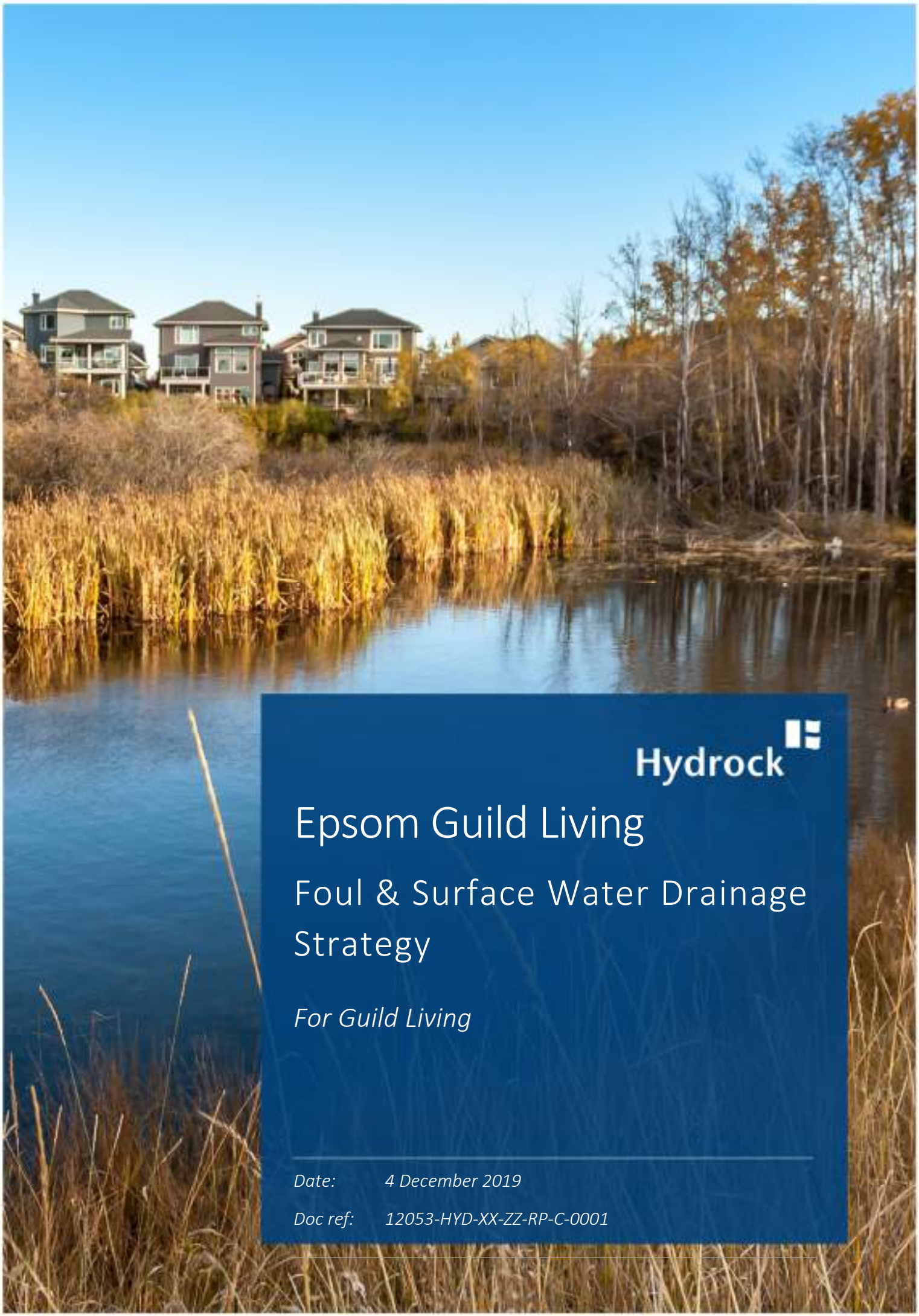


Hydrock

Epsom Guild Living

Foul & Surface Water Drainage Strategy

For Guild Living

Date: *4 December 2019*

Doc ref: *12053-HYD-XX-ZZ-RP-C-0001*

DOCUMENT CONTROL SHEET

Issued by	Hydrock Consultants Limited Merchants' House North Wapping Road Bristol BS1 4RW	Tel: +44(0)117 945 9225 www.hydrock.com
Client	Guild Living	
Project name	Epsom Guild Living	
Title	Foul & Surface Water Drainage Strategy	
Doc ref	12053-HYD-XX-ZZ-RP-C-0001	
Project no.	C-10409-C	
Status	S2 - For Information	
Date	04/12/2019	

Document Production Record		
Issue Number	P01	Name
Prepared by		Jason Magee
Checked by		Mike Griffin
Approved by		Mike Griffin

Document Revision Record			
Issue Number	Status	Date	Revision Details
P01	S2	NYI	Issued for Planning

Hydrock Consultants Limited has prepared this report in accordance with the instructions of the above-named client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

CONTENTS

Introduction

Hydrock Consultants have been appointed by Guild Living to carry out a drainage strategy report for the approval of Surrey County Council Lead Local Authority.

The proposed drainage strategy will be in accordance with both national guidelines and will incorporate a 'best practise' approach in reducing the impact of the flooding caused by the new development.

The report is based upon sewer asset information provided by the sewerage undertakers Thames Water in relation to assets within the vicinity of the development site.

The report highlights the key stakeholders in terms of ownership and maintenance to ensure the drainage system is kept well maintained and reduce the risk of failure. Should the network fail at any point, clearly defined ownership liabilities will ensure that problems can quickly be rectified thereby reducing the impact of potential damaged caused by flooding.

The information received is summarised within this report. In the event that the information is relied upon and is subsequently found to be incorrect, Hydrock Consultants Ltd accepts no responsibility for any direct and/or consequential loss that may occur as a result.

0.1 References

Appendix A - Topographical Survey - **3 Sixty - 18385-04.**

Appendix B - Architects Layouts - **18120 - Epsom - CD Option 1 - Preliminary Drawings**.

Appendix C - Sewer Asset Map - **Commercial Drainage Water Search - 2018_3808735.**

Appendix D - Existing Drainage Layout - **###-HYD-00-ZZ-SK-7701**

Appendix E - Existing / Proposed Catchment Areas **- ###-HYD-00-ZZ-SK-7702 / 7703.**

Appendix F - Calculations.

Appendix G - Overland Flow Routes - **###-HYD-00-ZZ-SK-C-7702.**

Appendix H - Drainage Strategy - **###-HYD-00-ZZ-DR-7000**.

Appendix J - Correspondence - **Thames Water Planning Liaison & Surrey Drainage and Flooding Team**.

0.2 References / Design Codes

- BS EN 752 - Drain and Sewer Systems Outside Buildings.
- Building Regulations Approved Document Part H - Drainage and waste disposals.
- Sewers for Adoption (where applicable).
- Local Water Authority requirements.
- CIRIA C753 - SuDS Manual.
- National Planning Policy Framework (NPPF).
- DEFRA Non-Statutory Technical Standards for Sustainable Drainage.

1. SITE INFORMATION

1.1 Site Referencing Information

Site Address	Epsom & St Heller University Hospital
	Woodcote Green Road
	KT18 7EG
	National Grid Reference 520430, 159764

1.2 Existing Situation

The site is located approximately 1km south west of the town centre of Epsom, Surrey. The overall site comprises the majority of the central and northern part of the Epsom hospital site and is situated along Woodcote Green Road. The site comprises part of an operational hospital facility with associated buildings and infrastructure, including several working hospital wards, offices, portacabins, and associated infrastructure such as generators. The boundary is bordered to the east and south by the hospital, with residential development to the west.

1.3 Topography

A detailed topographical survey has been undertaken which shows the site is generally flat and is located at approximately 59.00m Above Ordnance Datum (AOD). The site slopes from the western boundary (approximately 62.70m AOD) towards the centre of the site (approximately 60.00m AOD). The eastern boundary ties into an existing road at a relativity flat level (approximately 59.20m AOD). The site ties into an existing road (Woodcote Green) and an existing access at approximately 60.20m AOD.

See **Appendix A** for topographical layout.

Epsom Guild Living - Aerial Photo (Google maps)

1.4 Development proposals

The site is to be developed for Operators Legal & General and Guild Living to create new C2 assisted living mixed-use development. The design will integrate public spaces to improve and enhance pedestrian permeability linking hospital facilities with wider green spaces. The site will provide adaptable spaces for community events and will have a provision for a range of 1, 2 and 3 bedrooms accessible, assisted living apartments for sale. Provisions are made for transitional care suites for hospital use and Guild Living operated wellness facilities to provide residential care will be available also available for hospital use. Provision for key-worker units for hospital use are also allowed for.

See **Appendix B** for architect's layout.

1.5 Ground Conditions

See below extract from Arcadis Geotechnical assessment:

According to the British Geological Survey Geoindex and the Envirocheck Geology Datasheet obtained for the Phase 1 Desk Study the north western side of the site is underlain by the London Clay Formation, comprising Clay and Silt. The eastern part of the site is underlain by the Lambeth Group formerly known as the Reading Beds, comprising clay, silt and sand. According to the geological cross section lines provided on the published BGS Map sheet of Reigate, the bedrock (London Clay and Lambeth Group) appears to be dipping gently towards the north west. These strata (London Clay and Lambeth Group) that outcrop on the site are in turn underlain by Thanet Sands and then Chalk, at greater depth.

Superficial deposits directly underlie the majority of the site and cut across the solid geology. These are River Terrace Deposits, comprising sand and gravel which extend northwards from the site. In the north western corner of the site no superficial deposits are indicated to be present.

Refer to **20180924_Epsom Hospital_Phase 2 Geo-Environmental and Geotechnical Assessment** for further information.

1.6 Hydrology, Hydrogeology & Flood Risk

See below extract from Arcadis Geotechnical assessment:

The Envirocheck Report indicates that the bedrock is a Secondary A aquifer. The River Terrace Deposits are defined as having permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. *The site is not located within a groundwater Source Protection Zone (SPZ). There are no recorded groundwater abstraction licences within 1km of the site.*

Based on the topography and the published geological maps, the direction of groundwater flow within the River Terrace Deposits is expected to be towards the north. Groundwater flow within the Lambeth Group is conceived to be more likely to be towards the north west, based on the inferred dip direction of the bedrock.

Refer to **20180924_Epsom Hospital_Phase 2 Geo-Environmental and Geotechnical Assessment** for further information.

2. SURFACE WATER MANAGEMENT STRATEGY

2.1 Pre-Development Surface Water Drainage

Public sewer records have been obtained from Thames Water which show that there are no public sewers within the site boundary. The nearest public surface water sewer (675mm diameter) is located to the south of the site in Woodcote Green Road. The sewer flows in an easterly direction and is assumed to continue following the road to the junction 300m away from the site.

See **Appendix C** for sewer asset map.

Existing private surface water sewers within the site collects run-off from existing roofs / paved areas which conveys flows through the site via a combined system which discharges at five locations around the site (one to the north and four to the south). All existing private drainage within the boundary will be made redundant during the works, with only four of the five existing connection points to remain live.

See **Appendix D** for existing drainage layout.

2.2 Post-Development Surface Water Drainage

Surface water run-off from the new development will be collected by way of rainwater pipes, gullies and drainage channels into a dedicated below ground surface water drainage system which will discharge to an existing connection point south of the site **(Location E)**. Flows will be controlled at a restricted rate via a Hydro-Brake and be attenuated in the form of a detention basin and permeable paving storage sub-base.

Where applicable, the surface water management strategy has incorporated the recommendations of the 'Non-Technical Standards for Sustainable Drainage' and general 'good practice' in terms of providing a Sustainable Drainage System (SuDS) which does not adversely impact on flood risk either within the site of beyond the development boundary.

2.3 Run-off Destinations

The discharge of surface water run-off has been considered in accordance with the hierarchical approach:

2.3.1 Interception

Proposals will incorporate filter strips and permeable paving, which are expected to provide some interception of surface water run-off either by evaporation or evapotranspiration.

2.3.2 Infiltration

The ground conditions, are deemed unsuitable for infiltrating to ground and therefore infiltration has not been considered as the primary means for surface water disposal for the new development. See section 1.5 for further details.

2.3.3 Surface water body

The only surface water body within the vicinity is an existing pond across the other side of Woodcote Green Road which is assumed to be sized sufficiently for adjacent developments. Additionally, if storage was available, any works across Woodcote Green Road it is anticipated to cause major disruption. Therefore, considering both points, this approach has not been considered.

2.3.4 To dedicated surface water sewer (public, highways or otherwise)

There is no surface water sewer within 400m+ of the site therefore this approach has not been considered.

2.3.5 To a combined sewer

Surface water from the site will follow the current situation of the site and discharge to the existing combined 675mm dia sewer network situated in Woodcote Green Road.

2.4 Brownfield Discharge Rates

Extract from Surrey - Sustainable Drainage Systems SuDS Planning Advice:

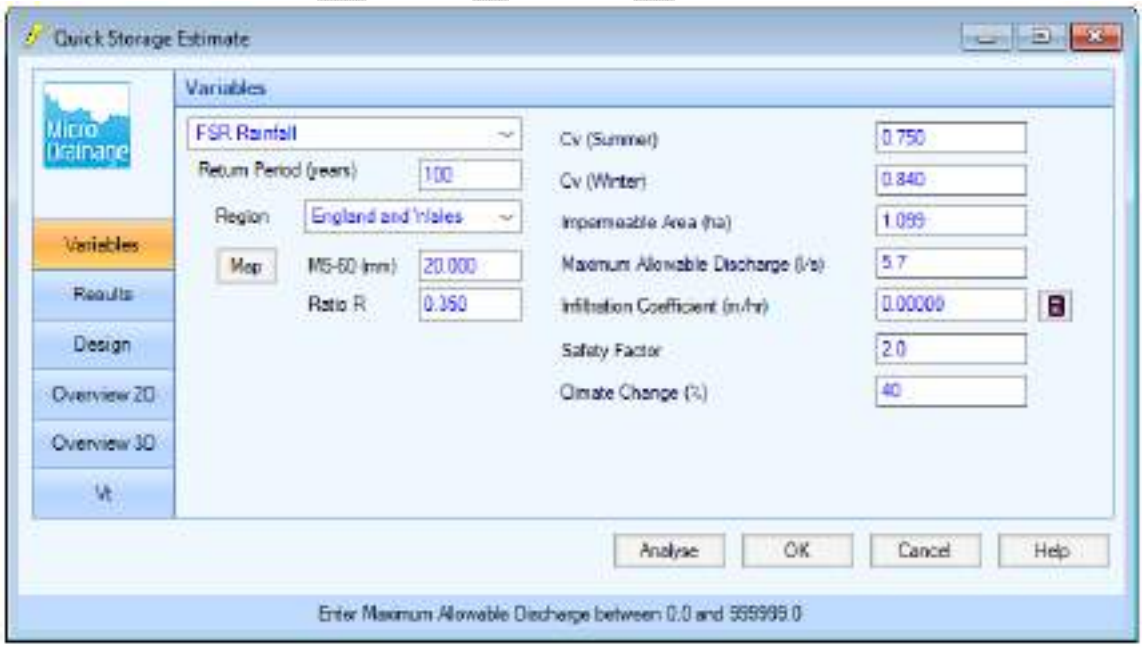
"Brownfield sites should be limited as close to greenfield rates as is reasonably practicable. If greenfield rates cannot be achieved, clear written evidence must be submitted as to why a lower rate cannot be achieved. Information will be considered on a site by site basis. For brownfield sites robust justification could include; analysis of storage requirements required to achieve greenfield runoff rates in comparison to a site area, a cost analysis, spatial or level constraints."

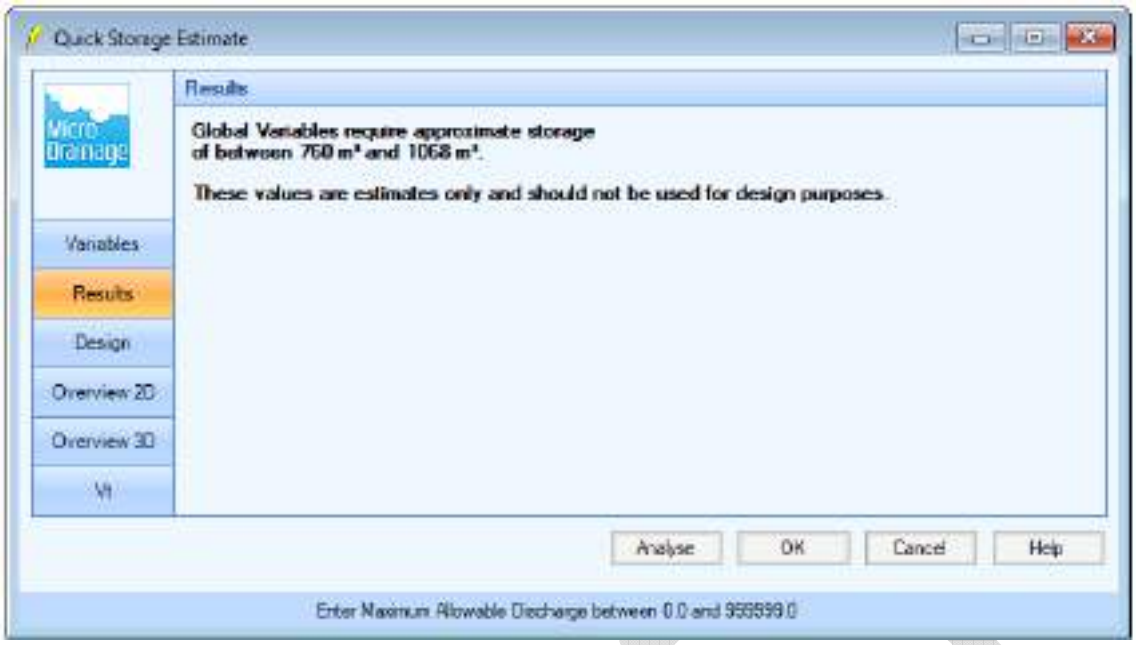
Due to the nature of the existing development and its current arrangement, the peak run-off for this site cannot be designed as close as reasonably practicable to the greenfield runoff rates. These points are outlined below:

2.4.1 Storage requirements to achieve Greenfield

A quick storage estimate was undertaken to gain an understanding of the approximate volume required for the site if the rate was set at QBar (outlined further in section 2.7.4).

Output shows that between **760m³** and **1068m³** of storage will be required for the site.





Assuming the site requires **1068m³**, further calculations for the storage components are as follows:

Stone sub-base system (30% voids): **1815m³**

Assuming a depth of 500mm the sub-base required will need to cover **3630m²** of surface area.

Crated system (95% voids): **1121m³**

Assuming a depth of 1000mm the tank required will need to cover **1121m²** of surface area.

2.4.2 Levels constraints

Surface water connection point of 57.710 to the current FFL 59.300 gives **1.59m** of depth available for the whole site. Accounting for minimum depth requirements in vehicle areas and minimum depth of cover to tanks required, conveying flows 200m from the north of the site will be unobtainable due to gradients required for falls. High level storage will need to be considered; however, depths of these storage components will still need to be reviewed.

2.4.3 Spatial constraints

The majority of the green areas within the site are unable to accommodate above ground SuDS as the site is constrained due to levels, green areas around the perimeter need to bank down to be able to tie-in to the adjacent sites.

A spatial constraint drawing has been produced to show the size of the tank in relation to the Q1 and Greenfield run-off rate storage requirements.

See **Appendix K** for constraints plan / calculations.

Subsequent to the points above, it is considered unfeasible for this site to reduce to the Greenfield run-off rates (QBar), therefore further analysis will need to be outlined to confirm what rate is considered close as reasonably practical to the current constraints.

See section 2.7.4 for continued proposals on proposed rates.

2.5 Selecting SuDS Techniques

All opportunities to implement green/traditional SuDS, have been considered as far as reasonably practicable.

Hierarchy	Description	Setting	Required area	Implemented
Green roofs	A planted soil layer is constructed on the roof of a building to create a living surface. Water is stored in the soil layer and absorbed by vegetation.	Building	Building integrated.	No. Have been considered however are not in keeping with the architects' requirements for the building.
Rainwater harvesting	Rainwater is collected from the roof of a building or from other paved surfaces and stored in an over ground or underground tank for treatment and reuse locally. Water could be used for toilet flushing and irrigation.	Building	Water storage (underground or above ground).	No. Have been considered however are not in keeping with the architects' requirements.
Soakaway	A soakaway is designed to allow water to quickly soak into permeable layers of soil. Constructed like a dry well, an underground pit is dug filled with gravel or rubble. Water can be piped to a soakaway where it will be stored and allowed to gradually seep into the ground.	Open space	Dependent on runoff volumes, water table and soils.	No. Site deemed unsuitable for infiltrating to ground.
Filter strip	Filter strips are grassed or planted areas that runoff is allowed to run across to promote infiltration and cleansing.	Open space	Minimum length 5m.	Yes. Considered and are implemented at the edge of footpaths where suitable
Permeable paving	Paving which allows water to soak through. Can be in the form of paving blocks with gaps between solid blocks or porous paving where water filters through the block itself. Water can be stored in the sub-base beneath or allowed to infiltrate into ground below.	Street / open space	Can typically drain double its area.	Yes. Considered and will be used as the primary method of surface water attenuation.
Bioretention area	A vegetated area with gravel and sand layers below designated to channel, filter and cleanse water vertically. Water can infiltrate into the ground below or drain to a perforated pipe and be conveyed elsewhere. Bioretention systems can be integrated with tree-pits or gardens.	Street / open space	Typically, surface area is 5-10% of drained area with storage below.	No. Have been considered however are not in keeping with the architects' requirements.

Swale	Swales are shallow depressions designed to convoy and filter water. These can be 'wet' where water gathers above the surface, or 'dry' where water gathers in a gravel layer beneath. Can be lined or unlined to allow infiltration.	Street / open space	Account for width to allow safe maintenance typically 2–3 metres wide.	No. As pond / basins will be implemented this approached has not been considered.
Hardscape storage	Hardscape water features can be used to store run-off above ground within a constructed container. Storage features can be integrated into public realm areas with a more urban character.	Street / open space	Could be above or below ground and sized to storage need.	No. As pond / basins will be implemented this approached has not been considered.
Pond / Basin	**Ponds can be used to store and treat water. 'Wet' ponds have a constant body of water and run-off is additional, while 'dry' ponds are empty during periods without rainfall. Ponds can be designed to allow infiltration into the ground or to store water for a period of time before discharge.**	**Open space**	**Dependent on runoff volumes and soils.**	**Yes.** **Considered and will be used as the primary method of surface water attenuation.**
Wetland	Wetlands are shallow vegetated water bodies with a varying water level. Specially selected plant species are used to filter water. Water flows horizontally and is gradually treated before being discharged. Wetlands can be integrated with a natural or hardscape environment.	Open space	Typically, 5–15% drainage area to provide good treatment.	No. There is minimal green space available to incorporate wetlands.
Underground storage	Water can be stored in tanks, gravel or plastic crates beneath the ground to provide attenuation.	Open space	Dependent on runoff volumes and soils.	No. As pond / basins will be implemented this approached has not been considered.

2.6 Point of Connection / Discharge Location

The development is collected around the site by an existing network, which ultimately connects to five points **(Locations A to E).** One connection point **(Location A)** discharges north of the site which is assumed to connect into the main offsite hospital network. The other four remaining points **(Location B to E)** discharge south of the site into the existing 675mm dia combined sewer running along Wootcote Green Road.

Further CCTV drainage investigation will confirm the exact connectivity and point of discharge of all the existing drainage connection points discharging from the site.

The new development will utilise four of the five existing connection points.

(Locations E) will be used as the surface water discharge point.

See **Appendix D** for existing drainage layout.

2.7 Flow Rate Run-off Control

An assessment has been made of the pre-development surface water flows and volumes based on the following rainfall and site characteristics for the site.

Site Characteristics	
SAAR (mm)	820
Soil	0.150
Region	8

Rainfall Characteristics	
M5-60	21.000
Ratio R	0.350
CV (Summer)	0.750
CV (Winter)	0.840

2.7.1 Pre-Development surface water run-off catchments

Discharge to existing offsite networks are anticipated to come from the following run-off catchments:

Pre-Development Drainage Catchments		
Catchment	Discharge Location	Catchment Area (m2)
1	Location A	6400
2	Location B	562
3	Location C	173
4	Location D	3474
5	Location E	1720
6	Offsite	2369
Total		14,698m²

2.7.2 Post-Development surface water run-off catchments

Discharge to proposed discharge points are to come from the following run-off catchments:

Post-Development Drainage Catchments		
Catchment	Discharge Location	Catchment Area (m2)
1	Location A	Zero (to become foul only)
2	Location B	Zero (to become foul only)
3	Location C	Zero (to become redundant)
4	Location D	Zero (to become redundant)
5	Location E	10,998
Total		10,998m²

The post development catchment areas offer a reduction due to increased landscaped areas.

See **Appendix E** for catchment layouts.

2.7.3 Pre-development run-off rates

Discharge to existing offsite networks are anticipated to come from the following run-off catchments:

Pre-Development Drainage Capacity Check							
Catchment	Discharge Location	Catchment Area (m2)	Existing Pipe Size	Pre-Development Storm (Pipe Cap)	Pre-Development Storm (MRM)		
					1yr	30yr	100yr
1	Location A	6400	150mm@1:100	14 l/s	54	133	171
2	Location B	562	TBC@1:15	45 l/s	4.7	11.7	15
3	Location C	173	TBC@1:7	55 l/s	1.5	3.6	4.6
4	Location D	3474	150mm@1:55	23 l/s	29.3	72.4	93
5	**Location E**	**1720**	**225mm@1:30**	**92 l/s**	**14.5**	**35.8**	**46**
Total				229 l/s	**104**	**256**	**329**

Calculating the system using the modified rational method and highlighting the existing pipe capacity the table currently shows the networks cannot accommodate any storm in excess of the 30yr return period. It is assumed that any additional storms will exceed the network and flood on site and surrounding area. It is anticipated run off will find its way to the main networks via off site gullies and channels, therefore increasing capacity to other offsite systems.

2.7.4 Post-development run-off rates

Due to the constraints outlined in section 2.5 it is considered unfeasible to restrict to the Greenfield run-off rates. Reviewing the current options, it is felt that matching the existing Brownfield Q1 with 50% betterment would be a practical rate to work with given both the spatial and level constraints presented on the site. The table below shows the Greenfield rates, current brownfield rates, the new proposed rate of **52 l/s** and the difference in flow reduction between existing rates and the proposed:

Peak Discharge Rates				
	Greenfield (l/s)	Brownfield (l/s) (MRM)	Proposed Rates (l/s)	Difference (Prop - Exist)
QBar	5.7			
1 in 1	4.8	104	**52**	52
1 in 30	12.9	256	**52**	206
1 in 100	18.1	329	**52**	277
1 in 100 plus 40%	N/A	N/A	**52**	N/A

The site will therefore offer a betterment of **52 l/s** in the Q1 and **277 l/s** in the Q100.

The peak discharge table shows that the proposed rate is a substantial betterment on the current existing rates (min 50% betterment), therefore it is considered **52 l/s** is the rate which can be as close as reasonably practicable to the greenfield runoff rate from this development. It is also confirmed that the figure does not exceed the rate of discharge from the development prior to redevelopment for that event.

Further to above, as the proposal is to discharge to the combined system and not discharge to a watercourse / to ground, it can be confirmed the site will not adversely affect flood risk with the rates proposed.

2.8 Volumetric run-off control

In accordance with current guidance where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in100 year, 6-hour rainfall event should never exceed the greenfield runoff volume for the same event.

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

The development site is currently brownfield covering 14.69ha with approximately 14.6ha of impermeable surfacing. Under the current development proposals, the impermeable area of the site will be reduced to approximately 10.99ha and, therefore, the overall rate and volume of surface water runoff from the site during a 1 in 100-year storm event will be reduced.

2.9 Flood Storage Attenuation

It is anticipated that in order to match the existing pipe capacity (plus 50% betterment) rates for the new development flows will need to be restricted with sustainable attenuation methods to gain a balance, before the water is released into the site wide system at a controlled rate.

Source control has been carried out using MicroDrainage based on the following parameters:

1. Attenuate volume from the agreed flow rate at existing (Location E) plus betterment of 52 l/s.

2. Provide attenuation storage for the 100-year rainfall event plus 40% climate change.

Volume = 345m³ required.

3. Restricted flow by a Hydro-Brake or similar to assist in minimising upstream storage.

See Appendix F for source control calculations.

The drainage system will be designed so that flooding does not occur during the 1 in 100-year rainfall event in any part of the building, or in any utility plant susceptible to water.

An allowance for 40% climate change is to be incorporated into the surface water drainage design.

2.10 Exceedance flow management

In the event that flows from rainfall exceed the 1 in 100-year rainfall event, surface water run-off will be directed via exceedance routes away from the buildings to localised areas e.g. car park, thereby not increasing flood risk to critical infrastructure.

See Appendix G for flood exceedance routes.

2.11 Water quality treatment

The development is considered to be 'low risk' for surface water pollution.

It is anticipated that the during construction adequate provisions will be put in place to ensure that any construction silts, spillages will be prevented from the entering the downstream ditch network.

In accordance with Environment Agency Document PPG3 an oil interceptor will be implemented to car park and road areas.

Gully's and drainage channels will be specified with silt traps and catch pits will be incorporated in the drainage system to reduce the risk of silts / salts getting into the surface water network.

Consideration will be given to both during construction and post-development water quality treatment to ensure that water quality is not impacted during the construction works:

2.11.1 Quality of Surface Water Run-off: Post-Development

In accordance with Environment Agency Document PPG3 the proposed as the car park is less than 50 spaces or 800m2 it is considered to be 'low risk' in terms of pollution to the surface water network and as such an oil interceptor is deemed to be required.

Gully's and drainage channels will be specified with silt traps and catch pits will be incorporated in the drainage system to reduce the risk of silts / salts getting into the surface water network.

2.11.2 Quality of Surface Water Run-off: During Construction

It is anticipated that the during construction adequate provisions will be put in place to ensure the existing drainage is protected to prevent material which could have a negative impact on water quality entering the system.

2.12 Design Standards

All materials and products relating to the below ground drainage system shall be specified in accordance with their intended use and meet all relevant British Standards and BBA accreditations.

In accordance with best practice storm drainage will be designed to the following performance criteria:

Pipes running under full conditions with no surcharge	-	1 in 2-year storm return period
No flooding	-	1 in 30-year storm return period
Extreme flooding to be retained on site	-	1 in 100-year storm return period

2.13 Summary

It is considered that the drainage strategy report has demonstrated compliance with both the recommendations for the 'Non-Technical Standards for Sustainable Drainage' and current national standards by using attenuation as the primary method of surface water disposal.

See Appendix H for drainage strategy.

3. FOUL WATER MANAGEMENT STRATEGY

3.1 Pre-Development Foul Water Drainage

See Section 2.1 for public sewer information.

Existing private foul water sewers within the site collects flows from existing stack points / gully's and conveys through the site via a combined system which discharges at five locations around the site (one to the north and four to the south). All existing private drainage will be made redundant during the works with only four existing connection points to remain.

See **Appendix C** for sewer asset map.

See **Appendix D** for existing drainage layout.

3.2 Post-Development Foul Water Drainage

Foul drainage for the new development will be via conventional gravity pipe system which connects into the existing off-site public network. The site will be spilt into north and south foul catchments, with the northern development connecting at the northwest boundary into the existing 150mm foul sewer **(Location A),** and the southern development connecting into the existing 150mm diameter foul sewer in Woodcote Green Road **(Location B).**

The foul drainage system will be designed in accordance with Building Regulations Approved Document H and the relevant British Standards.

The foul drainage within the development boundary serves only the development and will be maintained by the owner / management company. A schedule of maintenance activities which ensure the drainage is kept in good working order will be produced and submitted as part of the 'Health & Safety' documentation.

In the absence of detailed number of discharged units and appliances, calculation have been derived from SFA 7th Edition.

Residential units = 669 units.

Using Flows and Loads 4 Code of Practise, the flows calculate as:

- 669 x 350 = 234,150
- 94,850 x 6 DWF = 1,404,900
- 569,100 / 24 = 58,537
- 23,712 / 3600 = **16.5l/s**
- 16.5 / 2 = **8.25 l/s**

Location A = 8.25 l/s

Location B = 8.25 l/s

Thames have advised that the flow of 16.5 l/s can be used for the site.

See **Appendix J** for correspondence with Thames Water.

4. MAINTENANCE & OWNERSHIP

The key elements of the foul and surface water drainage system will require periodic maintenance to prevent failure of the system and/or a reduction in capacity of the networks as a whole and the following matrix therefore sets out the various drainage items to be maintained, identifies who is responsible and the frequency of maintenance.

It is anticipated that the drainage within the development will be maintained privately by a management company appointed by the owner / occupier.

4.1 Responsibility Matrix

Ownership & Maintenance Responsibility Matrix			
Responsibility	Feature	Maintenance	Frequency
Owner / Occupier Appointed Management Company	Private Drains	Inspection	CCTV survey every 5-10 years.
		Regular Maintenance	Jet clean system fully every 5-10 years. (Recommend prior to CCTV drainage survey is)
		Remedial / Occasional Maintenance	Carry out remedial works as identified in CCTV survey.
	Discharge orifice manholes/flow control devices	Inspection	Quarterly
		Regular Maintenance	Remove silt and debris as necessary to prevent build up.
	Gullys / Drainage Channels	Inspection	Quarterly
		Regular Maintenance	Remove silt and debris as necessary to prevent build up.
	Permeable Paving (Refer to specialist)	Inspection	Within 3 months of installation then annually
		Regular Maintenance	Sweep surface to remove debris and contamination 1-2 times a year, typically after leaf fall in autumn.
		Occasional Maintenance	Removal of weeds. As required.
		Remedial Measures	Remediate areas of rutting and depressions. As required. Replace broken / damaged blocks. As required. Rehabilitate surface with sweeping and reapplication of clean gritstone. As required.
	Tank / Interceptors	Inspection	Quarterly
		Regular Maintenance	Remove silt and debris as necessary to prevent build up.
		Remedial / Occasional Maintenance	Carry out remedial works as identified in CCTV survey.
	Reference should be made to the manufacturer recommendations where applicable		

The following information should be passed to the development operator to ensure that future maintenance is carried out in a safe and proper manner.

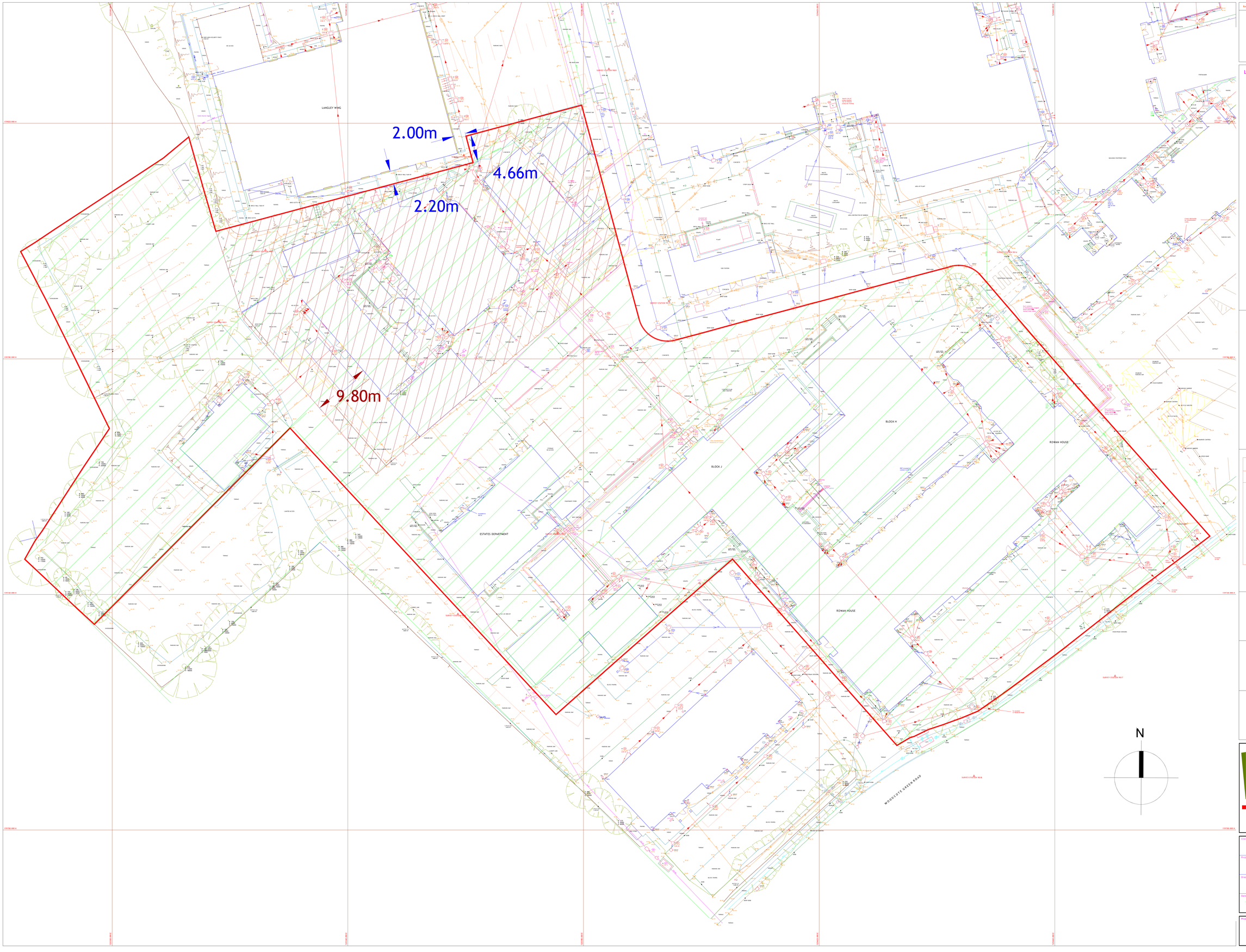
A formal review of the risks should be undertaken on an annual basis.

Operation	Risks	Mitigating Measures
Access to manholes for Inspection and Maintenance.	1. Confined spaces	1. Entry to confined space to be minimised and, where unavoidable, to be carried out by appropriately trained personnel
Removal of silt from outfall	1. Risk to members of the public 2. Open Water	1. Access to hazardous areas by members of the public to be prohibited. 2. To be carried out by appropriately trained personnel
Removal of silt from drainage channel	1. Risk to members of the public	1. Access to hazardous areas by members of the public to be prohibited

All inspection and maintenance works should take into consideration the implications of 'lone working'. An assessment should be carried out and the risks mitigated accordingly.

Appendix A

Topographical Survey



Rev	Date	By	Amendment

LEGEND

ABBREVIATIONS

B	BOLLARD	MH	MANHOLE
BOE	BRICK ON EDGE	O/H	OVER HEAD
BOX	BOXING	P	POST
BT	BRITISH TELECOM	P/L	PAVEMENT LIGHT
B/W	BRICK WALL	RAD	RADIATOR
CCTV	CLOSED CIRCUIT TELEVISION	RE	REFLECTIVE EYE
C/F	CEILING FALL	RS	ROOD SIGN
CL	COVER LEVEL	RSJ	ROLLED STEEL JOIST
CONC	CONCRETE FENCE	RSS	ROLLED STEEL STANCHION
COV	COVER ORIGIN UNKNOWN	RWP	RAIN WATER PIPE
CPD	CUPBOARD	SC	STOP COCK
DK	DROP KERB	SP	SIGN POST
DL	DRAIN LEVEL	SVP	SOIL VENT PIPE
ELEC	ELECTRICAL	T/L	TRAFFIC LIGHT
ER	EARTHING ROD	TN	TREE NUMBER
F/B	FLOWER BED	TP	TELEPHONE POLE
FAR	FLAT ASPHALT ROOF	UTL	UNABLE TO LIFT
G	GUILLY	VP	VENT PIPE
GV	GAS VALVE	VTF	VINYL TILED FLOOR
H/W	HOARDING WINDOW	WB	WATER BUTT
IC	INSPECTION COVER	WHB	WASH HAND BASIN
L/L	LOW LEVEL	WV	WATER VALVE
LP	LAMP POST	Ø	DIAMETER

OVERHEAD DETAIL

BARRIER OR FENCE

CHANGE IN SURFACE

GATE

SURVEY STATION

HEIGHTS

C	HEIGHT FROM FLOOR TO CILL
H	HEIGHT FROM CILL TO HEAD
SP	HEIGHT FROM FLOOR TO SPRING OF ARCH
AH	HEIGHT FROM FLOOR TO HEAD OF ARCH
(2850)	HEIGHT TO CEILING, BEAM OR DOOR
S/C	STRUCTURAL CEILING HEIGHT
F/C	FALSE CEILING HEIGHT
DL	DEDUCED LEVEL DERIVED FROM PLUS MEASUREMENTS

TREES

Ø DIAMETER(mm)
S SPREAD(mm) diameter
H HEIGHT(mm)
ALL TREE HEIGHTS SHOWN IN (mm)

SURVEY CONTROL STATION SCHEDULE

STN	EASTING	NORTHING	LEVEL
9001	520384.298	159829.239	59.261
9002	520359.689	159814.557	59.532
9003	520326.002	159798.495	60.760
9008	520355.279	159958.576	58.796
9009	520395.081	160031.058	56.637
9010	520442.051	159985.910	56.747
9011	520464.505	159899.378	58.591
9012	520495.357	159829.786	58.637
9013	520466.912	159807.117	58.622
9014	520452.229	159798.368	58.920
9015	520394.515	159789.829	59.254
9016	520496.447	159726.165	59.607
9018	520446.275	159709.181	60.016
9019	520375.611	159750.521	59.734
9020	520358.679	159736.682	59.787
9021	520318.075	159786.454	61.013
9022	520368.996	159890.862	59.177

SURVEY GRID IS RELATED TO ORDNANCE SURVEY NATIONAL GRID AND LEVEL DATUM BY GPS OBSERVATIONS

PLEASE NOTE
THIS DRAWING IS BASED UPON
DRAWING 18385-01 REV B
WHICH IS THE FULL SITE
TOPOGRAPHIC AND BURIED SERVICES SURVEY

LEVELS ARE RELATED TO ORDNANCE SURVEY BENCH MARK BY MEANS OF GPS OBSERVATIONS TO CONTROL STATIONS WHERE A MEAN VALUE HAS BEEN OBTAINED

3sixty measurement
LONDON
SOUTH BANK HOUSE, BLACK PRINCE ROAD
LONDON SE1 7SJ
Tel: 020 7637 2930
Fax: 020 7637 2931
E-mail: info@3sixtymeasurement.co.uk
Website:www.3sixtymeasurement.co.uk

Client	EPSOM & ST HELIER UNIVERSITY HOSPITAL NHS TRUST
Project	EPSOM GENERAL HOSPITAL DORKING ROAD, EPSOM KT18 7EG
Drawing	SITE PLAN - PLOT 2A
Date: SEPT 2018	Scale: A0@1:200
Drawn by: ACW	Checked by: GAJ
Project No: 18385	Drawing No: -04
Revision	