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Flood Risk Assessment

Proposed Residential Development at

Edwina Mountbatten House, Romsey

On behalf of

Churchill Retirement Living

June 2023

Document History and Status

Project Number 23763

Date	Version	Prepared By	Reviewed By	Approved By
19 May 2023	1.0	Steve Doughty Director	Stuart Magowan IEng MICE	Stuart Magowan IEng MICE
12 June 2023	1.1	Steve Doughty Director	Stuart Magowan IEng MICE	Stuart Magowan IEng MICE

CONTENTS

1 Non Technical Summary

1.1 This Flood Risk Assessment has been undertaken in accordance with the National Planning Policy Framework on behalf of Churchill Retirement Living in support of a Planning Application for the demolition Edwina Mountbatten House care home in Romsey, Hampshire and the construction of 47 retirement living apartments within a single building.

1.2 This Assessment is to be read in conjunction with all planning, architectural and other reports that accompany the Outline Planning Application for the proposed development.

1.3 The site is located in Fluvial Flood Zones 1, 2 and 3.

1.4 The proposed building will be located outside Flood Zone 3 and will have a finished floor level set in accordance with the Environment Agency publication 'Accounting for Residential Uncertainty – an update to fluvial freeboard guide' such that the building is located above Flood Zone 2 and effectively within Flood Zone 1.

1.5 The proposed development will incorporate a sustainable drainage system which will discharge surface water at a suitably restricted rate to the Tadburn Lake via one of the existing headwalls at the southern site boundary and provide storage for all storm return periods up to and including the 1:100 year rainfall event with an allowance for climate change.

1.6 Foul drainage will be discharged by gravity to the existing public foul sewer located within the southeast corner of the site.

1.7 This report concludes that the new accommodation is not at risk of flooding from tidal or fluvial sources, overland flows, or groundwater.

1.8 In terms of flood risk the proposed development is suitable at this location.

2 Planning Policy Context

2.1 National Planning Policy Framework

2.1.1 The National Planning Policy Framework was updated in July 2021.

2.1.2 With regard to planning and flood risk the policy framework states that *'when determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment.*

Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

a) 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;

b) the development is appropriately flood resistant and resilient, such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.'

2.1.3 With regard to major developments the NPPF states that *'major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:*

a) take account of advice from the lead local flood authority;

b) have appropriate proposed minimum operational standards;

c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and

d) where possible, provide multifunctional benefits.'

2.1.4 Major development is defined as follows:

'For housing, development where 10 or more homes will be provided, or the site has an area of 0.5 hectares or more. For non-residential development it means additional floorspace of 1,000m^2 or more, or a site of 1 hectare or more, or as

otherwise provided in the Town and Country Planning (Development Management Procedure) (England) Order 2015.'

2.1 Lead Local Flood Authority

2.1.1 Hampshire County Council became a Lead Local Flood Authority under the Flood and Water Management Act 2010 and was given a series of new responsibilities to coordinate the management of local flood risk.

2.1.2 As part of its role Hampshire County Council has commissioned and produced the following documents:

Preliminary Flood Risk Assessment – April 2011
Groundwater Management Plan – October 2013
Local Flood Risk Management Strategy – 2013
TG8-1 Drainage General Technical Guidance Note - March 2023

2.1.3 The above documents have been reviewed in the preparation of this report.

2.2 Test Valley Borough Council

2.2.1 Test Valley Council has commissioned and produced a Strategic Flood Risk Assessment in September 2007 which has been reviewed in the preparation of this report.

2.3 Local Planning Policy

2.3.1 The Test Valley Borough Revised Local Plan DPD - 2011 - 2029 was adopted by Test Valley Borough Council on 27 January 2016.

2.3.2 **Policy E7** Water Management is of specific relevance to this Flood Risk Assessment and states that *'development will be permitted provided that:*

a) it does not result in the deterioration of and, where possible, assists in improving water quality and be planned to support the attainment of the requirements of the Water Framework Directive;

b) it complies with national policy and guidance in relation to flood risk;

c) it does not result in a risk to the quality of groundwater within a principal aquifer, including Groundwater Source Protection Zones and there is no risk to public water supplies;'

3 Existing Site

3.1 Site Location

3.1.1 The development site is located on the south side of Broadwater Road, Romsey, Hampshire SO51 8GG and is centred on Ordnance Survey reference SU 354 210.

Image 1: Site Location

3.1.2 The site is within a well establish urban area and is bounded on its north side by Barnhorn Road, it's south by the river known as the Tadburn Lake, it's east by the B3398 Palmerston Street and its west by commercial and residential properties.

3.1.3 The Tadburn Lake is classified as Main River.

3.1.4 A copy of the site location plan is located in Appendix 1 at the rear of this report.

3.2 Site Description

3.2.1 The site is approximately 3,022m^2 in area and currently accommodates the vacant Edwina Mountbatten House care home.

3.2.2 Existing ground levels are highest at the northwest corner of the site at approximately 17m AOD. The site falls towards its southeast corner to a lowest level of approximately 15.3m AOD.

3.2.3 The existing care home has a finished flood level of approximately 16.4m AOD.

3.2.4 The areas of the various positively drained elements of the existing site are summarised as follows:

Roof Areas	1,111m^2
Access Road and Parking Areas	534m^2

3.2.5 A copy of the existing site layout plan is located in Appendix 2 at the rear of this report.

3.3 Existing Drainage

3.3.1 There is a public surface water sewer located beneath Broadwater Road which comprises a 150mm diameter public surface water sewer the depth of which is unrecorded, which discharges to the Tadburn Lake at the southeast corner of the site via a 525mm diameter public surface water sewer located at a depth of 1.6m beneath the B3398 Palmerston Street to the east of the site.

3.3.2 There are also a total of four headwalls located along the southern site boundary which discharge to the Tadburn Lake.

3.3.3 Surface water from the site is discharged in an unrestricted manner in part to the public surface water sewer located beneath Broadwater Road and in part to the headwalls located along the southern site boundary.

3.3.4 There is a 300mm diameter public foul sewer located at a depth of 2m beneath the B3398 Palmerston Street to the east of the site which flows into a 375mm diameter public foul sewer which crosses the site at its southeast corner.

3.3.5 Foul water is believed to discharge on part to the existing public foul sewer locate beneath the B3398 Palmerston Street and in part to the section of that same sewer which is located within the site boundary.

3.3.6 A copy of the sewer records is located in Appendix 3 at the rear of this report.

3.4 Geology and Groundwater

3.4.1 Site investigation has confirmed the presence of 200-400mm of sandy and gravely silts over river terrace deposits to a depth of at least 4m below ground level. Groundwater seepage was encountered at approximately 4m below ground level.

3.4.2 The site investigation indicates that seasonal variation could see groundwater levels rising to between 2 and 3m below ground level.

3.4.3 Ground water monitoring will be required to confirm and site specific investigation will be required to whether permeability of surface water to ground

by infiltration will provide a variable surface water drainage solution for the redevelopment of the site.

3.4.4 The site investigation confirms that *'based on the ground conditions encountered at the site, it is considered that soakaway drainage within the River Terrace Deposits will be constrained by the relatively shallow groundwater (and possible seasonal fluctuations of the adjoining brook). Hence, this may constrain soakaways to very shallow systems (that may or may not provide a practicable solution). It is recommended that allowance be made for an alternative drainage solution in the instance that soakaways are not feasible.'*

3.4.5 Extracts from the site investigation are located in Appendix 4 at the rear of this report.

4 Flood Zone, and Flood History

4.1 Tidal Flood Zone

4.1.1 The site is located in Tidal Flood Zone 1 and is not at risk of flooding from tidal sources from anything less extreme than a 1:1,000 year flood event.

4.2 Fluvial Flood Zone

4.2.1 The Environment Agency's online mapping confirms that the site is located in Fluvial Flood Zones 1 and 2 with Fluvial Flood Zone 3 encroaching at the centre of its southern boundary.

4.2.2 The fluvial flood level data upon which the online Environment Agency maps is based on modelling undertaken between 2010 and 2015. The predicted climate change models were updated in October 2021 and as such an uplift of future flood levels will be required.

4.2.3 The Environment Agency have been contacted in that regard and provided updated flood levels in March 2023 which confirm the highest 1:1,000 year flood level of 16.54m AOD at the approximate centre of the southern site boundary.

4.3 Flood History

4.3.1 Environment Agency

4.3.1.1 The Environment Agency online maps of historic flood incidents do not identify any historic incidents of flooding in the locality of the site.

4.3.2 Hampshire County Council

4.3.2.1 Neither the Preliminary Flood Risk Assessment dated April 2011, the Groundwater Management Plan dated October 2013, nor the Local Flood Risk Management Strategy dated 2013 identify any specific flood incidents in the immediate vicinity of the site.

4.3.3 Test Valley Borough Council

4.3.3.1 The Strategic Flood Risk Assessment dated September 2007 does not identify any specific flood incidents in the immediate vicinity of the site.

4.3.4 Copies of the available flood maps and correspondence are located in Appendix 5 at the rear of this report.

5 Flooding Potential

5.1 Tidal Flooding

5.1.1 The site is located 7km north of Southampton Water and is not at risk of tidal flooding.

5.2 Fluvial Flooding

5.2.1 The site is located in Fluvial Flood Zones 1 and 2 and encroaching into Fluvial Flood Zone 3 at the centre of its southern boundary.

5.2.2 The proposed building will however be located only within Flood Zones 1 and 2 and will have a finished floor level set 300mm above that of the existing building at 16.7m AOD, above the updated Flood Zone 2 and 3 levels provided by the Environment Agency thereby locating the building effectively within Flood Zone 1.

5.3 Fluvial Uplift

5.3.1 The fluvial flood level data supplied by the Environment Agency is based on the data model from 2011 undertaken by Hyder. The predicted climate change models were updated in October 2021.

5.3.2 Guidance issued by the Environment agency, (Thames Region), identifies three possible approaches to account for flood risk impacts due to climate change in new development proposals as follows:

'1. Basic - Developer can add an allowance to the 'design flood' (i.e. 1% annual probability) peak levels to account for potential climate change impacts. The allowance should be derived and agreed locally by Environment Agency teams.

2. Intermediate - Developer can use existing modelled flood and flow data to construct a stage-discharge rating curve, which can be used to interpolate a flood level based on the required peak flow allowance to apply to the 'design flood' flow.

3. Detailed - Perform detailed hydraulic modelling, through either re-running Environment Agency hydraulic models (if available) or construction of a new model by the developer.'

5.3.3 For major development the basic or intermediate approach are deemed suitable by the guidance noted above.

5.3.4 Product 5 modelling data undertaken by Hyder in 2011 was requested from the Environment Agency to establish modelled flow and corresponding levels such that an updated assessment of Fluvial Uplift could be established, however the Environment Agency have confirmed that they no longer have access to the original modelling data and the PDF version files which they possess are corrupted.

5.3.5 As a result modelled flow values are unavailable and the Intermediate approached identified above cannot be progressed.

5.3.6 The Environment Agency have been consulted with regard to determining a suitable finished floor level following the Basic Approach noted above.

5.3.7 A summary of the request made (a full copy of which is located within the correspondence in Appendix 5 at the rear of this response) is as follows:

'as we are trying to set a finished floor level for the development we would normally add climate change uplift however as the modelled discharge data for the corresponding flood level data is not available we normally suggest that setting a finished floor level 300mm above the 1,000 year flood level would be suitable….

To help us progress we confirm the existing building on site, (which is indicated outside the flood mapping), has a finished floor level of approximately 16.4m AOD.

Can we, with your agreement, adopt a finished floor level for the site of 16.7m AOD?

This would place the proposed building 400mm-700mm above the 1,000 year flood levels noted at the north of the site at nodes 1, 2, 3 and 4 (the only data available) and between 10mm and 1.2m above the quoted 100 year flood levels at the south of the site at nodes 5, 6 and 8.'

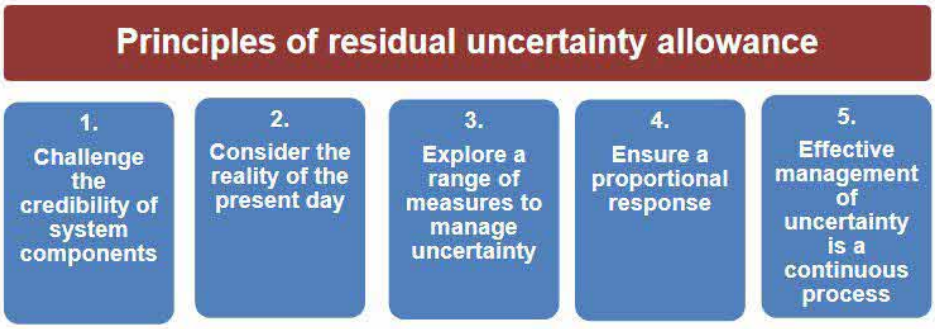
5.3.8 The Environment Agency have referred The Civil Engineering Practice to their publication *'Accounting for Residential Uncertainty – an update to fluvial freeboard guide'* details of which can be found at the following link:

https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/accounting-for-residual-uncertainty-an-update-to-the-fluvial-freeboard-guide

5.3.9 That process has been followed and is discussed below.

5.4 Fluvial Freeboard

5.4.1 The EA Publication 'Accounting for Residential Uncertainty – an update to fluvial freeboard guide' sets out 5 principles of residual uncertainty allowance as follows:



5.4.2 The principles are further described as follows:

5.4.3 **Principle 1** Credibility of System Components

5.4.3.1 Accounting for Residential Uncertainty – an update to fluvial freeboard guide notes that *'In flood risk assessments (FRAs), good practice such as setting the finished floor levels at a safe height is encouraged. This means that the development or internal floors within them should be dry during particular flood events. This height includes an allowance for uncertainties in the analysis.'*

5.4.3.2 Modelled node data has been supplied by the Environment Agency which confirms both 1:100 year flood levels and 1:1,000 year flood levels.

5.4.3.3 As previously noted the original modelling data is no longer available as such an accurate prediction for future fluvial uplift is not possible.

5.4.3.4 The level data supplied by the Environment Agency is based on Modelling by Hyder which took account of general topography within the catchment.

5.4.3.5 Topography is understood to have been based on LiDAR data which is inherently less accurate that a site specific topographical survey.

5.4.4 **Principle 2** Reality of the Present Day

5.4.4.1 Correspondence received from the Environment Agency confirms that the site has no history of flooding from any source.

5.4.4.2 Modelled levels have been queried in the production of this Flood Risk Assessment and were clarified by the Environment Agency on 28 March 2023.

5.4.5 **Principle 3** Range of Measures used to Manage Uncertainty

5.4.5.1 With regard to the setting of finished floor level it has been proposed that a finished ground floor level of 16.7m AOD be adopted such that the proposed building is located above both the 1:100 year and the 1,000 year flood levels noted at the north and south of the site.

5.4.5.1 Calculations undertaken in relation to the surface water drainage proposals for the proposed development have been undertaken using Causeway Flow Software taking account of the currently predicted increase in pluvial event noted at
https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall
to include an upper end allowance for increased peak rainfall of 45% during a 1:100 year future rainfall event.

5.4.5.2 Storage is proposed to accommodate all surface water during such an event and the site will not contribute to any existing flood waters experienced during such times.

5.4.6 **Principle 4** Ensure the Response is Proportionate

5.4.6.1 The processes undertaken so far have sought to establish a suitable finished flood level based against the revised flood level data supplied by the Environment Agency in March 2023 by providing a finished floor level above both the 1:100 and 1:1,000 year flood levels whilst not elevating the site significantly above the surrounding land.

5.4.6.2 The proposed 300mm increase to existing ground floor levels provides a proportionate response to the predicted 1:100 and 1:1,000 year flood levels.

5.4.6.3 Raising levels further could be considered a disproportionate proposal given the anticipated design life of the development and the remaining uncertainties in regard of future climate change which is discussed below.

5.4.7 **Principle 5** Effective Management of Uncertainty is a Continuous Process

5.4.7.1 The proposed finished ground floor level seeks to ensure the new building is protected against flooding during storm return periods beyond the normal 1:100yr storm event required by current National Policy for a development of this type but also up to the 1:1,000 year storm event.

5.4.7.2 Flood risk of the site can re-evaluated throughout the life of the development and if further flood resilience is require this could be provided by supplementary defences such as flood boards at building entrances.

5.4.7.3 A drainage maintenance plan is proposed so as to ensure that the new surface water drainage system remains fully functional during the life of the building.

5.4.8 Following the above process the proposed finished ground floor level for the site of 16.7m AOD is considered to meet the principles of residual uncertainty and provides a suitable proportional response to the challenge and uncertainty of climate change.

5.5 Groundwater Flooding

5.5.1 The site investigation indicates that seasonal variation could see groundwater levels rising to between 2 and 3m below ground level.

5.5.2 There is no recorded history of groundwater flooding at this location but site specific groundwater monitoring should be undertaken.

5.5.3 There are no records identified within Hampshire County Council's Preliminary Flood Risk Assessment, Groundwater Management Plan or Local Flood Risk Management Strategy or in Test Valley Borough Council's Strategic Flood Risk Assessment of groundwater flooding affecting the site.

5.6 Overland Flow

5.6.1 The Environment Agency maps confirm that the B3398 Palmerston Street form a surface water flow route during the low risk (between 1:100 and 1:1,000 year) scenario with a depth of flow of approximately 300mm during such events.

5.6.2 The flood mapping contained within the various flood documents produced by Hampshire County Council and Test Valley Borough Council does not identify any flood risk associated with overland flow routes.

5.7 Flood Routing

5.7.1 The natural route for flood waters to dissipate, should any event occur on the site, is towards Tadburn Lake adjacent to the southern boundary.

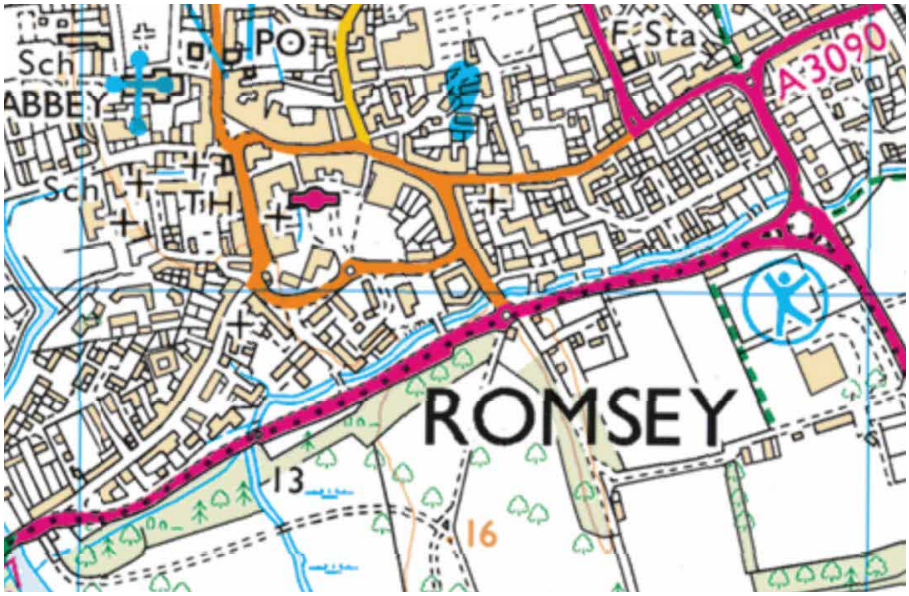


Image 2: Local Topography

5.8 Advance Flood Warning

5.8.1 The site is located within a Flood Warning Area with alerts typically raised 5 days before a predicted flood event.

5.8.2 Flood warnings can be signed up for at www.fws.environment-agency.gov.uk or by phone using the Environment Agency's Floodline service on 0345 988 1188.

6 Development Proposals

6.1 Description

6.1.1 The development proposals are for the demolition of the existing vacant care home and the construction of 47 new retirement living apartments within one building together with associated car parking and landscaping.

6.1.2 The areas of the various positively drained elements of the development are summarised as follows:

Roof Areas	1,503m^2
Patio and Paths	103m^2
Substation and Bin Store Area	75m^2
Access Road and Parking Areas	493m^2

6.2 Finished Flood Levels

6.2.1 Following the proceed detailed in the Environment Agency's publication The EA Publication 'Accounting for Residential Uncertainty – an update to fluvial freeboard guide' the proposed finished ground floor level for the new building will be set at 300mm above that of the existing building at 16.7m AOD.

6.2.2 This will locate the building above the updated Flood Zones 2 and 3 levels provided by the Environment Agency thereby locating the building exclusively within Flood Zone 1.

6.2.3 A copy of the proposed site layout plan is located in Appendix 6 at the rear of this report.

6.3 Surface Water Drainage

6.3.1 CIRIA report C753 The SuDS Manual-v6 provides guidance on surface water drainage. The aim for surface water runoff is to match greenfield runoff rates and volumes where reasonably achievable.

6.3.2 For surface water discharge, the drainage hierarchy notes the following list of drainage options in order of preference:

1 Infiltration to ground

2 Discharge to a watercourse

3 Discharge to a surface water sewer

4 Discharge to a foul water sewer

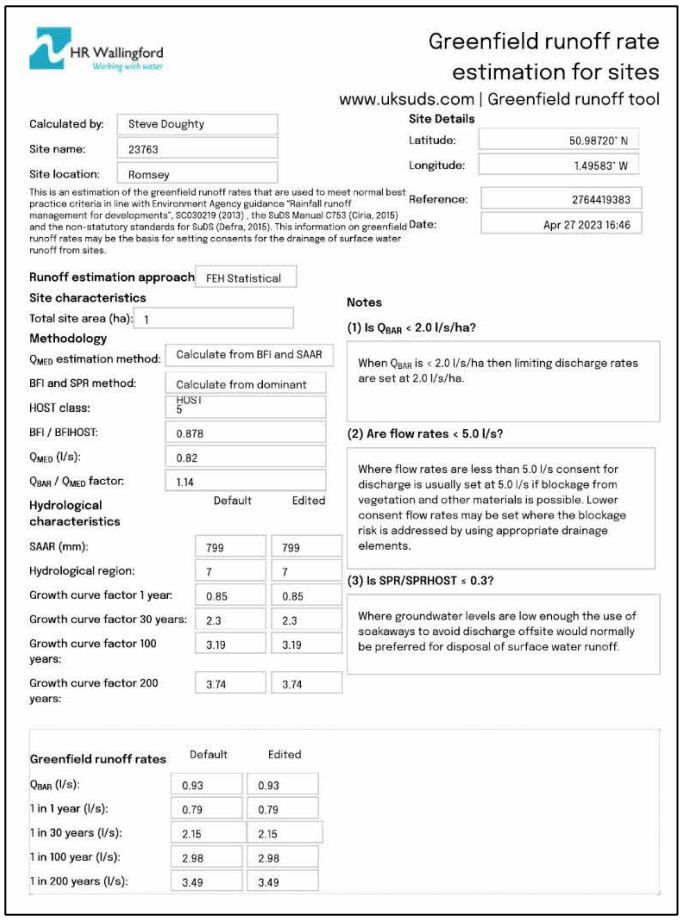
6.3.3 The preferred surface water drainage strategy should where possible be based on infiltration to ground, however, the site is underlain by River Terrace Deposits which as noted in the Site Investigation will be constrained by the relatively shallow groundwater, and infiltration is not considered a practical method of discharging surface water runoff from this site.

6.3.4 The proposed surface water drainage strategy will be based on a restricted discharge to the Tadburn Lake via one of the existing headwalls at the southern site boundary.

6.3.5 In order to provide the maximum benefit to the wider area it is proposed to restrict runoff to the predeveloped greenfield equivalent of the site.

6.3.6 Pre-developed greenfield runoff rates have been established using the HR Wallingford tool for Greenfield runoff estimation based on the FEH Statistical method for rainfall estimation.

6.3.7 The Hydrology of Soil Type (HOST) has been confirmed by the National Soil Resources Institute at Cranfield University as soil type 5 which is classified as *'Free draining permeable soils in unconsolidated sands or gravels with relatively high permeability and high storage capacity.'*



HR Wallingford
Working with water

Greenfield runoff rate estimation for sites
www.uksuds.com | Greenfield runoff tool

Calculated by: Steve Doughty
Site name: 23763
Site location: Romsey

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

Site Details

Latitude:	50.98720° N
Longitude:	1.49583° W
Reference:	2764419383
Date:	Apr 27 2023 16:46

Runoff estimation approach FEH Statistical

Site characteristics

Total site area (ha): 1

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Calculate from dominant
HOST class:	HOST 5
BFI / BFIHOST:	0.878
Q_{MED} (l/s):	0.82
Q_{BAR} / Q_{MED} factor:	1.14

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

Hydrological characteristics	Default	Edited
SAAR (mm):	799	799
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	0.93	0.93
1 in 1 year (l/s):	0.79	0.79
1 in 30 years (l/s):	2.15	2.15
1 in 100 year (l/s):	2.98	2.98
1 in 200 years (l/s):	3.49	3.49

Image 3: Greenfield Runoff Calculation

6.3.8 The total impermeable area of the site will be approximately 2,174m^2 and the equivalent greenfield runoffs are as follows:

Q_{bar} (approximate 1:2 year)	at 0.93 l/s/ha	0.20 l/s
1:30 year	at 2.15 l/s/ha	0.47 l/s
1:100 year	at 3.49 l/s/ha	0.76 l/s

6.3.9 HR Wallingford guidance recommends a maximum restriction of 5l/s. Rates of 2l/s are however now achievable.

6.3.10 Preliminary calculations indicate that with a restricted rate of 2l/s during the 1:100 year +45% rainfall event an 800mm deep 95% voided storage crate of 166m^2 in area would be required to store the peak pluvial event.

6.3.11 The drainage proposals will be confirmed at detailed design stage subject to further site investigations and testing and if infiltration is found to be viable the storage requirement will be reduced.

6.4 Foul Drainage

6.4.1 Foul drainage will be discharged by gravity to the existing public foul sewer located within the southeast corner of the site.

6.4.2 Copies of the preliminary drainage strategy plan and calculations are located in Appendix 7 and an exceedance flow route plan is located in Appendix 8 at the rear of this report.

6.5 Water Quality

6.5.1 The proposed development is for residential use. In accordance with CIRIA SuDS Manual 2015 (Report C753), the pollution hazard level for this type of development is classified as between very low and low depending on the use / area of the site.

6.5.2 The surface water scheme will include mitigation to ensure that surface water is suitably treated and any pollution risk adequately managed prior to discharge.

6.5.3 Table 26.2 in Chapter 26 of CIRIA report C753 The SuDS Manual provides Pollution Hazard Indices for varying land types. Those of relevance to the development proposals are as follows:

Land Use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car park, low-traffic roads	Low	0.5	0.4	0.4

Table 1: Pollution Hazard Indices

6.5.4 The surface water drainage design will combine the use of permeable paving and filter drains and will meet the target treatment level required.

SuDS Type	Total suspended solids (TSS)	Metals	Hydrocarbons
Filter drain	0.4	0.4	0.4
Permeable pavement	0.7	0.6	0.7

Table 2: Pollution Mitigation Indices

6.5.5 An outline drainage maintenance schedule is located in Appendix 9 at the rear of this report.

7 Safe Development

7.1 Flood Zone Compatibility

7.1.1 The Environment Agency's online mapping confirms that the site is located in Fluvial Flood Zones 1 and 2 with Fluvial Flood Zone 3 encroaching at the centre of its southern boundary.

7.1.2 The proposed building will be entirely outside Flood Zone 3 and will have a finished floor level set such that it will be located above Flood Zone 2 and effectively within Flood Zone 1.

7.1.3 With reference to Annex 3 of the National Planning Policy Framework and Table 2 of the Government Guidance on Flood Risk and Coastal Change at https://www.gov.uk/guidance/flood-risk-and-coastal-change and:

Annex 3: Flood Risk Vulnerability Classification

Residential development is classified as More Vulnerable.

Table 2: Flood Risk Vulnerability and Flood Zone Compatibility

More Vulnerable development is considered appropriate in Flood Zones 1 and 2.

7.1.4 Both the existing site use and its proposed use are residential. The proposed development provides the opportunity to lessen the existing level of risk flood risk to future residents.

7.2 Risk to Others

7.2.1 The proposed surface water drainage system will be designed to current standards incorporating SuDS elements providing treatment, attenuation and storage which will minimise runoff leaving the site during times of heavy rain.

7.2.2 Allowance has been made for a 45% increase in rainfall intensities which accords with the latest figures published by the Environment Agency and in accordance with the requirements under the National Planning Policy Framework.

7.2.3 The proposed drainage system will incorporate sufficient treatment prior to final discharge thus mitigating the risk of pollution from the site.

7.2.4 The proposed development provides the opportunity to lessen the risk of surface water flooding to the benefit of the wider community by significantly reducing the rate of discharge from an unrestricted brownfield runoff to its predeveloped greenfield equivalent.

7.2.5 Sewerage undertakers have an obligation to upgrade the existing networks if a connection to an equivalent or larger sized public sewer is technically achievable.

7.2.6 The residual risk of sewer flooding from this development for the foreseeable future is therefore negligible.

8 Conclusions

8.1 The site is located in Fluvial Flood Zones 1, 2 and 3.

8.2 The proposed building will be located outside Flood Zone 3 and will have a finished floor level set at 300mm above that of the existing building and locating the building exclusively within Flood Zone 1.

8.3 There are no historic records of flooding from any source affecting the site or its immediate area.

8.4 Fluvial uplift calculations have been considered and the Environment Agency publication 'Accounting for Residential Uncertainty – an update to fluvial freeboard guide' has been followed in order to set an appropriate finish ground floor level.

8.5 The site is underlain by River Terrace Deposits which as noted in the Site Investigation will be constrained by the relatively shallow groundwater, and infiltration is not considered a practical method of discharging surface water runoff from this site.

8.6 A suitable SuDS drainage system is proposed which accords with the requirements of national and local policy with a restricted discharge to the Tadburn Lake via one of the existing headwalls at the southern site boundary.

8.7 In order to provide the maximum benefit to the wider community it is proposed to restrict runoff to the predeveloped greenfield equivalent of the site.

8.8 Preliminary calculations confirm that surface water runoff generated by the proposed development can be attenuated on site for all rainfall events up to the 1:100 year event including an allowance for climate change.

8.9 Water quality improvement will be provided to mitigate against any risk to the receiving waterbody.

8.10 Foul drainage will be discharged by gravity to the existing public foul sewer located within the southeast corner of the site.

8.11 The new accommodation is not at risk of flooding from tidal or fluvial sources, overland flows, or groundwater.

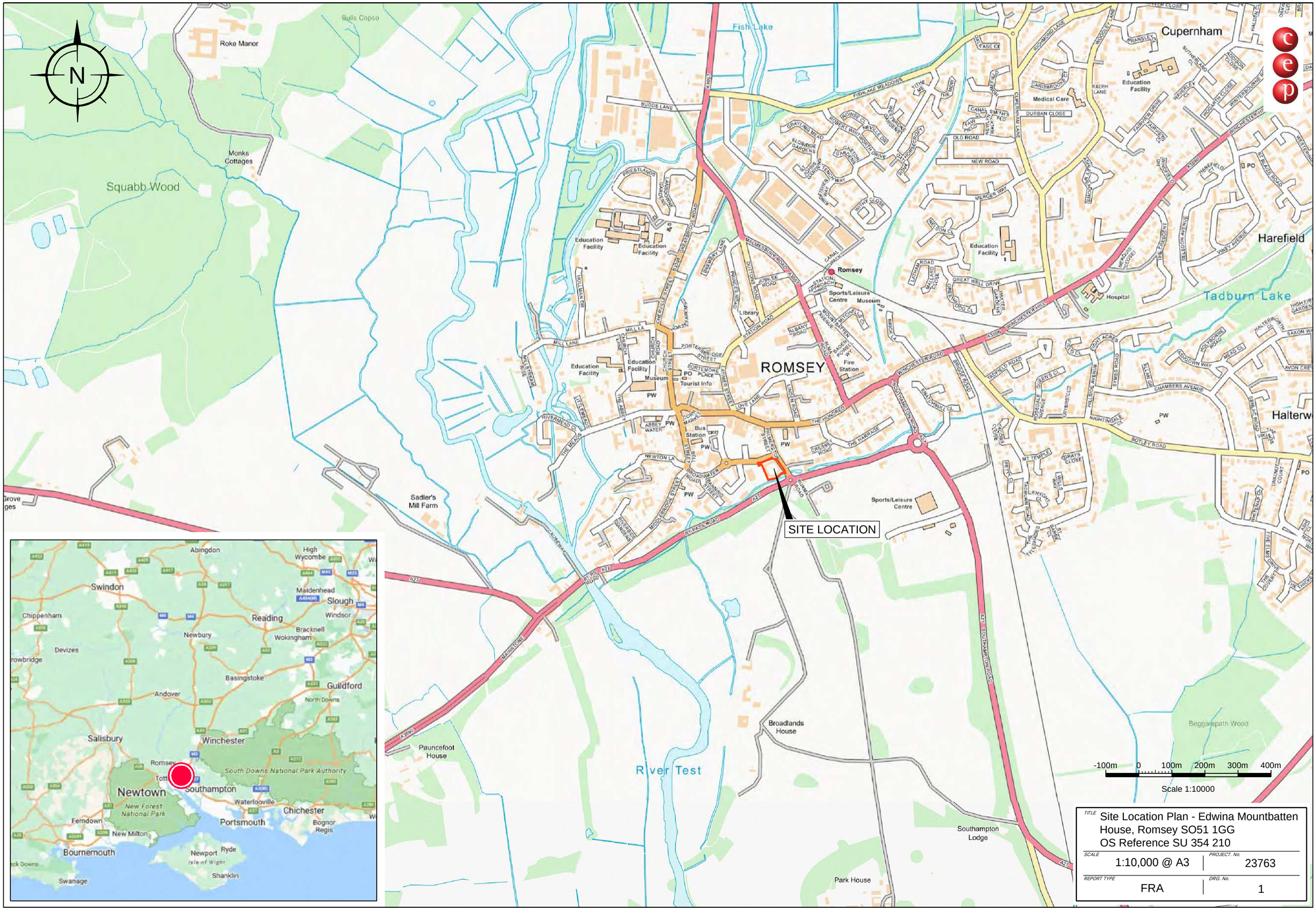
8.12 In terms of flood risk planning the proposed development is safe and will manage surface water from all rainfall events up to the 100 year plus climate change event so as not to increase flood risk elsewhere.

8.13 The development proposals are suitable at this location.

9 List of Appendices, Images and Tables

Appendix 1

Site Location Plan



TITLE: Site Location Plan - Edwina Mountbatten House, Romsey SO51 1GG
OS Reference SU 354 210

SCALE	PROJECT. No.
1:10,000 @ A3	23763
REPORT TYPE	DRG. No.
FRA	1

Appendix 2

Existing Site Layout Plan

Edwina Mountbatten

Palmerston Street

Existing Surface Water Headwall

Existing Surface Water Headwall

Existing Surface Water Headwall

Existing Surface Water Headwall

375mm FW sewer

The Tadburn Lake

-2.5m 0 2.5m 5.0m 7.5m 10m

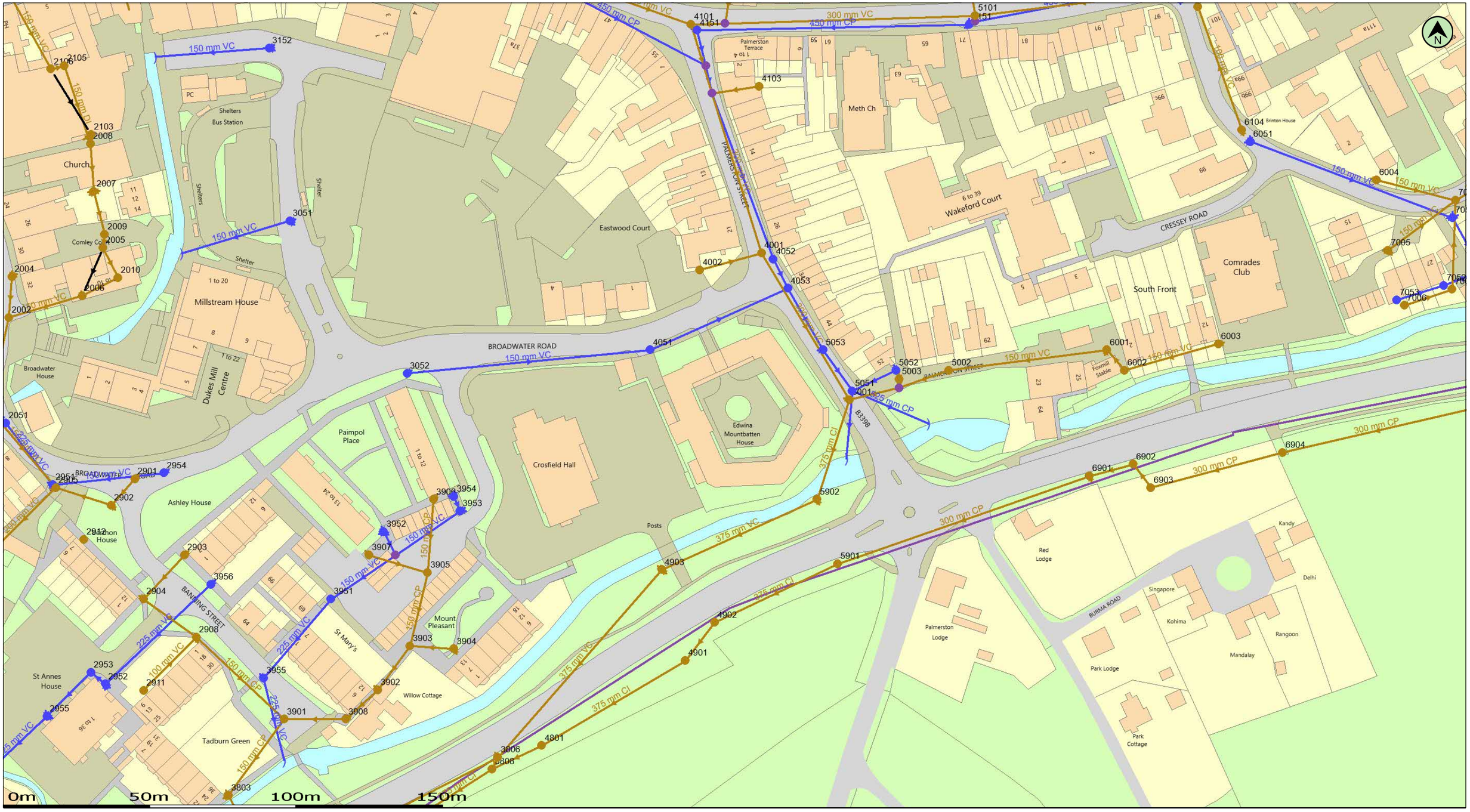
Scale 1:250

TITLE
Existing Site Layout Plan

SCALE	PROJECT. No.
1:250 @ A3	23763
REPORT TYPE	DRG. No.
FRA	2

Appendix 3

Sewer Records



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The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2022 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Surface Water Outfall
Foul Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Decarcation Chamber, Dummy Manhole or Surface Water Soakaway

john.duncan@nrswa.net
Romsey

WATER for LIFE from Southern Water

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
2002	F	14.57	12.64	
2004	F	14.90	13.44	
2005	F	16.01	14.57	
2006	F	15.51	13.73	
2007	F	16.64	14.57	
2008	F	16.39	15.02	
2009	F	0.00	14.40	
2010	F	15.78	14.05	
2103	F	16.39	15.04	
2105	F	16.61	15.29	
2106	F	16.81	0.00	
2901	F	15.41	14.23	
2902	F	15.59	13.79	
2903	F	16.43	14.83	
2904	F	14.60	13.14	
2905	F	14.69	12.12	
2908	F	14.30	12.88	
2911	F	0.00	0.00	
2912	F	0.00	0.00	
3803	F	13.43	11.80	
3806	F	15.43	13.17	
3808	F	14.83	12.02	
3901	F	14.19	12.33	
3902	F	15.42	12.91	
3903	F	15.24	13.39	
3904	F	14.83	13.69	
3905	F	16.97	14.42	
3906	F	17.05	15.47	
3907	F	17.10	15.26	
3908	F	14.18	12.68	
4001	F	15.12	13.00	
4002	F	0.00	0.00	
4101	F	15.89	0.00	
4103	F	0.00	0.00	
4801	F	14.94	12.18	
4901	F	15.10	12.36	
4902	F	15.09	12.38	
4903	F	14.43	12.73	
5001	F	14.92	12.87	
5002	F	16.22	13.86	
5003	F	15.42	14.26	
5101	F	16.00	13.32	
5901	F	15.38	12.45	
5902	F	0.00	0.00	
6001	F	16.99	14.96	
6002	F	16.78	15.06	
6003	F	16.73	15.44	
6004	F	17.35	16.15	
6103	F	16.45	14.93	
6104	F	17.40	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
6901	F	15.69	13.67	
6902	F	15.89	13.71	
6903	F	16.89	13.75	
6904	F	16.70	13.83	
7004	F	17.21	15.39	
7005	F	17.09	15.80	
7006	F	0.00	0.00	
7008	F	0.00	0.00	
2051	S	13.96	13.31	
2951	S	14.69	13.62	
2952	S	13.60	12.50	
2953	S	13.39	12.45	
2954	S	15.81	14.20	
2955	S	13.16	12.45	
3051	S	17.44	16.50	
3052	S	17.21	16.00	
3152	S	17.30	16.52	
3951	S	16.73	14.13	
3952	S	17.10	15.75	
3953	S	17.09	15.77	
3954	S	17.07	15.78	
3955	S	15.05	13.81	
3956	S	0.00	0.00	
4051	S	0.00	0.00	
4052	S	0.00	0.00	
4053	S	0.00	0.00	
4151	S	15.82	13.60	
5051	S	14.81	13.29	
5052	S	15.59	14.37	
5053	S	14.87	13.26	
5151	S	15.88	13.85	
6051	S	17.42	16.60	
7052	S	0.00	0.00	
7053	S	0.00	0.00	
7057	S	17.16	16.26	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Appendix 4

Extracts from Site Investigation

mercury, polybrominated diphenyl ethers (PBDE) and dichlorvos. It is noted that the relevant groundwater body is classified as 'good' regarding WFD water quality.

Regarding Environment Agency data, Palmerston Street and the eastern margin of the site are located within a Flood Zone 2 area. The brook to the south of the site is associated with a Flood Zone 3 area.

All natural ground geohazard risks associated with the site are classified as very low to negligible by the BGS.

With reference to the BGS database information, there are no records of past mineral extraction in the vicinity of the site.

Reference to relevant BGS borehole data in the area indicates ground conditions of dense brown flint gravel to approximately 5 m, underlain by 'firm to stiff' and becoming 'stiff' grey fissured clay. These strata are considered to be associated with the Terrace Deposits and Bracklesham Beds respectively.

BRE BR211 (2015) and the Groundsure report (based on BGS UK health Security Agency data) indicate that the site is not within an area where radon precautions are required in new buildings.

5. GROUND CONDITIONS AND GEOLOGICAL MODEL

5.1 Ground Investigation

Details of the rationale and scope of the ground investigation and laboratory testing, together with exploratory hole logs, monitoring, in situ and laboratory test results, are given in Appendix III. The investigation has identified the presence of the following, below the site.

5.2 Buried Foundations and Services

No buried foundations or other such structures were encountered during the ground investigation. Such remaining buried structures, associated with former and current buildings, should be anticipated. Underground services should be anticipated.

5.3 Strata Encountered

Topsoil
In all locations investigated, topsoil was recorded to depths of between 0.2 m and 0.4 m, generally comprising sandy silt and gravelly silt with rootlets. However, across much of the site, as occupied by the existing buildings and hardstanding, topsoil should be absent.

Made Ground
Below topsoil, Made Ground was encountered in three locations investigated, to depths of between 0.5 m and 0.7 m, comprising gravelly clays with brick and rare clinker fragments.

River Terrace Deposits
Underlying the Topsoil/Made Ground, superficial River Terrace Deposits are present which generally comprise medium dense (and dense) gravelly sands and sandy gravels to the maximum recorded depth of 4.0 m. A characteristic 'N' value (uncorrected) of 15 is indicated for the strata between 1 m and 3 m.

Possible Bracklesham Beds
Below approximately 4 m depth, and as indicated in the northern margin of the site (DS1 and DP1) clays of the Bracklesham Beds may be present, based on nearby borehole records and the site dynamic probing data.

5.4 Groundwater

During the ground investigation, groundwater seepages were encountered at depths of approximately 4.0 m in the exploratory holes.

The groundwater conditions are based on observations made at the time of the fieldwork. It should be noted that groundwater levels may vary due to seasonal and other effects. It should be appreciated that groundwater is likely to be in continuity and at a similar level to the adjoining brook, such that fluctuations in the brook water level may be reflected in groundwater levels below the site, such that groundwater at depths of between 2 m and 3 m below the site may arise.

6. PROPOSED DEVELOPMENT

The proposed development comprises a three-storey block of apartments with car parking and areas of managed soft landscaping. The residents will be of retirement age. An indicative proposed development plan is presented as Figure 3.

7. ASSESSMENT OF POTENTIAL CONTAMINATION AND GROUND GASES

7.1 Assessment Criteria

Assessment of potential contamination and ground gases has been undertaken using a risk assessment based approach, as recommended within the Environmental Protection Act (1990) (and subsequent amendments), Environment Agency LCRM (2020), CLEA Model (2004-2009), BS 10175:2011+A2:2017, CIRIA C552 (2001) and NHBC R&D Report 66 (2008). This approach considers the likely source of contamination, given the history and location of the site, and the possible migration pathways by which these potentially hazardous substances may reach likely receptors, such as end users of the site, controlled waters or the wider environment, in the context of the proposed development.

Part IIA of the Environmental Protection Act (1990) states that

'Contaminated Land is any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that –

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or
(b) significant pollution of controlled waters is being caused or there is significant possibility of such pollution being caused;'

All risk assessments carried out as part of this investigation have been carried out with respect to the definition of 'contaminated land' within Part IIA of the Environmental Protection Act (1990) and have considered the site both before and on completion of the development. The basis of the risk assessment is the Conceptual Site Model, which is derived from the desk study and initial information and identifies potential contaminant linkages that could affect receptors relevant to the site and the wider environment. The Conceptual Site Model is presented in Table 1.

Based on guidance published within BRE Special Digest 1 (2005), the specified DC Class of concrete for buried structures and foundations should be suitable for an ACEC site classification of AC-1.

9.3 Floor Slab Recommendations

As the ground is likely to be disturbed during demolition of existing structures, allowance should be made for suspended ground floor slabs, together with an underfloor void of 250 mm within the influence zone of trees.

9.4 General Construction Advice

All formations should be cleaned, and subsequently inspected by a suitably qualified engineer prior to placing concrete. Should any soft, compressible or otherwise unsuitable materials be encountered they should be removed and replaced by blinding concrete.

Foundation concrete, or alternatively, a blinding layer of concrete, should be placed immediately after excavation and inspection in order to protect the formation against softening and disturbance.

Generally, all formations should be placed wholly within the same material type, unless specific geotechnical inspection and assessment have been undertaken.

Care should be taken to ensure that any existing services encountered are carefully and satisfactorily blocked to prevent water seeping through the drains and into any excavations.

As outlined in Section 7.5, due care will be needed during site development to preclude any uncontrolled/unauthorised releases of materials or discharges into the brook. It would be prudent to include the necessary controls in a Construction Management Plan for the works.

10. TEMPORARY WORKS

Conventional plant is considered to be suitable for excavation works at the site. Hydraulic breakers may be required to break out existing buried structures (foundations etc).

Shallow excavations may remain stable in the short-term, provided there is no groundwater ingress. However, instability may occur in excavations left open for extended periods of time. Support should be provided, or the sides battered back to a shallow angle, in any excavations requiring man entry in compliance with a relevant risk assessment.

Groundwater below the site is likely to be at a similar level to the adjoining brook. It will be necessary to carefully control construction works, such that foundations remain above the level of groundwater seepages. It is possible that this may constrain or preclude foundation construction during periods of high river levels/near-flood conditions.

11. ASSESSMENT OF SOAKAWAY DRAINAGE

On the basis of the recorded ground conditions, it is considered that soakaway drainage may be possible within the granular strata of the River Terrace Deposits. It should be appreciated that groundwater levels are likely to reflect water levels in the adjoining brook and that areas immediately adjoining the site are classified as Flood Zones 2 and 3. As it is necessary for soakaway drainage systems to be located entirely above highest

groundwater levels, this may constrain soakaways to very shallow systems (that may or may not provide a practicable solution).

In view of the above, allowance should be made for alternative drainage solutions in the instance that soakaway drainage does not provide a practicable solution.

12. ROAD PAVEMENTS

Based on the nature of the shallow soils beneath the site a preliminary design equilibrium CBR of 5% may be considered for the design of road pavements within compacted granular Terrace Deposits. The materials at shallow depth may be regarded as frost susceptible.

13. ASSESSMENT OF MATERIALS FOR WASTE DISPOSAL

There is no requirement to remove soils from site and, therefore, development levels should be set such that soils can be retained and reused on site where possible. Providing development levels are set to accommodate soil arisings (for example, from foundation excavations), such materials would not be classified as waste if retained and re-used on site. However, if materials are excess to requirements, they should be taken to an appropriately permitted waste facility.

If material is identified for removal to a waste facility, it will be necessary to provide a description of the material and laboratory test data to the receiving facility. This information is included in Appendix III. It should be noted that additional testing, either for classification purposes or for waste acceptance criteria (WAC) testing to confirm acceptability of the waste may be required (as noted below).

The available analytical laboratory test data has been used to provide preliminary waste disposal advice. It should be noted that these test results may not specifically relate to materials that are, or will be, scheduled for removal from site. However, the results are appropriate for preliminary guidance and costing purposes.

A preliminary assessment of potential waste classification for materials on site has been undertaken in accordance with the Environment Agency's document Guidance on the Classification and Assessment of Waste WM3 (2021). The assessment indicates that the following preliminary waste classification advice would be appropriate.

- Topsoil is likely to be classified as 'non-hazardous' waste if taken to a landfill due to the organic content of such materials. Alternatively, these materials could be taken to a recycling facility.
- Based on the test data to date, the Made Ground materials may be classified as "inert" waste for disposal at landfill.
- Natural strata, providing they have not been impacted by potential contaminants associated with the site usages, would be classified as 'inert' waste without any requirement for laboratory testing.

Waste requires pre-treatment prior to disposal at landfill and this may take the form of physical or chemical treatment to reduce hazards and/or waste volumes. The segregation and screening of waste soils into separate, and appropriately classified, waste streams would satisfy the pre-treatment criteria by ensuring that volumes of each waste category are minimised. Segregation of waste streams is also important to prevent materials being classified within a worse-case category and, therefore, incurring higher disposal costs. Mixing of different waste streams to dilute hazardous properties is not permitted.

It should be noted that the above assessment is provided in accordance with current waste disposal and environmental permitting legislation and guidance documents. However, individual landfills and other waste

BGS ID: 406777 BGS Reference: SU32SE123
British National Grid (27700): 435610, 121090

SU32SE/123

Norwest Holst Soil Engineering Ltd.

Borehole No. **1**

BOREHOLE LOG

Contract No. F8174
Location Waitrose, Romsey
Client Hurst Pierce & Malcolm
Method of Boring Percussion
Diameter of Borehole 150mm

Sheet 1 of 2
Chainage
Ground Level m.A.O.D.
Date 14/12/88

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
MADE GROUND: Clay, topsoil, gravel & bricks		0.30					
Dense brown flint GRAVEL		5.50			1.00 2.00 3.00 4.00 5.00 5.50 (29)	31 45 34 36 37	
Firm to stiff grey/brown silty CLAY		8.00			7.00 (38)		
Stiff grey fissured silty CLAY					8.50 (49)		

Type of Sample

Is S.P.T. ■ Undisturbed
Ic. C.P.T. × Vane
O Jar Δ Water
● Bulk Piezometer

Remarks (Observations of Ground Water etc.) () - U100 blows

Water struck at 3.80m, level rose after 20 mins to 3.70m
Sealed by casing at 5.50m

Water levels are subject to seasonal or tidal variations and should not be taken as constant

BGS ID: 406777 BGS Reference: SU32SE123
British National Grid (27700): 435610, 121090

SU32SE/123 contd.

Norwest Holst Soil Engineering Ltd.

Borehole No. 1

BOREHOLE LOG

Contract No. F8174
Location Waitrose, Romsey
Client Hurst Pierce & Malcolm
Method of Boring Percussion
Diameter of Borehole 150mm

Sheet 2 of 2
Chainage
Ground Level m.A.O.D.
Date 14/12/88

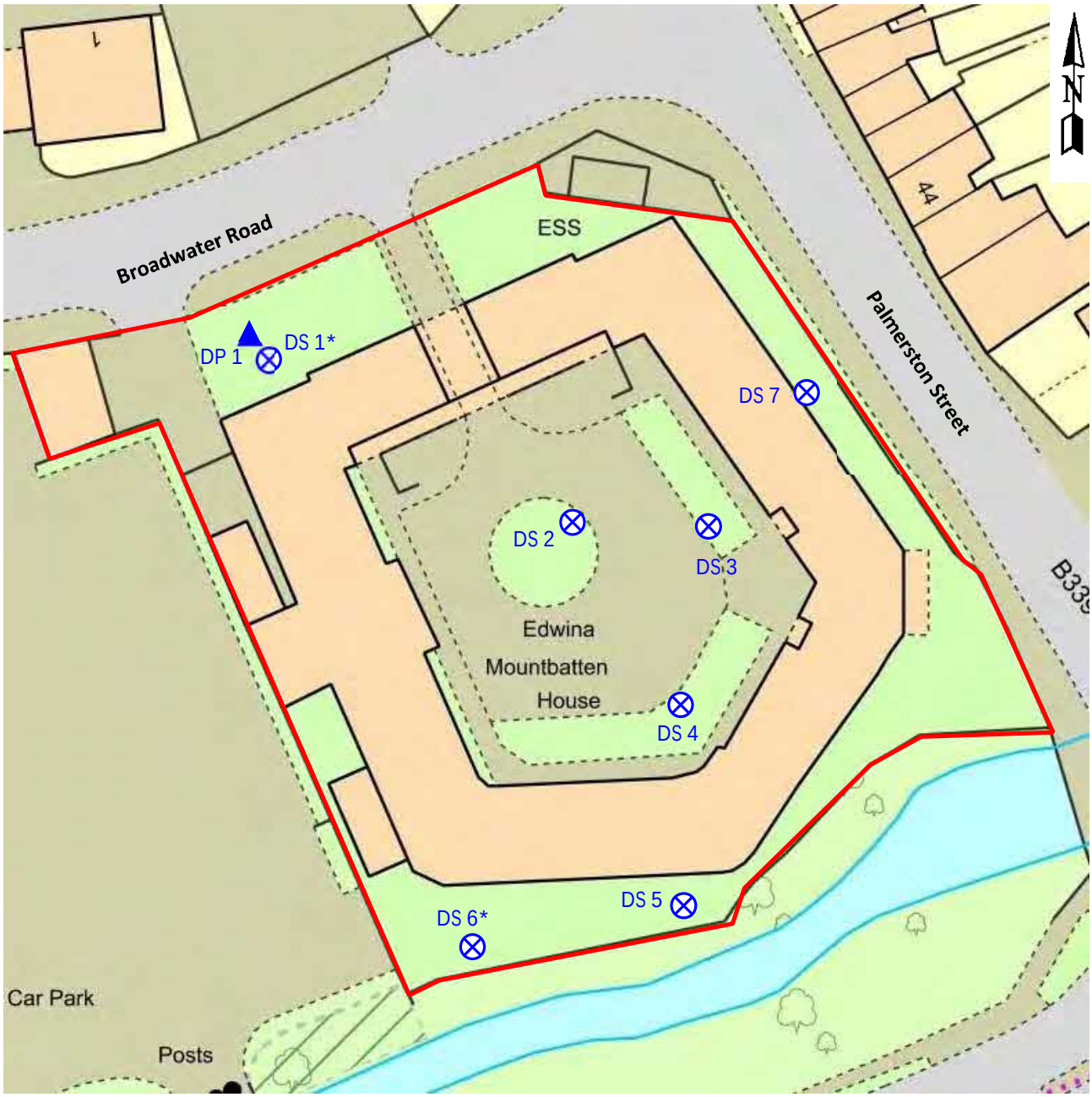
Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
Stiff grey fissured silty CLAY		12.00			10.00 (61) 11.50 (69)		

Type of Sample

Is S.P.T. ■ Undisturbed
Ic. C.P.T. × Vane
O Jar Δ Water
● Bulk Piezometer

Remarks (Observations of Ground Water etc.) () - U100 blows

Water levels are subject to seasonal or tidal variations and should not be taken as constant



LEGEND

- ⊗ Dynamic Sampling Hole
- ▲ Dynamic Probing Hole
- * Groundwater Monitoring Installation

EXPLORATORY HOLE LOCATION PLAN

Scale 1:500 Approx

Crossfield CONSULTING
GEOTECHNICAL ENVIRONMENTAL

Dynamic Sample Record Sheet

Project:	Broadwater Road, Romsey	**Hole Ref.**	**DS1**
Date:	22/09/2022	**Sheet**	1 of 1
		Job No.	CCL03602
Contractor	Regional Drilling	**Equipment**	Premier Compact 110
Method	0.0 m to 4.0 m dynamic sampling	**Ground Level.**	m OD
Boring Diameter	100 mm	**Co-ordinates**	
		Logged by:	DJ — Logged on site during drilling operations
		Checked by:	[redacted]

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Backfill	Level O.D.
0.20	J				Grass over brown clayey sand with rare gravel, medium and angular of brick fragments (MADE GROUND)	0.30		
0.40	J				Brown sandy silt with rare fine rounded gravel of chert (MADE GROUND)	0.50		
0.60	JGg				Brown gravely clay. Gravel is fine to medium and subangular to subrounded of chert/flint fragments, clinker fragments and rare fine brick fragments (MADE GROUND)	0.70		
1.00-1.45	S	None	Dry	N=15	Medium dense brown sandy GRAVEL. Gravel is fine to medium and angular of chert/flint (RIVER TERRACE DEPOSITS)			
1.50	J							
2.00-2.45	S	None	Dry	N=17				
3.00-3.45	S	None	Dry	N=18				
3.50	J							
4.00-4.45	S	None	4.00	N=4	...Loose at 4.0 m	4.00		
					Base of hole			

Core Recovery

Depth	Recovery
0.00-1.00	100%
1.00-2.00	60%
2.00-3.00	70%
3.00-4.00	60%

Groundwater

Hole Depth	Strike Depth	Water Depth	Observations
4.00	4.00	4.00	

Additional Tests

Test type	Test Depth	Test Value

Remarks

SPT at 4 m may be inlfuenced by strata dsiturbance and groundwater

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

Crossfield CONSULTING
GEOTECHNICAL ENVIRONMENTAL

Dynamic Sample Record Sheet

Project:	Broadwater Road, Romsey	**Hole Ref.**	**DS2**
Date:	22/09/2022	**Sheet**	1 of 1
		Job No.	CCL03602
Contractor	Regional Drilling	**Equipment**	Premier Compact 110
Method	0.0 m to 4.0 m dynamic sampling	**Ground Level.**	m OD
Boring Diameter	100 mm	**Co-ordinates**	
		Logged by:	DJ — Logged on site during drilling operations
		Checked by:	[redacted]

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
0.20	JGg				Grass over brown silt with roots (TOPSOIL)	0.20			
					Brown silty, gravelly clay with rootlets. Gravel is fine and angular of chert/flint fragments (SUBSOIL)	0.30			
0.50	J				Brown gravelly CLAY. Gravel is fine to medium and subrounded of chert/flint fragments (POSSIBLE RIVER TERRACE DEPOSITS)	0.70			
1.00-1.45	S	1.00	Dry	N=24	Medium dense brown very gravelly SAND. Gravel is fine to medium and subrounded of chert/flint (RIVER TERRACE DEPOSITS)				
2.00-2.45	S	2.00	Dry	N=16					
2.80	J								
3.00-3.45	S	3.00	Dry	N=16		3.00			
					Medium dense and becoming dense brown sandy GRAVEL. Gravel is fine to medium and subrounded of flint/chert (RIVER TERRACE DEPOSITS)				
4.00-4.45	S	3.00	4.00	N=38		4.00			
					Base of hole				

Core Recovery

Depth	Recovery
0.00-1.00	80%
1.00-2.00	90%
2.00-3.00	30%
3.00-4.00	60%

Groundwater

Hole Depth	Strike Depth	Water Depth	Observations
4.00	4.00	4.00	

Additional Tests

Test type	Test Depth	Test Value

Remarks

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

Crossfield CONSULTING
GEOTECHNICAL ENVIRONMENTAL

Dynamic Sample Record Sheet

Project:	Broadwater Road, Romsey	**Hole Ref.**	**DS3**
Date:	22/09/2022	**Sheet**	1 of 1
		Job No.	CCL03602
Contractor	Regional Drilling	**Equipment**	Premier Compact 110
Method	0.0 m to 4.0 m dynamic sampling	**Ground Level.**	m OD
Boring Diameter	100 mm	**Co-ordinates**	
		Logged by:	DJ — Logged on site during drilling operations
		Checked by:	[redacted]

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
0.20	JGg				Grass over brown slightly gravelly silt. Gravel is fine to medium and rounded of chert/flint fragments with rootlets (TOPSOIL)	0.20			
					Brown gravelly silt. Gravel is fine and subrounded of chert/flint (POSSIBLE SUB-SOIL)	0.70			
0.90	J				Medium dense brown sandy GRAVEL. Gravel is fine to medium and subrounded of chert/flint				
1.00-1.45	S	1.00	Dry	N=23	(RIVER TERRACE DEPOSITS)				
2.00-2.45	S	2.00	Dry	N=19					
3.00-3.45	S	3.00	Dry	N=24					
3.80	J								
4.00-4.45	S	3.00	4.00	N=25		4.00			
					Base of hole				

Core Recovery

Depth	Recovery
0.00-1.00	90%
1.00-2.00	70%
2.00-3.00	70%
3.00-4.00	60%

Groundwater

Hole Depth	Strike Depth	Water Depth	Observations
4.00	4.00	4.00	

Additional Tests

Test type	Test Depth	Test Value

Remarks

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

Crossfield CONSULTING
GEOTECHNICAL ENVIRONMENTAL

Dynamic Sample Record Sheet

Project:	Broadwater Road, Romsey	**Hole Ref.**	**DS4**
Date:	22/09/2022	**Sheet**	1 of 1
		Job No.	CCL03602
Contractor	Regional Drilling	**Equipment**	Premier Compact 110
Method	0.0 m to 4.0 m dynamic sampling	**Ground Level.**	m OD
Boring Diameter	100 mm	**Co-ordinates**	
		Logged by:	DJ — Logged on site during drilling operations
		Checked by:	[redacted]

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
					Grass over brown silt with roots (TOPSOIL)	0.10			
0.20	JGg				Brown slightly gravelly silt with roots. Gravel is medium and rounded of chert/flint fragments (SUBSOIL)	0.40			
					Greyish brown sandy GRAVEL. Gravel is fine to medium and subrounded of chert/flint (RIVER TERRACE DEPOSITS)				
1.00-1.45	S	1.00	Dry	N=34	...Dense from 1.0 m	1.10			
1.30	J				Dense greyish brown gravelly SAND. Gravel is fine to medium and subrounded of chert/flint (RIVER TERRACE DEPOSITS)	1.50			
					Orangish brown sandy GRAVEL. Gravel is fine to medium and subrounded of chert/flint (RIVER TERRACE DEPOSITS)				
2.00-2.45	S	2.00	Dry	N=25	...Medium dense below 2.0 m				
3.00-3.45	S	3.00	Dry	N=19					
4.00-4.45	S	4.00	3.70	N=21		4.00			
					Base of hole				

Core Recovery

Depth	Recovery
0.00-1.00	100%
1.00-2.00	100%
2.00-3.00	60%
3.00-4.00	60%

Groundwater

Hole Depth	Strike Depth	Water Depth	Observations

Additional Tests

Test type	Test Depth	Test Value

Remarks

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

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GEOTECHNICAL ENVIRONMENTAL

Dynamic Sample Record Sheet

Project:	Broadwater Road, Romsey	**Hole Ref.**	**DS5**
Date:	22/09/2022	**Sheet**	1 of 1
		Job No.	CCL03602
Contractor	Regional Drilling	**Equipment**	Premier Compact 110
Method	0.0 m to 1.0 m dynamic sampling	**Ground Level.**	m OD
Boring Diameter	100 mm	**Co-ordinates**	
		Logged by:	DJ — Logged on site during drilling operations
		Checked by:	[redacted]

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
					Grass over brown silt with rootlets (TOPSOIL)	0.10			
					Brown clayey GRAVEL. Gravel is fine to medium and subrounded of chert/flint fragments (PROBABLE SUB-SOIL)	0.40			
0.60	J				Brown gravelly SILT. Gravel is fine and subrounded of chert/flint fragments with rootlets (POSSIBLE RIVER TERRACE DEPOSITS)	0.90			
1.00-1.32	S	None	Dry	N=50 280 mm	Very dense brown sandy GRAVEL. Gravel is fine to medium and subrounded of chert/flint fragments with rare coarse gravel (RIVER (POSSIBLE RIVER TERRACE DEPOSITS)	1.00			
					Base of hole				

Core Recovery		Groundwater				Additional Tests		
Depth	Recovery	Hole Depth	Strike Depth	Water Depth	Observations	Test type	Test Depth	Test Value
0.00-1.00	100%							

Remarks

Very dense strata/possible cobbles precluded further penetration below 1 m.

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

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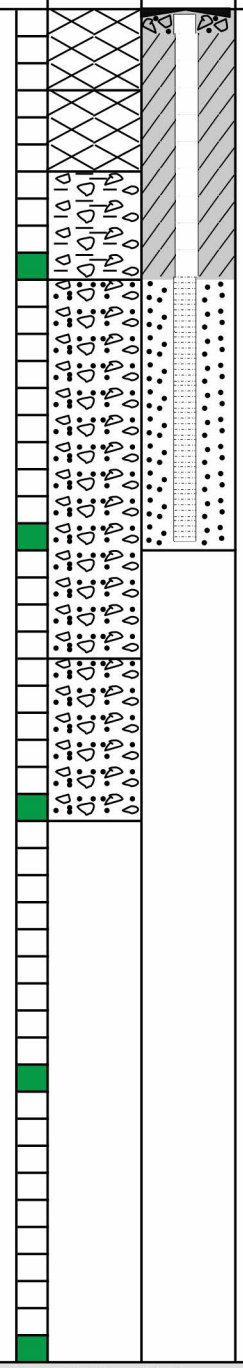
GEOTECHNICAL ENVIRONMENTAL

Dynamic Sample Record Sheet

Project:	Broadwater Road, Romsey	**Hole Ref.**	**DS6**
Date:	22/09/2022	**Sheet**	1 of 1
		Job No.	CCL03602
Contractor	Regional Drilling	**Equipment**	Premier Compact 110
Method	0.0 m to 3.0 m dynamic sampling	**Ground Level.**	m OD
Boring Diameter	100 mm	**Co-ordinates**	
		Logged by:	DJ — Logged on site during drilling operations
		Checked by:	

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
					Grass over brown gravelly silt. Gravel is fine to medium and subrounded of chert/flint fragments (TOPSOIL - MADE GROUND)	0.30			
0.40	JGg				Brown very gravelly clay. Gravel is fine to medium and subangular of flint/chert fragments with rare brick fragments (MADE GROUND)	0.60			
					Brown sandy slightly clayey GRAVEL. Gravel is fine to medium and subrounded of chert/flint fragments (RIVER TERRACE DEPOSITS)				
1.00-1.45	S	1.00	Dry	N=42		1.00			
					Dense orangish brown gravelly SAND. Gravel is fine to medium and subrounded of chert/flint (RIVER TERRACE DEPOSITS)				
1.30	J								
2.00-2.45	S	2.00	Dry	N=36					
					Dense becoming medium dense orangish brown sandy GRAVEL. Gravel is fine to medium and subrounded of chert/flint (RIVER TERRACE DEPOSITS)	2.40			
3.00-3.45	S	3.00	Dry	N=21		3.00			
					Base of hole				



Core Recovery

Depth	Recovery
0.00-1.00	100%
1.00-2.00	100%
2.00-3.00	100%

Groundwater

Hole Depth	Strike Depth	Water Depth	Observations

Additional Tests

Test type	Test Depth	Test Value

Remarks

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

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GEOTECHNICAL ENVIRONMENTAL

Dynamic Sample Record Sheet

Project:	Broadwater Road, Romsey	**Hole Ref.**	**DS7**
Date:	22/09/2022	**Sheet**	1 of 1
		Job No.	CCL03602
Contractor	Regional Drilling	**Equipment**	Premier Compact 110
Method	0.0 m to 2.0 m dynamic sampling	**Ground Level.**	m OD
Boring Diameter	100 mm	**Co-ordinates**	
		Logged by:	DJ — Logged on site during drilling operations
		Checked by:	[redacted]

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
0.20	JGg				Brown slightly gravelly clay with rootlets. Gravel is fine and subrounded of chert/flint and rare brick fragments (MADE GROUND)	0.30			
					Brown very gravelly CLAY. Gravel is fine to medium and rounded of chert/flint (SUB-SOIL)	0.60			
0.80	J				Medium dense brown very gravelly SAND. Gravel is fine and subrounded of flint/chert (RIVER TERRACE DEPOSITS)				
1.00-1.45	S	1.00	Dry	N=14		1.00			
					Medium dense orangish brown sandy GRAVEL. Gravel is fine to medium and subrounded of chert/flint (RIVER TERRACE DEPOSITS)				
2.00-2.45	S	2.00	Dry	N=13		2.00			
					Base of hole				

Core Recovery		Groundwater				Additional Tests		
Depth	Recovery	Hole Depth	Strike Depth	Water Depth	Observations	Test type	Test Depth	Test Value
0.00-1.00	90%							
1.00-2.00	80%							

Remarks

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2