wardell-armstrong.com

ENERGY AND CLIMATE CHANGE
ENVIRONMENT AND SUSTAINABILITY
INFRASTRUCTURE AND UTILITIES
LAND AND PROPERTY
MINING AND MINERAL PROCESSING
MINERAL ESTATES
WASTE RESOURCE MANAGEMENT

CROUDACE HOMES

LAND AT ALBOURNE

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

JULY 2022

wardell armstrong

Wardell Armstrong
2 Devon Way, Longbridge, Birmingham, West Midlands, B31 2TS, United Kingdom
Telephone: +44 (0)121 580 0909 www.wardell-armstrong.com

DATE ISSUED:	**25 JULY 2022**
JOB NUMBER:	**BM12183**
REPORT NUMBER:	**0002**
VERSION:	**V1.0**
STATUS:	**FINAL**

CROUDACE HOMES

LAND AT ALBOURNE

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

JULY 2022

PREPARED BY:

Abbigail Spiers	Technician	A. Spiers

REVIEWED AND APPROVED BY:

Kerry Whitehouse	Technical Director	K M Whitehouse

CONTENTS

APPENDICES

DRAWINGS	TITLE	SCALE
3117-A-1006-SK-L	Stetch Site Layout Full Site	
3117-A-1201-PR-B	Land Use Plan	
BM12183-001	Indicative Drainage Strategy	1:1000@A1

SUPPORTING DOCUMENTS

- National Planning Policy Framework (2018)
- Planning Practice Guidance (PPG) (2014)
- West Sussex County Council Preliminary Flood Risk Assessment (2011)
- Mid Sussex District Council Strategic Flood Risk Assessment (SFRA) (2015)
- West Sussex County Council Local Flood Risk Management Strategy (LFRMS) (2014)
- West Sussex LLFA Policy for the Management of Surface Water (2018)

EXECUTIVE SUMMARY

Wardell Armstrong have been commissioned by Croudace Homes to produce a Flood Risk Assessment and Drainage Strategy to accompany an outline planning application. Table 1 summarises the details of the development, flood risk to the site and proposed drainage strategy.

Table 1: Site Summary	
Site Location	The site is located to the south of Henfield Road, Albourne, West Sussex, BN6 9DH. NGR: 526170, 116630
Proposed Development	The proposed development will comprise of up to 120 residential dwellings, of which 30% are affordable, public open space and community facilities.
Environment Agency Flood Zone	Flood Zone 1
Flood Risk Vulnerability Classification	More Vulnerable
Fluvial Flood Risk	Low Risk
Tidal Flood Risk	Low Risk
Surface Water Flood Risk	Low Risk
Groundwater Flood Risk	Low Risk
Reservoir, Canal and Lake Flood Risk	Low Risk
Sequential and Exception Test	Sequential and Exception Test Not Required
Surface Water Drainage Strategy	It is proposed to utilise Sustainable Drainage Systems to manage surface water runoff from the proposed development in line with current best practice. The development will utilise attenuation basins to reduce runoff to the greenfield runoff rate of 12.2l/s for all events up to and including the 1 in 100 yr + climate change event.
Foul Water Drainage Strategy	Foul drainage will discharge via pumping Southern Water network, capacity will be provided by Southern Water once the application is approved.

1 INTRODUCTION

1.1.1 Wardell Armstrong have been instructed by Croudace Homes to complete a Flood Risk Assessment (FRA) and Drainage Strategy for the proposed development at Land at Albourne.

1.1.2 As part of the site appraisal process it is necessary to demonstrate that the proposed development has an acceptable risk of flooding over the development's lifetime, taking climate change into account.

1.1.3 This FRA assesses the risk of flooding from all sources, including fluvial, tidal, surface water, groundwater, existing and proposed drainage infrastructure and other artificial sources in accordance with the National Planning Policy Framework and Planning Practice Guidance.

1.1.4 In addition, this report provides a comprehensive site wide surface water and foul drainage strategy, demonstrating the principles of sustainable surface water management and foul treatment disposal.

1.1.5 This report will form part of a larger suite of information to support an outline planning application for the proposed development of the site.

1.2 Acknowledgement

1.2.1 Within this report data from the British Geological Survey (BGS) website has been 'Reproduced with the permission of the British Geological Survey © NERC. All rights reserved'. Reproduction of any BGS materials does not amount to an endorsement by NERC or any of its employees of any product or service and no such endorsement should be stated or implied.

1.2.2 Data from the Environment Agency (EA) has been included within this report. Flood Zone data is now classed as open data. 'Open Data can be accessed, used and shared by anybody. It allows access to our data under the Open Government Licence – free of charge and free of restriction, even for commercial use.'

2 EXISTING SITE CONDITIONS AND DEVELOPMENT PROPOSALS

2.1 The Site and Surrounding Area

2.1.1 The site is located to the south of Henfield Road, Albourne, West Sussex, BN6 9DH at National Grid Reference 526170, 116630.

2.1.2 The site is bounded to the north by the B2116 Henfield Road with a farmhouse and agricultural land beyond. Albourne Church of England Primary School is to the east, beyond which lies the village of Albourne. Church Lane and cottages are to the south and agricultural fields lie to the western boundary of the site. In addition, a public footpath crosses the site west to east. A site location plan is included as Figure 1 below.

Figure 1 – Site Location Plan
(Source: www.google.co.uk/maps)

2.2 Development Proposals

2.2.1 The development proposals are for up to 120 residential dwellings, of which 30% are affordable, public open space and community facilities.

2.2.2 Indicative proposed areas are as follows:

- Total Indicative Site Area – 11.54ha
- Developable Area (area of urban blocks) – 3.65 ha
- Area of open space including SuDS – 7.51 ha

- Land set aside for School – 0.38 ha

2.2.3 The latest site layout ref 3117-C-1006-SK-L and land use plan ref 3117-A-1201-PR-B accompanies this report.

2.3 Existing Topography

2.3.1 A topographical survey was carried out by Encompass Surveys.

2.3.2 There are two small plateaus within the site, one located towards the north east with highest levels around 38m AOD and another to the south west with highest levels around 40.25m AOD. These plateaus divide the site into two different catchments: The north western area drains to the north and north west towards the ordinary watercourse with levels falling to 30m AOD in the far north western corner. The south eastern area drains towards the south with levels falling to 31.50m AOD in the vicinity of Church Lane and Wellcroft Cottages access road.

2.3.3 The topographical survey ENC/4DD1/060918 accompanies this report.

2.4 Proximity to Watercourses

2.4.1 An un-named ordinary watercourse crosses the site to the northeast and flows west following the northern boundary of the site. This watercourse flows into the River Adur approximately 5km north west. There is another ordinary un-named watercourse which is located to the south of the site adjacent to Wellcroft Cottages on Church Lane, this flows south to join another watercourse approximately 150m south of the site. From this point the watercourse flows west to join Cutlers Brook.

2.5 Geology and Ground Conditions

2.5.1 According to the BGS, bedrock geology in the area comprises Weald Clay Formation - Mudstone And Lower Greensand Group - Sandstone, Silty. See Figure 2.

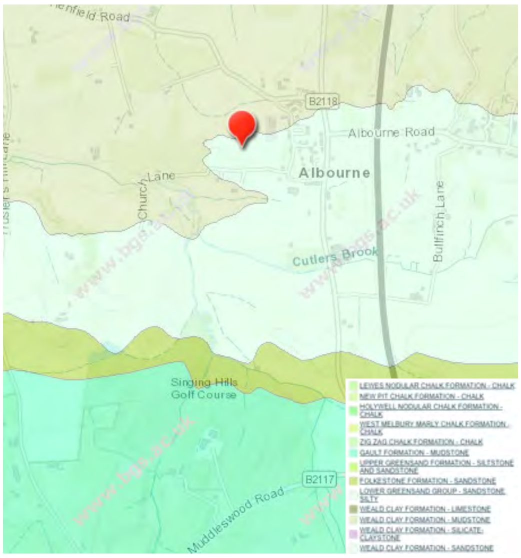


Figure 2 – Bedrock Geology
(Source: http://mapapps.bgs.ac.uk/geologyofbritain/home.html)

2.5.2 BGS records show superficial deposits at the site to comprise of a small section of Head - Clay, Silt, Sand And Gravel in the centre of the Site. See Figure 3.

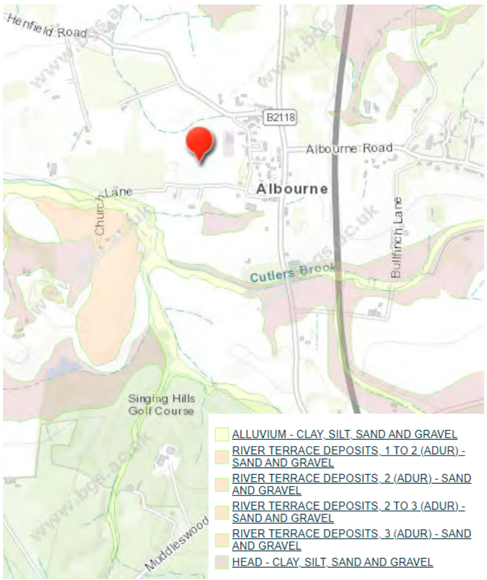


Figure 3 – Superficial Deposits
(Source: http://mapapps.bgs.ac.uk/geologyofbritain/home.html)

2.5.3 British Geological Survey (BGS) records on the A23, approximately 650m to the east of the site (Borehole TQ21NE66), shows water strikes but no groundwater water levels. BGS contains historic records of a well in Church Lane in the vicinity of Spring Cottage.

2.5.4 Infiltration testing was carried out by Geotechnical Investigation Ltd in March 2022. Four trial pits were excavated (TP01, TP02, TP03 and TP03A). Soakaway tests were carried out in TP01, TPO2 and TP03. TP03A was located approximately 5m east of TP03 to determine the presence of groundwater - no groundwater was encountered.

2.5.5 In all three trial pits there was insufficient fall in the water level to calculate the soil infiltration rate. Refer to Appendix A for the report.

2.6 Hydrogeology

Source Protection Zones

2.6.1 Groundwater provides a third of drinking water in England and Wales, and maintains the flow in many of our rivers. The EA have defined Source Protection Zones (SPZ's) for 2000 groundwater sources such as springs, boreholes and wells used for the public drinking supply. These zones show the risk of contamination from any activities that might cause pollution in the area – the closer the activity the greater the risk. The maps show three main zones (inner, outer and total catchment) and a fourth zone of special interest, which occasionally applies to a groundwater source.

2.6.2 EA mapping shows that the site is not within a SPZ.

Aquifers

2.6.3 Aquifers are underground layers of water-bearing permeable rock or drift deposits from which groundwater can be extracted. Aquifer designations reflect their importance in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems. The aquifer designation data is based on geological mapping provided by the BGS, which is updated regularly to reflect ongoing improvements.

2.6.4 EA mapping indicates that the north of the site is not underlain by a bedrock aquifer. However, the south of the site is underlain by a 'Principal' bedrock aquifer. These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. Principal aquifers may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

3 ASSESSMENT OF FLOOD RISK

3.1 National Planning Policy

3.1.1 The National Planning Policy Framework (NPPF) was published in 2012 and revised by the Ministry of Housing, Communities and Local Government (MHCLG) in July 2021. It sets out the Government's national policies on flood risk management in relation to land use planning in England.

3.1.2 NPPF is accompanied by Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change' which was published in March 2014 and last updated in May 2022. PPG is a web-based resource which advises how planning can take account of the risks associated with flooding and coastal change, both in plan making and the planning application process.

3.1.3 This section will review the risk of flooding at the site from all sources, both pre- and post-development. Reference will be made to local and strategic policies and documents as relevant.

3.2 Fluvial Flood Risk

3.2.1 Fluvial (river) flooding occurs when the capacity of watercourses (including streams, brooks and ditches etc.) are exceeded due to intense or prolonged rainfall events. The Environmental Agency have produced mapping to indicate areas which may be at risk of fluvial flooding, called Flood Zones, depicted on the Flood Map for Planning.

3.2.2 The PPG states that all development within Flood Zones 2 or 3, and/or are over 1ha in size must be accompanied by a site-specific FRA undertaken as part of the planning application process.

3.2.3 This site is located in Flood Zone 1 - 'Low Probability'. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%). See Figure 4.

Figure 4 – Flood Map for Planning
(Source: https://flood-map-for-planning.service.gov.uk/)

3.3 Flood Risk Vulnerability

3.3.1 The PPG identifies the Flood Risk Vulnerability Classification of development types. Development types are classed as 'Essential Infrastructure', 'Highly Vulnerable', 'More Vulnerable', 'Less Vulnerable' and 'Water Compatible Development' depending on their use and vulnerability.

3.3.2 As a residential development is proposed this development is classified as More Vulnerable.

3.4 The Sequential and Exception Tests

3.4.1 The PPG details the Sequential and Exception Tests. The Sequential Test ensures that a sequential approach is followed to steer new development to areas with the lowest probability of flooding, i.e. Flood Zone 1. Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 (areas with a high probability of river or sea flooding) be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

3.4.2 The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

3.4.3 PPG identifies when the Exception Test should be applied, and is reproduced as Table 2 below. As this More Vulnerable will be located in Flood Zone 1, the Sequential Test is considered to be passed and the Exception Test does not need to be applied.

Table 2: Flood Risk Vulnerability Classification

Flood Zones	**Flood Risk Vulnerability Classification**				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a	Exception Test Required	✗	Exception Test Required	✓	✓
Zone 3b	Exception Test Required	✗	✗	✗	✓

✓ Development is appropriate
✗ Development should not be permitted

3.4.4 The West Sussex County Council Strategic Flood Risk Assessment (SFRA) and West Sussex County Council Preliminary Flood Risk Assessment (PFRA) have been reviewed. However, there are no records of historical fluvial flooding affecting the site. The River Adur Catchment Flood Management Plan states that less than 10 properties within the Upper Adur catchment are at risk of fluvial flooding up to the year 2100.

3.4.5 It is therefore considered that the site is at low risk of fluvial flooding.

3.5 Tidal Flooding

3.5.1 Tidal flooding is caused by exceptionally high sea levels and extreme wave heights. Tidal flooding is incorporated into the Environment Agency Flood Map for Planning and Flood Zone designation.

3.5.2 Due to the sites inland location, tidal flooding is not considered to be a risk at this site.

3.6 Surface Water Flooding

3.6.1 Surface water flooding is caused by rain falling onto the surface which does not reach watercourses or drainage infrastructure. The Environment Agency ‘Risk of Flooding from Surface Water’ mapping examines the risk of flooding from surface water assuming local estimates of sewer infiltration losses. The likelihood of surface water flooding is split into four categories; ‘Very Low’, ‘Low’, ‘Medium’ and ‘High’ risk.

3.6.2 Environment Agency mapping identifies the site to be at 'Low' to 'High' risk of flooding from surface water.

3.6.3 The majority of the site is at very low risk of surface water flooding (Figure 5). However, the northern boundary of the site appears to lie in an area of low to high risk of flooding from surface water, this is consistent with the location of the existing small watercourse crossing and bounding the site. There is another surface water path of low to high risk of flooding from surface water to the south of the site. The risk seems consistent with topographical low-lying areas draining south toward the unnamed watercourse. Any residential dwellings will be located outside of the surface water flow paths.

3.6.4 The north east corner of the site where the access road will be located is shown as being at risk from surface water, this overland flow route needs to be considered in the design of the road layout.

3.6.5 The 'Risk of Flooding from Surface Water' mapping is shown in Figure 5.

Figure 5 – Flood Risk from Surface Water

(Source: https://flood-warning-information.service.gov.uk/long-term-flood-risk/map)

3.6.6 The West Sussex County Council SFRA and West Sussex County Council PFRA have been reviewed. However, there are no records of historical surface water flooding affecting the site.

3.6.7 It is therefore considered the risk of flooding from surface water is Low.

3.7 Groundwater Flooding

3.7.1 Groundwater flooding can occur anywhere where groundwater levels rise above the ground surface. Groundwater flooding can be difficult to predict and identify and is often associated with surface water flooding.

3.7.2 The risk of groundwater flooding was assessed in the West Sussex County Council SFRA and West Sussex County Council PFRA. However, there are no records of historical surface water flooding affecting the site.

3.7.3 The nearest BGS borehole record to the site (Borehole TQ21NE66), identifies water strikes but no groundwater water levels. BGS contains historic records of a well in Church Lane in the vicinity of Spring Cottage. No groundwater was encountered during the infiltration testing conducted on site.

3.7.4 Based upon information provided within the SFRA, PFRA, BGS borehole records and from on-site testing, the site is considered to be at low risk of groundwater flooding.

3.8 Existing Sewers and Drains

3.8.1 Flooding from sewers and drains can occur when capacity is exceeded or there is a blockage or collapse in the network.

3.8.2 Sewer records have been obtained from Southern Water. Existing sewers are located to the east of the site running north-south through the northeast of the site and through Albourne Church of England Primary School. Should flooding of these sewers occur, flows in the north of the site would head north to the unnamed watercourse and flows in the south of the site would head south following the topography of the area.

3.8.3 The West Sussex County Council SFRA and West Sussex County Council PFRA contains no records of historical sewer flooding affecting the site.

3.9 Reservoirs, Canals and Lakes

3.9.1 Flooding from reservoirs, canals and lakes occurs when their associated dams, embankments or other retaining structures fail or are breached.

3.9.2 There are no reservoirs near the site. The Environment Agency 'Risk of Flooding from Reservoirs' mapping indicates that the site is not at risk of reservoir flooding.

3.9.3 There are no canals or lakes near the site. Therefore, the risk of flooding from reservoirs, canals and lakes in this location is considered to be low.

4 PROPOSED SURFACE WATER DRAINAGE STRATEGY

4.1.1 Site-specific surface water drainage infrastructure will need to be constructed to serve the proposed development. It is a requirement of the NPPF that Sustainable Drainage Systems (SuDS) are used in all major development if feasible. The Lead Local Flood Authority also strongly advocate the use of SuDS within new development.

4.1.2 All new drainage systems will be designed with consideration for PPG, Non-Statutory Technical Standards for Sustainable Drainage Systems, Building Regulations – Approved Document H (Drainage and Waste Disposal), the local authority sustainable drainage guidance and the latest version of Design Construction Guidance.

4.2 Planning Practice Guide

4.2.1 PPG requires that SuDS measures are implemented to manage surface water runoff within new developments.

4.2.2 PPG advises that climate change allowances should be determined with reference to the guidance provided in the EA document 'Flood Risk Assessment: Climate Change Allowances' (May 2022). As the Site is proposed for residential dwellings, the development is assumed to have a design life of 100 years.

4.2.3 In accordance with the guidance, for developments with a design life extending beyond the year 2070, climate change allowances of 25% and 45% should be considered against design rainfall intensities.

4.2.4 As such it is proposed that the surface water drainage strategy will be based on a provision of surface water attenuation on site which will accommodate the 1 in 100 year plus 45% climate change rainfall event.

4.3 Non-Statutory Technical Standards for Sustainable Drainage Systems

4.3.1 Non-Statutory Technical Standards for Sustainable Drainage Systems were published by the Department for Environment, Food and Rural Affairs in March 2015 to support the Lead Local Flood Authority Statutory consultee role in relation to surface water. The standards relate to the design, construction, operation and maintenance of SuDS and have been published as guidance for those designing schemes.

4.3.2 The Standards sets out general recommendations for the control of development runoff, including the requirement to ensure that runoff from the site is not increased by the development, and the requirement to manage surface water runoff from events up to and including the 1 in 100 year (including an allowance for the projected impacts of climate change).

4.4 Local Requirements

4.4.1 A number of local authorities have also produced their own policy and guidance in relation to SUDS. West Sussex published local guidance 'West Sussex LLFA Policy for the Management of Surface Water' in November 2018 which sets out 10 policies. Policies 1 to 6 set out the requirements for a drainage strategy to be compliant with the NPPF and Non-Statutory Technical Standards for Sustainable Drainage. Policies 7 to 10 set out expectations to be considered within a drainage strategy in response to environmental legislation and guidance. Key requirements in this guidance include relevant to this drainage strategy include:

- Policy 1: Surface water must be discharged in accordance with the drainage hierarchy
- Policy 2: The drainage system must be designed to operate without any flooding occurring during any rainfall event up to (and including) the critical 1 in 30 year storm (3.33% AEP). The system must also be able to accommodate the rainfall generated by events of varying durations and intensities up to (and including) the critical, climate change adjusted 1 in 100 year storm (1% AEP) without any on-site property flooding and without exacerbating the off-site flood-risk. Consideration should be given to flow routes both at low flows and with exceedance flows.
- Policy 3: Drainage schemes should be designed to match greenfield discharge rates and follow natural drainage routes as far as possible. Greenfield runoff should be calculated from FEH or a similar. Runoff should where possible be restricted to the greenfield 1 in 1 year runoff rate during all events up to and including the 1 in 100 year rainfall event with climate change.
- Policy 4: New development should be designed to take full account of any existing flood risk, irrespective of the source of flooding. Where a site or its immediate surroundings have been identified to be at flood risk, all opportunities to reduce the identified risk should be investigated at an early stage and subsequently incorporated at the detailed design stage.
- Policy 5: The design of the drainage system must account for the likely impacts of climate change and changes in impermeable area over the design life of the development.

- Policy 6: The drainage system must be designed to take account of the construction, operation and maintenance requirements. A verification report is required which demonstrates the suitable operation of the drainage system.
- Policy 7: When designing a surface water management scheme, full consideration should be given to the system's capacity to remove pollutants and to the cleanliness of the water being discharged from the site, irrespective of the receiving system. Interception of small rainfall events should be incorporated into the design of the drainage system.
- Policy 8: Drainage design should from the outset consider opportunities for inclusion of amenity and biodiversity objectives and thus provide multi-functional use of open space with appropriate design for drainage measures within the public realm.
- Policy 9: Drainage design should from the outset consider opportunities for biodiversity enhancement, through optimising the scope for surface systems, consideration of connectivity to adjacent water bodies or natural habitats, and appropriate planting specification.
- Policy 10: Drainage design should from the outset consider opportunities to contribute to the wider landscape and ensure proposals are coherent with the surrounding landscape character area.

4.4.2 The following surface water strategy has been developed in line with the local policy and SuDS requirements.

4.5 Piped System

4.5.1 In accordance with the Design and Construction Guidance, the piped system will be designed to accommodate runoff during storm events up to the 1 in 30-year event. Adoptable piped sewer systems will be designed in accordance with the Design and Construction Guidance and any private drainage systems designed in accordance with Building Regulations – Approved Document H.

4.6 Discharge Hierarchy

4.6.1 In accordance with Building Regulations and West Sussex Policy for the Management of Surface Water the preferred hierarchy for disposal of surface water is: infiltration; watercourse; sewer.

4.6.2 Infiltration testing was undertaken by Geotechnical Investigations Ltd in March 2022. comprising three trial pits to a depth of 1.5 m. This has determined that infiltration is not a viable means of surface water discharge. Details of the infiltration testing can be found in Appendix A.

4.7 Surface Water Drainage Strategy

4.7.1 CIRIA report C753 'The SuDS Manual' outlines the various types of SuDS, their benefits and limitations and design considerations associated with each. Not all SuDS components/methods are feasible or appropriate for all developments due to factors such as ground conditions, available space and site levels, which will influence the different methods adopted as part of a particular development. Given the nature of the site and existing ground conditions the following surface water drainage strategy is proposed.

4.7.2 The site has been split into six catchments for the purposes of the drainage strategy. Catchment locations are shown on Drawing BM12183-001

4.7.3 Source control SuDS (e.g. water butts and/or rainwater recycling) will be considered (as appropriate). Such features will provide further betterment in terms of surface water runoff rates and volumes not accounted for in the drainage design.

4.7.4 Permeable paving with sub-base storage will be considered for driveways/shared surfaces to provide additional attenuation, water quality treatment and slow the time of concentration into the drainage network.

4.7.5 Surface water runoff for catchment A1 will be collected through permeable paving and discharge to underground storage beneath the shared parking. This will discharge at 4.5l/s to an attenuation basin 1. Runoff from catchment A2 will also be conveyed via the site surface water sewers to attenuation basin 1. Runoff from catchment B will be conveyed via the site surface water sewers to attenuation basin 2. Runoff from catchment C will be conveyed via the site surface water sewers to attenuation basin 3. Runoff from catchment D will be conveyed via the site surface water sewers to an attenuation basin 4. Basin 4 will discharge via a swale to attenuation basin 5 at a rate of 6.0l/s. Runoff from catchment E with be conveyed via the site surface water sewers and swale to an attenuation basin 5. Attenuation basin 1 will discharge to attenuation basin 2 at a rate of 3.5l/s and attenuation basin 2 will discharge to attenuation basin 3 at a rate of 65l/s . Attenuation basin 5 will discharge via a surface water sewer to attention basin 3 at a rate of 5.2l/s. Attenuation basin 3 will discharge to the unnamed watercourse to the north of the site's 1 in 1 year greenfield runoff rate at a rate of 12.2l/s

4.7.6 The final discharge to the watercourse from the proposed development will require consent from the Local Authority.

4.8 Greenfield Runoff Rate

4.8.1 Surface water flows from the new development will be attenuated down to the 1 in 1 year runoff rate pre-development (Greenfield) runoff rates for design storm events up to and including the 1 in 100yr + 45% climate change event, to ensure the rate and volume of runoff leaving the site post-development does not exceed pre-development conditions.

4.8.2 Greenfield runoff rates have been determined using the FEH method. The FEH (Flood Estimation handbook) is a statistical method, produced by the Institute of Hydrology. Following Local guidance and CIRIA Manual C753, FEH methods should be the preferred approach for developing runoff estimates for use in surface water management design.

4.8.3 The 1 in 1 year greenfield runoff rate for this site has been calculated to be 4.38 l/s/ha. The total impermeable area of the site is 2.789ha, therefore the proposed 1 in 1 year discharge has been set to 12.2l/s

4.9 Attenuation Requirements

4.9.1 To achieve greenfield runoff rates, attenuation storage is required. MicroDrainage software has been used to size the attenuation as a cascade as outlined in Table 3. Full MicroDrainage calculations are included in Appendix B.

Table 3: Attenuation Details Discharging at Q1 (FEH Catchment Descriptors) 45%CC

Catchment	Total Impermeable Area (ha)	Proposed Cascade Discharge (l/s)	Proposed Attenuation Feature	Total Attenuation Volume (m^3)	Attenuation Surface Area (m^2)
A1	0.130	4.5	Underground Storage	66	85
A2	0.217	3.5	Attenuation Basin 1	207	403
B	0.526	65.0	Attenuation Basin 2	134	295
C	0.719	12.2*	Attenuation Basin 3	1,274	1,710
D	0.228	6.0	Attenuation Basin 4	111	257
E	0.968	5.2	Attenuation Basin 5	1,079	1,494

* Discharge rate leaving the site 1

4.9.2 The surface water drainage strategy is based on the following parameters:

- 60% impermeability for residential catchments;
- Attenuation volumes based on 1 in 100yr rainfall event, including a 45% allowance for climate change;
- Attenuation pond depth of 1m with 300mm of freeboard;
- Pond side slopes of 1 in 4;
- Greenfield runoff rate of 4.38l/s/ha;
- An allowance of 6-8% for urban creep, based on a development density of between 32 and 36 dwelling per hectare

4.10 Water Quality

4.10.1 The surface water drainage system which will incorporate SuDS will ensure that a sufficient level of water quality treatment is provided to ensure that the proposed development does not have any adverse impact on of the receiving network.

4.10.2 According to CIRIA C753, runoff from residential developments (roof and highway runoff) is considered to present a ‘low’ source of runoff pollution, therefore at least one treatment stage will be provided within the SuDS system. The first 5mm of rainfall is known as the ‘first flush’ and generally has a higher pollutant load than subsequent runoff. This flow will be contained within the Site, through provision of the SuDS techniques outlined above.

4.10.3 Within the attenuation basin, an area of permanent standing water could be provided for ecological and amenity benefits. This will not affect the hydraulic design of the feature.

4.10.4 The attenuation basin will also be landscaped such that the banks will be shallow, making the area accessible and safe to the public, and enhancing the amenity value of the site.

4.11 Ecology

4.11.1 The surface water drainage system will aim to enhance existing habitats and provide new habitats within the site wherever possible. If designed correctly, SuDS can provide an excellent habitat for aquatic flora and fauna. The ecological potential of the SuDS system can be maximised by utilising local planting, locating SuDS near to existing wetlands, ponds or watercourses, creating a range of habitats and providing varied water depths within SuDS features, and by ensuring an effective maintenance regime is in place.

4.12 Visual Impact and Amenity

4.12.1 SuDS can be used as a striking visual feature within a development and can contribute to visual character. The surface water drainage system aims to have a positive visual impact on the development and will enhance the sites amenity value wherever possible. Open-water SuDS features such as ponds often form part of public open spaces, and as such should be designed so they provide amenity benefits to the development, with specific attention given to their visual impact and public acceptability. This can be done by using vegetation and landscaping, effective maintenance, and provision of information/education about the onsite SuDS system.

5 PROPOSED FOUL DRAINAGE STRATEGY

5.1.1 This section outlines how foul flows from the proposed development will be managed in accordance with national and regional policy requirements and best practice guidance.

5.2 Existing Foul Water Drainage

5.2.1 Southern Water sewer records indicate that the closest public foul sewer is located to the east of the site, running north-south through the northeast of the site and through Albourne Church of England Primary School. Manhole MH3701 lies within the red line boundary of the site, just north of the primary school and Manhole MH2501 is also located within the site's boundary.

5.3 Design Foul Flows

5.3.1 As the site is currently undeveloped, site-specific foul drainage infrastructure will need to be installed to serve the proposed development. At this stage an indicative foul water network is not available, however the preferred connection point is MH2501 as shown on Drawing BM12183-001.

5.3.2 Preliminary checks indicate that although the majority of the development can be drained by gravity to MH2501, pumping will be required for a proportion of the development in low lying areas towards the north west of the site as indicated in the Drainage Strategy Drawing BM12183-001.

5.3.3 According to the latest Design and Construction Guidance, the design flows for gravity sewers for residential developments should be based on 4000litres/unit dwellings/per 24 hours. The peak design flows for the development based on 4000 litres per dwelling per day and 120 dwellings have been calculated to be 5.55/s.

5.3.4 The Mid Sussex District Plan (2014 – 2031) set out a water efficiency strategy that seeks to reduce water consumption for all households from 165 litres per person per day to 148.3 litres per person per day by 2040 and highlights the importance of partnership when working with Local Authorities to incorporate water efficiency into all new buildings. Furthermore, correspondence with Southern Water has indicated that a water consumption rate of 125 litres per person per day should be used, with an occupancy rate of 2.4 and a daily Dry Weather Flow (DWF) multiplier of 2.5. Refer to Appendix C.

5.3.5 As such the average daily Dry Weather Flow (DWF) has also been determined for the site. This has been calculated using Southern Water's guidelines to be 1.14l/s based on the following parameters:

- 120 dwellings
- Water consumption of 125 litres per person per day, as specified by southern Water;
- 2.4 occupancy rate;
- 10% infiltration allowance, and
- 2.5* DWF (typical diurnal profile).

5.3.6 A developer enquiry was submitted to Southern Water on 8 April 2021 to confirm that there is capacity within the existing network to accommodate foul flows from this development a response was received on 5 May 2021. As this developer enquiry response is over a year old an updated enquiry has been submitted, a response is awaited.

5.3.7 In the May 2021 response, Southern Water state that there is currently inadequate capacity within the foul sewerage network to accommodate a foul flow of 1.35 l/s for the development at manhole reference TQ26162501. Additional off-site sewers or improvements to existing sewers will be required to provide sufficient capacity to service the development. Southern Water has a duty to provide network capacity from the point of practical connection (point of equivalent or larger diameter pipe) funded by the New Infrastructure Charge.

5.3.8 The nearest point where capacity is currently available is at Highcross Albourne WTW which is located approximately 1.1 km North West of the proposed development site. Full response from Southern Water is included in Appendix C.

6 RESIDUAL FLOOD RISK AND MITIGATION MEASURES

6.1 Designing for Exceedance

6.1.1 The surface water drainage system has been designed to minimise the risk of flooding to properties in the event of exceedance of the system capacity during storm events in excess of the design storm, which in this case is the 1 in 100 year + 45% climate change event. In addition, the basins have been designed to provide a minimum freeboard of 300mm in the event of surface water exceedance.

6.1.2 The layout and landscaping of the proposed development will be designed and developed to ensure that exceedance flood flow paths are routed away from vulnerable development and toward either landscaped areas, areas of open attenuation/SuDS features or the local ditch course system. Minor modifications to topography, the profile of a highway, footpath or kerb and strategically placed green infrastructure will be developed as the masterplan is progressed to ensure that exceedance flood flows are managed and there is little or no risk of property flooding.

6.2 Finished Floor Levels

6.2.1 In accordance with Building Regulations, Finished Floor Levels (FFL's) of new residential properties should be set at least 150mm above surrounding ground levels. This will provide some protection to properties from extreme fluvial flood events or flooding of the drainage system due to blockages or collapse etc. It is recommended that finished floor levels of the proposed dwellings in the immediate vicinity of attenuation ponds and basins are set a minimum of 300mm above finished ground levels.

6.3 Safe Access and Egress

6.3.1 Considering the assessed flood risk to the site, safe access and egress will be provided to the B2116 Henfield Road during all flood events. Based on data provided by the EA, the site is in Flood Zone 1 and will therefore have dry access and egress up to the 1 in 100yr + climate change event. Dry pedestrian access will also be available to London Road via the public footpath to the east of the development.

6.3.2 There is a surface water flow path which crosses the site entrance which corresponds with the unnamed watercourse. This watercourse will need to be culverted to allow the access road to be constructed into the site. The design of the culvert and road will be developed to ensure the access remains dry.

6.3.3 Consent will be required from the Local Authority for any works affecting the watercourse for the access road.

7 ADOPTION AND MAINTENANCE

7.1.1 As part of the planning application approval process, in considering planning applications, Local Planning Authorities consult the relevant Lead Local Flood Authority on the management of surface water; satisfy themselves that the proposed minimum standards of operation are appropriate and ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

7.2 Onsite Drainage Network

7.2.1 Southern Water is the appointed water company for this area and are responsible for the operation and maintenance of the public surface water and foul water network.

7.2.2 The onsite surface water and foul water network will be offered to Southern Water for adoption. This will be subject to a satisfactory Section 104 application, to be submitted at the detailed design stage.

7.3 SuDS Features

7.3.1 The onsite SuDS system will be offered to Southern Water for adoption following the Design Construction Guidance, and the POS areas will be offered to the Local Authority for adoption.

7.3.2 Alternatively, a Private Management Company may be appointed subject to approval from the LPA, to maintain the effective operation of any SuDS features on site. Funding for this would be recovered through the mechanism of service charges to the occupiers of the development.

7.3.3 Typical maintenance schedules for the proposed SuDS features can be found in Appendix D.

8 CONCLUSIONS

8.1.1 The proposed development of Land at Albourne will comprise the construction of up to 120 dwellings.

8.1.2 Environment Agency mapping indicates that the site is entirely located in Flood Zone 1 and therefore this site is suitable for development in terms of fluvial flood risk. The majority of the site is at very low risk of surface water flooding. However, the northern boundary of the site appears to lie in an area of low to high risk of flooding from surface water, this is consistent with the location of the existing small watercourse crossing and bounding the site. Any residential dwellings will be located outside of the surface water flow paths. The site is at low risk of flooding from all other sources and therefore the flood risk to the development is considered to be low overall.

8.1.3 As this 'More Vulnerable' development is located wholly within Flood Zone 1, the Sequential Test is not required, and the site is therefore sequentially preferable. According to PPG Table 3, 'More Vulnerable' uses are considered appropriate for Flood Zone 1 without the need to apply the Exception Test.

8.1.4 To ensure that the development does not have any adverse offsite impacts and does not increase flood risk elsewhere surface water runoff will be sustainably managed and disposed of using SuDS techniques.

8.1.5 Infiltration testing carried on site confirmed that soakways were not a viable means of surface water discharge therefore discharge to watercourse is the preferred method of surface water disposal.

8.1.6 To replicate pre-developed conditions, the use of five attenuation basins with a total storage capacity of 2871m^3 is proposed. These basins have been designed to accommodate runoff from all storm events up to and including a 1 in 100 year + 45% climate change storm event.

8.1.7 The surface water drainage strategy will consider other SuDS and incorporate SuDS principles wherever possible, such as water butts, permeable paving and swales to provide further enhancement to the water quality of surface water runoff.

8.1.8 Due to the residual risk of exceedance flows in excess of the design storm event, it is recommended that finished floor levels of the proposed dwellings in the immediate vicinity of the basins are be set a minimum of 300mm above finished ground levels, with all other finished floor levels set 150mm above ground level. In addition, the basins have been designed to provide a minimum freeboard of 300mm in the event of surface water exceedance. Safe access and egress will be provided to the B2116 Henfield Road during all flood events.

8.1.9 In May 2021, Southern Water confirmed that there is currently inadequate capacity within the foul sewerage network to accommodate a foul flow of 1.35 l/s for the development. Additional off-site sewers or improvements to existing sewers will be required to provide sufficient capacity to service the development. Southern Water has a duty to provide network capacity from the point of practical connection (point of equivalent or larger diameter pipe) funded by the New Infrastructure Charge. An updated developer enquiry has been submitted to confirm there has been no change to this response.

8.1.10 In conclusion, it has been demonstrated that the proposals within this report are compliant with NPPF, PPG and local planning policy, taking predicted climate change allowances into account. It is therefore considered that on implementation of this strategy, the development will remain safe from flood risk and can be suitably drained for the development lifetime.

APPENDICES

APPENDIX A

Infiltration Testing Results

Wardell Armstrong LLP
2 Devon Way
Longbridge
Birmingham
B31 2TS

Geotechnical Investigations Limited
Unit 1
Far Hill Farm
Fairford
Gloucestershire
GL7 4PZ

25th March 2022

Soakaway tests at Land off Henfield Road, Albourne – GI1774

Geotechnical Investigations Limited (this Company) was instructed via email by Samantha Nevitt of Wardell Armstrong (the Client) using ref:BM12183, to undertake a ground investigation at the above site.

The sitework was conducted on the 21st March 2022 and comprised the excavation of four trial pits reference TP01, TP02, TP03 and TP03A. Soakaway tests were carried out in TP01 to TP03.

The exploratory hole locations were set out by this company using the coordinates provided by the Client and are shown in figure 1.

Service information provided by the Client was reviewed by this company in advance of the siteworks. A CAT (cable avoidance tool) was used by a suitably qualified engineer at each exploratory location prior to commencing the excavations.

The trial pits were excavated using a Kabuta KX057-4 tracked excavator and a 0.35m wide toothed bucket, provided by this company. The materials arising were logged by an engineering geologist.

The exploratory hole location referenced TP03A was located approximately 5m east of TP03 to determine the presence of groundwater - no groundwater was encountered.

Prior to undertaking the soakaway tests at TP01 to TP03, a 50mm diameter HDPE slotted monitoring pipe was installed to the base of each pit. The pits were then backfilled with imported granular material and topped up to the surface with arisings. On completion of the works all surfaces were made good.

A supply of potable water provided by this company, was used to rapidly fill each soakaway pit. The soakaway tests were conducted in accordance with BRE DG 365 (2016) and the result for each test are attached.

The excess arisings from the pits were disposed of offsite using a skip, provided by this company.

Photographs of the excavations and reinstatement were taken and are attached to this letter.

This written report has been prepared by Geotechnical Investigations Limited solely for the benefit of Wardell Armstrong Consulting. It shall not be relied upon or transferred to any third party without the prior written authorisation of Geotechnical Investigations Limited.

Robert Ewens BSC (Hons) PGC FGS

Director

Location coordinates provided by Wardell Armstrong
Not to scale

GEOTECHNICAL INVESTIGATIONS LIMITED

CLIENT	WARDELL ARMSTRONG
SITE	Land at Henfield Road, Albourne
CONTRACT	GI1774

Figure 1.

GEOTECHNICAL INVESTIGATIONS LIMITED

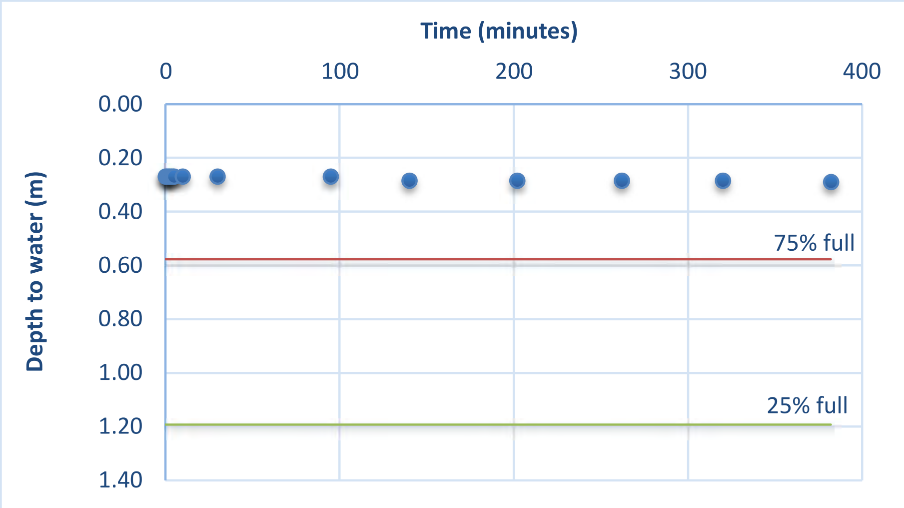
Soakaway Test

CLIENT	Wardell Armstrong
SITE	Land off Henfield Road, Albourne
CONTRACT	GI1774
DATE	21/03/2022
HOLE ID	TP01

TEST 1

LENGTH	1.55	m
BREADTH	0.35	m
DEPTH	1.50	m
WATER LEVEL PRE TEST	Dry	
FILL LEVEL To 100%	0.27	m
V_{p75-25}	0.33	m^3
a_{p50}	2.88	m^2
t_{p75-25}	*	min

soil infiltration rate, *f* = * ms^{-1}



Remarks	Groundwater not encountered Test carried out in accordance with BRE DG 365 (2016). * unable to calculate tp75-25 and soil infiltration rate due to insufficient fall in water level.

Geological Description (BS5930 2015)	0.00-0.30m	Crop over brown slightly sandy silty CLAY with occasional subangular medium to coarse flint gravel.
	0.30-1.50m	Firm fissured greyish-brown mottled brown slightly sandy CLAY with occasional subangular medium to coarse flint gravel.

GEOTECHNICAL INVESTIGATIONS LIMITED

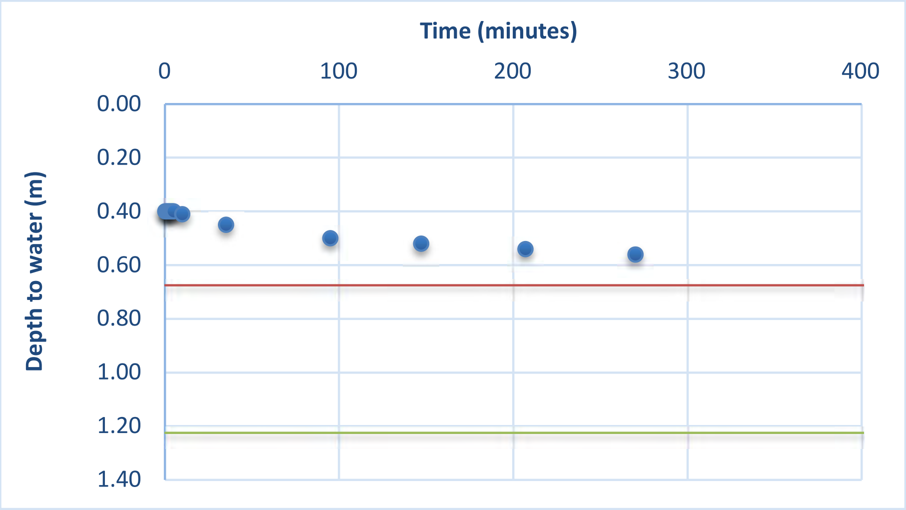
Soakaway Test

CLIENT	Wardell Armstrong
SITE	Land off Henfield Road, Albourne
CONTRACT	GI1774
DATE	21/03/2022
HOLE ID	TP02

TEST 1

LENGTH	1.60	m
BREADTH	0.35	m
DEPTH	1.50	m
WATER LEVEL PRE TEST	Dry	
FILL LEVEL To 100%	0.40	m
v_{p75-25}	0.31	m^3
a_{p50}	2.71	m^2
t_{p75-25}	*	min

soil infiltration rate, *f* = * ms^{-1}



Remarks

Groundwater not encountered
Test carried out in accordance with BRE DG 365 (2016).
* unable to calculate tp75-25 and soil infiltration rate due to insufficient fall in water level.

Geological Description (BS5930 2015)		
	0.00-0.30m	Crop over brown slightly sandy silty CLAY with occasional subangular medium to coarse flint gravel.
	0.30-1.50m	Firm fissured greyish-brown and brown slightly sandy CLAY with occasional subangular medium to coarse flint gravel.

GEOTECHNICAL INVESTIGATIONS LIMITED

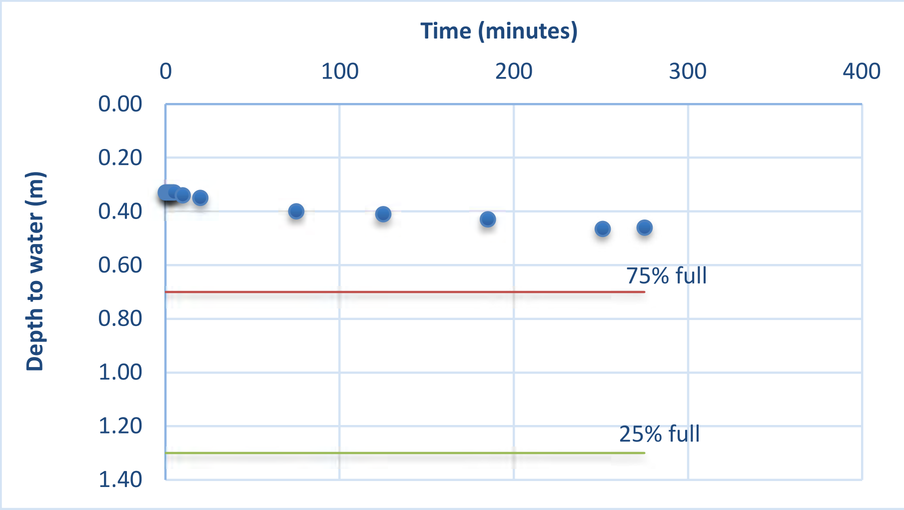
Soakaway Test

CLIENT	Wardell Armstrong
SITE	Land off Henfield Road, Albourne
CONTRACT	GI1774
DATE	21/03/2022
HOLE ID	TP03

TEST 1

LENGTH	1.75	m
BREADTH	0.35	m
DEPTH	1.60	m
WATER LEVEL PRE TEST	Dry	
FILL LEVEL To 100%	0.40	m
v_{p75-25}	0.37	m^3
a_{p50}	3.13	m^2
t_{p75-25}	*	min

soil infiltration rate, *f* = * ms^{-1}



Remarks

Groundwater not encountered
Test carried out in accordance with BRE DG 365 (2016).
* unable to calculate tp75-25 and soil infiltration rate due to insufficient fall in water level.

Geological Description (BS5930 2015)

0.00-0.30m	Crop over brown slightly sandy silty CLAY with occasional subangular medium to coarse flint gravel.
0.30-1.60m	Firm to stiff fissured grey and orangish-brown slightly sandy CLAY with occasional subangular medium to coarse flint gravel.

GEOTECHNICAL INVESTIGATIONS LIMITED

Trial Pit

CLIENT	Wardell Armstrong
SITE	Land off Henfield Road, Albourne
CONTRACT	GI1774
DATE	21/03/2022
HOLE ID	TP03A

Geological Description (BS5930 2015)	0.00-0.30m	Crop over brown slightly sandy silty CLAY with occasional subangular medium to coarse flint gravel.
	0.30-2.60m	Firm to stiff fissured grey and orangish-brown slightly sandy CLAY with occasional subangular medium to coarse flint gravel.
Remarks	Groundwater not encountered	

GEOTECHNICAL
INVESTIGATIONS
LIMITED

CLIENT: Wardell Armstrong

SITE: Land off Henfield Road, Albourne

CONTRACT NUMBER: GI1774

GI1774 TP01 1.50m.01

GI1774 TP01 1.50m.02

GI1774 TP01 1.50m.03

GI1774 TP01 1.50m.04

GI1774 TP02 1.50m.01

GI1774 TP02 1.50m.02

GI1774 TP02 1.50m.03

GI1774 TP02 1.50m.04

GI1774 TP03 1.60m.01

GI1774 TP03 1.60m.02

GI1774 TP03 1.60m.03

GI1774 TP03A 2.60m.01

GI1774 TP03A 2.60m.02

GI1774 TP03A 2.60m.03

GI1774 TP03&TP03A 1.60m&2.60m.04

APPENDIX B

MicroDrainage Calculations

Cascade Summary of Results for BM12183-CA1.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	BM12183-CA2.SRCX	(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	99.596	0.396	3.2	33.6	O K
30 min Summer	99.717	0.517	3.7	43.9	Flood Risk
60 min Summer	99.823	0.623	4.0	52.9	Flood Risk
120 min Summer	99.867	0.667	4.2	56.7	Flood Risk
180 min Summer	99.881	0.681	4.2	57.9	Flood Risk
240 min Summer	99.884	0.684	4.2	58.1	Flood Risk
360 min Summer	99.868	0.668	4.2	56.8	Flood Risk
480 min Summer	99.844	0.644	4.1	54.7	Flood Risk
600 min Summer	99.817	0.617	4.0	52.4	Flood Risk
720 min Summer	99.789	0.589	3.9	50.1	Flood Risk
960 min Summer	99.736	0.536	3.7	45.5	Flood Risk
1440 min Summer	99.649	0.449	3.4	38.2	O K
2160 min Summer	99.557	0.357	3.0	30.3	O K
2880 min Summer	99.493	0.293	2.7	24.9	O K
4320 min Summer	99.411	0.211	2.3	18.0	O K
5760 min Summer	99.365	0.165	2.0	14.0	O K
7200 min Summer	99.335	0.135	1.7	11.5	O K
8640 min Summer	99.316	0.116	1.6	9.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	149.060	0.0	36.1	24
30 min Summer	100.050	0.0	48.5	37
60 min Summer	63.945	0.0	62.2	64
120 min Summer	38.570	0.0	75.1	110
180 min Summer	28.710	0.0	83.8	140
240 min Summer	23.236	0.0	90.5	174
360 min Summer	17.134	0.0	100.1	242
480 min Summer	13.796	0.0	107.5	312
600 min Summer	11.650	0.0	113.4	380
720 min Summer	10.138	0.0	118.5	446
960 min Summer	8.118	0.0	126.5	578
1440 min Summer	5.939	0.0	138.8	830
2160 min Summer	4.347	0.0	152.5	1196
2880 min Summer	3.489	0.0	163.2	1560
4320 min Summer	2.567	0.0	180.0	2292
5760 min Summer	2.077	0.0	194.3	3000
7200 min Summer	1.774	0.0	207.5	3688
8640 min Summer	1.568	0.0	220.0	4416

Cascade Summary of Results for BM12183-CA1.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
10080 min Summer	99.302	0.102	1.5	8.7	O K
15 min Winter	99.645	0.445	3.4	37.8	O K
30 min Winter	99.782	0.582	3.9	49.5	Flood Risk
60 min Winter	99.905	0.705	4.3	59.9	Flood Risk
120 min Winter	99.960	0.760	4.5	64.6	Flood Risk
180 min Winter	99.970	0.770	4.5	65.5	Flood Risk
240 min Winter	99.969	0.769	4.5	65.4	Flood Risk
360 min Winter	99.940	0.740	4.4	62.9	Flood Risk
480 min Winter	99.900	0.700	4.3	59.5	Flood Risk
600 min Winter	99.858	0.658	4.2	55.9	Flood Risk
720 min Winter	99.817	0.617	4.0	52.4	Flood Risk
960 min Winter	99.740	0.540	3.7	45.9	Flood Risk
1440 min Winter	99.622	0.422	3.3	35.9	O K
2160 min Winter	99.506	0.306	2.8	26.0	O K
2880 min Winter	99.434	0.234	2.4	19.9	O K
4320 min Winter	99.353	0.153	1.9	13.0	O K
5760 min Winter	99.313	0.113	1.6	9.6	O K
7200 min Winter	99.291	0.091	1.3	7.7	O K
8640 min Winter	99.277	0.077	1.2	6.6	O K
10080 min Winter	99.270	0.070	1.1	5.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	1.418	0.0	232.0	5144
15 min Winter	149.060	0.0	40.4	25
30 min Winter	100.050	0.0	54.3	38
60 min Winter	63.945	0.0	69.7	64
120 min Winter	38.570	0.0	84.1	118
180 min Winter	28.710	0.0	93.9	148
240 min Winter	23.236	0.0	101.4	186
360 min Winter	17.134	0.0	112.1	262
480 min Winter	13.796	0.0	120.4	336
600 min Winter	11.650	0.0	127.1	406
720 min Winter	10.138	0.0	132.7	476
960 min Winter	8.118	0.0	141.7	612
1440 min Winter	5.939	0.0	155.4	870
2160 min Winter	4.347	0.0	170.8	1240
2880 min Winter	3.489	0.0	182.8	1596
4320 min Winter	2.567	0.0	201.6	2300
5760 min Winter	2.077	0.0	217.7	3008
7200 min Winter	1.774	0.0	232.4	3720
8640 min Winter	1.568	0.0	246.4	4416
10080 min Winter	1.418	0.0	259.9	5120

Cascade Rainfall Details for BM12183-CA1.SRCX

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 525500 117400 TQ 25500 17400
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.130

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.043	4	8	0.043	8	12	0.043

Cascade Model Details for BM12183-CA1.SRCX

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 99.200

Depth (m)	**Area (m²)**	**Depth (m)**	**Area (m²)**
0.000	85.0	0.800	85.0

Orifice Outflow Control

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 99.200

Cascade Summary of Results for BM12183-CA2.SRCX

Upstream Structures	Outflow To	Overflow To
BM12183-CA1.SRCX	BM12183-CB.SRCX	(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	99.096	0.396	3.5	59.8	O K
30 min Summer	99.204	0.504	3.5	81.1	O K
60 min Summer	99.325	0.625	3.5	107.7	O K
120 min Summer	99.417	0.717	3.5	130.3	O K
180 min Summer	99.471	0.771	3.5	144.2	O K
240 min Summer	99.507	0.807	3.5	153.9	O K
360 min Summer	99.550	0.850	3.5	166.1	O K
480 min Summer	99.577	0.877	3.5	173.8	O K
600 min Summer	99.590	0.890	3.5	177.7	O K
720 min Summer	99.593	0.893	3.5	178.5	O K
960 min Summer	99.577	0.877	3.5	173.8	O K
1440 min Summer	99.540	0.840	3.5	163.2	O K
2160 min Summer	99.486	0.786	3.5	148.4	O K
2880 min Summer	99.430	0.730	3.5	133.5	O K
4320 min Summer	99.284	0.584	3.5	98.4	O K
5760 min Summer	99.143	0.443	3.5	68.8	O K
7200 min Summer	99.037	0.337	3.5	49.1	O K
8640 min Summer	98.960	0.260	3.5	36.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	149.060	0.0	96.2	27
30 min Summer	100.050	0.0	129.3	77
60 min Summer	63.945	0.0	166.0	188
120 min Summer	38.570	0.0	200.3	248
180 min Summer	28.710	0.0	223.7	292
240 min Summer	23.236	0.0	241.4	332
360 min Summer	17.134	0.0	267.1	408
480 min Summer	13.796	0.0	286.7	492
600 min Summer	11.650	0.0	302.7	608
720 min Summer	10.138	0.0	316.0	724
960 min Summer	8.118	0.0	337.4	906
1440 min Summer	5.939	0.0	370.1	1140
2160 min Summer	4.347	0.0	407.0	1516
2880 min Summer	3.489	0.0	435.5	1904
4320 min Summer	2.567	0.0	480.3	2648
5760 min Summer	2.077	0.0	518.7	3336
7200 min Summer	1.774	0.0	553.9	3976
8640 min Summer	1.568	0.0	587.2	4664

Cascade Summary of Results for BM12183-CA2.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
10080 min Summer	98.907	0.207	3.4	27.8	O K
15 min Winter	99.135	0.435	3.5	67.2	O K
30 min Winter	99.257	0.557	3.5	92.3	O K
60 min Winter	99.387	0.687	3.5	122.8	O K
120 min Winter	99.483	0.783	3.5	147.6	O K
180 min Winter	99.541	0.841	3.5	163.5	O K
240 min Winter	99.581	0.881	3.5	174.9	O K
360 min Winter	99.629	0.929	3.5	189.5	O K
480 min Winter	99.660	0.960	3.5	198.9	O K
600 min Winter	99.678	0.978	3.5	204.6	O K
720 min Winter	99.686	0.986	3.5	207.0	O K
960 min Winter	99.677	0.977	3.5	204.3	O K
1440 min Winter	99.628	0.928	3.5	189.0	O K
2160 min Winter	99.551	0.851	3.5	166.4	O K
2880 min Winter	99.462	0.762	3.5	141.8	O K
4320 min Winter	99.210	0.510	3.5	82.4	O K
5760 min Winter	99.004	0.304	3.5	43.4	O K
7200 min Winter	98.887	0.187	3.4	24.8	O K
8640 min Winter	98.829	0.129	3.1	16.5	O K
10080 min Winter	98.806	0.106	2.9	13.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	1.418	0.0	619.3	5344
15 min Winter	149.060	0.0	107.8	27
30 min Winter	100.050	0.0	144.8	115
60 min Winter	63.945	0.0	186.0	210
120 min Winter	38.570	0.0	224.4	264
180 min Winter	28.710	0.0	250.6	310
240 min Winter	23.236	0.0	270.4	350
360 min Winter	17.134	0.0	299.2	428
480 min Winter	13.796	0.0	321.2	502
600 min Winter	11.650	0.0	339.0	604
720 min Winter	10.138	0.0	354.0	716
960 min Winter	8.118	0.0	377.9	928
1440 min Winter	5.939	0.0	414.4	1190
2160 min Winter	4.347	0.0	455.9	1604
2880 min Winter	3.489	0.0	487.8	2028
4320 min Winter	2.567	0.0	538.1	2768
5760 min Winter	2.077	0.0	581.0	3352
7200 min Winter	1.774	0.0	620.4	3960
8640 min Winter	1.568	0.0	657.7	4576
10080 min Winter	1.418	0.0	693.7	5144

Cascade Rainfall Details for BM12183-CA2.SRCX

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 525500 117400 TQ 25500 17400
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.217

Time From:	**(mins) To:**	**Area (ha)**	**Time From:**	**(mins) To:**	**Area (ha)**	**Time From:**	**(mins) To:**	**Area (ha)**
0	4	0.072	4	8	0.072	8	12	0.072

Cascade Model Details for BM12183-CA2.SRCX

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 98.700

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	117.9	1.000	322.1	1.300	402.9

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0089-3500-1000-3500
Design Head (m)	1.000
Design Flow (l/s)	3.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	89
Invert Level (m)	98.700
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	3.5
Flush-Flo™	0.300	3.5
Kick-Flo®	0.632	2.8
Mean Flow over Head Range	-	3.1

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	2.7	1.200	3.8	3.000	5.8	7.000	8.7
0.200	3.4	1.400	4.1	3.500	6.2	7.500	9.0
0.300	3.5	1.600	4.3	4.000	6.7	8.000	9.2
0.400	3.4	1.800	4.6	4.500	7.0	8.500	9.5
0.500	3.3	2.000	4.8	5.000	7.4	9.000	9.8
0.600	3.0	2.200	5.0	5.500	7.7	9.500	10.0
0.800	3.1	2.400	5.2	6.000	8.1		
1.000	3.5	2.600	5.4	6.500	8.4		

Cascade Summary of Results for BM12183-CB.SRCX

Upstream Structures	Outflow To	Overflow To
BM12183-CA2.SRCX BM12183-CA1.SRCX	BM12183-CC.SRCX	(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	99.491	0.791	64.8	93.7	O K
30 min Summer	99.608	0.908	64.8	116.6	O K
60 min Summer	99.618	0.918	64.8	118.8	O K
120 min Summer	99.513	0.813	64.8	97.8	O K
180 min Summer	99.382	0.682	64.8	74.8	O K
240 min Summer	99.260	0.560	64.8	56.1	O K
360 min Summer	99.076	0.376	63.9	32.7	O K
480 min Summer	98.997	0.297	59.2	24.3	O K
600 min Summer	98.966	0.266	51.6	21.2	O K
720 min Summer	98.945	0.245	45.9	19.1	O K
960 min Summer	98.916	0.216	37.9	16.5	O K
1440 min Summer	98.883	0.183	28.9	13.6	O K
2160 min Summer	98.857	0.157	22.1	11.4	O K
2880 min Summer	98.842	0.142	18.5	10.2	O K
4320 min Summer	98.824	0.124	14.6	8.8	O K
5760 min Summer	98.814	0.114	12.5	8.0	O K
7200 min Summer	98.807	0.107	11.1	7.5	O K
8640 min Summer	98.802	0.102	10.2	7.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	149.060	0.0	242.9	21
30 min Summer	100.050	0.0	326.3	30
60 min Summer	63.945	0.0	418.2	48
120 min Summer	38.570	0.0	504.5	80
180 min Summer	28.710	0.0	563.4	112
240 min Summer	23.236	0.0	608.0	140
360 min Summer	17.134	0.0	672.5	196
480 min Summer	13.796	0.0	722.0	252
600 min Summer	11.650	0.0	762.1	310
720 min Summer	10.138	0.0	795.8	370
960 min Summer	8.118	0.0	849.6	490
1440 min Summer	5.939	0.0	932.1	734
2160 min Summer	4.347	0.0	1024.3	1092
2880 min Summer	3.489	0.0	1096.1	1452
4320 min Summer	2.567	0.0	1209.2	2148
5760 min Summer	2.077	0.0	1305.2	2936
7200 min Summer	1.774	0.0	1393.8	3656
8640 min Summer	1.568	0.0	1477.7	4360

Cascade Summary of Results for BM12183-CB.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
10080 min Summer	98.798	0.098	9.4	6.8	O K
15 min Winter	99.571	0.871	64.8	109.0	O K
30 min Winter	99.690	0.990	64.8	134.4	O K
60 min Winter	99.688	0.988	64.8	133.8	O K
120 min Winter	99.524	0.824	64.8	99.9	O K
180 min Winter	99.305	0.605	64.8	62.7	O K
240 min Winter	99.122	0.422	64.5	38.1	O K
360 min Winter	98.981	0.281	55.4	22.7	O K
480 min Winter	98.944	0.244	45.6	19.1	O K
600 min Winter	98.920	0.220	39.1	16.9	O K
720 min Winter	98.904	0.204	34.6	15.4	O K
960 min Winter	98.881	0.181	28.5	13.4	O K
1440 min Winter	98.855	0.155	21.8	11.2	O K
2160 min Winter	98.835	0.135	16.9	9.6	O K
2880 min Winter	98.823	0.123	14.2	8.7	O K
4320 min Winter	98.809	0.109	11.5	7.6	O K
5760 min Winter	98.801	0.101	10.0	7.0	O K
7200 min Winter	98.795	0.095	8.8	6.5	O K
8640 min Winter	98.790	0.090	7.9	6.2	O K
10080 min Winter	98.786	0.086	7.3	5.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	1.418	0.0	1558.7	5136
15 min Winter	149.060	0.0	272.2	21
30 min Winter	100.050	0.0	365.6	31
60 min Winter	63.945	0.0	468.4	50
120 min Winter	38.570	0.0	565.1	86
180 min Winter	28.710	0.0	631.0	116
240 min Winter	23.236	0.0	681.0	142
360 min Winter	17.134	0.0	753.2	192
480 min Winter	13.796	0.0	808.7	250
600 min Winter	11.650	0.0	853.5	310
720 min Winter	10.138	0.0	891.3	370
960 min Winter	8.118	0.0	951.6	488
1440 min Winter	5.939	0.0	1043.8	724
2160 min Winter	4.347	0.0	1147.2	1076
2880 min Winter	3.489	0.0	1227.7	1452
4320 min Winter	2.567	0.0	1354.4	2188
5760 min Winter	2.077	0.0	1461.9	2928
7200 min Winter	1.774	0.0	1561.0	3624
8640 min Winter	1.568	0.0	1655.0	4408
10080 min Winter	1.418	0.0	1745.9	5080

Cascade Rainfall Details for BM12183-CB.SRCX

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 525500 117400 TQ 25500 17400
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.526

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.175	4	8	0.175	8	12	0.175

Cascade Model Details for BM12183-CB.SRCX

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 98.700

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	63.4	1.000	226.6	1.300	295.1

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0329-6500-1000-6500
Design Head (m)	1.000
Design Flow (l/s)	65.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	329
Invert Level (m)	98.700
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	65.0
Flush-Flo™	0.483	64.8
Kick-Flo®	0.805	58.5
Mean Flow over Head Range	-	51.2

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	9.7	1.200	71.0	3.000	110.7	7.000	167.5
0.200	33.5	1.400	76.5	3.500	119.4	7.500	173.3
0.300	59.8	1.600	81.6	4.000	127.4	8.000	178.8
0.400	64.3	1.800	86.4	4.500	134.9	8.500	184.2
0.500	64.8	2.000	90.9	5.000	142.1	9.000	189.5
0.600	64.0	2.200	95.2	5.500	148.9	9.500	194.6
0.800	58.7	2.400	99.3	6.000	155.3		
1.000	65.0	2.600	103.3	6.500	161.5		

Cascade Summary of Results for BM12183-CC.SRCX

Upstream Structures	Outflow To	Overflow To
BM12183-CB.SRCX BM12183-CA2.SRCX BM12183-CA1.SRCX BM12183-CE.SRCX BM12183-CD.SRCX	(None)	(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	99.003	0.303	12.2	334.3	O K
30 min Summer	99.100	0.400	12.2	450.3	O K
60 min Summer	99.202	0.502	12.2	577.8	O K
120 min Summer	99.295	0.595	12.2	699.4	O K
180 min Summer	99.354	0.654	12.2	777.4	O K
240 min Summer	99.396	0.696	12.2	835.6	O K
360 min Summer	99.453	0.753	12.2	914.7	O K
480 min Summer	99.492	0.792	12.2	969.9	O K
600 min Summer	99.520	0.820	12.2	1010.1	O K
720 min Summer	99.541	0.841	12.2	1040.1	O K
960 min Summer	99.567	0.867	12.2	1078.3	O K
1440 min Summer	99.590	0.890	12.2	1110.9	O K
2160 min Summer	99.584	0.884	12.2	1102.2	O K
2880 min Summer	99.570	0.870	12.2	1082.0	O K
4320 min Summer	99.553	0.853	12.2	1057.5	O K
5760 min Summer	99.534	0.834	12.2	1029.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	149.060	0.0	697.8	59
30 min Summer	100.050	0.0	907.1	78
60 min Summer	63.945	0.0	1292.0	100
120 min Summer	38.570	0.0	1548.0	138
180 min Summer	28.710	0.0	1705.5	194
240 min Summer	23.236	0.0	1806.4	256
360 min Summer	17.134	0.0	1877.8	372
480 min Summer	13.796	0.0	1852.6	492
600 min Summer	11.650	0.0	1829.7	610
720 min Summer	10.138	0.0	1811.4	730
960 min Summer	8.118	0.0	1779.2	968
1440 min Summer	5.939	0.0	1723.7	1446
2160 min Summer	4.347	0.0	3207.3	2160
2880 min Summer	3.489	0.0	3379.3	2684
4320 min Summer	2.567	0.0	3249.7	3352
5760 min Summer	2.077	0.0	4154.8	3984

Cascade Summary of Results for BM12183-CC.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
7200 min Summer	99.506	0.806	12.2	990.0	O K
8640 min Summer	99.474	0.774	12.2	944.5	O K
10080 min Summer	99.445	0.745	12.2	902.7	O K
15 min Winter	99.037	0.337	12.2	374.6	O K
30 min Winter	99.144	0.444	12.2	504.7	O K
60 min Winter	99.256	0.556	12.2	647.3	O K
120 min Winter	99.359	0.659	12.2	784.1	O K
180 min Winter	99.424	0.724	12.2	874.3	O K
240 min Winter	99.471	0.771	12.2	939.2	O K
360 min Winter	99.532	0.832	12.2	1027.4	O K
480 min Winter	99.575	0.875	12.2	1089.9	O K
600 min Winter	99.607	0.907	12.2	1136.4	O K
720 min Winter	99.630	0.930	12.2	1171.9	O K
960 min Winter	99.662	0.962	12.2	1219.2	O K
1440 min Winter	99.693	0.993	12.2	1267.1	O K
2160 min Winter	99.698	0.998	12.2	1274.1	O K
2880 min Winter	99.681	0.981	12.2	1248.8	O K
4320 min Winter	99.660	0.960	12.2	1216.8	O K
5760 min Winter	99.616	0.916	12.2	1150.9	O K
7200 min Winter	99.557	0.857	12.2	1063.1	O K
8640 min Winter	99.502	0.802	12.2	983.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
7200 min Summer	1.774	0.0	4434.2	4656
8640 min Summer	1.568	0.0	4696.8	5448
10080 min Summer	1.418	0.0	4943.9	6256
15 min Winter	149.060	0.0	777.2	64
30 min Winter	100.050	0.0	978.5	83
60 min Winter	63.945	0.0	1443.3	106
120 min Winter	38.570	0.0	1711.3	142
180 min Winter	28.710	0.0	1852.1	194
240 min Winter	23.236	0.0	1897.6	252
360 min Winter	17.134	0.0	1872.2	368
480 min Winter	13.796	0.0	1855.6	486
600 min Winter	11.650	0.0	1843.4	602
720 min Winter	10.138	0.0	1833.6	720
960 min Winter	8.118	0.0	1817.6	952
1440 min Winter	5.939	0.0	1802.7	1412
2160 min Winter	4.347	0.0	3548.3	2076
2880 min Winter	3.489	0.0	3628.4	2720
4320 min Winter	2.567	0.0	3387.1	3428
5760 min Winter	2.077	0.0	4653.3	4104
7200 min Winter	1.774	0.0	4965.4	4976
8640 min Winter	1.568	0.0	5257.8	5880

Cascade Summary of Results for BM12183-CC.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
10080 min Winter	99.449	0.749	12.2	908.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Winter	1.418	0.0	5531.6	6760

Cascade Rainfall Details for BM12183-CC.SRCX

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 525500 117400 TQ 25500 17400
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.719

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

Cascade Model Details for BM12183-CC.SRCX

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 98.700

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1033.0	1.000	1539.0	1.300	1710.4

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0159-1220-1000-1220
Design Head (m)	1.000
Design Flow (l/s)	12.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	159
Invert Level (m)	98.700
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	12.2
Flush-Flo™	0.313	12.2
Kick-Flo®	0.689	10.2
Mean Flow over Head Range	-	10.4

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	5.7	1.200	13.3	3.000	20.5	7.000	30.8
0.200	11.8	1.400	14.3	3.500	22.1	7.500	31.9
0.300	12.2	1.600	15.2	4.000	23.6	8.000	32.9
0.400	12.1	1.800	16.1	4.500	24.9	8.500	33.9
0.500	11.8	2.000	16.9	5.000	26.2	9.000	34.8
0.600	11.3	2.200	17.7	5.500	27.5	9.500	35.8
0.800	11.0	2.400	18.5	6.000	28.6		
1.000	12.2	2.600	19.2	6.500	29.8		

Cascade Summary of Results for BM12183-CD.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	BM12183-CE.SRCX	(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	99.367	0.667	6.0	57.5	O K
30 min Summer	99.492	0.792	6.0	75.5	O K
60 min Summer	99.585	0.885	6.0	90.6	O K
120 min Summer	99.614	0.914	6.0	95.7	O K
180 min Summer	99.610	0.910	6.0	94.9	O K
240 min Summer	99.600	0.900	6.0	93.2	O K
360 min Summer	99.573	0.873	6.0	88.5	O K
480 min Summer	99.544	0.844	6.0	83.7	O K
600 min Summer	99.513	0.813	6.0	78.8	O K
720 min Summer	99.481	0.781	6.0	73.7	O K
960 min Summer	99.410	0.710	6.0	63.4	O K
1440 min Summer	99.234	0.534	6.0	41.1	O K
2160 min Summer	99.019	0.319	6.0	20.3	O K
2880 min Summer	98.892	0.192	5.8	10.8	O K
4320 min Summer	98.817	0.117	4.8	6.1	O K
5760 min Summer	98.797	0.097	3.9	5.0	O K
7200 min Summer	98.786	0.086	3.3	4.4	O K
8640 min Summer	98.780	0.080	2.9	4.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	149.060	0.0	63.7	25
30 min Summer	100.050	0.0	85.5	38
60 min Summer	63.945	0.0	109.3	66
120 min Summer	38.570	0.0	131.9	122
180 min Summer	28.710	0.0	147.3	156
240 min Summer	23.236	0.0	158.9	188
360 min Summer	17.134	0.0	175.8	256
480 min Summer	13.796	0.0	188.7	326
600 min Summer	11.650	0.0	199.2	394
720 min Summer	10.138	0.0	208.0	462
960 min Summer	8.118	0.0	222.1	598
1440 min Summer	5.939	0.0	243.7	840
2160 min Summer	4.347	0.0	267.6	1172
2880 min Summer	3.489	0.0	286.4	1500
4320 min Summer	2.567	0.0	316.0	2200
5760 min Summer	2.077	0.0	340.9	2912
7200 min Summer	1.774	0.0	364.1	3608
8640 min Summer	1.568	0.0	386.0	4392

Cascade Summary of Results for BM12183-CD.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
10080 min Summer	98.775	0.075	2.7	3.7	O K
15 min Winter	99.421	0.721	6.0	65.0	O K
30 min Winter	99.555	0.855	6.0	85.5	O K
60 min Winter	99.657	0.957	6.0	103.5	O K
120 min Winter	99.698	0.998	6.0	111.2	O K
180 min Winter	99.698	0.998	6.0	111.2	O K
240 min Winter	99.684	0.984	6.0	108.6	O K
360 min Winter	99.649	0.949	6.0	102.0	O K
480 min Winter	99.608	0.908	6.0	94.7	O K
600 min Winter	99.563	0.863	6.0	86.9	O K
720 min Winter	99.515	0.815	6.0	79.0	O K
960 min Winter	99.405	0.705	6.0	62.7	O K
1440 min Winter	99.116	0.416	6.0	28.9	O K
2160 min Winter	98.861	0.161	5.6	8.8	O K
2880 min Winter	98.815	0.115	4.7	6.0	O K
4320 min Winter	98.789	0.089	3.4	4.5	O K
5760 min Winter	98.777	0.077	2.8	3.9	O K
7200 min Winter	98.770	0.070	2.4	3.5	O K
8640 min Winter	98.765	0.065	2.1	3.2	O K
10080 min Winter	98.761	0.061	1.9	3.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	1.418	0.0	407.3	5040
15 min Winter	149.060	0.0	71.3	25
30 min Winter	100.050	0.0	95.8	38
60 min Winter	63.945	0.0	122.4	66
120 min Winter	38.570	0.0	147.7	120
180 min Winter	28.710	0.0	164.9	174
240 min Winter	23.236	0.0	178.0	198
360 min Winter	17.134	0.0	196.9	276
480 min Winter	13.796	0.0	211.4	352
600 min Winter	11.650	0.0	223.1	428
720 min Winter	10.138	0.0	233.0	500
960 min Winter	8.118	0.0	248.7	646
1440 min Winter	5.939	0.0	272.9	866
2160 min Winter	4.347	0.0	299.7	1148
2880 min Winter	3.489	0.0	320.7	1472
4320 min Winter	2.567	0.0	353.9	2204
5760 min Winter	2.077	0.0	381.8	2920
7200 min Winter	1.774	0.0	407.7	3656
8640 min Winter	1.568	0.0	432.3	4360
10080 min Winter	1.418	0.0	456.1	5056

Cascade Rainfall Details for BM12183-CD.SRCX

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 525500 117400 TQ 25500 17400
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.228

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.076	4	8	0.076	8	12	0.076

Cascade Model Details for BM12183-CD.SRCX

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 98.700

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	46.5	1.000	193.4	1.300	257.1

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0115-6000-1000-6000
Design Head (m)	1.000
Design Flow (l/s)	6.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	115
Invert Level (m)	98.700
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	6.0
Flush-Flo™	0.298	6.0
Kick-Flo®	0.647	4.9
Mean Flow over Head Range	-	5.2

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	4.0	1.200	6.5	3.000	10.0	7.000	15.0
0.200	5.8	1.400	7.0	3.500	10.8	7.500	15.5
0.300	6.0	1.600	7.5	4.000	11.5	8.000	16.0
0.400	5.9	1.800	7.9	4.500	12.2	8.500	16.5
0.500	5.7	2.000	8.3	5.000	12.8	9.000	17.0
0.600	5.3	2.200	8.7	5.500	13.4	9.500	17.4
0.800	5.4	2.400	9.0	6.000	14.0		
1.000	6.0	2.600	9.4	6.500	14.5		

Cascade Summary of Results for BM12183-CE.SRCX

Upstream Structures	Outflow To	Overflow To
BM12183-CD.SRCX	BM12183-CC.SRCX	(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	98.997	0.297	5.2	275.8	O K
30 min Summer	99.090	0.390	5.2	370.0	O K
60 min Summer	99.191	0.491	5.2	477.1	O K
120 min Summer	99.287	0.587	5.2	583.5	O K
180 min Summer	99.353	0.653	5.2	659.2	O K
240 min Summer	99.396	0.696	5.2	709.2	O K
360 min Summer	99.453	0.753	5.2	778.2	O K
480 min Summer	99.495	0.795	5.2	828.3	O K
600 min Summer	99.526	0.826	5.2	867.0	O K
720 min Summer	99.551	0.851	5.2	899.0	O K
960 min Summer	99.580	0.880	5.2	935.1	O K
1440 min Summer	99.578	0.878	5.2	932.2	O K
2160 min Summer	99.559	0.859	5.2	908.2	O K
2880 min Summer	99.539	0.839	5.2	883.3	O K
4320 min Summer	99.499	0.799	5.2	833.9	O K
5760 min Summer	99.463	0.763	5.2	789.3	O K
7200 min Summer	99.431	0.731	5.2	750.8	O K
8640 min Summer	99.401	0.701	5.2	715.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	149.060	0.0	305.1	176
30 min Summer	100.050	0.0	396.1	249
60 min Summer	63.945	0.0	557.6	324
120 min Summer	38.570	0.0	668.6	398
180 min Summer	28.710	0.0	737.0	454
240 min Summer	23.236	0.0	780.2	498
360 min Summer	17.134	0.0	804.4	578
480 min Summer	13.796	0.0	796.7	652
600 min Summer	11.650	0.0	787.4	724
720 min Summer	10.138	0.0	778.6	788
960 min Summer	8.118	0.0	763.2	964
1440 min Summer	5.939	0.0	737.5	1424
2160 min Summer	4.347	0.0	1380.3	1756
2880 min Summer	3.489	0.0	1455.5	2140
4320 min Summer	2.567	0.0	1377.4	2952
5760 min Summer	2.077	0.0	1783.4	3808
7200 min Summer	1.774	0.0	1903.6	4624
8640 min Summer	1.568	0.0	2016.7	5456

Cascade Summary of Results for BM12183-CE.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
10080 min Summer	99.373	0.673	5.2	682.0	O K
15 min Winter	99.029	0.329	5.2	308.2	O K
30 min Winter	99.133	0.433	5.2	415.1	O K
60 min Winter	99.245	0.545	5.2	537.2	O K
120 min Winter	99.355	0.655	5.2	662.0	O K
180 min Winter	99.419	0.719	5.2	736.4	O K
240 min Winter	99.465	0.765	5.2	791.9	O K
360 min Winter	99.528	0.828	5.2	869.9	O K
480 min Winter	99.574	0.874	5.2	927.5	O K
600 min Winter	99.609	0.909	5.2	972.4	O K
720 min Winter	99.637	0.937	5.2	1008.5	O K
960 min Winter	99.681	0.981	5.2	1066.0	O K
1440 min Winter	99.690	0.990	5.2	1078.5	O K
2160 min Winter	99.669	0.969	5.2	1050.2	O K
2880 min Winter	99.644	0.944	5.2	1017.6	O K
4320 min Winter	99.589	0.889	5.2	947.2	O K
5760 min Winter	99.534	0.834	5.2	877.0	O K
7200 min Winter	99.482	0.782	5.2	812.6	O K
8640 min Winter	99.431	0.731	5.2	751.3	O K
10080 min Winter	99.380	0.680	5.2	691.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	1.418	0.0	2123.9	6344
15 min Winter	149.060	0.0	339.8	201
30 min Winter	100.050	0.0	424.5	279
60 min Winter	63.945	0.0	623.1	362
120 min Winter	38.570	0.0	739.4	442
180 min Winter	28.710	0.0	798.6	498
240 min Winter	23.236	0.0	811.3	544
360 min Winter	17.134	0.0	803.2	624
480 min Winter	13.796	0.0	794.5	696
600 min Winter	11.650	0.0	787.6	766
720 min Winter	10.138	0.0	782.1	834
960 min Winter	8.118	0.0	773.8	956
1440 min Winter	5.939	0.0	767.6	1386
2160 min Winter	4.347	0.0	1527.7	1996
2880 min Winter	3.489	0.0	1541.6	2256
4320 min Winter	2.567	0.0	1428.2	3200
5760 min Winter	2.077	0.0	1997.4	4112
7200 min Winter	1.774	0.0	2131.7	5040
8640 min Winter	1.568	0.0	2257.7	5960
10080 min Winter	1.418	0.0	2376.5	6856

Cascade Rainfall Details for BM12183-CE.SRCX

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 525500 117400 TQ 25500 17400
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.968

Time From:	**(mins) To:**	**Area (ha)**	**Time From:**	**(mins) To:**	**Area (ha)**	**Time From:**	**(mins) To:**	**Area (ha)**
0	4	0.323	4	8	0.323	8	12	0.323

Cascade Model Details for BM12183-CE.SRCX

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 98.700

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	866.1	1.000	1333.7	1.300	1493.6

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0108-5200-1000-5200
Design Head (m)	1.000
Design Flow (l/s)	5.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	108
Invert Level (m)	98.700
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	5.2
Flush-Flo™	0.296	5.2
Kick-Flo®	0.641	4.2
Mean Flow over Head Range	-	4.5

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	3.7	1.200	5.7	3.000	8.7	7.000	13.0
0.200	5.1	1.400	6.1	3.500	9.4	7.500	13.4
0.300	5.2	1.600	6.5	4.000	10.0	8.000	13.9
0.400	5.1	1.800	6.8	4.500	10.5	8.500	14.3
0.500	4.9	2.000	7.2	5.000	11.1	9.000	14.7
0.600	4.5	2.200	7.5	5.500	11.6	9.500	15.1
0.800	4.7	2.400	7.8	6.000	12.1		
1.000	5.2	2.600	8.1	6.500	12.6		

APPENDIX C
Developer Enquiry

Adriana Garcia
Wardell Armstrong
2 Devon Way
Longbridge
Birmingham
West Midlands
B31 2TS

Your ref

Our ref
DS_CC_PPE-153488

Date
05 May 2021

Contact
Tel 0330 303 0119

Dear Ms Garcia,

Level 1 Capacity Check Enquiry: Land West of Albourne C of E Primary School, The Street, Albourne, West Sussex, BN6 9DH.

We have completed the capacity check for the above development site and the results are as follows:

Foul Water

There is currently inadequate capacity within the foul sewerage network to accommodate a foul flow of **1.35 l/s** for the above development at manhole reference TQ2616**2501**. The proposed development would increase flows to the public sewerage system which may increase the risk of flooding to existing properties and land. Additional off-site sewers or improvements to existing sewers will be required to provide sufficient capacity to service the development. Southern Water has a duty to provide Network capacity from the point of practical connection (point of equivalent or larger diameter pipe) funded by the New Infrastructure Charge.

Southern Water aim to provide this within 24 months following the date that planning has been granted for developments not identified as strategic sites in our current business plan. Strategic sites are larger developments and will often take longer than 24 months for a full solution to be provided.

The nearest point where capacity is currently available is at **Highcross Albourne WTW** which is located approximately **1.1 km** North West of the proposed development site. Rights are not issued for a direct connection to Wastewater Treatment Works (WTW). Please note that connection to the WTW will have to be agreed by Southern Water Services before being carried out.

New Infrastructure Charging

Please note as of 1st April 2018 we have moved to the “New Connections Services Charging Arrangements”. We understand that this may cause uncertainty for customers, particularly where they may have already committed to a development based on previous charging arrangements. We have worked with our stakeholders and Water UK to agree a set of principles by which we will base our charges. Please read through our new charging arrangement documents available at the following link: southernwater.co.uk/developing-building/connection-charging-arrangements

Alternatively, New Appointees and Variations (NAVs), also known as 'inset' companies, can provide new connection services or take ownership of the new water and wastewater connection infrastructure provided for a new development. NAVs are appointed by Ofwat and replace the regional water company. It is for the developer to choose whether to use a NAV or the regional water company to supply services for new sites, according to certain legal criteria.

Connecting to our network

It should be noted that this information is only a hydraulic assessment of the existing sewerage network and does not grant approval for a connection to the public sewerage system. A formal Sewer Connection (S106) application is required to be completed and approved by Southern Water Services. To make an application visit: Developer Services Portal (southernwater.co.uk)

Please note the information provided above does not grant approval for any designs/drawings submitted for the capacity analysis. The results quoted above are only valid for 12 months from the date of issue of this letter.

Should it be necessary to contact us please quote our above reference number relating to this application by email at southernwaterplanning@southernwater.co.uk

Yours sincerely,

Growth Planning Team
Business Channels

southernwater.co.uk/developing-building/planning-your-development

SOUTHERN WATER

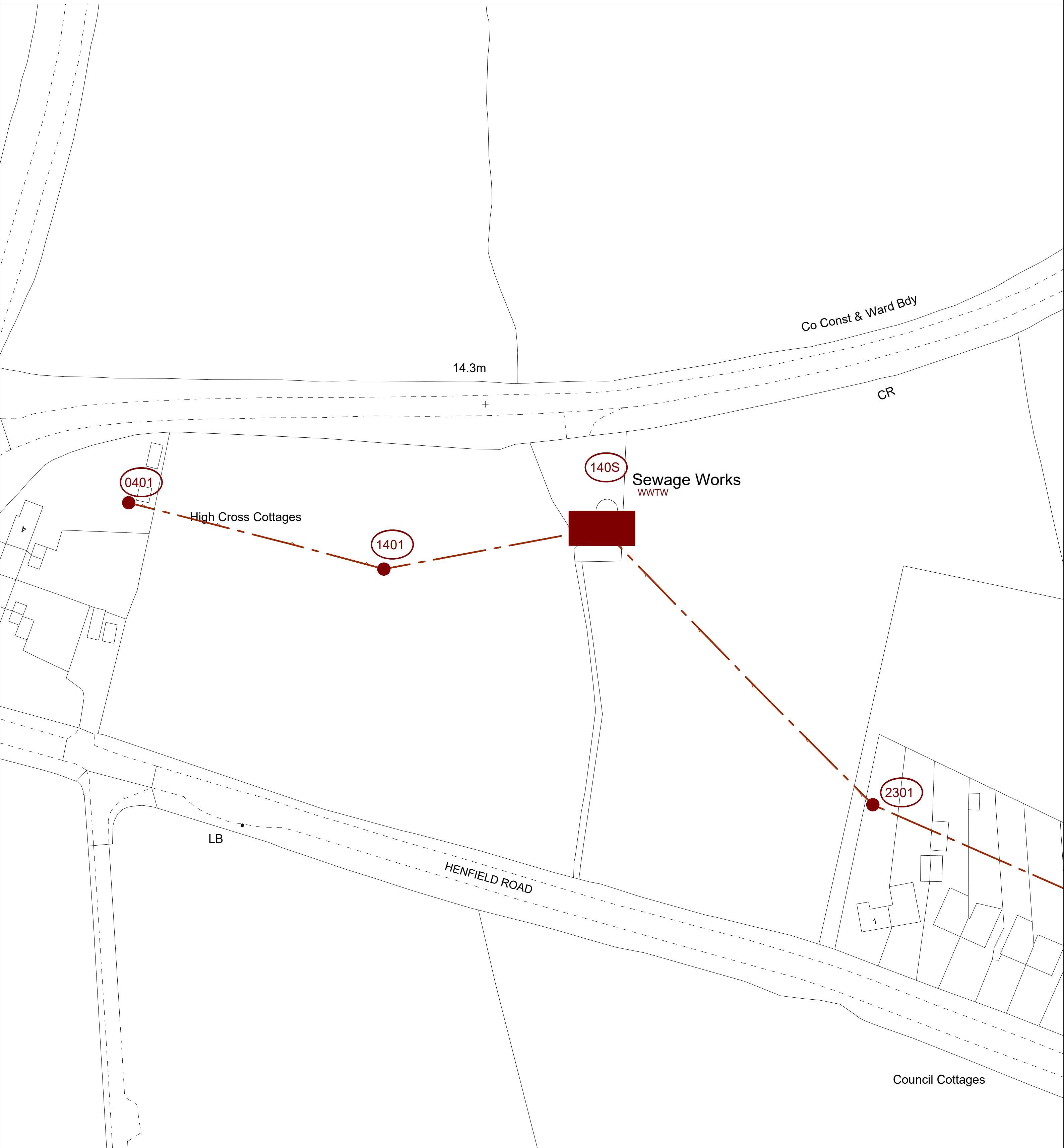
The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site.

Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530

Southern Water

O.S. REF: TQ2616NW	Scale: 1:2500	Printed By: Mercy	Date: 11-4-2021
Sewer Plot		Site Plan	
WARNING: BAC pipes are constructed of Bonded Asbestos Cement		Requested By:	
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement			

SOUTHERN WATER



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.

Southern Water

O.S. REF: TQ2517SW | Scale: 1:1250 | N | Printed By: Mercy | Date: 5-5-2021

Sewer Plot

WTW

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

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

Requested By:

APPENDIX D

Typical Maintenance Schedules

Sustainable Drainage Systems (SuDS):
Maintenance Schedule

Detention Basin

Regular Maintenance	
Monthly	• Litter and debris removal • Mow grasses (where required) and remove resultant clippings • Remove nuisance and invasive vegetation (for 12 months following installation) • Inspect/check all inlets, outlets, surface and overflows (where required) to ensure that they are in good condition, free from blockages and operating as designed. Take action where required
Six Monthly	• Remove nuisance and invasive vegetation
Annually	• Remove all dead growth prior to the start of growing season • Remove sediment from inlets, outlet and forebay • Manage wetland plants, where required • Inspect and document the presence of wildlife • Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, where required
As Required	• Prune and trim trees and remove cuttings. • Remove sediment from forebay, when 50% full and from micropools if volume reduced by more than 25% • Repair erosion or other damage by re-turfing or reseeding • Re-level uneven surfaces and reinstate design levels (typically once every 60 month period) • Remove and dispose of oils or petrol residues using safe standard practices
Remedial Actions: Significant storms may cause significant damage to SuDS. As such, a number of actions may be required following such events	
Following all significant storm events	• Inspect and carry out essential recovery works to return the feature to full working order

Sustainable Drainage Systems (SuDS):

Maintenance Schedule

Permeable Paving

Regular Maintenance	
Monthly	• Refer to manufacturer specifications • For sealed systems, inspection of outfalls should be undertaken
Six Monthly	• Brushing and vacuuming to manufacturer requirements. Re-grit where necessary after brushing.
Annually	• Not applicable
As Required	• Inspect/check all inlets, outlets, inspection chambers, surface and overflows (where required) to ensure that they are in good condition, free from blockages and operating as designed. Take action where required (for 3 months following installation) • Removal of weeds where required • Stabilizing and mowing of contributing areas where required
Remedial Actions: Significant storms may cause significant damage to SuDS. As such, a number of actions may be required following such events	
Following all significant storm events	• Inspect and carry out essential recovery works to return thefeature to full working order

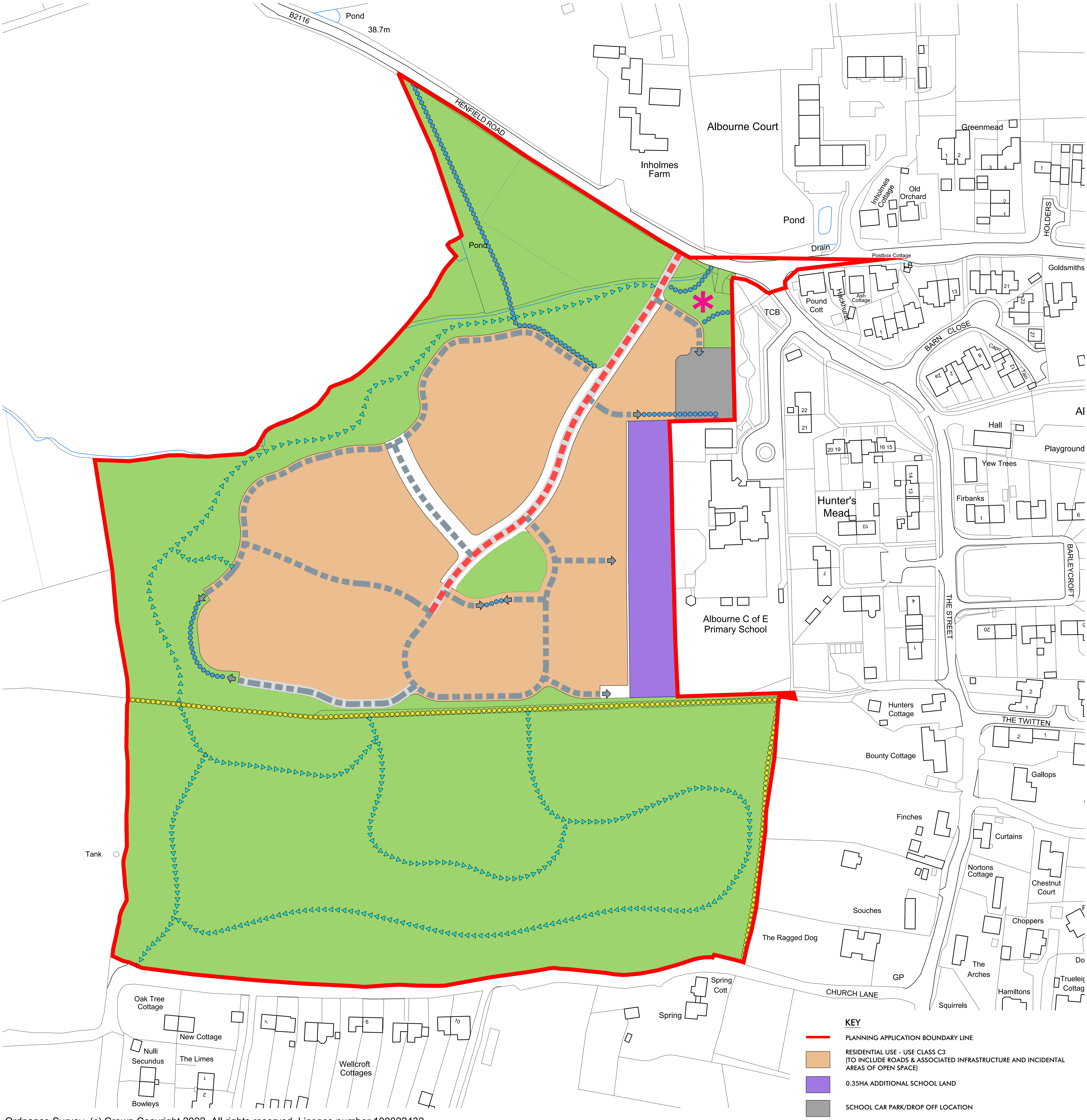
Sustainable Drainage Systems (SuDS):

Maintenance Schedule

Swale

Regular Maintenance	
Monthly	• Litter and debris removal • Mow grasses {where required) and remove resultant clippings (during growing season only) • Remove nuisance and invasive vegetation (for 12 months following installation) • Inspect/check all inlets, outlets, surface and overflows (where required) to ensure that they are in good condition, free from blockages and operating as designed. Take action where required
Six Monthly	• Remove nuisance and invasive vegetation
Annually	• Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where required • Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, where required • Inspect and document the presence of wildlife
As Required	• Repair erosion or other damage by re-turfing or reseeding • Re-level uneven surfaces and reinstate design levels (typically every 60 month period) • Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface where required (typically every 60 month period) • Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip, where required • Remove and dispose of oils or petrol residues using safe standard practices
Remedial Actions: Significant storms may cause significant damage to SuDS. As such, a number of actions may be required following such events	
Following all significant storm events	• Inspect and carry out essential recovery works to return the feature to full working order

DRAWINGS



KEY

- PLANNING APPLICATION BOUNDARY LINE
- RESIDENTIAL USE - USE CLASS C3 (TO INCLUDE ROADS & ASSOCIATED INFRASTRUCTURE AND INCIDENTAL AREAS OF OPEN SPACE)
- 0.35HA ADDITIONAL SCHOOL LAND
- SCHOOL CAR PARK/DROP OFF LOCATION
- GREEN INFRASTRUCTURE - TO INCLUDE PUBLIC OPEN AND AMENITY SPACE (INCLUDING EQUIPPED CHILDREN'S PLAY AREAS); ASSOCIATED LANDSCAPING AND ECOLOGICAL ENHANCEMENT WORKS; FOOTPATHS, CYCLEWAYS; DRAINAGE, UTILITIES AND SERVICE INFRASTRUCTURE; GREEN INFRASTRUCTURE MAY ALSO INCLUDE CROSSING POINTS OF ROADS;
- INDICATIVE LOCATION FOR COMMUNITY BUILDING
- PRIMARY ACCESS ROAD
- SECONDARY/TERTIARY/SHARED RESIDENTIAL STREET (INDICATIVE LOCATION)
- FOOTWAY/CYCLEWAY LINKS (INDICATIVE LOCATION)
- EXISTING PUBLIC RIGHT OF WAY
- INFORMAL FOOTWAYS (INDICATIVE LOCATION)

NOTE:
DEVELOPMENT CELLS/ROAD ALIGNMENT CAN DEVIATE BY UP TO 10m UPON DETAILED DESIGN

PRIMARY ACCESS CORRIDOR TO INCLUDE ROAD, FOOTPATHS, CYCLE PATHS WHERE NECESSARY, SERVICE MARGINS, VERGES, SUDS WHERE INCLUDED & PRIVATE FRONT GARDENS.

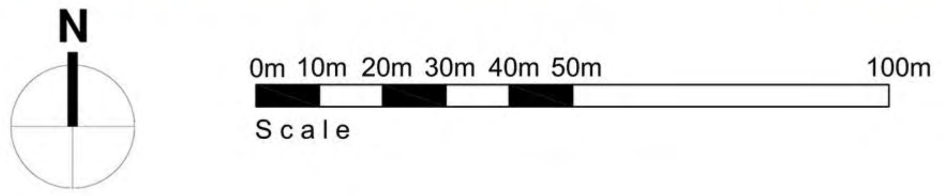
SECONDARY/TERTIARY/SHARED RESIDENTIAL STREET AND FOOTWAY/CYCLEWAY POSITIONS TO BE FIXED AT DETAILED DESIGN STAGE THROUGH RESERVED MATTERS APPLICATION

N

0 m 50 m 100 m
SCALE

Croudace
HOMES.CO.UK

Client: CROUDACE HOMES GROUP	Drawing Title: LAND USE PLAN					Omega Architects	Project No 3117	Class A	Dwg No 1201	Status PR	Rev B
Project: HENFIELD ROAD, ALBOURNE	Scale: 1:1000 @ A1	Revision A / B	Drawn MP / MP	Check JH / JH	Date 10.06.22 / 13.07.22	The Front Barn, 124 Manor Road North, Thames Ditton, KT7 0BH T: 01372 470 313 W: www.omega-architects.co.uk					



Croudace HOMES.CO.UK

Client: CROUDACE HOMES	Drawing Title: SITE SKETCH LAYOUT - FULL SITE					Omega Architects	Project No'	Class	Dwg No'	Status	Rev
Project: HENFIELD ROAD, ALBOURNE	Scale: 1:1000 @ A1	Revision: A	Drawn: OT	Check: JH	Date: 10/06/22	The Front Barn, 124 Manor Road North, Thames Ditton Surrey, KT7 0BH T: 01372 470 313 W: www.omega-architects.co.uk	3117	C	1006	SK	L

CLASS: C - COLOURED, A - BLACK & WHITE
STATUS: SK - SKETCH, PR - PRELIMINARY, PL - PLANNING, WD - WORKING DRAWING

DO NOT SCALE FROM THIS DRAWING

REFERENCE

- INDICATIVE SITE BOUNDARY
- PROPOSED SURFACE WATER SEWER
- SW PUBLIC FOUL GRAVITY SEWER
- SW FOUL WATER MANHOLE
- EASEMENT FROM WATERCOURSE
- SEWER EASEMENT
- ATTENUATION BASIN
- ATTENUATION BASIN EARTHWORKS TIE BACK AREA
- PROPOSED FOUL RISING MAIN
- PROPOSED PUMPING STATION
- INDICATIVE PROPOSED HEADWALL
- PROPOSED SWALE
- CONSTRUCTION DEPTH IN EXCESS OF 4m
- POTENTIAL AREA REQUIRING PUMPING OF FOUL FLOWS
- 1 IN 30 YEAR SURFACE WATER FLOOD RISK
- 1 IN 100 YEAR SURFACE WATER FLOOD RISK
- 1 IN 1000 YEAR SURFACE WATER FLOOD RISK

NOTES

1. DO NOT SCALE FROM THIS DRAWING, ALL DIMENSIONS MUST BE CHECKED/VERIFIED ON SITE
2. ALL DIMENSIONS AND ARE IN METERS UNLESS OTHERWISE STATED
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM
4. TOPO SURVEY (4DD1-Henfield Road PS) RECEIVED 2019-11-28
5. BASED ON SKETCH LAYOUT FULL SITE BY CROUDACE HOMES, DRG NO. 3117 C 1006 SK L
6. POND SIZES ARE INDICATIVE ONLY
7. POND SIZES AND TIE INS TAKEN FROM EXISTING GROUND LEVEL. NO RE-PROFILING TAKEN INTO CONSIDERATION. IF GROUND RE-PROFILING IS TO BE UNDERTAKEN THIS MIGHT REDUCE THE LAND TAKEN BY THE TIE-INS HENCE REDUCING THE TOTAL FOOTPRINT OF THE POND
8. MAX POND SLOPES ARE 1 IN 4. TIE-INS COULD BE LANDSCAPED INTO STEPS OR USE SHALLOW SLOPES TO INTEGRATE WITH SURROUNDINGS.
9. BASE OF PONDS CALCULATED TO PROVIDE GRAVITY DISCHARGE GIVEN THE EXISTING GROUND LEVELS.
10. SURFACE WATER FLOOD RISK FROM EA DATA
11. PONDS HAVE BEEN SIZED TO ALLEVIATE ALL EVENTS UP TO, AND INCLUDING, 100yr +45%CC AND DISCHARGE TO A MAXIMUM RATE OF Q1 GREENFIELD RUNOFF
12. POND DESIGN ASSUMED 1m DEPTH AND 0.3m FREEBOARD WITH 1 IN 4 SIDE SLOPE.
13. 8m EASEMENT AROUND EXISTING WATERCOURSE
14. SEWER RECORDS AND INVERT LEVELS TAKEN FROM SOUTHERN WATER DRAWINGS 366328.
15. 3m EASEMENT ASSUMED EITHER SIDE OF EXISTING FOUL SEWERS CROSSING THE SITE. TO BE CONFIRMED WITH SOUTHERN WATER.

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
D	Basin 3 & 5 amended, layout revised	21/07/22	HG	KW	KW
C	Layout, basins and drainage updated	15/07/22	HG	KW	KW
B	Masterplan removed	09/09/21	HRK	KW	KW
A	First Issue	11/05/21	HRK	AG	KW

CLIENT
CROUDACE HOMES

PROJECT
LAND AT ALBOURNE

DRAWING TITLE
INDICATIVE DRAINAGE STRATEGY

DRG No.		REV
BM12183-001		D
DRG SIZE: A1	SCALE: 1:1000	DATE: 11/05/21
DRAWN BY: HRK	CHECKED BY: AG	APPROVED BY: KW

wardell armstrong
BIRMINGHAM | TEL 0121 580 0909
WWW.WARDELL-ARMSTRONG.COM
BOLTON, CARDIFF, CARLISLE, EDINBURGH, GLASGOW, LEEDS, LONDON, MANCHESTER, NEWCASTLE UPON TYNE, STOKE ON TRENT

N:\BM\BM12183 - LAND AT ALBOURNE\03 - DESIGN\AUTOCAD\BM12183-001-D.DWG wardell-armstrong.com

STOKE-ON-TRENT
Sir Henry Doulton House
Forge Lane
Etruria
Stoke-on-Trent
ST1 5BD
Tel: +44 (0)1782 276 700

BIRMINGHAM
Two Devon Way
Longbridge Technology Park
Longbridge
Birmingham
B31 2TS
Tel: +44 (0)121 580 0909

BOLTON
41-50 Futura Park
Aspinall Way
Middlebrook
Bolton
BL6 6SU
Tel: +44 (0)1204 227 227

BRISTOL
Desklodge
2 Redcliffe Way
Bristol
BS1 6NL

BURY ST EDMUNDS
6 Brunel Business Court
Eastern Way
Bury St Edmunds
Suffolk
IP32 7AJ
Tel: +44 (0)1284 765 210

CARDIFF
Tudor House
16 Cathedral Road
Cardiff
CF11 9LJ
Tel: +44 (0)292 072 9191

CARLISLE
Marconi Road
Burgh Road Industrial
Estate Carlisle
Cumbria
CA2 7NA
Tel: +44 (0)1228 550 575

EDINBURGH
Great Michael House
14 Links Place
Edinburgh
EH6 7EZ
Tel: +44 (0)131 555 3311

GLASGOW
2 West Regent Street
Glasgow
G2 1RW
Tel: +44 (0)141 433 7210

LEEDS
36 Park Row
Leeds
LS1 5JL
Tel: +44 (0)113 831 5533

LONDON
Third Floor
46 Chancery Lane
London
WC2A 1JE
Tel: +44 (0)207 242 3243

NEWCASTLE UPON TYNE
City Quadrant
11 Waterloo Square
Newcastle upon Tyne
NE1 4DP
Tel: +44 (0)191 232 0943

TRURO
Baldhu House
Wheal Jane Earth Science Park
Baldhu
Truro
TR3 6EH
Tel: +44 (0)187 256 0738

International offices:

ALMATY
29/6 Satpaev Avenue
Hyatt Regency Hotel
Office Tower
Almaty
Kazakhstan
050040
Tel: +7(727) 334 1310

MOSCOW
21/5 Kuznetskiy Most St.
Moscow
Russia
Tel: +7(495) 626 07 67

wardell armstrong