

Our Ref: NB/LMO/20007

Date: June 2020

PROPOSED DEVELOPMENT

DELLWOOD HOSPITAL

LEIBENROOD ROAD

READING

DRAINAGE STRATEGY

AND

FLOOD RISK ASSESSMENT

Client: - Montpelier Estates Limited
Middle Hedge Barn
Chilton Business Centre
Chilton
Aylesbury
HP18 9LS

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RECORD OF DISTRIBUTION

Distribution	No. of Copies	Revision	Date
Montpelier Estates Anna Ciesielska & Mick Gamble	1 – Email	Draft	12/06/2020

1.0 INTRODUCTION

This report has been prepared on the instruction of Montpelier Estates Ltd, Montpelier Estates Limited, Middle Hedge Barn, Chilton Business Centre, Chilton, Aylesbury, HP18 9LS in support of a planning application for the re-development of a parcel of land at Delllwood Hospital, Leibenrood Road, Reading RG30 2BG. The report considers the proposed method of discharge of both storm and foul water from the development. A flood risk assessment for the site is also considered.

2.0 THE SITE

2.1 Location

The site is located within a portion of Dellwood Hospital, Leibenrood Road, Reading, at national grid reference SU 69375 72720, as shown on the appended site location plan, Appendix A. The total site area is 0.25ha.

2.2 Existing Development

Currently, the site is occupied by a two-storey hospital building and a ground level car park with 31 car parking spaces. The site has two vehicle access points directly on Leibenrood Road on the Western boundary. The general level is approximately 59.20m AOD with a slight fall across the site of some 0.3m from North to South. The existing site topographic survey is included in Appendix A.

2.3 Ground Conditions

A site-specific ground investigation has not yet been carried out, but published data from nearby boreholes indicate the near surface ground conditions to be silty, sandy clay overlying stiff clays at shallow depth.

The superficial deposits and bedrock are designated as secondary (A) aquifers which are permeable layers capable of supporting water supplies at a local rather than strategic level.

2.4 Existing Drainage Infrastructure

A pre-planning enquiry has been made to Thames Water as to existing public foul and surface water sewers adjacent to the site. The enquiry document is included in Appendix B and it contains a copy of Thames Water record drawing.

There is a 225mm diameter foul water sewer in the footpath to Leibenrood Road, with an invert level of 56.25m AOD. In the footpath on the opposite side of Leibenrood Road there is a 225mm diameter storm water sewer at a depth of approximately 1.5m below existing ground level. The position of these public sewers are indicated on the site topographic survey drawing (Appendix A).

3.0 PROPOSED DRAINAGE STRATEGY

3.1 Proposed Layout

The proposed development layout is shown on drawing number 20007/DS/01, see Appendix C. The proposed care home is positioned in the centre of the site, with the access road to the North and main parking to the East.

3.2 Disposal Principals

- a) The proposed storm water drainage system for the site is developed in line with the principles of Sustainable Drainage Systems (SuDs). These objectives are to minimise the impact from the development on the quantity and quality of surface water run-off, as 'The SuDs Manual' CIRIA Report C753, 2015 (ref 1).
- b) Various SuDs techniques are discussed below in relation to their possible inclusion in the development.

Ground Soakage:	The preferred method of ground water disposal.	Considered not to be suitable because of ground conditions, to be confirmed by site testing.
Green Roofs:	These can provide some surface water retention	Considered not to be suitable due to architectural design.
Rainwater Harvesting:	This can reduce total run-off volume	Not suitable due to capital and running costs and has no ability to restrict run-off in critical storm events
Permeable Paving:	Reduces total run-off from the site, improves water quality.	Considered to be suitable for car parking areas.
Swales, Basins, Ponds:	Above ground areas for storm water retention and conveyance	Not suitable due to the use of the development.
Bio Retention, Rain Gardens:	Shallow surface depressions to store water and infiltrate to the ground	Not suitable due to the use of the development.
Geocellular Storage:	Below ground storage structure for attenuation prior to discharge	Considered to be suitable for the development.

- c) SuDs considers a hierarchical approach to surface water discharge as follows:
- i. Infiltration to Ground – Subject to ground conditions.
 - ii. Discharge to Watercourse – No watercourse adjacent to the site.
 - iii. Discharge to sewer – Discharge to adjacent surface water sewer is achievable.
 - iv. Discharge to combined sewer – No sewer available.
- d) In the design of surface water disposal, an allowance needs to be made for the effects of climate change. Guidance published by Environmental Agency requires a 40% increase in peak rainfall intensities.

3.3 Surface Water Drainage

3.3.1 Rate of Outflow

- a) The existing site is predominantly covered by buildings and surface car parking. The present impermeable area is approximately 0.22ha, the proposed site layout reduces the impermeable area to 0.17ha.
- b) The requirements contained in Non-statutory technical Standards for sustainable drainage systems (ref 2) are that for brownfield sites the peak rate of run-off from the development must be as close as reasonably practical to the greenfield run-off rate. The relevant greenfield run-off rates for the site have been calculated using HR Wallingford software, the results are contained in appendix C, as follows: -

1 in 1-year event	0.35 l/s
1 in 30-year event	0.95 l/s
1 in 100-year event	1.31 l/s

HR Wallingford indicate that where greenfield flow rates are less than 5.0 l/s then a consent for discharge is usually set at 5.0 l/s subject to considerations of potential blockage of flow control devices, vegetation etc.

- c) In their response to the pre-development enquiry, Appendix B, Thames Water believe that the flow rate can be reduces below 5 l/s.

- d) The proposed surface water drainage strategy shown on drawing number 20007/DS/01/P1 and is based on the following principles: -
- Permeable paving is proposed to the car parking bays to drain the external areas. This will provide benefits in the quality of water leaving the site and also provide attenuation storage using proprietary 'sub-base' replacement units.
 - A below ground storm water attenuation storage cell, using proprietary cellular storage units.
 - The overall peak flow from the site has been restricted to 2l/s, although this raises concerns about the orifice size in flow control devices. Preliminary storage and attenuation calculations for the proposals are included in Appendix E, including an allowance of 40% for climate change.
 - The appended calculations assume that ground soakage is not feasible. Site permeability tests are recommended and can be included in the final design details to reduce the storage requirement.

3.3.2 Outflow Volume

The non-statutory guidelines (ref 2) require that for a brownfield site the volume of water leaving the site for the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as reasonably practical to the greenfield run-off volume for the same event. In reality this is difficult to achieve and it is accepted (REF 1) that this criteria is met if that water is discharged at a rate of 2.0 l/s.

3.3.3 Exceedance Routes

The non-statutory guidelines (REF 2) also require that flows resulting from rainfall in excess of a 1 in 100-year event are managed in exceedance routes that minimise risks to people and property. The natural slope of the site is down towards the South East corner. External ground levels are to be set to maintain these falls to allow drainage off the site in Leibenrood Road.

3.4 Foul Water Drainage

An estimate of the design foul water outflow from the development, using water consumption figures published by British Water is 1.7 l/s. . Thames Water have confirmed that this discharge from a 55-bed care home can be accommodated by the existing 225mm diameter foul water sewer at manhole 3605.

4.0 FLOOD RISK ASSESSMENT

4.1 Flood Zone

- a)** The Environment Agency publish 'flood zones' for the UK, which refer to the probability of river and sea flooding for a particular geographical area. These are described below.

Zone 1 - Low Probability

Land having less than 1 in 1000 annual probability of rivers or sea flooding.

Zone 2 - Medium Probability

Land having between a 1 in 100 and 1 in 1000 probability of river flooding.

Zone 3 - High Probability

Land having a 1 in 100 or greater probability of river flooding.

Zone 3b - Functional Flood plan.

- b)** The Flood map for the site, obtained from Environment Agency website, shows the site to lie in Flood Zone 1, See appendix G.

- c)** Environmental Agency also publish online maps with regard to pluvial flooding and risk of reservoir flooding. These maps are also included in Appendix G and show the site to be at very low risk of pluvial flooding and not in an area at risk from reservoir flooding.

4.2 Flood Vulnerability

The existing site is considered to have a use as a hospital which would place it in a Flood Vulnerability classification of 'more vulnerable'. The proposed use for a care home does not alter this classification. The national Planning Policy Framework (NPPF) does not require a Flood Risk Assessment for development sites of less than 1ha in flood zone 1 except where the vulnerability classification is increased.

5.0 CONCLUSIONS

5.1 The proposed surface water drainage strategy for the development is based on SuDS principles and incorporates: -

- Permeable paving to car parking areas.
- Storm water attenuation for roof water.

5.2 A peak rate of discharge of 2.0 l/s has been used in the preliminary design. The possible benefits of ground soakage have not been included at this time, subject to ground permeability tests being carried out.

5.3 A foul water design flow of 1.7 l/sec has been determined for the site and Thames Water have confirmed that the outflow from a 55-bed care home can be accommodated within the public sewer network.

5.4 The site lies in flood Zone 1 and is less than 1.0ha and a flood risk assessment is not required.

BAKER HALL LTD



Dr. N. Bartram

12th June 2020

B.Sc., Ph.D., C.Eng., M.I.C.E.

References

1. The SuDS Manual, Report C753, CIRIA, London, 2015.
2. Non-Statutory Technical Standards for Sustainable Drainage: Best Practice Guidance, Local Authority SuDS Officer Organisation, DEFRA, London 2015

Appendix A

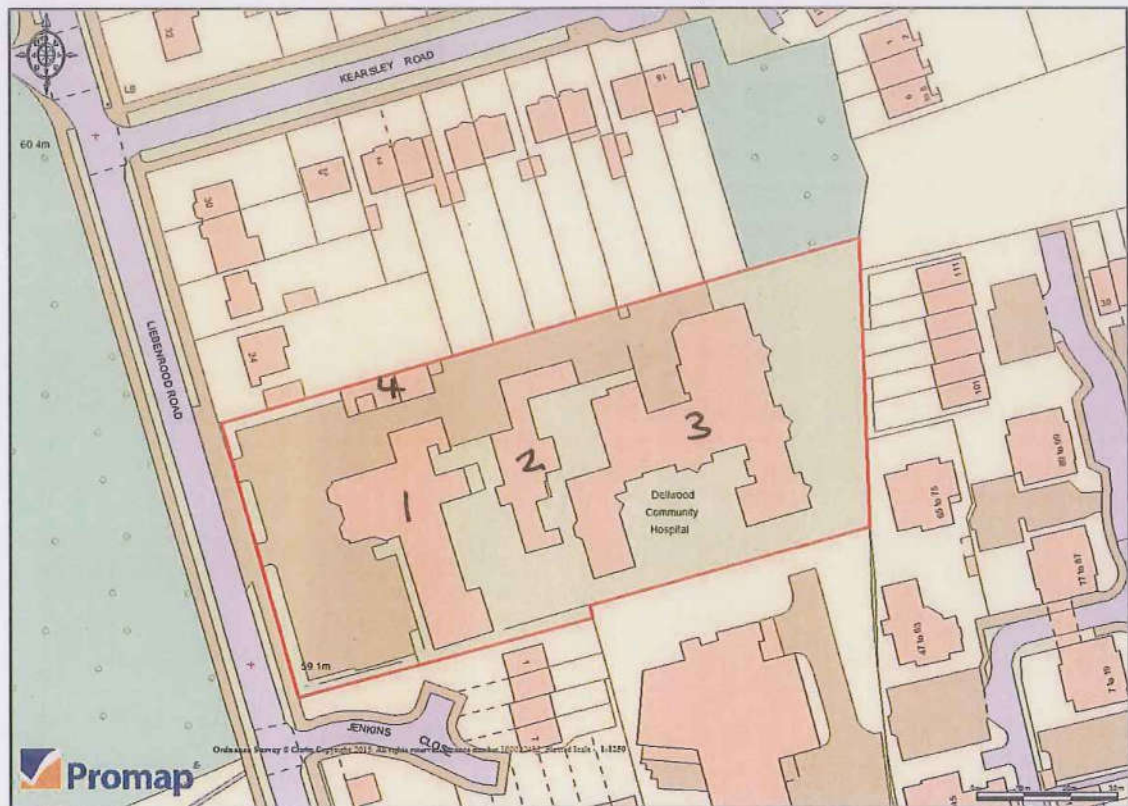
Drawings

- **Site Location Plan**
- **Topographic Survey**

Address: Dellwood Community Hospital

Date: 18 February 2015

Block 1, 2, 3+4



Promap Licence No. OS100017687



Front Elevation – Community Hospital



Rear Elevation – Community Hospital

alder king

172750N

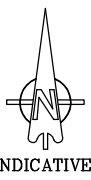
172700N

469350E

469400E

469450E

KEY:	
bt	British Telecom
cb	Control Box
cl	Cover Level
ctv	Cable Television
dk	Drop Kerb
el	Electric
ep	Electricity Pole
fh	Fire Hydrant
gu	Gully
gsv	Gas Stop Valve
ht	Height
ic	Inspection Cover
il	Invert Level
lp	Lamp Post
mkr	Marker
o/h	Overhead
pb	Post Box
pxg	Pavement Crossing
np	Name Plate
rs	Road Sign
sv	Stop Valve
tb	Telephone Box
tl	Traffic Light
tt	Top of Tree
th	Threshold
tw	Top of Wall
uti	Unable to Lift
vp	Vent pipe
wm	Water Meter
wsv	Water Stop Valve



NOTES:
LEVELS RELATE TO O.S. DATUM
TREE SPECIES SHOULD BE VERIFIED WHERE OF
CRITICAL IMPORTANCE
THE ARCHITECT SHOULD SATISFY HIMSELF THAT ALL TREES
LIKELY TO AFFECT HIS DESIGN HAVE BEEN SHOWN
INTER CONNECTION OF MANHOLES SHOULD BE VERIFIED
WHERE OF CRITICAL IMPORTANCE USING CCTV
PIPE SIZES & INVERTS DETERMINED WITHOUT
ENTRY INTO MANHOLE
ALL DIMENSIONS & LEVELS SHOWN IN METRES
ON SITE DIMENSION ACCURACY IS TAKEN RELATIVE TO
THE PRINTED SCALE AND SHOULD BE CHECKED ON SITE
WHERE OF CRITICAL IMPORTANCE

P STUBBINGTON LAND SURVEYS LTD

THE MEAD
DURLEY BROOK ROAD
DURLEY
SOUTHAMPTON
HAMPSHIRE
SO32 2AR
TEL : 023 8060 1876
MOBILE :
07979 248165
EMAIL :
PAUL@PSTLANDSURVEYS.COM

CLIENT: - MONTPELIER ESTATES
CONTRACT: - DELLWOOD HOSPITAL
LIEBENROOD ROAD
READING
TITLE: - TOPOGRAPHIC SURVEY
SCALE: - 1:200 @A1
DRAWING NO: 8071/01
DATE: - OCTOBER 2019
SURVEYOR: - RD

Appendix B

Thames Water

- **Pre-Planning Enquiry**
- **Thames Water Reply**

Pre- planning enquiry

Application form

Please complete this form and return it to us at
developer.services@thameswater.co.uk or
Thames Water, Developer Services, Clearwater Court,
Vastern Road, Reading, RG1 8DB.



Application for a pre-planning enquiry

Please complete ALL relevant sections of this form in BLOCK CAPITALS

Use this form to find out if there's existing capacity in our network for your proposed development. Please ensure you complete the form in full and we'll respond within 21 calendar days from receipt of your completed application form. We'll let you know if sufficient capacity already exists in the network or if further modelling will be needed to determine if network adjustments or reinforcement will be required.

Is your application for: Water and sewerage ☐ Water ☐ Sewerage ☒ (Please tick one.)

Section A - About you

(i) Details of applicant

Company name	Baker Hall Ltd		
	Developer ☐	Consultant ☒	Land promoter ☐ SLP ☐ NAV ☐ Other
Title	Mr ☐	Mrs ☐	Ms ☐ Miss ☐ Dr ☒ Other
First name(s)	Nigel		
Last name	Bartram		
Preferred phone no.	01214264792		
Alternative phone no.			
Email address	mail@baker-hall.com		
Full postal address	Address line 1	Innovation Centre	
	Address line 2	Devon Way	
	Town	Birmingham	
	County	West Midlands	Postcode

(ii) Who should we contact to discuss the application?

Applicant ☒ Nominated contact ☐ (Please tick one.)

If nominated contact:

Company name			
	Developer ☐	Consultant ☐	Land promoter ☐ SLP ☐ NAV ☐ Other
Title	Mr ☐	Mrs ☐	Ms ☐ Miss ☐ Dr ☐ Other
First name(s)			

Last name			
Preferred phone no.			
Alternative phone no.			
Email address			
Full postal address	Address line 1		
	Address line 2		
	Town		
	County		Postcode

Section B - About the site

(i) Your site address

Same as applicant ☐ Same as nominated contact ☐ At another location ☒ (Please tick one.)

If another location:

Site name	Dellwood Hospital		
Full postal address	Address line 1	Liebenrood Road	
	Address line 2		
	Town	Reading	
	County	Berkshire	Postcode RG30 2BG

Does the developer own the site? Yes ☐ No ☐ Don't know ☒

What is the local authority?

Ordnance Survey grid ref

Type of site Greenfield ☐ Brownfield ☒ Mixed ☐

How big is the site? hectares

(ii) Your planning status (If you've already started the planning process).

Is the development identified in the local plan? Yes ☐ No ☐ Don't know ☒ If Yes, reference number

Does it have outline planning permission? Yes ☐ No ☐ Don't know ☒ If Yes, reference number

Does it have full planning permission? Yes ☐ No ☒ Don't know ☐ If Yes, reference number

Does the development have building regulations permission? Yes ☐ No ☒ Don't know ☐

(iii) Your development

To enable us to determine whether the capacity is sufficient or whether further modelling and reinforcement of our network will be required please provide details of the properties currently existing on the site (where applicable) and how you will phase your development. The information you provide at this stage will help improve the accuracy of our assessment. If you have more than 6 phases for your development please add details on a separate sheet.

Property type	Existing site to be demolished	Proposed site						Total
		Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	
Start on site date								
Date of Occupation								
General housing (total units)								
Flat (total units)								
Primary school (max. pupil capacity)								
Secondary school (max. pupil capacity)								
Boarding school (max. pupil capacity)								
Assembly hall (max. capacity)								
Cinema (max. capacity)								
Theatre (max. capacity)								
Sports hall (max. capacity)								
Hotel (total bedrooms)								
Guest house (total bedrooms)								
Motel (total bedrooms)								
Holiday apartment (total capacity)								
Leisure park (max. capacity)								
Caravan park standard (total spaces)								
Caravan site standard (total spaces)								
Camping site standard (total spaces)								
Camping site serviced (total spaces)								
Student accommodation (max. capacity)								
Public house (max. capacity)								
Restaurant / Day care centre (max. capacity)								
Drive in restaurant (max. capacity)								
Hospital (total beds)								
Nursing / Care home (total beds)		55						
Offices (gross internal area in m ²)								
Shopping centre (gross internal area in m ²)								
Warehouse (gross internal area in m ²)								
Commercial premises (gross internal area in m ²)								
Manufacturing unit (gross internal area in m ²)								
Other (please state units and description)								

Section C - About the water supply

(Not required if only applying for sewerage connection).

(i) Phasing water supply for your development

If you already have a plan for the phasing of your development please give details below.

Property type	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Date water connection required						
Estimated peak clean water flow rate (litre/sec)						
Break tank capacity, if any (m³)						

If you're using a break tank please advise what measures you plan to take to avoid high peak flow over a short period of time.

Section D - About your sewerage connections

(Not required if only applying for water connection).

(i) Your existing sewerage connections (brownfield site only).

Please give us details of your existing connections.

	Foul water	Surface water
Does the site have the following sewerage connections?	☒	☒
What is the type of discharge method?	☒ Gravity	☒ Gravity
	☐ Pumped	☐ Pumped
If sewage is pumped, what is the pump rate?	litres/sec	litres/sec
What is the existing impermeable area per connection?		2600 m²
What are the existing connection points? (For example, 'X' properties to TW manhole ref 'Y')		

(ii) Your proposed sewerage connections

Please give us details of your proposed connections.

	Foul water	Surface water
Does the site have the following sewerage connections?	☒	☒
What is the type of discharge method?	☒ Gravity ☐ Pumped	☒ Gravity ☐ Pumped
If sewage is pumped, what is the pump rate?	litres/sec	litres/sec
What is your proposed approach to surface water drainage?		☒ Sustainable drainage system (SuDS) ☐ Traditional piped system
Do you propose using separate highway surface water drainage systems?		☐ Yes ☒ No
If the surface water rate is attenuated, to what rate is it attenuated?		litres/sec
What is the proposed impermeable area per connection?		m ²
What are the proposed connection points? (For example, 'X' properties to TW manhole ref 'Y')		

Please note: The developer is expected to follow the local authority's drainage strategy and be able to demonstrate how the proposed (attenuated) discharge rate of any surface water flows have been calculated. For developments in Greater London, please refer to the London Plan Drainage Hierarchy (Policy 5.13). We will challenge the rates provided if they are not in line with those based on the local drainage strategies.

Section E - What next?

(i) What we need to process your application:

- ✓ **Completed application** (ensure all relevant sections of this form are completed in full)
- ✓ **Site location plan** (showing the site with nearby buildings, road and any sewers) Included in Asset search
- ✓ **Scaled site layout** (showing existing and proposed layouts including Point of Connection to our water network) Drawing number 19016/F01/S02
- ☐ **Site drainage strategy plan** (if available at this stage showing all proposed sewers, pipe sizes and gradients)
- ✓ **CCTV and topographical surveys** (if available for existing brownfield sites) Drawing Number 8071/01

Please make sure any attachments are in PDF format and don't exceed a total of 20MB in size per email. All drawings must be of suitable detail and have a drawing reference number on them.

Please note: without this information we may need to make assumptions about your requirements when calculating your budget estimate (if requested).

(ii) How we'll use this information

We'll use the information you give on this application form, and potentially share it with our delivery partners, to provide the service you've requested.

This could include contacting you to discuss your application and/or provide more details, visiting the site where work needs to be carried out and invoicing you when appropriate. Your feedback is important to us, so we may also use the information to ask for your feedback on how we can improve our performance.

We won't use this information for marketing purposes without contacting you to seek your consent.

You can find Thames Water's privacy policy at thameswater.co.uk/Legal/Privacy.

(iii) Declaration

Print name	Nigel Bartram
Job title	Engineer
Company	Baker HALL Ltd
Date	27th April 2020
Signature	

(iv) Submitting your application

Please send your completed form to receive your capacity check in 21 calendar days:

Via email:

developer.services@thameswater.co.uk

Or send to:

Thames Water Developer Services, Clearwater Court, Vastern Road, Reading RG1 8DB

Getting in touch

For enquiries regarding this application or any other questions relating to your building or development work please contact us:



thameswater.co.uk/developerservices



developer.services@thameswater.co.uk



0800 009 3921

Monday – Friday, 8am – 5pm



**Thames Water,
Developer Services,
Clearwater Court,
Vastern Road,
Reading,
Berkshire RG1 8DB**



Asset location search



Property Searches

Cornerstone Projects LTD
91Market Street
HOYLAKE
WIRRAL
CH47 5AA

Search address supplied Dellwood Hospital, Liebenrood Road, Reading
RG30 2EQ

Your reference Dellwood

Our reference ALS/ALS Standard/2019_3939901

Search date 21 January 2019

Keeping you up-to-date

Notification of Price Changes

From 1 September 2018 Thames Water Property Searches will be increasing the price of its Asset Location Search in line with RPI at 3.23%.

For further details on the price increase please visit our website: www.thameswater-propertysearches.co.uk
Please note that any orders received with a higher payment prior to the 1 September 2018 will be non-refundable.



Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13



searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk



0845 070 9148



Search address supplied: Dellwood Hospital, Liebenrood Road, Reading, RG30 2EQ

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0845 070 9148, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk

Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.



For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2019 3939901



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 469403,172725
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
68NH	n/a	n/a
6953	60.92	58.92
6952	60.54	59.1
6911	60.71	58.51
6951	60.51	59.15
2901	61.21	58.4
2950	61.2	59.18
3902	61.19	58.68
3901	61.04	58.82
39MM	n/a	n/a
39ML	n/a	n/a
39NC	n/a	n/a
39ND	n/a	n/a
39MG	n/a	n/a
3802	60.57	59.33
3750	60.38	57.98
3702	60.27	57.15
3751	60.14	58.03
3903	60.26	58.83
3851	60.11	58.07
3950	60.19	59.43
37NE	n/a	n/a
37NF	n/a	n/a
37NH	n/a	n/a
38NC	n/a	n/a
38MN	n/a	n/a
3801	59.64	57.7
3904	60.41	59.04
3850	59.6	58.24
38MM	n/a	n/a
481D	n/a	n/a
471A	n/a	n/a
481C	n/a	n/a
48ND	n/a	n/a
48NF	n/a	n/a
481B	n/a	n/a
471B	n/a	n/a
48NC	n/a	n/a
48MN	n/a	n/a
48ML	n/a	n/a
48MK	n/a	n/a
48MM	n/a	n/a
4801	59.36	58.23
4850	59.35	58.65
4802	59.4	58.29
4803	59.2	58.51
481A	n/a	n/a
5951	60.48	58.37
5705	57.73	56.71
5950	60.32	58.77
5802	60.01	n/a
5850	60.51	58.86
5851	60.27	58.99
5801	60.13	57.84
6750	59.15	57.79
6701	59.19	57.12
68NK	n/a	n/a
68NJ	n/a	n/a
4505	58.45	55.9
4601	n/a	n/a
5716	57.77	56.77
5715	57.73	56.71
5704	57.75	56.57
5714	57.58	56.59
5703	57.67	56.45
5701	57.53	56.26
5712	57.5	56.46
5609	57.49	56.04
5608	57.52	55.95
5618	57.47	56.28
5607	57.49	55.79
5617	57.43	56.23
5606	57.46	55.7
561A	57.65	56.2
561C	57.45	56.173
5616	57.46	56.13
561B	57.385	55.9
5605	57.51	55.43
661A	57.355	55.8
6657	57.44	55.31
6659	57.39	56.03
6703	n/a	n/a
6702	57.82	56.01
6751	57.85	56.43
6601	57.72	55.3
261A	n/a	n/a
361K	n/a	n/a
3510	58.12	56.98
361J	n/a	n/a
361H	n/a	n/a
361I	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
3550	58.34	57.35
3508	n/a	n/a
3509	58.19	56.7
361B	n/a	n/a
361C	n/a	n/a
361D	n/a	n/a
361E	n/a	n/a
361F	n/a	n/a
361G	n/a	n/a
3603	58.33	56.42
3553	58.85	57.62
3505	58.69	57.61
3650	58.99	57.46
3604	58.98	56.09
3605	58.98	56.25
3551	58.78	57.12
361A	n/a	n/a
3503	58.74	55.7
4550	58.9	57.04
4503	58.82	n/a
4551	58.45	57.17
6650	57.37	55.85
661C	57.2	55.902
661B	57.4	54.911
6602	57.48	54.98
6658	n/a	56.08
6656	n/a	55.15
3401	58.63	57.15
541C	n/a	n/a
6402	59.26	n/a
541A	n/a	n/a
3402	58.56	56.49
3455	58.52	56.91
541B	n/a	n/a
3552	58.6	57.1
3504	58.59	56.19
3506	58.68	55.96
3554	58.71	57.42
3507	58.78	55.8
3502	58.63	57
4501	58.99	55.41
3501	58.35	56.73
2501	58.61	57.11
6950	60.24	59.24
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

	Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.		Trunk Foul
	Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.		Trunk Surface Water
	Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.		Trunk Combined
	Storm Relief		Bio-solids (Sludge)
	Vent Pipe		Proposed Thames Water Foul Sewer
	Proposed Thames Surface Water Sewer		Foul Rising Main
	Gallery		Combined Rising Main
	Surface Water Rising Main		Proposed Thames Water Rising Main
	Sludge Rising Main		Vacuum

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
- 5) 'na' or '0' on a manhole level indicates that data is unavailable.

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

	Air Valve
	Dam Chase
	Fitting
	Meter
	Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

	Control Valve
	Drop Pipe
	Ancillary
	Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

	Outfall
	Undefined End
	Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

	Public/Private Pumping Station
	Change of characteristic indicator (C.O.C.I.)
	Invert Level
	Summit

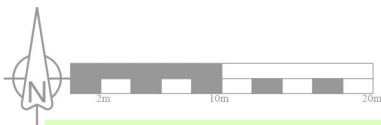
Areas

Lines denoting areas of underground surveys, etc.

	Agreement
	Operational Site
	Chamber
	Tunnel
	Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

	Foul Sewer		Surface Water Sewer
	Combined Sewer		Gully
	Culverted Watercourse		Proposed
			Abandoned Sewer



ALL DIMENSIONS TO BE CHECKED ON SITE.
ANY DISCREPANCIES MUST BE REPORTED TO THE ARCHITECT
FOR VERIFICATION PRIOR TO COMMENCEMENT OF THE EFFECTED
WORKS. IF IN DOUBT ASK. THIS DRAWING IS COPYRIGHT.

Rev. Date Description



CARE HOME, DELLWOOD HOSPITAL SITE
READING

PROPOSED SITE PLAN

1:500 @ A3



02/05/2019

19016/F01/S02/

172750N

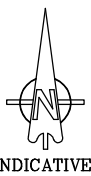
172700N

469350E

469400E

469450E

KEY:	
bt	British Telecom
cb	Control Box
cl	Cover Level
ctv	Cable Television
dk	Drop Kerb
el	Electric
ep	Electricity Pole
fh	Fire Hydrant
gu	Gully
gsv	Gas Stop Valve
ht	Height
ic	Inspection Cover
il	Invert Level
lp	Lamp Post
mkr	Marker
o/h	Overhead
pb	Post Box
pxg	Pavement Crossing
np	Name Plate
rs	Road Sign
sv	Stop Valve
tb	Telephone Box
tl	Traffic Light
tt	Top of Tree
th	Threshold
tw	Top of Wall
uti	Unable to Lift
vp	Vent pipe
wm	Water Meter
wsv	Water Stop Valve

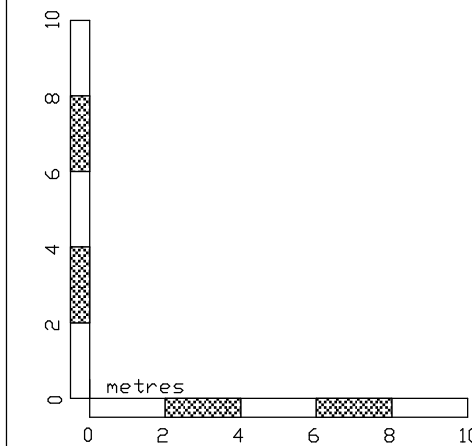


NOTES:
LEVELS RELATE TO O.S. DATUM
TREE SPECIES SHOULD BE VERIFIED WHERE OF
CRITICAL IMPORTANCE
THE ARCHITECT SHOULD SATISFY HIMSELF THAT ALL TREES
LIKELY TO AFFECT HIS DESIGN HAVE BEEN SHOWN
INTER CONNECTION OF MANHOLES SHOULD BE VERIFIED
WHERE OF CRITICAL IMPORTANCE USING CCTV
PIPE SIZES & INVERTS DETERMINED WITHOUT
ENTRY INTO MANHOLE
ALL DIMENSIONS & LEVELS SHOWN IN METRES
ON SITE DIMENSION ACCURACY IS TAKEN RELATIVE TO
THE PRINTED SCALE AND SHOULD BE CHECKED ON SITE
WHERE OF CRITICAL IMPORTANCE

P STUBBINGTON LAND SURVEYS LTD

THE MEAD
DURLEY BROOK ROAD
DURLEY
SOUTHAMPTON
HAMPSHIRE
SO32 2AR
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CLIENT: - MONTPELIER ESTATES
CONTRACT: - DELLWOOD HOSPITAL
LIEBENROOD ROAD
READING
TITLE: - TOPOGRAPHIC SURVEY
SCALE: - 1:200 @A1
DRAWING NO: 8071/01
DATE: - OCTOBER 2019
SURVEYOR: - RD





Dr. Nigel Bartram

Baker Hall Ltd
Innovation Centre
Longbridge Technology Park
1 Devon Way
Birmingham
B31 2TS



22 May 2020

Pre-planning enquiry: Confirmation of sufficient capacity

Dear Nigel,

Thank you for providing information on your proposed development at Dellwood Hospital site in Reading. The proposal includes a 55 bed care home on the brownfield site. Surface water is proposed to discharge at 5l/s into the 225mm diameter surface water sewer in the highway and the foul sewage is proposed to discharge to the 225mm diameter foul sewer in the highway via existing manhole MH3605. The size of the site is believed to be 1500m².

We have completed the assessment of the foul water flows and surface water run-off based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

Foul Water

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient sewerage capacity in the foul sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.

Surface Water

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable.

Before we can consider your surface water needs, you'll need written approval from the lead local flood authority that you have followed the sequential approach to the disposal of surface water and considered all practical means.

The disposal hierarchy being:

1. store rainwater for later use.
2. use infiltration techniques where possible.
3. attenuate rainwater in ponds or open water features for gradual release.
4. attenuate rainwater by storing in tanks or sealed water features for gradual release.
5. discharge rainwater direct to a watercourse.
6. discharge rainwater to a surface water sewer/drain.
7. discharge rainwater to the combined sewer.
8. discharge rainwater to the foul sewer

Where connection to the public sewerage network is still required to manage surface water flows we will accept these flows at a discharge rate in line with CIRIA's best practice guide on SuDS or that stated within the sites planning approval.

You have proposed a discharge rate of 5l/s, we believe that this discharge rate can be reduced further and efforts should be made to do so prior to submitting your proposal to the LLFA.

Please see the attached 'Planning your wastewater' leaflet for additional information.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

If you've any further questions, please contact me on 07747642033.

Yours sincerely

Many Thanks

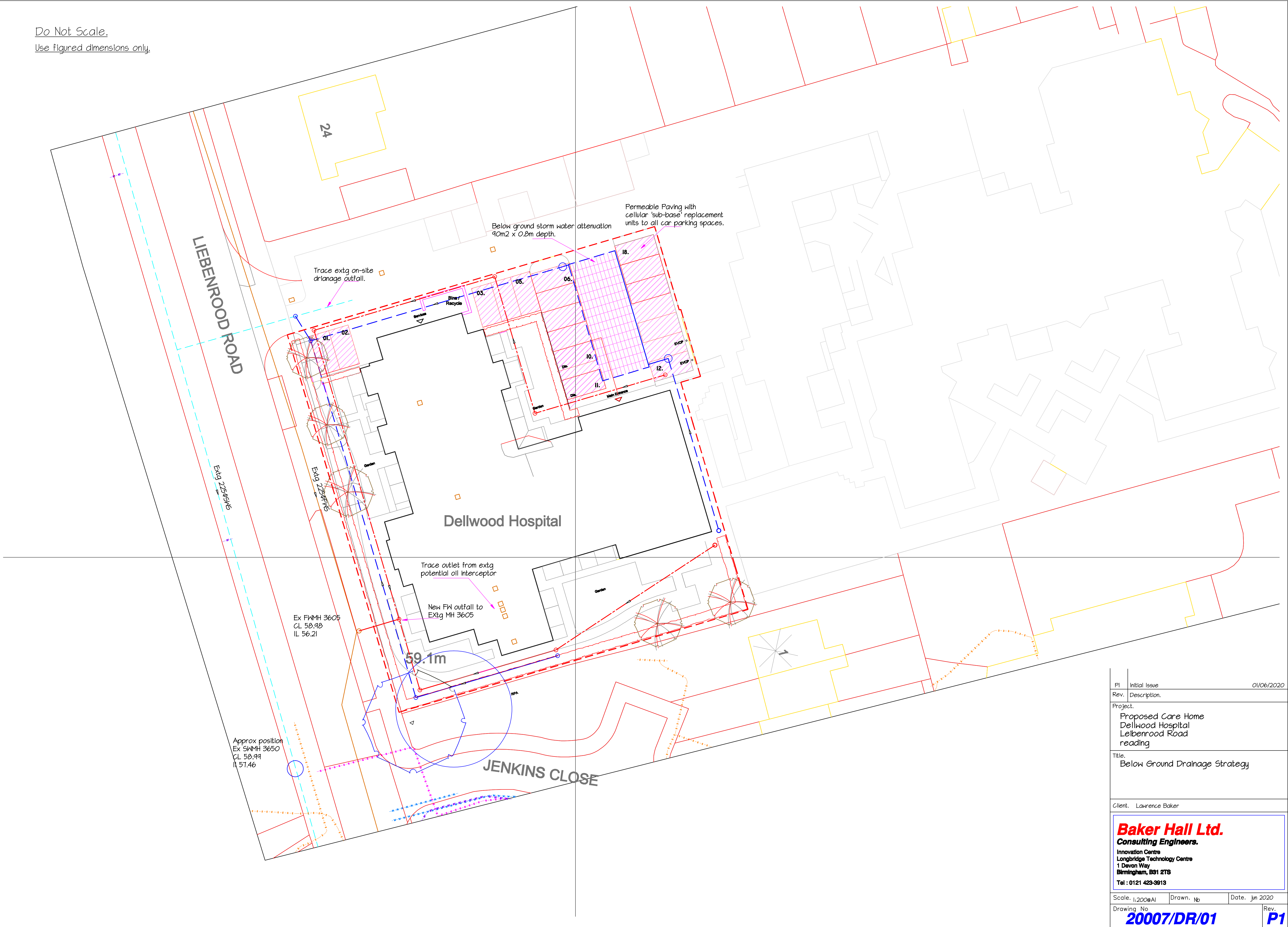
Kind Regards

Dan Rees

Developer Services

Appendix C Proposed Site Layout

Do Not Scale.
Use figured dimensions only.



PI	Initial Issue	01/06/2020
Rev.	Description.	
Project.		
Proposed Care Home Dellwood Hospital Liebenrood Road reading		
Title.		
Below Ground Drainage Strategy		
Client. Lawrence Baker		
Baker Hall Ltd. Consulting Engineers. Innovation Centre Longbridge Technology Centre 1 Devon Way Birmingham, B31 2TS Tel : 0121 423-3813		
Scale. 1:200@A1	Drawn. Nb	Date. Jun 2020
Drawing No.	Rev.	
20007/DR/01	P1	

Appendix D Greenfield Run-off Rate

Calculated by:	Nigel Bartram
Site name:	Dellwood Hospital
Site location:	Reading

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.44908° N
Longitude:	1.00272° W
Reference:	1424431313
Date:	Jun 11 2020 11:30

Runoff estimation approach**Site characteristics**

Total site area (ha):	.25
-----------------------	----------------------------------

Methodology

Q _{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	641	641
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

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

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

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

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

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

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

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	0.41	0.41
1 in 1 year (l/s):	0.35	0.35
1 in 30 years (l/s):	0.95	0.95
1 in 100 year (l/s):	1.31	1.31
1 in 200 years (l/s):	1.54	1.54

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

Appendix E Attenuation Calculations

Baker Hall Ltd		Page 1
413 Hagley Road West Quinton Birmingham B32 2AD	Dellwood Hospital Porous Car Park	
Date 01/06/2020 File 20007-car park.src	Designed By nb Checked By	
Micro Drainage	Source Control W.10.4	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 330 minutes

Storm Duration (mins)	Maximum Control (l/s)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m ³)	Maximum Volume (m ³)	Status
15 Summer	0.9	0.0	0.0	0.9	58.8253	0.2252	0.0	17.3	0 K
30 Summer	0.9	0.0	0.0	0.9	58.8618	0.2617	0.0	22.4	0 K
60 Summer	1.0	0.0	0.0	1.0	58.8943	0.2942	0.0	27.1	0 K
120 Summer	1.0	0.0	0.0	1.0	58.9193	0.3192	0.0	30.6	0 K
180 Summer	1.0	0.0	0.0	1.0	58.9247	0.3247	0.0	31.4	0 K
240 Summer	1.0	0.0	0.0	1.0	58.9223	0.3222	0.0	31.1	0 K
360 Summer	1.0	0.0	0.0	1.0	58.9107	0.3107	0.0	29.4	0 K
480 Summer	1.0	0.0	0.0	1.0	58.9013	0.3012	0.0	28.1	0 K
600 Summer	1.0	0.0	0.0	1.0	58.8933	0.2932	0.0	26.9	0 K
720 Summer	1.0	0.0	0.0	1.0	58.8858	0.2857	0.0	25.8	0 K
960 Summer	0.9	0.0	0.0	0.9	58.8708	0.2707	0.0	23.7	0 K
1440 Summer	0.9	0.0	0.0	0.9	58.8433	0.2432	0.0	19.8	0 K
2160 Summer	0.9	0.0	0.0	0.9	58.8058	0.2057	0.0	14.5	0 K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	93.28	18
30 Summer	61.30	33
60 Summer	38.41	62
120 Summer	23.28	122
180 Summer	17.15	180
240 Summer	13.73	240
360 Summer	9.97	298
480 Summer	7.95	360
600 Summer	6.66	424
720 Summer	5.76	492
960 Summer	4.58	628
1440 Summer	3.31	896
2160 Summer	2.39	1280

Dellwood Hospital
Porous Car Park

Designed By nb
Checked By

Micro Drainage

Source Control W.10.4



Summary of Results for 100 year Return Period (+40%)

Storm Duration (mins)		Maximum Control (l/s)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
2880	Summer	0.9	0.0	0.0	0.9	58.7723	0.1722	0.0	10.1	0 K
4320	Summer	0.9	0.0	0.0	0.9	58.7093	0.1093	0.0	4.1	0 K
5760	Summer	0.8	0.0	0.0	0.8	58.6518	0.0518	0.0	0.9	0 K
7200	Summer	0.8	0.0	0.0	0.8	58.6000	0.0000	0.0	0.0	0 K
8640	Summer	0.7	0.0	0.0	0.7	58.6000	0.0000	0.0	0.0	0 K
10080	Summer	0.6	0.0	0.0	0.6	58.6000	0.0000	0.0	0.0	0 K
15	Winter	0.9	0.0	0.0	0.9	58.8413	0.2412	0.0	19.5	0 K
30	Winter	1.0	0.0	0.0	1.0	58.8828	0.2827	0.0	25.4	0 K
60	Winter	1.0	0.0	0.0	1.0	58.9213	0.3212	0.0	30.9	0 K
120	Winter	1.0	0.0	0.0	1.0	58.9512	0.3512	0.0	35.2	0 K
180	Winter	1.0	0.0	0.0	1.0	58.9607	0.3607	0.0	36.5	0 K
240	Winter	1.0	0.0	0.0	1.0	58.9617	0.3617	0.0	36.6	0 K
360	Winter	1.0	0.0	0.0	1.0	58.9507	0.3507	0.0	35.1	0 K
480	Winter	1.0	0.0	0.0	1.0	58.9372	0.3372	0.0	33.2	0 K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
2880 Summer	1.90	1644
4320 Summer	1.37	2336
5760 Summer	1.08	2992
7200 Summer	0.90	0
8640 Summer	0.78	0
10080 Summer	0.68	0
15 Winter	93.28	18
30 Winter	61.30	33
60 Winter	38.41	62
120 Winter	23.28	120
180 Winter	17.15	176
240 Winter	13.73	232
360 Winter	9.97	338
480 Winter	7.95	382

413 Hagley Road West
Quinton
Birmingham B32 2AD

Dellwood Hospital
Porous Car Park

Date 01/06/2020
File 20007-car park.src

Designed By nb
Checked By



Micro Drainage

Source Control W.10.4

Summary of Results for 100 year Return Period (+40%)

Storm Duration (mins)	Maximum Control (l/s)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m ³)	Maximum Volume (m ³)	Status
600 Winter	1.0	0.0	0.0	1.0	58.9257	0.3257	0.0	31.6	0 K
720 Winter	1.0	0.0	0.0	1.0	58.9153	0.3152	0.0	30.1	0 K
960 Winter	1.0	0.0	0.0	1.0	58.8938	0.2937	0.0	27.0	0 K
1440 Winter	0.9	0.0	0.0	0.9	58.8513	0.2512	0.0	21.0	0 K
2160 Winter	0.9	0.0	0.0	0.9	58.7958	0.1957	0.0	13.1	0 K
2880 Winter	0.9	0.0	0.0	0.9	58.7433	0.1433	0.0	7.0	0 K
4320 Winter	0.8	0.0	0.0	0.8	58.6298	0.0297	0.0	0.3	0 K
5760 Winter	0.7	0.0	0.0	0.7	58.6000	0.0000	0.0	0.0	0 K
7200 Winter	0.6	0.0	0.0	0.6	58.6000	0.0000	0.0	0.0	0 K
8640 Winter	0.5	0.0	0.0	0.5	58.6000	0.0000	0.0	0.0	0 K
10080 Winter	0.4	0.0	0.0	0.4	58.6000	0.0000	0.0	0.0	0 K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
600 Winter	6.66	458
720 Winter	5.76	534
960 Winter	4.58	684
1440 Winter	3.31	968
2160 Winter	2.39	1364
2880 Winter	1.90	1728
4320 Winter	1.37	2288
5760 Winter	1.08	0
7200 Winter	0.90	0
8640 Winter	0.78	0
10080 Winter	0.68	0

Baker Hall Ltd		Page 4
413 Hagley Road West Quinton Birmingham B32 2AD	Dellwood Hospital Porous Car Park	
Date 01/06/2020 File 20007-car park.src	Designed By nb Checked By	
Micro Drainage	Source Control W.10.4	

Rainfall Details

Region	ENG+WAL	Cv (Summer)	0.750	Summer Storms	Yes
Return Period (years)	100	Cv (Winter)	0.840	Winter Storms	Yes
M5-60 (mm)	19.000	Shortest Storm (mins)	15	Climate Change %	+40
Ratio-R	0.400	Longest Storm (mins)	10080		

Time / Area Diagram

Total Area (ha) = 0.077

Time (mins)		Area
from:	to:	(ha)
0	4	0.077

Baker Hall Ltd

413 Hagley Road West
Quinton
Birmingham B32 2AD

Date 01/06/2020

File 20007-car park.src

Micro Drainage

Dellwood Hospital
Porous Car Park

Designed By nb

Checked By

Source Control W.10.4

Page 5



Porous Car Park Details

Infil Coef - Base (m/hr)	0.000000	Invert Level (m)	58.600
Membrane Percolation (mm/hr)	1000	Cover Level (m)	59.200
Safety Factor	2.0	Slope (1:x)	150.0
Porosity	0.95	Max Percolation (l/s)	41.6
Length (m)	31.2	Depression Storage (mm)	5
Width (m)	4.8	Evaporation (mm/day)	3

Hydro-Brake Outflow Control

Design Head (m)	1.250	Hydro-Brake Type	MD6	Invert Level (m)	57.800
Design Flow (l/s)	1.0	Diameter (mm)	40		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.10	0.5	0.60	0.7	1.60	1.2	2.60	1.5	5.00	2.1	7.50	2.5
0.20	0.4	0.80	0.8	1.80	1.2	3.00	1.6	5.50	2.2	8.00	2.6
0.30	0.5	1.00	0.9	2.00	1.3	3.50	1.7	6.00	2.2	8.50	2.7
0.40	0.6	1.20	1.0	2.20	1.4	4.00	1.8	6.50	2.3	9.00	2.8
0.50	0.6	1.40	1.1	2.40	1.4	4.50	1.9	7.00	2.4	9.50	2.8

Pipe Overflow Control

Pipe Diameter (m)	0.150	Length (m)	5.000	Entry Loss Coef	0.500	Invert Level (m)	59.200
Slope (1:x)	20.0	Roughness (mm)	0.600	Coef of Contraction	0.600		

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413 Hagley Road West Quinton Birmingham B32 2AD	Dellwood Hospital Cellular Storage	
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Micro Drainage	Source Control W.10.4	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 547 minutes

Storm Duration (mins)	Maximum Control (l/s)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m ³)	Maximum Volume (m ³)	Status
15 Summer	0.6	0.0	0.0	0.6	58.1028	0.3027	0.0	23.0	0 K
30 Summer	0.7	0.0	0.0	0.7	58.1937	0.3937	0.0	29.9	0 K
60 Summer	0.8	0.0	0.0	0.8	58.2828	0.4827	0.0	36.7	0 K
120 Summer	0.9	0.0	0.0	0.9	58.3613	0.5612	0.0	42.7	0 K
180 Summer	0.9	0.0	0.0	0.9	58.3958	0.5958	0.0	45.3	0 K
240 Summer	0.9	0.0	0.0	0.9	58.4113	0.6113	0.0	46.4	0 K
360 Summer	0.9	0.0	0.0	0.9	58.4153	0.6153	0.0	46.8	0 K
480 Summer	0.9	0.0	0.0	0.9	58.4103	0.6103	0.0	46.4	0 K
600 Summer	0.9	0.0	0.0	0.9	58.4043	0.6043	0.0	45.9	0 K
720 Summer	0.9	0.0	0.0	0.9	58.3963	0.5963	0.0	45.3	0 K
960 Summer	0.9	0.0	0.0	0.9	58.3793	0.5793	0.0	44.0	0 K
1440 Summer	0.8	0.0	0.0	0.8	58.3408	0.5407	0.0	41.1	0 K
2160 Summer	0.8	0.0	0.0	0.8	58.2852	0.4852	0.0	36.9	0 K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	93.28	19
30 Summer	61.30	33
60 Summer	38.41	64
120 Summer	23.28	122
180 Summer	17.15	182
240 Summer	13.73	242
360 Summer	9.97	360
480 Summer	7.95	412
600 Summer	6.66	474
720 Summer	5.76	536
960 Summer	4.58	672
1440 Summer	3.31	950
2160 Summer	2.39	1360

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Summary of Results for 100 year Return Period (+40%)

Storm Duration (mins)	Maximum Control (l/s)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m ³)	Maximum Volume (m ³)	Status
2880 Summer	0.8	0.0	0.0	0.8	58.2352	0.4352	0.0	33.1	0 K
4320 Summer	0.7	0.0	0.0	0.7	58.1498	0.3497	0.0	26.6	0 K
5760 Summer	0.6	0.0	0.0	0.6	58.0773	0.2772	0.0	21.1	0 K
7200 Summer	0.6	0.0	0.0	0.6	58.0148	0.2147	0.0	16.3	0 K
8640 Summer	0.6	0.0	0.0	0.6	57.9568	0.1568	0.0	11.9	0 K
10080 Summer	0.6	0.0	0.0	0.6	57.9178	0.1178	0.0	9.0	0 K
15 Winter	0.7	0.0	0.0	0.7	58.1398	0.3397	0.0	25.8	0 K
30 Winter	0.8	0.0	0.0	0.8	58.2422	0.4422	0.0	33.6	0 K
60 Winter	0.8	0.0	0.0	0.8	58.3428	0.5427	0.0	41.3	0 K
120 Winter	0.9	0.0	0.0	0.9	58.4333	0.6333	0.0	48.1	0 K
180 Winter	0.9	0.0	0.0	0.9	58.4748	0.6748	0.0	51.3	0 K
240 Winter	1.0	0.0	0.0	1.0	58.4948	0.6948	0.0	52.8	0 K
360 Winter	1.0	0.0	0.0	1.0	58.5058	0.7058	0.0	53.6	0 K
480 Winter	1.0	0.0	0.0	1.0	58.5018	0.7018	0.0	53.3	0 K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
2880 Summer	1.90	1760
4320 Summer	1.37	2552
5760 Summer	1.08	3336
7200 Summer	0.90	4040
8640 Summer	0.78	4672
10080 Summer	0.68	5256
15 Winter	93.28	19
30 Winter	61.30	33
60 Winter	38.41	62
120 Winter	23.28	120
180 Winter	17.15	178
240 Winter	13.73	236
360 Winter	9.97	346
480 Winter	7.95	452

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Summary of Results for 100 year Return Period (+40%)

Storm Duration (mins)	Maximum Control (l/s)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m ³)	Maximum Volume (m ³)	Status
600 Winter	0.9	0.0	0.0	0.9	58.4908	0.6908	0.0	52.5	0 K
720 Winter	0.9	0.0	0.0	0.9	58.4818	0.6818	0.0	51.8	0 K
960 Winter	0.9	0.0	0.0	0.9	58.4588	0.6588	0.0	50.1	0 K
1440 Winter	0.9	0.0	0.0	0.9	58.4043	0.6043	0.0	45.9	0 K
2160 Winter	0.8	0.0	0.0	0.8	58.3238	0.5237	0.0	39.8	0 K
2880 Winter	0.8	0.0	0.0	0.8	58.2522	0.4522	0.0	34.4	0 K
4320 Winter	0.7	0.0	0.0	0.7	58.1317	0.3317	0.0	25.2	0 K
5760 Winter	0.6	0.0	0.0	0.6	58.0253	0.2252	0.0	17.1	0 K
7200 Winter	0.6	0.0	0.0	0.6	57.9258	0.1258	0.0	9.6	0 K
8640 Winter	0.6	0.0	0.0	0.6	57.8943	0.0943	0.0	7.2	0 K
10080 Winter	0.5	0.0	0.0	0.5	57.8833	0.0833	0.0	6.3	0 K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
600 Winter	6.66	496
720 Winter	5.76	564
960 Winter	4.58	720
1440 Winter	3.31	1024
2160 Winter	2.39	1468
2880 Winter	1.90	1876
4320 Winter	1.37	2720
5760 Winter	1.08	3512
7200 Winter	0.90	4032
8640 Winter	0.78	4496
10080 Winter	0.68	5240

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Rainfall Details

Region	ENG+WAL	Cv (Summer)	0.750	Summer Storms	Yes
Return Period (years)	100	Cv (Winter)	0.840	Winter Storms	Yes
M5-60 (mm)	19.000	Shortest Storm (mins)	15	Climate Change %	+40
Ratio-R	0.400	Longest Storm (mins)	10080		

Time / Area Diagram

Total Area (ha) = 0.096

Time (mins)		Area
from:	to:	(ha)
0	4	0.096

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Cellular Storage Details

Infil Coef - Base (m/hr) 0.000000 Safety Factor 2.0 Invert Level (m) 57.800
 Infil Coef - Sides (m/hr) 0.000000 Porosity 0.95 Ground Level (m) 59.200

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.00	80.0	0.40	80.0	0.80	80.0	1.20	80.0	1.60	80.0	2.00	80.0	2.40	80.0
0.10	80.0	0.50	80.0	0.90	80.0	1.30	80.0	1.70	80.0	2.10	80.0	2.50	80.0
0.20	80.0	0.60	80.0	1.00	80.0	1.40	80.0	1.80	80.0	2.20	80.0		
0.30	80.0	0.70	80.0	1.10	80.0	1.50	80.0	1.90	80.0	2.30	80.0		

Hydro-Brake Outflow Control

Design Head (m) 0.800 Hydro-Brake Type MD6 Invert Level (m) 57.800
 Design Flow (l/s) 1.0 Diameter (mm) 45

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.10	0.6	0.60	0.9	1.60	1.4	2.60	1.8	5.00	2.6	7.50	3.1
0.20	0.6	0.80	1.0	1.80	1.5	3.00	2.0	5.50	2.7	8.00	3.2
0.30	0.6	1.00	1.1	2.00	1.6	3.50	2.1	6.00	2.8	8.50	3.3
0.40	0.7	1.20	1.3	2.20	1.7	4.00	2.3	6.50	2.9	9.00	3.4
0.50	0.8	1.40	1.4	2.40	1.8	4.50	2.4	7.00	3.0	9.50	3.5

Pipe Overflow Control

Pipe Diameter (m) 0.150 Length (m) 5.000 Entry Loss Coef 0.500 Invert Level (m) 58.600
 Slope (1:x) 20.0 Roughness (mm) 0.600 Coef of Contraction 0.600

Appendix F Foul Water Outflow

Dellwood Hospital
Leibenrood Road
Reading

20007
01/06/2020

Foul Water Outflow

	No	Water Consumption* l/p/day	Total
Care Home Bedrooms	55	350	19250
Care Home Staff	25	90	2250
Laundry **			2400
			23900
			l/day
DWF			0.28 l/sec
Design Flow			1.66 l/sec

* British Water - 'Flows and Loads'

** 2 No commercial washing machines at 100 l per hour over 12 hours

Appendix G Environment Agency Flood Maps

Flood map for planning

Your reference
Dellwood Hosp

Location (easting/northing)
469393/172716

Created
11 Jun 2020 11:37

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

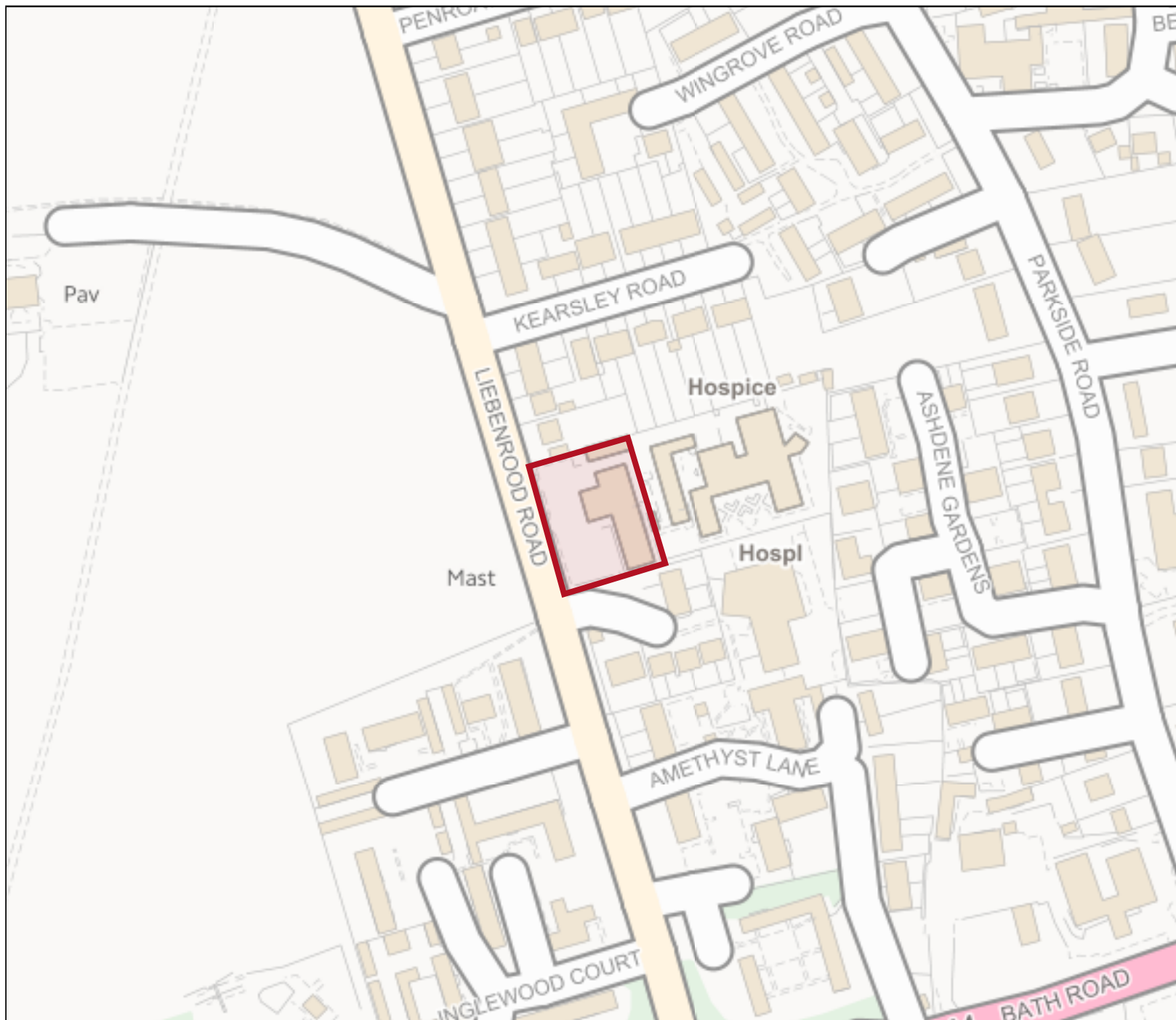
- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

The Open Government Licence sets out the terms and conditions for using government data.
<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>



Flood map for planning

Your reference
Dellwood Hosp

Location (easting/northing)
469393/172716

Scale
1:2500

Created
11 Jun 2020 11:37

-  Selected area
-  Flood zone 3
-  Flood zone 3: areas benefitting from flood defences
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Flood storage area

0 20 40 60m

