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CHRISTCHURCH LAND AND ESTATES (ELMSWELL SOUTH) LIMITED

LAND OFF SCHOOL ROAD, ELMSWELL (PHASE 2)

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

AUGUST 2025

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AUGUST 2025

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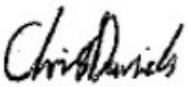
Chris Daniels	Principal Civil Engineer	
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SUPPORTING DOCUMENTS

- National Planning Policy Framework (NPPF) (2012 – Updated February 2025)
- Planning Practice Guidance (PPG) (2016 – Updated February 2024)
- Suffolk County Council Preliminary Flood Risk Assessment (2011)
- Suffolk County Council Preliminary Flood Risk Assessment Addendum (2017)
- Babergh and Mid Suffolk Strategic Flood Risk Assessment Level 1(SFRA) (2020)
- Babergh and Mid Suffolk SFRA Level 2 (2020)
- Babergh and Mid Suffolk Local Plan (November 2023)
- Suffolk Flood Risk Management Strategy Appendix A Sustainable Drainage Systems (SuDS) A Local Design Guide (2023)
- Protocol for Local Planning Authorities and Developers on SuDS, Surface Water Drainage and Local Flood Risk in Suffolk (Appendix C to the SFRMS) (2018)
- Babergh and Mid Suffolk District Council Water Cycle Study (2020)

EXECUTIVE SUMMARY

Wardell Armstrong have been commissioned by Christchurch Property Company Limited 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 at School Road, Elmswell, East of Bury St Edmunds, the closest postcode to the site is IP30 9EH. NGR: TL 98266 63848
Proposed Development	The proposed development will comprise a 66-bed care home accommodation and 40 assisted living bungalows and ancillary accommodation.
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 2 attenuation Basins to reduce runoff to the greenfield runoff rate of 6.2l/s for all events up to and including the 1 in 100 yr + climate change event.
Foul Water Drainage Strategy	Foul flows will be pumped to Anglian Water MH5901 located in School Road.

1 INTRODUCTION

1.1.1 Wardell Armstrong have been instructed by Christchurch Property Company Limited to complete a Flood Risk Assessment (FRA) and Drainage Strategy for the proposed development at Land off School Road, Elmswell.

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 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 at School Road, Elmswell, East of Bury St Edmunds, Suffolk. The site is centred at National Grid Reference (NGR) TL 98266 63848 and the closest postcode to the site is IP30 9EH.

2.1.2 The site is bounded to the north by open fields and Elmswell Hall Cottage, the east of the site is bounded by residential properties, Elmswell Train station and various commercial businesses. St John's Church lies to the southern border of the site and to the west of the site there are open fields, as shown in Figure 1.

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

2.2 Development Proposals

2.2.1 The development proposals are for 66 bed Care Home plus 40 assisted living bungalows, Admin/Management building, a club house, communal areas, carparking and green spaces.

2.2.2 Indicative proposed areas are as follows:

- Total Indicative Site Area – 11.6ha
- Potential Development Envelope - 2.9ha

2.3.2 The latest site plan ref 1661-CAM-XX-XX-DR-A-PL07, Block Plan ref 1661-CAM-XX-XX-DR-A-PL05 and Illustrative Landscape Plan drawing P22-1167_EN_0009_C_A3 P accompany this report.

2.3 Existing Topography

2.3.1 A topographical survey was carried out by Midland Survey Ltd in March 2021, which shows levels generally falling from east to west towards the watercourse. In the northerly part of the site, levels fall from approximately 60m AOD in east to 51m AOD in the west, and in the southerly part, levels fall from a highest level of 70m AOD to the lowest level in the southwestern corner at 40m AOD.

2.3.2 The topographical survey drawings 38441-1 and 388441-2 accompany this report.

2.4 Proximity to Watercourses

2.4.1 The prominent surface water feature within the proximity of the application site is an ordinary watercourse which defines the western boundary of the site. This watercourse forms the head of the fluvial system to the Black Bourn which is a tributary of the River Little Ouse.

2.4.2 The closest Main River to the site is the Black Bourn River which is located approximately 1.7km west of the site boundary.

2.5 Existing Sewers and Drains

2.5.1 Anglian Water (AWL) sewer records show there to be a 300mm diameter surface water sewer present, crossing the site from east to west and out falling into the ordinary watercourse on the western boundary of the site. Records of the drainage serving the proposed neighbouring development site to the northeast, indicate that the proposed 225mm diameter outfall from the surface water attenuation basin serving the site will cross the northern part of the site from east to west to reach the watercourse. Details of both sewers are included in Drawing BM12457-001.

2.5.2 There are no foul or combined public sewers located within the site. The nearest public foul sewer network is located to the east of the site within School Road, which is 150mm in diameter and flows in an easterly direction towards Elmswell Village. Please refer to Drawing BM12457-001 for details.

2.6 Geology and Ground Conditions

2.6.1 According to the BGS, bedrock geology across the site comprises mainly 'Crag Group-Sand' with a small area towards the southwest corner described as 'Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation and Culver Chalk Formation – Chalk'. See Figure 2.

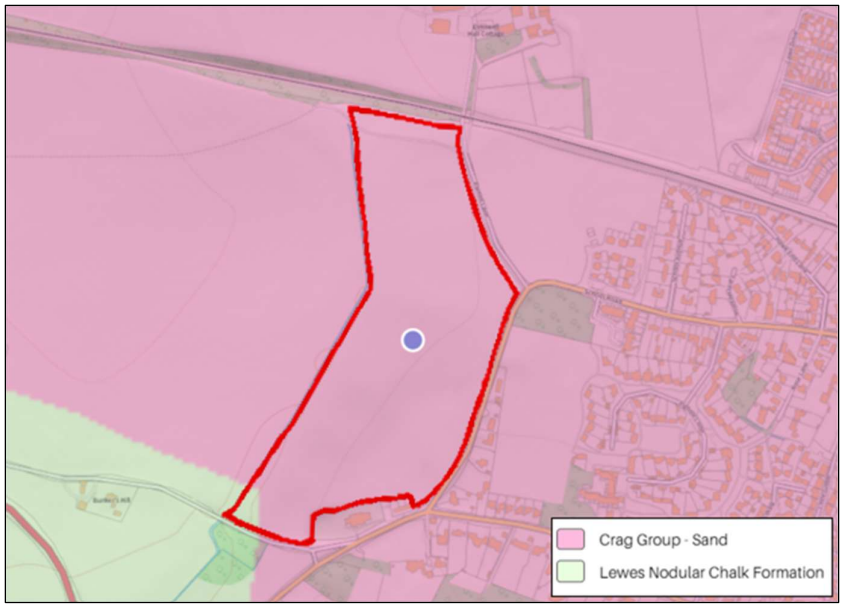


Figure 2 – Bedrock Geology
(Source: http://mapapps.bgs.ac.uk/geologyofbritain/home.html)

2.6.2 BGS records show superficial deposits within the site. To the northeast the superficial deposits comprise 'Lowestoft Formation – Diamicton', 'Head- Clay, silt, sand and gravel', across the centre of the site. To the southwest of the site the superficial geology is described as 'Lowestoft Formation – Diamicton' and to the southeast as 'Croxton Sand and Gravel Member- Sand and gravel' with a pocket of 'Lowestoft Formation – Diamicton'. as shown in Figure 3.

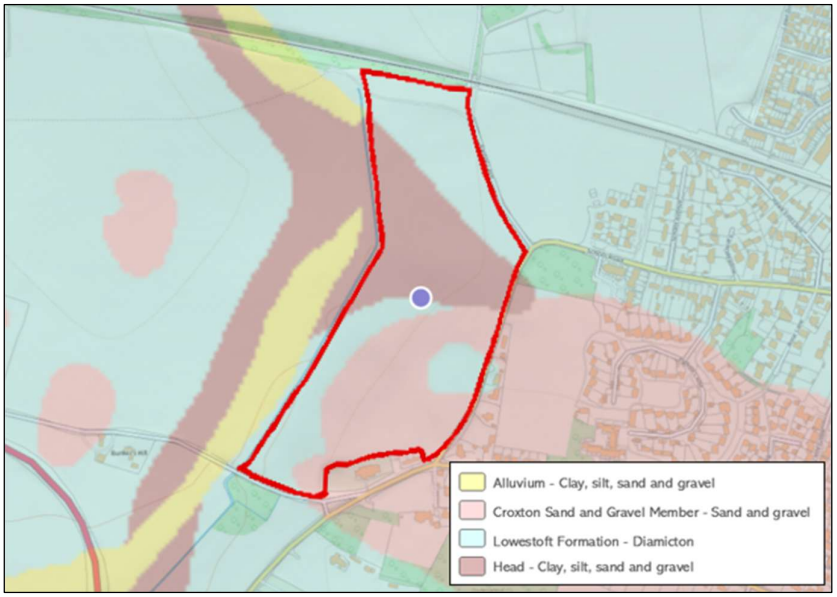


Figure 3 – Superficial Deposits
(Source: http://mapapps.bgs.ac.uk/geologyofbritain/home.html)

2.6.3 Borehole records are also available from the BGS. The closest boreholes to the site are TL96SE99 located approximately 132.9m to the east of the site boundary, TL96SE144 located 350m to the west of the site boundary and TL96SE93 located approximately 245m to the north site boundary. The soils in the vicinity of the boreholes are described as boulder clay, sand and gravel, crag, and upper chalk. No presence of groundwater is mentioned in any of the above boreholes.

2.6.4 The National Soil Resources Institute (NSRI) of Cranfield University described the soils at the site as Slightly acidic loamy and clayey soils.

2.6.5 Infiltration testing was conducted at this site by Wardell Armstrong in December 2016. The infiltration testing was undertaken at three locations within the site according to BRE Digest 365 (1991). Test results showed that the rate of infiltration was insufficient for all three trial pits dug. Refer to Appendix A for infiltration test results and location plan. As such the disposal of surface water runoff from the proposed development to ground will not be feasible. Instead, surface water runoff from the proposed development will discharge to the ordinary watercourse to the west of the site at a predevelopment runoff rate through the use of SuDS.

2.7 Hydrogeology

Source Protection Zones

2.7.1 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.

2.7.2 EA mapping shows that the majority of the site is within SPZ 2 - 'Outer Protection Zone'. The southwestern corner of the site is within SPZ 3- 'Total Catchment'.

Aquifers

2.7.3 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.

2.7.4 EA mapping indicates that the site is underlain by a Principal bedrock aquifer. The majority of the site is also underlain by a Secondary (undifferentiated) superficial aquifer. The southwestern corner of the site is also underlain by Secondary A superficial aquifer.

2.8 Nitrate Vulnerable Zone

2.8.1 Nutrient pollution is a particular problem for our freshwater habitats and estuaries. Increased levels of nutrients (especially nitrogen and phosphorus) can speed up the growth of certain plants, disrupting natural processes and impacting wildlife. This process damages water dependent sites, harming the plants and wildlife, and affects the oxygen carrying capacity of the water. The sources of excess nutrients are site specific, but predominantly originate from wastewater treatment works and agricultural pollution.

2.8.2 Although the entire site is located in an area classified by the Environmental Agency as Nitrate Vulnerability Zone, the site is not within one of the Habitats Sites that are in unfavourable condition due to high nutrient levels.

2.8.3 Conversion of land use from rural farmlands into populated urban areas may reduce Nitrate concentration and emissions from denitrification. It is anticipated that due to the change in land use from agriculture to mixed residential and employment, there will be a potential nitrate reduction to soils on the site that can be leached or entrained by overland flow following intense rainfall events. Therefore, providing a net benefit in terms of nitrate emissions from the site either directly or indirectly to the watercourses crossing the site.

3 ASSESSMENT OF FLOOD RISK

3.1 National Planning Policy

3.1.1 The National Planning Policy (NPPF) and the accompanying Planning Practice Guidance (PPG) aim to ensure that flood risk is taken into consideration at all stages of the planning process and advocates the use of a risk-based 'Sequential Test' to preferentially locate development in areas with a low risk of flooding. Where development is necessary in high-risk areas the NPPF aims to ensure that the development is safe without increasing flood risk through the application of the Exception Test.

- *The PPG defines the levels of flood risk within England as follows.*
- *Flood Zone 1 – Low Probability – Land having less than a 1 in 1,000 annual probability of river or sea flooding.*
- *Flood Zone 2 – Medium Probability – Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.*
- *Flood Zone 3a – High Probability – Land having a 1 in 100 or greater annual probability of river flooding; or having a 1 in 200 or greater annual probability of sea flooding.*
- *Flood Zone 3b – Functional Floodplain – Land where water must flow or be stored in times of flood.*

3.1.2 The PPG states that a site-specific FRA is required for all new development proposals located in Flood Zones 2 and 3, and for any proposal of 1 hectare or greater regardless of its flood zone classification. The flood zones as described above are shown on the EA Flood Map for Planning which is available online.

3.2 The Sequential Test

3.2.1 Paragraph 174 of the NPPF (December 2024) states:

"…the aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding."

3.2.2 Paragraph 175 states:

"The Sequential Test should be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk)."

3.2.3 As stated in paragraph 174 of the NPPF, the aim of the Sequential Test is to direct developments to areas of lowest flood risk, and it should be confirmed that there are no 'reasonably available' sites within the vicinity of the proposed site which are appropriate for the proposed development.

3.2.4 The proposed development will provide residential properties associated with existing development. The site is a greenfield with the majority within Flood Zone 1. There are areas of flood zone 2 and 3 adjacent to an existing watercourse to the western boundary of the site. However, the development layout has respected this and as a conservative approach has steered all built development and associated infrastructure outside of Flood Zones 2 and 3, ensuring that the proposed development remains safe from fluvial flood risk with development to be wholly within Flood Zone 1. There is a low-risk surface water flow path running at the northern boundary and a small area of 'Low' flood risk runs through the site from the east to the western boundary. Along the western boundary there are areas of 'Low' to 'High' flood risk. This flood risk is associated with the unnamed watercourse. A sequential approach to the development layout has respected this and as a conservative approach has steered all built development and associated infrastructure outside of these areas of flood risk, ensuring that the proposed development remains safe from surface water flooding. It is considered, therefore, that the site would pass the Sequential Test.

3.3 Flood Risk Vulnerability and The Exception Test

3.3.1 Table 2 of the PPG classifies development types based on their vulnerability to flooding, ranging from 'Essential Infrastructure' which has to be operational in times of flood, through 'Highly Vulnerable' (e.g. emergency service stations), 'More Vulnerable' (e.g. residential dwellings and establishments), 'Less Vulnerable' (e.g. offices/retail), to 'Water Compatible' development (e.g. open space, docks, marinas and wharves).

3.3.2 The proposed development is classified as 'Less Vulnerable' based on Table 2 of the PPG.

3.3.3 Table 3 of the PPG indicates which 'vulnerability classes' are acceptable in each of the Flood Zones and when the Exception Test should be applied. This is reproduced as Table 1 below.

3.3.4 The proposed development is classified as 'More Vulnerable' and located within Flood Zone 1. based on Table 1 below the Exception Test, therefore, does not need to be applied.

Table 1: Flood Risk Vulnerability Classification

Flood Zone	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	X	Exception Test Required	✓	✓
Zone 3b	Exception Test Required	X	X	X	✓

✓ Development is appropriate

× Development should not be permitted

3.3.5 This report 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.

3.4 Fluvial Flood Risk

3.4.1 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.

3.4.2 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.

3.4.3 The majority of the site boundary is located in Fluvial 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. However, the western border of the site encroaches into Flood Zones 2 and 3.

Figure 4 – Flood Map for Planning Fluvial
(Source: Map – Flood map for planning – GOV.UK)

3.4.4 The west boundary of the application site is partially within Flood Zones 2 (1 in 1000 year or 0.1% probability) and Flood Zone 3 (1 in 100 year or 1% probability) which are defined as 'Medium' and 'High' probability respectively. These areas are associated with the unnamed ordinary watercourse flowing southwards along the western site boundary and are confined to low-lying ground adjacent to the watercourse. The wider site area is situated on higher ground and any fluvial flooding would have no pathway into these areas. However, the development layout has respected this and

as a conservative approach has steered all built development and associated infrastructure outside of Flood Zones 2 and 3, ensuring that the proposed development remains safe from fluvial flood risk.

3.4.5 The Babergh and Mid Suffolk SFRA Level 1 (2020) and Level 2 (2020), Suffolk County Council PFRA (2016) and Suffolk County Council PRFA (2011) have been reviewed. There are no records of historical surface water flooding affecting the site.

3.4.6 It is therefore considered that the site is at a 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 site's 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 surface water flood risk 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 The EA surface water flooding extent mapping is shown in Figure 6.

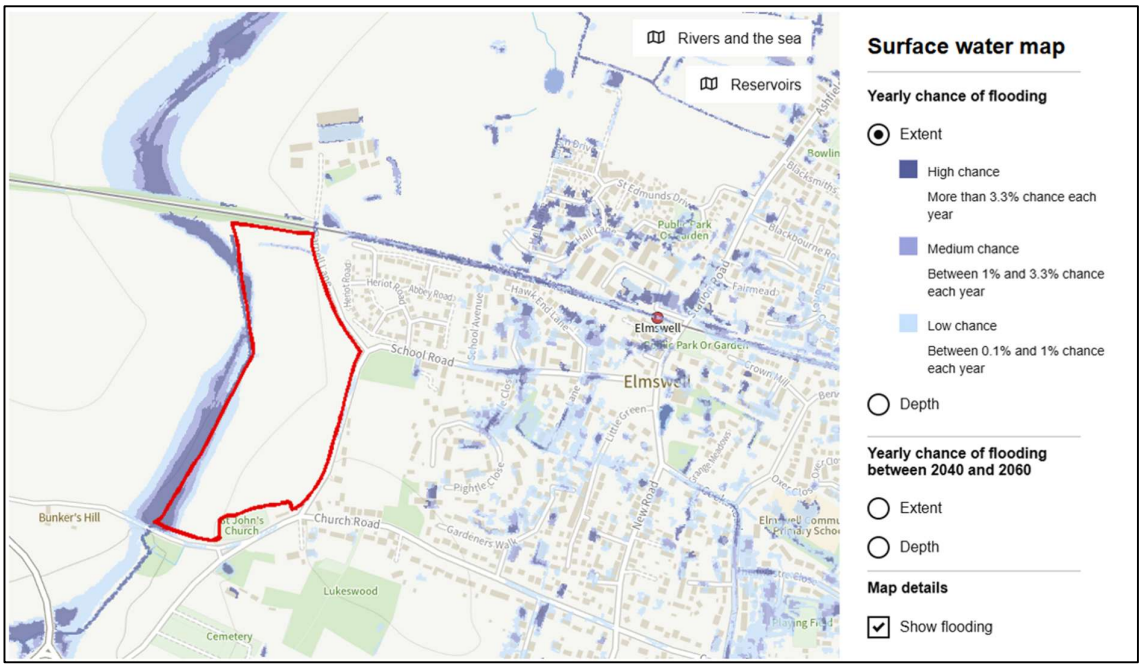


Figure 6 – Surface Water Flooding Extent Map (Present Day)
(Source: Map – Flood map for planning – GOV.UK)

3.6.3 As shown in Figure 6, the majority of the site is at a 'Very Low' risk of flooding from surface water. There is a low-risk surface water flow path running at the northern boundary and a small area of 'Low' flood risk runs through the site from the east to the western boundary. Along the western boundary there are areas of 'Low' to 'High' flood risk. This flood risk is associated with the unnamed watercourse. A sequential approach to the development layout has respected this and as a conservative approach has steered all built development and associated infrastructure outside of these areas of flood risk, ensuring that the proposed development remains safe from surface water flooding.

3.6.4 The EA surface water flooding extent mapping for the 2040 and 2060 'climate change' scenario is shown in Figure 7.

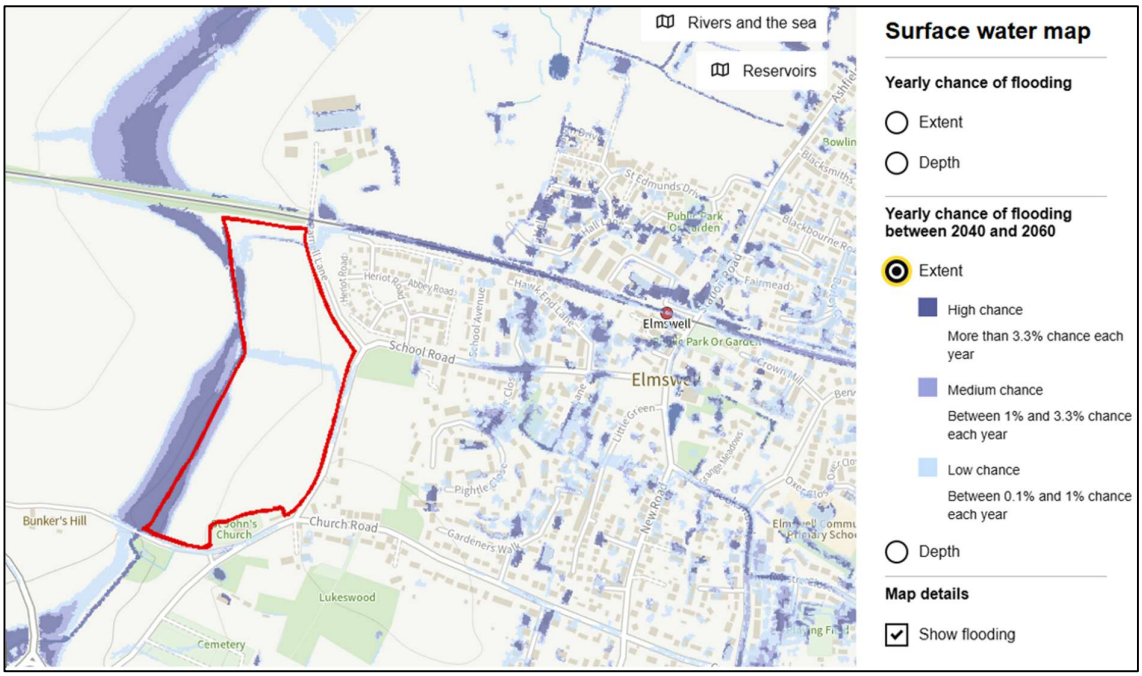


Figure 7 – Surface Water Flooding Extent Map (2040-2060 Climate Change Scenario)
Map – Flood map for planning – GOV.UK

3.6.5 The flood depth mapping for the climate change scenario is shown in Figure 8

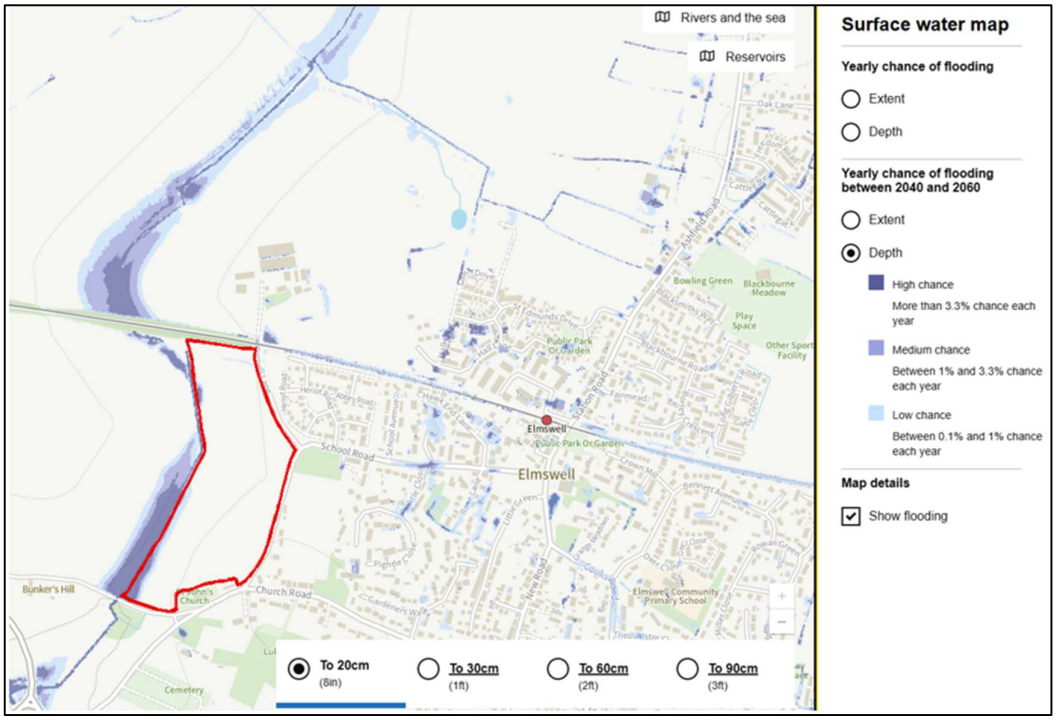


Figure 8 – Surface Water Flooding 20cm Depth Map (2040-2060 Climate Change Scenario)
Map – Flood map for planning – GOV.UK

3.6.6 Figure 7 identifies the majority of the site remains at a 'Very Low' risk of flooding from surface water in the climate change scenario. The area of Low risk close to the northern boundary becomes more extensive and now forms part of a larger overland flow from the railway to the north-east of the site to the watercourse along the western site boundary.

3.6.7 A narrow section of 'Low' flood risk runs through the site from east to west. It is considered that this represents an overland flow route from School Road along the eastern site boundary to the watercourse along the western boundary.

3.6.8 Figure 8, shows that the depth of flooding along the two overland flow routes would not exceed 0.2m in the 1 in 100 year ('Medium chance') return period.

3.6.9 Notwithstanding this a sequential approach to the development layout has respected this and as a conservative approach has steered all built development and associated infrastructure outside of these areas of flood risk, ensuring that the proposed development remains safe from surface water flooding.

3.6.10 The proposed layout of the development is in accordance with the 2023 Suffolk Flood Risk Management Strategy Appendix A ('Sustainable Drainage Systems (SuDS) A Local Design Guide') for managing existing surface water runoff. This states that in areas shown as having a high risk of pluvial flooding, developers should avoid constructing residential & commercial properties with water compatible land uses such as SuDS and/or public open space being preferable. Flood volumes should also not be displaced. For areas shown as having a medium/low risk of pluvial flooding, developers should avoid constructing residential properties in these areas. Flood resilient commercial properties could be located in these areas. Water compatible uses are again encouraged e.g. SuDS. Flood volumes should not be displaced.

3.6.11 Therefore the site is sequentially developed placing all built development away from surface water flood routes and in accordance with the Suffolk Flood Risk Management Strategy which states "*For sites on steep slopes or where overland flows of surface water are known to present issues locally, even if this hasn't been identified on national pluvial flood mapping, an allowance should be made for this within the location and design of SuDS features (e.g. including interception features to safely divert flows).*"

3.6.12 The Babergh and Mid Suffolk SFRA Level 1 (2020) and Level 2 (2020), Suffolk Flood Risk Management Strategy (2016) and Suffolk County Council PFRA (2016) have been assessed. There are no records of historical surface water flooding affecting the site.

3.6.13 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 Babergh and Mid Suffolk SFRA Level 1 (2020) and Level 2 (2020), Suffolk Flood Risk Management Strategy (2016) and Suffolk County Council PFRA (2016). This identified low to moderate risk of groundwater flooding.

3.7.3 The site is underlain by a Principal aquifer and groundwater may, therefore, be present in large volumes.

3.7.4 The nearest BGS borehole record located approximately 150m to the east of the site GL of circa 65m AOD, encountered groundwater approximately 67m below ground level (equivalent to approximately -2mAOD). The rest water level was approximately 26m below ground level (approximately 39mAOD). The minimum ground levels within the site are approximately 51mAOD and it is considered, therefore, that groundwater is a sufficient distance below ground level.

3.7.5 Based upon information provided within the SFRA, PFRA and BGS borehole records 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 Anglian Water (AWL) sewer records show there to be a 300mm diameter surface water sewer present, crossing the site from east to west and discharging into the ordinary watercourse on the western boundary of the site. Should flooding of these sewers occur, flows would head west following the topography of the area to reach the watercourse.

3.8.3 The proposals include the diversion to this sewer south of the developable area. Since ground levels fall westwards, there would be no pathway for any flooding from the diverted sewer to enter the developed site.

3.8.4 The existing development to the northeast of the site is served by a private surface water sewer that drains through the site in a westerly direction. Should flooding of this sewers occur, flows would head west following the topography of the area to reach the watercourse. The proposals include the diversion to this sewer to avoid development. Since ground levels fall westwards, there would be a pathway for any flooding from the sewer to continue in a westerly direction to its existing outfall to the watercourse.

3.8.5 The Babergh and Mid Suffolk SFRA Level 1 (2020) and Level 2 (2020), Suffolk Flood Risk Management Strategy (2016) and Suffolk County Council PFRA (2016) contains no records of historical sewer flooding affecting the site.

3.8.6 It is therefore considered the risk of flooding from sewers is Low.

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 artificial sources in this location is considered to be low.

3.10 Flood Risk Vulnerability

3.10.1 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.

3.10.2 As care home accommodation and assisted living bungalows are proposed, this development is classified as More Vulnerable.

4 ASSESSMENT OF FLOOD RISK POSED BY THE PROPOSED DEVELOPMENT

4.1.1 New development often poses a risk of flooding to neighbouring properties and areas downstream of the site because of increased impermeable area which has the effect of increasing the rate and volume of surface water runoff. In addition, climate change can be expected to cause an increase in rainfall intensity and surface water runoff over the lifetime of the development.

4.1.2 Flood risk can also be increased due to new development if the development reduces the floodplain storage area or alters surface water flood flow paths, ultimately displacing flood water and resulting in an increased risk to the surrounding area.

4.2 Fluvial Flooding

4.2.1 The development is shown to be located wholly within Flood Zone 1 and at Low Probability risk of flooding from fluvial flooding. There would be no loss of floodplain storage or impact on fluvial flood flow routes. The risk of fluvial flooding to surrounding areas will, therefore, not increase as a result of the proposed development.

4.3 Tidal Flooding

4.3.1 The development is shown to be located wholly within Flood Zone 1 and at Low Probability risk of flooding from tidal flooding. There would be no loss of floodplain storage or impact on fluvial flood flow routes. The risk of tidal flooding to surrounding areas will, therefore, not increase as a result of the proposed development.

4.4 Surface Water Flooding (Pluvial Flooding)

4.4.1 Surface water flood mapping shows that there will be isolated areas at low risk of flooding. The development has taken a sequential approach to avoid areas of surface water flood risk and to maintain its routing. Therefore, will have no impact on the risk of flooding to downstream areas.

4.5 Surface Water Runoff

4.5.1 At present, the site is a greenfield and is considered permeable. As part of the development, it has been assessed that 2.2Ha will become impermeable.

4.5.2 It is recognised that as a result, the existing rate and volume of surface water runoff may increase as a result of the proposed development.

4.5.3 Appropriate mitigation will be proposed, as detailed in Section 5, to provide sufficient

attenuation onsite and to ensure the risk of flooding to surrounding areas is not increased as a result of the development.

4.6 Climate Change

4.6.1 It is necessary to account for the anticipated effects of climate change for the lifetime of the development when assessing future flood risk. New climate change guidance was published by the Environment Agency in February 2016, and most recently updated in May 2022. The guidance provides predictions of anticipated increases to peak rainfall intensity. In assessing surface water runoff from the proposed development, the climate change predictions for peak rainfall intensity for the lifetime of the development need to be considered.

4.6.2 According to the peak rainfall allowances map, the proposed development falls within the Cam and Ely Ouse Management Catchment with the upper end allowance for the 1% annual exceedance rainfall event at 40% and the upper end allowance for the 3.3% annual exceedance rainfall event at 35%, therefore, that the risk of surface water flooding could increase as a result of climate change, and mitigation measures are required to manage this appropriately.

5 PROPOSED SURFACE WATER DRAINAGE STRATEGY

5.1.1 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.

5.1.2 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.

5.2 Planning Practice Guide

5.2.1 PPG requires that SuDS measures be implemented to manage surface water runoff within new developments.

5.2.2 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). The guidance indicates that for residential development a minimum lifetime of a 100 years should be considered. It also, indicates that for flood risk assessments and strategic flood risk assessments for developments with a lifetime beyond 2100 the upper end allowances should be assessed.

5.2.3 The assessment must be done for both the 1% and 3.3% annual exceedance probability events for the 2070s epoch (2061 to 2125).

5.2.4 According to the peak rainfall allowances map, the proposed development falls within the Cam and Ely Ouse Management Catchment with the upper end allowance for the 1% annual exceedance rainfall event at 40% and the upper end allowance for the 3.3% annual exceedance rainfall event at 35%, as shown in figure 6.

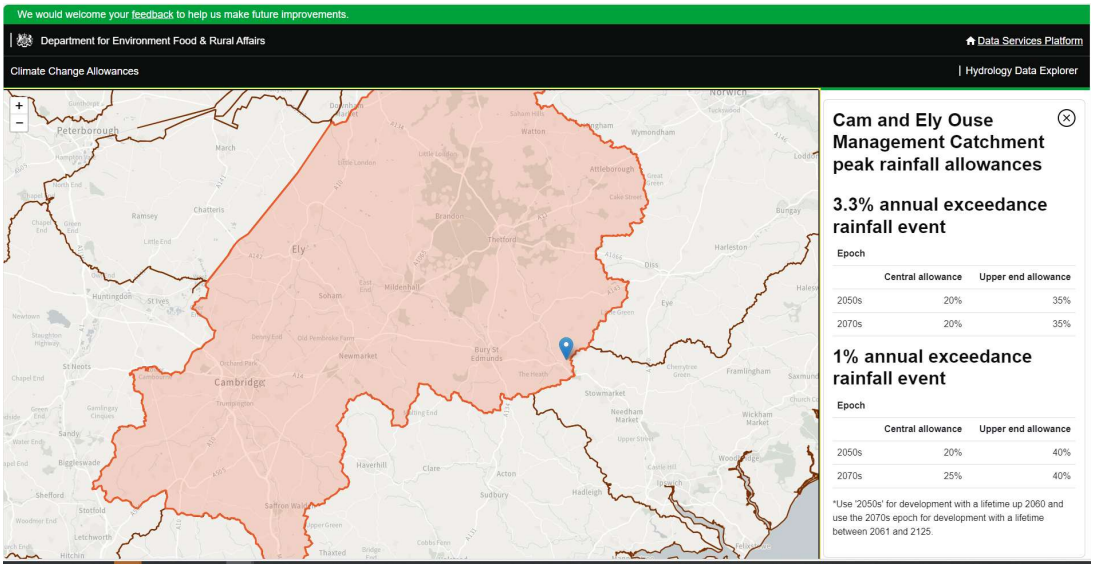


Figure 6 – Climate change allowance
(Source: Climate change allowances for peak rainfall (data.gov.uk))

5.2.5 The Babergh and Mid Sussex Council expects that all developers should design the surface water attenuation on site to accommodate the +20% climate change allowance and undertake a sensitivity analysis to understand the flooding implication of the +40% climate change allowance. If the implications are significant i.e. the site could flood existing development (by allowing additional flow of runoff from the site) or put people at risk (as a result of increased hazard levels within or off the site) then a view may be taken to provide more attenuation within the drainage design up towards the +40% allowance, or to provide additional mitigation, for example a higher freeboard to ensure no risk to third parties/onsite users for the +40% allowance.

5.2.6 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 years plus 40% climate change rainfall event.

5.3 Non-Statutory Technical Standards for Sustainable Drainage Systems

5.3.1 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.

5.3.2 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).

5.4 Local Requirements

5.4.1 A number of local authorities have also produced their own policy and guidance in relation to SUDS.

Joint Local Plan- Pre- Submission- November 2020

5.4.2 Part 1 of the Joint Local Plan was adopted by Mid Suffolk District Council on 20 November 2023 and by Babergh District Council on 21 November 2023. The Councils are currently progressing with the production of the Joint Local Plan Part 2 Development Plan Document. Policies relevant include Policies SP10- Climate Change, LP23- Sustainable Construction and Design, LP26- Water Resources and Infrastructure LP27- Flood Risk Vulnerability.

5.4.3 Policy SP10 – Climate Change

"1. The Councils will require all development to mitigate and adapt to climate change by*:*

a. Adopting a sequential risk-based approach taking into account future proofing measures for impacts of flooding;

b. Conforming to the principle of Holistic Water Management;

c. Applying existing and innovative approaches to sustainable design and construction; and

d. Identifying opportunities, where appropriate, to deliver decentralised energy systems powered by a renewable or low carbon source and associated infrastructure, including community-led initiatives."

5.4.4 Policy LP23- Sustainable Construction and Design

"1. All new development is required to minimise its dependence on fossil fuels and to make the fullest contribution to the mitigation of climate change through adopting a sustainable approach to energy use.

2. All new residential development is required to:

a. Achieve reductions in CO2 emissions for the Target Emissions Rate of new dwellings and new buildings as set out in the 2021 Edition of 2010 Building Regulations (Part L) or any subsequent more recent legislation which would lead to a greater reduction in CO2 emissions, where practicable;

b. Meet the higher water efficiency standards of 110 litres per person per day, as set out in Building Regulations Part G2 (or any subsequent more recent legislation);

c. Demonstrate climate change adaptation and mitigation measures by adopting effective design principles (including shading, landscaping, site layout and building orientation);

d. Be designed to minimise the energy demand of the building through maximising natural sunlight and ventilation, effectively utilising solar gain and to help buildings respond to winter and summer temperatures and incorporating flood mitigation measures;

e. Provide energy efficiency measures with a proactive approach to improving on the minimum standards specified in the Building Regulations where possible;

f. Provide feasible and viable on-site renewable and other low carbon energy generation to allow the greatest CO2 reduction32;

g. Demonstrate how it has incorporated sustainable building materials wherever possible; and

h. Plan for the risks associated with future climate change as part of the layout of the scheme and design of its buildings to ensure its longer-term resilience.

3. In meeting the above, all major developments are required to submit a Sustainability Design and Construction Statement. This should be submitted at the appropriate stage in the application process and demonstrate how the principles set out in 2c)-2h) will be incorporated into the design of the development.

4. Non-residential development of 1,000sqm and above must achieve a minimum of BREEAM 'Very Good' standard or equivalent. Developers will be expected to provide certification evidence of the levels for BREEAM at design stage and on completion of development. All new developments will also be expected to meet the higher water

efficiency standards as set out in 2b), unless it is convincingly demonstrated that it is not possible.

5. All residential developments are encouraged to achieve water usage of not more than 100 litres per person per day. This is in addition to criterion 2b) in accordance with recommendation from Anglian Water. Water re-use and recycling, rainwater and stormwater harvesting, and other suitable measures should be incorporated wherever feasible to reduce demand on mains water supply"

5.4.5 Policy LP26- Water resources and infrastructure

"Development will be supported where it:

1. Conforms to the principle of Holistic Water Management including the use of appropriate water efficiency and re-use measures, together with surface water drainage which provides community and environmental benefits;

2. Considers its impact on water resources and the capacity of water supply network infrastructure, taking into account the effects of climate change;

3. Demonstrates the applicant has consulted with the relevant authority regarding wastewater treatment and that capacity within the foul sewerage network and receiving water recycling centre is available or can be made available in time to serve the development;

4. Separates foul and surface water flows;

5. Complies with the relevant statutory environmental body policy on culverts; and

6. The proposal will not result in any adverse effect (either through construction and / or operation) on the integrity of the Protected Habitats Sites and designated AONBs."

5.4.6 Policy LP27- Flood Risk and Vulnerability

Development will be supported where it:

1. Conforms to the principle of Holistic Water Management including the use of appropriate water efficiency and re-use measures, together with surface water drainage which provides community and environmental benefits;

2. Considers its impact on water resources and the capacity of water supply network infrastructure, taking into account the effects of climate change;

3. Demonstrates the applicant has consulted with the relevant authority regarding wastewater treatment and that capacity within the foul sewerage network and receiving water recycling centre is available or can be made available in time to serve the development;

4. Separates foul and surface water flows;

5. Complies with the relevant statutory environmental body policy on culverts; and

6. The proposal will not result in any adverse effect (either through construction and / or operation) on the integrity of the Protected Habitats Sites and designated AONBs. Babergh and Mid Suffolk District Council Water Cycle Study (2020)

5.4.7 The recommendations in the Babergh & Mid Suffolk District Council Water Cycle Study are as follows;

- *Local Plan to adopt enhanced water efficiency standards (110l/p/d) permitted by National Planning Practice Guidance.*
- *The concept of water neutrality potentially has a lot of benefit in terms of resilience to climate change and enabling waterbodies to achieve good ecological status under the water framework directive.*
- *Early and continued engagement with Anglian Water and Essex & Suffolk Water is required in order to ensure that where upgrades to water supply or wastewater infrastructure is required, it can be planned in to ensure that it is in place prior to occupation of development sites.*
- *Incorporate water quality criterion into SuDS policy*
- Suffolk County Council Flood Risk Management Strategy (2016).

5.4.8 A number of local authorities have also produced their own policy and guidance in relation to SUDS. Suffolk County Council published local guidance in relation to SuDS in March 2016 'Suffolk Flood Risk Management Strategy'. Key requirements in this guidance include …Demonstration that the SuDS Management has been appropriately applied.

5.4.9 The Suffolk Local Flood Risk Management Strategy (LFRMS) was adopted March 2016. The document focuses on how Local Planning Authorities are responsible for ensuring sustainable drainage in new developments and the mechanisms for the ongoing maintenance of new sustainable drainage systems.

5.4.10 Within the Suffolk LFRMS the county council have produced a protocol (Appendix C of the LFRMS) to inform Local Planning Authorities and developments on the surface water disposal process and how to submit a successful application. In addition, a Local Surface Water Drainage Guide has been produced in Appendix A of the LFRMS and endorsed by the Suffolk Flood Risk Management Partnership to outline the various design criteria and the local interpretation. Sustainable Drainage Systems (SuDS) a Local Design Guide (2023). (Appendix A to the Suffolk Flood Risk Management Strategy).

5.4.11 The guiding principles for SuDS in Suffolk have been summarised below:

- Early consideration of sustainable flood and coastal risk management in production of Local Plans and master planning– promoting and protecting 'blue and green corridors'.
- Wherever possible, the use of multifunctional, above ground SuDS that deliver drainage, enhancement of biodiversity, improvements in water quality and amenity benefits.
- Ensuring that landowners realise both the importance of reducing flood risk and how properly designed sustainable drainage systems can be an asset to their development.
- Ensuring no increase in flood risk from new development wherever possible and contributing to reducing existing risk if feasible.
- Ensuring water flows around properties when the design capacity of drainage systems is exceeded by extreme rainfall.

5.4.12 Key points within the document focus on:

- Discharge Hierarchy.
- Suffolk County Council indicates that surface run off water should be discharged as high up in the hierarchy as possible. The following hierarchy stands: Infiltration; to a surface water body; to a surface water sewer, highway drain; or another drainage system and finally to a combined sewer. Deep borehole Soakaways (>2mbgl) are considered not viable and will be only considered as the last resort by Suffolk County Council. Collection and reuse of surface or ground water should also be a first consideration for developers.
- Soakage rates need to be above about 5-10 mm/hr for infiltration to be the sole means of drainage.

Run-off rate

- Suffolk County Council recommends that discharge is restricted to QBAR or 2l/s/ha (whichever is higher) for all events up to the critical 100yr+CC. Where discharging to public sewer Anglian Water policy takes precedence i.e., 1 in 1yr greenfield flow rate for all events.
- Alternatively discharge rates can be limited to a range of greenfield rates, based on the 1 in 1, 1 in 30 and 1 in 100 year storm events. However, the use of this method to restrict discharge rates requires inclusion of long-term storage, sized to take account of the increased post development volumes, discharging at no greater than 2l/s/ha.
- Greenfield rates should not include an allowance for climate change. Rainfall used to design the SuDS will need to be increased to allow for climate change.
- Impermeable areas to include allowances for future added paving, extensions, or verge hardening. Suffolk County Council will accept a figure of 10% for urban creep.

Volume Control

- Suffolk County Council will not normally accept flow control throttles with less than a 100mm opening however where volume control requires a smaller throttle then this requirement may be waived.
- Where the proposed discharge rate is greater than 2l/s/ha or QBAR for peak flow control a separate area must be available for volume control. Also known as Long Term Storage (LTS) this must be provided on the site to counter the excess volume created by new impermeable surfaces. Volume control or Long-Term Storage must be discharged from the site at 2/l/s/ha even if a higher rate is permitted for peak flow control.
- Suffolk County Council recommend that for all sites discharging to a watercourse, the final permitted discharge rate for the entire site is 2l/s/ha or QBAR for all events up to the 1in 100+CC event and this then accounts for any volume control needed. The proposed drainage strategy for this development is to discharge at a QBar rate and therefore satisfying the Suffolk CC volume control requirement

Adoption and Maintenance

- The LLFA will not adopt or maintain any SuDS features. The responsibility to ensure that adequate long-term maintenance of any drainage system can be delivered remains with Local Authority, Internal Drainage Board, Water and Sewerage

Companies, Local Highway Authority and Private Maintenance Companies (dependent on the type of SuDS).

Water Quality

- One of the guiding principles for SuDS in Suffolk is:
  - *"Wherever possible multifunctional above ground SuDS that deliver drainage, enhancement of biodiversity, improvements in water quality and amenity benefits should be used."*
- Suffolk County Council suggest wherever SuDS drain to a watercourse (including via a SW sewer or highway drain) open vegetated SuDS and/or permeable paving plus permanent wet pond(s) will be required to the improve the quality of water discharged. A SuDS train should be designed in accordance with the CIRIA SuDS Manual's 'Simple Index Method'.
- Surface runoff should be managed on the surface where it is reasonably practicable to do so and as close to its source as is reasonably practicable.
- The drainage system should be designed and constructed so surface water discharged does not adversely impact the water quality of receiving water bodies, both during construction and when operational.
- Water quality treatment components should be designed to ensure that they function effectively during rainfall events more frequent than the 1 in 1 year rainfall event.

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

5.5 Discharge Hierarchy

5.5.1 In accordance with Building Regulations and Suffolk County Council the preferred hierarchy for disposal of surface water is infiltration; watercourse; sewer.

5.5.2 Infiltration testing was undertaken by Wardell Armstrong in 2016 comprising 3 trial pits to a depth of 1.7m. This has determined that infiltration at the site is not viable. Details of the infiltration testing can be found in Appendix A. As such, and following the hierarchy of discharge, it is proposed that surface water runoff is attenuated and discharged to the watercourse bounding the site to the west.

5.6 Surface Water Drainage Strategy

5.6.1 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.

5.6.2 Following the LLFA Guidance, SuDS source control measures should be implemented in order to provide the required interception and water quality treatment, the current guidance states that ...'*wherever SuDS drain to a watercourse (including via a SW sewer or highway drain) open vegetated SuDS and/or permeable paving plus permanent wet pond(s) will be required to the improve the quality of water discharged. A SuDS train should be designed in accordance with the CIRIA SuDS Manual's 'Simple Index Method'. Surface runoff should be managed on the surface where it is reasonably practicable to do so and as close to its source as is reasonably practicable'*. The area of permanent standing water will not affect the hydraulic design of the feature.

5.6.3 Therefore, source control SuDS (e.g., water butts and/or rainwater recycling/ green roofs) 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.

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

5.6.5 Surface water runoff will be conveyed via the site surface water sewers to an attenuation feature (Pond 1) located within the public open space. This attenuation feature will cascade into another basin (Pond 2) further south without any restrictions. Pond 2 will discharge at the QBar greenfield runoff rate to the watercourse bounding the site to the west. The attenuation features will be used to both provide attenuation up to the 100yr plus climate change event and water quality treatment.

5.6.6 The final discharge to the watercourse from the proposed development will require consent from the Mid Suffolk District Council.

5.6.7 Please refer to BM12457-001 for details of the indicative drainage strategy.

5.7 Greenfield Runoff Rate

5.7.1 Surface water flows from the new development will be attenuated down to the QBAR pre-development (Greenfield) runoff rates, to ensure the rate and volume of runoff leaving the site post-development does not exceed pre-development conditions.

5.7.2 Greenfield runoff rates for the site have been calculated using the FEH method in MicroDrainage. The calculations are included in Appendix C.

5.7.3 The greenfield runoff rate QBAR determined using the FEH methodology was calculated as 2.88 l/s/ha, see Table 3.

Table 3: Greenfield Runoff Rates FEH Method

Storm Event	Growth Curve Factors (CIRIA Table 24.2)	Greenfield Runoff Rate (l/s/ha)
QMED	-	2.59
QBAR	1.11	**2.88**
Q1	0.87	2.50
Q2	0.89	2.56
Q30	2.55	7.33
Q100	3.56	10.24

*Suggested QBAR/QMED conversion:1.11 (based on suggested values by the EA Rainfall Runoff Management for Developments Report to convert QMED to QBAR of 0.9).

5.8 Impermeable Areas

5.8.1 The site's total area is 5.1ha as indicated in the site plan with 2.9ha being developed. An allowance of 10% has been made for urban creep and the surface area of the basins has been included in the impermeable area as shown in Table 4. The value of urban creep has been determined as 10% of the remaining total development area once the catchment impermeable area has been deducted.

Table 4: Catchments and Impermeability

Total Site Area (ha)	Total Developable Area (ha)	Catchment Impermeable Area (ha)	Urban Creep (ha)	Basin 1 & 2 Surface area (ha)	Total Impermeable Area (ha)
5.10	2.91	1.75	0.12	0.33	2.2

5.9 Attenuation Requirements

5.9.1 To achieve greenfield runoff rates, attenuation storage is required. In line with the Local Standards and Guidance, surface water flows from the proposed development will be discharged to an attenuation basin - Pond 1 where the water will be conveyed to a second attenuation basin - Pond 2 further south without any restrictions. Pond 2 will then discharge to the watercourse at a rate of 6.3 l/s (QBAR greenfield runoff rate) for design storms up to and including the 1 in 100yr + 40% climate change event to

ensure that there is no increase in flood risk. Table 5 summarises the attenuation requirements for the site. Causeway Flow software has been used to size the attenuation basins, details are included in Appendix C. Please refer to drawing BM12457-003 for sections of the attenuation basins, which show the water level at the 2 year, 30+CC year and 100+CC year events.

Table 5: Attenuation Details

Attenuation Feature	Impermeable Area (ha)	Greenfield Runoff QBAR (l/s)	Required Attenuation (m3)	Required Basin Surface Area (m2)
Pond 1	2.000	6.3	1058.4	1840
Pond 2	0.150	6.3	1120.9	1510.5

5.9.2 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 40% allowance for climate change;
- Attenuation basin - Pond 1 at a depth of 0.7m with 300mm of freeboard;
- Attenuation basin - Pond 2 at a depth of 1m with 300mm of freeboard;
- Basin side slopes of 1 in 4;
- Greenfield runoff rate of 2.88l/s/ha;
- 10% allowance for urban creep;
- Basin surface area included in the impermeable area; and
- CV value of 1 in the FLOW calculations.

5.10 Piped System

5.10.1 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.

5.10.2 It is proposed that the existing public surface water sewer crossing the site is diverted south, avoiding the proposed developable area, these would be subject to a S98 agreement. The diverted sewer to the south will require two manholes either side of the pipe connecting the two attenuation ponds. This will allow the diverted pipe to dive below the connecting pipe between the two ponds and ensure there is no collision between the two sewers.

5.10.3 Similarly, the proposed private surface water sewer serving the proposed development to the northeast will be diverted slightly to accommodate a proposed building, this will be subject to a private agreement. For details of the location of the sewers and potential diversion please refer to Drawing BM12457-001.

5.11 Water Quality

5.11.1 According to the CIRIA SuDS Manual (C753) to protect the water quality of receiving surface waters and/or groundwater (both now and in the future), runoff discharges from the site should be of an acceptable water quality. Even where a receiving water already contains elevated levels of pollutants, and the surface water discharge is unlikely to have a significant impact, pollutants generated by site activities should be managed on site.

5.11.2 SuDS can treat and clean surface water runoff from urban areas so that the receiving environment is protected, while at the same time conveying, storing, and infiltrating surface water runoff to protect flood risk, river morphology and water resources, and delivering amenity and biodiversity value for the development.

5.11.3 In most urban locations in the UK more than 50% of all rainfall events are less than 5mm in depth, therefore preventing runoff from these events is significant in terms of both hydrological and pollution impact reduction on receiving waterbodies. According to CIRIA (C753) the first 5mm of rainfall is known as the 'first flush' and generally has a higher pollutant load than subsequent runoff. This flow should be contained within the site through provision of source control SuDS.

5.11.4 According to CIRIA (C753), treatment within SuDS components is essential for frequent rainfall events, i.e., up to about the 1:1 year return period event. For rainfall events greater than the 1:1 year event, it is likely that the dilution available in the receiving surface waters will be significant reducing the environmental pollution risk.

5.11.5 There is a large variability in the level of pollutants in urban runoff. Un-trafficked areas are usually the least contaminated, with levels of contamination tending to rise with traffic intensities and higher risk of spillages. The size and number of treatment stages required is based on the level of pollution entering the system.

5.11.6 Table 4.3 of the CIRIA SuDS Manual (C753) indicates that residential roofs of small and medium residential infill have a 'Very Low' pollution hazard level, and the only requirement to discharge such flows to the surface waters is the removal of gross solids and sediments. However, in the case of neighbourhood streets (individual

property driveways, residential carparks, low traffic roads) the pollution hazard level is identified as 'Low,' in this case the Simple Index Approach should be applied. See Figure 7 below (Table 4.3 extracted from CIRIA 753).

TABLE 4.3 Minimum water quality management requirements for discharges to receiving surface waters and groundwater

Land use	Pollution hazard level	Requirements for discharge to surface waters, including coasts and estuaries[2]	Requirements for discharge to groundwater
Residential roofs	Very low	Removal of gross solids and sediments only	
Individual property driveways, roofs (excluding residential), residential car parks, low traffic roads (eg cul de sacs, home zones, general access roads), non-residential car parking with infrequent change (eg schools, offices)	Low	Simple index approach[3] *Note: extra measures may be required for discharges to protected resources[1]*	
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	Simple index approach[3] *Note: extra measures may be required for discharges to protected resources[1]*	Simple index approach[3] *Note: extra measures may be required for discharges to protected resources[1]* In England and Wales, Risk Screening[4] must be undertaken first to determine whether consultation with the environmental regulator is required. In Northern Ireland, the need for risk screening should be agreed with the environmental regulator.
Trunk roads and motorways	High	Follow the guidance and risk assessment process set out in HA (2009)	
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured, industrial sites	High	Discharges may require an environmental licence or permit[3]. Obtain pre-permitting advice from the environmental regulator. Risk assessment is likely to be required[5].	

Figure 7 – Table 4.3 Simple Index Approach, Pollution Hazard
Source (CIRIA report C753 'The SuDS Manual')

5.11.7 The Simple Index Approach within CIRIA (C753) Table 26.2 (see Figure 8 below) identifies the pollution hazard indices associated with "Low" Pollution hazard level.

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

Figure 8 – Table 26.2 Pollution Hazard Indices
Source (CIRIA report C753 'The SuDS Manual')

5.11.8 When referencing CIRIA (C753) Table 26.3 (see Figure 9 below) a vegetated detention basin, Pond or Swale can provide water quality treatment. The mitigation indices provided by these SuDS features are each sufficient to address the pollution hazards arising from residential developments. Therefore will address the potential pollution hazards at the site.

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Figure 9 – Table 26.3 Pollution Hazard Indices
Source (CIRIA report C753 'The SuDS Manual')

5.12 Ecology and Biodiversity

5.12.1 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.

5.12.2 The proposed attenuation features have been designed as detention basins but consideration is the be given to providing additional permanently wet features within the attenuation basins, without impacting on the attenuation volume provided, to convert them to attenuation ponds. The use of attenuation ponds would provide additional ecological, biodiversity and water quality improvements.

5.13 Visual Impact and Amenity

5.13.1 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 neutral or positive visual impact on the development and will enhance the sites amenity value wherever possible.

5.13.2 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.

5.13.3 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.

5.13.4 The attenuation basins have been designed with a 3.5m flat maintenance strip around the outside, which can also be used by the public. This makes the area accessible and enhances the amenity value of the site.

5.14 The Four Pillars of SuDS

5.14.1 The Drainage strategy will deliver the four pillars of SuDS design underpinning principles of sustainable drainage, namely: water quantity, water quality, biodiversity and visual amenity.

5.14.2 Water Quantity: The drainage strategy aims to control the quantity of runoff to manage flood risk and maintain the natural water cycle by mimicking nature and restricting the discharge rate to QBar greenfield runoff rates. This will regulate the flow of water during heavy rainfall, preventing flooding and ensuring sustainable water management.

5.14.3 Water Quality: Managing the quality of runoff is crucial. SuDS proposed by this drainage strategy will help prevent pollution by filtering and treating rainwater. Pollution hazard level is identified as 'Low,' in this case using the Simple Index Approach, which is mitigated thought the use of SuDS features like the detention basins before it enters the watercourse. This ensures that the water discharged will be clean and environmentally friendly.

5.14.4 Biodiversity: SuDS promote biodiversity by creating habitats for plants, insects, and wildlife. Features like the detention basins/ponds, swales, and wetlands will enhance local ecosystems and contribute to a healthier environment.

5.14.5 Visual Amenity: SuDS design considers aesthetics and integrates natural features into urban landscapes. The systems will enhance the visual appeal of the area, providing green spaces, ponds, and attractive vegetation.

6 PROPOSED FOUL DRAINAGE STRATEGY

6.1.1 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.

6.2 Existing Foul Water Drainage

6.2.1 Sewer records have been obtained from Anglian Water. The records indicate that there are foul sewers located along School Road to the north-east of the site and along Church Road to the south-east of the site. Sewer records have been included in Appendix F.

6.3 Design Foul Flows

6.3.1 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 MH5901 located in School Road, this is shown on Drawing BM12457-001.

6.3.2 Due to the topography of the site, a pumping station and foul rising main will need to be constructed to serve the site.

6.3.3 The design of the foul drainage network has been based on Design and Construction Guidance. Based on 4000 litres per dwelling per day and 105 dwellings (40 assisted living bungalows and 66 bed care home) the peak flows have been calculated to be approximately number 4.91l/s.

6.3.4 The total average daily foul flow, Dry Weather Flow, has also been determined for the site. This has been calculated to be 1.73l/s based on the parameters described below.

6.3.5 The dry weather flow for the 40 assisted living bungalows has been calculated as 0.68l/s based on Anglian Water document: Adoptable Pumping Station Design Criteria as follows:

- 40 assisted living bungalows;
- Water consumption of 125 litres per person per day;
- 2.35 people per property;
- 25% infiltration rate; and
- Pump Rate: 4 x DWF.

6.3.6 The dry weather flow for 66 No. Bed Home has been calculated based on the British Water Code of Practice - Flow and Loads, which suggest a foul loading of 350l/d/bed and a Pump Rate of 4 x DWF, which equate to 1.07l/s.

6.3.7 It is assumed that consumption arise from staff and visitors is included within the occupancy rate in the above calculations.

6.4 Public Sewer Capacity

6.4.1 A developer enquiry has been submitted to Anglian Water to confirm capacity within the existing foul water network. A response was received in January 2023.

6.4.2 A capacity check has been undertaken by Anglian Water and their response is included in Appendix D. Anglian Water have confirmed that the nearest practicable connection is to the 150mm diameter sewer at downstream of manhole 5901 in School Road at National Grid Reference NGR TL 98538 63914. Anglian Water has assessed the impact of a pumped conveyance from the planned development to the public foul sewerage network and can confirm that this connection is acceptable as the foul sewerage system, at present, has available capacity for your site. In line with Sewers for Adoption, the pumped discharge will need to connect via an intermediate manhole and at least 5 metres of an appropriately sized gravity sewer.

6.4.3 New connection charges recently have come into effect means that Anglian Water will be responsible for funding and implementing network reinforcement if required, in which case the water company will agree a timeframe for improvements to align with the build programme of the development.

7 RESIDUAL FLOOD RISK AND MITIGATION MEASURES

7.1 Designing for Exceedance

7.1.1 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 + 40% climate change event. In addition, the basins have been designed to provide a minimum freeboard of 300mm in the event of surface water exceedance.

7.1.2 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.

7.2 Finished Floor Levels

7.2.1 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.

7.3 Safe Access and Egress

7.3.1 Considering the assessed flood risk to the site, it is considered that safe access and egress will be provided to School Road during all flood events. Based on data provided by the EA, the site is considered to be at a low risk of flooding and will therefore have dry access and egress up to the 1 in 100yr + climate change event

8 ADOPTION AND MAINTENANCE

8.1.1 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.

8.2 Onsite Drainage Network

8.2.1 Anglian 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.

8.2.2 The onsite surface water and foul water network (excluding SuDS features) will be offered to Anglian Water ,this will be subject to a satisfactory Section 104 application, to be submitted at the detailed design stage.

8.3 SuDS Features

8.3.1 The onsite SuDS system will be offered to Anglian Water for adoption following the Design Construction Guidance, and the POS areas will be offered to Babergh and Mid Suffolk District Council.

8.3.2 If onsite SuDS are to be adopted by Anglian Water, the proposed design will need to meet Anglian Water's adoption criteria, referencing relevant guidance and advice where appropriate.

8.3.3 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.

8.3.4 Typical maintenance schedules for the proposed SuDS features can be found in Appendix E.

9 SUFFOLK FLOOD RISK MANAGEMENT STRATEGY LOCAL DESIGN GUIDE

9.1.1 Details of how the proposed Drainage Strategy will deliver on each of the four pillars of SuDS;

- *The Drainage strategy will deliver the four pillars of SuDS design underpinning principles of sustainable drainage, namely: water quantity, water quality, biodiversity and visual amenity. Details are provided within section 4.*

9.1.2 Flood Risk Assessment;

- *Section 3 satisfies the flood risk assessment section of the details required within the Suffolk flood risk management strategy local design guide by evaluating the fluvial, tidal, pluvial and groundwater flood risk that may affect the proposed site.*

9.1.3 Contour Plan;

- *Contours, flood zones and exceedance flow routes are shown on the drainage strategy drawing BM12457-001. Section 2.3 assesses levels through the topography survey conducted. Section 3.2 and 3.4 of the FRA examine the fluvial and pluvial flood risk to determine flow paths that may be affected by the proposed development with the aim of ensuring that the proposed development remains safe from fluvial, or surface water flooding and minimise a potential flood risk increase in the area*

9.1.4 Drainage Strategy/Statement;

- *Section 3.6 and 5.2 assesses Anglian water's existing drainage assets within the area of the proposed site to meet the drainage strategy / statement section of the local design guide requirements.*
- *Section 4 provides Impermeable area calculations that satisfy the drainage strategy / statement section of the local design guide.*
- *Section 4 describes the proposed SuDS and treatment design that will be used in the drainage strategy to satisfy the drainage strategy section of the local design guide.*

- *Greenfield discharge rates, storage volume/water depths calculations and long-term storage are provided within section 5, drainage strategy drawing and appendix to comply with preliminary hydraulic section of the local design guide.*
- *Treatment design in accordance with the Simple Index Approach is detailed in section 4.11*
- *Adoption and maintenance details are provided in section 7 that satisfy the drainage strategy / statement section of the local design guide. Appendix E also describes typical maintenance schedules for the proposed SuDS.*

9.1.5 Impermeable Areas Plan

- *A masterplan was created to illustrate new impervious surfaces and total areas to meet the impermeable areas plan section of the local design guide.*

9.1.6 Preliminary Layout Drawings (including landscaping details)

- *To satisfy the Preliminary layout drawing section of the local design guide, the drainage strategy drawing includes:*
- Existing watercourses to be retained within or abutting the site, 3.5m wide maintenance strip.
- Existing blue corridors.
- Cross section/plan views of basins; depicting area, side slopes, freeboard and volumes/depths (1:1, 1:30 and 1:100 + climate change allowance for all events).
- Discharge location and invert of watercourse (outfall).
- Form of SuDS and location on the site.
- Main above ground conveyance network.
- Maintenance strips/access points.
- Legal easements/no planting zones.

9.1.7 Preliminary Site Investigation Report

- *Section 2.6 discusses infiltration testing performed to comply with the preliminary site investigation report section of the local design guide.*
- *A Geo-Environmental desk study performed by Wardell Armstrong in 2017 discovered that no contaminated land entries or notices are identified within 1km of the site.*

9.1.8 Preliminary hydraulic calculations

- *Greenfield discharge rates, storage volume/water depths calculations and long-term storage are provided within section 5.12, drainage strategy drawing and appendix to comply with preliminary hydraulic section of the local design guide.*

9.1.9 Evidence of any agreements to discharge to a third-party system (i.e., Anglian Water or adjacent landowner)

- *The surface water discharge is to the watercourse on the site boundary within the client control.*
- *Anglian water have been consulted on discharge of foul sewage to the foul sewerage system and correspondence is contained within the Drainage Strategy.*

9.1.10 SuDS Maintenance & Management Plan

- *Maintenance details are provided in section 7. Appendix E also describes typical maintenance schedules for the proposed SuDS.*

10 CONCLUSIONS

10.1.1 The proposed development at Land off School Road, Elmswell will comprise 66 bed Care Home plus 40 assisted living bungalows, management building, a club house, communal areas, carparking, and green spaces.

10.1.2 Environment Agency mapping indicates that the majority of the site is located in fluvial Flood Zone 1, to the western border there are areas within Flood Zone 2 and Flood Zone 3, however the development will not be situated within this area. Therefore, this site is suitable for development in terms of fluvial flood risk. Surface water flooding of low to High risk is identified around the site but a sequential approach has been used to place the built development outside areas of flood risk. A low risk Surface water flood route that passes through the development is to be conveyed to avoid flood risk to the built development. The site is at a low risk of flooding from all other sources. The flood risk to the development is considered to be low overall.

10.1.3 As this 'More Vulnerable' development will be located wholly within Flood Zone 1, and avoiding areas of surface water flood risk the Sequential Test is considered passed, 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.

10.1.4 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.

10.1.5 Infiltration testing carried out at the site determined that the use of SuDS infiltration techniques is not suitable.

10.1.6 The proposed surface water drainage network will incorporate two attenuation basins with a total storage capacity of 2,179.3m^3 are proposed. The basins have been designed to accommodate runoff from all storm events up to and including a 1 in 100 year + 40% climate change storm event.

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

10.1.8 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.

10.1.9 It is proposed that the existing public surface water sewer crossing the site is diverted south of the developable area, similarly the proposed private surface water sewer crossing the site to the north which will serve the development to the northeast will be diverted to accommodate the proposed buildings.

10.1.10 Given the topography of the site and the location of the existing public sewers, pumping of foul flows will be required. A developer enquiry has been submitted to Anglian Water to confirm capacity within the existing network to accommodate foul flows from this development. Anglian water confirmed that there is capacity within the network for the flows from this network.

10.1.11 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

DO NOT SCALE FROM THIS DRAWING

REFERENCE

- SITE BOUNDARY
- SOAKAWAY LOCATION
- TRIAL PIT LOCATION

REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D
A	First Issue	06/07/17	TJ	AN	HD

CLIENT

CHRISTCHURCH LAND & ESTATES

PROJECT

SCHOOL ROAD, ELMSWELL

DRAWING TITLE

SITE INVESTIGATION LOCATION PLAN

DRG No.	REV
BM11245-008	A

DRG SIZE	SCALE	DATE
A3	1:2500	03/07/17

DRAWN BY	CHECKED BY	APPROVED BY
AF	AN	HD

■ CARDIFF TEL 029 2072 9191 WEB: WWW.WARDELL-ARMSTRONG.COM

☐ BIRMINGHAM ☐ CARLISLE ☐ CROYDON ☐ EDINBURGH
☐ GLASGOW ☐ LEIGH ☐ LONDON ☐ MANCHESTER
☐ NEWCASTLE UPON TYNE ☐ SHEFFIELD ☐ STOKE-ON-TRENT ☐ TAUNTON

wardell armstrong your earth our world

0m 50m 100m 150m 200m 250m

SCALE 1:2500

N:\WM\BM11245 - SCHOOL ROAD ELMSWELL\03 - DESIGN\AUTOCAD\BM11245-008-.DWG

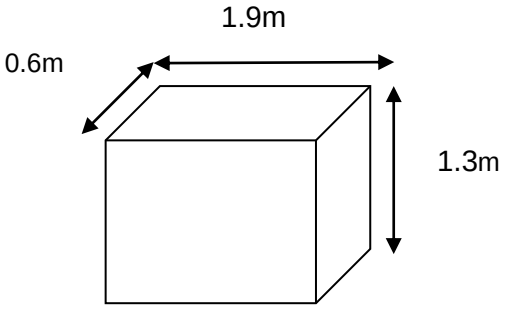
In-situ Soakaway Test Record – Test No: TP01

SITE	School Road, Elmswell	DATE	20/12/16
CLIENT	Christchurch Land & Estates Limited	JOB NO.	BM11245

Type of Test:	Pit
Width of pit:	0.6m
Length of pit:	1.9m
Depth of pit:	1.3m
Standing Water Level Prior to Test:	None
Depth of Water at T = 0 (below ground level):	0.7m
Infilled with gravel? (Y/N):	Y
Calculated Soil Infiltration Rate:	Insufficient Infiltration

NOTES:
Dry, mild weather conditions

Depth (mbgl)	Strata
0 – 0.3	Topsoil.
0.3 – 0.75	Sandy gravelly CLAY.
0.75 – 1.04	Sandy gravelly CLAY.
1.04 – 1.3	Gravelly CLAY.



Water Level Records

Time (mins)	Depth to Water (mbgl)
0	0.70
0.5	0.73
1	0.75
1.5	0.76
2	0.77
2.5	0.78
3	0.80
3.5	0.80
4	0.81
4.5	0.81
5	0.82
6	0.82
7	0.83
8	0.84
9	0.85
10	0.85

Time (mins)	Depth to Water (mbgl)
12	0.86
14	0.87
16	0.88
18	0.89
20	0.90
25	0.91
30	0.93
40	0.95
50	0.97
60	0.99
90	1.03
120	1.06
150	1.07
180	1.09
220	1.10
End of Test	

Time (mins)	Depth to Water (mbgl)

Undertaken in general accordance with the methodology set out within BRE 365.

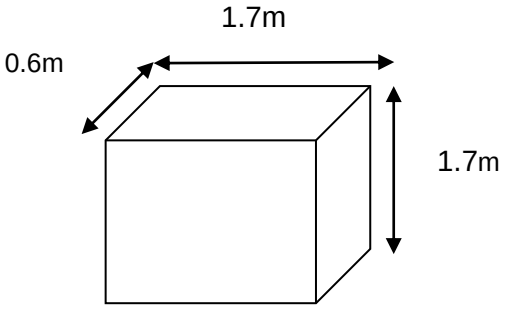
In-situ Soakaway Test Record – Test No: TP02

SITE	School Road, Elmswell	DATE	20/12/16
CLIENT	Christchurch Land & Estates Limited	JOB NO.	BM11245

Type of Test:	Pit
Width of pit:	0.6m
Length of pit:	1.7m
Depth of pit:	1.7m
Standing Water Level Prior to Test:	None
Depth of Water at T = 0 (below ground level):	1.2m
Infilled with gravel? (Y/N):	Y
Calculated Soil Infiltration Rate:	Insufficient Infiltration

NOTES:
Dry, mild weather conditions

Depth (mbgl)	Strata
0 – 0.45	Topsoil.
0.45 – 1.08	Clayey gravelly SAND.
1.08 – 1.40	Silty gravelly SAND.
1.40 – 1.7	Gravelly CLAY.



Water Level Records

Time (mins)	Depth to Water (mbgl)
0	1.20
0.5	1.20
1	1.20
1.5	1.20
2	1.20
2.5	1.20
3	1.20
3.5	1.20
4	1.20
4.5	1.20
5	1.20
6	1.20
7	1.20
8	1.20
9	1.21
10	1.21

Time (mins)	Depth to Water (mbgl)
12	1.21
14	1.21
16	1.21
18	1.21
20	1.21
25	1.21
30	1.21
40	1.22
50	1.24
60	1.25
90	1.27
120	1.28
150	1.29
180	1.30
235	1.31
End of Test	

Time (mins)	Depth to Water (mbgl)

Undertaken in general accordance with the methodology set out within BRE 365.

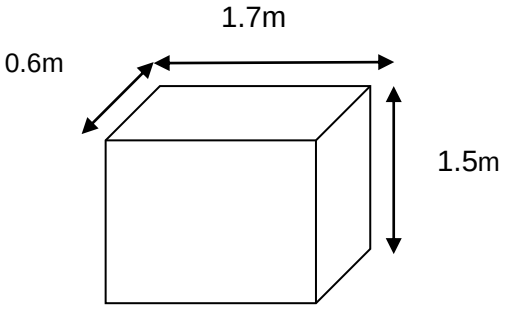
In-situ Soakaway Test Record – Test No: TP03

SITE	School Road, Elmswell	DATE	20/12/16
CLIENT	Christchurch Land & Estates Limited	JOB NO.	BM11245

Type of Test:	Pit
Width of pit:	0.6m
Length of pit:	1.7m
Depth of pit:	1.5m
Standing Water Level Prior to Test:	None
Depth of Water at T = 0 (below ground level):	0.85m
Infilled with gravel? (Y/N):	Y
Calculated Soil Infiltration Rate:	Insufficient Infiltration

NOTES:
Dry, mild weather conditions

Depth (mbgl)	Strata
0 – 0.4	Topsoil.
0.4 – 0.70	Sandy CLAY.
0.70 – 1.50	Gravelly CLAY.



Water Level Records

Time (mins)	Depth to Water (mbgl)
0	0.85
0.5	0.85
1	0.85
1.5	0.85
2	0.85
2.5	0.85
3	0.85
3.5	0.85
4	0.86
4.5	0.86
5	0.86
6	0.86
7	0.86
8	0.86
9	0.86
10	0.86

Time (mins)	Depth to Water (mbgl)
12	0.86
14	0.87
16	0.87
18	0.87
20	0.87
25	0.87
30	0.87
40	0.87
50	0.87
60	0.88
90	0.87
120	0.88
150	0.88
180	0.88
220	0.88
End of Test	

Time (mins)	Depth to Water (mbgl)

Undertaken in general accordance with the methodology set out within BRE 365.

Trial Pit Log

TrialPit No **TP08** Sheet 1 of 1

Project Name: School Road, Elmswell	Project No. BM11245	Co-ords: - Level:	Date 20/12/2016
Location: School Road, Elmswell		Dimensions (m): Depth 3.30	Scale 1:25
Client: Christchurch Land and Estates Limited			Logged

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Ploughed dark brown sandy clay TOPSOIL with gravel of flint and occasional brick.
				0.50			MADE GROUND: Dark brown silty clayey sand with gravel and cobbles of brick, concrete and some wood.
				1.40			MADE GROUND: Soft black brown silty sandy wet clay with wood, brick, tile, concrete, metal and sections of brick wall.
				2.60			Stiff dark grey silty sandy CLAY with gravel of chalk and chert.
				3.30			End of Pit at 3.30m

1 2 3 4 5

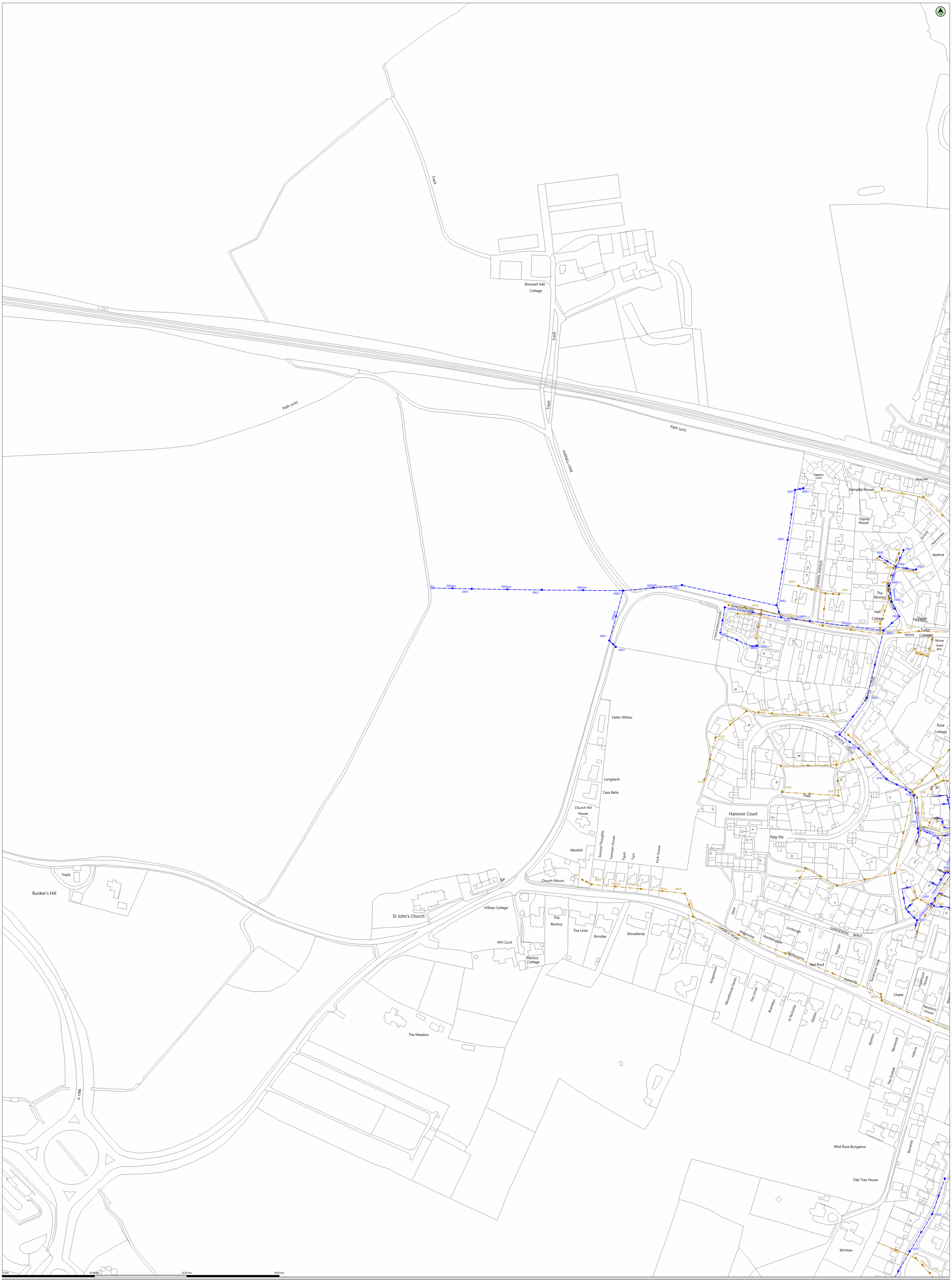
Remarks: Much collapse of wet soft made ground to 2.6m Natural clay noted as stable.

Stability:

AGS

APPENDIX B

Existing Sewers and Drains Drawings



Data updated: 31/10/22

Scale: 1:1250
Map Centre: 598253,263878
Date: 18/11/22
Our Ref: 1007442 - 2
Wastewater Plan A0
Powered by digdat

Foul Sewer
Surface Sewer
Combined Sewer
Final Effluent Sewer
Rising Main*
Private Sewer*
Decommissioned Sewer*

Outfall*
Inlet*
Manhole*

Sewage Treatment Works
Public Pumping Station
Decommissioned Pumping Station

*(Colour denotes effluent type)

utilitysearch@wardell-armstrong.com

Elmswell 1

love every drop
anglianwater

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
3601	598368	263619	F	-	-	-
3602	598378	263614	F	-	-	-
4501	598488	263579	F	72.06	70.51	1.55
4601	598431	263609	F	-	-	-
4602	598479	263604	F	-	-	-
4700	598500	263727	F	69.713	68.738	0.975
5501	598588	263539	F	70.27	68.71	1.56
5701	598512	263773	F	68.62	67.7	0.92
5703	598583	263742	F	68.31	67.38	0.93
5704	598584	263714	F	68.65	67.72	0.93
5801	598545	263801	F	68.19	67.56	0.63
5802	598573	263799	F	68.07	66.96	1.11
5803	598556	263881	F	-	-	-
5901	598526	263916	F	67.52	66.09	1.43
5902	598562	263911	F	67.75	65.87	1.88
5903	598561	263906	F	67.8	65.9	1.9
5904	598536	263907	F	67.9	66.11	1.79
6001	598692	264042	F	67.61	65.89	1.72
6401	598692	263488	F	68.67	67.01	1.66
6402	598691	263495	F	-	-	-
6601	598609	263632	F	69.1	68.18	0.92
6602	598643	263613	F	68.92	67.41	1.51
6701	598679	263755	F	67.43	66.11	1.32
6702	598643	263743	F	68.33	66.59	1.74
6703	598645	263710	F	-	-	-
6801	598628	263894	F	67	65.44	1.56
6803	598690	263896	F	67.1	65.09	2.01
6804	598690	263885	F	66.69	65.01	1.68
6805	598633	263796	F	67.4	66.48	0.92
6901	598646	263928	F	67.83	66.05	1.78
6902	598602	263937	F	67.89	66.14	1.75
6903	598631	263929	F	-	-	-
6904	598687	263967	F	67.3	65.97	1.33
6905	598705	263956	F	67.2	65.75	1.45
6906	598699	263940	F	67.4	65.65	1.75
6907	598700	263923	F	67.5	65.41	2.09
7001	598737	264033	F	67.53	65.56	1.97
7101	598744	263193	F	65.69	64.25	1.44
7201	598729	263209	F	65.62	64.41	1.21
7500	598746	263589	F	68.476	67.06	1.416
7601	598706	263626	F	68.34	66.56	1.78
7602	598733	263675	F	68.224	66.054	2.17
7603	598753	263667	F	67.919	66.202	1.717
7608	598730	263708	F	-	-	-
7702	598725	263715	F	67.73	65.67	2.06
7703	598747	263739	F	-	-	-
7801	598732	263888	F	66.88	64.74	2.14
7802	598746	263879	F	-	-	-
7803	598741	263861	F	-	-	-
7804	598738	263862	F	-	-	-
7805	598734	263863	F	-	-	-
7806	598730	263864	F	-	-	-
7902	598711	263972	F	67.1	65.96	1.14
7903	598726	263953	F	67.1	66.03	1.07
2951	598248	263934	S	52.92	50.39	2.53
3851	598397	263878	S	63.22	61.72	1.5
3951	598324	263933	S	55.7	54.41	1.29
4851	598404	263871	S	64.26	61.77	2.49
4951	598476	263938	S	66.6	63.5	3.1
4952	598412	263932	S	64.49	61.32	3.17
5051	598598	264041	S	67	66.09	0.91
5852	598517	263886	S	67.11	65.32	1.79
5853	598552	263871	S	67.11	65.64	1.47
5854	598557	263872	S	67.11	65.79	1.32
5951	598590	263987	S	67.33	65.13	2.2
5952	598578	263916	S	68	63.79	4.21
5953	598583	263903	S	67.39	63.52	3.87
5954	598522	263914	S	67.46	65.12	2.34
6051	598607	264043	S	68	66.19	1.81
6751	598697	263728	S	67.7	65.07	2.63
6752	598646	263776	S	67.7	64.8	2.9
6753	598667	263761	S	67.7	64.86	2.84
6851	598614	263899	S	-	64.17	-
6852	598676	263816	S	66.63	64.32	2.31
6853	598694	263889	S	-	63.91	-
6951	598700	263937	S	67.4	64.64	2.76
6952	598690	263969	S	67.3	65.39	1.91
7251	598722	263217	S	-	-	-
7252	598760	263295	S	-	-	-
7253	598747	263257	S	-	-	-
7550	598746	263593	S	68.484	65.531	2.953
7551	598730	263575	S	68.705	65.578	3.127
7650	598731	263674	S	68.214	65.28	2.934
7651	598749	263667	S	67.96	65.325	2.635
7751	598718	263717	S	67.8	65.17	2.63
7752	598726	263710	S	67.6	65.23	2.37
7951	598716	263976	S	67.1	65.06	2.04
7952	598707	263958	S	67.1	64.72	2.38
7953	598729	263955	S	67.1	65.59	1.51
7954	598703	263920	S	67.5	64.56	2.94
7955	598711	263904	S	67.7	64.49	3.21

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

APPENDIX C

Calculations

FEH Mean Annual Flood

Input

Site Location	GB 598000 263600 TL 98000 63600
Area (ha)	354.500
SAAR (mm)	582
URBEXT (2000)	0.0548
SPRHOST	42.090
BFIHOST	0.333
FARL	1.000

Results

QMED Rural (l/s) 917.3 QMED Urban (l/s) 980.3

1. INPUT DATA

Fill in yellow cells with MicroDrainage results

IH-124 Method

Catchment Area (from MicroDrainage) 50 ha

Input Greenfield Runoff Values for the relevant return Period from MicroDrainage Results

Table 1: IH-124 Greenfield Runoff Rates

Storm Event	Greenfield Runoff Rate (l/s/ha) per 50ha
QBAR	
Q1	
Q2	
Q5	
Q10	
Q30	
Q50	
Q100	

FEH Method

QMED (from MicroDrainage)	917.3	l/s per Catchment Area
Catchment Area (from MicroDrainage - FEH Catchment Descriptors)	354.50	ha
Hydrometric Area (Choose from Dropdown List)	5	
QMED to QBAR factor (Choose from Dropdown List)	Suggested	

2. RESULTS

IH-124 Method

QBAR 0.00 l/s/ha

Table 2: IH-124 Greenfield Runoff Rates

Storm Event	Greenfield Runoff Rate (l/s/ha) per 50ha	Greenfield Runoff Rate (l/s/ha)
QBAR	0.0	**0.00**
Q1	0.0	0.00
Q2	0.0	0.00
Q5	0.0	0.00
Q10	0.0	0.00
Q30	0.0	0.00
Q50	0.0	0.00
Q100	0.0	0.00

FEH Method

QMED 2.59 l/s/ha

QBAR 2.88 l/s/ha

Table 3: Greenfield Runoff Rates FEH Method

Storm Event	Growth Curve Factors (CIRIA Table 24.2)	Greenfield Runoff Rate (l/s/ha)
QMED	-	2.59
QBAR	1.11	**2.88**
Q1	0.87	2.50
Q2	0.89	2.56
Q5	1.29	3.71
Q10	1.65	4.74
Q30	2.55	7.33
Q50	2.83	8.14
Q100	3.56	10.24

3. CHOSSING A MAXIMUM DISCHARGE RATE FOR YOUR SITE

Planning Policy states that rates of discharge for the developed site will need to be restricted to those of the predeveloped state (Greenfield). In some instances local policy will required the use of a certain methodology.

Confirm Chosen Method Based on Policy FEH

Reason for choosing the above Method: More accurate

Usually Attenuation storage is designed based on QBAR Greenfield Runoff. However, sometimes different maximum rates are set by the Local Authority or IDB (Internal Drainage Board).

Select Max Design Rate According to Policy Requirements QBAR

Max Discharge Rate 2.88 l/s/ha

When QBAR is lower than 2l/s/ha, 2l/s/ha is used as the maximum discharge rate unless long term storage is used.

If the site is too small, flow rates will fall below minimum. Guidance from uksuds-Wallingford Procedure in this regard is included below:

The general position taken on minimum flow rate in the past has been to use 5l/s to avoid throttle sizes from being too small and thus create a risk of blockage. However as most development sites are small, this flow rate often does not really provide the degree of throttling of flow that is needed. The DCG (Design and Construction Guidance) allows adoption down to a 50mm orifice, it is now generally felt that 2 l/s (which can be achieved with a vortex control regulator), is now an appropriate target for the minimum flow rate. This does not mean that lower flow rates might be reasonably asked for in special circumstances.

Aditional Notes:

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	30	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
POND 1	2.000	5.00	100.000	2100	1.000
POND 2	0.150		100.000	1500	1.300

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
S1.000	POND 1	POND 2	50.000	0.600	99.000	98.700	0.300	166.7	525	5.48	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
S1.000	1.732	374.9	361.4	0.475	0.775	2.000	0.0

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
S1.000	50.000	166.7	525	Circular	100.000	99.000	0.475	100.000	98.700	0.775

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
S1.000	POND 1	2100	Manhole	Adoptable	POND 2	1500	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
POND 1	100.000	1.000	2100	0	S1.000	99.000	525
POND 2	100.000	1.300	1500	1	S1.000	98.700	525

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	40	0	0
100	40	0	0

Node POND 2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	98.700	Product Number	CTL-SHE-0118-6300-1000-6300
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.3	Min Node Diameter (mm)	1200

Node POND 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	99.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	1282.0	0.0	1.000	1840.0	0.0

Node POND 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	98.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	879.0	0.0	1.300	1510.5	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.93%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	POND 1	112	99.154	0.154	131.0	211.1898	0.0000	OK
480 minute winter	POND 2	472	99.065	0.365	41.7	354.3269	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute summer	POND 1	S1.000	POND 2	65.5	1.697	0.175	3.5724	
480 minute winter	POND 2	Hydro-Brake®		6.3				188.8

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.93%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	POND 1	945	99.477	0.477	72.7	695.6174	0.0000	OK
960 minute winter	POND 2	945	99.477	0.777	61.3	832.6426	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	POND 1	S1.000	POND 2	56.4	0.932	0.150	10.5539	
960 minute winter	POND 2	Hydro-Brake®		6.3				328.8

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.93%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	POND 1	945	99.696	0.696	100.3	1058.3910	0.0000	SURCHARGED
960 minute winter	POND 2	945	99.696	0.996	65.9	1120.9450	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	POND 1	S1.000	POND 2	60.5	1.023	0.161	10.8016	
960 minute winter	POND 2	Hydro-Brake®		6.3				365.7

APPENDIX D

Developer Enquiry Response

Pre-Planning Assessment Report

Land off School Road, Elmswell

InFlow Reference: PPE-0160329

Assessment Type: Used Water

Report published: 13/01/2023

Thank you for submitting a pre-planning enquiry.

This has been produced for Wardell Armstrong LLP.

Your reference number is **PPE-0160329**.

This report can be submitted as a drainage strategy for the development should it seek planning permission.

If you have any questions upon receipt of this report, you can submit a further question via InFlow. Alternatively, please contact the Planning & Capacity team on **07929 786 955** or email planningliaison@anglianwater.co.uk

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Section 1 - Proposed development

The response within this report has been based on the following information which was submitted as part of your application:

List of planned developments	
Type of development	**No. Of units**
Residential institution	1
Dwellings	39

The anticipated residential build rate is:

Year	Y1
Build rate	40

Development type: Greenfield

Planning application status: Unknown

Site grid reference number: TL9829063981

The comments contained within this report relate to the public water mains and sewers indicated on our records.

Your attention is drawn to the disclaimer in the useful information section of this report.

Section 2 - Assets affected

Our records indicate that we have the following types of assets within or overlapping the boundary of your development site as listed in the table below.

Additionally, it is highly recommended that you carry out a thorough investigation of your proposed working area to establish whether any unmapped public or private sewers and lateral drains are in existence. We are unable to permit development either over or within the easement strip without our prior consent. The extent of the easement is provided in the table below.

Please be aware that the existing water mains/public sewers should be located in highway or open space and not in private gardens. This is to ensure available access for any future maintenance and repair, and this should be taken into consideration when planning your site layout.

Water and Used water easement information		
Asset type	Pipe size (mm)	Total easement required (m)
Sewer mains	300	3.00 m either side of the centre line

If it is not possible to avoid our assets then these may need to be diverted in accordance with Section 185 of the Water Industry Act (1991). You will need to make a formal application if you would like a diversion to be considered.

Due to the private sewer transfer in October 2011 many newly adopted public used water assets and their history are not indicated on our records. You also need to be aware that your development site may contain private water mains, drains or other assets not shown on our records. These are private assets and not the responsibility of Anglian Water but that of the landowner.

Section 3 - Water recycling services

In examining the used water system we assess the ability for your site to connect to the public sewerage network without causing a detriment to the operation of the system. We also assess the receiving water recycling centre and determine whether the water recycling centre can cope with the increased flow and effluent quality arising from your development.

Water recycling centre

The foul drainage from the proposed development is in the catchment of Elmswell Water Recycling Centre, which currently does not have capacity to treat the flows from your development site.

Anglian Water are obligated to accept the foul flows from your development with the benefit of planning consent and would therefore take the necessary steps to ensure that there is sufficient treatment capacity should the planning authority grant planning permission.

Used water network

Our assessment has been based on development flows connecting to the nearest foul water sewer of the same size or greater pipe diameter to that required to drain the site. The infrastructure to convey foul water flows to the receiving sewerage network is assumed to be the responsibility of the developer. Conveyance to the connection point is considered as Onsite Work and includes all work carried out upstream from of the point of connection, including making the connection to our existing network. This connection point has been determined in reference to the calculated discharge flow and on this basis, a 150mm internal diameter pipe is required to drain the development site. The nearest practicable connection is to the 150mm diameter sewer at downstream of manhole 5901 in School Road at National Grid Reference NGR TL 98538 63914. Anglian Water has assessed the impact of a pumped conveyance from the planned development to the public foul sewerage network and we can confirm that this connection is acceptable as the foul sewerage system, at present, has available capacity for your site. In line with Sewers for Adoption, the pumped discharge will need to connect via an intermediate manhole and at least 5 metres of an appropriately sized gravity sewer. The pump rate and configuration of the connection will be determined with your detailed design. You should submit this detail with your Section 106 new connection application. Please note that Anglian Water will request a suitably worded condition at planning application stage to ensure this strategy is implemented to mitigate the risk of flooding.

It is assumed that the developer will provide the necessary infrastructure to convey flows from the site to the network. Consequently, this report does not include any costs for the conveyance of flows.

Surface water disposal

You have indicated on your application form that your method of surface water drainage is via SuDS. If the developer wishes Anglian Water to be the adopting body for all or part of the proposed SuDS scheme the Design and Construction Guidance must be followed. We would recommend the applicant contact us at the earliest opportunity to discuss your SuDS design via a Pre-Design Strategic Assessment (PDSA). The Lead Local Flood Authority (LLFA) are a statutory consultee for all major development and should be consulted as early as possible to ensure the proposed drainage system meets with minimum operational standards and is beneficial for all concerned organisations and individuals. We promote the use of SuDS as a sustainable and natural way of controlling surface water run-off. We please find below our SuDS website link for further information. https://www.anglianwater.co.uk/developers/drainage-services/sustainable-drainage-systems/

As you may be aware, Anglian Water will consider the adoption of SuDs provided that they meet the criteria outline in our SuDs adoption manual. This can be found on our website. We will adopt features located in public open space that are designed and constructed, in conjunction with the Local Authority and Lead Local Flood Authority (LLFA), to the criteria within our SuDs adoption manual. Specifically, developers must be able to demonstrate:

1. Effective upstream source control,
2. Effective exceedance design, and
3. Effective maintenance schedule demonstrating than the assets can be maintained both now and in the future with adequate access.

If you wish to look at the adoption of any SuDs then an expression of interest form can be found on our website

As the proposed method of surface water disposal is not relevant to Anglian Water; we suggest that you contact the relevant Local Authority, Lead Local Flood Authority, the Environment Agency or the Internal Drainage Board, as appropriate.

Trade Effluent

We note that you do not have any trade effluent requirements. Should this be required in the future you will need our written formal consent. This is in accordance with Section 118 of the Water Industry Act (1991).

Used Water Budget Costs

Your development site will be required to pay an Infrastructure charge for each new property connecting to the public water and sewerage network that benefits from Full planning permission. The infrastructure charge replaces the zonal charge as previously identified.

You will be required to pay an infrastructure charge upon connection for each new plot on your development site. The infrastructure charge are types of charges set out in Section 146(2) of the Water Industry Act 1991.

The charge should be paid by anyone who wishes to build or develop a property and is payable upon request of connection.

• The Infrastructure Charge is based on the cost of any reinforcement and upgrades to our existing network ("Network Reinforcements"), whether designed to address strategic or local capacity issues. For more information on our Infrastructure Charge, please see the 'Useful Information' section of this report.

Infrastructure charges are raised on a standard basis of one charge per new connection (one for water and one for sewerage).

The Water Recycling Infrastructure charge for your dwellings is:

Infrastructure charge	Number of units	Total
£ 490	39	£19,110.00

Please note that you should also budget for infrastructure charges on non-household premises where applicable and these will be calculated according to the number and type of water fittings in the premises. This is called the "relevant multiplier" method of calculating the charge and the relevant multiplier will be applied to the figures set out in our 2022-23 Developer Charging Arrangements to arrive at the amount payable. Details of the relevant multiplier for each fitting can be found on our website.

Section 4 - Map of Proposed Point of Connection(s)

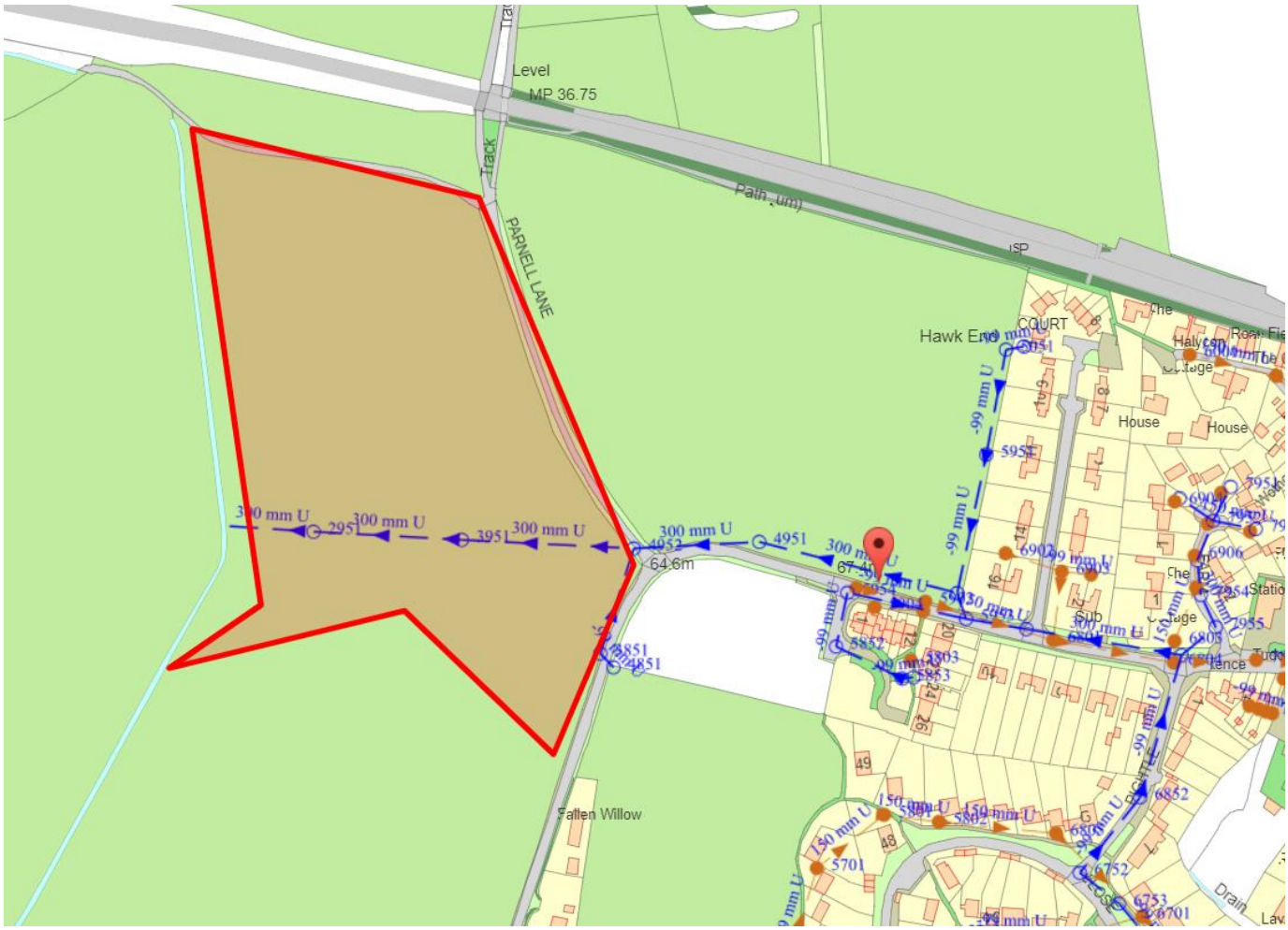


Figure 1: Showing your water recycling foul point of connection

Section 5 - Useful information

Water Industry Act – Key used water sections

Section 98:

This provides you with the right to requisition a new public sewer. The new public sewer can be constructed by Anglian Water on your behalf. Alternatively, you can construct the sewer yourself under section 30 of the Anglian Water Authority Act 1977.

Section 102:

This provides you with the right to have an existing sewerage asset vested by us. It is your responsibility to bring the infrastructure to an adoptable condition ahead of the asset being vested.

Section 104:

This provides you with the right to have a design technically vetted and an agreement reached that will see us adopt your assets following their satisfactory construction and connection to the public sewer.

Section 106:

This provides you with the right to have your constructed sewer connected to the public sewer.

Section 185

This provides you with the right to have a public sewerage asset diverted.

Details on how to make a formal application for a new sewer, new connection or diversion are available on our website or via our Development Services team on **0345 60 66 087**.

Sustainable drainage systems

Many existing urban drainage systems can cause problems of flooding, pollution or damage to the environment and are not resilient to climate change in the long term. .

Our preferred method of surface water disposal is through the use of Sustainable Drainage Systems or SuDS.

SuDS are a range of techniques that aim to mimic the way surface water drains in natural systems within urban areas. For more information on SuDS, please visit our website

We recommend that you contact the Local Authority and Lead Local Flood Authority (LLFA) for your site to discuss your application.

Private sewer transfers

Sewers and lateral drains connected to the public sewer on the 1 July 2011 transferred into Water Company ownership on the 1 October 2011. This follows the implementation of the Floods and Water Management Act (FWMA). This included sewers and lateral drains that were subject to an existing Section 104 Adoption Agreement and those that were not. There were exemptions and the main non-transferable assets were as follows:

Surface water sewers and lateral drains that do not discharge to the public sewer, e.g. those that discharged to a watercourse.

Foul sewers and lateral drains that discharged to a privately owned sewage treatment/collection facility.

Pumping stations and rising mains will transfer between 1 October 2011 and 1 October 2016.

The implementation of Section 42 of the FWMA will ensure that future private sewers will not be created. It is anticipated that all new sewer applications will need to have an approved section 104 application ahead of a section 106 connection.

It is anticipated that all new sewer applications will need to have an approved Section104 application ahead of a Section 106 connection

Encroachment

Anglian Water operates a risk based approach to development encroaching close to our used water infrastructure. We assess the issue of encroachment if you are planning to build within 400 metres of a water recycling centre or, within 15 metres to 100 metres of a pumping station. We have more information available on our website

Locating our assets

Maps detailing the location of our water and used water infrastructure including both underground assets and above ground assets such as pumping stations and recycling centres are available from digdat

All requests from members of the public or non-statutory bodies for maps showing the location of our assets will be subject to an appropriate administrative charge.

We have more information on our website

Charging arrangements

Our charging arrangements and summary for this year's water and used water connection and infrastructure charges can be found on our website

Section 6 - Disclaimer

The information provided in this report is based on data currently held by Anglian Water Services Limited ('Anglian Water') or provided by a third party. Accordingly, the information in this report is provided with no guarantee of accuracy, timeliness, completeness and is without indemnity or warranty of any kind (express or implied).

This report should not be considered in isolation and does not nullify the need for the enquirer to make additional appropriate searches, inspections and enquiries. Anglian Water supports the plan led approach to sustainable development that is set out in the National Planning Policy Framework ('NPPF') and any infrastructure needs identified in this report must be considered in the context of current, adopted and/or emerging local plans. Where local plans are absent, silent or have expired these needs should be considered against the definition of sustainability holistically as set out in the NPPF.

Whilst the information in this report is based on the presumption that proposed development obtains planning permission, nothing in this report confirms that planning permission will be granted or that Anglian Water will be bound to carry out the works/proposals contained within this report.

No liability whatsoever, including liability for negligence is accepted by Anglian Water or its partners, employees or agents, for any error or omission, or for the results obtained from the use of this report and/or its content.

Furthermore, in no event will any of those parties be liable to the applicant or any third party for any decision made or action taken as a result of reliance on this report.

This report is valid from the date issued and the enquirer is advised to resubmit their request for an up to date report should there be a delay in submitting any subsequent application for water supply/sewer connection(s). Our pre-planning reports are valid for 12 months, however please note Anglian Water cannot reserve capacity and available capacity in our network can be reduced at any time due to increased requirements from existing businesses and houses as well as from new housing and new commercial developments.

APPENDIX E

Typical Maintenance Schedules

Sustainable Drainage Systems (SuDS): Maintenance Schedule

Gullies, Catchpits, Manholes, Pipes and Drainage Channels

Regular Maintenance	
Monthly	• Inspect all inlets, outlet and chambers to ensure they are in good condition, free from blockage and operating as designed. If required, take remedial action (for 3 months following installation)
Six Monthly	• Inspect all inlets, outlet, and chambers to ensure they are in good condition, free from blockage and operating as designed. If required, take remedial action
Annually	• Not applicable
As Required	• Remove sediment from catchpit manholes • Where sediment has accumulated into manholes and pipes jet the associated pipes. • Where significant accumulation of silt or evidence of defects are present undertake CCTV survey of pipe and carry out remedial repairs as 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 the feature to full working order

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

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

Elmswell Hall
Moat
Track
Level Crossing
MP 36.75
RAILWAY LEVEL 63.61
Path (um)
Attenuation Basin
Pump Station
PARNELL LANE
SWALE
APPROVED PLANNING REF: DC/22/01615
UNDER CONSTRUCTION
SCHOOL ROAD
OLD SCHOOLS COURT
67.4m
64.6m
EXISTING OAK TREE TO BE RETAINED
GROUND LEVEL ≈ 64.00
Fallen Willow
Longbank
Casa Bella
Church Hill House
68.8m
Second Thoughts
Fernain House
Figuli
Tarn
Westhill
St Lucy
Church Mount
Almshouses
70.0m
GROUND LEVEL ≈ 68.00
St John's Church
Hillton Cottage
GP
Low Tops
The Rectory
The Links
Brindles
Woodlands
Highb
Hill Court
A
B
C
D
50.00
52.00
54.00
56.00
58.00
60.00
62.00
63.00
64.00
66.00
68.00
70.00
48.00

KEY

- Site Boundary. **11.6Ha**
- Site Contours at 2.0m Intervals
- Existing Oak Tree on Feature Road to be Retained
- Existing Trees
- Railway Line and height of embankment (63.61m)
- Neighboring Scheme Under Construction
- Existing Footpaths
- Potential new Footpaths and Connections
- Existing Cycle and Footpaths Under Construction as part of Neighboring Bloor Scheme
- **NEW** Community Growing Area
- **NEW** Planting
- **NEW** Field border/ meadow
- **NEW** Sustainable Drainage System
- **NEW** Buildings
- **NEW** Access
- **NEW** Pumping Station
- **NEW** Viewpoint Seating

ACCOMMODATION

A **66no. Beds Carehome**
25 Staff Parking and 22 Visitor Parking

B **Admin/Management Building**
3 Parking Spaces

C **Club House / Communal Area**
10 Parking Spaces

D **40no. Assisted Dwellings**
40 Dwellings and 10 Visitor Parking

0 10 20 30 40 50M

Rev.	Date	Comments	By	Chkd.
D	05/10/2023	Viewpoint Updated	TN	EA
C	02/10/2023	School Road Cluster Updated	TN	EA
B	18/09/2023	Proposed Dwellings Moved Away from School Road Corner	TN	EA
A	08/09/2023	Key Updated	TN	EA
-	20/07/2023		TN	EA

Client:
Christchurch Land & Estates (Elmswell South) Limited

Address:
Land to The North and West of School Rd, Elmswell, Bury St. Edmunds, Suffolk

Scale: 1:1000 @ A1

N

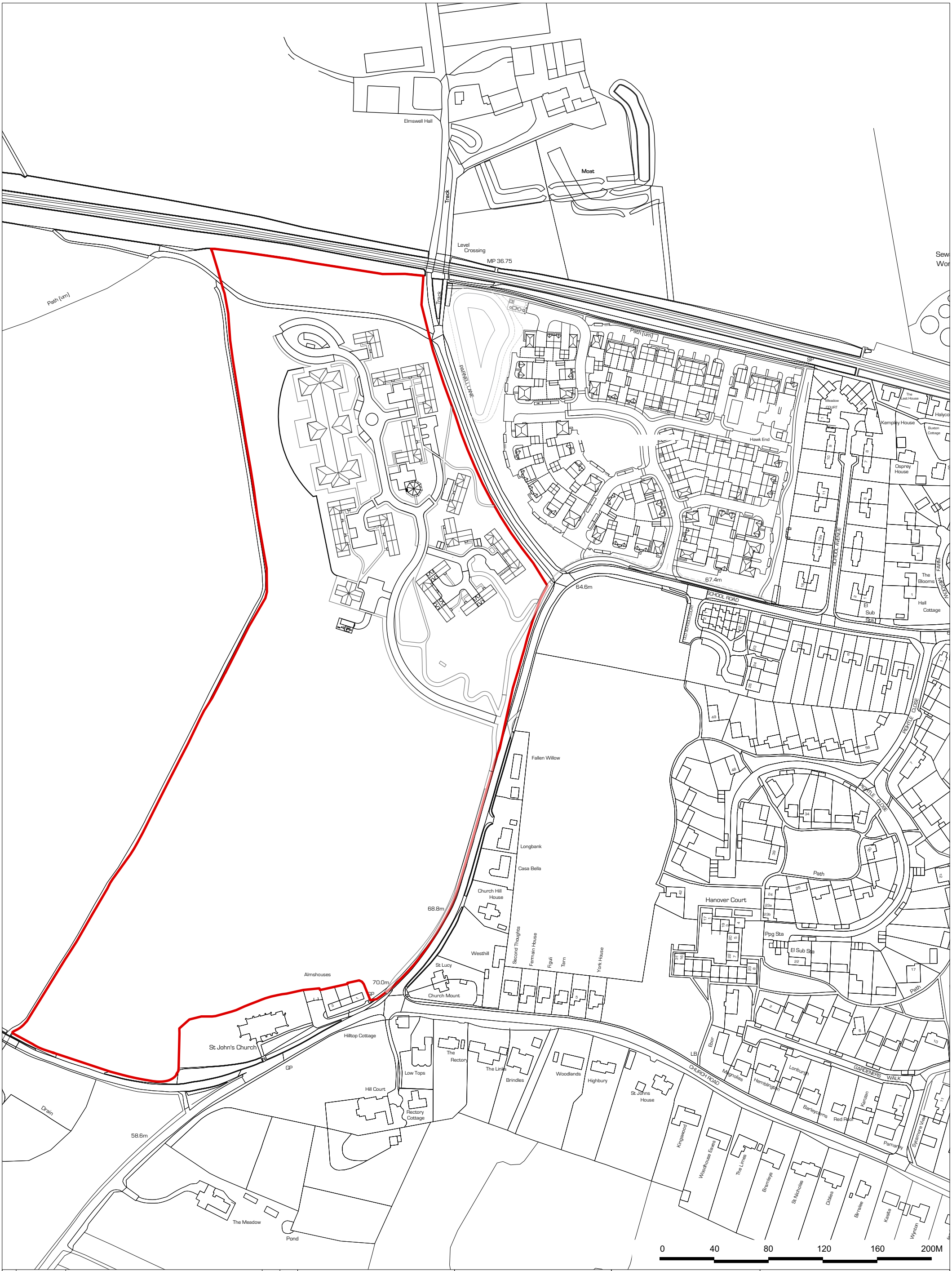
CAM ARCHITECTS
Suite 3, The Old Church, St Matthews Road, Norwich, NR1 1SP
www.camarchitects.co.uk info@camarchitects.co.uk
01603 666151

Project Details:
66 Bed Care Home(C2 Use) and Assisted Housing (C2 Use) and Associated works

Drawing Title
Site Plan As Proposed

Drawing Number: 1661-CAM-XX-XX-DR-A-PL07

Revision: D



Rev.	Date	Comments	By	Chkd.
C	05/10/2023	Viewpoint Updated	TN	EA
B	02/10/2023	Proposed Dwellings Moved Away from School Road Corner	TN	EA
A	08/09/2023	Graphics Updated	TN	EA
-	20/07/2023		TN	EA

This drawing has been prepared for the following purposes and does not constitute use for any other purpose:
For Information Only

Client:
Christchurch Land & Estates (Elmswell South) Limited

Address:
Land to The North and West of School Rd, Elmswell, Bury St. Edmunds, Suffolk

Scale:
1:2500 @ A3

CAM ARCHITECTS
Suite 3, The Old Church, St Matthews Road, Norwich, NR1 1SP
www.camarchitects.co.uk info@camarchitects.co.uk
01603 666151

Project Details:
66 Bed Care Home(C2 Use) and Assisted Housing (C2 Use) and Associated works

Drawing Title
Block Plan As Proposed

Drawing Number:
1661-CAM-XX-XX-DR-A-PL05

Revision:
C

Issue:

Site Boundary

Existing vegetation

Existing public right of way

Proposed connection

Proposed native woodland with native shrub understory

Proposed community orchard and growing area

Proposed native shrubs

Proposed native hedgerow

Proposed native trees

Proposed feature trees

Proposed trees tolerant to seasonably wet conditions

B Proposed community beehive (locations indicative only)

Proposed seasonally wet shrubs

Proposed meadow

Proposed mown paths through wildflower meadow

Proposed amenity grassland

Proposed ornamental shrubs

Proposed bulb planting

Proposed footpaths

Proposed road network

Proposed built form

Maintained Viewpoint Location

– Figure 8: Illustrative Landscape Masteplan

PEGASUS GROUP

NOTES

GENERAL NOTES :–

ALL LEVELS ARE IN METRES DERIVED FROM GPS TRANSFORMATION.

GRID COORDINATES ARE ORDNANCE SURVEY NATIONAL GRID DERIVED FROM GPS TRANSFORMATION. GPS COORDINATES AND LEVELS SET AT VM01 & VM06 (NO SCALE FACTOR APPLIED)

THIS DRAWING HAS BEEN PRODUCED WITH A PLOT SCALE ACCURACY OF 1:500

SERVICE COVERS INDICATED WHERE VISIBLE. PIPE INVERTS / DETAILS SURVEYED FROM SURFACE INSPECTION ONLY. GENERALLY DAMAGED COVERS AND COVERS WITHIN HIGHWAYS WILL NOT BE LIFTED

TREE SPECIES SHOULD BE CONFIRMED BY TREE SPECIALIST IF CRITICAL.

OVERHEAD CABLES ARE INDICATED USING REMOTE SURVEY METHODS AND ARE SUBJECT TO SEASONAL VARIATION, AND SHOULD BE TREATED AS APPROXIMATE.

SERVICE COVERS LOCATED UNDER PARKED VEHICLES/MOBILE STRUCTURES MAYBE OMITTED.

BURIED SERVICE COVERS WILL NOT BE INDICATED.

TOPOGRAPHICAL SURVEY/UTILITY KEY :–

(ht) – height
ø – diameter
● – pea trap
a/g – above ground
a/r – assumed route
av – air valve
bb – belisha beacon
bd – back drop
bl – bed level
boll – bollard
bos – bottom of shaft
bt – telecom
c/b fence – closeboard fence
c/box – control box
catv – cable television
cl – cover level
con – conifer
cr – cable riser
cws – combined water sewer
d/chan – drainage channel
ejb – electric junction box
elec – electric
eot – end of trace
ep – electric pole
er – earth rod
f/bed – flower bed
fh – fire hydrant
fl – floor level
fs – fire switch
fws – foul water sewer
g – gully
g/run – gully run
gr – gas riser
h/chestnut – horse chestnut
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ic – inspection cover
il – invert level
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int – interceptor
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mh – manhole cover
mkr – marker
o/h – over head
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osa – off survey area
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p & r fence – post & rail fence
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pr – pipe riser
ptg – pipe to ground
pts – pipe to surface
re – rodding eye
ret wall – retaining wall
rs – road sign
rwp – rain water pipe
s/birch – silver birch
s/p – safety paving
sap – sapling
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sfc – soil filled chamber
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wfc – water filled chamber
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wp – waste pipe
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SURVEY CONTROL :–

STATION	EASTINGS	NORTHINGS	LEVEL
ST01	598528.922	263919.828	67.698
ST02	598409.708	263936.366	64.191
ST03	598329.746	264101.004	60.608
ST04	598393.816	263865.398	63.666
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ST12	598188.265	263844.511	51.229

SHEET LAYOUT :–

A0–SHEET 38441/1
A0–SHEET 38441/2

NORTH POINT :–

NORTH

UTILITY SURVEY KEY :–

HATCHED AREA
BOREHOLE
CPT
TRIAL PIT
HAND PIT
WINDOW SAMPLE

— N — ELECTRIC CABLE
— W — WATER PIPE
FOUL SEWER
STORM SEWER
COMBINED SEWER
— D — DUCTS
— TV — CABLE TELEVISION
— COM — DATA CABLE
— : — TELECOM CABLE
— G — GAS PIPE
— U — UNIDENTIFIED SERVICE
— – – OTHER
— CCTV — CCTV
— TL — TRAFFIC LIGHT
— O — OFFSET FILL
— V — VENT
— F — FUEL PIPE
— GL — GAUGE LINES
— P — PIPE
— AR — ASSUMED ROUTE
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TSA Standards – "Even an appropriate and professionally executed survey may not be able to achieve a 100% detection rate."

UTILITY NOTES

0 5 10 20 30 40 50

MIDLAND SURVEY LTD

HEAD OFFICE
Cromwell House, Westfield Road, Southam, Warwickshire, CV47 0JH.
Tel: 01926 810811 Fax 01926 810812
E–Mail: mail@midlandsurvey.co.uk
www.midlandsurvey.co.uk

Client RICHARD BROWN PLANNING LIMITED

Project ELMSWELL

Title TOPOGRAPHICAL SURVEY

Date MARCH 2021

Scale 1:500@A0

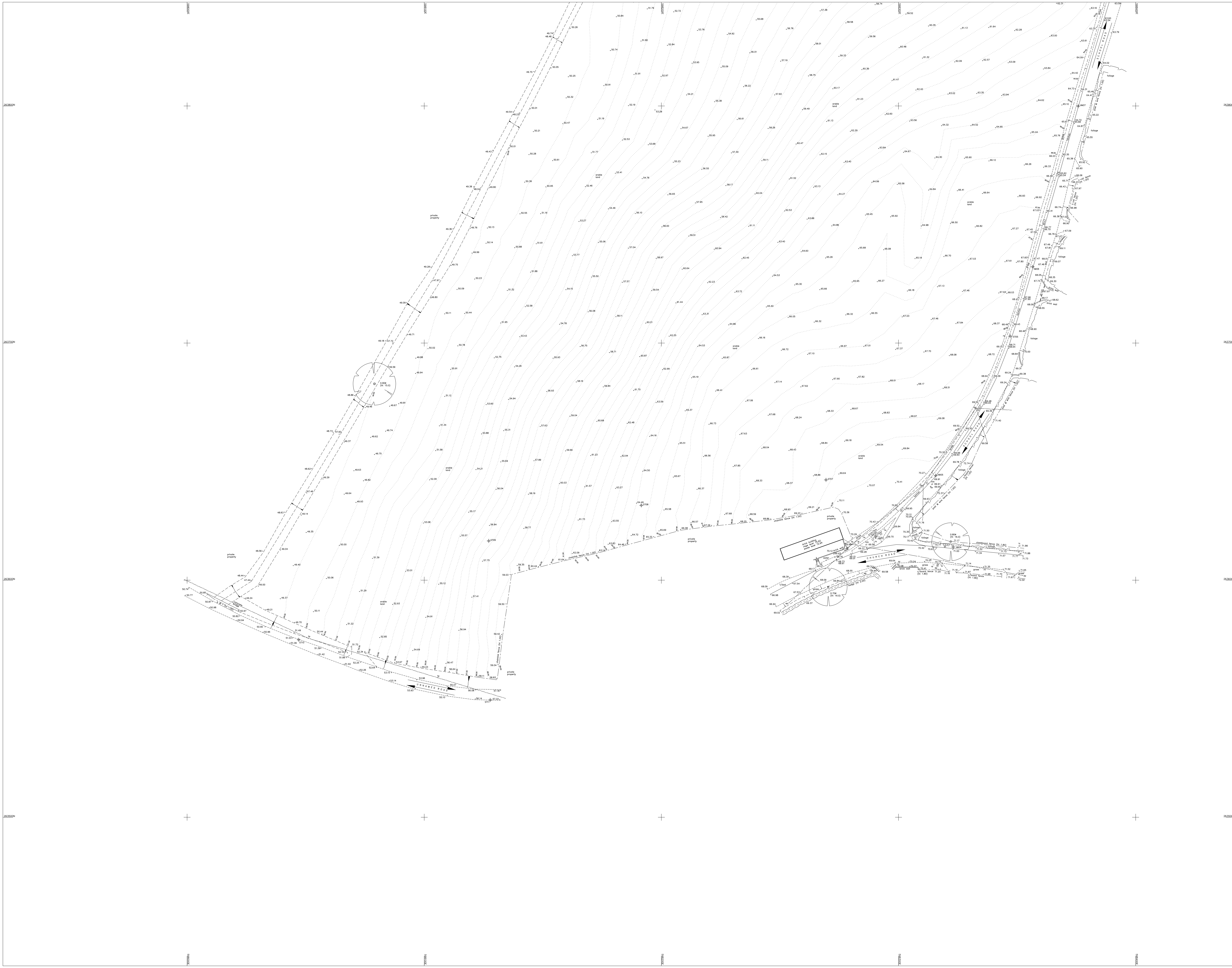
Dwg No 38441 / 1

Surveyor T.S.R / V.M.

Checked J.Y

Revisions
R1 – EXTRA DETAIL ADDED

TOPOGRAPHICAL (LAND) SURVEYORS / UTILITY SURVEYORS
BUILDING MEASUREMENT SURVEYORS / 3D LASER SCANNING



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A0–SHEET 38441/2

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NORTH

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CPT
TRIAL PIT
HAND PIT
WINDOW SAMPLE

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FOUL SEWER
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COMBINED SEWER
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UTILITY NOTES

0 5 10 20 30 40 50

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Client RICHARD BROWN PLANNING LIMITED

Project ELMSWELL

Title TOPOGRAPHICAL SURVEY

Date	MARCH 2021	Revisions
Scale	1:500@A0	R1 – EXTRA DETAIL ADDED
Dwg No	38441 / 2	
Surveyor	T.S.R / V.M.	
Checked	J.Y	

TOPOGRAPHICAL (LAND) SURVEYORS / UTILITY SURVEYORS
BUILDING MEASUREMENT SURVEYORS / 3D LASER SCANNING

PROPOSED PRIVATE SWS DIVERSION

SWALE TO CONVEY EXCEEDANCE FLOW TO ATTENUATION POND

BASIN TIE-INS

3.5m MAINTENANCE STRIP

ATTENUATION BASIN 1
REQUIRED ATTENUATION VOLUME: 1058m³
REQUIRED SURFACE AREA (INCLUDING 300mm FREEBOARD): 1840m²
BASIN DEPTH:0.7m+0.3m FREEBOARD

REPROFILED AREA TO DIVERT SURFACE WATER PATH AROUND BASIN

SWS DIVERSION MUST HAVE MANHOLE AT EITHER SIDE OF THE PIPE CONNECTING THE PONDS. THIS IS SO ANY CLASH BETWEEN THE PIPES CAN BE AVOIDED.

3.5m MAINTENANCE STRIP

ATTENUATION BASIN 2
REQUIRED ATTENUATION VOLUME: 1120m³
REQUIRED SURFACE AREA(INCLUDING 300mm FREEBOARD): 1510m²
BASIN DEPTH:1m+0.3m FREEBOARD

PROPOSED HYDROBRAKE CONTROL
MAXIMUM DISCHARGE RATE 6.3l/s
(BASED ON 2.88l/s/ha)

APPROXIMATE DISCHARGE INVERT LEVEL: 48.1m

POND TIE-INS

PUBLIC SWS TO BE DIVERTED SOUTH

POTENTIAL POINT OF CONNECTION FOR FOUL FLOWS

PUBLIC SWS PROPOSED DIVERSION

DO NOT SCALE FROM THIS DRAWING

REFERENCE

- INDICATIVE SITE BOUNDARY
- EXISTING ANGLIAN WATER FOUL SEWER
- EXISTING ANGLIAN WATER FOUL SEWER MANHOLE
- EXISTING ANGLIAN WATER SURFACE SEWER
- EXISTING ANGLIAN WATER SURFACE SEWER MANHOLE
- PROPOSED PRIVATE SURFACE WATER SEWER APPLICATION DC/18/02146
- PROPOSED PRIVATE SURFACE WATER MANHOLE APPLICATION DC/18/02146
- SURFACE WATER SEWER EASEMENT
- PUBLIC SWS PROPOSED DIVERSION
- PUBLIC SURFACE WATER MANHOLE PROPOSED DIVERSION
- PROPOSED SECTION OF SEWER TO BE ABANDONED
- PROPOSED PUMPING STATION LOCATION
- INDICATIVE FOUL RISING MAIN ROUTE
- WATERCOURSE EASEMENT
- ATTENUATION BASIN TIE-INS
- ATTENUATION BASIN 3.5m MAINTENANCE STRIP
- ATTENUATION BASIN
- FLOOD ZONE 2
- FLOOD ZONE 3
- SURFACE WATER FLOOD EXTENTS 30YR
- SURFACE WATER FLOOD EXTENTS 100YR
- SURFACE WATER FLOOD EXTENTS 1000YR
- SURVEY CONTOURS (mAOD)
- EXCEEDANCE FLOOD ROUTES
- PROPOSED SURFACE WATER PLUVIAL FLOOD ROUTE
- REPROFILED GROUND

NOTES

1. DO NOT SCALE FROM THIS DRAWING, ALL DIMENSIONS MUST BE CHECKED/VERIFIED ON SITE.
2. ALL DIMENSION ARE IN METERS UNLESS STATED OTHERWISE.
3. ALL LEVELS ARE IN METERS ABOVE ORDNANCE DATUM.
4. TOPOGRAPHICAL SURVEY BY MIDLAND SURVEY LTD, DWG NO 38441, DATED MARCH 2021.
5. BASED ON FIGURE 8 BY PEGASUS GROUP DRG NO. P22-1167_EN_0009_D
6. SURFACE WATER FLOOD RISK AND FLOOD ZONES FROM EA DATA.-
7. ATTENUATION DESIGNED FOR ALL EVENTS UP TO AND INCLUDING THE 100yr + 40% CLIMATE CHANGE STORM.
8. FEH13 RAINFALL STATISTICS USED IN ATTENUATION CALCULATIONS.
9. ATTENUATION BASINS ARE INDICATIVE AND SUBJECT TO DETAILED DESIGN.

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
E	Ponds, layout and flood routes updated	08/04/24	HRK	JB	JB
D	Second Pond Added and Pond 1 Updated	21/02/24	KN	CD	EK
C	Maintenance Strip Added and Pond Update	31/01/24	KN	CD	EK
B	Client Name Updated	13/11/23	HG	AG	KW
A	First Issue	16/10/23	HG	AG	KW

CLIENT

CHRISTCHURCH LAND AND ESTATES (ELMSWELL SOUTH) LIMITED

PROJECT

LAND OFF SCHOOL ROAD, ELMSWELL (PHASE 2)

DRAWING TITLE

INDICATIVE DRAINAGE STRATEGY

DRG No.	REV	SUIT. CODE
BM12457-001	E	

DRG SIZE	SCALE	DATE
A1	1:1250	16/10/23

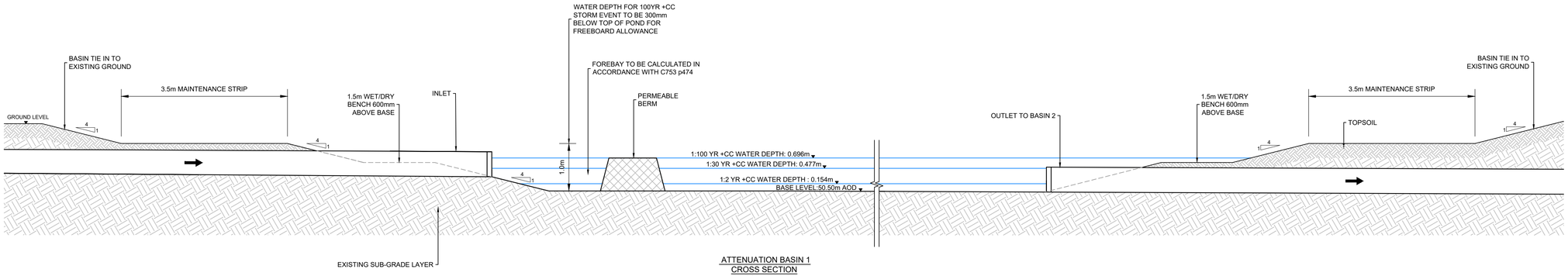
DRAWN BY	CHECKED BY	APPROVED BY
HG	AG	KW

wardell armstrong

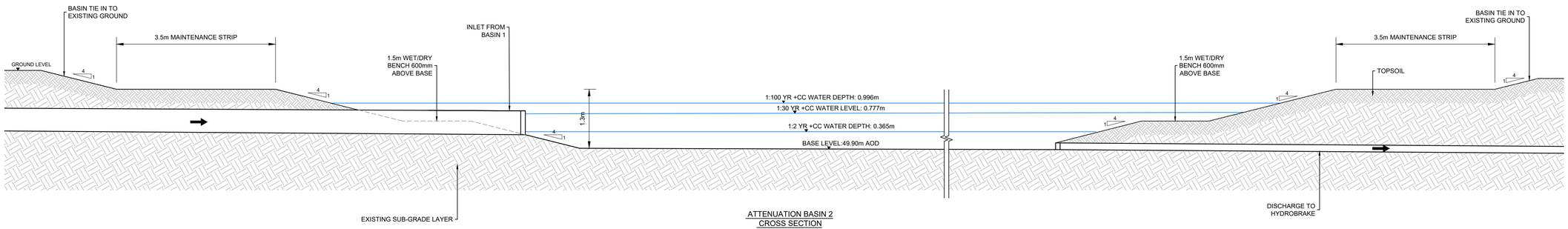
0m 25m 50m 75m 100m 125m

SCALE 1:1250

N:\BM\BM12457 - LAND OFF SCHOOL ROAD ELMSWELL\03 - DESIGN\AUTOCAD\BM12457-001-E INDICATIVE DRAINAGE STRATEGY.DWG



ATTENUATION BASIN 1
CROSS SECTION
SCALE 1:50



ATTENUATION BASIN 2
CROSS SECTION
SCALE 1:50

0m 1m 2m 3m 4m 5m
SCALE 1:50

DO NOT SCALE FROM THIS DRAWING

NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. ALL LEVELS ARE IN METERS ABOVE ORDNANCE DATUM.
3. THE CONTRACTOR IS TO CHECK ALL THE INFORMATION PROVIDED PRIOR TO COMMENCING WORKS AND SOUGHT ANY CLARIFICATION FROM THE ENGINEER IN RESPECT TO ANY AMBIGUITIES FOUND
4. ALL FOUL AND SURFACE WATER SEWERS TO BE DESIGNED IN ACCORDANCE WITH DESIGN AND CONSTRUCTION GUIDANCE FOR FOUL AND SURFACE WATER SEWERS.
5. REFER TO DRAWING BM12457-001 FOR GENERAL ARRANGEMENT OF BASINS
6. BASINS AND PIPES SHOWN ARE INDICATIVE AND SUBJECT TO DETAILED DESIGN

REVISION	DETAILS	DATE	DRAWN	CHKD	APPD
B	Benches and berm added. Earthworks amended to be all 1 in 4	08/04/24	HRK	JB	JB
A	First Issue	08/04/24	KN	CD	

CLIENT
CHRISTCHURCH LAND AND ESTATES (ELMSWELL SOUTH) LIMITED

PROJECT
LAND OFF SCHOOL ROAD, ELMSWELL

DRAWING TITLE
BASIN CROSS SECTION VIEW

DRG No.		REV
BM12457-003		B
DRG SIZE: A1	SCALE: 1:50	DATE: 08/04/24
DRAWN BY: KN	CHECKED BY: CD	APPROVED BY: JB

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