

Flood Risk Assessment & Drainage Strategy

Title	High Street, Colney Heath
Client	Tarmac Trading Limited
Location	High Street, Colney Heath, St. Albans, Hertfordshire
Project number	21-0570
BIM reference	CHSA-BSP-ZZ-XX-RP-C-0001-P02_Flood_Risk_Assessment
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Authorisation Sheet & Revisions Record

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Executive Summary

Introduction	<p>BSP Consulting has been commissioned by Tarmac Trading Limited to undertake a Flood Risk Assessment and Drainage Strategy for a new residential development at High Street, Colney Heath, St. Albans, Hertfordshire. This Flood Risk Assessment has been prepared in accordance with the Technical Guidance to the National Planning Policy Framework.</p>
Existing Site Conditions	<p>The site currently comprises entirely of greenfield land utilised for agricultural purposes. Within the very southern corner of the site, there is a small agricultural shed present. Site levels are shown to range between 76.0m AOD in the west, near the site access, and 73.77 AOD to the north of the site. Generally, the western half of the site is shown to fall in a southerly direction, away from the northern boundary of the site, whereas the eastern half of the site is shown to fall from south to north. Across the centre of the site a low point is indicated, with levels shown to fall from the east and west towards this point.</p>
Development Description and Planning Context	<p>The development proposals are to construct a new housing development comprising of 45 residential dwellings, associated driveways, parking spaces, access, landscaping and supporting infrastructure. Accommodation will be a mix of affordable housing, open market dwellings, and self-build plots. In accordance with the NPPF, the project falls under the more vulnerable category in terms of flood risk.</p>
Definition of Flood Hazard	<p>Ellen Brook is an EA Main River and is the nearest source of fluvial flood risk to the site. Ellen Brook is located approximately 633m to the north of the site, however Colney Heath Lakes are formed online of this watercourse and are located approximately 13.6m to the north of the site at the closest point.</p>
Probability (Rivers/fluvial)	<p>The EA Risk of Flooding from Rivers and Sea mapping indicates that the proposed development site has less than a 1 in 1,000 annual probability of flooding from rivers or the sea. This map shows the indicative extent of the natural floodplain if there were no flood defences or certain other manmade structures.</p>
Climate Change	<p>The implications of climate change of up to 40% have been considered in this assessment and mitigation measures have been determined accordingly.</p>
Development Proposals	<p>The technical guidance to the NPPF states that developments of a more vulnerable category such as the proposed residential use are appropriate within Flood Zone 1, without being subject to the application of the Sequential Test. without being subject to the application of the Sequential Test.</p>

Flood Risk Management Measures	<p>The site is at very low risk of flooding however, in line with best practice, dwellings should be raised by 150mm to minimise the potential for internal surface water flooding.</p>
Off-Site Impacts	<p>The proposed development surface water should discharge to ground via infiltration together with a provision of source control. Where this is not possible, the proposed development surface water will discharge at a restricted rate via the provision of attenuation. Therefore, the development will bring about improvements to the surface water regime in the area, and hence will not increase flooding adjacent to or downstream of the site for the lifetime of the development.</p>
Residual Risks	<p>The investigations carried out as part of this flood risk assessment and flood risk management measures proposed have demonstrated that the development will be safe, without increasing flood risk elsewhere.</p>
Recommendations	<ul style="list-style-type: none"> • In accordance with best practice, finished floor levels should be set a minimum of 150mm above the surrounding external levels and external ground levels should comprise falls away from the proposed dwellings in order to encourage surface water runoff away from the dwellings and towards drainage features. • The proposed surface water drainage system should be designed to accommodate the 1 in 30-year rainfall event without any surface water flooding and should be capable of retaining the 1 in 100-year plus climate change (40%) storm event on site without flooding any buildings. • Where possible, infiltration-based systems should be used for the disposal of surface water from the site. However, comprehensive soakaway testing to BRE 365 specification should be completed prior to design. • Where infiltration is found to be infeasible for the site, it is proposed to restrict surface water runoff to 5.0l/s for all storms up to and including 100-year (1% AEP) plus 40% climate change return periods. In order to achieve this discharge rate, an attenuation volume in the order of 427.9m³ will need to be provided. It is proposed the required attenuation volume is provisioned by a detention basin. • It is recommended that source control methods should be utilised where possible. These include the use of permeable paving for parking spaces and private pedestrian footways, and the creation of bioretention gardens along the main highway curtilage and in landscaped areas to the south of the site. • Foul water from the site should drain to the public foul sewer, located to the north of the site, via a pumped discharge.

1.0 Introduction

1.1 Terms of Reference

1.1.1 BSP Consulting has been commissioned by Tarmac Trading Limited to undertake a Flood Risk Assessment and Drainage Strategy for a new residential development at High Street, Colney Heath, St. Albans, Hertfordshire.

1.1.2 This Flood Risk Assessment has been prepared in accordance with the Department for Communities and Local Government (DCLG) Planning Practice Guidance website section on 'Flood Risk and Coastal Change' and the Site-Specific Flood Risk Assessment Checklist.

1.1.3 This report has been produced on behalf of the Client, Tarmac Trading Limited, and no responsibility is accepted to any third party for all or any part. This report should not be relied upon or transferred to any other parties without the express written authorisation of BSP Consulting. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care or skill.

1.2 National Planning Policy Framework

1.2.1 The National Planning Policy Framework (NPPF) was published on 27 March 2012, with the latest update published in July 2021. This replaces Planning Policy Statement 25: Development and Flood Risk.

1.2.2 Planning Practice Guidance to the NPPF regarding Flood Risk and Coastal Change has been published and this site-specific FRA is written in compliance with this guidance.

1.2.3 The NPPF, and supporting technical guidance, can be downloaded free of charge from the internet at the following link:

<http://www.communities.gov.uk/publications/planningandbuilding/nppf>

2.0 Background Information

2.1 Site Details

2.1.1 Figure 2.1 below indicates the location of the site, a more detailed site location plan is included in **Appendix A**. A range of sources have been used to assess the local topography, local watercourses and current site use.

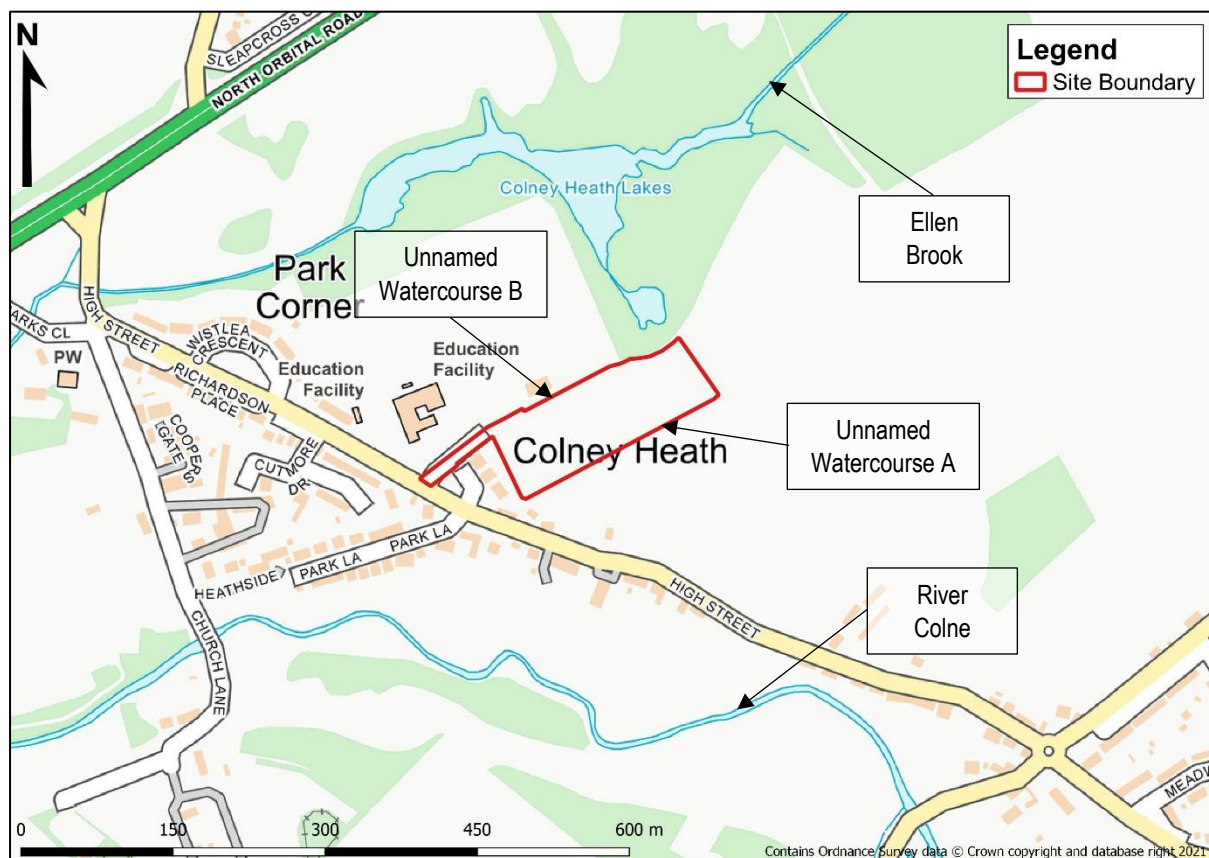


Figure 2.1 High Street, Colney Heath
 – Site Location Plan

2.1.2 The proposed development site occupies an area of approximately 1.75 hectares and is located immediately to the east of Colney Heath village centre, centred on OSNGR 520230E, 206141N.

2.1.3 The site is bounded by Unnamed Watercourse B, a dry field drainage ditch, with Colney Heath Football Club and Colney Heath Lakes beyond to the north, agricultural greenfield land to the east and south with Unnamed Watercourse A, a dry drainage ditch, adjacent to the site's southern boundary, and existing residential dwellings along the site's western boundary, with Colney Heath village beyond.

2.1.4 The site currently comprises entirely of greenfield land utilised for agricultural purposes. Within the very southern corner of the site, there is a small agricultural shed present.

2.1.5 A topographical survey of the site has been included in **Appendix B**. Site levels are shown to range between 76.0m AOD in the west, near the site access, and 73.77 AOD to the north of the site. Generally, the western half of the site is shown to fall in a southerly direction, away from the northern boundary of the site, whereas the eastern half of the site is shown to fall from south to north. Across the centre of the site a low point is indicated, with levels shown to fall from the east and west towards this point.

Table 2.1: Overall Catchment Context and Local Watercourse Classifications

Classification	Name	Description
Main Rivers	Ellen Brook	Ellen Brook is an EA Main River located approx. 166m to the north of the site. Ellen Brook runs through Colney Heath Lakes and discharges into the River Colne approx. 633m to the southwest of the site.
	River Colne	The River Colne is an EA Main River located approx. 151m to the south of the site at its closest point.
Ordinary Watercourses	Unnamed Watercourse A	Unnamed Watercourse A is a field drainage ditch located along the southern boundary of the site and is indicated to drain in a south-westerly direction. However, this watercourse is known to run dry.
	Unnamed Watercourse B	Unnamed Watercourse B is a field drainage ditch located along the northern boundary of the site and is indicated to drain in a north-easterly direction, towards Colney Heath Lakes. However, this watercourse is known to run dry.
Man-made watercourses	N/A	There are no man-made watercourses located in close proximity to the site.

2.1.6 The locations of the above watercourses are indicated on Figure 2.1 above.

2.2 Approach to the Assessment

2.2.1 This study has been supplemented by additional information from Thames Water (TW) and the Environment Agency (EA), and additional information contained on the British Geological Society (BGS) website, the DEFRA MagicMap website, the Cranfield Soil and Agrifood Institute Soilscales website and the Ordnance Survey website.

2.2.2 This assessment seeks to draw together the relevant data information from these sources and to collate this with the findings of our investigations and discussions to assess the flood risk and drainage strategy for this site.

3.0 Flood Risk Assessment

3.1 Development Description and Planning Context

3.1.1 Development proposals are to construct a new housing development comprising of 45 residential dwellings, associated driveways, parking spaces, access, landscaping and supporting infrastructure. Accommodation will be a mix of affordable housing, open market dwellings, and self-build plots. The proposed site plan is included in **Appendix C**.

3.1.2 The local area benefits from a Strategic Flood Risk Assessment. This assessment is the South West Hertfordshire SFRA (SWHSFRA) (2018). The SWHSFRA notes the site to be located in Flood Zone 1.

3.1.3 In accordance with the NPPF, the proposed residential use falls under the **more vulnerable** category in terms of flood risk.

3.2 Sequential and Exception Tests

3.2.1 The Sequential Test is designed to steer development towards areas of lower flood risk and is required to be completed for development within Flood Zone 2 and 3. As the site is located within Flood Zone 1 the Sequential Test is not required.

3.2.2 The Exception Test is designed to require evidence of how flood risk will be managed on the proposed development site, ensuring that it is safe for its lifetime and will not increase flood risk elsewhere. Table 3.1 below indicates whether developments, based on their vulnerability classification, are permitted within each Flood Zone and whether the Exception Test is required. The NPPF states that developments of the more vulnerable category are suitable within Flood Zone 1 without the requirement of an Exception Test, as is the case for this site.

Table 3.1: Flood Risk Vulnerability and Flood Zone Compatibility (Source: NPPF)

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

3.3 Definition of Flood Hazard

Historic Flooding

3.3.1 Figure 3.1 below shows the Environment Agency's Historic Flood Map, which indicates that, while parts of the local area have flooded previously, the development site itself was not affected. The dataset shows the maximum extent of all individual recorded flood outlines that have occurred as a result of flooding from rivers, the sea and groundwater sources since records began 1946. The dataset does not account for flooding from other sources, such as sewer flooding or surface water flooding, nor is it exhaustive as it may not include all previous flooding incidents and does not provide information regarding event dates. However, the dataset does provide an insight into the potential for flooding from nearby sources.

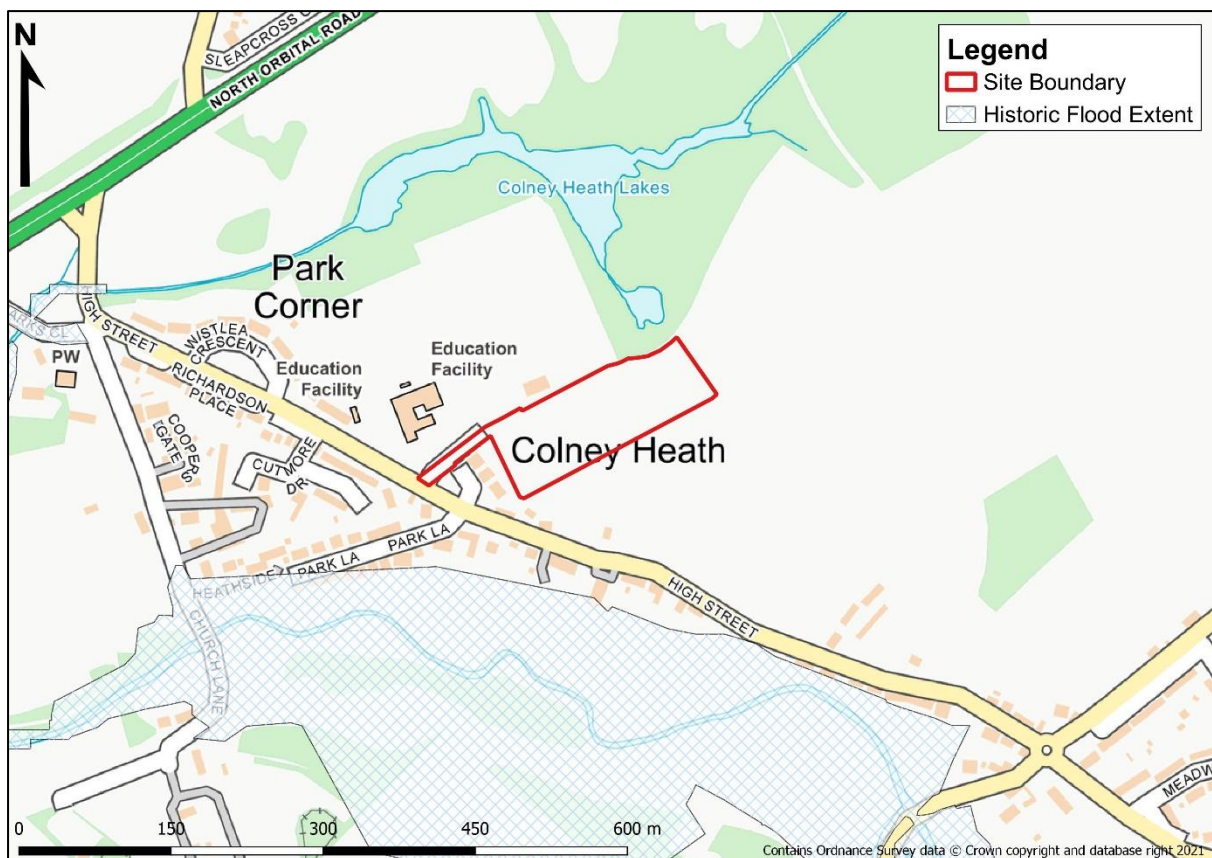


Figure 3.1 High Street, Colney Heath
– Historic Flood Map (Source: EA)

The potential sources of flooding in the vicinity of the site are as detailed below:

Fluvial Flood Risk

3.3.2 Although the River Colne, an EA Main River, is located approximately 151m to the south of the site, this river is located on the opposite side of High Street (road). As such, the site is situated on ground higher than that to the south of High Street and is therefore, not at risk of fluvial flooding from the River Colne.

3.3.3 Ellen Brook is an EA Main River and is the nearest source of fluvial flood risk to the site. Ellen Brook is located approximately 633m to the north of the site, however Colney Heath Lakes are formed online of this watercourse and are located approximately 13.6m to the north of the site at the closest point. Flood defence mapping from the EA indicates that high ground is present along both sides of Ellen Brook and the River Colney. Fluvial flooding associated with Ellen Brook is shown to mainly be kept within the lakes and banks of the brook and is not indicated to encroach onto the site. Although the Environment Agency (EA) have been contacted regarding predicted floodplain flood levels and flood extent data, they do not hold any detailed flood modelling data that would impact the site. Correspondence from the EA is included in **Appendix D**.

3.3.4 The EA Risk of Flooding from Rivers and Sea mapping, shown below in Figure 3.2, indicates that the proposed development site has less than a 1 in 1,000 annual probability of flooding from Rivers and Sea. This map shows the indicative extent of the natural floodplain, if there were no flood defences or certain other manmade structures, such as surface water sewers, and channel improvements.

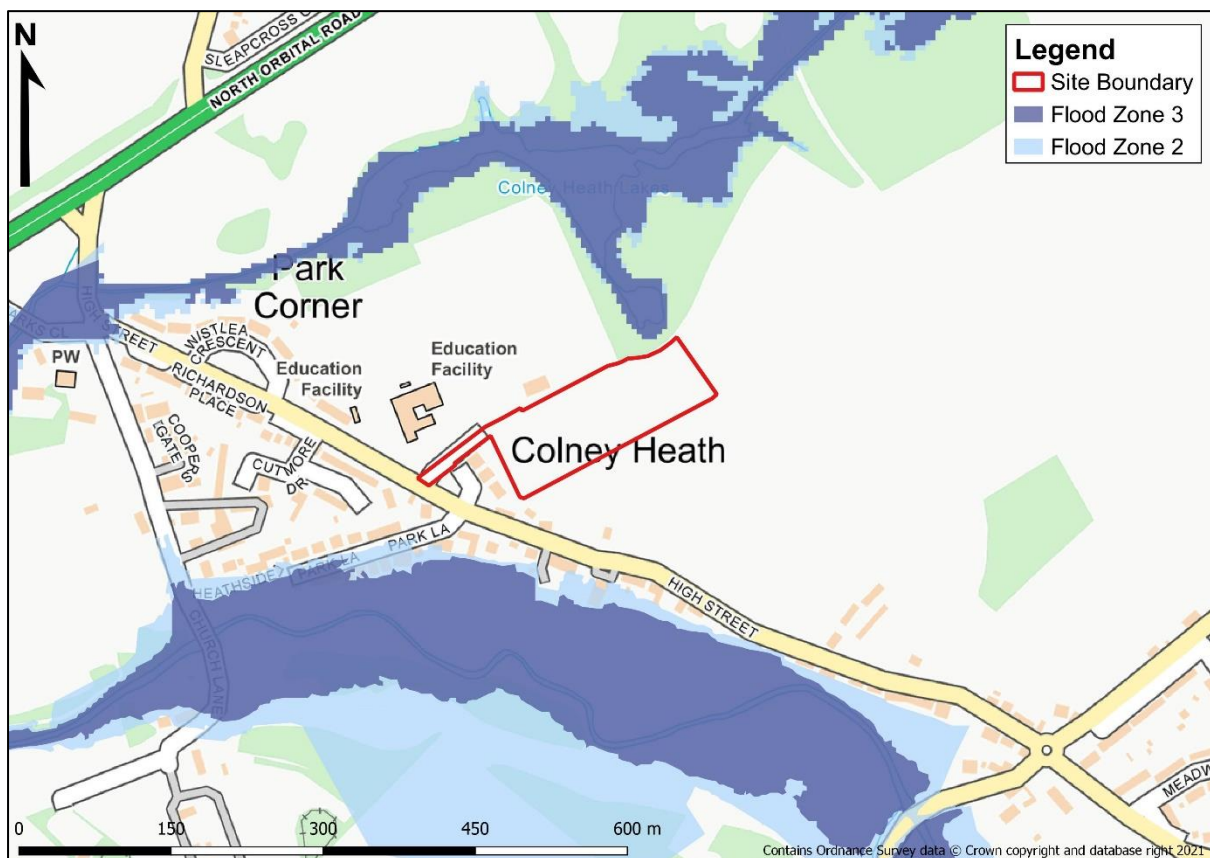


Figure 3.2 High Street, Colney Heath
– Risk of Flooding from Rivers and Sea (Source: EA)

Tidal Flood Risk

3.3.5 Ellen Brook is a non-tidal EA Main River and, therefore, the site is not at risk of flooding from tidal sources.

Surface Water Flood Risk

3.3.6 Generally, the western half of the site is shown to fall in a southerly direction, away from the northern boundary of the site, whereas the eastern half of the site is shown to fall from south to north. Across the centre of the site a low point is indicated, with levels shown to fall from the east and west towards this point. Therefore, any surface water runoff from the site is expected to follow the natural contours of the land.

3.3.7 Figure 3.3 below shows the Risk of Flooding from Surface Water mapping and indicates that almost the entire site is at a very low risk of surface water flooding (<0.1% AEP). However, towards the northern boundary of the site there is a small, isolated area at low risk (0.1% AEP) of surface water flooding.

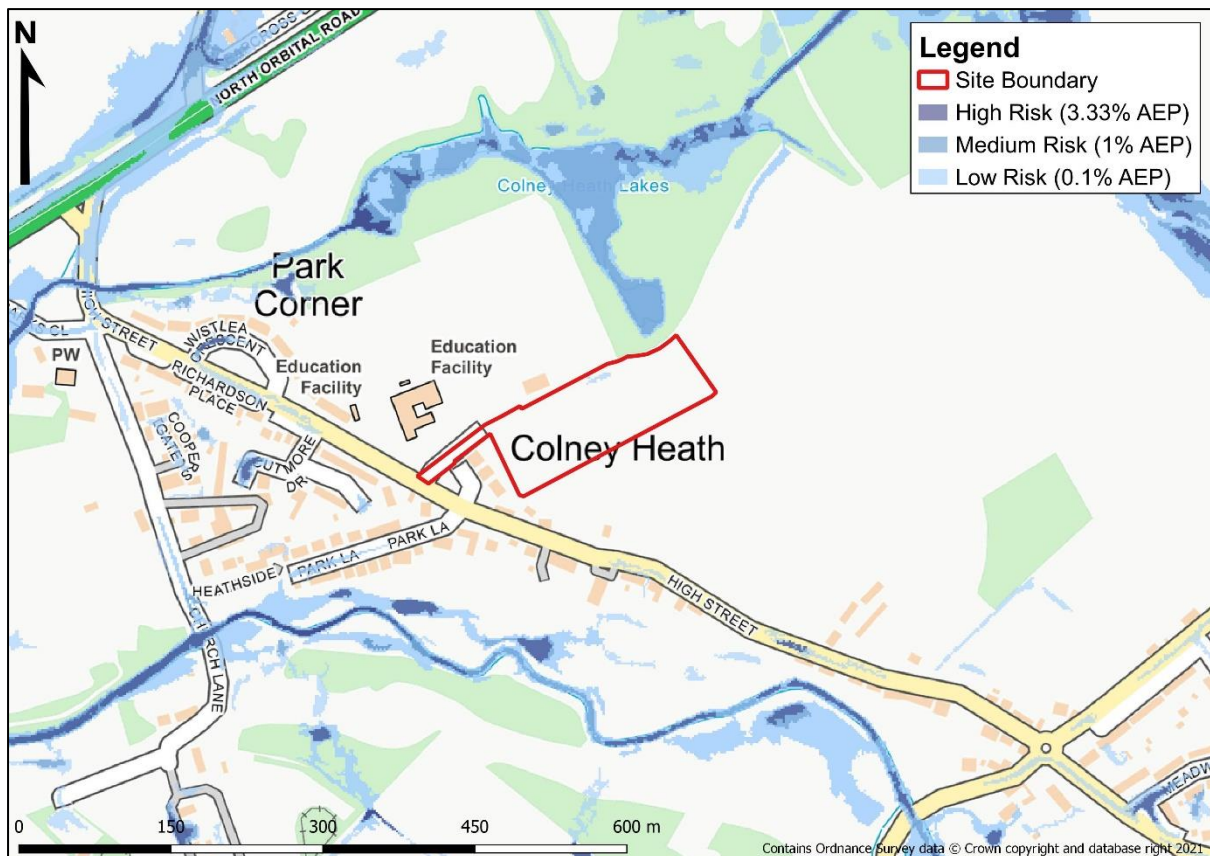


Figure 3.3 High Street, Colney Heath
– Risk of Flooding from Surface Water (Source: EA)

Flood Risk from Ground Water

3.3.8 The British Geological Survey's Geology of Britain mapping indicates that the site lies upon bedrock geology consisting of Lewes Nodular Chalk Formation and Seaford Chalk Formation (undifferentiated) – Chalk, and superficial deposits consisting of Lowestoft Formation – Diamicton. Lewes Nodular Chalk Formation and Seaford Chalk Formation are generally classed as highly productive aquifer.

3.3.9 The Environment Agency Aquifer Designation Map identifies the site as being situated on bedrock classed as Principal aquifer; geology that exhibit high permeability and/or provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. The superficial drift below the east of the site is classed as Secondary (undifferentiated) aquifer; in cases where it has not been possible to attribute either category A or B to a rock type.

3.3.10 The SWHSFRA (2018) includes mapping of areas that are susceptible to groundwater flooding at a 5m resolution. The risk is scaled between 0 and 4, with 0 indicating no risk and 4 identifying groundwater levels either at or very near (within 0.025m of) the ground surface. This mapping indicates that the site is not at risk of groundwater flooding.

3.3.11 Based on the information from the above sources, the site is considered to be at low risk of flooding from groundwater sources.

3.4 **Flood Risk from Sewers and Infrastructure**

3.4.1 The local sewers are operated and maintained by Thames Water (TW). TW sewer records indicate that there is a public foul sewer located adjacent to the northern boundary of the site, to the south of Colney Heath Football Club. Aside from this sewer, there are no other public sewers in close proximity to the site. A copy of the sewer record plan is included in **Appendix E**. An enquiry regarding possible capacity issues and historical sewer flooding incidents has been made to TW. In their response, TW have not raised any concerns regarding existing flood issues or capacity problems.

3.4.2 There are no canals or other manmade watercourses within close proximity of the site.

3.4.3 The site is not in close proximity to any reservoirs or wet process industrial works.

3.4.4 The sewers and infrastructure flood risk source can therefore be discounted as a significant source of flood risk to the site.

3.5 **Climate Change**

3.5.1 The implications of climate change should be taken into account in relation to surface water drainage. Peak rainfall intensity for longer lifetime residential developments is estimated to increase between 20% and 40% as a result of climate change. In this instance, the site is within a suitably developed area and there is potential for surface water runoff affecting adjacent development. Therefore, it is recommended that the Upper End allowance of 40% is applied to design rainfall intensity to allow for the potential implications of climate change.

3.6 **Detailed Development Proposals**

3.6.1 The proposed development and vulnerability classification are discussed in Section 3.1 above.

3.6.2 The technical guidance to the NPPF states that developments of a more vulnerable category such as the proposed residential use are appropriate within Flood Zone 1, without being subject to the application of the Sequential Test.

4.0 Flood Risk Management & Drainage Strategy

4.1 Surface Water Flood Risk Mitigation

4.1.1 Development proposals are to construct a new housing development comprising of 45 residential dwellings, associated driveways, parking spaces, access, landscaping and supporting infrastructure. Accommodation will be a mix of affordable housing, open market dwellings, and self-build plots.

4.1.2 Although the proposed development will see the levelling of ground during construction, in accordance with best practice, finished floor levels should be set a minimum of 150mm above the surrounding external levels and external ground levels should comprise falls away from the proposed dwellings in order to encourage surface water runoff away from the dwellings and towards drainage features.

4.2 Surface Water Drainage

Sustainable Drainage Systems

4.2.1 Part H of the Building Regulations 2010 recommends that surface water run-off shall discharge to one of the following, listed in order of priority:

- a) an adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable.
- b) a watercourse, or, where that is not reasonably practicable.
- c) a sewer.

4.2.2 It is necessary to identify the most appropriate method of controlling and discharging surface water. The design should seek to improve the local run-off profile by using systems that can either attenuate run-off and reduce peak flow rates or positively impact on the existing flood profile.

Infiltration Based Systems

4.2.3 The British Geological Survey's Geology of Britain mapping indicates that the site lies upon bedrock geology consisting of Lewes Nodular Chalk Formation and Seaford Chalk Formation (undifferentiated) – Chalk, and superficial deposits consisting of Lowestoft Formation – Diamicton.

4.2.4 The Cranfield Soil and Agrifood Institute's Soilscape mapping indicates the entirety of the site to be situated on soils categorised as Soilscape 6: Freely draining slightly acid loamy soils.

4.2.5 Based on the above information, it is likely that permeable ground conditions are present at the site and as such, infiltration-based systems should be used for the disposal of surface water from the site, where possible. However, it is recommended that an intrusive site investigation is carried out for the site, this should include soakaway testing to BRE 365 specification to confirm the infiltration potential of the soils.

Open Watercourses

4.2.6 As the site is indicated to be situated on freely draining soils, infiltration-based systems should be utilised, where possible, for the disposal of surface water. Where this is not feasible, it is proposed to discharge surface water, at an attenuated rate, to Colney Heath Lakes online of Ellen Brook to the north of the site, subject to agreement with the Environment Agency. Although this watercourse is not within the site boundary, it does lie within the wider site ownership.

Sewers

4.2.7 As infiltration-based systems should be feasible for the site, and where not possible the site can discharge surface water to an open watercourse, it should not be necessary to discharge surface water to the TW sewer network.

SuDS Option Feasibility

4.2.8 A range of SuDS options have been considered for use within the context of the proposed development site, in-line with CIRIA guidance. Table 4.1 below provides a summary of the options considered for this site.

Table 4.1: Sustainable Urban Drainage Systems Options

SuDS Category	SuDS Technique	Viability	Explanation
Infiltration/Filtration	Infiltration Trenches	✓	As the site is situated on freely draining soils it is likely that infiltration/filtration can be utilised for this site. However, this will depend on soakaway testing to BRE365 specification being completed and is subject to detailed drainage design.
	Infiltration Basins	✓	
	Soakaways	✓	
	Bioretention/Filter Strips	✓	
Source Control	Green Roofs	✗	The proposed development comprises of residential dwellings with pitched roofs. As a result, green roofs are not feasible.
	Rainwater Harvesting	✓	The development proposals include areas of landscaped land to the east of the site. These areas will essentially act to harvest rainwater as opposed to resulting in runoff, while also being maintenance free. These areas could potentially be further developed to include raingardens or other bioretention areas.

	Pervious Pavements	✓	Pervious paving may be utilised for the private parking spaces and pedestrian walkways. This will serve to increase the rainfall-runoff response time and provide water quality benefits.
Conveyance	Swales	✗	Due to the spatial constraints of the site, the opportunities for incorporating conveyance features are limited. Where is space is available, more suitable options will be possible, such as bioretention features and filter strips.
	Filter Drains	✗	
	Channels/Rills	✗	
Retention/Detention	Detention Basin	✓	Should infiltration be proven infeasible for the site, surface water runoff will need to be attenuated by a detention basin before restricted discharge to an open watercourse.
	Retention Pond	✗	
	Subsurface Storage	✗	
	Wetlands	✗	

Runoff Assessment

- 4.2.9 As the site is indicated to be situated on freely draining soils, infiltration-based systems for the disposal of surface water should be feasible for the site. However, this will depend upon further soakaway testing being completed to BRE 365 specification. This will confirm the infiltration potential of the soils and allow for infiltration rates to be calculated. Where infiltration methods are not possible surface water runoff will need to be restricted to the pre-development greenfield discharge rate, as calculated below.
- 4.2.10 The ICP SUDS and IH124 (Flood Studies Report) methods have been used to calculate the surface water runoff ($QBAR_{RURAL}$) from a small (<50ha) greenfield site, which are detailed below:

$$QBAR_{RURAL} = 0.00108 \times \text{Where AREA} = \text{Area (ha)}$$

$$(0.01 \times \text{AREA})^{0.89} \times$$

$$SAAR^{1.17} \times SPR^{2.17}$$

SAAR = Standard Average Annual Rainfall (mm, 1941-1970)

SPR = Standard Percentage Runoff Coefficient

- 4.2.11 With a site area of 1.75ha and using Flood Studies Report values for SAAR (700mm) and SPR (0.3), this results in a $QBAR_{RURAL}$ rate of **3.2l/s** and discharge rates for the following return periods:

1 in 1-year	2.7l/s
1 in 30-year	7.2l/s
1 in 100-year	10.2l/s
1 in 100-year + 40% Climate Change	14.3l/s

Return Period Design

4.2.12 The proposed surface water drainage system should be designed to accommodate the 1 in 30-year rainfall event without any surface water flooding and should be capable of retaining the 1 in 100-year plus climate change (40%) storm event on site without flooding any buildings.

Discharge Rate

4.2.13 In accordance with DEFRA guidance, the peak surface water runoff rate for greenfield developments should be restricted to the existing peak runoff rate where reasonably practicable. However, DEFRA guidance also states that, where a flow control device is used then a minimum rate of 5.0l/s should be applied to prevent blockages in the system. Therefore, the surface water discharge from the site will need be restricted to **5.0l/s**, in the event that a discharge to a watercourse is required.

Drainage Proposals – Main Strategy & Attenuation Volume

4.2.14 As the site is situated on soils that are indicated to allow infiltration, infiltration-based systems should be utilised where possible for the disposal of on-site surface water runoff. Moreover, the runoff assessment completed above has produced relatively low discharge rates, implying permeable ground conditions are present at the site.

4.2.15 For the most part the site should drain to trench soakaways. Roofs and privately owned hardstanding areas could be drained to plot-based soakaways within the curtilage of the properties, either situated under driveways or gardens. To comply with Part H of the building regulations, soakaways must have 5m clearance from buildings. In order to determine reliable infiltration rates for soils on-site, comprehensive soakaway testing to BRE 365 specification should be completed. From this, appropriate storage volumes can be determined.

4.2.16 Should infiltration be proven infeasible, surface water attenuation will need to be provided before restricted discharge to an open watercourse. The proposed development will comprise of an impermeable footprint of approximately 1.06ha, including urban creep. In order to maintain a discharge rate of **5.0l/s** for all storms up to and including the 100-year return period with a 40% allowance for climate change, attenuation would be required which provides in the order of **427.9m³** of surface water storage. The

required surface water attenuation volume should be provisioned by a detention basin before restricted discharge to Colney Heath Lakes online of Ellen Brook to the north of the site.

- 4.2.17 A surface water drainage strategy plan and supporting calculations are provided in **Appendix F**.
- 4.2.18 It is recommended that parking spaces and private pedestrian footways are constructed from permeable paving where appropriate and bioretention features, such as raingardens, are utilised where possible. For example, bioretention features can be incorporated in landscaped areas to the east of the site, or in the highway curtilage in the place of soft verges in order to collect surface water runoff from the highway and other nearby impervious surfaces. Both above-mentioned source control methods will act to increase the rainfall-runoff response time by intercepting rainfall at or near source while also providing improvements to water quality.
- 4.2.19 The surface water discharge rate and proposed outfall location will be subject to agreement with Hertfordshire County Council as Lead Local Flood Authority.

4.3 **Foul Water Drainage**

- 4.3.1 TW sewer records indicate a public foul sewer suitably located to the north of the site, just outside of the site boundary. Although parts of the site may be able to drain via gravity, foul flows will likely require pumping to this sewer. As there are no current foul connections into this sewer, a new sewer connection will be required.
- 4.3.2 New foul public sewer connections will be subject to agreement with TW via a Section 106 (Water Industry Act 1991) application.

5.0 **Off-Site Impacts**

- 5.1.1 The proposed development surface water should discharge to ground via infiltration together with a provision of source control. Where this is not possible, the proposed development surface water will discharge at a restricted rate via the provision of attenuation. Therefore, the development will bring about improvements to the surface water regime in the area, and hence will not increase flooding adjacent to or downstream of the site for the lifetime of the development.

6.0 **Overland Flow & Flood Routing Considerations**

- 6.1.1 The routing of potential surface water runoff, should the capacity of the proposed drainage system be exceeded, needs to be built into the layout of the site such that the residual risk of flooding from this element can be easily mitigated.
- 6.1.2 Careful attention will need to be paid to the proposed site levels to ensure that overland flow routes are maintained, and localised low spots are not created.

7.0 Residual Risks

- 7.1.1 The investigations carried out as part of this flood risk assessment and flood risk management measures proposed have demonstrated that the development will be safe, without increasing flood risk elsewhere.

8.0 Recommendations

The following recommendations are made to ensure flood risk at this site is minimised:

- In accordance with best practice, finished floor levels should be set a minimum of 150mm above the surrounding external levels and external ground levels should comprise falls away from the proposed dwellings in order to encourage surface water runoff away from the dwellings and towards drainage features.
- The proposed surface water drainage system should be designed to accommodate the 1 in 30-year rainfall event without any surface water flooding and should be capable of retaining the 1 in 100-year plus climate change (40%) storm event on site without flooding any buildings.
- Where possible, infiltration-based systems should be used for the disposal of surface water from the site. However, comprehensive soakaway testing to BRE 365 specification should be completed prior to design.
- Where infiltration is found to be infeasible for the site, it is proposed to restrict surface water runoff to **5.0l/s** for all storms up to and including 100-year (1% AEP) plus 40% climate change return periods. In order to achieve this discharge rate, an attenuation volume in the order of **427.9m³** will need to be provided. It is proposed the required attenuation volume is provisioned by a detention basin.
- It is recommended that source control methods should be utilised where possible. These include the use of permeable paving for parking spaces and private pedestrian footways, and the creation of bioretention gardens along the main highway curtilage and in landscaped areas to the south of the site.
- Foul water from the site should drain to the public foul sewer, located to the north of the site, via a pumped discharge.

Disclaimer

We would note that all comments made in this report are based on the sources stated in Section 1.1. This report and its recommendations are intended for the use of Tarmac Trading Limited for the above site only.

Project Number: 21-0570
Project Title: High Street, Colney Heath
Location: High Street, Colney Heath, St. Albans, Hertfordshire
BSP Document Ref: CHSA-BSP-ZZ-XX-RP-C-0001-P02_Flood_Risk_Assessment



Appendix A

Detailed Site Location Plan



Recreation Ground

L Twr

L Twr

L Twr

Lake

Football Pitch

L Twr

Colney Heath Junior Mixed Infant and Nursery School

Tennis Court

L Twr

Sports Pavilion

L Twr

TCB (dis)

HIGH STREET

PH 88

PARK LANE

Bill Franklin Memorial Garden



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KEY

 Application boundary

Revision	Note	Sign off
-	Draft	LN
A	Revised to reflect Deed of variation for 106 High Street	CD
B	Revised to remove Fishing Club access and NE woodland	LN

CLIENT
Tarmac Trading Ltd

PROJECT
Land at High Street
Colney Heath
St Albans

DRAWING
Site Location Plan

PROJECT NUMBER
TARC3006

DRAWING NUMBER 1001 **CHECKED BY** LN

REVISION B **STATUS** Submission

DATE 14/01/2022 **SCALE** 1:1,250 @ A3



Project Number: 21-0570
Project Title: High Street, Colney Heath
Location: High Street, Colney Heath, St. Albans, Hertfordshire
BSP Document Ref: CHSA-BSP-ZZ-XX-RP-C-0001-P02_Flood_Risk_Assessment



Appendix B

Topographical Survey



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 with the permission of Land & Property Services
 under delegated authority the Controller of Her Majesty's Stationery Office
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 © Crown Copyright, Department of Infrastructure, Isle of Man

NOTE: Certain information on this plan has been
 digitised and therefore its accuracy cannot be
 guaranteed. Do not scale off plans/building.



Land Survey
 Stancombe Lane, Flax Bourton,
 Bristol, Avon, BS48 3QD
 Tel +44(0)1275 465714
 e-mail: stuart.blackhurst@tarmac.com

C304 - COLNEY HEATH

SITE PLAN & ENTRANCE
 9th SEPTEMBER 2021

LSS Models Used To Create Plot
 C304 COLNEY HEATH 2021-09-09 SU

Drawn By
 SJB

Date
 SEPTEMBER 2021

Drawing No.
 C304-00053

Scale
 1 : 1000

Project Number: 21-0570
Project Title: High Street, Colney Heath
Location: High Street, Colney Heath, St. Albans, Hertfordshire
BSP Document Ref: CHSA-BSP-ZZ-XX-RP-C-0001-P02_Flood_Risk_Assessment












Appendix C

Proposed Site Plan



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- KEY**
-  Application boundary
 -  Residential Development
 -  Open Space
 -  Attenuation Basin
 -  Local Area of Play (LAP)
 -  Proposed Structural Planting
 -  Retained Hedges and Trees
 -  Proposed Pedestrian Links
 -  Retained Farm Access

CLIENT:
 Tarmac Ltd

PROJECT:
 Land adjacent to Colney Heath Football Club
 Colney Heath

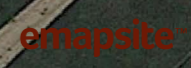
DRAWING:
 Concept Masterplan

PROJECT NUMBER:
 TARC3006

DRAWING NUMBER: 3001 **CHECKED BY:** CD

REVISION: D **STATUS:** Final

DATE: 20/01/2022 **SCALE:** 1:1000 @ A3



Project Number: 21-0570
Project Title: High Street, Colney Heath
Location: High Street, Colney Heath, St. Albans, Hertfordshire
BSP Document Ref: CHSA-BSP-ZZ-XX-RP-C-0001-P02_Flood_Risk_Assessment



Appendix D

Environment Agency Correspondence

Alysha Searle

From: NET Enquiries <HNLenquiries@environment-agency.gov.uk>
Sent: 05 October 2021 12:04
To: Alysha Searle
Subject: HNL236006/AS - 21-0570 - CHSA_High St, Colney Heath, St Albans: Product 4 Request

Dear Alysha

Thank you for your request dated 10 September 2021 for Environment Agency data.

The information on Flood Zones in the area relating to CHSA_High St, Colney Heath, St Albans is as follows:

The property is in an area located within Flood Zone 1 shown on our Flood Map for Planning (Rivers and Sea).

Note - This information relates to the area that the above named site is in and is not specific to the property/proposed development itself.

Because this site does not fall within an area at risk of flooding from rivers or the sea, we do not hold any detailed flood modelling data that would impact your site. As such we are unable to provide a flood risk product.

We do not hold records of historic flood events from rivers and/or the sea affecting the area local to this site. However, please be aware that this does not necessarily mean that flooding has not occurred here in the past, as our records are not comprehensive.

This address is in an area at Low risk of surface water flooding.

Following the Flood and Water Management Act 2010, Lead Local Flood Authorities are responsible for the management of groundwater and surface water flooding. They also maintain a register of property flooding incidents. You may want to seek further advice from the LLFA Herfordshire County Council who may have further information.

You can view groundwater flooding issues here

<https://www.gov.uk/government/collections/groundwater-current-status-and-flood-risk>

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments

<https://www.gov.uk/planning-applications-assessing-flood-risk>

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

You can also view and print surface water flood maps online at:

<http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=ufmfsw#x=357683&y=355134&scale=2>

This information is provided subject to the [Open Government Licence](#), which you should read.

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

Data Available Online

Many of our flood datasets are available online:

- **You can view and download flood risk maps from our website at:**
<http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=floodmap#x=357683&y=355134&scale=2>
- **Flood Map For Planning** ([Flood Zone 2](#), [Flood Zone 3](#), [Flood Storage Areas](#), [Flood Defences](#), [Areas Benefiting from Defences](#))
- [Risk of Flooding from Rivers and Sea](#)
- [Historic Flood Map](#)
- [Current Flood Warnings](#)
- [Open data](#)

I hope that we have correctly interpreted your request. If you are not satisfied with our response to your request for information you can contact us within 2 calendar months to ask for our decision to be reviewed.

Kind regards

Annette Smith

Customers and Engagement Officer
Environment Agency, Hertfordshire and North London
Alchemy, Bessemer Road, Welwyn Garden City, Hertfordshire, AL7 1HE
Tel: 0203 025 8975

My usual working hours are 8.30am to 3pm, Mondays to Wednesdays

Did you know that the Environment Agency publishes most of its data via www.data.gov.uk?
Using this site you can search for our data alongside other environmental data providers from the Defra Network and local authorities.

We are now **Hertfordshire and North London Area**

Our new email address for requests for information is HNLenquiries@environment-agency.gov.uk.
But don't worry, any emails you send to our old address will still reach us.



Our website has moved. Find us at <http://www.gov.uk/environment-agency>



Planning for the
future of water



From: Alysha Searle [<mailto:a.searle@bsp-consulting.co.uk>]

Sent: 10 September 2021 14:11

To: Enquiries, Unit <enquiries@environment-agency.gov.uk>

Subject: 210913/CMC14 - 21-0570 - CHSA_High St, Colney Heath, St Albans: Product 4 Request

Dear External Relations,

Please can you provide me with the data listed within the attached letter detailing a Product 4 request. However, if you could check and confirm that would be much appreciated.

If you have any queries, please do not hesitate to contact me.

Kind Regards,

Alysha Searle

BSc (Hons)

Flood Risk Engineer

BSP Consulting (Nottingham)

direct: **0345 413 4013**

office: 0345 413 4000

email: a.searle@bsp-consulting.co.uk



www.bsp-consulting.co.uk



Please consider the environment before printing this email. Thank you.

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Where design information is issued in CAD format it is only the information which is displayed in the paper-space which is to be used, furthermore should any discrepancies be present between the CAD and the pdf drawings issued the contents of the pdf are to take precedence. Finally, we note

that, whilst we endeavour to coordinate all our drawings, we are not responsible for the setting out of the private works.

BSP accept no responsibility for any infections found in this email. This email has been scanned for viruses and was free from infection upon leaving our network.

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Project Number: 21-0570
Project Title: High Street, Colney Heath
Location: High Street, Colney Heath, St. Albans, Hertfordshire
BSP Document Ref: CHSA-BSP-ZZ-XX-RP-C-0001-P02_Flood_Risk_Assessment



Appendix E

Thames Water Sewer Records & Correspondence



BSP Consulting
12Oxford Street
NOTTINGHAM
NG1 5BG

Search address supplied Land off High Street, Colney Heath
High Street
Colney Heath
St Albans
Hertfordshire
AL4 0NS

Your reference 21-0570

Our reference ALS/ALS Standard/2021_4504700

Search date 14 September 2021

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.



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



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



0800 009 4540

Search address supplied: Land off High Street, Colney Heath, High Street, Colney Heath, St Albans, Hertfordshire, AL4 0NS

Dear Sir / Madam

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

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

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

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

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

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

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

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

Email: searches@thameswater.co.uk

Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

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

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

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

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

For your guidance:

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

Clean Water Services

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

With regard to the fresh water supply, this site falls within the boundary of another water company. For more information, please redirect your enquiry to the following address:

Affinity Water Ltd
Tamblin Way
Hatfield

Asset location search



Property Searches

AL10 9EZ
Tel: 0345 3572401

For your guidance:

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

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

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

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

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

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

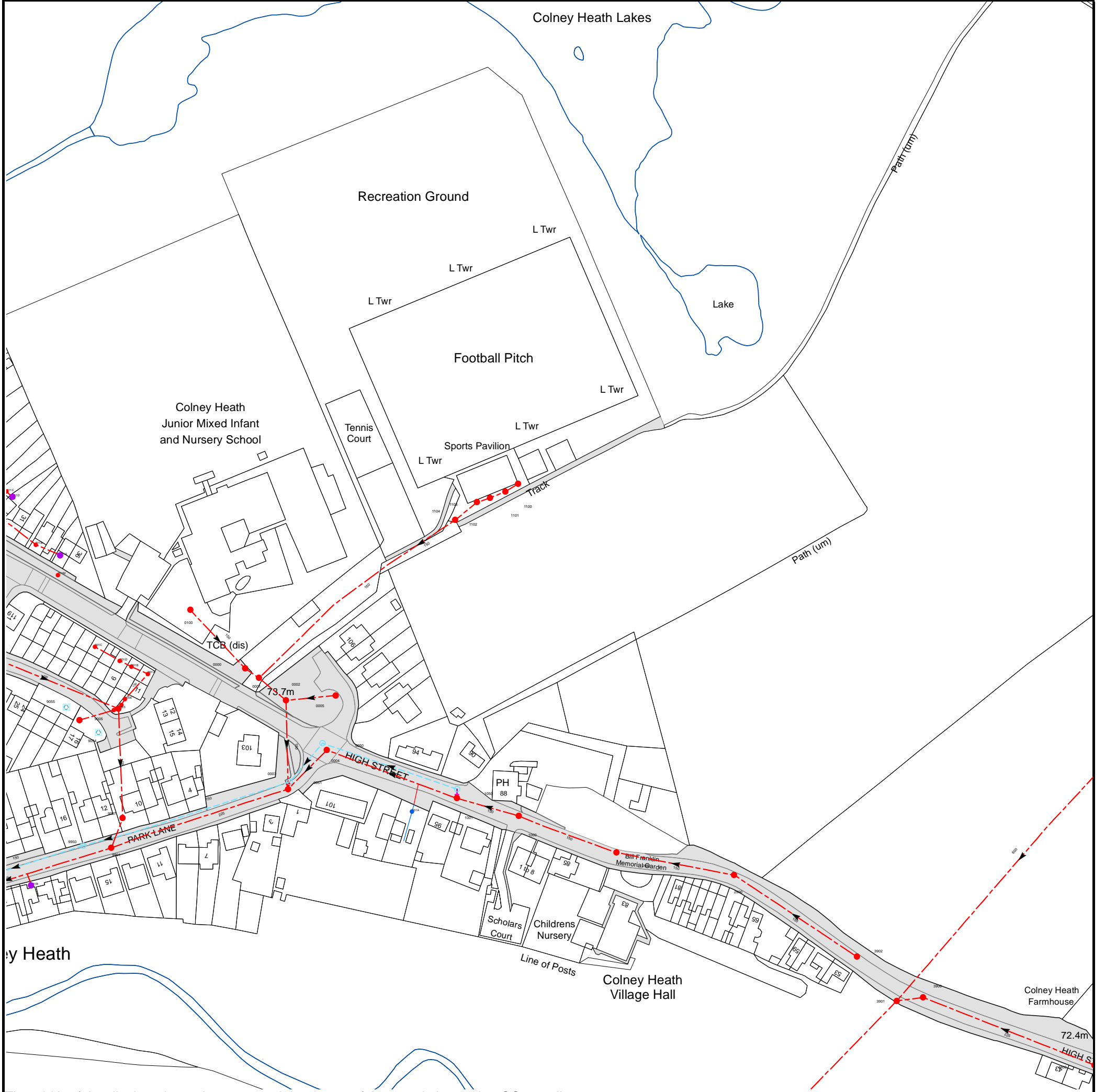
Clean Water queries

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

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

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

Asset Location Search Sewer Map - ALS/ALS Standard/2021_4504700



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 520196,206129

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any kind or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

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

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



















Manhole Reference	Manhole Cover Level	Manhole Invert Level
911C	n/a	n/a
101A	n/a	n/a
911M	n/a	n/a
911B	n/a	n/a
911D	n/a	n/a
0005	74.46	72.56
0001	74.55	72.24
001A	n/a	n/a
0000	74.81	72.3
0100	74.93	72.73
1104	75.45	73.45
1103	75.43	73.78
1102	75.39	73.97
1101	75.3	74.11
1100	75.22	74.42
991B	n/a	n/a
911A	n/a	n/a
9055	n/a	n/a
9005	72.96	71.51
9950	70.81	70.2
901C	n/a	n/a
9054	n/a	n/a
9901	70.71	68.61
9003	73.27	69.37
901D	n/a	n/a
9007	71.4	68.81
9006	73.66	71.97
001B	n/a	n/a
4800	72.58	70.13
3901	72.09	69.04
3900	72.52	69.85
3902	72.41	70.39
2900	72.1	69.98
2901	72.04	69.69
1000	71.95	69.45
1001	72.28	69.18
0003	72.11	68.86
1050	n/a	n/a
0051	n/a	n/a
0004	73.27	68.97
0050	n/a	n/a
0002	74.56	72.15

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



ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

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

Notes:

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

Sewer Fittings

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

-  Air Valve
-  Dam Chase
-  Fitting
-  Meter
-  Vent Column




Operational Controls

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

-  Control Valve
-  Drop Pipe
-  Ancillary
-  Weir

End Items






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

-  Outfall
-  Undefined End
-  Inlet

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Searches on 0800 009 4540.






Other Symbols

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








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

Areas

Lines denoting areas of underground surveys, etc.

-  Agreement
-  Operational Site
-  Chamber
-  Tunnel
-  Conduit Bridge

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

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

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL's terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	BACS Payment	Telephone Banking	Cheque
<p>Call 0800 009 4540 quoting your invoice number starting CBA or ADS / OSS</p>	<p>Account number 90478703 Sort code 60-00-01 A remittance advice must be sent to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. or email ps.billing@thameswater.co.uk</p>	<p>By calling your bank and quoting: Account number 90478703 Sort code 60-00-01 and your invoice number</p>	<p>Made payable to 'Thames Water Utilities Ltd' Write your Thames Water account number on the back. Send to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW or by DX to 151280 Slough 13</p>

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.

Sewer Flooding

History Enquiry



Property Searches

BSP Consulting

Oxford Street

Search address supplied Land off High Street, Colney Heath
High Street
Colney Heath
St Albans
AL4 0NS

Your reference 21-0570

Our reference SFH/SFH Standard/2021_4504701

Received date 14 September 2021

Search date 14 September 2021



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



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



0800 009 4540

Sewer Flooding

History Enquiry



Property Searches

Search address supplied: Land off High Street, Colney Heath, High Street, Colney Heath, St Albans, AL4 0NS

This search is recommended to check for any sewer flooding in a specific address or area

TWUL, trading as Property Searches, are responsible in respect of the following:-

- (i) any negligent or incorrect entry in the records searched;
- (ii) any negligent or incorrect interpretation of the records searched;
- (iii) and any negligent or incorrect recording of that interpretation in the search report
- (iv) compensation payments



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



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



0800 009 4540

History of Sewer Flooding

Is the requested address or area at risk of flooding due to overloaded public sewers?

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

- A sewer is “overloaded” when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- “Internal flooding” from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- “At Risk” properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company’s reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0800 316 9800 or website www.thameswater.co.uk



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



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



0800 009 4540

Project Number: 21-0570
Project Title: High Street, Colney Heath
Location: High Street, Colney Heath, St. Albans, Hertfordshire
BSP Document Ref: CHSA-BSP-ZZ-XX-RP-C-0001-P02_Flood_Risk_Assessment



Appendix F

Proposed Drainage Strategy Plan & Calculations



LEGEND

- Site Boundary
- Surface Water Sewer
- Surface Water Manhole
- Attenuation mBasin

NOTES

1. DO NOT SCALE.
2. Should there be any conflict between the details indicated on this drawing and those indicated on other drawings the Engineer should be informed PRIOR to construction on site.
3. Until technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are Preliminary and NOT for construction. Should the contractor commence site work prior to such approval being given, it is entirely at his own risk.
4. This is a drainage strategy drawing intended for planning purposes only. It is not intended as a final solution. Further detailed design is required.

Updated Masterplan and Attenuation Volume					
P02	AS	27/01/2022	SCB	27/01/2022	TG
First Issue					
P01	AS	22/10/2021	SCB	22/10/2021	TG
SCALE @ A3		ISSUING OFFICE		PROJECT NUMBER	
NTS		Nottingham		21-0570	

CLIENT APPROVAL

A - APPROVED	
B - APPROVED WITH COMMENTS	
C - DO NOT USE	

STATUS S01 **PURPOSE OF ISSUE** Preliminary

*CIVIL *STRUCTURAL *TRANSPORTATION *GEOTECHNICAL *ENVIRONMENTAL

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Also offices in Derby, Leicester and Sheffield

PROJECT

High Street, Colney Heath


TITLE

Surface Water Drainage Strategy Plan

CLIENT

Tarmac Trading Limited

PROJECT	ORIGINATOR	ZONE	LEVEL	TYPE	ROLE	NUMBER	REV
CFGN-BSP-ZZ-XX-DR-C-0001							P02

BSP Consulting		Page 1
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Date 21/10/2021 File	Designed by AS Checked by SCB	
Innovyze	Source Control 2019.1	

ICP SUDS Mean Annual Flood

Input


Return Period (years)	1	Soil	0.300
Area (ha)	1.750	Urban	0.000
SAAR (mm)	700	Region Number	Region 6

Results 1/s

QBAR Rural	3.2
QBAR Urban	3.2

Q1 year 2.7


Q1 year	2.7
Q30 years	7.2
Q100 years	10.2

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Date 29/11/2021 File Pond_Attenuation_P02.SRCX	Designed by AS Checked by SCB	
Innovyze	Source Control 2019.1	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	73.399	0.509	5.0	0.0	5.0	186.2	O K
30 min Summer	73.520	0.630	5.0	0.0	5.0	240.2	O K
60 min Summer	73.628	0.738	5.0	0.0	5.0	291.8	O K
120 min Summer	73.717	0.827	5.0	0.0	5.0	336.8	O K
180 min Summer	73.756	0.866	5.0	0.0	5.0	357.1	O K
240 min Summer	73.775	0.885	5.0	0.0	5.0	367.1	O K
360 min Summer	73.786	0.896	5.0	0.0	5.0	373.2	O K
480 min Summer	73.783	0.893	5.0	0.0	5.0	371.5	O K
600 min Summer	73.771	0.881	5.0	0.0	5.0	365.1	O K
720 min Summer	73.758	0.868	5.0	0.0	5.0	357.9	O K
960 min Summer	73.731	0.841	5.0	0.0	5.0	344.1	O K
1440 min Summer	73.681	0.791	5.0	0.0	5.0	318.1	O K
2160 min Summer	73.609	0.719	5.0	0.0	5.0	282.4	O K
2880 min Summer	73.535	0.645	5.0	0.0	5.0	247.3	O K
4320 min Summer	73.379	0.489	5.0	0.0	5.0	177.8	O K
5760 min Summer	73.256	0.366	5.0	0.0	5.0	127.3	O K
7200 min Summer	73.162	0.272	5.0	0.0	5.0	91.6	O K
8640 min Summer	73.096	0.206	4.9	0.0	4.9	68.0	O K
10080 min Summer	73.053	0.163	4.7	0.0	4.7	52.7	O K
15 min Winter	73.452	0.562	5.0	0.0	5.0	209.2	O K
30 min Winter	73.583	0.693	5.0	0.0	5.0	270.0	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Overflow Volume (m ³)	Time-Peak (mins)
15 min Summer	141.917	0.0	188.6	0.0	26
30 min Summer	91.958	0.0	244.4	0.0	41
60 min Summer	56.713	0.0	304.8	0.0	70
120 min Summer	33.812	0.0	363.6	0.0	128
180 min Summer	24.675	0.0	398.0	0.0	188
240 min Summer	19.628	0.0	422.1	0.0	246
360 min Summer	14.150	0.0	456.4	0.0	364
480 min Summer	11.224	0.0	482.6	0.0	482
600 min Summer	9.372	0.0	503.6	0.0	588
720 min Summer	8.084	0.0	521.2	0.0	632
960 min Summer	6.399	0.0	549.6	0.0	758
1440 min Summer	4.596	0.0	590.8	0.0	1016
2160 min Summer	3.296	0.0	639.9	0.0	1432
2880 min Summer	2.602	0.0	673.4	0.0	1848
4320 min Summer	1.862	0.0	722.1	0.0	2564
5760 min Summer	1.467	0.0	760.0	0.0	3280
7200 min Summer	1.219	0.0	789.2	0.0	3960
8640 min Summer	1.047	0.0	813.5	0.0	4592
10080 min Summer	0.921	0.0	834.0	0.0	5248
15 min Winter	141.917	0.0	211.3	0.0	26
30 min Winter	91.958	0.0	273.3	0.0	40

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Innovyze	Source Control 2019.1	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m ³)	Status
60 min Winter	73.701	0.811	5.0	0.0	5.0	328.2	O K
120 min Winter	73.799	0.909	5.0	0.0	5.0	380.1	O K
180 min Winter	73.844	0.954	5.0	0.0	5.0	404.5	O K
240 min Winter	73.866	0.976	5.0	0.0	5.0	417.1	O K
360 min Winter	73.884	0.994	5.0	0.0	5.0	426.9	O K
480 min Winter	73.885	0.995	5.0	0.0	5.0	427.9	O K
600 min Winter	73.878	0.988	5.0	0.0	5.0	423.6	O K
720 min Winter	73.865	0.975	5.0	0.0	5.0	416.3	O K
960 min Winter	73.831	0.941	5.0	0.0	5.0	397.6	O K
1440 min Winter	73.771	0.881	5.0	0.0	5.0	364.7	O K
2160 min Winter	73.673	0.783	5.0	0.0	5.0	314.3	O K
2880 min Winter	73.570	0.680	5.0	0.0	5.0	263.8	O K
4320 min Winter	73.333	0.443	5.0	0.0	5.0	158.4	O K
5760 min Winter	73.161	0.271	5.0	0.0	5.0	91.3	O K
7200 min Winter	73.060	0.170	4.7	0.0	4.7	55.4	O K
8640 min Winter	73.013	0.123	4.4	0.0	4.4	39.3	O K
10080 min Winter	72.998	0.108	3.9	0.0	3.9	34.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Overflow Volume (m ³)	Time-Peak (mins)
60 min Winter	56.713	0.0	341.5	0.0	70
120 min Winter	33.812	0.0	407.2	0.0	126
180 min Winter	24.675	0.0	445.7	0.0	184
240 min Winter	19.628	0.0	472.7	0.0	242
360 min Winter	14.150	0.0	511.1	0.0	356
480 min Winter	11.224	0.0	540.4	0.0	470
600 min Winter	9.372	0.0	563.8	0.0	580
720 min Winter	8.084	0.0	583.4	0.0	686
960 min Winter	6.399	0.0	615.0	0.0	798
1440 min Winter	4.596	0.0	659.9	0.0	1090
2160 min Winter	3.296	0.0	716.8	0.0	1556
2880 min Winter	2.602	0.0	754.2	0.0	2000
4320 min Winter	1.862	0.0	809.1	0.0	2724
5760 min Winter	1.467	0.0	851.3	0.0	3352
7200 min Winter	1.219	0.0	884.0	0.0	3960
8640 min Winter	1.047	0.0	911.2	0.0	4424
10080 min Winter	0.921	0.0	934.4	0.0	5152

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.432	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.720

Time (mins) Area			Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)	From:	To:	(ha)
0	4	0.240	4	8	0.240	8	12	0.240

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Model Details

Storage is Online Cover Level (m) 74.290

Tank or Pond Structure

Invert Level (m) 72.890

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	305.7	0.500	427.1	1.000	568.8	1.400	663.4

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0105-5000-1000-5000
Design Head (m)	1.000
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	105
Invert Level (m)	72.890
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	5.0
Flush-Flo™	0.296	5.0
Kick-Flo®	0.637	4.1
Mean Flow over Head Range	-	4.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.6	1.200	5.4	3.000	8.4	7.000	12.5
0.200	4.8	1.400	5.8	3.500	9.0	7.500	12.9
0.300	5.0	1.600	6.2	4.000	9.6	8.000	13.3
0.400	4.9	1.800	6.6	4.500	10.1	8.500	13.7
0.500	4.7	2.000	6.9	5.000	10.6	9.000	14.1
0.600	4.3	2.200	7.2	5.500	11.1	9.500	14.5
0.800	4.5	2.400	7.5	6.000	11.6		
1.000	5.0	2.600	7.8	6.500	12.1		

Orifice Overflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 73.890



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