



Hinckley Day Case

Flood Risk Assessment and Drainage Strategy

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Waterman Infrastructure & Environment Ltd

5th Floor, One Cornwall Street, Birmingham, B3 2DX
www.watermangroup.com

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Issue	Date	Prepared by	Checked by	Approved by
First	15/08/2023	R Lal Engineer Apprentice 	A Shinwari Senior Engineer 	S Songprasit  Associate Director
Comments		First Issue for comments		

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Contents

1. Introduction	1
1.1 Background	1
1.2 Site Description	1
1.3 Development Proposals	1
1.4 Topography	2
2. Planning Policy and Guidance	3
2.1 National Planning Policy Framework and Planning Practice Guidance	3
2.2 Non-statutory Technical Standards for Sustainable Drainage Systems	3
2.3 Local Planning Policy	3
2.3.1 Site Allocations and Development Management Policies DPD Local Plan (2006 – 2026)	3
3. Sources of Potential Flooding.....	5
3.1 Rivers	5
3.2 Residual Risk from Breach	5
3.3 Surface Water	5
3.4 Groundwater	6
3.4.1 Geology	6
3.4.2 Borehole Data	7
3.4.3 Risk of Groundwater Flooding	7
3.5 Risk of Flooding from Drainage Systems	7
3.6 Reservoir, Canal and Artificial Sources	8
4. The Sequential and Exception Test.....	9
4.1 National Planning Policy Framework	9
4.2 The Sequential Test	9
4.3 The Exception Test	9
5. Surface Water Drainage Strategy.....	10
5.1 Pre and Post-development Drainage.....	10
5.2 Geology.....	10
5.2.1 Groundwater Vulnerability.....	10
5.2.2 Groundwater Source Protection Zone	10
5.3 Existing Drainage	10
5.3.1 Existing Public Sewers.....	10
5.3.2 Existing Private Surface Water Sewers	10
5.3.3 Greenfield Runoff Rates	11
5.3.4 Brownfield Runoff Rates	11

Contents

Hinckley Day Case

Document Reference: WIE19849

WIE19849-100-R-2-1-3-FRA

5.4	Proposed Surface Water Drainage Strategy	12
5.4.1	Climate Change Allowances (Peak Rainfall Intensity Allowances) to Assess Surface Water Flood Risk.....	12
5.4.2	Surface Water Drainage Hierarchy	13
5.4.3	Sustainable Urban Drainage System (SuDS).....	13
5.4.4	Surfac Water Drainage Strategy	15
5.4.5	Water Quality	15
5.4.6	Exceedance Flow.....	16
5.5	Maintenance.....	16
6.	Foul Drainage Strategy	19
6.1	Existing Foul Drainage	19
6.2	Proposed Foul Drainage	19
7.	Conclusions and Recommendations	20

Figures

Figure 1-1:	Site Location Plan	1
Figure 3-1:	EA Flood Map for planning	5
Figure 3-2:	Extent of Flooding from Surface Water.....	6
Figure 3-3:	BGS Borehole Data.....	7
Figure 3-4:	Maximum Extent of Flooding from Reservoirs.....	8

Tables

Table 5-1:	Summary of Permeable and Impermeable Areas	10
Table 5-2:	Greenfield Runoff Rates.....	11
Table 5-3:	Brownfield Runoff Rates for 1 in 1 year	11
Table 5-4:	Brownfield Runoff Rates for 1 in 30 year	12
Table 5-5:	Brownfield Runoff Rates for 1 in 100 year	12
Table 5-6:	Soar Management Catchment Peak Rainfall Allowances	13
Table 5-7:	Summary of Surface Water Discharge Options	13
Table 5-8:	Sustainable Drainage Techniques	14
Table 5-9:	Pollution Hazard Indices for the Development.....	15
Table 5-10:	Total SuDS mitigation index.....	15
Table 5-11:	Operation and Maintenance for Attenuation Tanks	16
Table 5-12:	Operation and Maintenance for Gullies	17
Table 5-13:	Operation and Maintenance for Manhole and Inspection Chamber	17
Table 5-14:	Operation and Maintenance for Drainage Pipes.....	17
Table 5-15:	Operation and Maintenance for Permeable Paving	18

Contents

Table 5-16: Flow Control Device18

Appendices

- A. Site Layout Plan
- B. Topographical and Utility Surveys
- C. National Planning Policy Framework and Planning Practice Guidance
- D. BGS Borehole Data
- E. Severn Trent Water Sewer Map
- F. Greenfield Runoff Calculations
- G. InfoDrainage Calculation Results
- H. Surface Water Drainage Strategy

1. Introduction

1.1 Background

Waterman Infrastructure & Environment Limited ("Waterman") have been commissioned by NHS Property Services ('the Client') to prepare a Flood Risk Assessment and Drainage Strategy to support a planning application for a site at Hinckley and District Hospital, Daycase Building on Mount Road, Hinckley LE10 1AG (hereafter referred to as 'the Site').

The purpose of this report is to provide an assessment of flood risk from all sources and details of how the foul and surface water drainage from the proposed development would be managed in consideration of the surface water drainage hierarchy and appropriate discharge points.

Leicestershire County Council is the Lead Local Flood Authorities (LLFA). Severn Trent Water (STW) is the sewerage undertaker. Hinckley and Bosworth Borough Council is the Local Planning Authority (LPA).

1.2 Site Description

The Site is located at Hinckley and District Hospital, Hinckley, approximately 20km from Leicester City Centre. The Site is brownfield with an approximate red line boundary of 0.274ha.

The west of the Site is bound by access roads (Argents Mead) and a leisure centre. There are residential dwellings to the east and Mount Road to the south of the Site. To the north, there are more access roads, footways, Greenland and behind that a car park.

The Site is located at the grid reference SP 42948 93716 with coordinates X:442948, Y: 293716 and the nearest postcode being LE10 1AG.

A Site location plan is shown in **Figure 1-1**.

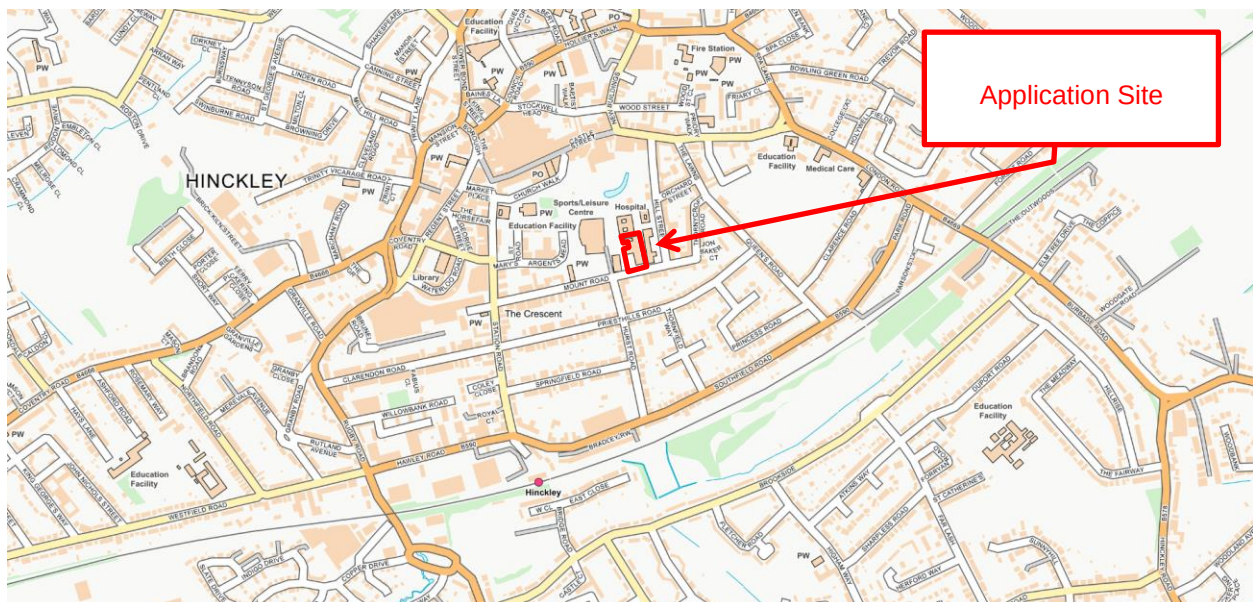


Figure 1-1: Site Location Plan

1.3 Development Proposals

The proposed developments involve the construction of a high-quality two-storey building, which will be in

the form of a Daycase Health facility. The proposed site layout is provided in **Appendix A**.

1.4 Topography

A topographical survey was undertaken by Survey Solutions in June 2019. At the northeast corner of the Site, the topographical levels are approximately 124.79mAOD, at the northwest corner of the Site, the levels are slightly lower at 124.19mAOD. At the southeast of the Site, the topographical levels are approximately 125.03mAOD, they then decrease in the west of the Site to 123.36mAOD.

It can be concluded that the Site generally falls from east to west with low levels of around 122.38mAOD located in the middle west of the Site.

A copy of the topographical survey can be found in **Appendix B**.

2. Planning Policy and Guidance

2.1 National Planning Policy Framework and Planning Practice Guidance

The National Planning Policy Framework¹ (NPPF) last revised in July 2021 and its supporting Planning Practice Guidance² (PPG) states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. Where development is necessary, it must be made safe without increasing flood risk elsewhere. Refer to **Appendix C**.

In relation to drainage, it states that when determining planning applications, Local Planning Authorities (LPA) should only consider development in areas where priority is given to the use of Sustainable Drainage Systems (SuDS).

The PPG states that developers and LPAs should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of SuDS.

2.2 Non-statutory Technical Standards for Sustainable Drainage Systems

The Non-statutory Technical Standards for SuDS³ was published in March 2015 and is the current guidance for the design, maintenance and operation of SuDS.

The standards set out that the peak runoff rates should be as close as is reasonably practicable to the greenfield rate but should never exceed the pre-development runoff rate.

The standards also set out that the drainage system should be designed so that flooding does not occur on any part of the Site for a 1 in 30-year rainfall event, and that no flood of a building (including basement) would occur during a 1 in 100-year rainfall event.

It is also noted within the standards that pumping should only be used when it is not reasonably practicable to discharge by gravity.

2.3 Local Planning Policy

2.3.1 Site Allocations and Development Management Policies DPD Local Plan (2006 – 2026)

There are two relevant policies listed within the Local Plan (2006-2026), which are DM7 and DM10 for the 'Natural Environment' and the 'Built Environment', respectively.

Point h) of Policy DM7 Preventing Pollution and Flooding states that:

"Adverse impacts from pollution and flooding will be prevented by ensuring that development proposals demonstrate that:

- h) The development doesn't create or exacerbate flooding by being located away from areas of flood risk unless adequately mitigated against in line with National Policy."*

Point h) of Policy DM10 Development and Design states that:

"Developments will be permitted providing that the following requirements are met:

¹ Ministry of Housing, Communities and Local Government, March 2012. National Planning Policy Framework.

² Ministry of Housing, Communities and Local Government, November 2016. Planning Practice Guidance.

³ Department for Environment, Food, and Rural Affairs, March 2015. Non-statutory technical standards for sustainable drainage systems.

- h) An appropriate Sustainable Drainage Scheme is submitted to and approved by the relevant Authority. Schemes should incorporate wildlife areas, ponds, swales and permeable paving where appropriate*

In exceptional circumstances where outstanding, innovative design is demonstrated (particularly where high levels of sustainability are an integral feature), applications will be considered favourably, even where this may result in some limited conflict with the above criteria.”

3. Sources of Potential Flooding

3.1 Rivers

Sketchley Brook is located approximately 600m to the south of the Site.

According to the EA Flood Map for planning, shown in **Figure 3-1**, the Site is situated within Flood Zone 1 (less than 1 in 1000 annual probability of river or sea flooding in any year). The closest flood risk in flood zone 2 and 3, is approximately 550m to the south of the Site boundary.

Based on the information currently available, the risk posed by fluvial flooding sources to the development areas of the Site can be considered as low.

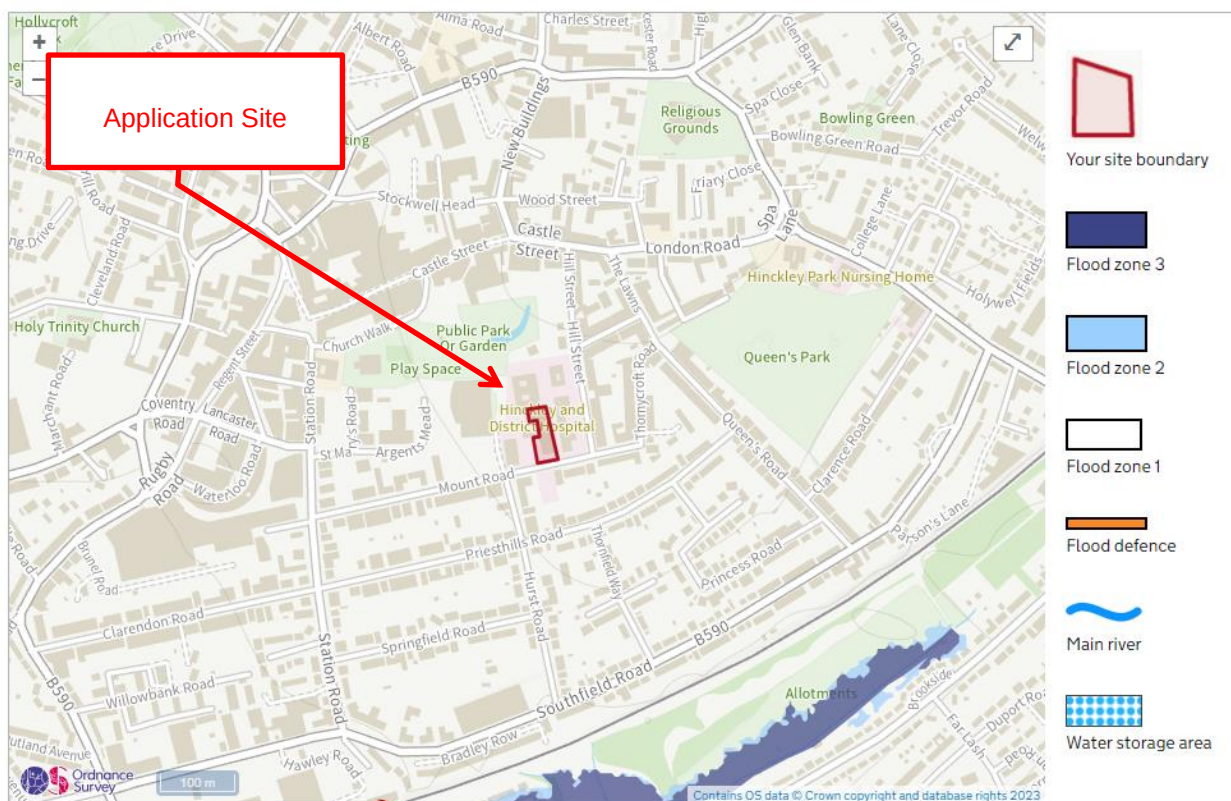


Figure 3-1: EA Flood Map for planning

Source: [Flood risk information for this location - Flood map for planning - GOV.UK \(flood-map-for-planning.service.gov.uk\)](https://flood-risk-information-for-this-location-flood-map-for-planning.service.gov.uk)

3.2 Residual Risk from Breach

There are no formal flood defences within the vicinity of the Site and the Site is not within the Areas Benefiting from Flood Defences (ABDs). Therefore, it is considered that the risk of breach failure or overtopping is low.

3.3 Surface Water

Surface water flooding in urban areas can sometimes occur during extreme, high-intensity, low-duration summer rainfall events which overwhelm the local surface water drainage system, or in rural areas during

medium-intensity, long-duration events where saturated ground conditions prevent infiltration into the subsoil. The floodwater would be conveyed via overland flow routes as dictated by the local topography.

The Environment Agency (EA) surface water flooding map, as shown in **Figure 3-2** indicates that the west side of the Site is at a 'very low' risk of surface water flooding, while the portion on the east side is at a 'low' risk.

The surface water runoff as a result of the proposed development will be managed by the Site's surface water drainage. To mitigate the risk posed by surface water flooding, the proposed development will attenuate surface water runoff on-site within attenuation tanks and permeable paving.

Based on the information currently available, the risk of surface water flooding affecting the Site can be considered as low.



Figure 3-2: Extent of Flooding from Surface Water

Source: [Learn more about flood risk - GOV.UK \(check-long-term-flood-risk.service.gov.uk\)](https://check-long-term-flood-risk.service.gov.uk)

3.4 Groundwater

3.4.1 Geology

Geological information and maps have been extracted from the British Geological Survey (BGS) Digital Geological map of Great Britain at 1:50,000 scale, to be used for a geological assessment of the Site.

Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time. They rest on older deposits or rocks referred to as Bedrock. The BGS dataset describes the superficial deposits as Oadby Member - Diamicton Sedimentary superficial deposits.

Bedrock geology is a term used for the main mass of rocks forming the Earth that are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water. The bedrock geology at the Site is found to be Mercia Mudstone Group, made up of mudstone.

3.4.2 Borehole Data

The BGS historic borehole scan records show that there are two groups of manholes to the north of the Site between 0 and 10m deep as shown in **Figure 3-3**.

The closest boreholes to the Site have a reference SP49SW387 with a depth of 5.18m, SP49SW386 with a depth of 9.44m, SP49SW385 with a depth of 7.01m and SP49SW384 with a depth of 5.18m.

The borehole data indicate that the underlying geology primarily consists of a monotonous sequence of brown, red-brown, calcareous sandy clays and sandstones. Refer to the borehole data in **Appendix D**.



Figure 3-3: BGS Borehole Data

Source: [BGS Geology Viewer \(BETA\)](#)

3.4.3 Risk of Groundwater Flooding

There are no records of the previous flooding attributed to groundwater flooding in the area. Two of the boreholes in the area indicate a water level of around 3.4m below ground. The other two boreholes are dry. Therefore, it is considered that the risk of groundwater flooding at the Site is low.

3.5 Risk of Flooding from Drainage Systems

Sewer flooding poses the highest risk of frequent flooding. Flooding from the drainage system occurs when flow entering a system exceeds its discharge capacity, the system becomes blocked or, in the case of surface water sewers, it cannot discharge due to high water level in the receiving watercourse. Sewer

flooding is often caused by sewer capacity being exceeded in large rainfall events causing a backup of floodwaters within properties or through manholes.

Severn Trent Water is responsible for the management of urban drainage (surface water) and sewerage for the Site.

The Leicestershire County Council Level 1 Strategic Flood Risk Assessment (SFRA) suggests that there is no historic flooding within the Site or any flooding which has affected any properties within the area. It is therefore considered that the risk of sewer flooding at the Site is low.

3.6 Reservoir, Canal and Artificial Sources

The Environment Agency's Reservoir Flood Map in **Figure 3-4** indicates that the Site is not within the maximum extent of flooding from reservoirs. Therefore, there is a low likelihood of flooding due to reservoirs or artificial sources. It is considered the residual risk of reservoir breach is low.



Figure 3-4: Maximum Extent of Flooding from Reservoirs

Source: [Learn more about flood risk - GOV.UK \(check-long-term-flood-risk.service.gov.uk\)](https://www.gov.uk/check-long-term-flood-risk)

There is a small pond approximately 40m to the north of the Site in a public park. It is assumed that the water level in the pond is regulated, and the risk of overtopping is low.

No canals or other artificial sources that may pose a flood risk are within the vicinity of the Site. Therefore, the risk of flooding from canals and artificial sources is considered low.

4. The Sequential and Exception Test

4.1 National Planning Policy Framework

The NPPF sets out the approach LPAs should take when determining planning applications. LPAs should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a Site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated that:

- Within the Site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location; and
- Development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems.

The Site falls within Flood Risk Vulnerability Zone 1. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). It is considered that all uses of land are appropriate in this zone.

In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage systems.

4.2 The Sequential Test

Paragraph 162 of the NPPF gives guidance on the aim of the Sequential Test, which states:

“The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available Sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding”.

The Environment Agency’s (EA) Flood Zone Map indicates that the Site falls within Flood Zone 1 and therefore, a sequential test has been passed.

4.3 The Exception Test

Paragraph 163 of the NPPF states that:

“If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the Site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3”.

Annex 3: Flood risk Vulnerability Classification classes the proposed daycare development as ‘more vulnerable’. According to Table 2 Flood Risk Vulnerability and Flood Zone Compatibility of the Planning Practice Guidance (PPG), ‘More Vulnerable’ development in Flood Zones 1 is appropriate and, therefore, the Site does not require to undergo the Exception Test.

Table 1 of the PPG: Definition of Flood Zones, Table 2 of the PPG: Flood risk vulnerability and flood zone ‘incompatibility’, and NPPF Annex 3: Flood risk vulnerability classification are provided in **Appendix C**.

5. Surface Water Drainage Strategy

5.1 Pre and Post-development Drainage

The Site area is 0.274ha, which consists of tarmac, compacted soil, concrete, rough ground, vegetation and an access road.

A summary of the permeable and impermeable areas is summarised below in **Table 5-1**.

Table 5-1: Summary of Permeable and Impermeable Areas

	Impermeable Area (ha)	Permeable Area (ha)	% Impermeable
Pre-Development	0.228	0.046	83%
Post-Development	0.274	0.000	100%

5.2 Geology

5.2.1 Groundwater Vulnerability

Based on the Groundwater Vulnerability Maps from Magic Maps, the Site is within an area of 'medium' groundwater vulnerability. The 'Medium' zones are medium-priority groundwater resources that have some natural protection resulting in a moderate overall groundwater risk. Activities in these areas should, as a minimum, follow good practice to ensure they do not cause groundwater pollution.

5.2.2 Groundwater Source Protection Zone

The EA's Ground Source Protection Zone map indicates that the Site is not within the Ground Source Protection Zone.

5.3 Existing Drainage

Severn Trent Water is the statutory undertaker and is responsible for the public sewer systems in the area. Based on the Severn Trent Water sewers record map, which is presented in **Appendix E**, there are existing combined water public sewers running to the south of the Site along Mount Road. There are private sewers within the vicinity of the Site. They are summarised below.

5.3.1 Existing Public Sewers

- There is a 225mm diameter combined public sewer flowing in a southerly direction in Hill Street to the east of the Site.
- There is a 300mm diameter combined public sewer flowing in a westerly direction in Mount Road to the south of the Site.

5.3.2 Existing Private Surface Water Sewers

The existing utility survey (**Appendix B**) indicates that there are existing private surface, foul and combined water drainage networks within the Site. They are summarised below:

- 150mm diameter surface water sewers from other buildings to the north of the Site flowing in the westerly direction connecting to the 225mm diameter combined sewer to the west.
- 100mm diameter surface water sewers from the existing building flowing west which discharges

into 150mm combined sewer.

- 100mm diameter Foul water sewer in the north running east joining existing 100mm diameter combined pipe.
- 150mm diameter Combined sewer to the east flowing north joins the 100mm diameter combined sewer and flowing west of the Site.
- Combined 150mm diameter sewers running along the main building to the west flowing south.
- Combined 150mm diameter sewers to the northwest of the Site flowing west.
- 100mm Foul water pipe flow west into a 100mm combined sewer which discharges into a 150mm diameter combined sewer.
- The utility survey indicates surface water discharging to the ground to the south of the Site.
- Several gullies to the east of the main building are flooded.

5.3.3 Greenfield Runoff Rates

The greenfield runoff rates have been calculated using the ICP SUDS method in InfoDrainage which uses the IH124 method and scales the runoffs down from a 50-ha Site. The calculated rates based on the total impermeable area of approximately 0.274 ha are shown in **Table 5-2** below and **Appendix F**.

Table 5-2: Greenfield Runoff Rates

Flood Event	Open Field
QBAR _{Rural}	1.3 l/s
QBAR _{Urban}	1.3 l/s
Q1 Year	1.1 l/s
Q30 Years	2.6 l/s
Q100 Years	3.4 l/s

5.3.4 Brownfield Runoff Rates

As the entire Site has been previously developed, a brownfield runoff rate is calculated based on the hardstanding area of 0.228ha. Runoff from the existing Site has been calculated using the Rational Method based on an estimation of impermeable areas. The existing Site runoff calculation is shown in **Table 5-3** to **Table 5-5**.

Table 5-3: Brownfield Runoff Rates for 1 in 1 year

Average Rainfall Intensity (mm/hr)		Brownfield Runoff Rate (l/s)
Storm Duration (mins)	1 in 1 year	Modified Rational Method $Q = 2.78 C i A$
15	30.8	19.0
30	20.0	12.4
60	12.7	7.8
120	7.9	4.9
240	4.8	3.0
360	3.6	2.2
600	2.5	1.5
1440	1.3	0.8

Table 5-4: Brownfield Runoff Rates for 1 in 30 year

Storm Duration (mins)	Average Rainfall Intensity (mm/hr)	Brownfield Runoff Rate (l/s)
	1 in 30 years	Modified Rational Method $Q = 2.78 C i A$
15	75.2	46.5
30	49.0	30.3
60	30.5	18.8
120	18.4	11.4
240	10.9	6.7
360	8.0	4.9
600	5.4	3.3
1440	2.7	1.7

Table 5-5: Brownfield Runoff Rates for 1 in 100 year

Storm Duration (mins)	Average Rainfall Intensity (mm/hr)	Brownfield Runoff Rate (l/s)
	1 in 100 years	Modified Rational Method $Q = 2.78 C i A$
15	97.6	60.3
30	64.1	39.6
60	40.1	24.8
120	24.2	15.0
240	14.2	8.8
360	10.3	6.4
600	6.9	4.3
1440	3.4	2.1

The brownfield runoff rates for the 1 in 1, 1 in 30 and 1 in 100 year for 60 minutes storm duration are 7.8l/s, 18.8l/s and 24.8l/s respectively.

5.4 Proposed Surface Water Drainage Strategy

The management of surface water is considered an essential element in reducing future flood risk to both the Site and its surroundings. In accordance with the NPPF, design proposals should seek to ensure that surface water run-off is managed as close to its source as possible.

5.4.1 Climate Change Allowances (Peak Rainfall Intensity Allowances) to Assess Surface Water Flood Risk

The NPPF in **Appendix C**, Annex 3: Flood Risk Vulnerability Classification, classes the proposed Day Care as 'More Vulnerable'. The government guidance states that if a development has a development lifetime beyond 100 years, then the upper-end allowances should be considered for climate change.

It is assumed that for this development, the lifetime will be beyond 100 years, so 40% climate change is considered for the Site.

The Site is located within the Soar Management Catchment peak rainfall allowances. The central allowances for the Site are shown in **Table 5-6**.

Table 5-6: Soar Management Catchment Peak Rainfall Allowances

3.3% annual exceedance rainfall event	Central allowance	Upper end allowance
2050s	20%	35%
2070s	25%	35%
1% annual exceedance rainfall event	Central allowance	Upper end allowance
2050s	20%	40%
2070s	25%	40%

5.4.2 Surface Water Drainage Hierarchy

Part H of the Building Regulations 2010⁴ recommends that surface water runoff shall discharge to one of the following, listed in order of priority:

- An adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable.
- A watercourse, or, where that is not reasonably practicable.
- A sewer.

The surface water discharge options are considered based on the surface water drainage hierarchy, which is summarised in **Table 5-7**.

Table 5-7: Summary of Surface Water Discharge Options

Drainage Hierarchy	Consideration	✓/✗
1 Store rainwater for later use	Recycling attenuated rainwater is considered unfeasible for use within the Site because of the limited space and nature of the proposal.	✗
2 Into the ground by infiltration	The geology of the Site indicates that it is made up of mudstone. It is likely that infiltration is not feasible. However, this will have to be confirmed by a ground investigation study. If infiltration rates are appropriate, partial infiltration may be used	✗
3 Into a surface water body such as a river, ditch, pond or stream	Sketchley Brook is approximately 500m to the south of the Site. It would require permission to cross public highways and third-party lands to discharge into the watercourse. Therefore, this method of discharge is deemed unfeasible.	✗
4 Into a surface water sewer	No public surface water sewers within the vicinity of the Site. There are private surface water sewers within the Site however, they discharge into the public combined sewer in Mouth Road	✗
5 Into a combined sewer	There are public combined sewers in Mouth Road to the south of the Site.	✓

Based on the hierarchy above, it is proposed to discharge the surface water runoff into the existing combined water manhole 9604 to the south of the Site in Mount Road. The proposed connection is subject to third party's approval.

5.4.3 Sustainable Urban Drainage System (SuDS)

The surface water drainage strategy has been developed to incorporate appropriate SuDS techniques for

⁴ The Building Regulations 2010 – Drainage and Waste Disposal – HM Government – 2015 Edition

the Site to enhance the amenity of the proposed development while minimising the impacts of the quantity and quality of the surface water runoff. **Table 5-8** outlines constraints and comments for different SuDS techniques.

Table 5-8: Sustainable Drainage Techniques

Device	Description	Constraints/Comments	✓/✗
Green/Brown Roofs	Provide soft landscaping at roof level which reduces surface water runoff	The proposed design would be modular construction, therefore, green roof would not be appropriate for the Site.	✗
Infiltration devices & Soakaways (source control)	Store runoff and allow water to percolate into the ground via natural infiltration	The geology of mudstone would not make infiltration suitable. This will have to be confirmed by a ground investigation study.	✗
Pervious surfaces (source control)	Stormwater is allowed to infiltrate through the surface into a storage layer, from which it can either infiltrate and/or slowly release to sewers	Pervious surface would be suitable for parking bays.	✓
Rainwater harvesting (source control)	Reduces the annual average rate of runoff from the Site by reusing water for non-potable uses e.g., toilet flushing or water butts	Due to the nature of the proposals, rainwater harvesting is not deemed suitable at the Site.	✗
Swales (permeable conveyance)	Broad shallow channels that convey / store runoff, and allow infiltration (ground conditions permitting)	Swales are not deemed feasible at the Site due to the nature of the proposed development, which is limited with space. Therefore, it is considered not feasible.	✗
Filter drains & perforated pipes (permeable conveyance)	Trenches filled with granular materials (which are designed to take flows from adjacent impermeable areas) that convey runoff while allowing infiltration (ground conditions permitting)	Filter drains are not suitable due to the nature of the proposed development, and limited space. It is considered not feasible.	✗
Filter Strips (permeable conveyance)	Wide gently sloping areas of grass or dense vegetation that remove pollutants from runoff from adjacent areas	Filter strips are not deemed feasible at the Site due to space constraints.	✗
Infiltration basins (end of pipe treatment)	Depressions in the surface designed to store runoff and allow infiltration through the base	Infiltration basins are not deemed feasible at the Site due to space constraints.	✗
Bio-retention Systems / Rain Garden (end of pipe treatment)	A shallow landscaped depression which allows runoff to pond temporarily on the surface before filtering through vegetation and underlying soils.	Bio-retention systems are not suitable due to the nature of the development.	✗
Detention Basins (end of pipe treatment)	Depressions in the surface designed to store runoff without infiltration through the base	Detention basins are not deemed feasible at the Site due to the limited space.	✗
Attenuation Underground/Podium (end of pipe treatment)	Oversized pipes or geo-cellular tanks designed to store water below ground level or at podium level.	Attenuation tanks are feasible to be incorporated into the Site.	✓

5.4.4 Surface Water Drainage Strategy

As the greenfield run-off rates are very low and will likely cause blockage in the drainage system, the proposed discharge rate for the surface water drainage for the Site has been designed based on the maximum rate of 5 l/s.

The proposed overall attenuation storage volume of approximately 152m³ is sized for a maximum allowable surface water discharge rate of 5l/s for the 1 in 100-year critical storm return period with a 40% allowance for climate change. The proposed storage volume is to be attenuated through the below-ground cellular tank and permeable paving. The InfoDrainage calculations are presented in **Appendix G**

The proposed surface water and foul water drainage is to connect to the existing combined water manhole 9604 to the south of the Site in Mount Road. The proposed connection is subject to third party's approval.

Location and size of the proposed attenuation storage systems are subject to coordination with the landscaping proposal, site levels and other proposed works.

Further investigation should take place to confirm the outfall of the existing drainage network and infiltration rates. A pre-development enquiry has been submitted to STW for consultation to establish sewers capacity, SuDS and connection requirements. The proposed Drainage Strategy is presented in **Appendix H**.

5.4.5 Water Quality

In line with the SuDS Manual Simple Index Approach, appropriate treatments would be incorporated into the drainage system to ensure that the quality of water discharged is acceptable. The runoff from the Site will flow through an oil separator which provides water treatment before the runoff discharges into the existing downstream drainage system.

The Pollution Hazard Indices for the SuDS used in this development in different land use classifications are presented in **Table 5-9** below, and the Total SuDS mitigation index is shown in **Table 5-10**.

The indices range from 0 to 1 to show the rate of pollution hazard. The pollution hazards and the total SuDS mitigation for the different types of SuDS proposed for this development are referred to SuDS Manual CIRIA document.

Table 5-9: Pollution Hazard Indices for the Development

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Non-residential Car Park	Low	0.5	0.4	0.4
Other Roofs	Low	0.3	0.2	0.05
Total		0.8	0.6	0.45

Table 5-10: Total SuDS mitigation index

Type of SuDS Component	TTS	Metals	Hydrocarbons
Permeable Paving	0.7	0.6	0.7
Total	0.7	0.5	0.4

To make sure that the treatment is delivered to an accurate extent, for each component type the Total SuDS mitigation index should be greater than the total pollution hazard index.

The total mitigation index levels are less than the total pollution hazard levels. However, a propriety treatment system such as a petrol interceptor is proposed to improve the discharge quality.

5.4.6 Exceedance Flow

During an exceedance event, any surface water flooding will be managed safely on-site. This would be achieved by setting out the external levels to direct flows away from the buildings and to be stored temporarily in car parks.

In an event that the capacity of the proposed surface water drainage network is exceeded, flood water escaping from the drainage system will be routed away from the buildings until there is sufficient capacity to allow it back into the system.

5.5 Maintenance

All those responsible for maintenance should take appropriate health and safety precautions and risk assessments. In any eventuality, it is considered the SuDS features will be adopted and maintained in perpetuity.

The detailed drainage design will incorporate sufficient access and working spaces for maintaining the drainage systems. This will be achieved by incorporating appropriate access points at reasonable intervals (for example manhole, rodding eye and inspection chamber). After completion of works, routine checks need to be carried out to ensure the ongoing performance of drainage systems.

The proposed SuDS features will need to be maintained throughout their lifetime to ensure their effectiveness.

The future Site owner will be responsible for the maintenance of the proposed private drainage works. A management company is normally set up to undertake regular inspections and maintenance activities with respect to drainage components and SuDS features.

A schedule of inspections and activities is to be incorporated into the maintenance plan. Refer to **Table 5-11** to **Table 5-16**.

Table 5-11: Operation and Maintenance for Attenuation Tanks

Maintenance schedule	Required action	Typical frequency	Expected Design Life
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually	50 Years
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly	
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually	
	Remove sediment from pre-treatment structures and/or internal forebays.	Annually, or as required	
Remedial actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required	
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually	

Maintenance schedule	Required action	Typical frequency	Expected Design Life
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required	

Table 5-12: Operation and Maintenance for Gullies

Maintenance schedule	Required action	Typical frequency	Expected Design Life
Regular Maintenance	Inspect and identify blockages, debris and litter	As Required	50-100 Years
	Removal of any debris and litter from the gully	As Required	
Occasional	Inspection gullies to determine whether they are operating correctly	Annually or as required	
Remedial Actions	Repair gullies and any identified areas that are not operating correctly	As Required	

Table 5-13: Operation and Maintenance for Manhole and Inspection Chamber

Maintenance schedule	Required action	Typical frequency	Expected Design Life
Regular maintenance	Inspect and identify blockages, debris and litter. If required, take remedial action	As Required	50-100 Years
	Removal of sediments, debris and litter from the manhole and inspection chamber	As Required	
Occasional maintenance	Inspect all manholes and inspection chambers to determine whether they are operating correctly	Annually or as required	
Remedial actions	Repair gullies and any identified areas that are not operating correctly	As required	
	Repair manhole and inspection chamber by clearing any blockages and any other areas that are not operating correctly	As required	
	Removal of any blockages by rodding or jetting through an access point	As Required	

Table 5-14: Operation and Maintenance for Drainage Pipes

Maintenance schedule	Required action	Typical frequency	Expected Design Life
Regular maintenance	Remove sediment and debris from drainage pipes	Annually or as required	50-100 Years
	Remove any root ingress	Annually or as required	
	Cleaning of gutters and any filters on downpipes	As required	
Occasional maintenance	CCTV survey of drains to check alignment, cracking and joint displacement	10-year intervals	

Table 5-15: Operation and Maintenance for Permeable Paving

Maintenance schedule	Required action	Typical frequency	Expected Design Life
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over the whole surface)	Once a year	Lifetime of the development
	Stabilise and mow contributing and adjacent areas	As required	
	Removal of weeds	As required	
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required	
	Removal of weeds	As required	
Remedial actions	Remedial work to any depressions rutting and cracked or broken blocks	As required	
Monitoring	Inspect for evidence of poor operation and weed growth	Three-monthly	
	Inspect silt accumulation	Annually	

Table 5-16: Flow Control Device

Maintenance schedule	Required action	Typical frequency	Expected Design Life
Regular maintenance	Keep the device free from silt and debris	Monthly	60 Years
Occasional maintenance	Remove obstructions and silt as necessary	As necessary	
Remedial actions	Repair physical damage if necessary	As required	
Monitoring	Inspect for evidence of blockage and silt accumulation	Annually	

6. Foul Drainage Strategy

6.1 Existing Foul Drainage

Based on the existing utility survey, which can be found in **Appendix B**, there is an existing foul water sewer located in the access road. This is summarised as follows:

- 225mm diameter foul water sewer in Argents Mead to the west of the Site flowing in a southerly direction from a manhole which appears to discharge into the 300mm combined sewer in Mount Road.

6.2 Proposed Foul Drainage

Based on Design and Construction Guidance for Foul and Surface Water Sewers (March 2019) offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England, the peak flow rate of 0.60 l/s per developed area in hectare for commercial use is used for the proposed development. This equates to 0.164 l/s of foul flow rate. The exact flow rate will be calculated at a later stage once the Site layout is further developed.

A pre-development enquiry has been submitted to STW regarding the capacity in the combined network located in Mount Road to the south of the Site.

It is proposed to connect foul water drainage from the development to the existing combined water manhole CW01. Refer to the location of the manhole in **Appendix H**.

7. Conclusions and Recommendations

Waterman Infrastructure & Environment Limited have been commissioned by NHS Property Services to prepare a Flood Risk Assessment and Drainage Strategy to support a planning application for a Site at Hinckley Day Case Building.

Based on the assessment in this report, our conclusions are as follows:

- The proposed Site boundary extends to an area of approximately 0.274ha.
- The Site lies within Flood Zone 1.
- The risk of flooding from surface water, sewers, groundwater and artificial sources is low.
- The sequential test has been passed and the Site does not require to undergo the exception test.
- Severn Trent Water is the statutory undertaker and is responsible for the public sewer systems for the Site area.
- As the greenfield run-off rates are very low, to reduce the risk of blockage in the drainage system, the proposed surface water drainage for the Site has been designed based on 5 l/s.
- The Site is located within the Soar Management Catchment peak rainfall climate change allowances. For this development, the lifetime will be beyond 100 years, so 40% climate change is considered for the Site.
- The required attenuation storage for the Site is 152m³ which will be accommodated with attenuation tanks and permeable paving. The attenuation storage volumes are calculated based on a maximum allowable surface water discharge rate of 5 l/s for the 1 in 100 year critical storm return period with 40% allowance for climate change.
- The proposed surface water and foul water drainage is to discharge a combined demarcation chamber before connecting to the existing combined water manhole 9604 to the south of the Site in Mount Road. The proposed connection is subject to third party's approval.
- Future maintenance for any private drainage systems would be under the responsibility of the Site owner or an appointment management company.

APPENDICES

A. Site Layout Plan

Site Address

Hinckley and District Hospital
Mount Road
Hinckley
LE10 1AG

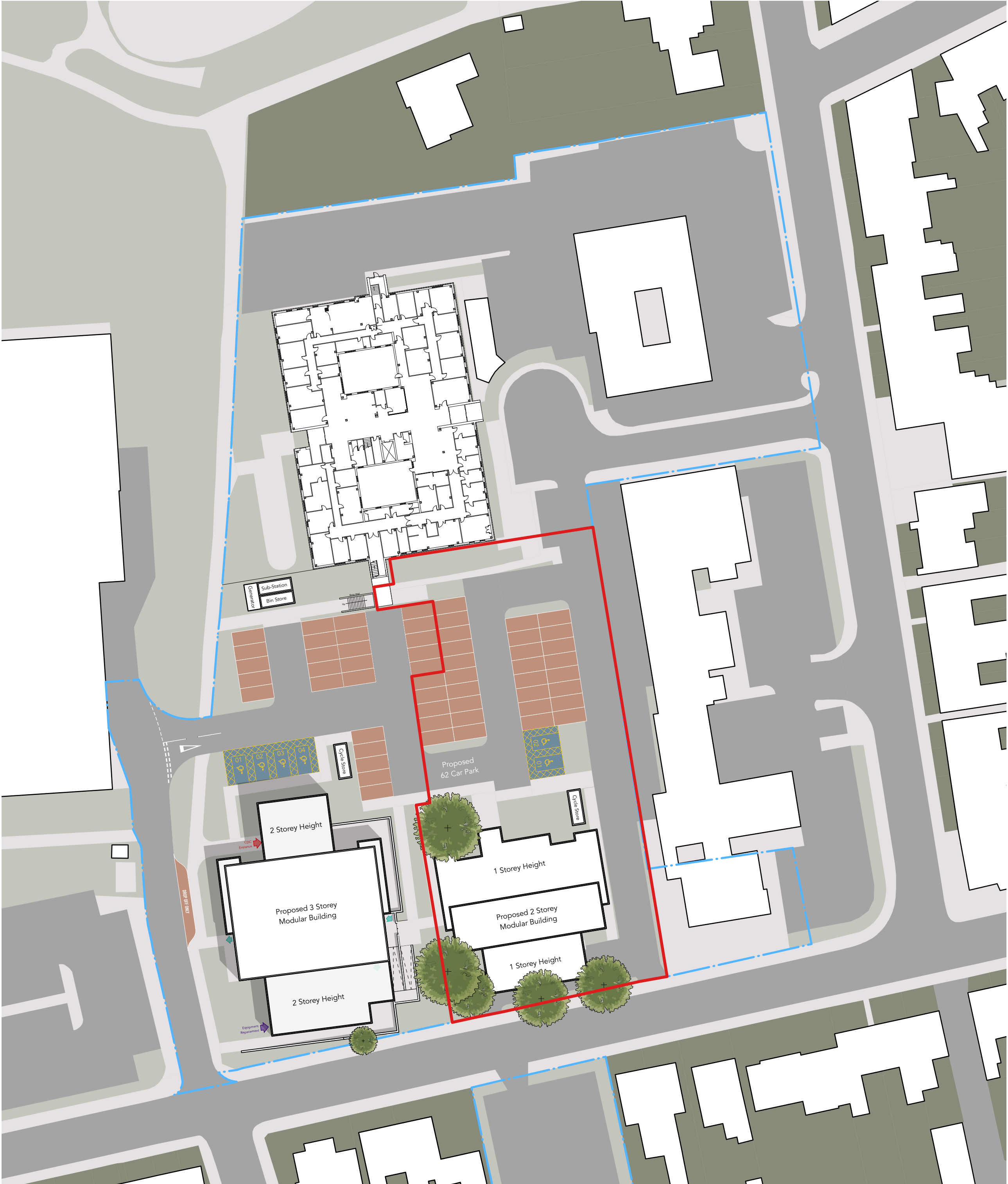
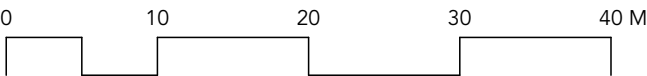
N

North

Key

Application Site Area:
2735.93 sq m
0.274 ha

Land owned/controlled by the
trust



Notes:

This drawing is to be read in conjunction with all other consultants engineers and specialist sub contractors drawings.
All items are to be cross referenced throughout design, tender & construction.

Any discrepancies whatsoever discovered must be reported to the Main Contractor or Contract Administrator (CA) as soon as they become apparent.

The Main Contractor is responsible for checking all dimensions prior to commencement of work.

All specified manufacturers are OSA (or similar approved) OEA (or equal approved) whether stated or not. Any equivalent product or manufacturer must be approved in writing by the CA before use.

All structure shown on these drawings is based on structural philosophy & is to be fully designed, detailed & dimensioned by 'Others'. Refer to Structural Engineers plans for current structural design.

All drawings are to be read in conjunction with project specific NBS (national building specification)

P0121/04/2023Issued for InformationBCP

Rev	Date	Revision Details	Author
-----	------	------------------	--------

StatusPurpose For Issue

S0Initial Issue

designbüro

Home

The Design Buro (Coventry) Ltd
5 Euston Place,
Leamington Spa,
Warwickshire,
CV32 4LN

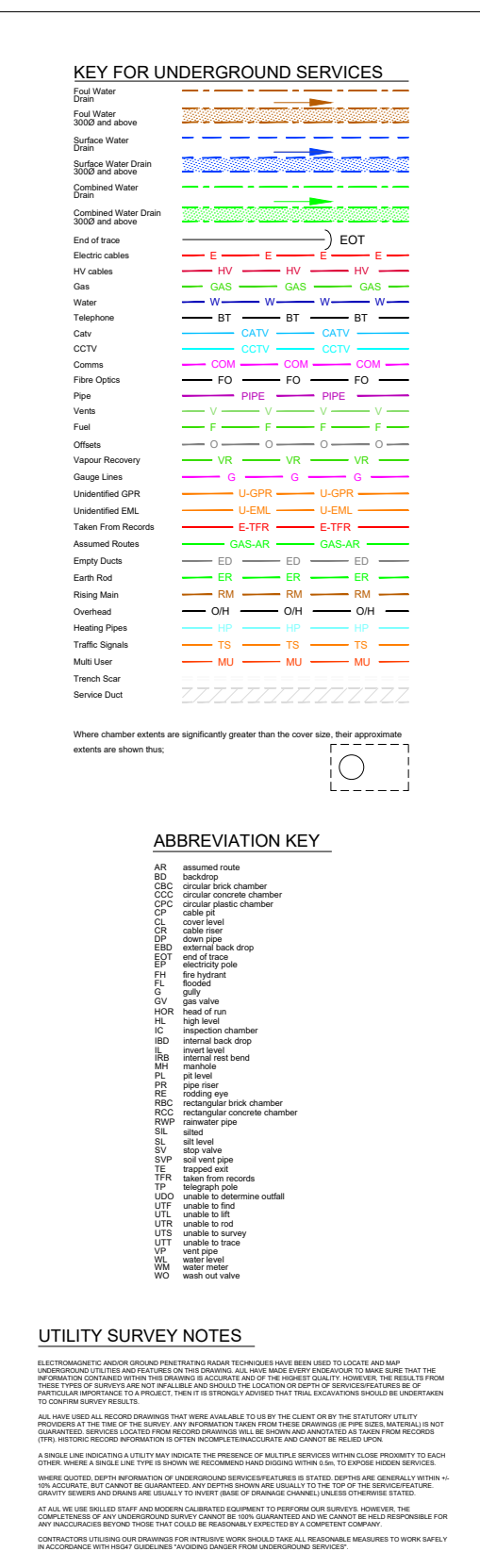
Phone

01788 555350
www.thedesignburo.co.uk

Client	NHS Property Services		
Job	Hinckley Daycase & CDC Business Case Support		
Title	Proposed Site Plan Phase 2		
Drawn BCP	Date Feb 2023	Checked MH	Date Feb 2023
Scale:Size	1:500	@	A2
Drawing Number	Revision		
1782-DBC-ZZ-00-DR-A-0101	P01		

The copyright of this drawing is vested in the Architect/ Designer and must not be copied or reproduced without his written consent. Figured dimensions only to be taken from this drawing. All contractors and / or specialists must visit the site and be responsible for taking and checking all dimensions relative to this work.

B. Topographical and Utility Surveys



Rev	Date	Description

This plan has been surveyed to the scale shown
Caution should be exercised when enlargements are made

Some services may not have been surveyed due to parked vehicles or other obstructions

All dimensions have been measured or estimated from ground level, unless stated otherwise.

Tree species shown should be treated with caution and expert identification is advised.

Drainage Information has been taken from a surface inspection and should be treated as approximate only

All critical dimensions should be confirmed onsite prior to the commencement of any works.

PROJECT

NHS Hinckley & District Hospital Centre
Mount Road Hinckley
LE10 1AG

UTILITY SURVEY	
Drg. No. JA23-4692-1	Date:- Jan 2023
Drawn by A.T.C	Scale:- 1:500(A1)
	Cad Scale 1:1

C L B Surveys Ltd
38 Forest View
Overseal
Swadlincote
Derbyshire
DE12 6GZ

Telephone: 01283 331788
Email: admin@clbsurveys.co.uk

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C. National Planning Policy Framework and Planning Practice Guidance

Table 1 of the Planning Practice Guidance Flood Zones

In accordance with the sequential test in the National Planning Policy Framework, sites are to be classed as follows:

Flood Risk Vulnerability	Definition	Appropriate Uses	FRA Requirements	Policy Aims
Zone 1 – Low Probability	This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).	All uses of land are appropriate in this zone.	For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a FRA. This need only be brief unless the factors above or other local considerations require particular attention.	In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage systems.
Flood Zone 2 – Medium Probability	This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.	Essential infrastructure and the water-compatible, less vulnerable and more vulnerable uses as set out in table 2 are appropriate in this zone. The highly vulnerable uses are only appropriate in this zone if the Exception Test is passed.	All development proposals in this zone should be accompanied by a FRA.	In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage systems.
Zone 3a -High Probability	This zone comprises land assessed as having a 1 in 100 or greater annual probability of river (>1%) or a 1 in 200-year greater annual probability of flooding from the sea (>0.5%) in any year.	The water-compatible and less vulnerable uses of land (table 2) are appropriate in this zone. The highly vulnerable uses in the table below should not be permitted in this zone. The more vulnerable uses and essential infrastructure should only be permitted in this zone if the Exception Test is passed.	All development in this zone should be accompanied by a FRA.	In this zone, developers and local authorities should seek opportunities to: i. reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage systems; ii. relocate existing development to land in zones with a lower probability of flooding; and

Flood Risk Vulnerability	Definition	Appropriate Uses	FRA Requirements	Policy Aims
		Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.		iii. create a space for flooding to occur by restoring functional and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.
Zone 3b - The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local Planning Authorities should identify in their SFRAs areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, should provide a starting point for consideration and discussions to identify the functional floodplain.	Only the water-compatible uses and essential infrastructure listed in table 2 that has to be there should be permitted in this zone. It should be designed and constructed to: • remain operational and safe for users in times of flood; • result in no net loss of floodplain storage; • not impede water flows; and • not increase flood risk elsewhere. Essential infrastructure in this zone should pass the Exception Test.	All development in this zone should be accompanied by a FRA.	In this zone, developers and local authorities should seek opportunities to: i. reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage techniques; and ii. relocate existing development to land with a lower probability of flooding.

National Planning Policy Framework Annex 3 - Flood Risk Vulnerability Classification

Vulnerability	Land Use Types
Essential Infrastructure	- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk; - Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary stations; water treatment works that need to remain operational in times of flood; - Wind turbines. - Solar farms.
Highly Vulnerable	- Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding; - Emergency dispersal points; - Basement dwellings; - Caravans, mobile homes and park homes intended for permanent residential use; - Installations requiring hazardous substances consent.
More Vulnerable	- Hospitals; - Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels; - Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels; - Non-residential uses for health services, nurseries and educational establishments; - Landfill and sites used for waste management facilities for hazardous waste; - Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	- Police stations, Ambulance stations and Fire stations which are not required to be operational during flooding; - Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non-residential institutions not included in 'more vulnerable'; and assembly and leisure; - Land and buildings used for agriculture and forestry; - Waste treatment (except landfill and hazardous waste facilities); - Minerals working and processing (except for sand and gravel working); - Water treatment plants which are not required to be operational during flooding; - Sewage treatment plants (if adequate measures to control pollution and manage sewage during flooding events are in place). - Car parks
Water-compatible Development	- Flood control infrastructure; - Water transmission infrastructure and pumping stations; - Sewage transmission infrastructure and pumping stations; - Sand and gravel workings; - Docks, marinas and wharves; - Navigation facilities; - Ministry of Defence installations; - Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location - Water-based recreation (excluding sleeping accommodation); - Lifeguard and coastguard stations; - Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms; - Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan

Table 2 of the Planning Practice Guidance - Flood Risk Vulnerability and Flood Zone Compatibility

Flood Risk Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	√	√	√	√	√
Zone 2	√	√	Exception Test Required	√	√
Zone 3a	Exception Test Required	√	X	Exception Test Required	√
Zone 3b	Exception Test Required	√	X	X	X

√ - Development is appropriate.

X – Development should not be permitted.

Notes: This table does not show:

1. The application of the Sequential Test which gives development to Flood Zone 1 first, then Zone 2, and then Zone 3;
2. Flood risk assessment requirements; or
3. The policy aims for each flood zone.

D. BGS Borehole Data



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Ltd.

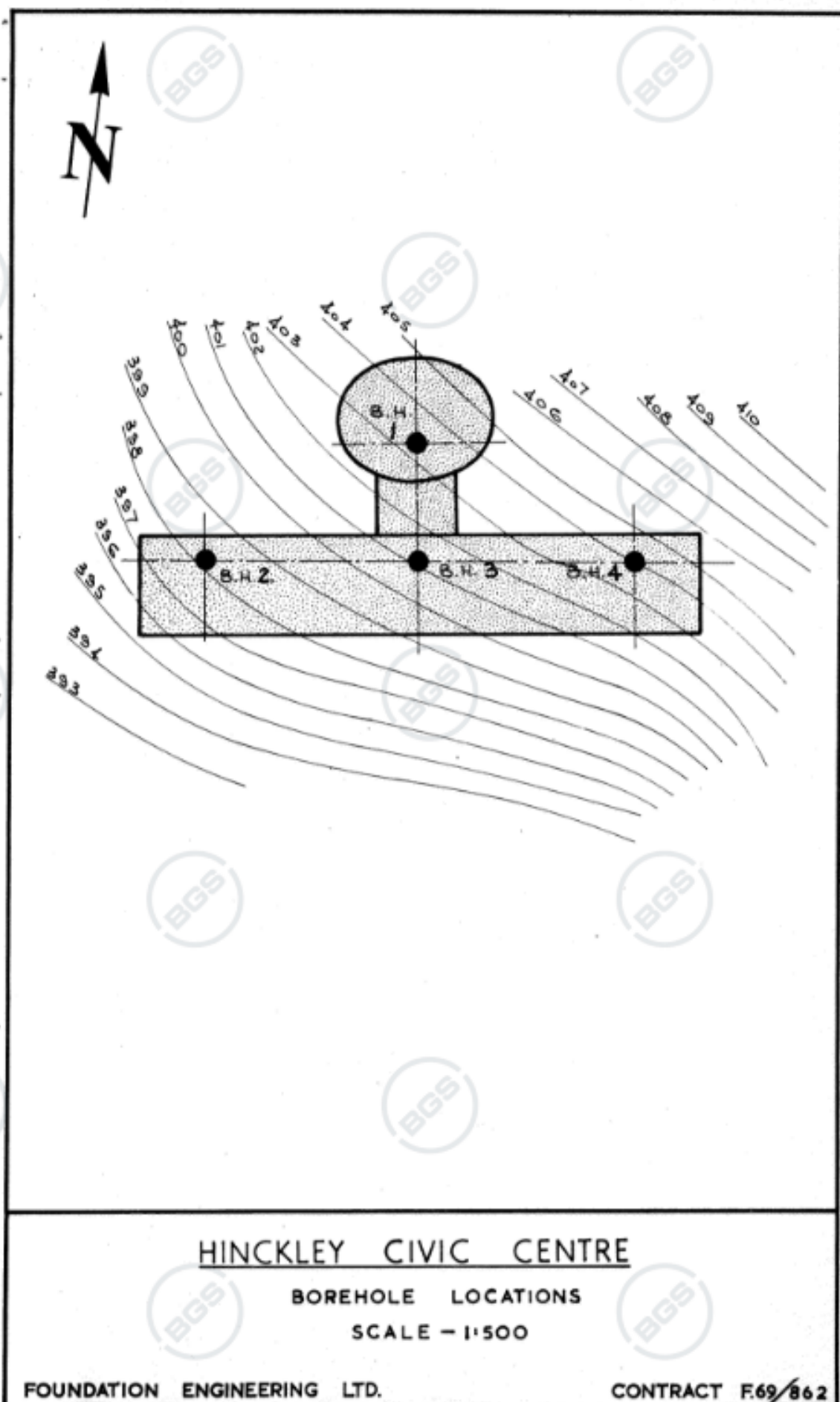
BOREHOLE LOG

LOCATION : HINCKLEY
BOREHOLE DIA : 8"
DATE (Start) : 30-4-1964

BOREHOLE No. : 1
GROUND LEVEL : 403' Newlyn
WATER LEVEL : Borehole dry.

Dates	Description	Thickness	Depth	Sample	Remarks
	TOPSOIL.	2'-0"	0'-0"		
	Firm brown sandy CLAY.	2'-3"	2'-0"	• 1	
	Stiff brown mottled CLAY with some small stones.	4'-3"	4'-3"	• 2	
	6" layer of yellow SAND.	0'-6"	8'-0"		
	Stiff brown/yellow sandy CLAY with small pieces of sandstone.	1'-0"	8'-6"	• 3	
	Red clayey SAND.	4'-6"	10'-6"	• 4	
	Stiff red/brown CLAY with some small stones.	2'-0"	15'-0"	• 5	
			17'-0"		
					BOREHOLE COMPLETED.

BOREHOLE SCALE : 1" = 5' • : DISTURBED SAMPLE I : UNDISTURBED SAMPLE — : STANDARD PENETRATION TEST



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Ltd.

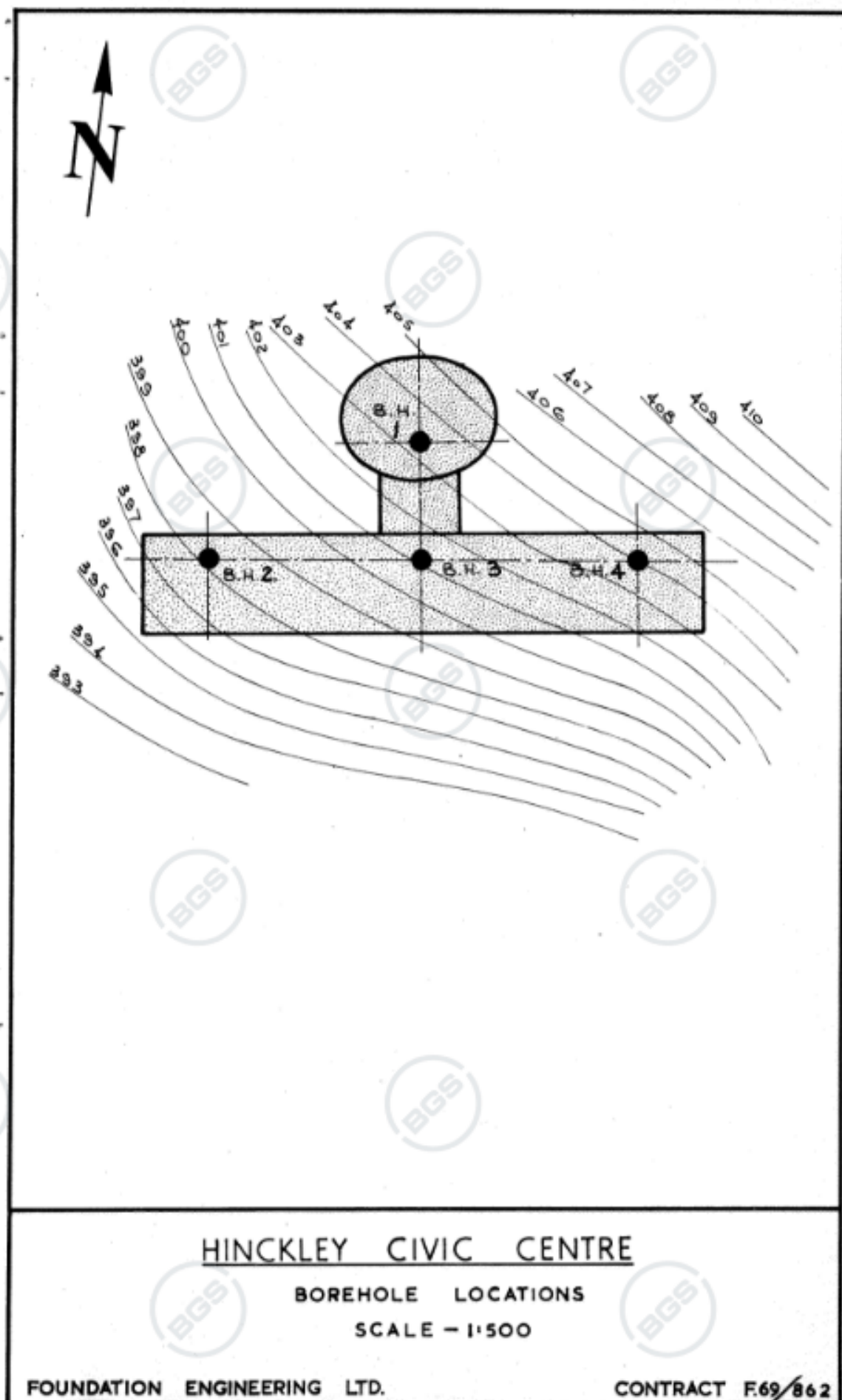
BOREHOLE LOG

LOCATION : HINCKLEY
BOREHOLE DIA: 8"
DATE (Start) : 30-4-1964

BOREHOLE No. : 2
GROUND LEVEL : 398' Newlyn
WATER LEVEL : Borehole dry.

Dates	Description	Thickness	Depth	Sample	Remarks
	TOPSOIL.	2'-0"	0'-0"		
	Firm brown sandy CLAY with a few stones.	3'-0"	2'-0"	•1	
	Soft red clayey SAND.	2'-0"	5'-0"	•2	
	Firm brown/grey mottled CLAY with some stones.	0'-6"	7'-0"		
			7'-6"		
	Firm to stiff brown/red CLAY with some small stones.	11'-6"		•3	
				•4	
			19'-0"	•5	
	Stiff yellow/brown sandy CLAY.	3'-0"			
	Stiff yellow sandy CLAY with pieces of coal.	1'-0"	22'-0"		
			23'-0"	•6	61 blows to drive 9"
					BOREHOLE COMPLETED.

BOREHOLE SCALE: 1"=5' • : DISTURBED SAMPLE I : UNDISTURBED SAMPLE + STANDARD PENETRATION TEST



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Ltd.

BOREHOLE LOG

LOCATION : HINCKLEY

BOREHOLE No. : 3

BOREHOLE DIA. : 8"

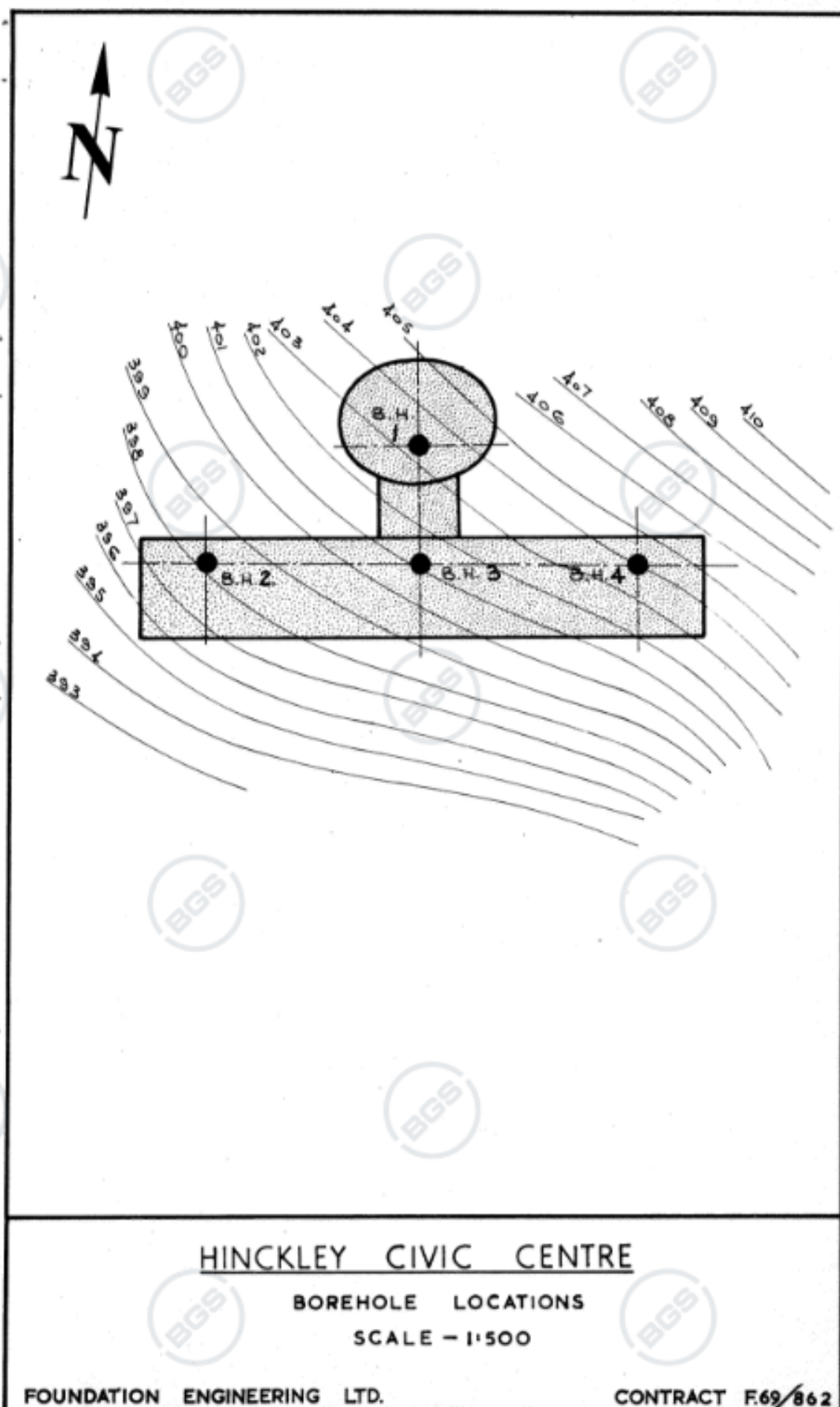
GROUND LEVEL : 40.3' Newlyn

DATE (Start) : 29.4.1964

WATER LEVEL : 10' 8" B.C.L.

Dates	Description	Thickness	Depth	Sample	Remarks
	TOPSOIL.	1'-6"	0'-0"		
	Firm red/brown sandy CLAY with some stones.	2'-0"	1'-6"	• 1	
			3'-6"	• 2	
	Medium density coarse red SAND.	6'-6"			
			10'-0"	• 3	+ 17 blows / ft.
	Medium density SAND with stones & small pieces of sandstone.	4'-6"			
			14'-6"	• 4	
	Clayey silty SAND with some stones.	1'-6"	16'-0"	• 5	30 blows to drive 1'-0"
				• 6	
				• 7	86 blows to drive 1'-0"
				• 8	
	Stiff to hard dark-brown / red sandy silty CLAY with some small stones.	15'-0"			
				• 9	104 blows to drive 1'-0"
				• 10	
				• 11	128 blows to drive 1'-0"
			31'-0"	• 12	
					BOREHOLE COMPLETED.

BOREHOLE SCALE : 1" = 5' • : DISTURBED SAMPLE I : UNDISTURBED SAMPLE + STANDARD PENETRATION TEST



FOUNDATION ENGINEERING
Ltd.

BOREHOLE LOG

LOCATION : HINCKLEY

BOREHOLE No. : 4

BOREHOLE DIA. : 8"

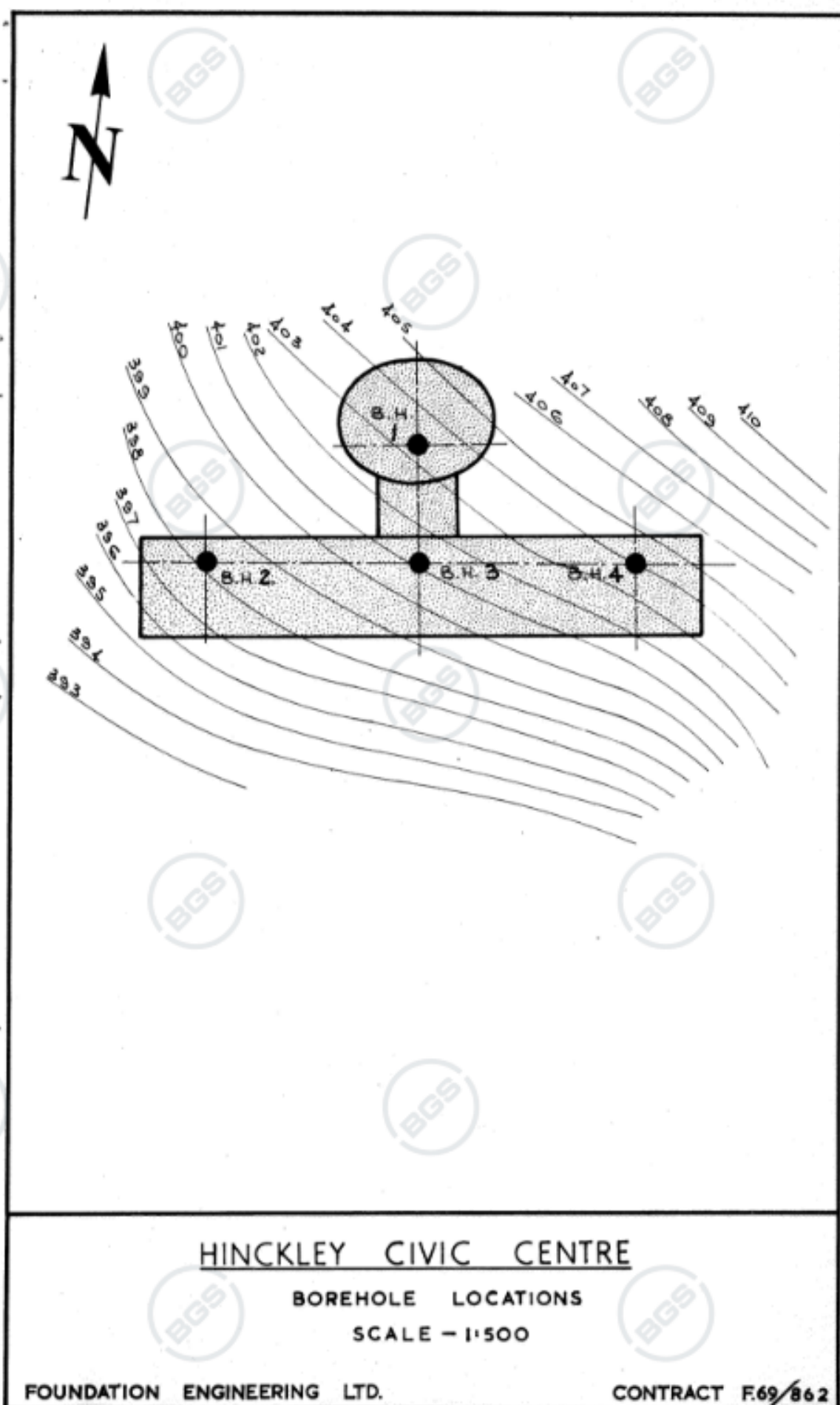
GROUND LEVEL : 40.4' Newlyn

DATE (Start) : 30-4-1964

WATER LEVEL : 11'-0" B.C.L.

Date	Description	Thickness	Depth	Sample	Remarks
	TOPSOIL.	1'-0"	0'-0"		
	Firm brown sandy CLAY.	3'-0"	1'-0"	•1	
			4'-0"	•2	
	Coarse red SAND changing to clayey red SAND, very wet at 9'-0".	11'-0"		•3	
			15'-0"	•4	
	Firm yellow/brown CLAY with small stones.	1'-0"	16'-0"	•5	
	Firm red/brown CLAY with small stones.	1'-0"	17'-0"	•6	
					BOREHOLE COMPLETED.

BOREHOLE SCALE : 1"=5' • : DISTURBED SAMPLE I : UNDISTURBED SAMPLE + STANDARD PENETRATION TEST



E. Severn Trent Water Sewer Map



(c) Crown copyright and database rights 2023 Ordnance Survey 100031673

Date: 23/05/23

Scale: 1:1250

Map Centre: 442944,293731

Data updated: 14/05/23

Our Ref: 1184236 - 1

Wastewater Plan A2

Do not scale off this map. The plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN-TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems. Reproduction by permission of Ordnance Survey on behalf of HMSO. © Crown Copyright and database rights 2023. All rights reserved. Ordnance Survey licence number 100031673. Document users other than SEVERN-TRENT WATER business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.

- | | | | | | |
|--|--|------------------------|--|---------------------------------------|--|
| Public Foul Gravity/Lateral Drain | | Highway Drain | | Manhole Foul | |
| Public Combined Gravity/Lateral Drain | | Overflow Pipe | | Manhole Surface | |
| Public Surface Water Gravity/Lateral Drain | | Disposal Pipe | | Abandoned Pipe | |
| Pressure Foul | | Culverted Water Course | | Chamber | |
| Pressure Combined | | Pumping Station | | Section 104 sewers are shown in green | |
| Pressure Surface Water | | Fitting | | Private sewers are shown in magenta | |

reeya.lal@watermangroup.com

Hinckley Day Care





GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your contractor on site. If any damage is caused to Severn Trent Water Limited (STW) apparatus (defined below), the person, contractor or subcontractor responsible must inform STW immediately on:
0800 783 4444 (24 hours)

- a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991(a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions.
- b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.
- c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.
- d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.
- e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).
- f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

In order to achieve safe working conditions adjacent to any STW Apparatus the following should be observed:

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.
2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).
3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.
4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.
5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.
6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.
7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.
8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.
9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected.
10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.
11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.
12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.
13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,
14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

There are many problems with the location of trees adjacent to sewers, water mains and other STW Apparatus and these can lead to the loss of trees and hence amenity to the area which many people may have become used to. It is best if the problem is not created in the first place. Set out below are the recommendations for tree planting in close proximity to public sewers, water mains and other STW Apparatus.

15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below.
16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.
17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May 2014
18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.
19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose: Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.

	F			
	F			

8507	F	-	0	0
8601	F	-	0	0

F. Greenfield Runoff Calculations

Project:	Date: 09/08/2023			
	Designed by:	Checked by:	Approved By:	
Report Title: Rainfall Analysis Criteria	Company Address: BMAS2			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall		
FSR	Type: FSR	
Region	England And Wales	
M5-60 (mm)	19.8	
Ratio R	0.400	
Summer	☒	
Winter	☒	

Return Period	
Return Period (years)	Increase Rainfall (%)
100.0	40.000

Storm Durations	
Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520
7200	14400
8640	17280
10080	20160

Project:	Date: 09/08/2023			
	Designed by:	Checked by:	Approved By:	
Report Title: UK and Ireland Rural Runoff Calculator	Company Address: BMAS2			

ICP SUDS / IH 124

Details

Method	ICP SUDS
Area (ha)	0.274
SAAR (mm)	700.0
Soil	0.47
Region	Region 4
Urban	0
Return Period (years)	100

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 100 (years) (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Region 4	1.3	1.3	3.4	1.1	2.6	3.4

G. InfoDrainage Calculation Results

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023		
	Designed by: AS	Checked by:	Approved By:
Report Details: Type: Junctions Storm Phase: Phase	Waterman Infrastructure and Environment:		



Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
1	Manhole	442952.982	293694.874	124.500	1.150	123.350	Circular	1.200
2	Manhole	442970.885	293698.408	124.500	1.332	123.168	Circular	1.200
3	Manhole	442968.823	293712.550	124.450	1.372	123.078	Circular	1.200
4	Manhole	442962.813	293741.575	124.500	1.607	122.893	Circular	1.200
5	Manhole	442957.172	293740.486	124.500	1.667	122.833	Circular	1.200
8	Manhole	442964.003	293751.016	124.450	1.770	122.680	Circular	1.350
9	Manhole	442971.276	293712.677	124.450	1.892	122.558	Circular	1.200
10	Manhole	442973.058	293694.945	124.800	2.594	122.206	Circular	1.200
6	Manhole	442941.976	293727.983	124.500	1.425	123.075	Circular	1.200
7	Manhole	442940.199	293737.209	124.500	1.484	123.016	Circular	1.200
11	Manhole	442972.020	293686.565	124.910	2.915	121.995	Circular	1.200

Name	Lock
1	None
2	None
3	None
4	None
5	None
8	None
9	None
10	None
6	None
7	None
11	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
1	Inlet	Catchment Area	(None)	No Restriction
2	Inlet	1.000	(None)	No Restriction
3	Inlet (1)	Catchment Area (1)	(None)	No Restriction
4	Inlet	1.001	(None)	No Restriction
5	Inlet (1)	Catchment Area (2)	(None)	No Restriction
6	Inlet	1.002	(None)	No Restriction
7	Inlet (1)	Catchment Area (6)	(None)	No Restriction
8	Inlet (2)	Catchment Area (3)	(None)	No Restriction
9	Inlet	2.001	(None)	No Restriction
10	Inlet (1)	1.003	(None)	No Restriction
11	Inlet	Catchment Area (5)	(None)	No Restriction
8	Inlet	1.005	(None)	No Restriction
9	Inlet	1.006	(None)	No Restriction
10	Inlet	1.007	(None)	No Restriction
6	Inlet	Catchment Area (4)	(None)	No Restriction
7	Inlet	2.000	(None)	No Restriction
11	Inlet	1.008	(None)	No Restriction

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
1	Outlet	1.000	Free Discharge
2	Outlet	1.001	Free Discharge
3	Outlet	1.002	Free Discharge
4	Outlet	1.003	Free Discharge
5	Outlet	1.004	Free Discharge
8	Outlet	1.006	Free Discharge
9	Outlet	1.007	Free Discharge
10	Outlet	1.008	Free Discharge
6	Outlet	2.000	Free Discharge
7	Outlet	2.001	Free Discharge

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023		
	Designed by: AS	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Waterman Infrastructure and Environment:		



Cellular Storage

Type : Cellular Storage

Dimensions

Exceedance Level (m)	124.500
Depth (m)	0.800
Base Level (m)	122.710
Number of Crates Long	32
Number of Crates Wide	15
Number of Crates High	1
Porosity (%)	95
Crate Length (m)	0.65
Crate Width (m)	0.65
Crate Height (m)	0.8
Total Volume (m ³)	155.118

Inlets

Inlet

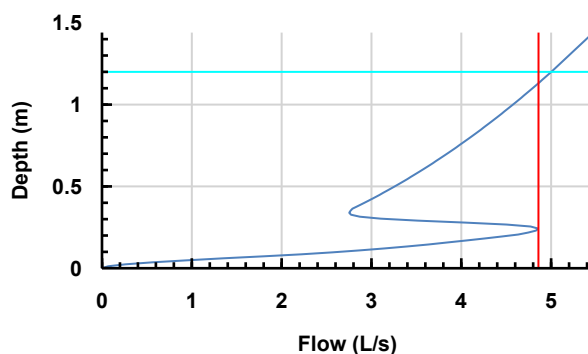
Inlet Type	Point Inflow
Incoming Item(s)	1.004
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	1.005
Outlet Type	Hydro-Brake®
Invert Level (m)	122.710
Design Depth (m)	1.200
Design Flow (L/s)	5.0
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0098-5000-1200-5000
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WIE19849: HINCKLEY DAYCASE BUILDING		Date: 15/08/2023			
		Designed by: AS	Checked by:		Approved By:
Report Details: Type: Connections Storm Phase: Phase		Waterman Infrastructure and Environment:			

Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)
1.000	18.249	Pipe	100.000		0.6	150	124.500	123.350
1.001	14.292	Pipe	160.000		0.6	225	124.500	123.168
1.002	29.641	Pipe	160.000		0.6	225	124.450	123.078
1.003	5.744	Pipe	96.225		0.6	300	124.500	122.893
1.006	39.022	Pipe	320.000		0.6	300	124.450	122.680
1.007	17.822	Pipe	50.622		0.6	300	124.450	122.558
1.008	8.444	Pipe	40.000		0.6	300	124.800	122.206
2.000	9.396	Pipe	160.000		0.6	225	124.500	123.075
2.001	17.286	Pipe	160.000		0.6	225	124.500	123.016
1.004	3.541	Pipe	28.737		0.6	300	124.500	122.833
1.005	3.360	Pipe	112.011		0.6	375	124.500	122.710

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Lock	Flow Restriction (L/s)
1.000	124.500	123.168	None	
1.001	124.450	123.078	None	
1.002	124.500	122.893	None	
1.003	124.500	122.833	None	
1.006	124.450	122.558	All	
1.007	124.800	122.206	All	
1.008	124.910	121.995	All	
2.000	124.500	123.016	None	
2.001	124.500	122.908	None	
1.004	124.500	122.710	None	
1.005	124.450	122.680	Levels	5.0

WIE19849: HINCKLEY DAYCASE BUILDING		Date: 15/08/2023			
		Designed by: AS	Checked by:		Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase		Waterman Infrastructure and Environment:			

Name	Cover Level (m) Invert Level (m)		Connection Details				Type
Coordinates (m)	Depth (m)	Manhole Size (m)	Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
1	124.500 123.350	Diameter / Length: 1.200					Manhole
E:442952.982 N:293694.874	1.150						
			{a} 1.000	Pipe	123.350	Diam/Width:150	Not Applicable
2	124.500 123.168	Diameter / Length: 1.200	{1} 1.000	Pipe	123.168	Diam/Width:150	Manhole
E:442970.885 N:293698.408	1.332						
			{a} 1.001	Pipe	123.168	Diam/Width:225	Not Applicable
3	124.450 123.078	Diameter / Length: 1.200	{1} 1.001	Pipe	123.078	Diam/Width:225	Manhole
E:442968.823 N:293712.550	1.372						
			{a} 1.002	Pipe	123.078	Diam/Width:225	Not Applicable
4	124.500 122.893	Diameter / Length: 1.200	{1} 1.002	Pipe	122.893	Diam/Width:225	Manhole
E:442962.813 N:293741.575	1.607						
			{a} 1.003	Pipe	122.893	Diam/Width:300	Not Applicable
5	124.500 122.833	Diameter / Length: 1.200	{1} 2.001	Pipe	122.908	Diam/Width:225	Manhole
E:442957.172 N:293740.486	1.667		{2} 1.003	Pipe	122.833	Diam/Width:300	
			{a} 1.004	Pipe	122.833	Diam/Width:300	Not Applicable

WIE19849: HINCKLEY DAYCASE BUILDING		Date: 15/08/2023			
		Designed by: AS	Checked by:		Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase		Waterman Infrastructure and Environment:			

Name	Cover Level (m) Invert Level (m)		Connection Details				Type
Coordinates (m)	Depth (m)	Manhole Size (m)	Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
8	124.450 122.680	Diameter / Length: 1.350	{1} 1.005	Pipe	122.680	Diam/Width:375	Manhole
E:442964.003 N:293751.016	1.770		{a} 1.006	Pipe	122.680	Diam/Width:300	Not Applicable
9	124.450 122.558	Diameter / Length: 1.200	{1} 1.006	Pipe	122.558	Diam/Width:300	Manhole
E:442971.276 N:293712.677	1.892		{a} 1.007	Pipe	122.558	Diam/Width:300	Not Applicable
10	124.800 122.206	Diameter / Length: 1.200	{1} 1.007	Pipe	122.206	Diam/Width:300	Manhole
E:442973.058 N:293694.945	2.594		{a} 1.008	Pipe	122.206	Diam/Width:300	Not Applicable
6	124.500 123.075	Diameter / Length: 1.200					Manhole
E:442941.976 N:293727.983	1.425		{a} 2.000	Pipe	123.075	Diam/Width:225	Not Applicable
7	124.500 123.016	Diameter / Length: 1.200	{1} 2.000	Pipe	123.016	Diam/Width:225	Manhole
E:442940.199 N:293737.209	1.484		{a} 2.001	Pipe	123.016	Diam/Width:225	Not Applicable

WIE19849: HINCKLEY DAYCASE BUILDING		Date: 15/08/2023			
		Designed by: AS	Checked by:		Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase		Waterman Infrastructure and Environment:			

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
11	124.910 121.995	Diameter / Length: 1.200	{1} 1.008	Pipe	121.995	Diam/Width:300	Manhole
E:442972.020	2.915						
N:293686.565							Not Applicable

WIE19849: HINCKLEY DAYCASE BUILDING		Date: 15/08/2023			
		Designed by: AS	Checked by:		Approved By:
Report Details: Type: Inflow Summary Storm Phase: Phase		Waterman Infrastructure and Environment:			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	1		Time of Concentration	0.041	100	0	100	0.041
Catchment Area (1)	2		Time of Concentration	0.024	100	0	100	0.024
Catchment Area (2)	3		Time of Concentration	0.035	100	0	100	0.035
Catchment Area (3)	4		Time of Concentration	0.027	100	0	100	0.027
Catchment Area (4)	6		Time of Concentration	0.056	100	0	100	0.056
Catchment Area (5)	5		Time of Concentration	0.052	100	0	100	0.052
Catchment Area (6)	4		Time of Concentration	0.038	100	0	100	0.038
TOTAL		0.0		0.273				0.273

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023		
	Designed by: AS	Checked by:	Approved By:
Report Details: Type: Network Design Report Storm Phase: Phase Flow Path: Secondary flow	Waterman Infrastructure and Environment:		



Name	From	To	Length (m)	Connection Type	Slope (1:X)	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)
2.000	6	7	9.396	Pipe	160.00	0.6	225	124.500
2.001	7	5	17.286	Pipe	160.00	0.6	225	124.500

Name	Upstream Invert Level (m)	Downstream Cover Level (m)	Downstream Invert Level (m)	Total Area (ha)	Total Impermeable Area (ha)	Total Contributing Area (ha)	Volumetric Runoff Coefficient	Local Time of Concentration (mins)
2.000	123.075	124.500	123.016	0.056	0.056	0.042	0.750	5
2.001	123.016	124.500	122.908	0.056	0.056	0.042		0

Name	Time Of Travel (mins)
2.000	
2.001	

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023			
	Designed by: AS	Checked by:	Approved By:	
Report Details: Type: Network Design Report Storm Phase: Phase Flow Path: Flow Path	Waterman Infrastructure and Environment:			

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023		
	Designed by: AS	Checked by:	Approved By:
Report Details: Type: Network Design Report Storm Phase: Phase Flow Path: Flow Path (1)	Waterman Infrastructure and Environment:		



Name	From	To	Length (m)	Connection Type	Slope (1:X)	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)
1.000	1	2	18.249	Pipe	100.000	0.6	150	124.500
1.001	2	3	14.292	Pipe	160.000	0.6	225	124.500
1.002	3	4	29.641	Pipe	160.000	0.6	225	124.450
1.003	4	5	5.744	Pipe	96.225	0.6	300	124.500
Branch: 2.000								
2.000	6	7	9.396	Pipe	160.000	0.6	225	124.500
2.001	7	5	17.286	Pipe	160.000	0.6	225	124.500
1.004	5	Cellular Storage	3.541	Pipe	28.737	0.6	300	124.500
1.005	Cellular Storage	8	3.360	Pipe	112.011	0.6	375	124.500
1.006	8	9	39.022	Pipe	320.000	0.6	300	124.450
1.007	9	10	17.822	Pipe	50.622	0.6	300	124.450
1.008	10	11	8.444	Pipe	40.000	0.6	300	124.800

Name	Upstream Invert Level (m)	Downstream Cover Level (m)	Downstream Invert Level (m)	Total Area (ha)	Total Impermeable Area (ha)	Total Contributing Area (ha)	Volumetric Runoff Coefficient	Local Time of Concentration (mins)
1.000	123.350	124.500	123.168	0.041	0.041	0.030	0.750	5
1.001	123.168	124.450	123.078	0.064	0.064	0.048	0.750	5
1.002	123.078	124.500	122.893	0.100	0.100	0.075	0.750	5
1.003	122.893	124.500	122.833	0.165	0.165	0.124	0.750	5
Branch: 2.000								
2.000	123.075	124.500	123.016	0.056	0.056	0.042	0.750	5
2.001	123.016	124.500	122.908	0.056	0.056	0.042		0
1.004	122.833	124.500	122.710	0.273	0.273	0.205	0.750	5
1.005	122.710	124.450	122.680	0.273	0.273	0.205		0
1.006	122.680	124.450	122.558	0.273	0.273	0.205		0
1.007	122.558	124.800	122.206	0.273	0.273	0.205		0
1.008	122.206	124.910	121.995	0.273	0.273	0.205		0

Name	Time Of Travel (mins)	Rainfall Intensity (mm/hr)	Total Base Flow (L/s)	Proportional Velocity (m/s)	Capacity Limited to 75% (L/s)	Full Bore Velocity (m/s)	Capacity (L/s)	Flow (L/s)
1.000	5.30	158.634		1.142	17.7567	1.005	17.7567	17.4042
1.001	5.53	156.108		1.101	40.9943	1.031	40.9943	27.2600
1.002	6.01	151.178		1.170	40.9943	1.031	40.9943	40.7559
1.003	6.07	150.591		1.669	113.3133	1.603	113.3133	67.3004
Branch: 2.000								
2.000	5.15	160.341		1.075	40.9943	1.031	40.9943	24.4013
2.001	5.43	157.215		1.075	40.9943	1.031	40.9943	24.4013
1.004	6.10	150.277		2.055	129.8534	1.837	129.8534	111.1434
1.005	6.14	149.960		1.778	189.0094	1.711	189.0094	111.1434
1.006	6.88	143.166		0.873	61.7427	0.873	61.7427	111.1434
1.007	7.02	142.025		2.396	156.5692	2.215	156.5692	111.1434
1.008	7.07	141.551		2.631	176.2483	2.493	176.2483	111.1434

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023			
	Designed by: AS	Checked by:	Approved By:	
Report Details: Type: Network Design Criteria Storm Phase: Phase	Waterman Infrastructure and Environment:			

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

FSR

Type: FSR

Return Period (years)	100.0
Region	England And Wales
M5-60 (mm)	19.8
Ratio R	0.400

Pipe Options

Lock Slope Options	None
Design Level	Level Soffits
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Pipe Size Library

Default

Add. Increment (mm)	75
---------------------	----

Diameter (mm)	Min. Slope (1:X)	Max. Slope (1:X)
100	0.00	0.00
150	0.00	0.00

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023			
	Designed by: AS	Checked by:	Approved By:	
Report Details: Type: Network Design Criteria Storm Phase: Phase	Waterman Infrastructure and Environment:			

Manhole Options

Apply Offset

An error has occurred while processing TextBox
'txtSynchroniseManholeInvertLevelsHeader':
The expression contains object 'SynchroniseManholeInvertLevelsTitle' that is
not defined in the current context.



Manhole Size Library

Default

Diameter / Width

Connection (mm)	Diameter / Length (m)	Width (m)
0	1.200	0.000
375	1.350	0.000
500	1.500	0.000
750	1.800	0.000

Additional Sizing

Connection (mm)	900
Diameter / Length (m)	0.900
Width (m)	0.000

Depth

Depth (m)	Diameter / Length (m)	Width (m)
0.000	1.050	0.000
1.500	1.200	0.000

Access

Depth (m)	Ladder Protrusion (mm)
0.000	130
3.000	230

Benching Requirements

Landing Width (mm)	500
Benching Width (mm)	225

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023			
	Designed by: AS	Checked by:	Approved By:	
Report Details: Type: Outfall Details Storm Phase: Phase	Waterman Infrastructure and Environment:			

Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
11	Free Discharge		

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023			
	Designed by: AS	Checked by:	Approved By:	
Report Title: Rainfall Analysis Criteria	Waterman Infrastructure and Environment:			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall		
FSR	Type: FSR	
Region	England And Wales	
M5-60 (mm)	19.8	
Ratio R	0.400	
Summer	☒	
Winter	☒	

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0.000
30.0	0.000
100.0	40.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520
7200	14400

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023			
	Designed by: AS	Checked by:	Approved By:	
Report Title: UK and Ireland Rural Runoff Calculator	Waterman Infrastructure and Environment:			

ICP SUDS / IH 124

Details

Method	ICP SUDS
Area (ha)	0.274
SAAR (mm)	700.0
Soil	0.47
Region	Region 4
Urban	0
Return Period (years)	100

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 100 (years) (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Region 4	1.3	1.3	3.4	1.1	2.6	3.4

WIE19849: HINCKLEY DAYCASE BUILDING		Date: 15/08/2023			
		Designed by: AS	Checked by:		Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Waterman Infrastructure and Environment:			



Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Cellular Storage	FSR: 100 years: +40 %: 240 mins: Winter	123.427	123.427	0.717	0.717	30.1	138.088	0.000	0.000	4.9	87.343	10.979	OK

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023			
	Designed by: AS	Checked by:	Approved By:	
Report Details: Type: Inflow Results Storm Phase: Phase	Waterman Infrastructure and Environment:			



Catchment Area

Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	25.2
Total Inflow Volume (m³)	11.628

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	6.8
10	25.2
15	6.8
20	0.1
25	0.0
30	0.0

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023			
	Designed by: AS	Checked by:	Approved By:	
Report Details: Type: Inflow Results Storm Phase: Phase	Waterman Infrastructure and Environment:			



Catchment Area (1)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	14.9
Total Inflow Volume (m³)	6.878

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	4.0
10	14.9
15	4.0
20	0.0
25	0.0
30	0.0

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023			
	Designed by: AS	Checked by:	Approved By:	
Report Details: Type: Inflow Results Storm Phase: Phase	Waterman Infrastructure and Environment:			



Catchment Area (2)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	21.8
Total Inflow Volume (m³)	10.064

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	5.9
10	21.8
15	5.9
20	0.1
25	0.0
30	0.0

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023			
	Designed by: AS	Checked by:	Approved By:	
Report Details: Type: Inflow Results Storm Phase: Phase	Waterman Infrastructure and Environment:			



Catchment Area (3)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	16.9
Total Inflow Volume (m³)	7.835

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	4.6
10	16.9
15	4.6
20	0.0
25	0.0
30	0.0

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023			
	Designed by: AS	Checked by:	Approved By:	
Report Details: Type: Inflow Results Storm Phase: Phase	Waterman Infrastructure and Environment:			



Catchment Area (4)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	34.9
Total Inflow Volume (m³)	16.132

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	9.4
10	34.9
15	9.5
20	0.1
25	0.0
30	0.0

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023			
	Designed by: AS	Checked by:	Approved By:	
Report Details: Type: Inflow Results Storm Phase: Phase	Waterman Infrastructure and Environment:			



Catchment Area (5)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	32.2
Total Inflow Volume (m³)	14.886

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	8.7
10	32.2
15	8.7
20	0.1
25	0.0
30	0.0

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023			
	Designed by: AS	Checked by:	Approved By:	
Report Details: Type: Inflow Results Storm Phase: Phase	Waterman Infrastructure and Environment:			



Catchment Area (6)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	23.7
Total Inflow Volume (m³)	10.959

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	6.4
10	23.7
15	6.4
20	0.1
25	0.0
30	0.0

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023		
	Designed by: AS	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Waterman Infrastructure and Environment:		



Cellular Storage
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 240 mins: Winter

Type : Cellular Storage

Tables

Half Drain Down Time (mins)	291
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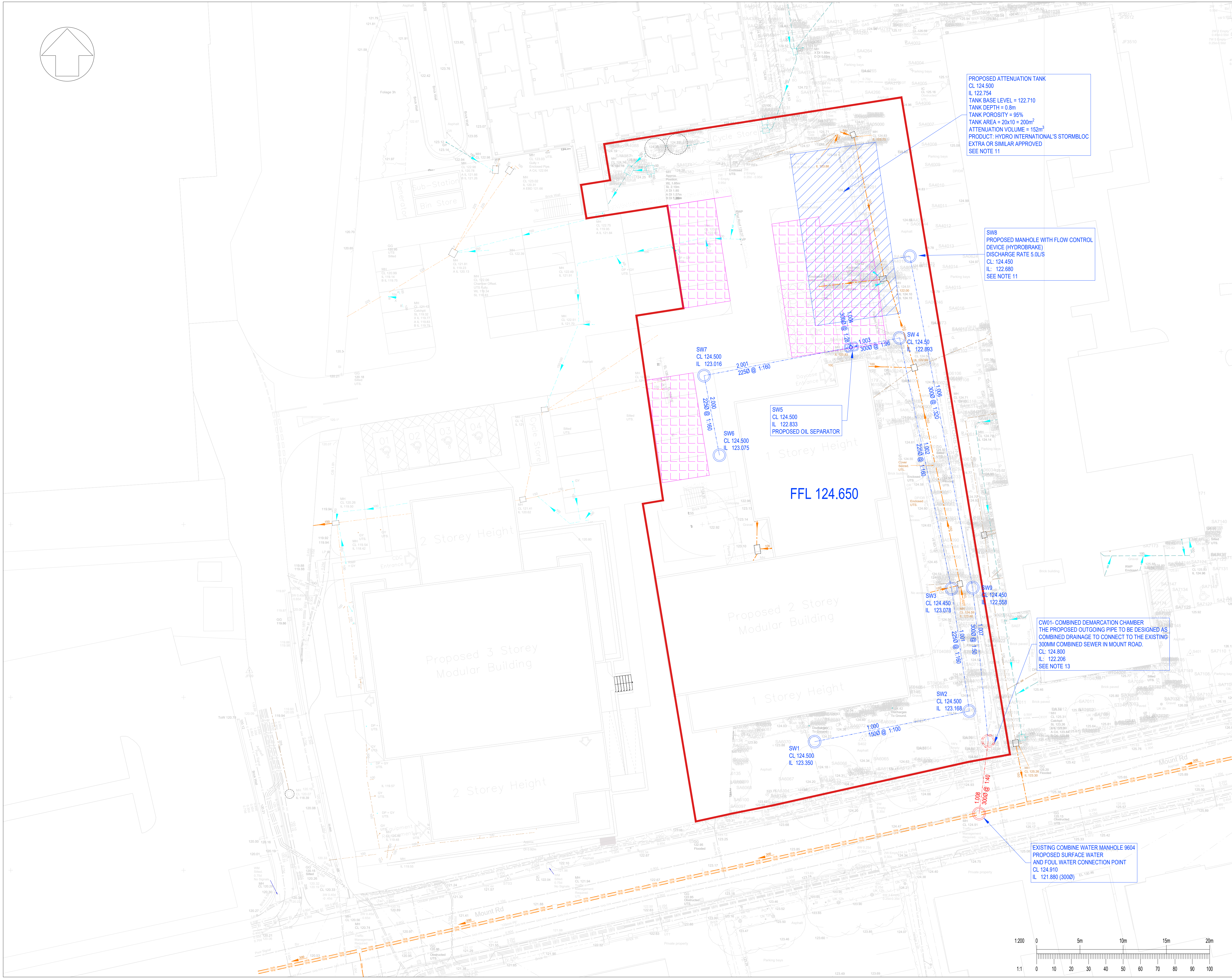
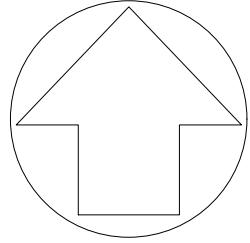
Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0
5	0.4	0.000	0.033	0.000	0.0
10	2.5	0.002	0.441	0.000	0.0
15	4.1	0.008	1.456	0.000	0.0
20	5.1	0.015	2.831	0.000	0.1
25	5.5	0.023	4.389	0.000	0.1
30	5.6	0.031	6.005	0.000	0.2
35	5.7	0.040	7.615	0.000	0.4
40	5.7	0.048	9.183	0.000	0.5
45	5.7	0.056	10.715	0.000	0.7
50	6.0	0.064	12.244	0.000	0.9
55	6.5	0.072	13.824	0.000	1.1
60	7.3	0.081	15.530	0.000	1.3
65	8.4	0.091	17.443	0.000	1.5
70	9.8	0.102	19.654	0.000	1.9
75	11.6	0.116	22.240	0.000	2.2
80	13.6	0.131	25.288	0.000	2.6
85	15.9	0.150	28.875	0.000	3.0
90	18.4	0.172	33.059	0.000	3.4
95	20.9	0.197	37.865	0.000	3.8
100	23.7	0.225	43.261	0.000	4.2
105	26.6	0.256	49.306	0.000	4.7
110	27.1	0.290	55.827	0.000	4.9
115	29.3	0.327	62.965	0.000	3.7
120	30.1	0.368	70.882	0.000	2.8
125	30.0	0.411	79.131	0.000	2.8
130	28.7	0.452	87.006	0.000	3.0
135	26.8	0.491	94.472	0.000	3.1
140	25.0	0.526	101.318	0.000	3.2
145	22.8	0.558	107.518	0.000	3.3
150	20.5	0.587	113.017	0.000	3.4
155	18.1	0.612	117.787	0.000	3.5
160	15.8	0.632	121.822	0.000	3.5
165	13.6	0.650	125.157	0.000	3.6
170	11.6	0.664	127.846	0.000	3.6
175	9.8	0.675	129.945	0.000	3.7
180	8.4	0.683	131.568	0.000	3.7
185	7.3	0.689	132.806	0.000	3.7
190	6.5	0.694	133.754	0.000	3.7
195	6.0	0.698	134.502	0.000	3.7
200	5.7	0.701	135.128	0.000	3.7
205	5.6	0.704	135.693	0.000	3.7
210	5.6	0.707	136.238	0.000	3.7
215	5.6	0.710	136.781	0.000	3.8
220	5.5	0.713	137.306	0.000	3.8
225	5.1	0.715	137.768	0.000	3.8
230	4.4	0.717	138.074	0.000	3.8

WIE19849: HINCKLEY DAYCASE BUILDING	Date: 15/08/2023		
	Designed by: AS	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Waterman Infrastructure and Environment:		



Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Total Outflow (L/s)
235	3.2	0.717	138.088	0.000	3.8
240	1.2	0.714	137.628	0.000	3.8
245	0.2	0.710	136.713	0.000	3.8
250	0.2	0.704	135.641	0.000	3.7
255	0.2	0.698	134.572	0.000	3.7
260	0.2	0.693	133.509	0.000	3.7
265	0.2	0.687	132.452	0.000	3.7
270	0.2	0.682	131.400	0.000	3.7
275	0.2	0.677	130.355	0.000	3.7
280	0.2	0.671	129.313	0.000	3.7
285	0.2	0.666	128.277	0.000	3.6
290	0.2	0.660	127.245	0.000	3.6
295	0.2	0.655	126.217	0.000	3.6
300	0.2	0.650	125.195	0.000	3.6
305	0.2	0.644	124.177	0.000	3.6
310	0.2	0.639	123.158	0.000	3.6
315	0.2	0.634	122.142	0.000	3.5
320	0.2	0.629	121.132	0.000	3.5
325	0.2	0.623	120.127	0.000	3.5
330	0.2	0.618	119.127	0.000	3.5
335	0.2	0.613	118.133	0.000	3.5
340	0.2	0.608	117.144	0.000	3.5
345	0.2	0.603	116.160	0.000	3.5
350	0.2	0.598	115.181	0.000	3.4
355	0.2	0.593	114.206	0.000	3.4
360	0.2	0.588	113.238	0.000	3.4
365	0.2	0.583	112.276	0.000	3.4
370	0.2	0.578	111.320	0.000	3.4
375	0.2	0.573	110.371	0.000	3.4
380	0.2	0.568	109.428	0.000	3.4
385	0.2	0.563	108.489	0.000	3.3
390	0.2	0.558	107.554	0.000	3.3
395	0.2	0.553	106.625	0.000	3.3
400	0.2	0.549	105.702	0.000	3.3
405	0.2	0.544	104.785	0.000	3.3
410	0.2	0.539	103.872	0.000	3.3
415	0.2	0.534	102.965	0.000	3.2
420	0.2	0.530	102.063	0.000	3.2
425	0.2	0.525	101.166	0.000	3.2
430	0.2	0.520	100.275	0.000	3.2
435	0.2	0.516	99.389	0.000	3.2
440	0.2	0.511	98.507	0.000	3.2
445	0.2	0.507	97.631	0.000	3.2
450	0.2	0.502	96.759	0.000	3.1
455	0.2	0.498	95.892	0.000	3.1
460	0.3	0.493	95.030	0.000	3.1
465	0.3	0.489	94.173	0.000	3.1
470	0.3	0.484	93.322	0.000	3.1
475	0.3	0.480	92.474	0.000	3.1
480	0.3	0.476	91.627	0.000	3.1

H. Surface Water Drainage Strategy



This drawing should not be scaled. Dimensions to be verified on site.
Any discrepancies should be referred to the Engineer prior to work being put in hand.

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Pickfords Wharf, Clink Street, London SE1 1JG 1 020 7928 7888 1 033333 444 501

GENERAL NOTES

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEER, ARCHITECT'S OR OTHER RELEVANT DRAWINGS AND SPECIFICATIONS.
- ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE BY THE CONTRACTOR PRIOR TO PREPARING ANY WORKING DRAWINGS OR COMMENCING ON SITE.
- THE CONTRACTOR MUST ENSURE AND WILL BE HELD RESPONSIBLE FOR THE OVERALL STABILITY OF THE BUILDING/STRUCTURE/EXCAVATION AT ALL STAGES OF THE WORK.
- ALL WORK BY THE CONTRACTOR MUST BE CARRIED OUT IN SUCH A WAY THAT ALL REQUIREMENTS UNDER THE HEALTH AND REGULATIONS.
- ALL WORK IS TO BE CARRIED OUT IN COMPLIANCE WITH THE REQUIREMENTS OF THE RELEVANT STATUTORY AUTHORITIES
- THE PROPOSED ARCHITECTS LAYOUT IS BASED ON THE DESIGN BURD'S DRAWING *1782-08C-ZZ-00-DR-A-0101 DATED 19 JULY 2023, REV P02
- THE TOPOGRAPHICAL SURVEY INFORMATION IS BASED ON SURVEY SOLUTIONS DRAWING *2442-01 DATED 24/05/19.
- THE EXISTING UTILITY SURVEY INFORMATION IS BASED ON CL B SURVEY LTD'S DRAWING *JAZ3-4892-1 DATED JANUARY 2023.
- THE EXISTING PUBLIC SEWER INFORMATION IS BASED ON SEVERN TRENT'S SEWER RECORD PLAN
- CATCHMENT AREA IS CALCULATED BASED ON THE OVERALL IMPERMEABLE AREA FOR THE SITE IS 0.274HA.
- THE PROPOSED OVERALL ATTENUATION STORAGE VOLUME OF 149M³ IS SIZED BASED ON A MAXIMUM ALLOWABLE SURFACE WATER DISCHARGE RATE OF 5 L/S FOR THE 1 IN 100 YEAR CRITICAL STORM RETURN PERIOD WITH 40% ALLOWANCE FOR CLIMATE CHANGE ALLOWANCE FOR CLIMATE CHANGE.
- THE LOCATION AND SIZE OF THE PROPOSED ATTENUATION STORAGE SYSTEMS & PROPOSED LINEAR DRAINAGE CHANNELS ARE SUBJECT TO COORDINATION WITH THE LANDSCAPING PROPOSAL AND OTHER PROPOSED WORKS.
- THE PROPOSED SURFACE WATER DRAINAGE STRATEGY IS SUBJECT TO FURTHER SITE INVESTIGATIVE WORKS AND THIRD PARTIES APPROVAL.
- THE PROPOSED SURFACE WATER DRAINAGE STRATEGY IS BASED ON ASSUMED FINISHED FLOOR LEVELS AND EXTERNAL LEVELS.
- THE PROPOSED FINISHED FLOOR LEVELS AND EXTERNAL LEVELS ARE BASED ON INFORMATION RECEIVED FROM NHS PROPERTY SERVICES.

KEY

- PROPOSED SITE BOUNDARY
- EXISTING PRIVATE FOUL WATER DRAINAGE (SEE NOTE 8)
- EXISTING PRIVATE SURFACE WATER DRAINAGE (SEE NOTE 8)
- EXISTING PRIVATE COMBINED WATER DRAINAGE (SEE NOTE 8)
- EXISTING PUBLIC COMBINED WATER SEWER (SEE NOTE 8)
- PROPOSED COMBINED SEWER
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED OIL SEPARATOR
- PROPOSED ATTENUATION TANK
- PROPOSED PERMEABLE PAVING

A01	15.08.23	FIRST ISSUE	AS	SS
Rev	Date	Description	By	Chk
Amendments				
Project				
HINCKLEY DAYCASE BUILDING				
Title				
PROPOSED SURFACE WATER DRAINAGE STRATEGY				
Client				
NHS PROPOERTY SERVICES				
				
5th Floor, One Cornwall Street, Birmingham, B3 2DX T: 0121 212 7700 mail@watermangroup.com www.watermangroup.com				
Work Stage		STAGE 2 Concept design		
Subsidiary		RIBA		
Designed By		Director		
AS		SS		
Drawn By		Waterman Ref		
AS		WIE19849		
Project		Discipline		
Originator		Functional		
Spatial		Form		
Number		Revision		
August 2023		Scales @ A1		
1:200		1:200		
19849-WIE-ZX-ZX-DR-D-92-002		A01		

A1-Wat-ISO-S-2023, X-JAZ3-4692-1 utilities, X-Proposed Site Plan Phase2(Edition)

Our vision

“Engineering a better environment for people and the planet”

Our mission

“To solve complex problems for the benefit of clients, communities and the climate”

Our values

People orientated

Individually and collectively, people are our business. We strive to create environments for everyone to flourish and thrive.

Flexible

Pragmatic by nature and dedicated to getting the job done to the highest possible standard.

Professional

Operating at pace with integrity to deliver technical and robust solutions.

Environmentally aware

We understand our responsibility to the environment, it shapes our decision making and informs our practice.

Innovative

Our forensic questioning provides the ability to deliver appropriate innovations at every stage on every project.

Relationship focused

We value individuality and the benefits of working collaboratively to achieve positive outcomes for all.

