

Royal Elm Park – Phase 5
(Block 6)

Drainage Strategy and
Maintenance Statement

For
RFC Prop Co.

Project No.
14096

Date
November 2025

Campbell Reith Hill LLP
15 Bermondsey Square
London
SE1 3UN

T: +44 (0)20 7340 1700
E: london@campbellreith.com
W: www.campbellreith.com

DOCUMENT HISTORY AND STATUS

Revision	Date	Purpose/ Status	File Ref	Author	Check	Review
P1	21/10/2025	Draft	14096-CRH-XX-XX-RP-C-0005-P1	NA	AJH	AJH
P2	24/10/2025	Draft	14096-CRH-XX-XX-RP-C-0005-P2	NA	AJH	AJH
P3	12/11/2025	Preliminary	14096-CRH-XX-XX-RP-C-0005-P3	LB	AJH	AJH

This document has been prepared in accordance with the scope of Campbell Reith Hill LLP's (CampbellReith) appointment with its client and is subject to the terms of the appointment. It is addressed to and for the sole use and reliance of CampbellReith's client. CampbellReith accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of Campbell Reith Hill LLP. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole. The contents of this document are not to be construed as providing legal, business or tax advice or opinion.

© Campbell Reith Hill LLP 2025

Document Details

Author	Noor Abed
Project Partner	Simon Burr
Project Number	14096
Project Name	Royal Elm Park – Phase 5 (Block 6)
Revision	P03
File Ref	14096-CRH-XX-XX-RP-C-0005

CONTENTS

1.0	INTRODUCTION.....	5
1.1	Brief.....	5
1.2	Site Location	5
1.3	Planning Context	6
1.4	Proposed Development	6
2.0	DESIGN CRITERIA.....	8
2.1	Reading Council Decision Notice.....	8
2.3	Royal Elm Park Design Code	9
2.4	Surface Water Drainage Strategy.....	9
2.5	Foul Water Drainage Strategy	10
3.0	SITE CONTEXT	11
3.1	Site Description	11
3.2	Topography	11
3.3	Geology.....	11
3.4	Hydrology.....	12
3.5	Hydrogeology.....	12
3.6	Existing Drainage.....	12
3.7	Flood Risk.....	14
4.0	SURFACE WATER	16
4.1	Site Constraints.....	16
4.2	Proposed Catchment Areas	16
4.3	Masterplan Surface Water Rates and Volumes.....	17
4.4	Proposed SuDS Strategy.....	18
4.5	Surface Water Quality	20
5.0	FOUL WATER.....	22
5.1	Foul Water Drainage Strategy	22
6.0	SCHEDULE OF MAINTENANCE	23
6.1	Introduction.....	23
6.2	Permeable Paving	23
6.3	Detention Basins	25
6.4	Bio-retention areas, Rain Gardens and Tree Pits.....	26
6.5	Green Roof	27
6.6	Attenuation Tanks	28
7.0	CONCLUSION	31

APPENDICES

Appendix 1 Site Location	32
Appendix 2 Proposed Layout.....	33
Appendix 3 Arup Drainage Strategy Masterplan (extracts)	34
Appendix 4 Topographical Survey.....	35
Appendix 5 Site Constraints and Ground Conditions.....	36
Appendix 6 Thames Water Asset Records.....	37
Appendix 7 Existing Drainage	38
Appendix 8 Proposed Drainage Strategy and Supporting Calculation.....	39

1.0 INTRODUCTION

1.1 Brief

1.1.1 CampbellReith have been commissioned by RFC Prop Co Ltd (the Client) to prepare a Drainage Strategy and Maintenance Statement for the proposed residential development forming Phase 5 (Block 6) of the Royal Elm Park scheme at Reading, Berkshire herein referred to as the 'site'.

1.1.2 The National Grid Reference for the site is 470591E and 169841N. The nearest postcode to the site is RG2 6AD. The site location and existing site plan is shown in Appendix 1.

1.1.3 A Flood Risk Assessment (FRA) was previously undertaken by Arup, which includes a surface water drainage strategy which was approved under the extant Planning Permission (ref: 160199) and forms the basis of this statement. Condition 79 (Drainage Strategy) within the original permission has since been discharged (ref: PL/23/0448).

1.1.4 The current document aims to implement the previously approved drainage strategy for the overall site under the extant Planning Permission and has been prepared to support a Reserved Matters Application to discharge Conditions 80 (Surface Water Drainage) and 81 (Drainage Maintenance) where they relate to Phase 5 (Block 6) of the Royal Elm Park development.

1.2 Site Location

1.2.1 Figure 1.1 below shows the extent of the Phase 5 (Block 6) (red) in the centre-west of the wider approved Royal Elm Park OPA extents. Refer to Appendix 1.

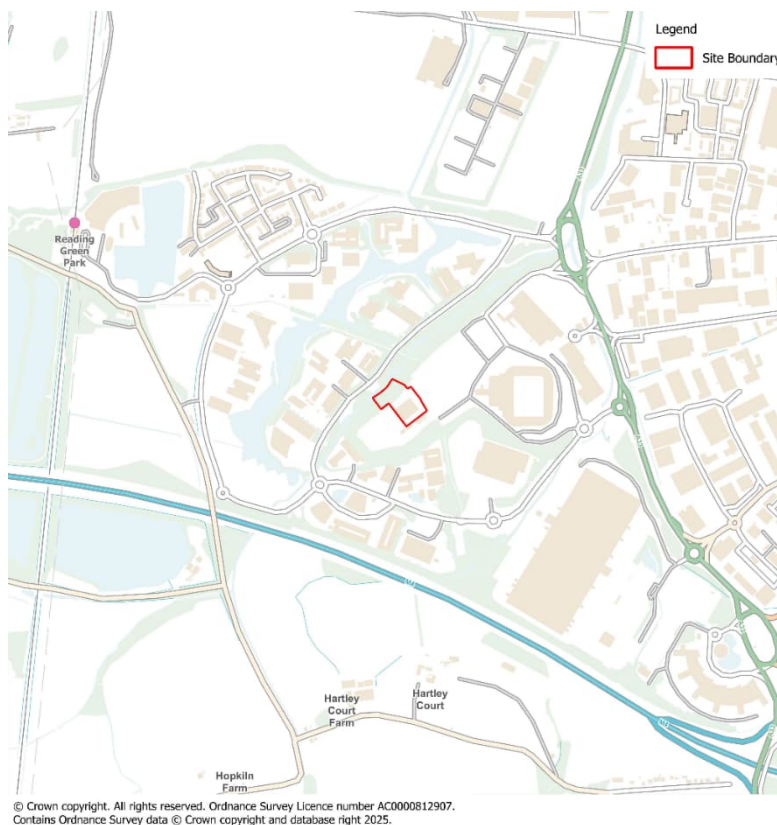


Figure 1.1: Site Boundary

1.3 Planning Context

1.3.1 The Client received a Hybrid Planning Permission from Reading Borough Council for the wider Royal Elm Park development on 29th November, 2018 under reference 160199.

1.3.2 The full site-wide permission is as follows:

“Outline application (all matters reserved apart from access to the site) for residential development (Blocks 1-6) to provide up to 422 residential units, comprising predominantly 1 and 2 bedroom apartments (Use Class C3) along with associated landscaping and car parking; and Detailed application for residential and mixed use development comprising: 196 residential units (within Block 7) (Use Class C3) including 164 dedicated parking spaces (of which 12 are accessible); Convention Centre and ice rink (Use Classes D1/D2); 246 bedroom hotel (Use Class C1) and up to 102 serviced apartments (Use Class C1); Decked car parking within Convention Centre; Flexible ancillary retail space (Use Class A1) (within Block 7 only); Flexible ancillary retail space (Use Class A3/A4) (within Convention Centre only); Multi storey car park including 1,972 sqm of office space (B1a) or 1,732sqm of office space (B1a) and 240 sqm of community space (D1 use); Public open space (including public square and public park) with associated street furniture and public art and directional signage to form part of wider outline public open space strategy; Associated access, landscaping, cycle parking, transport interchange and related infrastructure and engineering works; Ancillary facilities for storage, management facilities and plant; Vehicular and pedestrian access; and Demolition of existing indoor training facility; and Enhancement of existing RFC Garden of Remembrance.”

1.4 Proposed Development

1.4.1 Phase 5 is located in the west of Royal Elm Park and falls within the area consented at Outline level under permission 160199. The Proposed Development comprises:

- The construction of a residential courtyard block (Phase 5 – Block 6) containing approximately 84 dwellings, providing a mix of 1-, 2-, and 4-bedroom apartments. Enclosing a landscaped courtyard with communal podium-level amenity space of around 640 m².
- The buildings are arranged as two 7 storeys linear blocks, oriented southeast–northwest. They are enclosed on the southeast and northwest sides by 3-storey housing units.
- The development sits above a semi-basement podium providing 82 parking spaces along with various services. 35 street level/mews spaces (includes 2 accessible space), and 47 undercroft spaces (includes 2 accessible spaces).
- The proposals also include the associated portion of Royal Elm Gardens to the south of Block 6 as well as provisions for access roads, footpaths, and street-level parking.

1.4.2 An extract of the proposed development plan is contained in Figure 1.2 below and in full in Appendix 2.



Figure 1.2: Proposed Development (extract from Stantec Landscape Layout)

2.0 DESIGN CRITERIA

2.1 Reading Council Decision Notice

2.1.1 As previously mentioned, under the extant Hybrid Planning Permission (Ref: 160199) the following conditions are pertinent to the drainage strategy:

- *Condition 79: Prior to the commencement of development an overall surface water drainage strategy outline for the site, based on sustainable drainage principles and an assessment of the hydrological and hydro- geological context of the development, and that ensures that soakaways are not constructed into contaminated land, has been submitted to and approved in writing by the Local Planning Authority. The surface water drainage strategy shall be implemented in accordance with the approved details.*
- *Condition 80: Prior to the commencement of development of any phase or part of a phase, detailed surface water drainage proposals, which align with the general strategic approach identified in Condition 79 above, shall be submitted to and approved in writing by the Local Planning Authority. The scheme shall subsequently be implemented in accordance with the approved details. The detailed surface water drainage proposals shall cover:*
 - (i) A comparison of existing and proposed impervious areas for the entire development site;*
 - (ii) A comparison of existing, greenfield and proposed runoff rates and volumes for the 1 year, 30 year and 100 year plus climate change storms;*
 - (iii) Demonstration of the use of green roofs or a substantiated justification of why they have not been adopted;*
 - (iv) Demonstration of the use of (vegetated) rills and urban bio- retention features or a justification of why they have not been adopted; and*
 - (v) Full construction drawings of the proposed surface water drainage systems.*
- *Condition 81: No phase or part of a phase shall be occupied until a “whole-life” maintenance plan for the site has been submitted to and approved in writing by the Local Planning Authority. The plan should set out how and when to maintain the full drainage system (e.g. a maintenance schedule for each drainage/SuDS component) following construction, with details of who is to be responsible for carrying out the maintenance. The plan shall subsequently be implemented in accordance with the approved details.*
- *Condition 82: The development hereby permitted shall be carried out in accordance with the approved Flood Risk Assessment (FRA) Royal Elm Park – Land at Madejski Stadium Flood Risk Assessment and the following mitigation measures detailed within the FRA: ref 244202- ARP-00-XX-RP-CD-00001 dated 11th January 2016. Finished floor levels shall be set no lower than 41m above Ordnance Datum (AOD). The mitigation measures shall be fully implemented prior to occupation and subsequently in*

accordance with the timing / phasing arrangements embodied within the scheme, or within any other period as may subsequently be agreed, in writing, by the Local Planning Authority.

- *Condition 83. Prior to commencement of each phase or part of a phase full details of the method of disposal of foul sewage for that phase shall be submitted to and approved in writing by the Local Planning Authority. The development shall be carried out in accordance with the approved details.*

2.1.2 As noted previously, while Condition 79 has previously been discharged (reference: PL/23/0448), the strategy for Phase 5 (Block 6) must align with the general principles set out in the masterplan drainage strategy. This report specifically addresses the requirements of Condition 80 insofar as they relate to Phase 5 (Block 6). Information pertaining to Condition 81 (drainage maintenance) and Condition 83 (foul sewerage) is enclosed and evidence of compliance with Condition 82 is also included.

2.2 Masterplan Drainage Strategy

2.2.1 A FRA and accompanying Drainage Design Report was undertaken by Arup in 2016 (reference 244202-ARP-00-XX-RP-CD-00001). The FRA and Drainage Strategy were approved under the extant hybrid Planning Permission (ref: 160199) and forms the basis of this statement.

2.2.2 The proposed flow rates and attenuation requirements from the Arup masterplan should be accommodated within the proposed Phase 5 (Block 6) drainage strategy. Refer to Appendix 3 for key extracts from the Arup drainage masterplan.

2.3 Royal Elm Park Design Code

2.3.1 To guide the proposed development a Royal Park Design Code (reference 333101170 - ID01H - Design Code - Royal Elm Park) has been produced which should be used to ensure high-quality and consistent design for both Phase 5 (Block 6) and future phases of the wider site. The Design Code has been subject to review and discussion with the Local Planning Authority including representatives from the drainage team.

2.4 Surface Water Drainage Strategy

2.4.1 The surface water drainage system has been designed in accordance with the National Planning Policy Framework (NPPF) and the accompanying Guidance and Technical Standards for SuDS. It also complies with the requirements under Building Regulations Part H.

2.4.2 In accordance with CIRIA SuDS Manual 2015 (Report C753), Building Regulations Part H and in line with the SuDS hierarchy under paragraph 056 of the Planning Policy Guidance underpinning the NPPF, surface water should be managed by:

1. Collection for non-potable use
2. Infiltration to the maximum extent that is practical – where it is safe and acceptable to do so
3. Discharge to watercourses

4. Discharge to surface water sewer, highway drain or another drainage system
5. Discharge to combined sewers (last resort)

2.4.3 The proposed drainage strategy accords with the policies contained within the Reading Borough Local Plan (Adopted November 2019).

2.5 Foul Water Drainage Strategy

2.5.1 The foul drainage system has been designed with reference to the Sewerage Sector Design and Construction Guidance (DCG) and Building Regulations Part H. Foul flows from Phase 5 (Block 6) will discharge into the site-wide foul drainage network in line with the approved Arup Drainage Design Report (2016).

3.0 SITE CONTEXT

3.1 Site Description

- 3.1.1 The Phase 5 (Block 6) site boundary covers a total area approximately 0.99 hectares (ha).
- 3.1.2 This differs from the 0.33 ha site area referenced in the Arup (2016) Drainage Design Report, which represented an earlier indicative catchment. The updated boundary reflects the full parcel of land associated with Phase 5, including areas of landscaping, and interface with the existing car park and embankment down to the Foudry Brook.
- 3.1.3 The existing site is mainly brownfield land, comprising of a car park, a training academy building and an embankment which is soft landscaped. The site is bound to the north by Foudry Brook to the east by car parks and Select Car Leasing Stadium (formerly the Madejski Stadium) to the south by car parks and Nuffield Health Fitness and Wellbeing Centre and to the west by Thames Water Kemble Court.
- 3.1.4 The developable areas being considered for the current submission are outlined in Table 3.1 below.

Table 3.1: Existing Area Summary

Parcel	Impermeable Area (Ha)
Existing car park, hardstanding and Madajeski Training Academy Building	0.80
Embankment	0.15
Phase 5 (Block 6) Total	0.99

3.2 Topography

- 3.2.1 Lidar data has been obtained as part of this assessment and is shown in Figure 3.1
- 3.2.2 A topographical survey was undertaken by Lucion Survey Ltd in 2015 (ref: 4213-r5-reading-fc-2d) and is contained in Appendix 4. An update to this survey was undertaken in 2025.

Available data indicates that Phase 5 (Block 6) is generally located on a relatively flat to gently sloping area of hardstanding car park surface and the training academy building located central to the car park. The site is generally at an elevation of approximately 50 metres Above Ordnance Datum (mAOD), with levels falling away steeply towards the Foudry Brook to the north down to around 39 mAOD.

3.3 Geology

- 3.3.1 The British Geological Survey (BGS) Online Geology Viewer notes the underlain bedrock for the site as London Clay Formation which comprise of clay, silt and sand and notes the superficial deposits as River Terrace Deposits, which comprise of sand and gravel.
- 3.3.2 The site was undeveloped land until 1972 when landfilling operations commenced running until 1985. In 1997, waste material was excavated from land adjacent to the north of the site

and re-deposited across the entire site. The Madejski Stadium was constructed in 1997/1998 and the remainder of the site has been occupied by a car park and training ground since.

3.3.3 The landfill has been capped with a layer of engineered material to contain any potential contaminants. Remediation measures have been ongoing in liaison with the Environment Agency to make the site safe for residential development. For further information, refer to the Geo-Environmental Review (reference 14096-CRH-XX-XX-RP-LQ-0001), Land Quality Review and Gap Analysis Report (reference 14096-CRH-XX-XX-RP-LQ-0002) and Teir 1 Preliminary Risk Assessment Report (reference 14096-CRH-XX-XX-RP-LQ-0003) by CampbellReith.

3.3.4 A site Constraints Plan is contained in Appendix 5.

3.3.5 Site-specific ground investigation works are to be undertaken to confirm the anticipated onsite geology.

3.4 Hydrology

3.4.1 Environment Agency information confirms that the nearest Main River to the site is Foudry Brook, located immediately north of the site boundary. Foudry Brook forms part of the River Kennet catchment.

3.4.2 The Smallmead Drain is shown as a tributary to the Foudry Brook and runs to the south of the site.

3.4.3 There are not believed to be any additional unrecorded drainage ditches on the site.

3.5 Hydrogeology

3.5.1 The site is located is not located within a Source Protection Zone (SPZ).

3.5.2 The site is situated above a Secondary A Aquifer. The superficial deposits are classified as a Secondary A.

3.5.3 The groundwater vulnerability for the site is Medium. There is the potential for groundwater contamination as a result of past historic uses at this site including the previous landfill; however, remedial measures are ongoing to minimise the risk of gas or groundwater risks.

3.5.4 The groundwater levels beneath the site are subject to ongoing groundwater monitoring.

3.6 Existing Drainage

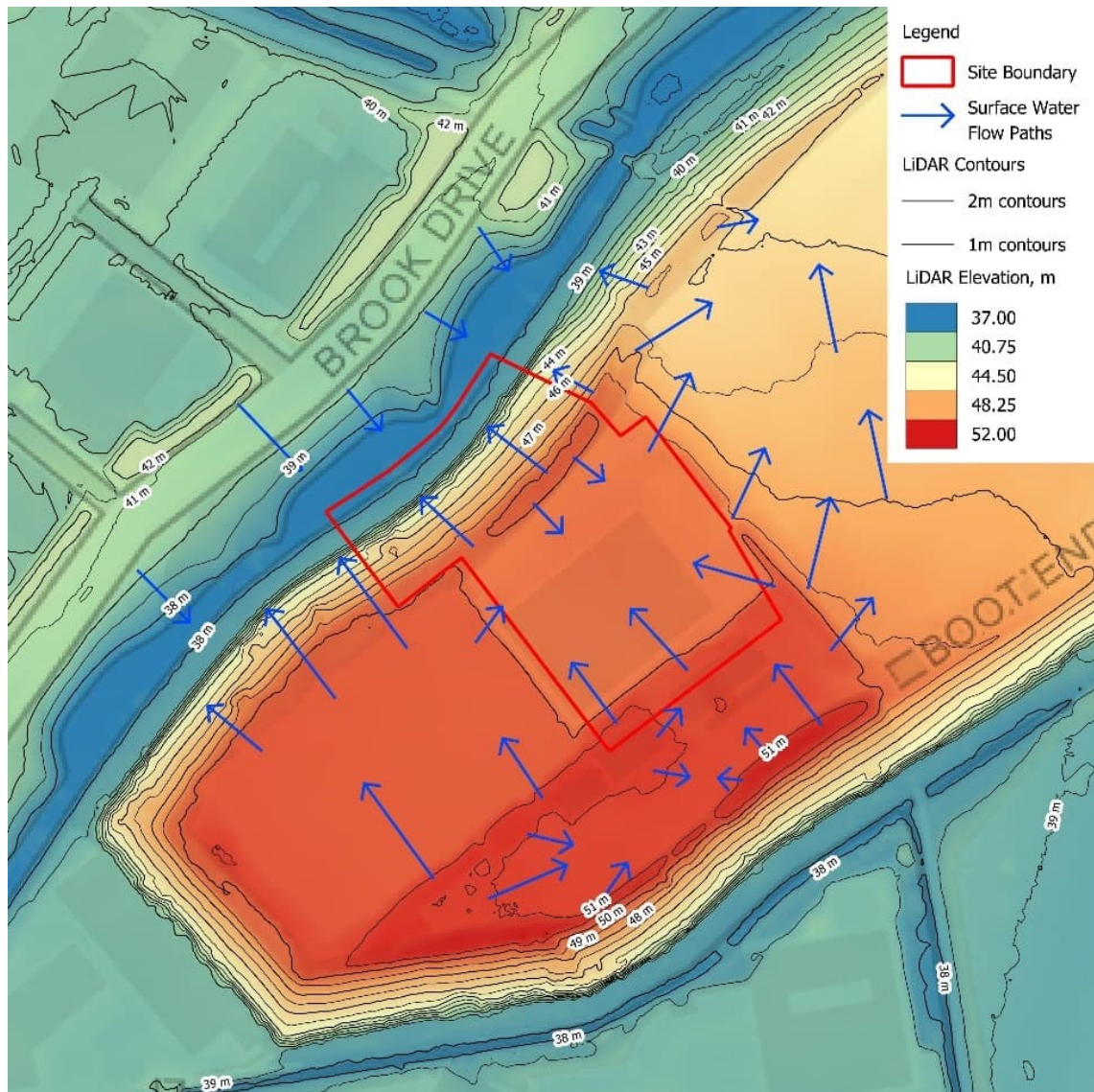
3.6.1 Thames Water are the incumbent sewerage utility provider for the area. A review of the Thames Water Records, contained in Appendix 6, confirms that the nearest public surface water sewer is located 475 m to the north-east and discharges into the Foudry Brook. The nearest public foul water sewer is located approximately 475 m to the north-west within the main site access road.

3.6.2 Thames Water are understood to be in the process of adopting the foul and surface water sewers which serve the Select Car Leasing (former Madejski) Stadium and surrounding areas.

3.6.3 The topographical survey confirms that there is also a system of private surface water drainage on the site which includes gullies and manholes. The existing private drainage network is

understood to discharge into the Foudry Brook/wider site drainage network at an unrestricted rate.

3.6.4 The natural surface water flow paths have been devised from reviewing the available Lidar and topographical data. Figure 3.1, below, shows that overland flows would generally fall from south to north with potential for some surface water accumulation to occur around the flatter areas around the existing Training Centre. However, generally, any overland flows will likely follow the topography of the land to discharge towards the steep embankment to the north and into the Foudry Brook.



© Crown copyright. All rights reserved. Ordnance Survey Licence number AC0000812907.
Contains Ordnance Survey data © Crown copyright and database right 2025.
Copyright © Environment Agency 2025.

Figure 3.1: Existing Surface Water Flow Paths

3.6.5 The greenfield runoff rates for the site were calculated using the IH124 method and are summarised in Table 3.2. Calculations contained in Appendix 7.

Table 3.2: Greenfield Runoff Rates

Return Period	Greenfield Runoff Rate (litres/second/hectare)
1 in 2 year	3.25
1 in 30 year	8.36
1 in 100 year	11.77

3.7 Flood Risk

- 3.7.1 The site is shown on EA mapping to be within Flood Zone 2 (medium risk of flooding from fluvial sources) as shown on Figure 3.2 below. However, due to the land-raising associated during the previous landfill exercises, the site levels are now considered to be above the potential flood level from the Foudry Brook and there have been no recent incidences of flooding. Refer to the Arup FRA (ref 244202- ARP-00-XX-RP-CD-00001) for more details.
- 3.7.2 As noted in the Arup FRA, and in accordance with Condition 82 of the extant Planning Permission, the Finished floor levels shall be set no lower than 41m above Ordnance Datum (AOD). As shown on Figure 3.1 on the previous page, the existing ground levels within Phase 5 (Block 6) are generally around 50 mAOD – comfortably higher than the requisite 41 mAOD. The proposed levels are to be at least as high as the existing ground and therefore are considered to be in accordance with Condition 82.



© Crown copyright. All rights reserved. Ordnance Survey Licence number AC0000812907.
Contains Ordnance Survey data © Crown copyright and database right 2025.
Copyright © Environment Agency 2025.

Figure 3.2: EA Flood Zones

4.0 SURFACE WATER

4.1 Site Constraints

4.1.1 A review of the site characteristics has informed the following site constraints:

- As the site is above an area of former landfill with clay capping layer, infiltration drainage will not be possible. Therefore, discharging surface water via soakaways is unfeasible.
- In accordance with Condition 81 under extant Hybrid Planning Permission (Ref: 160199) Finished floor levels shall be set no lower than 41m AOD to mitigate for any potential flood risk.
- The site is the first phase of a wider surface and foul water drainage strategy (by Arup, 2018) and must conform to the flow rates, discharge hierarchy and attenuation volumes set out in the Outline Planning Consent.
- Within Phase 5 (Block 6), the masterplan includes two attenuation basins which form part of the wider Arup drainage strategy and are required to be delivered as part of Phase 5 to serve future phases of development.
- While the wider downstream foul and surface water drainage networks have yet to be fully designed or constructed at this stage, however, for the purposes of this RMA it is assumed that they will be fully delivered in advance of the start of construction of Phase 5 (Block 6).

4.2 Proposed Catchment Areas

4.2.1 The proposed site layout plan has been analysed and the proposed impermeable areas which contribute to the site runoff summarised as shown in Table 4.1 below. A proposed catchment plan is contained in Appendix 8.

Table 4.1: Proposed Area Summary

Area	Impermeable Area (Ha)
Proposed building	0.25
Proposed access road and parking	0.18
Proposed hardstanding	0.04
Phase 5 (Block 6) Total Impermeable	0.47 (45%)
Proposed Soft Landscape	0.52
Phase 5 (Block 6) Total Site Area	0.99

4.2.2 As a result of the proposed development there is a net reduction in the overall impermeable area on site.

4.3 Masterplan Surface Water Rates and Volumes

- 4.3.1 The OPA drainage masterplan set flow restrictions and established preliminary attenuation requirements for each phase of the development. Phase 5 (Block 6) was allocated a maximum discharge rate of 3l/s in all storms up to the 1 in 100 year event + climate change (CC). This yielded an approximate storage requirement of 230m³ which was provisionally made up of permeable paving (50m³) and a geo-cellular attenuation tank (180m³).
- 4.3.2 The OPA drainage strategy also established mechanisms by which strategy surface water SuDS features could be most efficiently placed in the overall site masterplan. The Arup Drainage Strategy showed that two combined attenuation basins/tanks were to be included within Phase 5 to provide storage for future Phases of the masterplan including Blocks 3 and 4 as well as associated road and hardscape.
- 4.3.3 The basins were two of a series of four aligned attenuation features running east-west through the centre of the wider site and were referenced as Basin 3 and Basin 4 - the naming of which has been continued in this report for consistency. Basin 3 was to be restricted to provide a capacity of 300m³ and was to 25l/s while Basin 4 provided 606m³ with a restriction of 10l/s.
- 4.3.4 An extract from the OPA masterplan is shown in Figure 4.1 below. Refer to Section 5.6 of the Arup Drainage Strategy Report (reproduced in Appendix 3) for details.

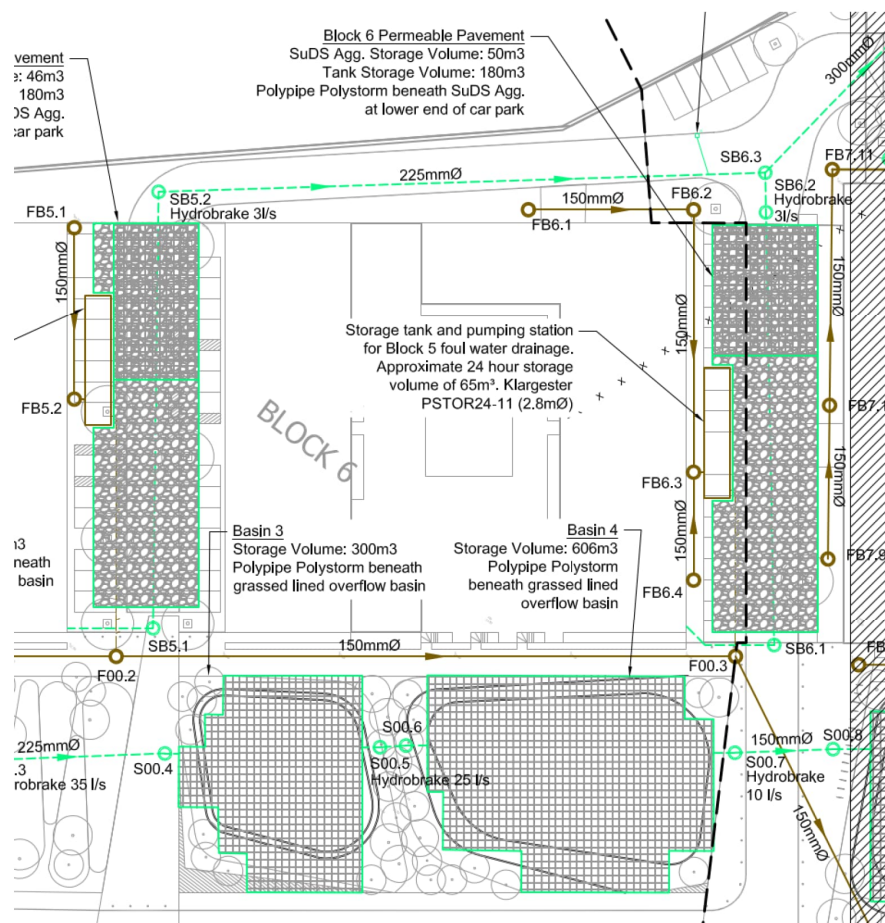


Figure 4.1: Arup Masterplan Drainage Strategy (extract)

4.4 Proposed SuDS Strategy

- 4.4.1 The proposed SuDS strategy is divided into two functional systems: one network serving the proposed Block 6 development (referred to from this point as 'Network A') and one accommodating flow from the future upstream development parcels (referred to from this point as 'Network B') respectively.
- 4.4.2 Network A manages the new building and paved runoff at a restricted rate of no more than 3l/s up to and including the 1 in 100 year storm plus climate change; meanwhile Network B attenuates and discharges incoming flows at no more than 10l/s through basins and geocellular tanks.
- 4.4.3 The surface water drainage strategy aims to control runoff from impermeable areas at source and attenuate through SuDS features. The proposed drainage strategy layout presented in Appendix 6 illustrates the SuDS features proposed to manage the surface water runoff from both Network A and Network B. The proposal is consistent with the Arup 2016 Drainage Design Report, whereby the discharge rates proposed will connect into the wider Royal Elm Park surface water network.
- 4.4.4 Following the SuDS hierarchy, and in line with the Royal Elm Park Design Code, opportunities for reuse of rainwater have been explored. However, given the nature of the proposed development, large-scale rainwater harvesting is not likely to be feasible. Rainwater pipes are central to the building core and so do not lend themselves to use with external water butts. However, space for small tanks or rainwater butts could potentially be allowed for on the podium level for irrigation of planters.
- 4.4.5 As infiltration is not feasible, the preferred method of surface-water discharge is therefore attenuation with controlled discharge to the site-wide surface-water network, in line with the SuDS hierarchy.
- 4.4.6 The following SuDS features have been considered within the proposed surface water drainage strategy:
- Green roofs
 - Blue Roofs
 - Permeable paving
 - Raingardens
 - Tree Pits
 - Attenuation basins
 - Geocellular attenuation tanks

Network A – Phase 5 (Block 6) building and external hard landscape

- 4.4.7 Network A includes runoff from the proposed building roofs via rainwater pipes (RWPs) and from surrounding hardstanding and landscaped areas.

- 4.4.8 Runoff is managed at source through green/blue roofs, permeable paving, and rain gardens, providing treatment and attenuation prior to discharge into geocellular attenuation tanks. The primary attenuation features are the blue roof and lined permeable paving, while an attenuation tank provides additional storage to ensure that there is no flooding for the 1 in 100-year + 40 % climate-change event when discharge is restricted to 3l/s.
- 4.4.9 The outfall to the wider surface water drainage network is in the north-east of the site.
- 4.4.10 The approximate breakdown of proposed SuDS features can be seen in Table 4.1 below. Refer to Appendix 8 for proposed drainage layout and supporting Infodrainage Calculations.

Table 4.2: Network A: SuDS Summary

Area		Depth (m)	Void Ratio	Volume (m ³)
Blue Roof	655m ²	0.10	95%	62m ³
Permeable Paving (Parking)	420m ²	0.45	30%	57m ³
Permeable Paving (Access Rd)	1785m ²	0.45	30%	241m ³
Tree Pit / Rain Garden	565m ²	0.10	10%	6m ³
Attenuation Tank	20m ²	0.50	95%	10m ³
TOTAL				375m ³

Network B – Upstream Catchment

- 4.4.11 Network B receives runoff from the upstream catchment area located immediately west of Phase 5, conveyed to two landscaped attenuation basins with underlying geocellular storage.
- 4.4.12 The upstream catchment includes Blocks 3 & 4 as well as external spaces. This catchment flows through Basins 1 & 2 upstream where it is controlled to 35l/s before also routing through Basin 3 and Basin 4.
- 4.4.13 The basins provide additional attenuation and treatment to runoff before controlled discharge at a rate of 10l/s, in line with the approved site-wide strategy. With the drainage masterplan, Basins 3 and 4 were to provide a combined required volume of approximately 900m³.
- 4.4.14 The flow restriction would be provided with a hydrobrake or similar device prior to outfall into the wider Royal Elm Park drainage network to the east. As Phase 5 is to be constructed in advance of the upstream catchments which it serves, the drainage stubs upstream of Basin 3 are to be suitably capped and recorded for future connection.
- 4.4.15 While the overall principle of the Arup drainage masterplan have been followed, updated drainage modelling has been undertaken utilising a more refined upstream catchment than that which was used at the initial application stage; potentially allowing for refinements in the overall provided volumes in Basins 3 and 4. Latest climate change allowances and rainfall data have also been used in the updated modelling. The overall assumed catchment - based on the indicative masterplan – is approximately 0.8ha.
- 4.4.16 The approximate breakdown of proposed Basin 3 and Basin 4 can be seen in Table 4.3 and Table 4.4 below. The overall volume provided (circa 785m³) is slightly less than the 900m³ which was provided in the masterplan strategy, however, this is considered to be reflective of

the more detailed catchment analysis and updated climate change and rainfall data. Refer to Appendix 8 for proposed drainage layout and supporting Infodrainage Calculations.

Table 4.3: Network B: Basin 3 Summary

Basin 3		Depth (m)	Void Ratio	Volume (m ³)
Basin 3 (shallow)	155m ²	0.75	100%	65m ³
Tank A (Access Rd)	130m ²	0.50	95%	62m ³
Tank B (beneath basin)	75m ²	0.50	95%	36m ³
TOTAL				162m ³

Table 4.4: Network B: Basin 3 Summary

Basin 4		Depth (m)	Void Ratio	Volume (m ³)
Basin 4 (shallow)	550m ²	0.75	100%	260m ³
Tank C (Access Rd)	155m ²	1.00	95%	147m ³
Tank D (beneath basin)	350m ²	0.65	95%	216m ³
TOTAL				623m ³

4.4.17 Thames Water have been consulted via pre-application enquiry and confirm that they have capacity for the anticipated foul and surface water flows from the proposed development. Refer to Appendix 6.

4.4.18 The proposed surface water drainage system can effectively control all runoff generated within the site and maintain pre-development brownfield runoff, without increasing flood risk elsewhere.

4.4.19 The maintenance of SuDS is vital ensuring that they work as efficiently as they set out to do. The maintenance requirements are discussed in details in section 6 of this report.

4.5 Surface Water Quality

4.5.1 The SuDS components within the surface water drainage strategy have been designed in accordance with the guidance set-out in the SuDS Manual C753.

4.5.2 Treatment within SuDS components is essential for frequent low intensity and duration rainfall events, where urban contaminants are being mobilised and washed off urban surfaces and the aggregated contribution to the total pollutant load to the receiving surface water body is potentially high. For rainfall events greater than the 1 in 1 return period, the pollutants become diluted and the environmental risks will be reduced which means that the SuDS treatment process becomes less crucial. Treatment effectiveness is strongly linked to the hydraulic control of runoff, in particular velocity control and retention time.

4.5.3 Table 26.2 of the CIRIA SuDS Manual provides the pollution hazard indices for different land use classifications applicable to the site as shown in the table below.

Table 4.5: CIRIA Pollution hazard indices for different land use classifications

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Residential Roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads, car parks with infrequent change	Low	0.5	0.4	0.4

4.5.4 Overall, the site presents a low pollution hazard potential, primarily associated with occasional vehicle movements within parking and access areas.

4.5.5 Table 4.6 below summarises the treatment efficiency of different SuDS components discharging to surface waters as detailed in Chapter 26 of the SuDS Manual.

Table 4.6: CIRIA Mitigation indices for different SuDS features

		Mitigation Indices	
Type of SuDS Component	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Permeable Pavement	0.7	0.6	0.7
Bioretention System (rain gardens / tree pits)	0.8	0.8	0.8
Detention Basin	0.5	0.5	0.6

4.5.6 Where multiple drainage features are used, the efficiency of the secondary system to treat water is reduced. The proposed SuDS treatment train for Phase 5 (Block 6) comprises source control measures (green roofs and permeable paving) followed by conveyance and further treatment features (rain gardens and basins).

5.0 FOUL WATER

5.1 Foul Water Drainage Strategy

- 5.1.1 The foul-water drainage system will convey domestic wastewater only generated from the residential units within Phase 5 (Block 6).
- 5.1.2 Foul flows from the building will be collected at lower-ground level, where the internal car park is located, via Soil Vent Pipes (SVPs) and Stub Stacks (SS). Routing is to be via traditional manholes, inspection chambers and below ground pipework.
- 5.1.3 The foul effluent will be directed to a pumping station with additional storage tank, providing a total capacity of approximately 65m³, located beneath the car park. This volume has been sized to provide adequate 24-hour emergency storage and operational capacity in the event of pump failure or maintenance shutdown. Pumped flows will discharge via a rising main to a gravity break chamber prior to outfall via the foul sewer connection (F00.3) at ground level, from where flows will gravitate into the wider Royal Elm Park foul drainage network. The pump and associated rising main will be subject to specialist design to be procured at the following design stages.
- 5.1.4 Condition 83 requires details of the proposed foul water network to be provided. The proposed foul drainage layout and supporting drainage details can be found in Appendix 8.

6.0 SCHEDULE OF MAINTENANCE

6.1 Introduction

6.1.1 The maintenance of SuDS features is vital ensuring that they work as efficiently as they set out to do. Maintenance activities can be broadly defined as:

- Regular maintenance – basic tasks carried out regularly
- Occasional maintenance – tasks that are required periodically but on a much less frequent basis
- Remedial maintenance – tasks required when a fault needs rectifying and often includes unforeseen events

6.1.2 During construction, it is the responsibility of the Principal Contractor to ensure the relevant management and maintenance requirements outlined below are implemented. The principal contractor will retain responsibility during construction up to the handing over.

6.1.3 It is understood that the drainage network serving both Phase 5 (Block 6) and the wider site will remain private and is not to be offered for adoption. The ongoing maintenance of the drainage network will remain the responsibility of the client and their appointed management company.

6.2 Permeable Paving

Construction

6.2.1 Construction vehicles and equipment not directly involved in the construction of the pervious pavements will be kept away from these areas. Silt fences, staged excavation works and temporary drainage swales/bunds to divert runoff away from exposed areas will be utilised, as appropriate, to manage the risks associated with, and to intercept the discharge of sediment laden runoff. Landscaping activities will be carefully designed and carried out to prevent deposition of topsoil, turf and other materials on the surface of the pavement. Infiltration surfaces will not be compacted and will be protected at all times. Excavations for the pervious pavement installation should aim to be undertaken in times of dry weather, when possible, to prevent mobilisation of sediments from exposed surfaces during rainfall events. Surfaces exposed as part of the pervious paving installation works should be stabilised as soon as possible. Perimeter controls should be installed prior to construction to protect watercourses.

Maintenance Schedule

6.2.2 The table below shows the operation and maintenance requirements for the pervious pavements which are in accordance with the CIRIA C753 SuDS Manual.

Table 6.1: Operation and maintenance requirements for pervious pavements (CIRIA C753, 2015)

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 surfaces from adjacent impervious areas as these areas are 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 onto 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 50 mm 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 significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth -if required, take remedial action	Three-monthly, 48 hrs after large storms in first six months
	Assess silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

6.3 Detention Basins

Construction

- 6.3.1 Construction vehicles and equipment not directly involved in the construction of the detention basin will be kept away from these areas. Silt fences, staged excavation works and temporary drainage swales/bunds to divert runoff away from exposed areas will be utilised, as appropriate, to manage the risks associated with, and to intercept the discharge of, sediment laden runoff prior to its discharge to nearby watercourses. Excavations for the detention basin should aim to be undertaken in times of dry weather when possible, to prevent mobilisation of sediments, during rainfall events. Surfaces exposed as part of the detention basin construction should be stabilised as soon as possible, by the use of hydroseeding or an alternative approved approach. Perimeter controls should be installed prior to construction to protect watercourses. Perimeter controls should be installed prior to construction to protect watercourses.

Maintenance Schedule

- 6.3.2 The table below shows the operation and maintenance requirements for the detention basins, taken from the CIRIA C753 SuDS Manual.

Table 6.2: Operation and maintenance requirements for detention basins (CIRIA C753, 2015)

Maintenance Schedule	Required Action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass - public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc. for evidence of blockage and/or physical damage	Monthly
	Inspect silt accumulation rates in the detention basin and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, e.g. penstocks	Half yearly
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay.	Every 1-5 years, or as required

	Remove sediment and planting from one quadrant of the main body of detention basins without sediment forebays.	Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of big detention basins when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, e.g. every 25-50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate detention basin when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair/rehabilitate inlets, outlets and overflows.	As required

6.4 Bio-retention areas, Rain Gardens and Tree Pits

Construction

- 6.4.1 Construction vehicles and equipment not directly involved in the construction of the tree pits will be kept away from these areas. Silt fences, staged excavation works and temporary drainage swales/bunds to divert runoff away from exposed areas will be utilised, as appropriate, to manage the risks associated with, and to intercept the discharge of, sediment laden runoff prior to its discharge to the drainage network. Excavations for the tree pits should aim to be undertaken in times of dry weather when possible, to prevent mobilisation of sediments, during rainfall events. Surfaces exposed as part of the tree pit construction should be stabilised as soon as possible. Perimeter controls should be installed prior to construction. Root protection measures should be undertaken if working in proximity to existing trees.

Maintenance Schedule

- 6.4.2 The table below shows the operation and maintenance requirements for rain gardens and tree pits, taken from the CIRIA C753 SuDS Manual

Table 6.3: Operation and maintenance requirements for tree pits (CIRIA C753, 2015)

Maintenance Schedule	Required Action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass - public areas	Monthly (during growing season)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc. for evidence of blockage and/or physical damage	Monthly
	Inspect silt accumulation rates in the rain garden/tree pit and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly

	Check any mechanical devices	Half yearly
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay.	Every 1-5 years, or as required
Occasional maintenance	Remove sediment from the main body of the tree pits when water volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, e.g. every 25-50 years
	Check edging and kerbing plus any inlets to rain garden/tree pit and repair/replace if required	As required
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate tree pit when signs of eutrophication are detected	As required
	Repair/rehabilitate inlets, outlets and overflows.	As required

6.5 Green Roof

- 6.5.1 Maintenance frequency varies pertaining to the complexity of the green roof; intensive green roofs require regular inspection and action, this may include weekly mowing of grassed areas and weeding of plant beds. On the other hand, extensive green roofs will be managed with a more subtle approach, biannual visits to remove litter, invasive plants species as well as checking fire breaks and drains.
- 6.5.2 Maintenance responsibility for green roof systems should be placed with a responsible organisation with specialist training in green roof care, all maintenance actions must comply with appropriate health and safety regulations, especially as this encompasses regulations for working at height (e.g. operators require safety fastenings to work at roof level). Training and guidance information for operating and maintenance the roof is to be distributed to all property owners and tenants.
- 6.5.3 Roof access points should be designed with safety and mobile convenience at foremost, providing secure points for harness attachments where approach of the roof edges is required. CDM 2015 requires designers to ensure that all maintenance risks have been identified, eliminated, reduced and/or controlled where appropriate. This information will be required as part of the health and safety file.
- 6.5.4 The table below provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive and some actions may not always be required.
- 6.5.5 Maintenance Plans and schedules should be developed during the design phase, and will be specific to the type of roof that is adopted. Specific maintenance needs of the system should be monitored, and maintenance schedules adjusted to suit requirements.

Table 6.4: Maintenance and Operation of Green Roofs (CIRIA C753, 2015)

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth.	Biannually
	During establishment (ie year one), replace dead plants as required	Monthly (usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where >5% loss of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Biannually or as required
	Remove nuisance and invasive vegetation, including weeds	Biannually or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Biannually or as required
Remedial actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required
Monitoring	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance of roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms

6.6 Blue Roofs

6.6.1 The maintenance schedule for Blue Roofs should be in accordance with manufacturer's requirements and is generally summarised in the table below.

Table 6.5: Maintenance and Operation of Blue Roofs

Maintenance Schedule	Required Actions	Typical Frequency
Regular maintenance	Remove litter and debris from outlets and overflows	Monthly (or as required)
	Monitor performance of waterproofing and general performance including siltation	Inspect monthly during first year
Occasional maintenance	Check overflows and flow controls	Annually or as required
	Break up ice formation around outlets and overflows	As required in cold weather
Remedial maintenance	Structural rehabilitation/repair and replacement of waterproofing membrane.	As required

6.7 Attenuation Tanks

Construction

- 6.7.1 Construction vehicles and equipment not directly involved in the construction of the attenuation tank will be kept away from these areas. Silt fences, staged excavation works and temporary drainage swales/bunds to divert runoff away from exposed areas will be utilised, as appropriate, to manage the risks associated with, and to intercept the discharge of, sediment laden runoff prior to its discharge to nearby watercourses. Excavations for the attenuation tank should aim to be undertaken in times of dry weather when possible, to prevent mobilisation of sediments during rainfall events. Perimeter controls should be installed prior to construction to protect watercourses.

Maintenance Schedule

- 6.7.2 The table below shows the operation and maintenance requirements for the Attenuation tanks, taken from the CIRIA C753 SuDS Manual.

Table 6.6: Operation and maintenance requirements for attenuation storage tanks (CIRIA C753, 2015)

Maintenance Schedule	Required Action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	Remove sediment from catchpits/ gullies/ sumps.	Annually, or as required

Occasional Maintenance	Removal of sediment from tank via vacuum pumping (if appropriate)	As required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

7.0 CONCLUSION

- 7.1.1 CampbellReith has prepared this Drainage Strategy and Maintenance Statement in support of an application to discharge Condition 80 (Surface Water Drainage) and Condition 81 (Drainage Maintenance) of the Royal Elm Park hybrid planning permission (Ref: 160199). This statement has been prepared with reference to the approved Arup (2016) Drainage Design Report and the associated Flood Risk Assessment for the wider site in accordance with Condition 79.
- 7.1.2 Existing ground levels within Phase 5 (Block 6) are generally around 50 mAOD – comfortably higher than the requisite 41 mAOD noted within the Arup FRA and under Condition 82 of the extant Planning Permission. The proposed levels are to be at least as high as the existing ground and therefore the proposals are considered to be in accordance with Condition 82.
- 7.1.3 The surface water drainage strategy has been designed in accordance with the NPPF and accompanying guidance and technical standards for SuDS. The site is underlain by the London Clay Formation with overlying River Terrace Deposits of sand and gravel. These conditions result in low infiltration potential, making infiltration unsuitable for the development.
- 7.1.4 The proposed surface-water drainage strategy for Phase 5 (Block 6) provides attenuation and treatment through a series of SuDS measures, including blue roofs, green roofs, permeable paving, rain gardens, basins, and geocellular attenuation tanks.
- 7.1.5 The strategy is divided into two systems: 'Network A' serving the proposed Block 6 development (discharging at 3l/s) and 'Network B' accommodating flows from the upstream catchment (discharging at 10l/s). Both systems connect to the site-wide surface-water drainage network, whilst ensuring that post-development runoff does not increase flood risk downstream.
- 7.1.6 In accordance with the CIRIA Pollution Hazard Indices the proposed development is considered a low pollution hazard. The use of the proposed SuDS is suitable to effectively treat suspended solids and metals before discharge into the site-wide surface-water network.
- 7.1.7 Foul water from the development will be disposed of via a pumped drainage system located at basement level, which conveys flows to a surface-level foul sewer connection (F00.3). From this point, flows will gravitate into the site-wide foul drainage network. The system includes a 65 m³ storage tank to provide 24-hour emergency storage capacity in accordance with Building Regulations Part H. Information provided in this report is to address Condition 83.
- 7.1.8 It has been demonstrated that the proposed drainage strategy can adequately drain the site for all storms up to and including the 1 in 100 year storm event plus an allowance for climate change with no flooding. The proposed development will not increase flood risk on or off the site.
- 7.1.9 The proposed drainage network is to remain private and should be maintained in line with the operation and maintenance schedule enclosed. The Maintenance Schedule is expected to be suitable to address the requirements of Condition 81 (Drainage Maintenance) under the extant Planning Permission. The maintenance of SuDS features is vital ensuring that they work as efficiently as they set out to do.



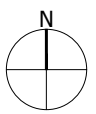
CampbellReith
consulting engineers

Appendix 1

Site Location

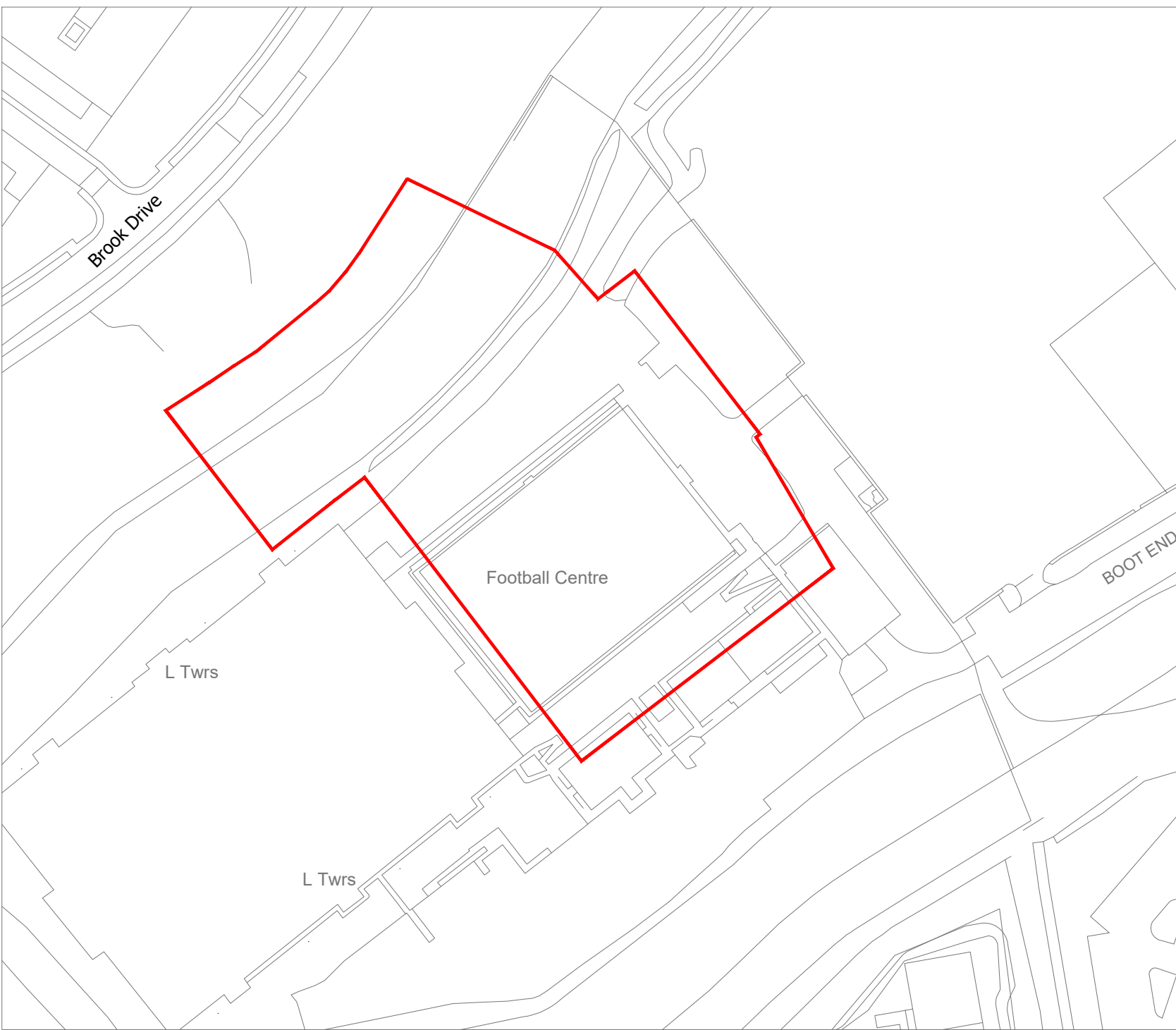
The scaling of this drawing cannot be assured

Revision	Date	Drn	Ckd
P2	Strip of land along south west added.	04.08.25	MK PJ
P3	Northeast boundary updated to extent of outline boundary. Area updated.	08.09.25	CB MK



LEGEND

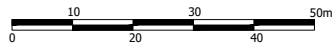
 Site Application Boundary (Area: 0.990 ha)



PLANNING

Project
Royal Elm Park
Block 6, Phase 5
Drawing Title
Site Application Boundary

Date	Scale	Drawn by	Check by
21.07.25	1:1250	MK	MK
Project No	Drawing No	Revision	
333101170	LN-A-SK001	P3	



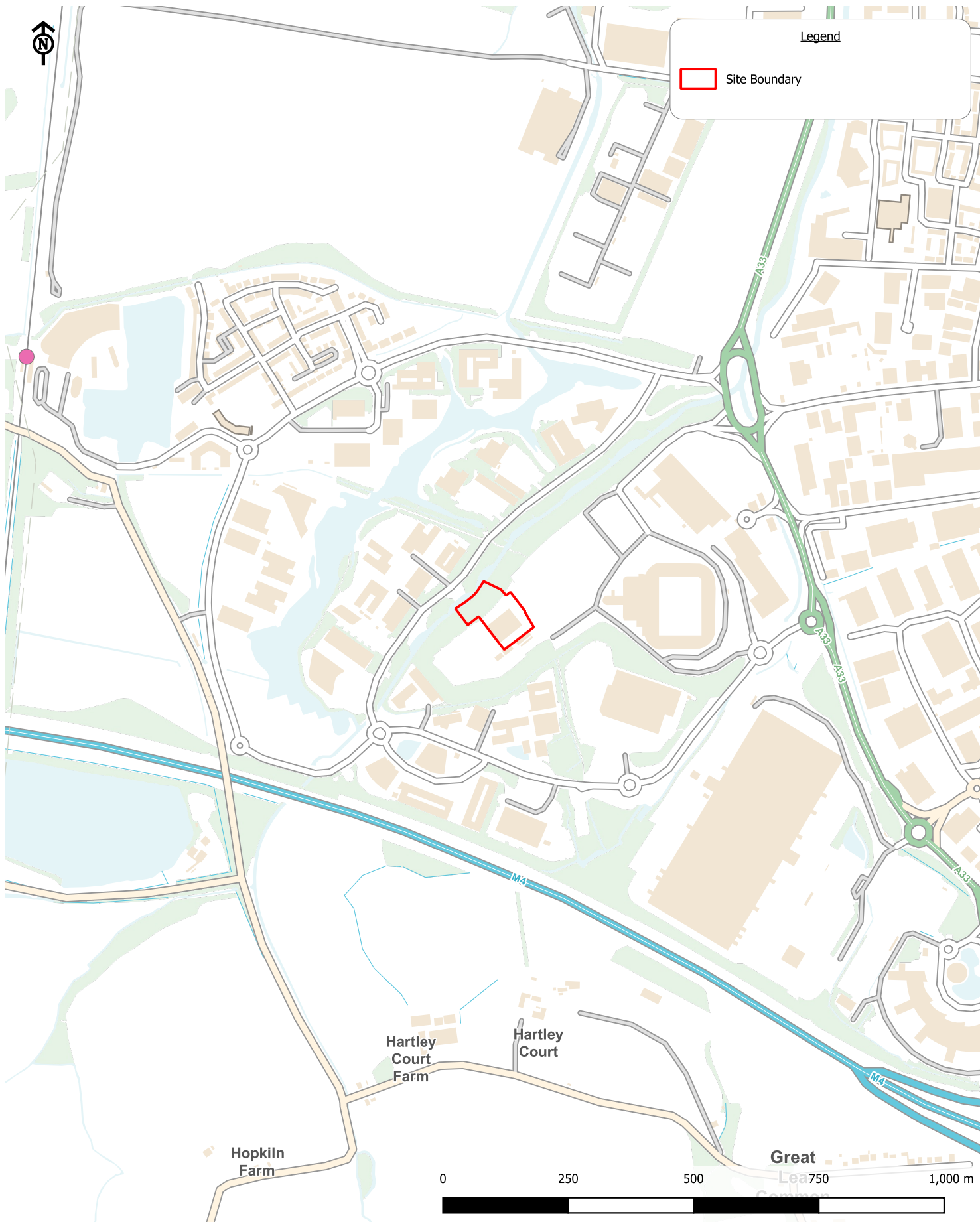


Stantec UK Limited
3rd Floor Arthur Stanley House
40-50 Tottenham Street
London
W1T 5RN
T: 020 7446 6888



stantec.com\uk

(c) Crown copyright, All rights reserved. 2025. License number AC0000808122



Royal Elm Park

Client: RFC PropCo Ltd

Site Location

Scale: 1:10000@A4
 CampbellReith OS Copyright: © Crown copyright. All rights reserved. Licence number AC0000812907
 Contains Ordnance Survey data © Crown copyright and database right 2025.
 Job Number: 14096
 Drawn by - Checked by: RLF - NA
 Drg No - Status/Revision: 14096-CRH-XX-XX-FG-G-7021 - P1
 File location: N:\14000 - 14249\14096 L - Royal Elm Park\Project_Workspaces\Phase 5 - Block 6 FRA (pdf in Outputs)
 Date (Revision History): 13/10/2025 (P1, First Issue, 13/10/25, RLF)

© Campbell Reith Hill LLP 2025

CampbellReith
 consulting engineers

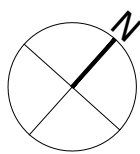
LONDON 020 7340 1700 ■ MANCHESTER 0161 819 3060
 BRISTOL 0117 916 1066 □ BIRMINGHAM 01675 467 484
www.campbellreith.com



CampbellReith
consulting engineers

Appendix 2

Proposed Layout



FOUDRY BROOK

PUBLIC RIGHT OF WAY

+ 37.480

+ 37.560

+ 43.580

+ 43.460

Existing grassland to banks, re-seeded with species rich EM4 meadow where necessary

1m minimum width upstand between carriageway and vehicle restraint barrier

1.5m high balustrade height retaining wall / vehicle restraint construction subject to site investigation and detailed design

1m minimum width upstand between carriageway and vehicle restraint barrier

1.5m high balustrade height retaining wall / vehicle restraint construction subject to site investigation and detailed design

Trees to be removed as per previous planning consent.

LEGEND

- Site Boundary
- Proposed Spot Levels and Slopes
- Existing Tree Canopy to be Removed as per Arboriculturalist recommendations
- Existing Tree Canopy to be Retained & Managed as per Arboriculturalist recommendations

Soft Materials

- Proposed Structural Planting, Refer to Tree and Shrub Schedule for details
- Structural Shrub Mix Planting, Refer to planting schedule for details
- Native Woodland Tree Mix and Understorey, Refer to planting schedule for details
- Rain Garden Mix, Refer to planting schedule for details
- Herbaceous Frontage Mix, Refer to planting schedule for details
- Courtyard Amenity Mix, Refer to planting schedule for details
- Managed Amenity Lawn and Desire Paths
- Wild Park Herbaceous Mix, Refer to planting schedule for details
- Wildflower Meadow for Clay Soils, Refer to planting schedule for details
- Wet Meadow Seed Mix, Refer to planting schedule for details
- Sensory Play Mix A&B, Refer to planting schedule for details
- Proposed Evergreen Hedge 1.2m High; Ligustrum ovalifolium
- Climbing Plant System, Refer to planting schedule for details

Hard Materials

- Self Binding Gravel; 14mm Golden Amber Footpath Gravel
- Permeable Paving to Road: Permeable Block Paving; natural colour
- Permeable Paving to Pavements: Permeable Block Paving; bracken colour
- Permeable Paving to Car Parking Spaces with contrasting delineating block: Permeable Block Paving; silver colour
- Dutch natural stone or concrete block paving; platinum and steel mix laid in herringbone pattern; laid atop pedestal system in courtyard podium
- Large Porcelain or Concrete Slab Paving; oat colour; laid atop pedestal system
- Textured concrete slabs; buff colour; laid atop pedestal system in courtyard podium
- Gravel Margin to buildings; 20mm Buff Flint Gravel
- Natural Stone or Concrete Setts; oat colour; laid atop pedestal system in courtyard podium
- Bespoke Natural Stone or Textured Concrete Plank paving; offset planks to be used as stepping features interspersed with flowering meadow
- P10a - Bonded Rubber Play Mulch; beige/light buff colour
- P10b - Bark Chippings Play Surface
- Bespoke Class 4 treated marine grade timber structures as play/rest stop elements as drawn
- Hazard Warning Tactile; Standard Natural colour; 400x400x50mm
- Natural Stone or concrete step units with contrasting nosing; 150mm height; buff or silver-grey colour
- Architectural Block Steps; 8-10mm mortared natural tone blocks laid on end as soldier course with single block stretcher course to beginning of each step; top and bottom step as brown tone block to provide contrast
- Stainless Steel Handrail to stairs

Furniture

- Iroko Timber Slat Bench; 1800mm(L), 450mm(h); black plate end supports with full width backrest and 2 armrests; surface mounted to podium courtyard & root-fixed within gardens
- Iroko Timber Slat Bench; 1800mm(L), 450mm(h); black plate end supports; surface mounted to podium courtyard & root-fixed within gardens
- Timber Seating Block ; 450mm high with black supports; free-standing
- Iroko Timber picnic bench; 1800mm length; free-standing
- Stainless Steel Litter Bin; surface-mounted
- Stainless Steel Drop Bollard; 900mm high; root fixed
- Cycle Stand; polyamide black finish; root-fixed
- Rock Boulders; Large, Medium and Small Features: circa 2500x2000x1000mm through to 600x600x400mm diameter; Boulders curated to be naturally free from acute and protruding irregularities and with a River Rock Mulch surround; 100-150mm Cobbles and Pebbles
- Clattering Bridge trim-trail play feature; natural aesthetic hardwood
- Log Climbing feature; natural aesthetic hardwood
- Stepping stump trim trail features; varying in diameter from 150-300mm; natural aesthetic hardwood
- Spinning disc play feature; natural aesthetic hardwood
- Slitted balance beam trim trail feature; natural aesthetic hardwood
- Swinging steps trim trail feature; rope handrails; natural aesthetic hardwood

Chess Board comprised of Textured concrete slabs; 400x400x50mm; mix of natural and charcoal colours with large polyurethane or bespoke painted hard-wood chess pieces

Potential Location for Public Art Piece

Bespoke Tensile Fabric Shade secured at 3 points with Stainless steel rolled masts; silver-grey colour

Fences and Edges

- Townhouse Boundary; 600mm height brick dwarf wall to match or suit architectural proposals with deep louvered black powder-coated steel railing atop at 500mm
- PPC Steel Raised Metal Herbaceous Planter Edge; circa 660mm height; olive colour to match architectural features
- PPC Steel Raised Metal Tree Planter Edge; circa 1100mm height; olive colour to match architectural features
- PPC Steel Flush Paving Edge; 100-150mm
- Flush Treated Timber Edging
- Single leaf lockable access gate to individual townhouses
- Wide single leaf self-closing secure key access gate to courtyard and associated vertical bar railing; black colour

The scaling of this drawing cannot be assured

Revision	Date	Drn	Ckd
P04 Response to comments	22.10.25	CY	NT
P05 Incorporated Pre-app Comments	30.10.25	CY	NT
P06 Updated to latest arch layout	04.11.25	CY	NT
P07 Final Plan Coordination	04.11.25	CY	NT

NOTES:

- Drawings are issued for Planning only.
- Drawings should be read in conjunction with other consultants information and cross referenced.
- For full details on planting information and planting schedules please refer to dwg RG-LD-101
- Should plants species and size not be available as specified an equal substitute will be agreed with the LPA.
- For ecological enhancement elements please refer to ecologist's information (Plan 4083/EEP).
- For the lighting design please refer to lighting specialist's drawings (7039-CB-XX-ZZ-DR-E-63001).
- Retaining wall has been shown indicatively and its design and extent is subject to detailed design at construction stage following further site investigation.
- Proposed levels should be considered in conjunction with architect's and drainage consultant's information.
- Area to the east as per the approved detailed consent (RBC Ref. 160199)

RESERVED MATTERS

Project
Royal Elm Park
Block 6
Drawing Title
Overall Landscape
General Arrangement (GA)
Date
05.09.25
Scale
1:200 @A1
1:400 @A3
Project No
333101170
Drawing No
RG-LD-100
Drawn by
CY
Check by
NT
Revision
P07



Stantec UK Limited
3rd Floor Arthur Stanley House
40-50 Tottenham Street
London
W1T 5RN
T: 020 7446 6888



stantec.com/uk



CampbellReith
consulting engineers

Appendix 3

Arup Drainage Strategy
Masterplan (extracts)

Barton Willmore
Royal Elm Park
Drainage Design Report

240524-ARP-XX-XX-DR-CD-001

Issue 1 | 11 January 2016

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 240524-00

Ove Arup & Partners Ltd
The Arup Campus
Blythe Gate
Blythe Valley Park
Solihull B90 8AE
United Kingdom
www.arup.com

ARUP

Contents

	Page
1 Introduction	1
2 Local Stakeholders and Operating Authorities	1
3 Data Sources	1
4 Existing Drainage Conditions	1
5 Surface Water Proposed Design	2
5.1 Surface Water Management	2
5.2 SuDS Selection	2
5.3 Design Principals & Assumptions	3
5.4 Catchment Areas	5
5.5 Greenfield Runoff	6
5.6 Attenuation Systems	8
5.7 Modelling Results	10
5.8 Design Details	10
5.9 Exceedance of Drainage	10
6 Foul Water Proposed Design	11
7 Utility Coordination	13
8 Operation and Maintenance Considerations	13
8.1 Settlement Strategies	13
8.2 Maintenance Strategies	14

Tables

Table 1 – Schedule of proposed catchments and areas
Table 2 - ICP SuDS Variables
Table 3 - Areas contributing to Foudry Brook Outfall
Table 4 - Areas contributing to drainage ditch on southern edge of site
Table 5 - Areas contributing to existing stadium surface water drainage outfall
Table 6 - Schedule of SuDS
Table 7 - Drainage Drawings
Table 8 - Phase 2 storage volumes and pumping rates
Table 9 - Drainage inspection and maintenance minimum requirements

Table 3 - Areas contributing to Foudry Brook Outfall

Controlled Catchments	Area (ha)	1 in 1 year Greenfield Runoff Rate (l/s)	1 in 100 year Greenfield Runoff Rate (l/s)	1 in 1 year Flow Rate (l/s)	1 in 100 + 30% CC year Flow Rate (l/s)
Multi-storey Car Park, Park 6	0.59	0.8	3.1	2.4	3.0
Block 7, Stadium Square 2	0.63	0.9	3.3	2.5	3.0
Convention Centre 5 & 8, Road 4	0.89	1.5	5.5	3.1	5.5
Convention Centre 3, 4, 6 & 7	0.74	1.0	3.9	3.0	3.0
Stadium Square 1, Convention Centre 1 & 2	1.14	1.6	6.0	4.6	5.0
Block 3 & 4, Park 1 - 5	1.38	1.9	7.2	4.5	5.0
Block 5	0.33	0.5	1.7	2.2	3.0
Block 6	0.33	0.5	1.7	2.4	3.0
Road 1 - 3	0.71	1.0	3.7	2.5	3.0
Road 5	0.23	0.3	1.2	2.8	3.0
Total	6.97	10	37.3	30	36.5

Table 4 - Areas contributing to drainage ditch on southern edge of site

Controlled Catchments	Area (ha)	1 in 1 year Greenfield Runoff Rate (l/s)	1 in 100 year Greenfield Runoff Rate (l/s)	1 in 1 year Flow Rate (l/s)	1 in 100 + 30% CC year Flow Rate (l/s)
Block 1	0.22	0.3	1.2	2.5	3.0
Block 2	0.24	0.3	1.3	1.4	3.0
Total	0.46	0.6	2.5	3.9	6.0

Table 5 - Areas contributing to existing stadium surface water drainage outfall

Controlled Catchments	Area (ha)	1 in 1 year Greenfield Runoff Rate (l/s)	1 in 100 year Greenfield Runoff Rate (l/s)	1 in 1 year Flow Rate (l/s)	1 in 100 + 30% CC year Flow Rate (l/s)
Hotel	0.20	0.3	1.2	2.9	3.0
MSCP Access	0.17	0.2	0.9	2.1	3.0
Total	0.37	0.5	2.1	5.0	6.0

5.6 Attenuation Systems

The predominant system of attenuation for this site is geocellular storage or high void aggregate pavement sub-base.

A summary of the proposed attenuation systems is provided in Table 6 - Schedule of SuDS. A detailed description of the attenuation systems for the detailed planning application can be found on the Surface Water Manhole Schedule Drawing CD-00102.

Table 6 - Schedule of SuDS

Name	Type	Catchment(s) Served	Flow Control & Design Rate	Storage Volume (m ³)
Block 1 Permeable Paving	Permeable Paving with SuDS Agg sub base	Block 1 car park	Hydrobrake 3 l/s	32
Block 1 Tank	Geocellular attenuation tank	Block 1 Building		95
Block 2 Permeable Paving	Permeable Paving with SuDS Agg sub base	Block 2 car park	Hydrobrake 3 l/s	45
Block 2 Tank	Geocellular attenuation tank	Block 2 Building		95
Block 5 Permeable Paving	Permeable Paving with SuDS Agg sub base	Block 5 car park	Hydrobrake 3 l/s	46
Block 5 Tank	Geocellular attenuation tank	Block 5 Building		180
Block 6 Permeable Paving	Permeable Paving with SuDS Agg sub base	Block 6 car park	Hydrobrake 3 l/s	50
Block 6 Tank	Geocellular attenuation tank	Block 6 Building		180
Basin 1	Detention Basin	Park 1	-	93
Basin 2	Geocellular attenuation tank + detention basin	Park 2, Block 3 & 4	Hydrobrake 35 l/s	434
Basin 3	Geocellular attenuation tank + detention basin	Park 3 + Tank 2	Hydrobrake 25 l/s	300
Basin 4	Geocellular attenuation tank + detention basin	Park 4 + Basin 3	Hydrobrake 10 l/s	606
Basin 5	Geocellular attenuation tank + detention basin	Park 5 + Basin 4	Hydrobrake 5 l/s	475
Car Park Tank	Geocellular attenuation tank	Multi-storey Car Park, Park 6	Hydrobrake 3 l/s	475
Block 7 Tank	Geocellular attenuation tank	Block 7, Stadium Square 2	Hydrobrake 3 l/s	445

Stadium Square Storage 1	Permeable Paving with SuDS Agg sub base	Stadium Square 1	Hydrobrake 5 l/s	45
Stadium Square Storage 2	Permeable Paving with SuDS Agg sub base	Stadium Square 1		250
Convention Centre Storage 1	Permeable Paving with geocellular sub base	Convention Centre 1 & Stadium Square 1		305
Convention Centre Storage 3	Permeable Paving with geocellular attenuation tank + SuDS Agg Sub base	Convention Centre 3, 4, 6 & 7	Hydrobrake 3 l/s	565
Convention Centre Storage 2	Geocellular attenuation tank	Convention Centre 2 & Stadium Square 1	Hydrobrake 5 l/s	190
Convention Centre Storage 4	Geocellular attenuation tank	Convention Centre 5 & 8, Road 4 (and controlled 3l/s flow from Convention Centre Storage 3)	Hydrobrake 8.5 l/s	520
Road Tank 1	Geocellular attenuation tank	Road 1, 2, 3	Hydrobrake 9 l/s	455
Road Tank 2	Geocellular attenuation tank	Road 5	Hydrobrake 3 l/s	91
Hotel Storage 1	Permeable Paving with SuDS Agg sub base	Hotel	Check dams and underdrains	145
Hotel Storage 2	Geocellular attenuation tank	MSCP Access	Hydrobrake 3 l/s	115