Pell Frischmann

O2 Finchley Road

Proposed Drainage Strategy Report

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1 Introduction

1.1 Report Context

1.1.1 This Flood Risk Assessment (FRA) has been prepared by Pell Frischmann on behalf of LS (Finchley Road) Limited ('the Applicant') in support of an application made in part detail and part outline ('the Application') for the demolition and redevelopment of land encompassing the O2 Centre and associated car park, Homebase store, car showrooms and Builder's merchant (the "Site") within the London Borough of Camden ("LBC").

1.1.2 Development plots N3-E, N4 and N5 and the associated landscaping, access roads and infrastructure form the detailed element of the Application which extends to 1.79ha and these proposals are referred to as the "Detailed Proposals".

1.1.3 The remainder of the Application (comprising Development Plots N1, N2, N3, N6, N7, S1 and S8) is submitted in outline and these proposals are together referred to as the "Outline Proposals".

1.1.4 The Detailed Proposals and Outline Proposals together are referred to as the "Proposed Development".

1.1.5 Full details and scope of the Applications are described in the submitted Planning Statement, prepared by Gerald Eve LLP.

1.1.6 This report sets out the principles of the chosen drainage strategy and demonstrates how the local and national guidance has been considered. This includes justification of; specific flow rates, the volume of attenuation required and sustainable drainage systems to be included.

1.1.7 The required Camden Flood SuDS and Camden SuDS proformas can be found in **Appendix F** and **Appendix G** respectively.

1.2 Sources of Information

1.2.1 A review of the relevant information from a range of sources has been undertaken and includes the following:

- National Planning Policy Framework (NPPF), July 2021;
- Non-statutory technical standards for sustainable drainage systems, March 2015;
- Water UK, Sewers for Adoption 7th Edition August 2012;
- CIRIA, The SuDS Manual Version 6, 2015;
- London Borough of Camden Surface Water Management Plan, July 2011;
- Camden Planning Guidance: Water and Flooding, March 2019;
- London Sustainable Drainage Action Plan, 2016;
- London Borough of Camden Strategic Flood Risk Assessment, July 2014; and
- Camden Local Plan, 2017.

1.2.2 The NPPF specifies that surface water arising from a developed site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development. Opportunities to reduce the flood risk to the site itself and elsewhere, taking climate change into account, should be investigated. The drainage proposals within this strategy have been prepared to meet planning policy requirements.

1.2.3 In their role as Lead Local Flood Authority, Camden Council have prepared a Surface Water Management Plan which outlines specific requirements for surface water drainage in new developments and provides advice and guidance on the use of suitable SuDS. This document will be referenced throughout this SDR wherever appropriate.

1.3 Site Location

1.3.1 The Site is located to the west of Finchley Road in the London Borough of Camden, and currently comprises the O2 centre, other retail units and associated car parking, access roads and service yards. It is situated east of West Hampstead Thameslink railway station. A site location map is included for reference as **Figure 1.1**. In total, the application area covers approximately 5.7 hectares.

1.3.2 Blackburn Road forms the northern and southern boundaries of the Site, with Finchley Road (A41) to the east and Billy Fury Way to the west. Beyond Blackburn Road, the Thameslink Bedford-Brighton railway line runs along the northern edge of the Site, and the London Underground Jubilee and Metropolitan lines run above ground along the southern edge of the Site.

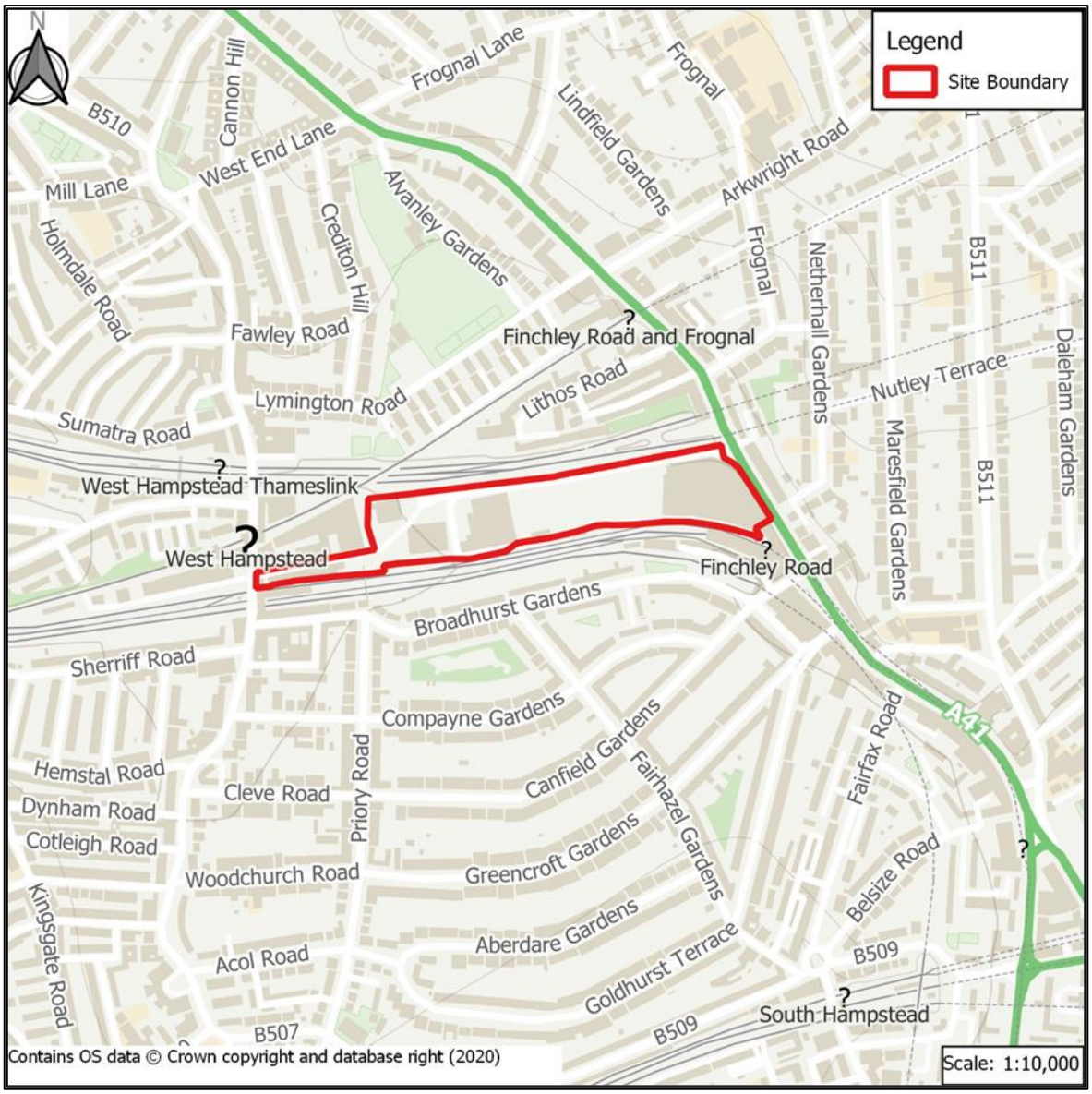

Figure 1.1 Site Location Map

1.4 Topography

1.4.1 The Development Site covers a generally large area and therefore has varied, undulating topography. The most elevated point is found towards the west, along Blackburn Road, with levels around 55.5m AOD. The low points of the Site are found along the southern boundary towards the south-east of the Site, around 47.1m AOD. All levels have been taken from the topographical survey which is included within **Appendix A**.

1.5 Proposed Development

1.5.1 Proposals consists of part full and part outline planning permission comprising the following:

- Detailed planning permission for Development Plots N3-E, N4, and N5 including demolition of existing above ground structures and associated works, and for residential development (Class C3) and commercial, business and service (Class E) uses in Development Plot N3-E, residential development (Class C3) and local community (Class F2) and commercial, business and service (Class E) uses in Development Plot N4, and residential development (Use Class C3) and commercial, business and service uses (Class E) uses in Development Plot N5 together with all landscaping, public realm, cycle parking and disabled car parking, highway works and infrastructure within and associated with those Development Plots.

- Outline planning permission for Development Plots N1, N2, N3, N6, N7, S1 and S8 including the demolition of all existing structures and redevelopment to include residential development (Class C3) commercial, business and service uses (Class E), sui generis leisure uses (including cinema and drinking establishments) together with all landscaping, public realm, cycle parking and disabled car parking, highway works and infrastructure within and associated with those Development Plots.

1.5.2 The Application is submitted in hybrid form – this means that part of the application is made in detail and part is made in outline.

1.5.3 The Application site has been subdivided into 10 Development Plots (N3-E, N4 and N5, N1, N2, N3, N6, N7, S1 and S8).

1.5.4 The first three Development Plots (N3-E, N4 and N5), located in the centre of the Site, are submitted in detail, and form the first phase – “Detailed Phases”.

1.5.5 Development Plots S8, N7 and N6 located in the west of the Site are submitted in Outline and form the Second Phase - “Outline Phases West”.

1.5.6 Development Plots N3, N2, N1 and S1 located in the east of the Site are submitted in Outline and form the third Phase – “Outline Phases East”.

1.5.7 The Detailed Proposals will include a total of 56,746 sq. m GIA of residential floorspace including an allowance for car parking. The Detailed Proposals will include approximately 608 dwellings.

1.5.8 The Outline Proposals will include up to 115,000sq. m GIA of residential floorspace including an allowance for car parking and basements.

1.5.9 Therefore, the total residential use across the site, including residential parking in podiums could be up to 171,746sq. m GIA which is equivalent to approximately 1,800 residential units.

1.5.10 Development proposals used to inform this SDR are included within **Appendix B.**

2 Existing Conditions

2.1 Existing Site

2.1.1 The existing Site is shown to be predominantly covered by buildings and paved areas and therefore, it is considered brownfield with existing drainage infrastructure.

2.1.2 The Site has no open watercourses within its boundary. The OS OpenRivers dataset indicates the presence of a potentially culverted watercourse approximately 920m to the east of the Site. A review of the information and wider mapping suggests that there may be a culverted section of watercourse from the southernmost pond in Hampstead Heath approximately 1.5km northeast of the Site conveying towards 'The Serpentine' in Hyde Park.

2.1.3 British Geological Survey (BGS) mapping shows that the Site has no recorded superficial geology within or surrounding the Site.

2.1.4 The Site is entirely underlain by a bedrock geology comprising London Clay Formation of clay, silt and sand.

2.2 Greenfield Runoff Rate

2.2.1 The London Plan Policy states "Development proposals should aim to get as close to greenfield run off rates as possible depending on site conditions". Where not possible to do so, evidence must be provided to the LLFA to demonstrate a reduction in flow rate (min. 50%) and reduction in runoff.

2.2.2 The existing greenfield runoff rates have been calculated using the IH124 method to meet normal best practice criteria. The greenfield rates are presented in **Table 2.1** below, the basis for which can be found in Appendix H

Table 2.1 Greenfield Runoff Rates

Return Period (Years)	Runoff Rate (l/s)
Qbar	24.9
1	21.1
30	57.2
100	79.3

2.2.3 Based on Table 2.1 the greenfield runoff rate for the site can be presented as 4.35 litres / per second / per hectare, based on an overall site area of 5.72 ha.

2.2.4 For the detailed application (Plots N3-A, N4, and N5), it has been possible to reduce discharge rates through design development to a rate equivalent to greenfield runoff. However, it should be noted that further co-ordination with the landscape design will be required post planning to ensure attenuation volumes provided by SuDS features are maximised.

2.2.5 Similarly, the discharge rates for the outline application have been reduced to a rate equivalent to greenfield runoff. However, it should be noted that given the outline nature of the scheme, further design development will be required to support future planning applications for the outline phases. Therefore, the final form and location of attenuation will need to be defined as part of further Reserved Matters.

2.2.6 The developable area and proposed combined discharge rates for each application are summarised in **Table 2.2** below

Table 2.2 Detailed and Outline Application Discharge Rates

Application	Developable Area (ha)	Combined Discharge Rate (l/s)
Detailed Application (Plots N3-A, N4, and N5) Phase 1	1.75	7.6
Outline Application Phase 2 (Plots N6, N7,and S8)	1.61	7.0
Outline Application Phase 3 (Plots N1, N2, N3, & S1)	2.36	10.3
Total	**5.72**	**24.9**

2.2.7 A discharge rate equivalent to that of the Qbar flow rate of 24.9 l/s, is approximately 56% less than the 30 year greenfield run off rate, and 69% less than the 100 year greenfield runoff rate. Qbar is defined as the mean annual maximum flow rate for an undeveloped rural catchment.

2.3 Existing Runoff Rate

2.3.1 The existing Site is positively drained, comprising buildings, car parks, and areas of hardstanding with an existing connection to the public sewer network. The existing development constitutes an impermeable area greater than 90%, i.e., the total site area is 5.72ha and impermeable area is greater than 5.14ha.

2.3.2 In order to understand the existing runoff rate, the entire site has been modelled using the Network module of Micro Drainage based on as-built drawings (ref: 40070T-01-1, Plowman Craven). This gives an accurate representation of the current surface water drainage regime and allows various scenarios to be accurately simulated. These existing rates are presented in **Table 2.** below. Full outputs from Micro Drainage are included for reference as **Appendix C**.

Table 2.3 Equivalent Runoff Rates

Return Period (Years)	Runoff Rate (l/s)
1	520
2	647
30	1240
100	1337

2.3.3 The ultimate outfall pipe from the development is a 1500mm diameter pipe, which is more than capable of facilitating these high runoff rates. There is no existing flow control restricting discharge leaving the Site, flowing directly into the public sewer. Existing surface water catchments are shown in Pell Frischmann Dwg No. 104878-PEF-ZZ-ZZ-DR-D-100006, included within **Appendix D.**

2.3.4 This drainage regime, with an unrestricted discharge, does not meet current design standards and therefore the Proposed Development presents an opportunity to implement the latest guidance and reduce flood risk in the wider area through inclusion of a sustainable drainage strategy.

2.4 Existing Runoff Volume

2.4.1 An assessment of the existing surface water runoff volume from the entire area proposed for development has been made for a 1 in 100-year, 6-hour storm. Greenfield runoff volumes for various return periods are summarised in **Table 2.4** below.

Table 2.4 Greenfield Runoff Volumes

Return Period (Years)	Greenfield Runoff Volume (m^3)
1	653
30	1811
100	2662

2.4.2 However, given the existing site is impermeable, the runoff volume will be higher than the theoretical greenfield runoff rates stated above. Using a rainfall intensity (i) of 14mm/hr for a 100 year 6 hour (T) storm which has been calculated using FEH rainfall data, we can calculate an existing runoff volume. Multiplying the rainfall intensity by the impermeable site area (A) for the required storm duration results in a runoff volume of 4,317m^3 (i x A x T = 14mm/hr x 51,400m^2 x 6hr = 4,317,600mm^3 = 4,317m^3)

2.4.3 Clause S5 of Defra 'Non-statutory technical standards for sustainable drainage system' states that:

> *"…where reasonably practical for previously developed sites, the runoff volume for the 1 in 100 year 6 hour rainfall event must be constrained as close as is reasonably practical to the greenfield runoff volume for the same event, but should not exceed the runoff volume from the development site prior to redevelopment for that event.*

2.4.4 The 100 year 6 hour runoff volume will therefore be constrained as close to 2,662m^3 as possible, but should not exceed 4,317m^3.

3 Surface Water Strategy

3.1 Drainage Hierarchy

3.1.1 Prevailing local and national guidance suggests that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonably practicable:

- Water reuse, where a need is identified
- into the ground (infiltration), where ground conditions permit
- to a surface water body
- to a surface water sewer, highway drain, or another drainage system
- to a combined sewer

3.1.2 The aim of this is approach is to manage surface water runoff close to where it falls and mimic natural drainage as closely as possible.

3.1.3 There are no borehole logs recorded within the Site boundary, although there are six which were carried out to the south of the site along Broadhurst Gardens to a maximum depth of 7.49m bgl. Of these six boreholes, groundwater was encountered at depths ranging from 2.62m bgl to 7.49m bgl.

3.1.4 British Geological Survey mapping recorded no superficial geology across the Site, whilst the bedrock geology of the entire Site is shown to be London Clay Formation (clay, silt and sand). London Clay is a typically dense soil type which limits the movement of groundwater.

3.1.5 Aquifer designations, as designated by DEFRA, for the underlying strata have recorded the superficial drift classification to be unproductive. The bedrock designation is also recorded as being unproductive.

3.1.6 Therefore, due to the absence of superficial deposits and the impermeable bedrock, infiltration is unsuitable in this location.

3.1.7 Furthermore, there are no existing watercourses in or near to the Site to discharge to, making this option also unsuitable.

3.1.8 The Site does benefit from an existing connection to the public sewerage network, which it is proposed to use as part of the strategy to serve the Proposed Development.

3.2 Proposed Runoff Rate

3.2.1 The overall site area is 5.72ha, and latest development proposals comprise approximately 4.36ha of built environment with landscape features forming the remaining area. 50% of the site will comprise of publicly accessible landscaped spaces. Therefore, the overall site impermeable area has been reduced through the introduction of green open spaces within the proposed layout by at least 0.78ha. The proposed site is approximately 76% impermeable which is lower than the existing site which is greater than 90% impermeable.

3.2.2 In order to provide a betterment to the surrounding area and downstream network, it is proposed that flow rates will be reduce to the estimated Qbar run-off rate for the detailed and outline application phases. The Qbar runoff rate has been estimated at 24.9l/s for the proposed site area of approximately 5.72 hectares, which equates to a rate of 4.35 l.s.ha.

3.2.3 Whilst the all phases area restricted to the equivalent greenfield runoff rate, Phase 3 is heavily constrained and it has not been possible to restricted the flow rate to a greenfield rate for Phase 3b. In order to mitigate the impact of this, phase 3a has been restricted to a rate lower the greenfield to account for the increased flow rate on Phase 3b. Proposed flow rate are summarised in **Table 3.2**.

3.2.4 The existing and proposed discharge rates are summarised in **Table 3.1** below, with all storms restricted to a maximum sitewide discharge rate of 24.9 l/s.

Table 3.1 Discharge Rates

	1 year rate (l/s)	2-year rate (l/s)	30-year rate (l/s)	100-year rate (l/s)
Existing	520	647	1240	1337
Proposed	24.9			
Betterment	495.1	622.1	1215.1	1312.1
Reduction	**95.2%**	**96.2%**	**98.0%**	**98.1%**

3.2.5 This restriction presents a significant reduction in the peak runoff generated by the site that would free up capacity within the downstream network that would not otherwise exist. This would contribute towards a demonstrable reduction in flood risk in the receiving network. These restricted runoff rates will be achieved through the implementation of flow control devices (HydroBrake or similar).

3.3 Surface Water Attenuation

3.3.1 As a runoff restriction is required, excess surface water runoff will be generated within the Site and so in order to balance this in a sustainable way, storage will be provided through a number of cellular storage tanks.

3.3.2 The Site has been divided into seven discrete catchments based on build programme so that a phase of the development does not come forward without having suitable drainage provision. These catchments, their associated discharge rates and volumes of attenuation are summarised in **Table 3.2** below.

Table 3.2 Phase areas, runoff rates and volumes of attenuation

Phase	Plots	Net Developable Area (ha)	Impermeable Area (ha)	Greenfield Runoff Ratio	Total Discharge Rate (l/s)	Volume of Attenuation (m^3)
1A	N3-A	0.34	0.180	1 x GFRR	1.5	286
1B	N4	0.65	0.525	1 x GFRR	2.8	521
1C	N5	0.76	0.623	1 x GFRR	3.3	576
Detailed Total		**1.75**	**1.328**	1 x GFRR	**7.6**	**1,383**
2A	S8	1.18	0.915	1 x GFRR	5.1	864
2B	N7 & N6	0.43	0.387	1 x GFRR	1.9	342
3A	N3	0.64	0.485	0.75 x GFRR	2.1	530
3B	N1, N2, & S1	1.72	1.242	1.1 X GFRR	8.2	1200
Outline Total		**3.97**	**3.029**		**17.3**	**2,936**
Sitewide Total		**5.72**	**4.357**		**24.9**	**4,319**

3.3.3 The overall site discharge rate of 24.9 l/s has been proportioned across the various phases pro-rated to a rate of 7.34l/s/ha (7.6 l/s for the detailed application, and 17.3 l/s for the outline application) based on the net developable area of each phase as shown above.

3.3.4 All proposed cellular storage tanks are based on a 95% void ratio and are designed to be 2.0m deep. They have been positioned in a topographically suitable location in relation to the built development, and an allowance of 40% for the effects of climate change has been provided.

3.3.5 Calculations for each of the phases listed in **Table 3.2** above can be found under Appendix H. It can be seen that there is no flooding on the 30 year event, or the 100 year event (plus 40% allowance for Climate Change).

3.3.6 The proposed Drainage Layout (dwg No. 104878-PEF-ZZ-XX-DR-D-100010) and Overland Flow Routes (Dwg No. 104878-PEF-ZZ-XX-DR-D-100017) can be found under **Appendix D**.

3.4 Runoff Volume Control

3.4.1 The Non-Statutory Technical Standards for Sustainable Drainage Systems S4-S6 states that where reasonably practical the runoff volume from a development for the 1 in 100-year 6-hour rainfall event should not exceed the runoff volume prior to development or redevelopment. Additionally, if practicable on previously developed sites, the runoff volume should not exceed the equivalent greenfield runoff volume.

3.4.2 The existing runoff volume for the 1 in 100-year 6-hour rainfall event has been calculated at 4317m³ as per paragraph 2.4.2. Using the same methodology to calculate the proposed runoff volume for the 100-year 6-hour event we get a figure of 3,660m³ (i.e. i x A x T = 14mm/hr x 43,570m² x 6hr = 3,659,880mm³ = 3,660m³)

3.4.3 To summarise, as the impermeable area of the Site has been reduced through the implementation of new permeable surfaces, the proposed site runoff volume has decreased from 4,137m³ to 3,660m³ and therefore the standards are met, and a betterment is provided.

3.5 SuDS Features

3.5.1 An indicative surface water drainage layout for the development is shown on Pell Frischmann Dwg No. 104878-PEF-ZZ-XX-DR-D-100010, as well as the proposed SuDS layout, Dwg No. 104878-PEF-ZZ-ZZ-DR-D-100008, which are both included within **Appendix D.** The proposed strategy is based on sustainable drainage principles, employing SuDS features to manage surface water runoff across the Site.

3.5.2 Whilst cellular storage tanks are not necessarily considered SuDS and are principally used for their attenuation capacity, a number of other SuDS features have been implemented to promote a sustainable development. These include:

- Brown roofs
- Green roofs
- Permeable paving
- Swales/Ponds

3.5.3 These features contribute towards improving water quality, biodiversity and amenity in varying degrees. They can also provide additional habitats for wildlife, increasing biodiversity and can increase the amenity of the immediate area / neighbourhood.

3.5.4 A wide variety of other SuDS features can also be implemented across the development as the design progresses and this could include, but is not limited to;

- Rainwater gardens
- Filter drains
- Silt traps
- Sump gullies

3.5.5 It is recommended that the final layout uses the proposed road infrastructure to provide drainage exceedance (overland flood flow) routes through the development and towards the attenuation for events in excess of the capacity of the drainage system. As the development progresses any SuDS features will be designed in line with the CDM Regulations 2015 and the health and safety observations made within the SuDS Manual.

3.6 Maintenance and Adoption

3.6.1 For the proposed surface water drainage system to function correctly, it will need to be appropriately maintained. There are several possibilities for these maintenance responsibilities, they are:

- Thames Water, as the local sewerage undertaker.
- The LLFA or SuDS Approval Body (SAB) (if section 3 of the FWM Act 2010 is enacted)
- A private management company.

3.6.2 Furthermore, there are 3 discrete components to the system – the pipe network, the principal SuDS (tanks and outfalls) and ancillary SuDS (permeable paving, tree planters etc.). A situation may arise whereby one of the bodies adopts a specific part of the network (the pipe network for example) but not one of the other components. In this case, a combination of adopting bodies may be required and agreements should be put in place to reflect this.

3.6.3 The maintenance schedule for the network must be comprehensive and detail the specific maintenance requirements for each element of the drainage system. The CIRIA SuDS Manual has extensive information relating to the maintenance of SuDS which should be consulted when specifying the requirements.

3.6.4 For pipes, manholes and gullies, both general best practice and specific manufacturer maintenance protocols should be followed.

3.6.5 In the event that a management company adopts all, or some of the drainage network, requirements for the ongoing maintenance of the infrastructure should form part of the Operation and Maintenance (O&M) manual for the Site, clearly detailing the extent of responsibility and features to be maintained.

3.6.6 Any specialist or proprietary products specified should have a manufacturer specific maintenance regime which should be included. It is envisaged that the O&M manual will be developed at the detailed design stage. A summary of general best practice maintenance is given below.

- All drainage features should be situated in open areas which are readily accessible.
- Gullies, pipes, manholes and silt traps should be inspected and de-silted at least once per year, where necessary.
- Wherever permeable paving is incorporated it should be swept a minimum of every 6 months to maintain flow capacity of the joints between blocks.
- For any basins which are designed to be dry, they should be seeded with a wildflower grass seed mix that can tolerate wet ground conditions and should be mowed periodically over the summer months to ensure they do not become overgrown.
- For any basins which are designed to be wet, plants which are suitable for growing in permanent water should be used, such as bull rushes and reeds.
- Regular inspections of all basins should be undertaken to remove litter/debris, invasive/colonising vegetation, and silt build-up as necessary.
- Inlet and outlet structures should be regularly inspected with remedial work as required to ensure clear flow of water and the prevention of silt/vegetation build up.
- Flow control chambers should be inspected every 6 months to ensure proper function with any litter or debris removed as necessary.

4 Foul Water Drainage

4.1.1 As the Site is currently developed, there is a network of shallow, private drainage beneath the car park that serves the existing shopping centre, DIY store and car park itself. This predominantly consists of a gravity network of manholes and gullies which discharges into the Thames Water public sewer system. This drainage only serves the Site and will be abandoned as part of the new proposals.

4.1.2 There are also Thames Water foul/combined water sewers of approximately 1.2m x 0.8m in diameter which run below Blackburn Road, the existing DIY store and car garages at an approximate depth of 3.5m to 5.5m. Thames Water sewer records are included for reference as **Appendix E**.

4.1.3 Given the proposed layout, it is likely that a gravity connection to the public combined water sewer network would be proposed via MH8701, which has a cover level of 49.78m AOD and an invert level of 44.64m AOD.

4.1.4 The proposed development is consistent with the land use of the surrounding area, and the loadings will be able to be accommodated within the existing foul sewer system as confirmed by the Thames Water pre-development enquiry

4.1.5 The anticipated foul water flows generated by the development have been calculated based on 4000 litres per dwelling per day, in accordance with Sewers for Adoption[1]. This 4000l/dwelling/day gives what is known as the 6 dry weather flow rate which is a conservative estimation of foul flows used to design pipes.

4.1.6 Based on 4000l/dwelling/day and an anticipated 1,794 dwellings for the entire masterplan, a foul flow rate of 83.06l/s has been calculated. Calculations for retail and commercial space are yet to be defined but would estimate approximately 10l/s maximum.

4.1.7 Thames Water have confirmed that there is sufficient capacity within the existing public sewer for the predicted foul flows based on the predevelopment enquiry dated March 2021. It is therefore envisaged that a connection would be possible to allow the proposed development to be served by foul drainage.

[1] Sewers for Adoption – 7th Edition – Water UK/Water Research Council, 2012

5 Summary

5.1.1 This report and supporting appendices demonstrate that an appropriate surface water drainage strategy has been developed for the Site based on sustainable drainage principles in line with the relevant local and national policy and standards.

5.1.2 This Sustainable Drainage Report is intended to support a planning application and as such the level of detail included is commensurate with the nature of the proposals. Table 5.1 provides a summary of key information included within this report.

Table 5.1 Summary of Drainage Principles

Topic		Existing Site	Proposed Development
Site Area (hectares)		5.72	5.72
Impermeable Area (hectares)		5.14	4.36
Number of Sub-Catchments		-	7
Outfall Location(s)		Public Sewer	Public Sewer
Total Site Runoff Rate (l/s)	1 in 1-year	520	24.9
	1 in 2-year	647	
	1 in 30-year	1240	
	1 in 100-year	1337	
Proposed Storage Volume (m^3)		-	4,319m^3
SuDS Features		-	Cellular storage tanks Brown roofs Green roof Permeable paving Swales and ponds
Maintenance Responsibilities		-	Thames Water, as the local sewerage undertaker. LLFA or SuDS Approval Body (SAB) (should section 3 of the FWM Act 2010 be enacted) A private management company.

5.1.3 Development flow rate are proposed to be restricted to a rate of 24.9 l/s which is equivalent to the QBar greenfield runoff rate for the site.

5.1.4 The existing site is over 90% impermeable with no current SuDS features. The existing site also has the potential of 1,632m^3 of flooding based on the existing modelled network for the 100-year event. The development proposals incorporate SuDS features and will be designed to ensure no flooding during 100-year event + 40% for climate change.

5.1.5 Overall, the development proposals offer a significant reduction in impermeable area, runoff rates and runoff volume whilst incorporating water quality, amenity and biodiversity. The development proposals offer a significant betterment to the existing development and existing drainage.

Appendix A Topographical Survey

Appendix B Development Proposals

Appendix C Micro Drainage Simulation Results

Appendix D Existing and Proposed Surface Water Drainage Layout and Proposed SuDS

Appendix E Thames Water Sewer Records

Appendix F Camden Flood SuDS Proforma

Appendix G Camden SuDS Proforma

Appendix H Greenfield Runoff Report

Appendix I Proposed Development Drainage Calculations