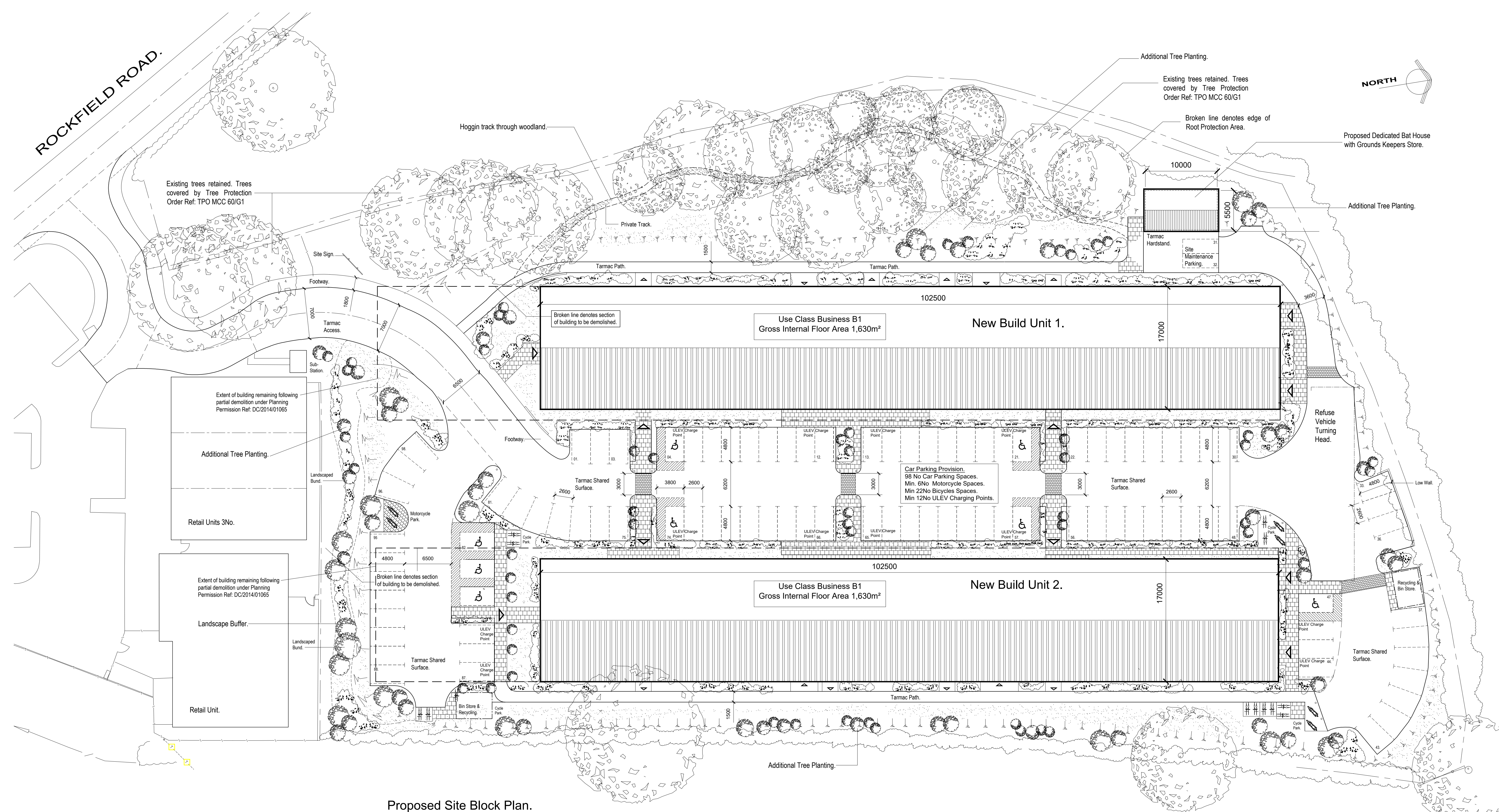


KEY					NOTES	ISSUE	REVISION	DATE	JOB
26.32	SPOY LEVEL	TS	TRAFFIC SIGNAL	CONC	CONCRETE	1.0 BR			TOPOGRAPHICAL SURVEY ROCKFIELD ROAD MONMOUTH
TAP	TARMAC SIGNAL CONTROLLER	TSC	TRAFFIC SIGNAL CONTROLLER	RWP	RAINWATER PIPE	2.0 PR			
FL	FLOWER BED	IC	INJECTION COVER	SWP	SOIL WENT PIPE				
H/S	HEDGE/SHEDDING	MP	MANHOLE	FW	FOUL WATER				
BOL	BOLLARD	MP	MARKER POST	SW	STORM/SURFACE WATER				
TM	TOP OF WALL	TP	TELEGRAPH POLE	W	WATER/STOP TAP				
RL	ROAD SIGN	LC	LIGHTING COLUMN	STW	STRAINER				
TL	TOP WATER LEVEL	G	GULLY	SNP	STREET NAMEPLATE				
EL	INVERT LEVEL	WM	WATER METER						
PH	FIRE HYDRANT	VM	VALVE METER						
BT	BRITISH TELECOM	ST	STOP TAP						
CAV	CABLE TV	DV	DRAIN VALVE						
TACT	TACTILE PAVING	FT	FINISHED FLOOR LEVEL						
					WALL (WITH DESCRIPTION & HEIGHT)				
					FENCE (WITH DESCRIPTION & HEIGHT)				
					HEDGEROW/TREE CANOPY				
					BUILDING LINE				
					CHANNEL/KERB LINE				
					TOP/BOTTOM OF BANK				
					SOFT EDGE OR VERGE EDGE				
					HARD EDGE				
					OVERHEAD LINE				
					GATE				
					DATE				

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Appendix B: Proposed Development Plan



Proposed Site Block Plan.

BAT MITIGATION NOTES.

Please be aware this site contains European Protected Species (EPS). An EPS Licence must be obtained from Natural Resources Wales prior the commencement of works on site. Refer to David Clements Ecology - Survey For Bats & Nesting Birds - Survey Report for Mitigation proposals.

The Retained Ecologist DAVID CLEMENTS ECOLOGY LIMITED 02920 350120 should be consulted on all issues relating to the protected species.

Proposed Mitigation to include:-

- Dedicated Bat Loft
- Four Number Integrated bat boxes on adjacent tress;
- Four Number Surface Mounted bat boxes on adjacent tress;
- Crawl board gaps between fascias / barge and wall;
- Using type 1F hessian-backed bitumen felt lining. The use of breathable roofing membrane will not be permitted.
- Sensitive lighting strategy;

Dedicated Bat House: Refer to drawing 1376[PL]11 & 1376[PL]12. To mitigate/compensate for the loss of the existing bat roosts a new dedicated Bat House will be constructed on site. The dimensions of the bat roost set below a duo-pitched roof will have the approximate dimensions as follows: apex height of **5.0m**, a width of **5.0m** and a length of **5.0m** giving a total volume of **100.0m³**. The secondary space containing the Toast Rack an Hot box has a apex height of **2.0m**, providing a further volume of **22.0m³**. Total volume of **122.0m³**. The bat loft will be created for the use by brown long-eared bats and other bat species such as common pipistrelles.

BAT MITIGATION Continued.

The retained Ecologist will undertake a Toolbox talk with the Contractors prior to development works commencing on site. Advising of protocol and procedures should a bat be discovered. The retained Ecologist will also be attendance during the soft strip of sensitive areas identified in the report.

Disturbance works to the existing structure shall be restricted, where practical, to the winter period between November and March.

Where the barge boards lie next to the roost, care will be taken to ensure that there are adequate gaps of at least 50mm x 20mm along the top of the wall panel to allow access by bats below the verge and onto the top edge of the wall panels into the roost without being blocked by insulation or other structures.

Hopper type access to Bat Roost formed in North Gable of dedicated building providing weather protection.

Bat access points to be left unobstructed during or post construction with rafters and purlins to roof structure exposed providing uninterrupted flying space.

External lights to be positioned at low level and away from bat access points. Installed to agreed positions with Ecologist.

All timber treatment chemicals and procedures to be approved by Natural Resources Wales.

BIRD NESTING OPPORTUNITIES.

Construction work on the buildings that may be used by breeding birds should, wherever possible, be undertaken from September to February outside the bird breeding season (March to August inclusive). Alternatively, any works undertaken from March to August should be subject to a check for nesting birds by a suitably qualified ecologist immediately prior to removal of such habitats. If any active nests are found these will be protected, along with an appropriate buffer zone of approximately 5m, until the nesting is complete and the young have fledged.

Proposed Mitigation to include:-

- Four number Swallow nest cups in a sheltered location on the structure;
- A integrated Starling box shall be installed in the wall structure.
- Two Number Jackdaw bird nest boxes to be located in nearby trees;
- Two Sparrow terraces shall be affixed / built into the structure; Located away from Bat mitigation features;
- A Barn Owl nest box located in a nearby tree;
- Two Number wren and robin nestboxes located in nearby trees;
- A Little Owl nest box located in a nearby tree;
- A House Martin cup to be affixed to the building;
- Nesting Box for Blue Tit, Birdhouse, Titmice fixed to a nearby tree;
- A integrated swift box shall be installed in the wall structure.

NOTE. All boxes should be of Woodcrete or other similar durable material other than wood.

Buckle Chamberlain Partnership Ltd. Architects & Architectural Technologists.

Mill House, Llancayo Court, Llancayo, Usk, Monmouthshire NP15 1HY
Tel: 01291 672264
01291 673424
Fax: 01291 671050
Email: enquiries@bucklechamberlain.co.uk

Client Morspan Pension Scheme Limited.

Project Candidate Site Proposal For the Siting of Business Use Class B1 - On Land At Rockfield Road, Monmouth.

Drawing Proposed Site Block Plan.

Date	August 2021	Scale	1:250 @ A1
Drawn by	JSS	Drawing No	1450[SK]11
Checked by			
Status	Preliminary		

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Appendix C: UKSuDS Greenfield Runoff Rate Calculations

Calculated by:	faye tomalin
Site name:	Poultry Shed, Rockfield Road
Site location:	Monmouth

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.

Site Details

Latitude:	51.81325° N
Longitude:	2.72425° W
Reference:	1098645541
Date:	Jan 30 2024 11:00

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha):	1.22
-----------------------	------

Methodology

Q _{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	N/A
BFI / BFIHOST:	0.589
Q _{MED} (l/s):	
Q _{BAR} / Q _{MED} factor:	1.08

Hydrological characteristics

	Default	Edited
SAAR (mm):	836	934
Hydrological region:	9	9
Growth curve factor 1 year:	0.88	0.88
Growth curve factor 30 years:	1.78	1.78
Growth curve factor 100 years:	2.18	2.18
Growth curve factor 200 years:	2.46	2.46

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

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

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Q_{BAR} (l/s):		5.58
1 in 1 year (l/s):		4.91
1 in 30 years (l/s):		9.94
1 in 100 year (l/s):		12.17
1 in 200 years (l/s):		13.74

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

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Appendix D: Dwr Cymru Welsh Water (DCWW) Sewer Records

[illegible][illegible]

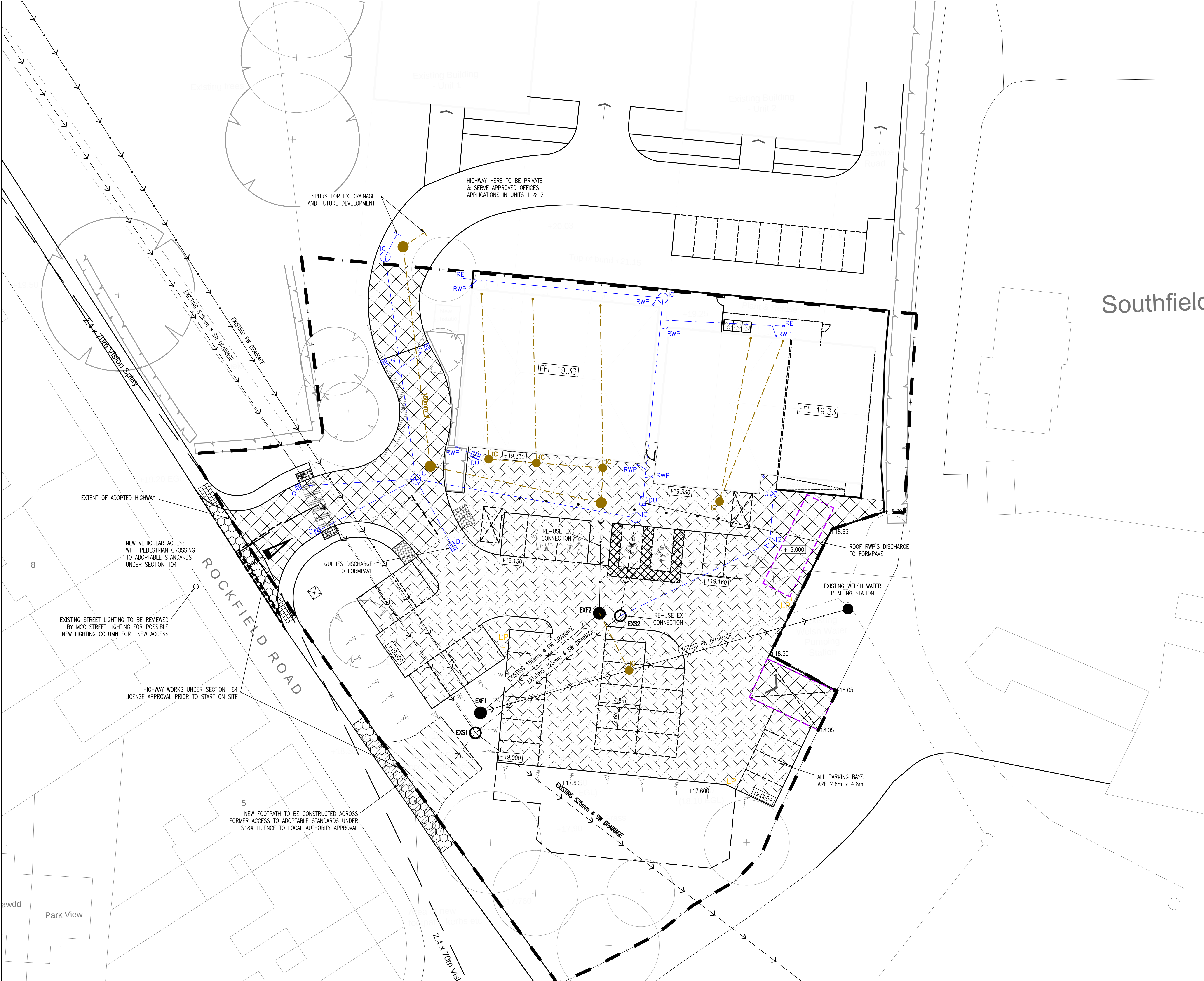
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Map Ref: 350161,212983
Map scale: 1:1,250
Printed by: DP
Printed on: 03/07/2017

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Appendix E: Surface Water Drainage Plan from Development reference DC/2014/01065



NOTES

GENERAL
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS RELATE TO ORDNANCE DATUM UNLESS NOTED OTHERWISE.
3. DO NOT SCALE FROM THIS DRAWING. USE FIGURED DIMENSIONS ONLY.
4. ANY DISCREPANCIES TO BE REPORTED IMMEDIATELY TO THE ENGINEER.
5. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SUBCONTRACTORS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.
6. THIS DRAWING IS COPYRIGHT © PROPERTY OF SHEAR DESIGN LIMITED.

- KEY
- FORMPAVE PERMEABLE PAVING SYSTEM
 - PROPOSED MACADAM SURFACING POSITIVE DRAINED TO EX SW SYSTEM. TOTAL AREA =930m² (20% REDUCTION ON EXISTING AREA DRAINED)
 - HIGHWAY WORKS TO ADOPTABLE STANDARDS
 - HARDSTANDING AREA TO BE BROKEN OUT
 - TACTILE PAVING AT PEDESTRIAN CROSSING
 - PROPOSED SW DRAINAGE WITH INSPECTION CHAMBER
 - PROPOSED RAIN WATER DOWN PIPE
 - PROPOSED SW RODDING EYE
 - PROPOSED SW ROAD GULLY
 - PROPOSED SURFACE WATER DISPERSAL UNIT INTO FORMPAVE SYSTEM
 - PROPOSED FW DRAINAGE WITH INSPECTION CHAMBER
 - EXISTING FOUL WATER SEWER
 - EXISTING SURFACE WATER SEWER
 - SITE BOUNDARY
 - PROPOSED GROUND LEVEL

NOTE
PRELIMINARY FOR PLANNING PURPOSES ONLY, SUBJECT TO DETAILED ENGINEERING DESIGN.

F	10.06.16	DRAINAGE REMOVED OUTSIDE OF BOUNDARY	BH	SJM
E	09.06.16	SITE BOUNDARY AMENDED	BH	SJM
D	08.06.16	NEW ARCHITECT LAYOUT ADDED	BH	SJM
C	31.05.16	DRAINAGE LAYOUT AMENDED	BH	SJM
B	17.12.15	LAYOUT AMENDED	BH	SJM
A	11.11.15	LAYOUT AMENDED	BH	SJM
REV	DATE	DESCRIPTION	BY	GK

CLIENT:
HENRY BOOT DEVELOPMENTS LTD

PROJECT:
FOODSTORE & RETAIL UNITS
ROCKFIELD ROAD, MONMOUTH

TITLE:
PROPOSED DRAINAGE AND SURFACING
LAYOUT



Consulting Civil and Structural Engineers

7 Ashtree Court - Woody Close - Cardiff Gate Business Park - Cardiff - CF23 8RW
Tel: 029 2054 7000 - Fax: 029 2054 7001 - www.shear-design.com - enquiries@shear-design.com

DRAWN	JG	CHECKED	TS	DATE	23.06.15	SCALE	1:200 @ A1
STATUS KEY		I = INFORMATION	P = PRELIMINARY	A = APPROVAL	CO = CONTRACT	AS-BUILT	
STATUS		DRAWING NUMBER		REVISION			
A		13193-SK101		F			

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Appendix F: UKSuDS Surface Water Storage Volume Calculations

Calculated by:	faye tomalin
Site name:	
Site location:	

This is an estimation of the storage volume requirements that are needed 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). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	51.81328° N
Longitude:	2.72444° W
Reference:	184862697
Date:	Jan 30 2024 11:26

Site characteristics

Total site area (ha):	1.22
Significant public open space (ha):	0.46
Area positively drained (ha):	0.76
Impermeable area (ha):	0.76
Percentage of drained area that is impermeable (%):	100
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.76
Net impermeable area for storage volume design (ha):	0.76
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other

flow rates will have been reduced accordingly.

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI and SPR manually

Soil characteristics

	Default	Edited
BFI HOST:	--	0.589
SPR HOST:	--	0.34

Hydrological characteristics

	Default	Edited
Q_{MED} :	--	3.24
Q_{BAR} / Q_{MED} conversion factor:	--	1.075
Rainfall 100 yrs 6 hrs:	--	64.31
Rainfall 100 yrs 12 hrs:	--	75.41
FEH / FSR conversion factor:	1.19	0.9
SAAR (mm):	836	934
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.3	0.3
Hydrological region:	9	9
Growth curve factor 1 year:	0.88	0.88
Growth curve factor 10 year:	1.42	1.42

Design criteria

Climate change allowance factor:	1.4	Growth curve factor 30 year:	1.78	1.78
Urban creep allowance factor:	1.1	Growth curve factor 100 years:	2.18	2.18
Volume control approach	Flow control to max of 2 l/s/ha or Q _{BAR}		Q _{BAR} for total site area (l/s):	-- 5.58
Interception rainfall depth (mm):	5	Q _{BAR} for net site area (l/s):	--	3.48
Minimum flow rate (l/s):	2			

Site discharge rates		Estimated storage volumes	
	Default	Edited	
1 in 1 year (l/s):	--	3.1	Attenuation storage 1/100 years (m³):
1 in 30 years (l/s):	--	3.5	Long term storage 1/100 years (m³):
1 in 100 year (l/s):	--	3.5	Total storage 1/100 years (m³):

This report was produced using the storage estimation tool developed by HRWallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at <http://uksuds.com/terms-and-conditions.htm>. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.