Pell Frischmann

O2 Finchley Road, Temporary Car Park

Sustainable Drainage Statement

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1 Introduction

1.1 Report Context

1.1.1 Pell Frischmann has been commissioned by Landsec to produce a Sustainable Drainage Statement (SDR) for a temporary Car Park. The temporary works are required to facilitate a new TfL bus turning loop, whilst retaining a minimum number of parking space and service vehicle access to the rear of the existing O2 centre

1.1.2 This SDR will set out the principles of the proposed drainage strategy and demonstrate how the local and national guidance has been considered. This will include justification of; specific surface water discharge rates, the volume of attenuation required (where applicable) and any sustainable drainage systems to be included.

1.1.3 The area under consideration forms part of a wider plan to regenerate the area, which has the benefit of an outline planning consent. The planning consent allows for the provision of surface water mitigation measures intended to restrict runoff to greenfield runoff rates. This application facilitates the delivery of Phase 1 of the development, and is therefore key to unlocking the benefits of wider improvements to the Surface Water drainage system within the site.

1.2 Sources of Information

1.2.1 A review of relevant information and guidance from a range of sources has been undertaken and includes the following key documents;

- National Planning Policy Framework (NPPF), December 2023;
- Non-Statutory Technical Standards for Sustainable Drainage Systems, March 2015;
- Water UK, Sewerage Sector Guidance, October 2019;
- CIRIA, C753 The SuDS Manual Version 6, 2015;
- HM Government, The Buildings Regulations 2010, Drainage and Water Disposal (Part H), 2015;
- London Borough of Camden, Advice note of contents of a Surface Water Drainage Statement

1.2.2 The NPPF specifies that 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 (LLFA), the London Borough of Camden have prepared a supplementary planning guidance document titled *Advice Note on contents of a Surface Water Drainage Statement* and associated SuDS Proforma, a completed copy of which is attached to this document as **Appendix A**. This document has aligned with these requirements to prepare the necessary information.

1.3 Site Location

1.3.1 The site is located within the extant car park serving the O2 Centre, Finchley, A site location plan is included for reference as **Figure 1-1.** The application area covers approximately 0.96ha.

1.3.2 The site is currently drained via a series of linear drainage features and gulleys prior to conveyance to the existing Thames Water combined water network. Sewer records for the area are provided in **Appendix B**.

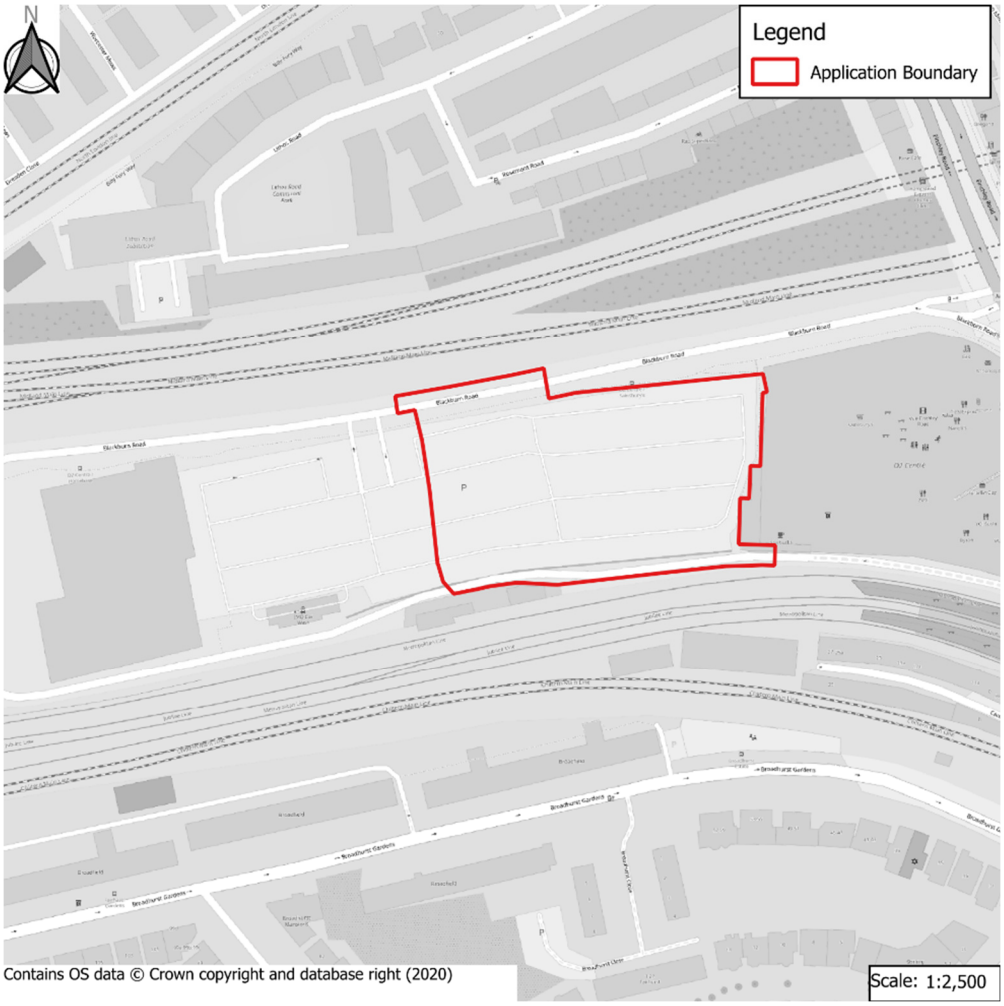

Figure 1-1 - Site Location Plan

1.4 Topography

1.4.1 The site falls generally from west to east, toward the O2 Finchley Centre. Elevations range from a high point of approximately 49.6mAOD in the northwestern corner of the site and fall to a low point of approximately 47.8mAOD in the southeastern corner.

1.4.2 The topographical survey for the wider site has been included for reference as **Appendix C**.

1.5 Proposed Development

1.5.1 The development proposals incorporate the reconfiguration of the western portion of the site to provide a new bus loop and footway links, and minor alterations to existing road markings in the eastern portion of the site with existing parking arrangements retained.

1.5.2 The proposed layout and landscape intent for the site can be seen in **Figure 1-2** below, and in more detail in **Appendix D**.

Figure 1-2 Proposed Layout

2 Existing Conditions

2.1 Existing Site

2.1.1 The existing site comprises almost entirely hardstanding within the existing O2 Finchley Centre Car Park.

2.1.2 Sewer records, provided in **Appendix B** and Drainage Survey results, shown in **Appendix E**, show there to be no public sewers within the application boundary. However, there are a number of public sewers within the wider development boundary.

2.1.3 There are numerous surface drainage features including drainage channels and gully's capturing runoff from the existing car park surface prior to discharging to below ground surface water drainage.

2.1.4 The below ground surface water drainage for the exiting car park area discharges surface water to the existing Thames Water combined drainage network as it crosses the site west of the application boundary. This existing drainage flows from the north to south

2.1.5 There are no significant watercourses within the site boundary or in the immediate vicinity of the site.

2.1.6 It should also be noted that a number of significant utilities are present in the existing car parking area, most notably High Voltage electrical routes that run along the southern boundary within the service road. Survey of existing utility infrastructure can be found in **Appendix E**

2.2 Existing Runoff Rate

2.2.1 The overall application site boundary comprises approximately 0.95ha and is assumed to be 100% impermeable.

2.2.2 The runoff rate for the total site boundary has calculated using the Modified Rational Method as outlined by the Wallingford Procedure as follows;

$$Q = 2.78CiA$$

2.2.3 Where the following variables are defined;

- Q – Flow
- C – Coefficient of Runoff, set as 1
- I – Rainfall Intensity, set as 50mm/hr as recommended in CIRIA C753
- A – Area, estimated as 0.95ha

2.2.4 Thus, the existing runoff from impermeable areas has been calculated as 130l/s.

2.3 Greenfield Runoff Rate

2.3.1 The greenfield rate for the site has been calculated or the application site for several key return period events. These calculations have been carried out using HR Wallingford's online Greenfield Runoff Rate tool. The outputs from this can be seen in **Appendix G.**

2.3.2 **Table 2-1** below highlights these key return period event runoff rates.

Table 2-1 - Greenfield Runoff Rates for Key Return Period Events

Return Period	Greenfield Runoff Rate 'per hectare' (l/s/ha)	Greenfield Runoff Rate for application site (0.95ha) (l/s)
1 in 1 Year	3.7	3.52
QBAR	4.35	4.13
1 in 30 Year	10	9.5
1 in 100 Year	13.87	13.18

2.4 Existing Runoff Volumes

2.4.1 In accordance with the requirements set out by the London Borough of Camden, the runoff volume for the 1 in 100-year 6 hour event has been assessed. It should be noted that this has been assessed for the both the entire application area (0.95ha), and a reduced area that excludes the area of car park where no modifications to existing surfacing are proposed (0.52ha).

Table 2-2 Existing Runoff Volumes for 100 year, 6 hour event

Area of assessment	Existing 100 Year Return Period 6 Hour Event Runoff Volume (m^3)
Application Area (0.95ha)	612
Reduced Area (0.52ha)	335

2.4.2 Calculations showing the above have been presented in **Appendix H**.

2.5 Existing Catchments

2.5.1 This section presents the existing drainage arrangement within the car application boundary in more detail, and should be considered alongside **Figure 2-1** below.

2.5.2 The eastern extent of the car park (Catchment 3) currently drains to a channel drain at the eastern extent of the car park. The channel drain discharges to a 300mm diameter surface water sewer within the car park that discharge to the existing drainage along the access road serving the O2 Centre.

2.5.3 The end of the service road is lower than the car park area, and therefore a surface water pumping station lifts surface water flows back up service road before discharging to the existing surface water drianage network in the main car park area.

2.5.4 The western extent of the car park drains initially as two catchments, North (Catchment 1) and South (Catchment 2).

2.5.5 Catchment 1 drains via gulleys and channel drains into an existing surface water sewer running east-west direction under Blackburn Road prior to turning south adjacent to the existing Homebase building at the far western extent of the existing O2 Car Park.

2.5.6 The southern half of this area (Catchment 2) drains into an existing surface water sewer running east-west under the car park which in turn connects to the surface water sewer serving Catchment 1.

2.5.7 These two connections then outfall into the existing Thames Water combined sewer running north-south through the site to the west of the proposed works.

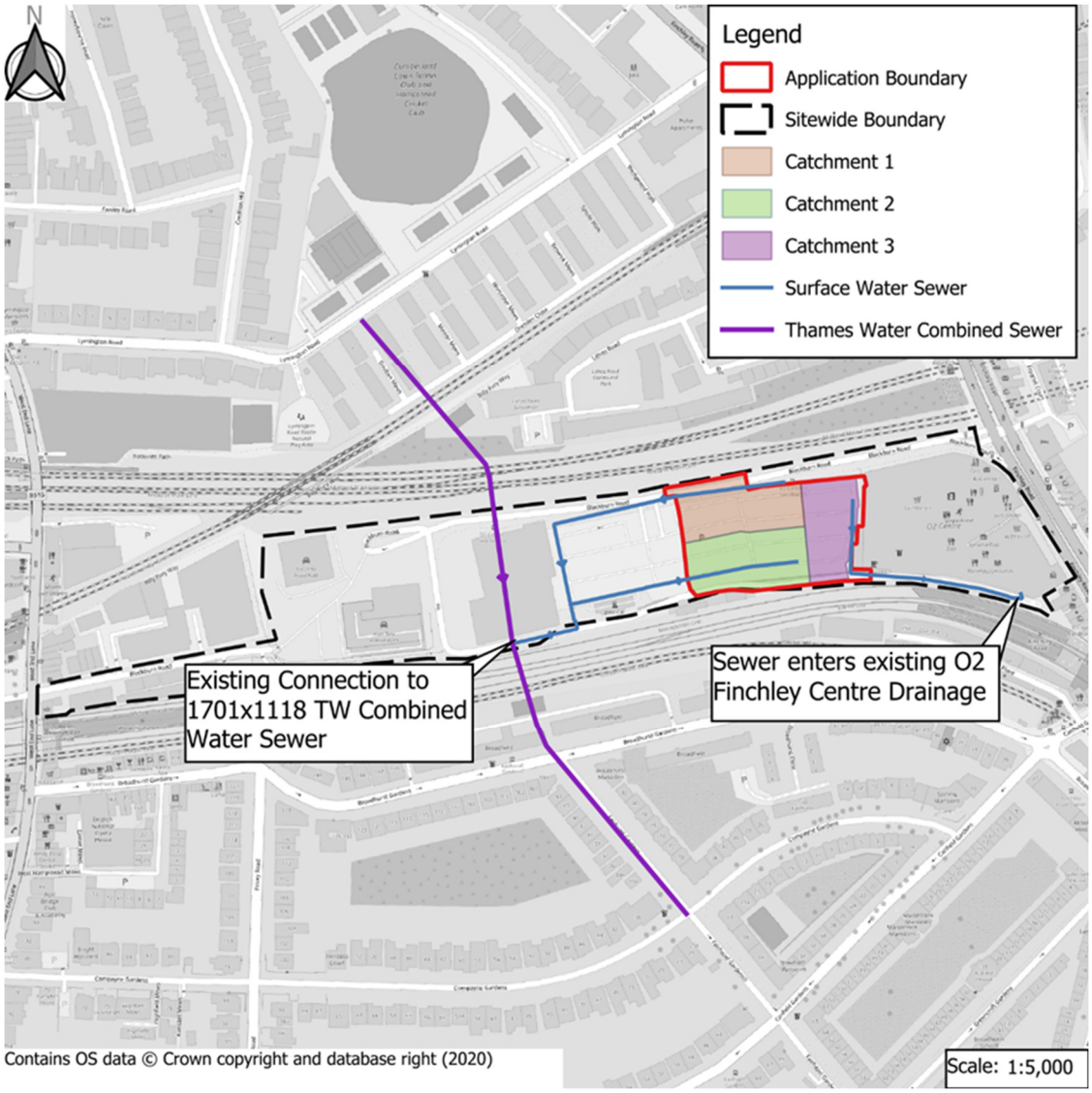

Figure 2-1 Existing Surface Water Catchments in the Vicinity of the Proposed Works

3 Surface Water Strategy

3.1 Drainage Philosophy

3.1.1 The temporary scheme is being brought forward to facilitate wider development works. When completed, the proposed surface water management scheme for the wider development will limit surface water runoff to greenfield equivalent rates. This will present a benefit to the downstream catchment.

3.1.2 In the short term, this temporary application is proposed to facilitate demolition works to the east, but critically needs to provide the following as a minimum

- Retained car park access.
- Minimum 200 parking space for the retained O2 Finchley centre.
- Temporary TfL bus turning loop.
- New delivery and servicing route for the O2 Finchley Centre.
- Phase 1 construction access

3.1.3 Considering the competing requirements listed above, and existing constraints, the proposed application boundary is very constrained. As a result, the proposed works incorporate a limited extent of reconstruction, and therefore the ability to alter the existing drainage regime is extremely limited.

3.1.4 Most of the existing car park surfacing will be retained in line with the existing arrangements with some proposed alteration to line marking/wayfinding, and thus the existing drainage regime within these areas will be maintained. The existing drainage regime is presented in **Section 2** above.

3.1.5 The western side of the site will undergo some modification to enable construction of a new turning facility for existing TfL bus routes. The works comprise relatively shallow demolition and reconstruction due to the presence of existing drianage and utility infrastructure required to be retained to serve areas outside of the development area.

3.1.6 The restrictions on excavation depth preclude the potential for any deep SuDS features or underground attenuation structures within the extent of works. However, it is proposed to introduce bioretention features (rain gardens or similar) to intercept and treat runoff prior to entry to the below ground drainage network. The introduction of landscape led SuDS features results in an overall reduction of impermeable areas within the boundary of the site.

3.1.7 In addition, proposed hard surfacing that will not be subject to vehicular traffic is also proposed to be permeable where possible, further reducing runoff from the proposed development area and improving water quality.

3.1.8 Consideration of revised hard and soft permeable surfacing results in a significantly reduction of impermeable surfacing within the development boundary. These reductions in impermeable areas are presented in more detail in **Section 3.2**.

3.1.9 Any new below ground drainage is proposed to discharge to the existing 525mm surface water along the southern extent of the existing car park which in turn discharges to the existing Thames Water combined sewerage system. This is reflective of the existing drainage arrangements.

3.1.10 As noted above future proposals for redevelopment of the site, will bring forward surface water mitigation measures that facilitate the reduction of surface water runoff to greenfield equivalent runoff rates.

3.2 SuDS Features

3.2.1 The proposed strategy is based on sustainable drainage principles, employing SuDS features to manage the surface water runoff within the application boundary where possible.

3.2.2 The proposed SuDS strategy, along with overland flow paths, can be seen on the SuDS layout plan in **Appendix F.** The strategy can be considered in 3 key areas identified on **Figure 3-1** below, and summarised in the following paragraphs.

- Area 1 – New Bus Loop
- Area 2 – Car Park
- Area 3 – Service Road Link

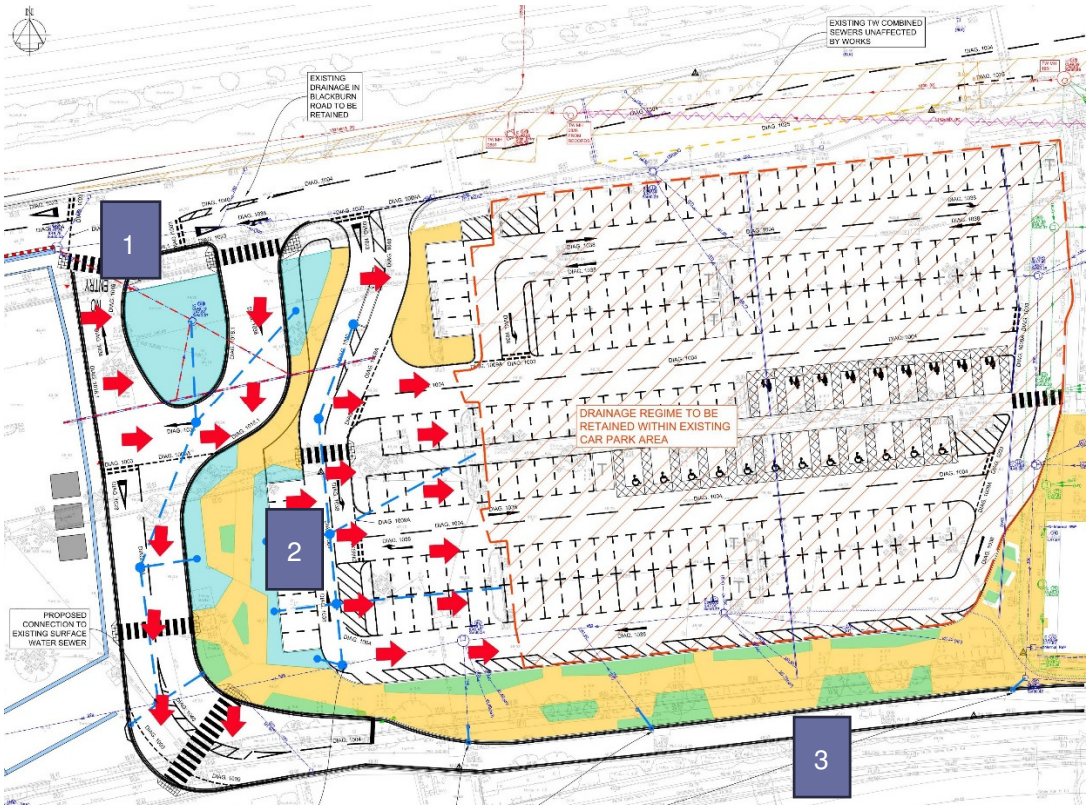

Figure 3-1 Proposed SuDS Strategy

3.2.3 Runoff generated by the area where configuration is proposed in the western half of the site, will drain into new bioretention systems incorporated within the proposed landscape extents in Area 1 and 2 shown in **Figure 3-1**.

3.2.4 Further permeable surfacing is also provided through soft landscape and permeable paving in Area 2 where reconstruction is proposed. This will control runoff in these areas where rainfall land, prior to discharge to the existing below ground drainage.

3.2.5 Where possible, resurfaced area of parking adjacent to Area 2 will also discharge to new bioretention systems. The area is constrained by the existing levels within the retained car park and therefore this will be limited.

3.2.6 Area 3 is heavily constrained by existing below ground utilities and trees that are proposed to be retained for Biodiversity net gain reasons. However, the area is proposed to be constructed of permeable paving to manage runoff from this area. This area incorporates areas of the existing car parking and part of the service access road which has been narrowed. Proposals result in a significant reduction of impermeable surfacing.

3.2.7 Retained trees are shown on the HTA landscape plan LNS-O2F_HTA-L_XX-00_DR_2900 provided in Appendix D

3.2.8 Existing gully's along the service road are proposed to be reconstructed improving existing surface water flood risk along this section, but overall peak runoff will be reduced through the implementation of permeable surfacing resulting in a reduction of impermeable surfacing which is discuss in **Section 3.3** below.

3.2.9 Introduction of further bioretention systems along the southern kerb line of the car park within Area 3 has been considered but has been deemed to be impractical and ineffective due to the retained levels within the car park fall from west to east parallel to the kerb line and therefore no surface water runoff would enter the areas.

3.3 Runoff Control

3.3.1 Bioretention areas and permeable surfacing will provide a treatment benefit to proposed runoff from the new bus turning loop and reconfigured car parking spaces and footpaths. Whilst not providing a direct attenuation benefit for surface water runoff, these features will control surface water runoff and provide interception storage volume for high frequency low intensity rainfall event i.e. the first 5mm runoff.

3.3.2 Approximate areas of permeable surfaces are as follows

- Bioretention Systems – 346m^2
- Permeable Paving – 1133m^2
- Soft Landscape – 241m^2
- Total – 1720m^2

3.3.3 With a full site area of 0.95Ha this represents a reduction in impermeable surfacing of circa 0.172Ha which equates to 18% overall reduction.

3.3.4 The area of the existing car park that is proposed to be retained is around 0.43Ha, with the remaining area of 0.52Ha subject to reconstruction. If considering the area of reconstruction only, a reduction in impermeable area of 0.172Ha equates to an overall reduction of 33%.

3.3.5 Using the equation set out in paragraph 2.2.2 above, the runoff rate for the proposed impermeable area is 108l/s. this results in an overall reduction of 22 l/s.

3.3.6 The proposed runoff volume for the 100-year return period 6 hour event has been calculated for the area undergoing construction as 224m^3 – a 33% reduction in runoff volume from the existing carpark.

3.3.7 An approximate 102m^3 of storage can be provided within the permeable paving areas of the proposed scheme, assuming a 300mm drainage layer of 0.3 porosity material. Approximately 83m^3 storage can be provided within the bio-retention areas, assuming a 150mm clear layer above a 300mm drainage layer.

3.3.8 Drainage exceedance (overland flood flow) will be managed within the proposed bus loop, service road, and existing car parking in line with the current arrangement. However, it should be noted that the proposal will not increase flood risk to the Southern boundary and the adjoining TfL land.

3.3.9 The location and scale of these features, along with overland flow paths, can be seen on the SuDS layout plan in **Appendix F.**

3.4 Water Quality

3.4.1 The Simple Index Approach for assessing pollution prevention outlined in the SuDS Manual has been used to quantify the water quality impacts of the proposed SuDS solution to determine their effectiveness.

3.4.2 The proposed use of the development would be considered a medium pollution hazard level, so pollution values have been taken from the SuDS Manual and compared to the mitigation index values as **per Table 3-1**.

Table 3-1 SuDS Mitigation Indices (from CIRIA SuDS Manual)

SuDS Component	Mitigation Indices		
	Total Suspended Solids	***Metals***	***Hydrocarbons***
Land Use Pollution Index *Non-residential Parking*	**0.7**	**0.6**	**0.7**
SuDS Mitigation Index *Bioretention System*	0.8	0.8	0.8
Pervious Pavement (No Infiltration	0.7	0.6	0.7
Aggregated Mitigation Index	**>0.95**	**>0.95**	**>0.95**
Mitigation Requirement Met?	**Yes**	**Yes**	**Yes**

3.5 Maintenance and Adoption

3.5.1 For the proposed surface water drainage system to function correctly, it will need to be appropriately maintained. The responsibility for maintenance of this drainage system will lie with the current landowner in line with the current arrangement.

3.5.2 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.

3.5.3 For pipes, manholes and gullies, both general best practice and specific manufacturer maintenance protocols should be followed. Example maintenance activities and frequencies for the proposed SuDS features are presented below;

Table 3-2 Recommended Maintenance Activities for Bio-retention Areas

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect infiltration surface for sitting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plant for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlet for blockage	Quarterly
Regular Maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to bi-annually
Occasional Maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial Actions	Remove and replace filter medium and vegetation above	As required, but likely to be >20 years

Table 3-3 Recommended Maintenance Activities for Tree Pits

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets and outlets	Inspect monthly
Occasional Maintenance	Check tree health and manage tree appropriately	Annually
	Remove sit build-up from inlets and surface and replace mulch as necessary	Annually, or as required
	Water	As required (in periods of drought)
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

Table 3-4 Recommended Maintenance Activities for Permeable Paving

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significance clogging)
Monitoring	Initial inspection	Monthly for three months after infiltration
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48hr after large storms in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

4 Conclusions & Recommendations

4.1.1 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.

4.1.2 The works proposed are temporary in nature and facilitate delivery of the wider masterplan. In turn the wider development proposal will unlock environmental benefits including reduction of surface water runoff rates to greenfield equivalent rates.

4.1.3 Whilst the proposed temporary scheme does not result in a greenfield runoff rate due to significant constraints, every effort has been made to improve management of surface water runoff.

4.1.4 The scheme incorporates a significant amount of new landscape which allows for the delivery of bioretention systems and permeable paving, and results in a significant reduction of impermeable surfacing within the application boundary. Within the area of the new bus loop, service road access, and pedestrian link to the O2 Finchley Centre, the proposed landscape proposals result in a 33% reduction of the existing impermeable surfacing.

4.1.5 This Sustainable Drainage Report is intended to support a detailed planning application and as such the level of detail included is commensurate with the nature of the proposals. **Table 4-1** provides a summary of key information.

Table 4-1 Summary of Key Information

Topic	Existing Site	Proposed Development
Site Area (m^2)	9500	9500
Impermeable Area (m^2)	9500	7780
Number of Sub-Catchments	1	1
Outfall Location(s)	Combined Sewer Network	Combined Sewer Network
Peak Runoff Rate (l/s)	130 l/s	108 l/s
Proposed Storage Volume (m^3)	-	185
SuDS Features	-	Bioretention Systems Pervious Pavements (No Infiltration) Soft Landscape
Maintenance Responsibilities	Landowner	Landowner