Ashwood Homes Ltd

Balmoral Way Phase 2, Holbeach

Flood Risk Assessment & Drainage Strategy

April 2021



Revision Schedule

Balmoral Way Phase 2, Holbeach

Flood Risk Assessment & Drainage Strategy

April 2021
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1 INTRODUCTION

1.1 Instructions

1.1.1 This report is prepared in accordance with instructions from Ashwood Homes Ltd to support an outline planning application to South Holland District Council (SHDC) for a residential development at Balmoral Way/Chaffinch Way, Holbeach, PE12 7FG.

1.1.2 The purpose of the report is to assess flood risk in accordance with the National Planning Policy Framework (NPPF) and other current guidelines and determine a drainage strategy for the site. It does not purport to be drainage design for construction purposes.

1.2 Planning Background

1.2.1 Planning permission was granted by SHDC on 21 February 2018 under Reference H09-0288-15 for 36 dwellings at Balmoral Way, now known as Chaffinch Way, supported by a Flood Risk Assessment dated January 2015. With respect to flood risk, Condition 5 of the permission contained the following requirements:

- *Finished floor levels shall be set no lower than 3.6m AOD;*
- *All dwellings shall be a minimum of two storeys;*
- *Flood resilient construction shall be incorporated throughout the development.*

1.2.2 The granting of the (Phase 1) planning permission demonstrates the acceptability of raising floor levels at this site in line with the flood depths shown on the SFRA hazard mapping and the guidance in SFRA Appendix C. A similar approach has been taken in the preparation of this FRA for Phase 2.

1.3 Technical Information

National Planning Policy Framework

1.3.1 The National Planning Policy Framework and associated Planning Practice Guidance explains how flood risk should be taken into consideration during the planning and development process. It categorises flood risk by *flood zone* and defines the types of development *appropriate* to each flood zone according to *vulnerability*. The flood zones are defined as:

- Zone 1: Areas with a Low Probability of flooding (annual probability less than 0.1% or 1 in 1000 years).
- Zone 2: Areas with a Medium Probability of flooding (annual probability between 0.1% (1 in 1000 years) and 1.0% (1in 100 years) for rivers, 0.1 – 0.5% (1 in 1000 to 1 in 200 years) for coastal areas.
- Zone 3a: Areas with a High Probability of flooding (annual probability greater than 1.0% (1 in 100 years) for rivers, 0.5% (1 in 200 years) for coastal areas).
- Zone 3b: The Functional Floodplain (probability as Zone 3a).

Environment Agency Flood Maps

1.3.2 The Environment Agency (EA) predicts the likelihood of flooding via a national series of indicative flood maps, available via the GOV.UK website.

1.3.3 The *Flood Map for Planning* shows the flood zones, described above, coloured in different shades of blue. In areas protected by flood defences, this flood map deliberately neglects their presence so as to present a worst-case scenario. Although it does not represent realistic risk, the *Flood Map for Planning* is the authoritative guidance on flood risk for use in the preparation of flood risk assessments for planning applications.

1.3.4 The *Long Term Flood Risk* maps cover the following topics:

- *Flood Risk from Rivers and the Sea*. This map (previously known as the NaFRA map) shows the risk of fluvial and tidal flooding in a similar manner to the *Flood Map for Planning*, except that, where they exist, defences are recognised. The resulting realistic risk presentation provides useful data for insurance assessors.

- *Flood Risk from Surface Water.* This map shows potential overland flow routes and accumulation of runoff resulting from rainstorm events based on topography, divided into low, medium and high risk scenarios.

- *Flood Risk from Reservoirs*. This map shows areas which may be subject to flooding from the failure of reservoirs and other water retaining infrastructure, the risk of which is very low.

South Holland District Council Strategic Flood Risk Assessment

1.3.5 Local planning authorities are required to produce a Strategic Flood Risk Assessment (SFRA) which sets the scene for flood risk in their areas. South Holland District Council published its original SFRA, now superseded, in January 2010.

South East Lincolnshire Local Plan

1.3.6 The South East Lincolnshire Local Plan, prepared jointly by South Holland District Council, Boston Borough Council and Lincolnshire County Council, was adopted in March 2019. The South East Lincolnshire SFRA and the 2016 Update of the South Holland District Council SFRA, which includes Holbeach, form part of this Local Plan.

Lincolnshire County Council Preliminary Flood Risk Assessment

1.3.7 Lead Local Flood Authorities (LLFAs) are required to produce a Preliminary Flood Risk Assessment (PFRA) to identify areas where there is significant flood risk from ordinary watercourses and surface water run-off, but not from main rivers or the sea, or from sewers. Lincolnshire County Council, as the LLFA, published its PFRA in June 2011.

South Holland Internal Drainage Board

1.3.8 Drainage of the site and surrounding area is administered by the South Holland IDB. The local drain serving the site is High Priority Watercourse Reference No. DRN206G1404, as shown on the SHIDB map extract at Appendix 3.

2 SITE INFORMATION

2.1 Existing Site

Location

2.1.1 The site comprises an irregular parcel of agricultural land to the north-west of Foxes Low Road and south of the A17 Bypass, Holbeach, an area of about 3.2 ha. Holbeach town centre lies about 1 km to the west. The site location is shown on the attached Drawing No AHL-1534-01-GA-002 *Location Plan*.

Watercourses

2.1.2 The site and the land around are drained to the South Holland IDB High Priority Watercourse DRN206G1404 which runs in a northerly direction along the eastern site boundary to form part of the Catchment 206G – Holbeach River (South) system. There is a highway drainage ditch flowing to the east along the northern site boundary which joins DRN206G1404.

2.1.3 The Catchment 206G system flows to the north to Holbeach Bank Pumping Station where the water is lifted to the River Whaplode which joins the River Welland close to The Wash.

Topography

2.1.4 The site comprises generally level ground, partly in use for crop production and partly disused. The ground levels vary between +2.6m and +3.8m AOD, a range of 1.2m. Topographical details are shown on the attached Drawing No AS2517/1 *OGL Survey*.

Ground Conditions

2.1.5 According to BGS data, the site is located on Tidal Flat Deposits, superficial deposits of Clay and Silt, overlying the Ampthill Clay Mudstone Formation.

2.1.6 The *Combined Phase 1 Desk Study and Phase 2 Exploratory Investigation* by Geodyne in April 2021 reported:

- Made Ground including Topsoil to depths up to 1m.
- Sandy Silt (Tidal Flat Deposits) beneath Topsoil or Made Ground.
- Soakaway test infiltration rates between 3 x 10^{-6} and 4 x 10^{-6} in 2 No test pits at depths up to 1.6m in Sandy Silt (Tidal Flat Deposits). In another 4 No test pits, there was insufficient drop in water level to enable a representative soil infiltration rate to be calculated.

2.2 Proposed Development

2.2.1 It is proposed to develop the site for residential use for 73 No dwellings, as shown on Drawing No 1280-003C *Preliminary Planning Layout*.

2.2.2 The ground floor level (FFL) of the new 2-storey dwelling houses will be set at a minimum of +3.6m AOD, up to 1.0m higher than the existing ground levels. Where necessary to achieve adequate falls for drainage, FFLs will be set at higher levels up to +4.6m AOD.

2.2.3 Ground levels around the buildings will be set at 0.15m below FFLs with access roads and public open space at lower levels.

2.2.4 Flood resilient construction will be incorporated up to 300mm above the +3.6m AOD FFLs. Dwellings with FFLs of +3.9m AOD or higher will not require flood resilience.

2.2.5 About 1.3 ha (40% of the total site area) will comprise impermeable roofs, drives and access roads. The remaining 1.9 ha (60% of the total site area) will comprise private gardens and soft landscaped public open space.

3 FLOODING INFORMATION

3.1 Flood Data

3.1.1 The EA *Flood Map for Planning* is attached at Appendix 1. Except for a small 'island' at Holbeach town centre, this map shows Flood Zone 3 at the site and extending for several kilometres in all directions.

3.1.2 The *Long Term Flood Risk* maps, including *Flood Risk from Rivers or the Sea* and *Flood Risk from Surface Water* are also attached at Appendix 1.

3.1.3 The *Residual Peak Depth - District 1% Fluvial/0.5% Tidal Event Probability* map for 2116 from the South Holland SFRA 2016 Update is attached at Appendix 2. *Residual Risk Extent, Residual Flood Hazard* and *Residual Peak Velocity Maps* have also been examined.

3.2 Flood History

3.2.1 According to the web-based EA *Historic Flood Map*, there have been no flood events recorded at the site.

3.2.2 Neither the South Holland SFRA nor the Lincolnshireshire County Council PFRA, make any reference to flood history at the site.

3.3 Potential for Tidal or Fluvial Flooding

EA Flood Map for Planning

3.3.1 The *Flood Map for Planning,* which assumes that no flood defences exist, shows the site to be entirely located in Flood Zone 3 (High Probability) associated with the potential failure of tidal defences.

EA Long Term Flood Map – Flood Risk from Rivers or the Sea

3.3.2 The *Flood Risk from Rivers or the Sea* map, which acknowledges the presence of flood defences, shows the site to be located partly in an area of Low flood risk, the equivalent of Flood Zone 2 and partly in an area of Medium flood risk, the equivalent of Flood Zone 3.

3.3.3 The nearest Flood Zone 1 (Low Probability) is in High Street, Holbeach, about 1 km to the west where the ground level is about +5m AOD.

South East Lincolnshire SFRA

3.3.4 As can be seen from the attached *Flood Map for Planning*, almost the entire area of South East Lincolnshire is in Flood Zone 3. Strict adherence to the guidelines would consequently result in no development being permitted across a very large area,

which is clearly impracticable. The South East Lincolnshire SFRA has therefore been developed to ensure that there is a consistent evidence base against which to take development decisions, particularly with respect to mitigation requirements.

3.3.5 The guidance on finished floor levels (FFLs) provided by Appendix C of the SFRA is as follows:

- Flood depth 0 to 0.25m – FFL 0.3m above GL
- Flood depth 0.25 to 0.5m – FFL 0.5m above GL
- Flood depth 0.5 to 1.0m – FFL 1.0m above GL

South Holland SFRA 2016 Update Maps

3.3.6 Whereas the *Flood Map for Planning* simply assumes that defences are non-existent, the SFRA 2016 Update maps are based on modelling a theoretical series of breaches in the tidal defences. The map generally referred to in assessing development applications is the *Residual Peak Depth - District 2115 1% Fluvial/0.5% Tidal Event Probability* map which not only forecasts the consequences of a defences breach but also the effect of climate change over the next 100 years. This map shows various flood depths in the ranges 0 – 0.25m (yellow), 0.25m – 0.5m (light orange) and 0.5m -1.0m (dark orange) across the site for this conjectured event – see Appendix 2.

3.4 Potential for Surface Water Flooding

EA Flood Risk from Surface Water Map

3.4.1 The EA *Flood Risk from Surface Water* map shows no significant risk of surface water flooding at the site.

Lincolnshire County Council PFRA

3.4.2 There is no specific mention of flood risk at the site in the LCC *Preliminary Flood Risk Assessment* (PFRA).

South Holland IDB

3.4.3 The site and surrounding land are well drained by the system of South Holland IDB maintained drains, thereby preventing surface water flooding.

3.5 Potential for Flooding from Reservoirs

3.5.1 The EA *Flood Risk from Reservoirs* map shows no risk of reservoir flooding at or near the site.

3.6 Potential for Flooding from Groundwater or Sewers

3.6.1 Flood risk from other sources such as groundwater or sewers is considered to be negligible in comparison with that for tidal at this site. It is considered that the ground raising proposed for the latter will address flood risk from these sources which, consequently, are not addressed further in this assessment.

4 FLOOD RISK ASSESSMENT

4.1 Approach to Development

4.1.1 As can be seen from the *Flood Map for Planning* at Appendix 1, the area around Holbeach is situated in Flood Zone 3. This means that the town can only expand by permitting development in Flood Zone 3, as supported by the SFRA, using suitable mitigation measures.

4.1.2 Such development has been in progress during the past several years; planning permission Ref H09-0288-15, as described in Section 1.2 above, being a typical example. In permitting residential development on such sites, the authorities generally consider the contingency scenario represented by the *Residual Peak Depth - District 2115 1% Fluvial/0.5% Tidal Event Probability* map from the SFRA to be an appropriate guideline and typically require that finished floor levels (FFLs) be set in accordance with the guidance provided in Appendix C of the SFRA.

4.1.3 In terms of existing ground levels and flood risk, the proposed development at Phase 2 is very similar to that approved at Phase 1 by planning permission Ref H09-0288-15.

4.2 Tidal Flooding

Predicted Flood Levels

4.2.1 The EA *Long Term Flood Risk from Rivers or the Sea map* (previously known as the NaFRA map), represents the current defended state of the site and is used by insurers to assess the actual likelihood of a flood occurring. While this map shows part of the site to be at Medium flood risk, the equivalent of Flood Zone 3 and consistent with the *Flood Map for Planning*, it also shows a significant area of Low flood risk, the equivalent of Flood Zone 2. In doing so, it recognises the value of the coastal defences in reducing flood risk to a more realistic level than the blanket Flood Zone 3 status indicated by the *Flood Map for Planning*.

4.2.2 The South Holland SFRA maps are based on modelling the theoretical breaching of the coastal defences; however, based on the historical records over the past 50+ years, the chances of this happening in the foreseeable future must be regarded as extremely low.

4.2.3 The reference SFRA map, *Residual Peak Depth - District 2115 1% Fluvial/0.5% Tidal Event Probability* – see Appendix 2 - shows areas of the site having flood depths of 0 – 0.25m (yellow), areas having flood depths of 0.25m - 0.5m (light orange) and areas having depths of 0.5m to 1m (dark orange). There are also areas with no flooding indicated (white).

4.2.4 As shown on the attached Drawing No AS2517/1 *OGL Survey*., the ground levels lie in the range +2.6m to +3.8m AOD.

4.2.5 By way of background, the approved FRA for Phase 1 (Ref H09-0288-15) followed the same guidance as that in Appendix C of the SFRA, although the SFRA and the Flood Depth maps have been updated since then. The methodology was:

- Ground levels range from +3.1m to +4.1m.
- Flood depths are shown as 0.25 to 0.5m (light orange zone).
- FFL set 0.5m above GL the lowest GL of +3.1, therefore FFL = +3.6m.

4.2.6 At Phase 2 there are three flood depth zones, as follows:

- GLs 3.3 to 3.9m. Flood depths 0 to 0.25m (yellow) – FFL set 0.3m above the lowest GL of +3.3, therefore minimum FFL = +3.6m.
- GLs 3.1 to 3.4m. Flood depths 0.25 to 0.5m (light orange) – FFL set 0.5m above the lowest GL of +3.1, therefore minimum FFL = +3.6m.
- GLs 2.6 to 3.6m. Flood depths 0.5 to 1.0m (dark orange) – FFL set 1.0m above the lowest GL of +2.6, therefore minimum FFL = +3.6m.

4.2.7 While the FFLs will be set at a minimum of +3.6m AOD, where necessary to achieve adequate falls for drainage, they will be set at higher levels up to +4.6m AOD. Gardens, driveways and access roads will be set at lower levels as appropriate. As it would remain possible that some areas between the dwellings might flood, it would be prudent for the occupants to operate a flood management plan so as to assure their safety in an extreme event – see Section 5 below.

4.2.8 As the Flood Zone 3 area indicated at the site extends as far as the coast without a break – see attached *Flood Map for Planning* - raising ground levels at the site will not occupy flood storage volume. Consequently, no floodplain compensation is required and there will be no increase in flood risk elsewhere as a result of the development.

4.3 Surface Water Flooding

4.3.1 As stated in 3.4.1 above, there is no significant risk of surface water flooding at the site. This is achieved by the site and surrounding land being well drained by the system of South Holland IDB maintained drains, thereby preventing surface water flooding.

4.3.2 Although the impermeable area of the proposed development will be increased by the introduction of roofs, driveways and access roads, the corresponding increase in surface water flood risk will be fully mitigated by the SuDS-based surface water drainage system described in Section 6 below.

5 FLOOD MANAGEMENT

5.1 Flood Management

5.1.1 As the site is at risk of flooding in a residual risk breach event, even though there is a very low risk of floodwater entering the buildings, a Flood Management Plan containing the following robust flood management provisions will be prepared and implemented.

5.2 Warnings and Evacuation

5.2.1 The occupants of the new dwellings will register for the EA's *Floodline Warnings Direct* service which is available for the site (*Holbeach, Fleet, Gedney and Surrounding Areas* Alert Area Map). Should a flood warning be received or a flood event otherwise be predicted, occupants will evacuate in good time before any local flooding occurs to dry ground either at Holbeach town centre, about 1 km to the west, or other location clear of the flood zones.

5.2.2 Alternatively, residents might remain in their houses and ascend to safe refuge on the upper floors so as to remain well clear of flooding outside the buildings or even of any floodwater entering at ground floor level. In the event of a need for evacuation of any personnel, e.g. for medical reasons, attendance by the emergency services would not be precluded by the depth of the floodwater in the access roads.

5.2.3 In neither case would the occupants be exposed to any danger.

5.3 Sequential Test

5.3.1 The finished floor levels (FFLs) of the new buildings will be set at a minimum of +3.6m AOD by raising ground levels at least to predicted residual risk flood levels. This will effectively place the development in Flood Zone 1 where the Sequential Test is not required to be addressed.

5.3.2 Furthermore, as there are no sites available outside the flood zones in Holbeach or the surrounding area, there is no alternative but to build in the flood zones, as recognised by the South Holland SFRA. This has been the case for some years and the established practice is to mitigate the flood risk by raising ground levels so as to lift new developments out of the floodplain.

5.3.3 Consequently, the Sequential Test is considered to be satisfied.

5.4 Exception Test

5.4.1 Notwithstanding the above, in order to ensure the safety of the occupants it is necessary to satisfy the NPPF Exception Test. The following points are relevant:

5.4.2 The development the new housing with easy access to the existing urban facilities will provide significant sustainability benefits to the east side of Holbeach.

5.4.3 The occupants of the new dwellings will register for the EA's *Floodline Warnings Direct* service which is available for the site (*Holbeach, Fleet, Gedney and Surrounding Areas* Alert Area Map). Should a flood warning be received or a flood event otherwise predicted, occupants will evacuate in good time before any local flooding occurs to dry ground either at Holbeach town centre, about 1 km to the west, or other location clear of the flood zones.

5.4.4 As the Flood Zone 3 area indicated at the site extends as far as the coast without a break, raising ground levels at the site will not occupy flood storage volume. Consequently, no floodplain compensation is required and there will be no increase in tidal or fluvial flood risk elsewhere as a result of the development.

5.4.5 Similarly, as a result of the SuDS-based site drainage scheme, there will be no increase in surface water flood risk elsewhere as a result of the development.

5.4.6 Consequently, the Exception Test is considered to be satisfied.

5.5 Flood Resilience

5.5.1 Appendix C of the SFRA requires *flood resilient construction to a height of 300mm above the predicted flood depth,* which is equivalent to the FFL at the lowest areas of the site.

5.5.2 In line with this requirement and as documented in the approved FRA for Phase 1, flood resilient construction will be incorporated up to 300mm above the +3.6m AOD FFLs. Dwellings with FFLs of +3.9m AOD or higher will not require flood resilience.

6 DRAINAGE STRATEGY

6.1 Surface Water Drainage

Existing Site Drainage

6.1.1 The site drains at present to the South Holland IDB High Priority Watercourse DRN206G1404 which runs in a northerly direction along the eastern site boundary.

Sustainable Urban Drainage Systems (SuDS)

6.1.2 The drainage system will be based on SuDS techniques for the disposal of surface water run-off, as described below.

6.1.3 The first consideration in the SuDS hierarchy is infiltration to ground. As recorded in para. 2.1.6 above, very low infiltration rates, between 3×10^{-6} and 4×10^{-6}, were recorded in 2 No test pits in the natural Sandy Silt (Tidal Flat Deposits). In another 4 No test pits, there was insufficient drop in water level to enable a representative soil infiltration rate to be calculated. Consequently, it is considered that infiltration to the ground will not be feasible.

6.1.4 The second consideration in the SuDS hierarchy is discharge to watercourse. As the nearest receiving watercourse is the IDB drain at the eastern site boundary, this is the principal feasible option.

6.1.5 The presence of the watercourse which receives the current runoff, makes the third consideration in the SuDS hierarchy, discharge to sewer, unnecessary.

Proposed Site Drainage

6.1.6 The proposed surface water drainage system, therefore, will collect future runoff from the impermeable areas of the site, 40% of the total area, as shown on Drawing No AHL-1534-01-DR-002 *Drainage Strategy*, and discharge the outflow to the IDB drain. Hydraulic calculations are attached at Appendix 4.

6.1.7 The proposed system will collect runoff from the roofs, driveways and access roads and convey it via filter drains alongside the access roads to a normally dry detention basin in the public open space at the north-east corner of the site. The attenuated flow will be discharged to the adjacent IDB drain via a flow control device at the standard IDB runoff rate of 1.4 l/s/ha, which equates to 5 l/s for the whole site – see Appendix 4. This discharge rate may be increased by agreement with the IDB at a later date.

6.1.8 As shown in the hydraulic calculations at Appendix 4, the proposed storage volume in the detention basin will be sufficient to accommodate the 1 in 100 year rainfall event with 40% climate change allowance in accordance with the EA Guidance *Flood Risk Assessments: Climate Change Allowances*, March 2020. A small volume of flooding indicated in the calculations around Manhole S13 will be stored between the kerbs of the access road and retained on the site.

6.1.9 The permeable areas of the site, 60% of the total area, will comprise private gardens and soft landscaping in the public open spaces and therefore offer a measure of bioretention through shallow infiltration into topsoil and the evapo-transpiration of the vegetation.

Treatment

6.1.10 Adequate treatment of runoff from the access roads and driveways will be provided by the filter drains running alongside the access roads which convey the runoff to the outfall.

Allowance for Urban Creep

6.1.11 An allowance of 10% urban creep has be made in the hydraulic calculations in accordance with BS 8582:2013 *Code of practice for surface water management for development sites*.

Long Term Maintenance

6.1.12 The drainage system and SuDS features will be maintained in the long term by public authorities where adoption is feasible and by individual householders and/or a private management company where it is not.

6.1.13 An operation and maintenance manual for the SuDS elements will be prepared and administered.

Surface Water Approvals

6.1.14 The proposed drainage system is illustrated on Drawing No AHL-1534-01-DR-002 *Drainage Strategy* with hydraulic calculations attached at Appendix 4. Discharge to the IDB maintained drain will be subject to approval by the South Holland Internal Drainage Board.

6.1.15 All relevant authorities will be kept fully informed regarding the detailed design of the surface water drainage system. It is normal practice for detailed surface water drainage design to be subject to the approval of the local planning authority subsequent to the grant of planning permission and this will be sought from South Holland District Council at the appropriate time.

6.2 Foul Sewerage

Existing Foul Sewerage

6.2.1 There is no foul sewerage currently serving the site.

Proposed Foul Sewerage

6.2.2 As shown on Drawing No AHL-1534-01-DR-002, the foul sewage from the proposed development will be conveyed partly by gravity and partly by pumping from an on-site pumping station via a rising main to the existing public foul sewer at Manhole F15 (Existing).

Foul Sewerage Approvals

6.2.3 At the detailed design stage, application will be made to Anglian Water under the Water Industry Act 1991 for consent to discharge foul sewage from the proposed development into the public sewer system.

6.2.4 All relevant authorities will be kept fully informed regarding the detailed design of the foul sewerage system. It is normal practice for detailed foul water drainage design to be subject to the approval of the local planning authority subsequent to the grant of planning permission and this will be sought from South Holland District Council at the appropriate time.

7 CONCLUSIONS

7.1.1 The EA *Flood Map for Planning* shows the site to located in Flood Zone 3, High Probability of flooding.

7.1.2 The SFRA map *Residual Peak Depth – District 2115 1% Fluvial/0.5% Tidal Event Probability* map, which forecasts the consequences of a defences breach and the effect of climate change over the next 100 years, shows depths in the ranges 0 – 0.25m (yellow), 0.25m – 0.5m (light orange) and 0.5m -1.0m (dark orange).

7.1.3 In accordance with the guidance in Appendix C of the SFRA, finished floor levels (FFLs) of the buildings will be set at a minimum of +3.6m AOD. This methodology, which will involve raising ground levels, is consistent with the approved FRA for Phase 1 (Ref H09-0288-15).

7.1.4 In accordance with the guidance in Appendix C of the SFRA, flood resilient construction will be incorporated up to a minimum level of 300mm above the +3.6m AOD FFL.

7.1.5 As the Flood Zone 3 area indicated at the site extends as far as the coast without a break, raising ground levels at the site will not occupy flood storage volume.

7.1.6 The EA *Flood Risk from Surface Water* map shows no significant risk of surface water flooding at the site. Surface water run-off will continue to discharge to the adjacent IDB drain, as it does at present. The new impermeable areas of the site will be drained using SuDS techniques which will provide flow attenuation to reduce flood risk and treatment to improve water quality.

7.1.7 Climate change allowance will be made in accordance with the latest EA guidelines.

7.1.8 In order to address the risk of flooding, a Flood Management Plan will be prepared for the safety of occupants, involving early warning and either evacuation to dry ground or refuge on an upper floor, as required.

7.1.9 As the raising of levels effectively places the development in Flood Zone 1, the NPPF Sequential Test is considered to be satisfied. Level raising is the normally acceptable mitigation practice for similar developments in the Holbeach area and supported by the South Holland SFRA.

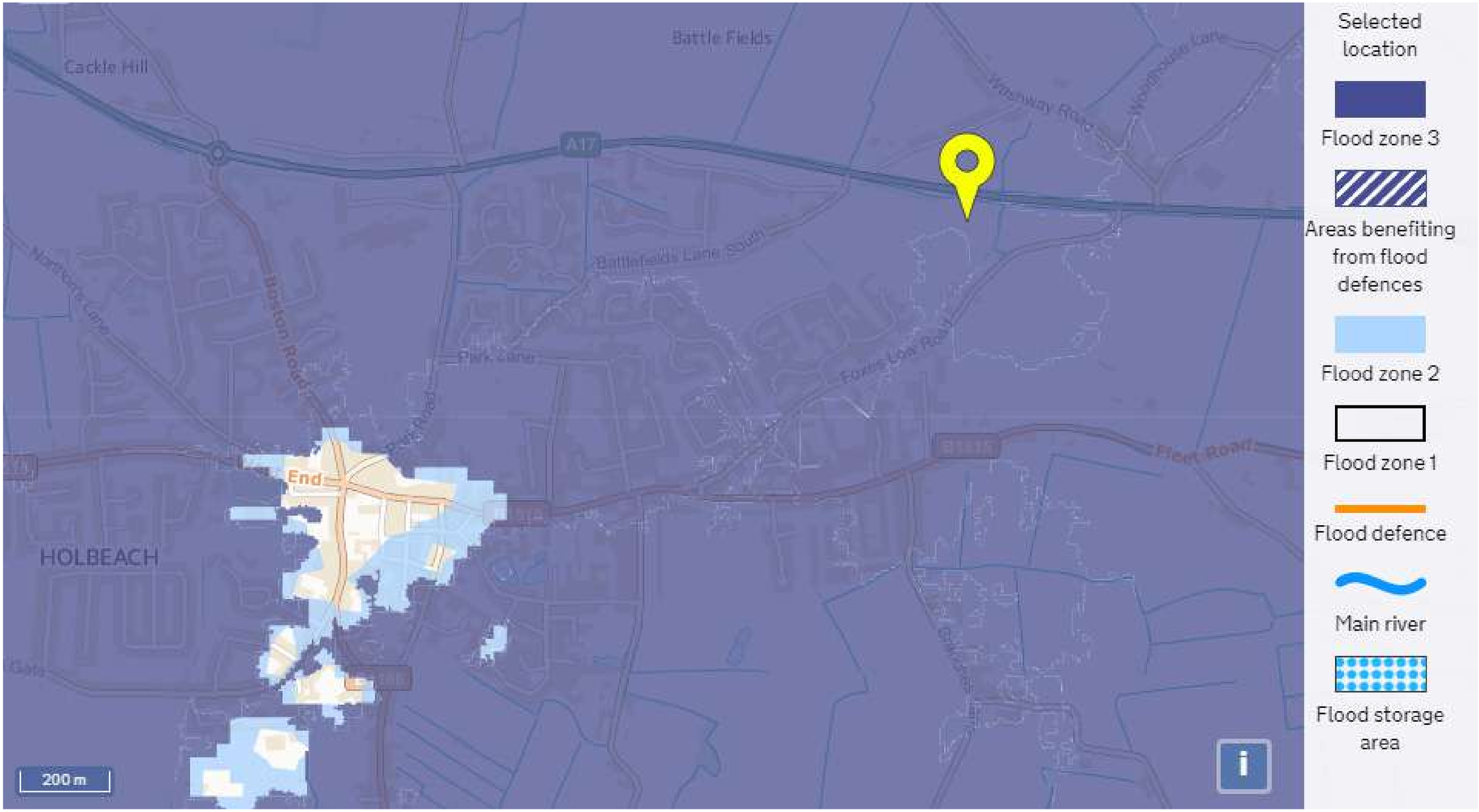
7.1.10 As the proposed buildings will be made safe by raising the finished floor levels to the residual risk flood level and adopting of a Flood Management Plan which includes early warning from the EA and options of evacuation, the NPPF Exception Test is considered to be satisfied.

7.1.11 Foul sewerage will be connected to the public sewerage system, partly by gravity and partly by pumping.

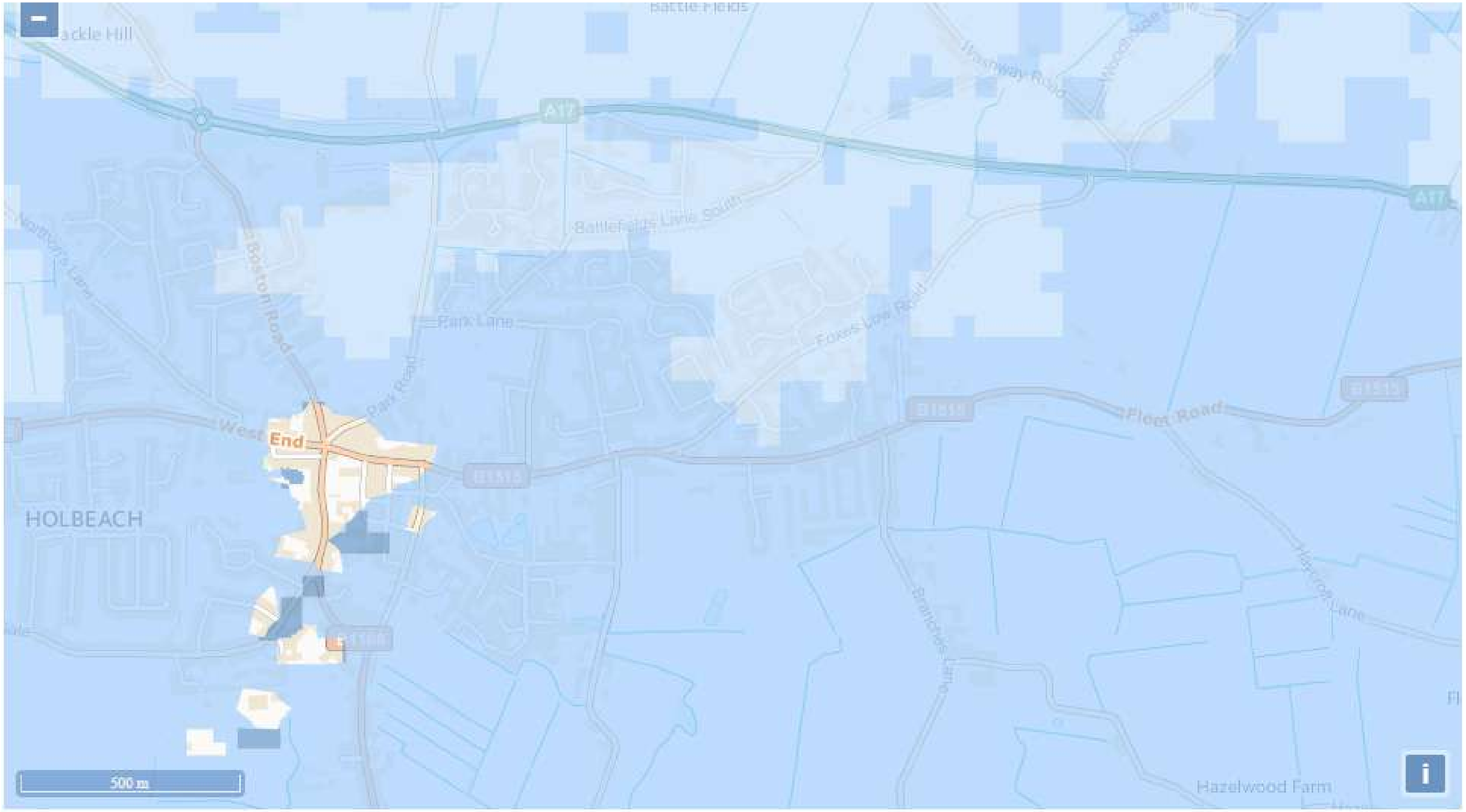
7.1.12 With regard to flood risk and drainage, therefore, the site is suitable for the proposed use. The development may be occupied safely and adequately drained without increasing flood risk elsewhere.

APPENDIX 1

EA FLOOD MAPS



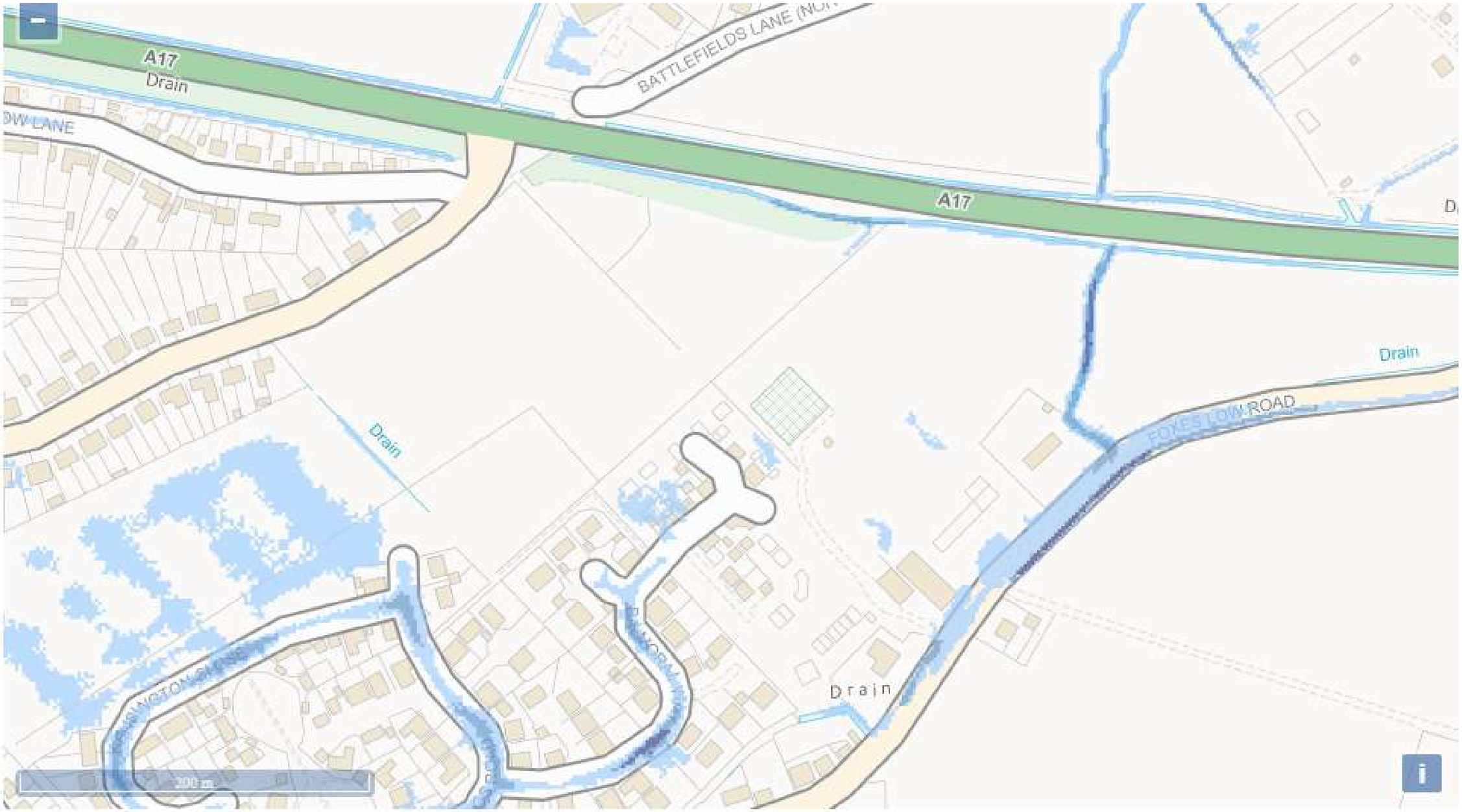
Flood Map for Planning



Extent of flooding from rivers or the sea

High Medium Low Very low

Flood Risk from Rivers or the Sea



Extent of flooding from surface water

High Medium Low Very low

Flood Risk from Surface Water

APPENDIX 2

SOUTH HOLLAND SFRA FLOOD DEPTH MAP

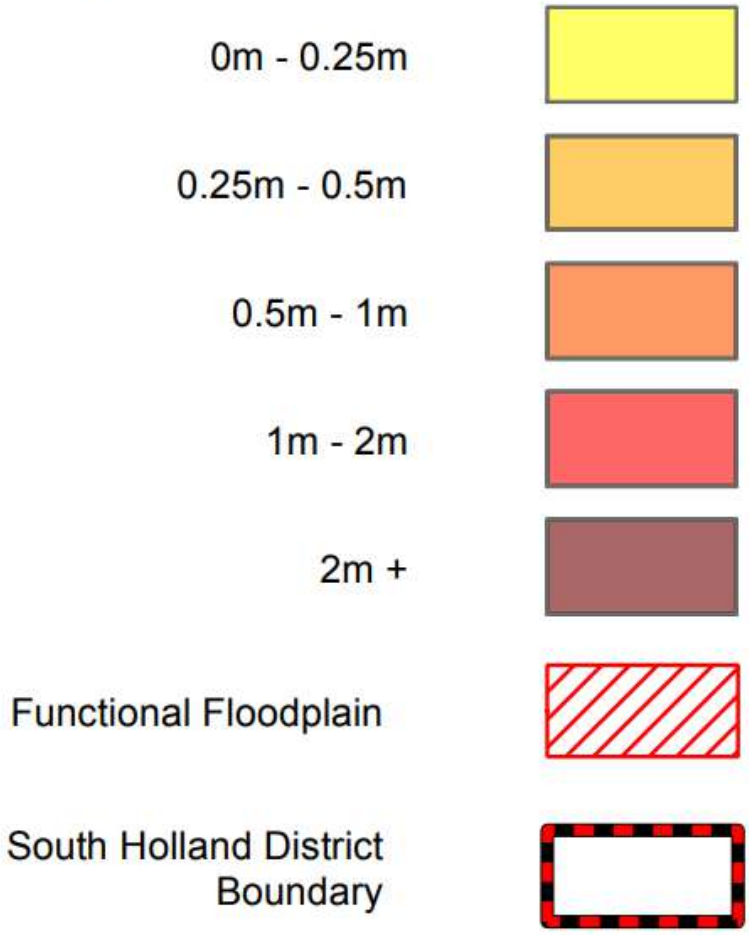
South Holland SFRA 2016 Update

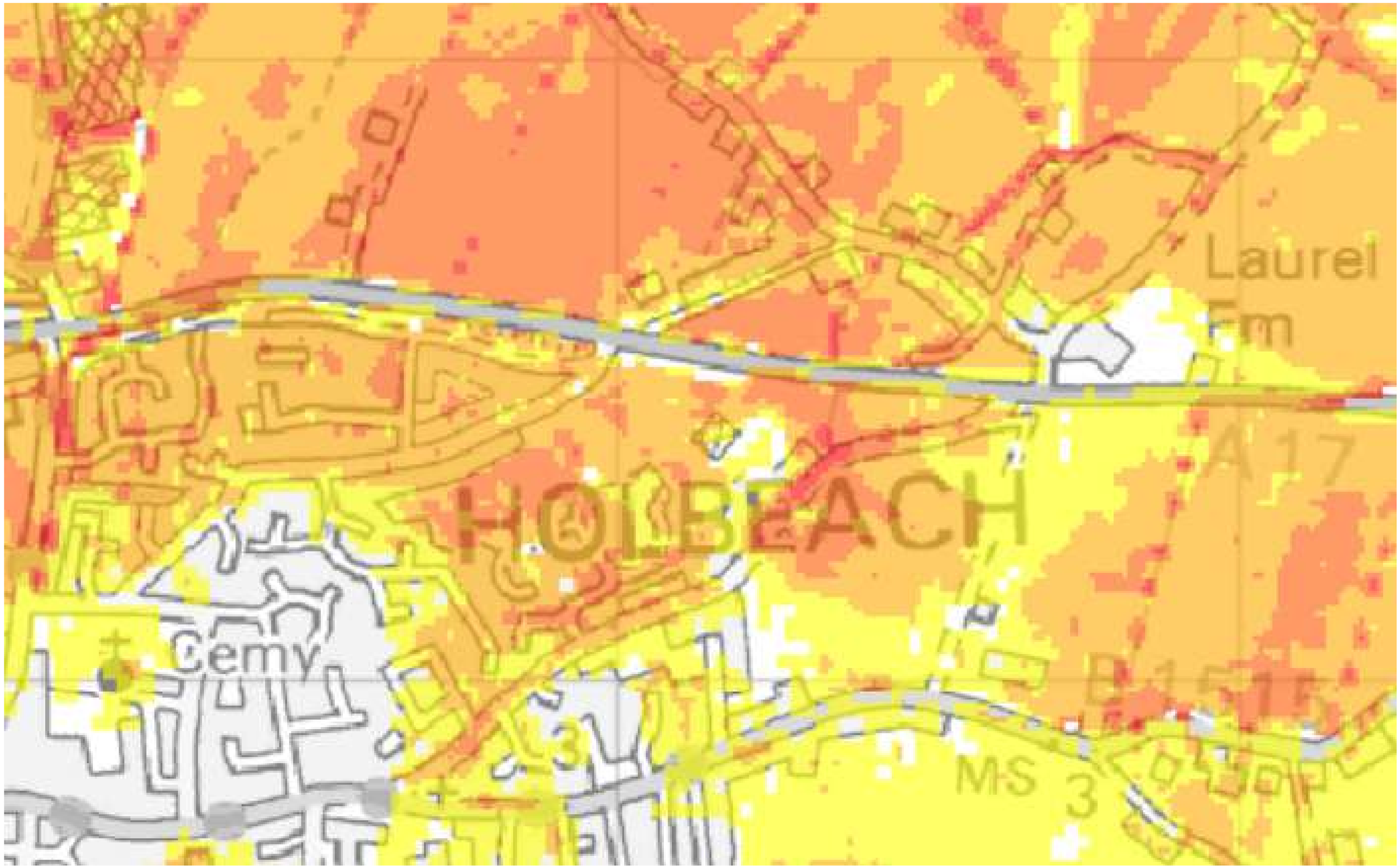
Residual Peak Flood Depth 2116

1% Fluvial/0.5% Tidal Event Probability

Map Legend

Peak Depth



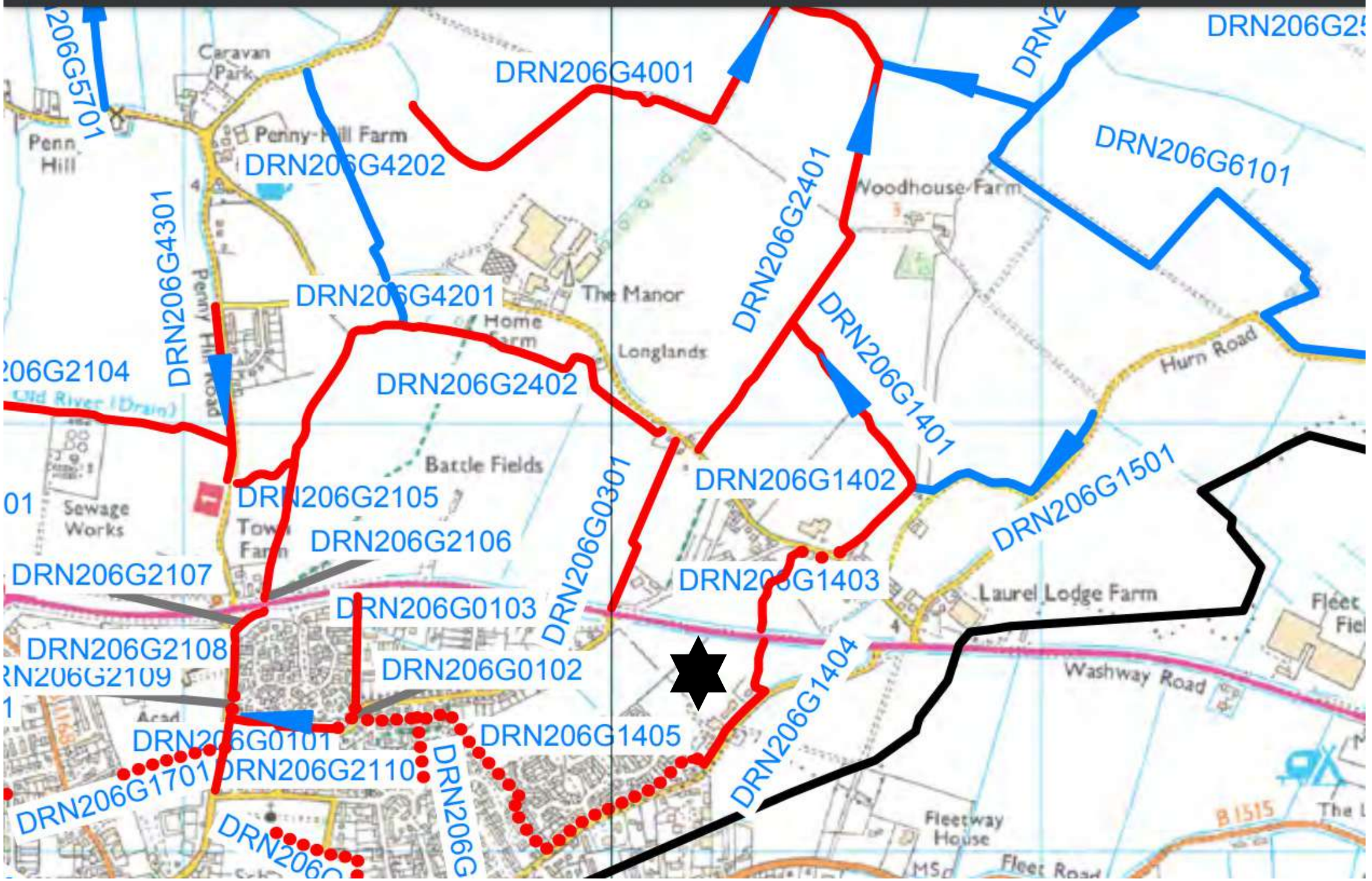


South Holland SFRA 2016 Update – Residual Peak Flood Depths 2116 – 1% Fluvial/0.5% Tidal

APPENDIX 3

SOUTH HOLLAND IDB DRAIN MAP

SHIDB: Catchment 206G - Holbeach River (S) 1 / 1 300%



APPENDIX 4

HYDRAULIC CALCULATIONS

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.000
CV	0.750	Include Intermediate Ground	x
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.074	5.00	4.300	1350	537098.592	325472.534	1.783
2	0.038	5.00	4.180	1350	537112.072	325458.181	1.712
3	0.102	5.00	4.130	1500	537121.590	325452.895	1.689
4	0.055	5.00	4.210	1500	537133.525	325440.019	1.813
5			4.170	1500	537136.795	325438.356	1.782
6			4.220	1500	537144.611	325437.673	1.852
7	0.075	5.00	4.170	1500	537152.664	325434.734	1.824
8	0.124	5.00	4.000	1500	537184.759	325401.286	1.768
9	0.110	5.00	4.000	1800	537197.482	325395.672	1.803
10	0.027	5.00	4.100	1500	537181.751	325355.721	1.789
11			4.100	1500	537186.363	325360.139	1.805
12			4.100	1500	537195.436	325369.607	1.838
13			3.900	1500	537196.492	325375.019	1.652
14			3.900	1500	537200.030	325399.213	1.714
15	0.123	5.00	3.900	1500	537232.395	325430.288	1.824
16	0.054	5.00	3.700	1500	537242.283	325440.381	1.659
17	0.107	5.00	3.900	1500	537202.643	325475.345	1.727
18	0.040	5.00	3.800	1500	537221.753	325476.937	1.633
19			3.800	1500	537214.178	325469.765	1.659
20			3.700	1500	537220.566	325463.018	1.582
21	0.070	5.00	3.540	1500	537267.837	325413.776	1.590
22	0.033	5.00	3.410	1500	537277.431	325403.824	1.494
23	0.038	5.00	3.480	1500	537268.882	325395.121	1.530
24			3.520	1500	537289.130	325415.497	1.645
25	0.080	5.00	3.460	1500	537304.505	325432.235	1.641
26	0.143	5.00	3.000	1500	537318.672	325448.199	1.234
HW			2.800	1200	537349.708	325474.339	1.200

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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)
1.000	1	2	19.691	0.600	2.517	2.468	0.049	401.8	450	5.33	50.0
1.001	2	3	10.887	0.600	2.468	2.441	0.027	403.2	450	5.51	50.0
1.002	3	4	17.557	0.600	2.441	2.397	0.044	399.0	450	5.80	50.0
1.003	4	5	3.669	0.600	2.397	2.388	0.009	407.6	450	5.86	50.0
1.004	5	6	7.846	0.600	2.388	2.368	0.020	392.3	450	5.98	50.0
1.005	6	7	8.573	0.600	2.368	2.346	0.022	389.7	450	6.12	50.0
1.006	7	8	46.356	0.600	2.346	2.232	0.114	406.6	450	6.90	50.0
1.007	8	9	13.907	0.600	2.232	2.197	0.035	397.3	450	7.12	50.0
2.000	10	11	6.387	0.600	2.311	2.295	0.016	399.2	450	5.11	50.0
2.001	11	12	13.113	0.600	2.295	2.262	0.033	397.4	450	5.32	50.0
2.002	12	13	5.514	0.600	2.262	2.248	0.014	393.9	450	5.41	50.0
2.003	13	9	20.677	0.600	2.248	2.197	0.051	405.4	450	5.75	50.0
1.008	9	14	4.362	0.600	2.197	2.186	0.011	396.6	450	7.20	50.0
1.009	14	15	44.868	0.600	2.186	2.076	0.110	407.9	450	7.94	50.0
1.010	15	16	14.129	0.600	2.076	2.041	0.035	403.7	450	8.18	50.0
3.000	17	19	12.814	0.600	2.173	2.141	0.032	400.4	450	5.21	50.0
4.000	18	19	10.432	0.600	2.167	2.141	0.026	401.2	450	5.17	50.0
3.001	19	20	9.291	0.600	2.141	2.118	0.023	404.0	450	5.37	50.0
3.002	20	16	31.370	0.600	2.118	2.041	0.077	407.4	450	5.89	50.0
1.011	16	21	36.889	0.600	2.041	1.950	0.091	405.4	450	8.79	50.0
1.012	21	22	13.823	0.600	1.950	1.916	0.034	406.6	450	9.02	50.0
5.000	23	22	12.199	0.600	1.950	1.916	0.034	358.8	450	5.19	50.0
1.013	22	24	16.527	0.600	1.916	1.875	0.041	403.1	450	9.29	50.0
1.014	24	25	22.728	0.600	1.875	1.819	0.056	405.9	450	9.67	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)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.008	160.3	14.0	1.333	1.262	0.074	0.0	89	0.628
1.001	1.006	160.0	21.3	1.262	1.239	0.112	0.0	110	0.707
1.002	1.011	160.9	40.6	1.239	1.363	0.214	0.0	153	0.848
1.003	1.001	159.1	51.0	1.363	1.332	0.269	0.0	174	0.894
1.004	1.020	162.2	51.0	1.332	1.402	0.269	0.0	173	0.907
1.005	1.024	162.8	51.0	1.402	1.374	0.269	0.0	173	0.910
1.006	1.002	159.3	65.3	1.374	1.318	0.344	0.0	200	0.953
1.007	1.014	161.2	88.8	1.318	1.353	0.468	0.0	239	1.037
2.000	1.011	160.8	5.1	1.339	1.355	0.027	0.0	54	0.466
2.001	1.013	161.2	5.1	1.355	1.388	0.027	0.0	54	0.467
2.002	1.018	161.9	5.1	1.388	1.202	0.027	0.0	54	0.469
2.003	1.003	159.6	5.1	1.202	1.353	0.027	0.0	55	0.466
1.008	1.014	161.3	114.8	1.353	1.264	0.605	0.0	282	1.098
1.009	1.000	159.1	114.8	1.264	1.374	0.605	0.0	284	1.086
1.010	1.005	159.9	138.1	1.374	1.209	0.728	0.0	325	1.126
3.000	1.010	160.6	20.3	1.277	1.209	0.107	0.0	108	0.700
4.000	1.009	160.4	7.6	1.183	1.209	0.040	0.0	66	0.527
3.001	1.005	159.8	27.9	1.209	1.132	0.147	0.0	126	0.761
3.002	1.001	159.2	27.9	1.132	1.209	0.147	0.0	127	0.760
1.011	1.003	159.6	176.3	1.209	1.140	0.929	0.0	450	1.016
1.012	1.002	159.3	189.5	1.140	1.044	0.999	0.0	450	1.015
5.000	1.067	169.7	7.2	1.080	1.044	0.038	0.0	63	0.540
1.013	1.006	160.0	203.0	1.044	1.195	1.070	0.0	450	1.019
1.014	1.003	159.5	203.0	1.195	1.191	1.070	0.0	450	1.016

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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)
1.015	25	26	21.344	0.600	1.819	1.766	0.053	402.7	450	10.03	50.0
1.016	26	HW	40.577	0.600	1.766	1.600	0.166	244.4	300	10.70	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)	Pro Depth (mm)	Pro Velocity (m/s)
1.015	1.007	160.1	218.2	1.191	0.784	1.150	0.0	450	1.020
1.016	1.001	70.8	245.3	0.934	0.900	1.293	0.0	300	1.014

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)
1.000	19.691	401.8	450	Circular	4.300	2.517	1.333	4.180	2.468	1.262
1.001	10.887	403.2	450	Circular	4.180	2.468	1.262	4.130	2.441	1.239
1.002	17.557	399.0	450	Circular	4.130	2.441	1.239	4.210	2.397	1.363
1.003	3.669	407.6	450	Circular	4.210	2.397	1.363	4.170	2.388	1.332
1.004	7.846	392.3	450	Circular	4.170	2.388	1.332	4.220	2.368	1.402
1.005	8.573	389.7	450	Circular	4.220	2.368	1.402	4.170	2.346	1.374
1.006	46.356	406.6	450	Circular	4.170	2.346	1.374	4.000	2.232	1.318
1.007	13.907	397.3	450	Circular	4.000	2.232	1.318	4.000	2.197	1.353
2.000	6.387	399.2	450	Circular	4.100	2.311	1.339	4.100	2.295	1.355
2.001	13.113	397.4	450	Circular	4.100	2.295	1.355	4.100	2.262	1.388
2.002	5.514	393.9	450	Circular	4.100	2.262	1.388	3.900	2.248	1.202
2.003	20.677	405.4	450	Circular	3.900	2.248	1.202	4.000	2.197	1.353
1.008	4.362	396.6	450	Circular	4.000	2.197	1.353	3.900	2.186	1.264
1.009	44.868	407.9	450	Circular	3.900	2.186	1.264	3.900	2.076	1.374
1.010	14.129	403.7	450	Circular	3.900	2.076	1.374	3.700	2.041	1.209
3.000	12.814	400.4	450	Circular	3.900	2.173	1.277	3.800	2.141	1.209
4.000	10.432	401.2	450	Circular	3.800	2.167	1.183	3.800	2.141	1.209
3.001	9.291	404.0	450	Circular	3.800	2.141	1.209	3.700	2.118	1.132

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1350	Manhole	Adoptable	2	1350	Manhole	Adoptable
1.001	2	1350	Manhole	Adoptable	3	1500	Manhole	Adoptable
1.002	3	1500	Manhole	Adoptable	4	1500	Manhole	Adoptable
1.003	4	1500	Manhole	Adoptable	5	1500	Manhole	Adoptable
1.004	5	1500	Manhole	Adoptable	6	1500	Manhole	Adoptable
1.005	6	1500	Manhole	Adoptable	7	1500	Manhole	Adoptable
1.006	7	1500	Manhole	Adoptable	8	1500	Manhole	Adoptable
1.007	8	1500	Manhole	Adoptable	9	1800	Manhole	Adoptable
2.000	10	1500	Manhole	Adoptable	11	1500	Manhole	Adoptable
2.001	11	1500	Manhole	Adoptable	12	1500	Manhole	Adoptable
2.002	12	1500	Manhole	Adoptable	13	1500	Manhole	Adoptable
2.003	13	1500	Manhole	Adoptable	9	1800	Manhole	Adoptable
1.008	9	1800	Manhole	Adoptable	14	1500	Manhole	Adoptable
1.009	14	1500	Manhole	Adoptable	15	1500	Manhole	Adoptable
1.010	15	1500	Manhole	Adoptable	16	1500	Manhole	Adoptable
3.000	17	1500	Manhole	Adoptable	19	1500	Manhole	Adoptable
4.000	18	1500	Manhole	Adoptable	19	1500	Manhole	Adoptable
3.001	19	1500	Manhole	Adoptable	20	1500	Manhole	Adoptable

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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)
3.002	31.370	407.4	450	Circular	3.700	2.118	1.132	3.700	2.041	1.209
1.011	36.889	405.4	450	Circular	3.700	2.041	1.209	3.540	1.950	1.140
1.012	13.823	406.6	450	Circular	3.540	1.950	1.140	3.410	1.916	1.044
5.000	12.199	358.8	450	Circular	3.480	1.950	1.080	3.410	1.916	1.044
1.013	16.527	403.1	450	Circular	3.410	1.916	1.044	3.520	1.875	1.195
1.014	22.728	405.9	450	Circular	3.520	1.875	1.195	3.460	1.819	1.191
1.015	21.344	402.7	450	Circular	3.460	1.819	1.191	3.000	1.766	0.784
1.016	40.577	244.4	300	Circular	3.000	1.766	0.934	2.800	1.600	0.900

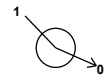
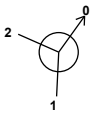
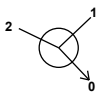
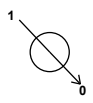
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
3.002	20	1500	Manhole	Adoptable	16	1500	Manhole	Adoptable
1.011	16	1500	Manhole	Adoptable	21	1500	Manhole	Adoptable
1.012	21	1500	Manhole	Adoptable	22	1500	Manhole	Adoptable
5.000	23	1500	Manhole	Adoptable	22	1500	Manhole	Adoptable
1.013	22	1500	Manhole	Adoptable	24	1500	Manhole	Adoptable
1.014	24	1500	Manhole	Adoptable	25	1500	Manhole	Adoptable
1.015	25	1500	Manhole	Adoptable	26	1500	Manhole	Adoptable
1.016	26	1500	Manhole	Adoptable	HW	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	537098.592	325472.534	4.300	1.783	1350	0	1.000	2.517	450
2	537112.072	325458.181	4.180	1.712	1350	1	1.000	2.468	450
						0	1.001	2.468	450
3	537121.590	325452.895	4.130	1.689	1500	1	1.001	2.441	450
						0	1.002	2.441	450
4	537133.525	325440.019	4.210	1.813	1500	1	1.002	2.397	450
						0	1.003	2.397	450
5	537136.795	325438.356	4.170	1.782	1500	1	1.003	2.388	450
						0	1.004	2.388	450
6	537144.611	325437.673	4.220	1.852	1500	1	1.004	2.368	450
						0	1.005	2.368	450
7	537152.664	325434.734	4.170	1.824	1500	1	1.005	2.346	450
						0	1.006	2.346	450

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
8	537184.759	325401.286	4.000	1.768	1500	 1	1.006	2.232	450
						0	1.007	2.232	450
9	537197.482	325395.672	4.000	1.803	1800	 1	2.003	2.197	450
						2	1.007	2.197	450
						0	1.008	2.197	450
10	537181.751	325355.721	4.100	1.789	1500				
						0	2.000	2.311	450
11	537186.363	325360.139	4.100	1.805	1500	 1	2.000	2.295	450
						0	2.001	2.295	450
12	537195.436	325369.607	4.100	1.838	1500	 1	2.001	2.262	450
						0	2.002	2.262	450
13	537196.492	325375.019	3.900	1.652	1500	 1	2.002	2.248	450
						0	2.003	2.248	450
14	537200.030	325399.213	3.900	1.714	1500	 1	1.008	2.186	450
						0	1.009	2.186	450
15	537232.395	325430.288	3.900	1.824	1500	 1	1.009	2.076	450
						0	1.010	2.076	450
16	537242.283	325440.381	3.700	1.659	1500	 1	3.002	2.041	450
						2	1.010	2.041	450
						0	1.011	2.041	450
17	537202.643	325475.345	3.900	1.727	1500				
						0	3.000	2.173	450
18	537221.753	325476.937	3.800	1.633	1500				
						0	4.000	2.167	450
19	537214.178	325469.765	3.800	1.659	1500	 1	4.000	2.141	450
						2	3.000	2.141	450
						0	3.001	2.141	450
20	537220.566	325463.018	3.700	1.582	1500	 1	3.001	2.118	450
						0	3.002	2.118	450

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
21	537267.837	325413.776	3.540	1.590	1500	 1	1.011	1.950	450
						0	1.012	1.950	450
22	537277.431	325403.824	3.410	1.494	1500	 1	5.000	1.916	450
						2	1.012	1.916	450
						0	1.013	1.916	450
23	537268.882	325395.121	3.480	1.530	1500	 0	5.000	1.950	450
24	537289.130	325415.497	3.520	1.645	1500	 1	1.013	1.875	450
						0	1.014	1.875	450
25	537304.505	325432.235	3.460	1.641	1500	 1	1.014	1.819	450
						0	1.015	1.819	450
26	537318.672	325448.199	3.000	1.234	1500	 1	1.015	1.766	450
						0	1.016	1.766	300
HW	537349.708	325474.339	2.800	1.200	1200	 1	1.016	1.600	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	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 %)
1	0	0	0
2	0	0	0
30	0	0	0
100	0	0	0
100	40	10	0

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Node 26 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	1.766	Product Number	CTL-SHE-0102-5000-1230-5000
Design Depth (m)	1.230	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node 26 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.766
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)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	980.0	0.0	1.000	980.0	0.0	1.001	0.0	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	2.602	0.085	10.4	0.1214	0.0000	OK
15 minute winter	2	11	2.594	0.126	15.1	0.1803	0.0000	OK
15 minute winter	3	11	2.588	0.147	28.3	0.2605	0.0000	OK
15 minute winter	4	11	2.571	0.174	35.4	0.3070	0.0000	OK
15 minute winter	5	11	2.554	0.166	35.1	0.2926	0.0000	OK
15 minute winter	6	11	2.531	0.163	34.9	0.2882	0.0000	OK
15 minute winter	7	11	2.507	0.161	44.5	0.2846	0.0000	OK
15 minute winter	8	12	2.456	0.224	59.9	0.3949	0.0000	OK
15 minute winter	9	13	2.434	0.237	70.8	0.6031	0.0000	OK
15 minute winter	10	13	2.437	0.126	3.8	0.2222	0.0000	OK
15 minute winter	11	12	2.436	0.141	4.7	0.2483	0.0000	OK
15 minute winter	12	13	2.435	0.173	5.2	0.3063	0.0000	OK
15 minute winter	13	13	2.435	0.187	8.3	0.3311	0.0000	OK
15 minute winter	14	13	2.408	0.222	68.3	0.3915	0.0000	OK
15 minute winter	15	14	2.379	0.303	79.4	0.5357	0.0000	OK
15 minute winter	16	14	2.365	0.324	94.7	0.5721	0.0000	OK
15 minute winter	17	14	2.381	0.208	15.1	0.3682	0.0000	OK
15 minute winter	18	14	2.381	0.214	5.6	0.3780	0.0000	OK
15 minute winter	19	14	2.380	0.239	19.1	0.4230	0.0000	OK
15 minute winter	20	14	2.377	0.259	18.4	0.4573	0.0000	OK
15 minute winter	21	12	2.333	0.383	101.5	0.6765	0.0000	OK
15 minute winter	22	12	2.327	0.411	111.0	0.7261	0.0000	OK
15 minute winter	23	12	2.326	0.376	5.4	0.6637	0.0000	OK
15 minute winter	24	12	2.316	0.441	115.2	0.7786	0.0000	OK
15 minute winter	25	12	2.296	0.477	122.2	0.8436	0.0000	SURCHARGED

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	9.4	0.417	0.058	0.5329	
15 minute summer	2	1.001	3	14.1	0.370	0.088	0.4247	
15 minute summer	3	1.002	4	26.9	0.560	0.167	0.8581	
15 minute winter	4	1.003	5	35.1	0.650	0.221	0.2005	
15 minute winter	5	1.004	6	34.9	0.669	0.215	0.4107	
15 minute winter	6	1.005	7	34.5	0.672	0.212	0.4404	
15 minute summer	7	1.006	8	42.0	0.692	0.264	2.8613	
15 minute winter	8	1.007	9	56.7	0.755	0.352	1.1295	
15 minute winter	9	1.008	14	68.3	0.869	0.423	0.3540	
15 minute summer	10	2.000	11	3.3	0.405	0.020	0.2241	
15 minute winter	11	2.001	12	3.7	0.362	0.023	0.6441	
60 minute winter	12	2.002	13	2.5	0.327	0.015	0.1842	
15 minute winter	13	2.003	9	8.7	0.207	0.055	1.5201	
15 minute summer	14	1.009	15	62.9	0.759	0.395	3.9306	
15 minute summer	15	1.010	16	67.6	0.766	0.423	1.5249	
30 minute winter	16	1.011	21	86.5	0.828	0.542	3.9190	
15 minute summer	17	3.000	19	14.1	0.526	0.088	0.9205	
15 minute winter	18	4.000	19	4.9	0.211	0.031	0.8343	
15 minute summer	19	3.001	20	16.9	0.641	0.106	0.7686	
15 minute winter	20	3.002	16	24.1	0.339	0.151	3.3951	
30 minute winter	21	1.012	22	93.3	0.835	0.586	1.5939	
30 minute winter	22	1.013	24	100.5	0.924	0.628	2.0596	
15 minute winter	23	5.000	22	5.3	0.204	0.031	1.7882	
30 minute winter	24	1.014	25	102.1	1.018	0.640	3.0582	
15 minute winter	25	1.015	26	128.2	2.185	0.801	1.7086	

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	26	540	1.953	0.187	16.6	183.8282	0.0000	OK
15 minute summer	HW	1	1.600	0.000	2.3	0.0000	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	26	Hydro-Brake®	HW	4.6				178.0

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	2.627	0.110	13.5	0.1569	0.0000	OK
15 minute winter	2	11	2.621	0.153	19.3	0.2193	0.0000	OK
15 minute winter	3	11	2.616	0.175	36.2	0.3097	0.0000	OK
15 minute winter	4	11	2.600	0.203	45.4	0.3579	0.0000	OK
15 minute winter	5	11	2.582	0.194	45.0	0.3423	0.0000	OK
15 minute winter	6	12	2.559	0.191	44.7	0.3382	0.0000	OK
15 minute winter	7	12	2.538	0.192	57.0	0.3387	0.0000	OK
15 minute winter	8	13	2.506	0.274	76.6	0.4834	0.0000	OK
15 minute winter	9	14	2.493	0.296	90.6	0.7523	0.0000	OK
15 minute winter	10	13	2.499	0.188	4.9	0.3326	0.0000	OK
15 minute winter	11	13	2.496	0.201	5.3	0.3549	0.0000	OK
15 minute winter	12	13	2.495	0.233	6.3	0.4126	0.0000	OK
15 minute winter	13	14	2.495	0.247	10.9	0.4365	0.0000	OK
15 minute winter	14	14	2.478	0.292	81.6	0.5167	0.0000	OK
15 minute winter	15	13	2.463	0.387	96.7	0.6832	0.0000	OK
15 minute winter	16	13	2.447	0.406	122.0	0.7177	0.0000	OK
15 minute winter	17	13	2.459	0.286	19.5	0.5059	0.0000	OK
15 minute winter	18	13	2.458	0.291	7.3	0.5147	0.0000	OK
15 minute winter	19	13	2.458	0.317	23.0	0.5609	0.0000	OK
15 minute winter	20	13	2.456	0.338	29.9	0.5977	0.0000	OK
15 minute winter	21	12	2.385	0.435	128.2	0.7681	0.0000	OK
15 minute winter	22	11	2.373	0.457	138.3	0.8069	0.0000	SURCHARGED
15 minute winter	23	11	2.375	0.425	9.1	0.7516	0.0000	OK
15 minute winter	24	11	2.359	0.484	142.4	0.8553	0.0000	SURCHARGED
15 minute winter	25	11	2.338	0.519	152.3	0.9171	0.0000	SURCHARGED

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	12.0	0.426	0.075	0.7191	
15 minute summer	2	1.001	3	17.9	0.366	0.112	0.5435	
15 minute summer	3	1.002	4	34.4	0.580	0.214	1.0643	
15 minute winter	4	1.003	5	45.0	0.679	0.283	0.2466	
15 minute winter	5	1.004	6	44.7	0.696	0.276	0.5076	
15 minute winter	6	1.005	7	44.1	0.691	0.271	0.5511	
15 minute summer	7	1.006	8	53.2	0.713	0.334	3.5807	
15 minute summer	8	1.007	9	68.5	0.797	0.425	1.3505	
15 minute winter	9	1.008	14	81.6	0.899	0.506	0.4785	
15 minute summer	10	2.000	11	4.8	0.427	0.030	0.3512	
15 minute winter	11	2.001	12	5.4	0.383	0.034	0.9930	
60 minute winter	12	2.002	13	3.2	0.337	0.020	0.2467	
15 minute winter	13	2.003	9	12.5	0.236	0.079	2.0623	
15 minute summer	14	1.009	15	76.0	0.765	0.478	5.1873	
15 minute winter	15	1.010	16	88.4	0.789	0.553	2.0877	
30 minute winter	16	1.011	21	107.9	0.864	0.676	4.6469	
15 minute summer	17	3.000	19	17.7	0.548	0.110	1.3982	
15 minute winter	18	4.000	19	7.4	0.216	0.046	1.1896	
15 minute summer	19	3.001	20	22.1	0.660	0.138	1.1048	
15 minute winter	20	3.002	16	35.5	0.343	0.223	4.3672	
30 minute winter	21	1.012	22	115.5	0.891	0.725	1.8206	
30 minute winter	22	1.013	24	123.7	0.990	0.773	2.1738	
15 minute winter	23	5.000	22	6.6	0.226	0.039	1.9127	
30 minute winter	24	1.014	25	124.8	1.110	0.783	3.1991	
15 minute winter	25	1.015	26	159.1	2.320	0.994	1.7219	

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	26	424	1.996	0.230	27.1	226.1620	0.0000	OK
15 minute summer	HW	1	1.600	0.000	3.2	0.0000	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	26	Hydro-Brake®	HW	4.8				149.3

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	12	3.155	0.638	25.6	0.9134	0.0000	SURCHARGED
15 minute winter	2	12	3.166	0.698	36.0	0.9982	0.0000	SURCHARGED
15 minute winter	3	12	3.179	0.738	67.3	1.3033	0.0000	SURCHARGED
15 minute winter	4	12	3.206	0.809	82.3	1.4303	0.0000	SURCHARGED
15 minute winter	5	12	3.205	0.817	78.7	1.4444	0.0000	SURCHARGED
15 minute winter	6	12	3.204	0.836	76.0	1.4778	0.0000	SURCHARGED
15 minute winter	7	12	3.191	0.845	97.9	1.4935	0.0000	SURCHARGED
15 minute winter	8	13	3.157	0.925	128.3	1.6351	0.0000	SURCHARGED
15 minute winter	9	13	3.142	0.945	135.5	2.4050	0.0000	SURCHARGED
15 minute winter	10	13	3.132	0.821	9.8	1.4510	0.0000	SURCHARGED
15 minute winter	11	13	3.133	0.838	15.7	1.4806	0.0000	SURCHARGED
15 minute winter	12	13	3.138	0.876	31.3	1.5477	0.0000	SURCHARGED
15 minute winter	13	13	3.139	0.891	53.0	1.5739	0.0000	SURCHARGED
15 minute winter	14	13	3.116	0.930	138.2	1.6425	0.0000	SURCHARGED
15 minute winter	15	13	3.002	0.926	165.1	1.6370	0.0000	SURCHARGED
15 minute winter	16	13	2.931	0.890	193.4	1.5731	0.0000	SURCHARGED
15 minute winter	17	13	2.923	0.750	37.0	1.3244	0.0000	SURCHARGED
15 minute winter	18	13	2.923	0.756	13.8	1.3353	0.0000	SURCHARGED
15 minute winter	19	13	2.924	0.783	45.0	1.3829	0.0000	SURCHARGED
15 minute winter	20	13	2.925	0.807	47.4	1.4265	0.0000	SURCHARGED
15 minute winter	21	12	2.750	0.800	207.8	1.4136	0.0000	SURCHARGED
15 minute winter	22	12	2.666	0.750	224.2	1.3259	0.0000	SURCHARGED
15 minute winter	23	11	2.670	0.720	13.1	1.2716	0.0000	SURCHARGED
15 minute winter	24	11	2.581	0.706	227.1	1.2476	0.0000	SURCHARGED
15 minute winter	25	11	2.483	0.664	240.5	1.1726	0.0000	SURCHARGED

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	-65.1	-0.440	-0.406	3.1199	
15 minute summer	2	1.001	3	-59.9	-0.378	-0.374	1.7250	
15 minute summer	3	1.002	4	61.6	0.623	0.383	2.7818	
15 minute summer	4	1.003	5	75.3	0.752	0.473	0.5813	
15 minute summer	5	1.004	6	72.9	0.754	0.450	1.2431	
15 minute summer	6	1.005	7	73.7	0.715	0.453	1.3583	
15 minute winter	7	1.006	8	85.4	0.736	0.536	7.3448	
15 minute summer	8	1.007	9	110.4	0.872	0.685	2.2035	
15 minute summer	9	1.008	14	122.6	0.959	0.760	0.6911	
15 minute winter	10	2.000	11	8.7	0.429	0.054	1.0120	
15 minute winter	11	2.001	12	14.5	0.427	0.090	2.0777	
15 minute summer	12	2.002	13	-53.1	-0.335	-0.328	0.8737	
15 minute summer	13	2.003	9	-62.8	-0.397	-0.394	3.2761	
15 minute winter	14	1.009	15	140.6	0.888	0.884	7.1090	
15 minute winter	15	1.010	16	164.0	1.035	1.025	2.2386	
15 minute winter	16	1.011	21	198.1	1.251	1.242	5.8448	
15 minute summer	17	3.000	19	35.6	0.604	0.222	2.0303	
15 minute winter	18	4.000	19	13.3	0.224	0.083	1.6529	
15 minute winter	19	3.001	20	47.4	0.670	0.297	1.4721	
15 minute summer	20	3.002	16	-77.3	-0.490	-0.485	4.9704	
15 minute winter	21	1.012	22	211.4	1.334	1.327	2.1902	
15 minute winter	22	1.013	24	227.1	1.433	1.419	2.6186	
15 minute summer	23	5.000	22	17.8	0.245	0.105	1.9329	
15 minute winter	24	1.014	25	229.5	1.448	1.439	3.6011	
15 minute winter	25	1.015	26	244.8	2.571	1.529	1.9179	

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	26	690	2.217	0.451	34.5	442.8609	0.0000	SURCHARGED
15 minute summer	HW	1	1.600	0.000	4.6	0.0000	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	26	Hydro-Brake®	HW	5.0				219.6

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Results for 100 year Critical Storm Duration. Lowest mass balance: 99.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	13	3.871	1.354	33.2	1.9372	0.0000	SURCHARGED
15 minute winter	2	13	3.869	1.401	69.5	2.0042	0.0000	SURCHARGED
15 minute winter	3	13	3.865	1.424	77.9	2.5171	0.0000	FLOOD RISK
15 minute winter	4	13	3.855	1.458	93.9	2.5768	0.0000	SURCHARGED
15 minute winter	5	13	3.847	1.459	87.7	2.5784	0.0000	SURCHARGED
15 minute winter	6	13	3.837	1.469	83.2	2.5957	0.0000	SURCHARGED
15 minute winter	7	13	3.825	1.479	108.6	2.6137	0.0000	SURCHARGED
15 minute winter	8	13	3.773	1.541	149.9	2.7224	0.0000	FLOOD RISK
15 minute winter	9	13	3.738	1.541	188.8	3.9212	0.0000	FLOOD RISK
15 minute winter	10	13	3.754	1.443	25.1	2.5498	0.0000	SURCHARGED
15 minute winter	11	13	3.754	1.459	38.2	2.5772	0.0000	SURCHARGED
15 minute winter	12	13	3.751	1.489	55.1	2.6313	0.0000	SURCHARGED
15 minute winter	13	13	3.749	1.501	73.1	2.6524	0.0000	FLOOD RISK
15 minute winter	14	13	3.702	1.516	164.3	2.6791	0.0000	FLOOD RISK
15 minute winter	15	13	3.566	1.490	191.6	2.6322	0.0000	SURCHARGED
15 minute winter	16	13	3.483	1.442	247.2	2.5488	0.0000	FLOOD RISK
15 minute winter	17	13	3.501	1.328	49.4	2.3472	0.0000	SURCHARGED
15 minute winter	18	13	3.501	1.334	33.2	2.3563	0.0000	FLOOD RISK
15 minute winter	19	13	3.500	1.359	69.2	2.4010	0.0000	SURCHARGED
15 minute winter	20	13	3.495	1.377	83.4	2.4340	0.0000	FLOOD RISK
15 minute winter	21	13	3.204	1.254	263.6	2.2150	0.0000	SURCHARGED
15 minute winter	22	13	3.037	1.121	286.4	1.9806	0.0000	SURCHARGED
15 minute winter	23	13	3.037	1.087	25.3	1.9211	0.0000	SURCHARGED
15 minute winter	24	12	2.832	0.957	288.7	1.6914	0.0000	SURCHARGED
15 minute winter	25	11	2.590	0.771	311.5	1.3632	0.0000	SURCHARGED

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	26.2	0.421	0.163	3.1199	
240 minute summer	2	1.001	3	12.4	0.359	0.078	0.3778	
15 minute summer	3	1.002	4	74.8	0.640	0.465	2.7818	
15 minute summer	4	1.003	5	89.5	0.780	0.562	0.5813	
15 minute summer	5	1.004	6	84.2	0.768	0.519	1.2431	
15 minute winter	6	1.005	7	76.9	0.714	0.472	1.3583	
15 minute winter	7	1.006	8	97.5	0.738	0.612	7.3448	
15 minute summer	8	1.007	9	134.6	0.900	0.835	2.2035	
15 minute winter	9	1.008	14	164.3	1.037	1.018	0.6911	
15 minute winter	10	2.000	11	-13.7	0.450	-0.085	1.0120	
15 minute winter	11	2.001	12	-38.2	0.439	-0.237	2.0777	
15 minute summer	12	2.002	13	-70.9	-0.448	-0.438	0.8737	
15 minute summer	13	2.003	9	-101.9	-0.643	-0.639	3.2761	
15 minute winter	14	1.009	15	168.3	1.062	1.058	7.1090	
15 minute winter	15	1.010	16	194.1	1.225	1.214	2.2386	
15 minute winter	16	1.011	21	251.0	1.584	1.573	5.8448	
15 minute winter	17	3.000	19	50.3	0.591	0.313	2.0303	
15 minute summer	18	4.000	19	11.1	0.263	0.069	1.6529	
15 minute winter	19	3.001	20	-69.2	0.706	-0.433	1.4721	
15 minute winter	20	3.002	16	-83.4	-0.526	-0.524	4.9704	
15 minute winter	21	1.012	22	267.3	1.687	1.678	2.1902	
15 minute winter	22	1.013	24	288.7	1.822	1.804	2.6186	
15 minute winter	23	5.000	22	16.7	0.258	0.099	1.9329	
15 minute winter	24	1.014	25	290.9	1.836	1.824	3.6011	
15 minute winter	25	1.015	26	316.6	2.874	1.978	2.1987	

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Results for 100 year Critical Storm Duration. Lowest mass balance: 99.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	26	705	2.366	0.600	43.8	589.0734	0.0000	SURCHARGED
15 minute summer	HW	1	1.600	0.000	4.8	0.0000	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	26	Hydro-Brake®	HW	5.0				222.1

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Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	1	18	4.167	1.650	63.2	2.3613	0.0000	FLOOD RISK
30 minute summer	2	18	4.151	1.683	77.6	2.4081	0.0000	FLOOD RISK
15 minute winter	3	10	4.130	1.689	162.8	2.9845	18.6366	FLOOD
15 minute winter	4	10	4.171	1.774	112.9	3.1346	0.0000	FLOOD RISK
15 minute winter	5	10	4.170	1.782	103.1	3.1488	0.3949	FLOOD
15 minute winter	6	10	4.174	1.806	95.8	3.1909	0.0000	FLOOD RISK
15 minute winter	7	10	4.165	1.819	129.8	3.2146	0.0000	FLOOD RISK
15 minute winter	8	10	4.000	1.768	219.6	3.1241	6.7573	FLOOD
30 minute summer	9	18	3.932	1.735	233.8	4.4153	0.0000	FLOOD RISK
15 minute winter	10	10	4.009	1.698	18.7	3.0003	0.0000	FLOOD RISK
15 minute winter	11	10	3.989	1.694	27.2	2.9936	0.0000	FLOOD RISK
15 minute winter	12	10	3.928	1.666	60.0	2.9430	0.0000	FLOOD RISK
15 minute winter	13	10	3.900	1.652	138.0	2.9191	29.9588	FLOOD
15 minute winter	14	10	3.900	1.714	176.7	3.0286	3.0339	FLOOD
15 minute winter	15	10	3.808	1.732	211.1	3.0603	0.0000	FLOOD RISK
15 minute winter	16	10	3.700	1.659	265.2	2.9315	7.2613	FLOOD
15 minute winter	17	10	3.790	1.617	73.9	2.8576	0.0000	FLOOD RISK
15 minute winter	18	10	3.769	1.602	28.0	2.8306	0.0000	FLOOD RISK
15 minute winter	19	10	3.757	1.616	116.7	2.8551	0.0000	FLOOD RISK
15 minute winter	20	10	3.700	1.582	121.1	2.7954	16.3559	FLOOD
15 minute winter	21	10	3.530	1.580	288.6	2.7926	0.0000	FLOOD RISK
15 minute winter	22	10	3.387	1.471	316.6	2.5998	0.0000	FLOOD RISK
15 minute winter	23	10	3.394	1.444	26.9	2.5523	0.0000	FLOOD RISK
15 minute winter	24	10	3.163	1.288	319.1	2.2767	0.0000	SURCHARGED
15 minute winter	25	10	2.892	1.073	360.6	1.8957	0.0000	SURCHARGED

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	61.1	0.427	0.381	3.1199	
15 minute winter	2	1.001	3	92.3	0.583	0.577	1.7250	
15 minute summer	3	1.002	4	78.1	0.664	0.486	2.7818	
15 minute summer	4	1.003	5	99.5	0.818	0.625	0.5813	
15 minute summer	5	1.004	6	100.5	0.791	0.620	1.2431	
15 minute winter	6	1.005	7	97.2	0.719	0.597	1.3583	
15 minute winter	7	1.006	8	134.5	0.849	0.844	7.3448	
30 minute winter	8	1.007	9	179.0	1.130	1.110	2.2035	
15 minute winter	9	1.008	14	176.7	1.116	1.095	0.6911	
15 minute winter	10	2.000	11	27.2	0.460	0.169	1.0120	
15 minute winter	11	2.001	12	35.4	0.461	0.220	2.0777	
30 minute summer	12	2.002	13	-66.0	-0.416	-0.407	0.8737	
15 minute winter	13	2.003	9	-99.5	-0.628	-0.624	3.2761	
15 minute winter	14	1.009	15	183.4	1.158	1.153	7.1090	
30 minute summer	15	1.010	16	212.5	1.342	1.329	2.2386	
60 minute summer	16	1.011	21	274.5	1.733	1.720	5.8448	
15 minute winter	17	3.000	19	80.6	0.652	0.502	2.0303	
15 minute winter	18	4.000	19	36.1	0.296	0.225	1.6529	
15 minute winter	19	3.001	20	121.1	0.807	0.758	1.4721	
15 minute winter	20	3.002	16	-73.4	-0.463	-0.461	4.9704	
60 minute summer	21	1.012	22	300.0	1.894	1.883	2.1902	
30 minute winter	22	1.013	24	328.3	2.072	2.052	2.6186	
15 minute winter	23	5.000	22	27.5	0.276	0.162	1.9329	
30 minute winter	24	1.014	25	329.2	2.078	2.064	3.6011	
15 minute winter	25	1.015	26	368.1	3.358	2.299	2.5501	

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Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.75%

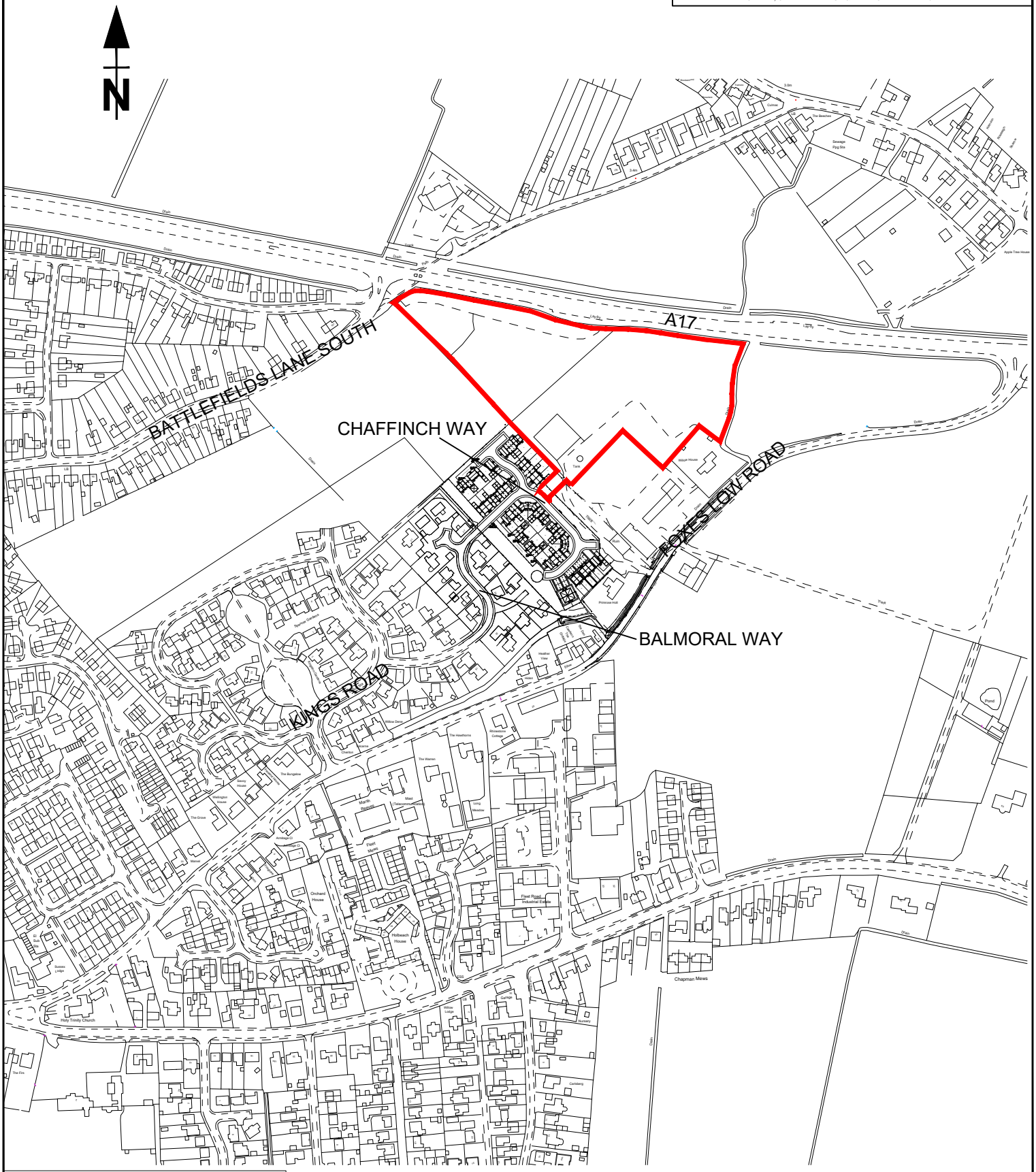
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	26	1410	2.762	0.996	36.4	978.3154	0.0000	FLOOD RISK
15 minute summer	HW	1	1.600	0.000	5.0	0.0000	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	26	Hydro-Brake®	HW	5.0				382.3

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DRAWINGS

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KEY

SITE BOUNDARY

©CROWN COPYRIGHT AND DATABASE RIGHTS 2021 ORDNANCE SURVEY 0100031673

DATE: 29/04/21	DRAWING TITLE: LOCATION PLAN		REV	DATE	NAME	CHECK	NOTES
DRAWN: AJS								
CHECKED: SR			DRAWING STATUS: FOR INFORMATION					
APPROVED: SR	PROJECT: BALMORAL WAY PHASE 2	CLIENT: ASHWOOD HOMES LTD	DRAWING No: AHL-1534-01-GA-002				REVISION No:	
SCALE @ A4: 1:5000								

A17

Drain

Lay-by

A17

Ditch

Easement 3.0

PUBLIC OPEN SPACE

Hedge

Line of Acoustic fence

DRY DETENTION BASIN
980m² AT 1m DEPTH

PUBLIC OPEN SPACE

S26
FLOW CONTROL MANHOLE
HYDROBRAKE UNIT REF:
CTL-SHE-0102-5000-1230-5000
DISCHARGE RATE: 5L/S
DESIGN HEAD: 1.230M

Willow House

Public Open Space

CHAFFINCH WAY

BALMORAL WAY PHASE 2

FOXP

Drain

Ditch

KEY:

EXISTING

ADOPTED FOUL DRAIN/ MANHOLE

PROPOSED

FOUL DRAIN/ MANHOLE

FOUL RISING MAIN

SURFACE WATER DRAIN/ MANHOLE

SURFACE WATER FILTER DRAIN

DRAINAGE EASEMENT

3.420 × PROPOSED LEVEL

REV	DATE	NAME	CHECK	NOTE

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CLIENT: ASHWOOD HOMES LTD

PROJECT: BALMORAL WAY PHASE 2

DRAWING TITLE: DRAINAGE STRATEGY

DRAWING STATUS: FOR APPROVAL

DATE: 30 April 2021

SCALE @ A1: 1:500

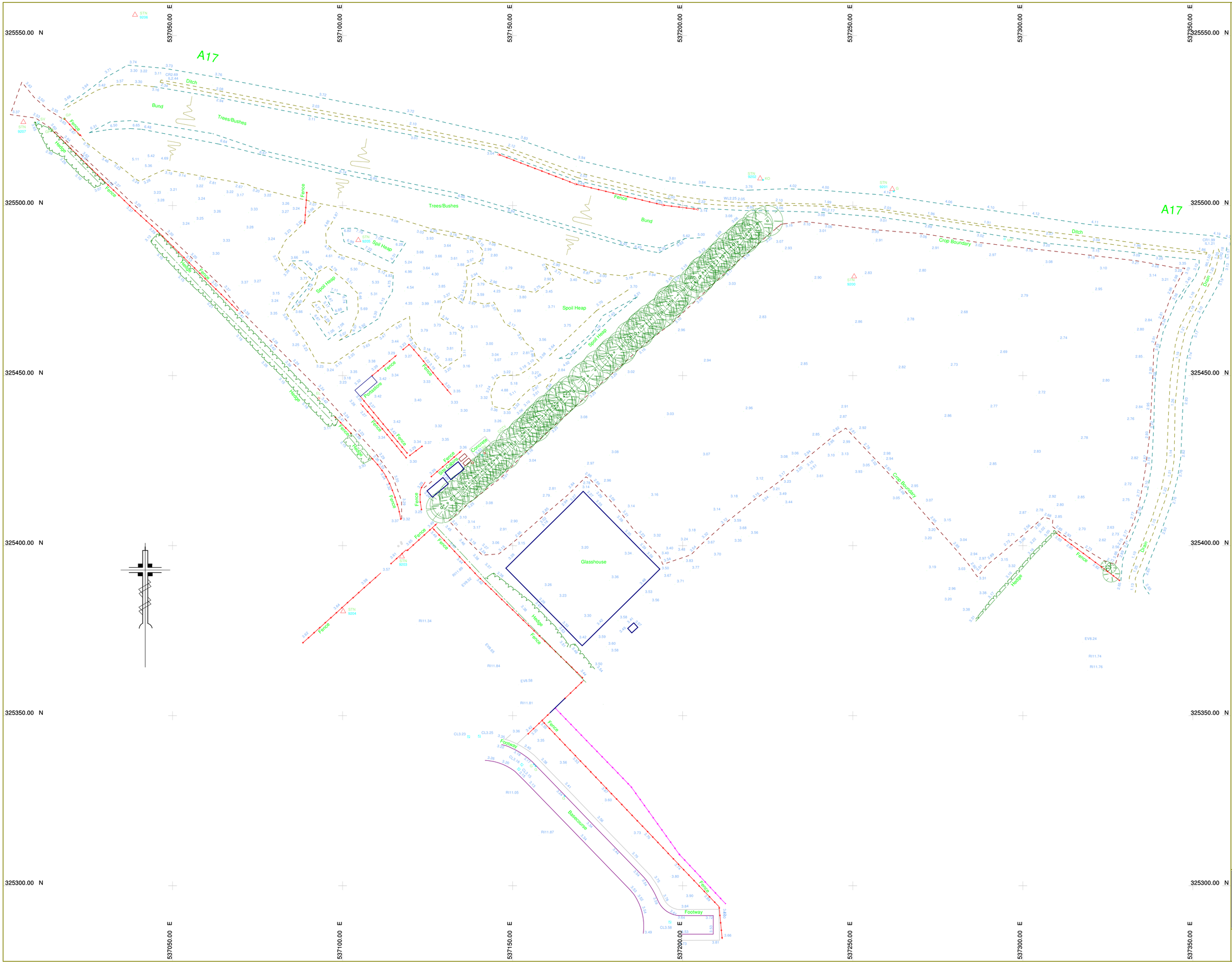
DRAWN: AJS

CHECKED: SR

APPROVED: CR

DRAWING No.: AHL-1534-01-DR-002

REVISION No.:



KEY:

- BUILDING
- FENCE
- HEDGE
- CHANNEL
- WALL
- BANK EDGE
- STORM DRAINAGE
- FOUL DRAINAGE
- CHANGE OF SURFACE
- OVERHEAD ELECTRIC
- OVERHEAD TELEPHONE

TREE BOREHOLE MANHOLE

CONTROL STATION

B	BOLLARD	RE	ROD EYE
BIN	BIN	RI	RIDGE
BT	BRITISH TELECOM	SP	SIGN POST
CR	PIPE CROWN	STAY	STAY
CTV	CABLE TELEVISION	SV	STOP VALVE
EA	EARTH	TBM	BENCH MARK
EL	ELECTRIC BOX	TH	THRESHOLD
EP	ELECTRIC POLE	TL	TRAFFIC LIGHT
EV	EAVES	TP	TELEGRAPH POLE
FH	FIRE HYDRANT	TS	TRAFFIC SIGNAL
G	GULLY	VC	VENT COLUMN
GA	GAS VALVE	VP	VENT PIPE
IC	INSPECTION CHAMBER	WL	WATER LEVEL
IL	INVERT LEVEL	WM	WATER METER
KO	KERB OFFLET	WT	WALL TOP
LH	LAMP HOLE		
LP	LAMP POST		
MP	MARKER POST		
PB	POST BOX		

NOTES:

1. Survey plotted to OS National Grid.
2. All levels related to OS Datum.
3. GPS/GLONASS ETRS89 observations transformed to OSGB36 using OSTN02 Transformation.
4. ETRS89 ellipsoid heights converted to heights above mean sea level using National Geoid Model OSGM02.

Initial Survey Date:	4 AUG 2014

CONTROL STATIONS

Stn:	Eastings:	Northings:	Height:
9200	537250.407	325479.158	2.874
9201	537261.621	325504.840	4.127
9202	537222.773	325507.975	3.976
9203	537117.456	325396.791	3.596
9204	537100.186	325380.679	3.610
9205	537104.626	325489.839	7.342
9206	537038.964	325556.097	3.829
9207	537006.143	325524.564	3.520

Rev:	Amendments:	Date:

Client: ASHWOOD HOMES

Project Title: BALMORAL WAY, HOLBEACH, LINCOLNSHIRE

Drawing Title: OGL SURVEY

Scale:	Date:
1:500	8 FEB 2021

Drawing No:	Rev:
AS2517/1	A1

C.A.D. Title: ASHWOODHOLBEACH270121

Drawn By: D.J.SMITH

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KEY:

SITE BOUNDARY:

1800mm Facing Brick wall: (brick to match adjacent property)

Bin Collection Areas: Refuse/Recycling Collection area

Affordable housing locations: *

SCHEDULE:

Unit	Beds	Storey	SqFt	Parking	No
Market					
Dee	2	2	732	ps	8
Aire	3	2	870	sg	12
Avon	3	2	910	sg	6
Coronation	3	2	932	sg	4
Nene	3	2	1,077	sg	3
Lock	3	2	1,079	sg	3
Mere	3	2	1,079	sg	9
Ribble	4	2	1,283	dg	6
Severn	4	2	1,229	sig	2
Harren	4	2	1,396	dg	2
				Sub-Tot	**55**
Affordable Housing 25% *					
A516	1	2	516	ps	2
A732	2	2	732	ps	10
A902	3	2	902	ps	6
				Sub-Tot	**18**
GRAND TOTAL				**Total**	**73**

REVISIONS:

Rev A: Mix updated, numbers changed to 92 total. 12.3.21
Rev B: POS moved, numbers reduced to 81. 6.4.21
Rev C: 9 plots removed, affordable provision adjusted. 8.4.21

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PROJECT: Land off BALMORALWAY, HOLBEACH PHASE 2

TITLE: PRELIMINARY PLANNING LAYOUT

CLIENT: ASHWOOD HOMES
GOLDSON ROAD, LINCS GATEWAY BUSINESS PARK
SPALDING, LINCOLNSHIRE
PE12 6 FY 01406 490590

PRELIMINARY

SCALE	DATE	DRAWN
1:500 @ A1	MARCH 2021	NKW

DRAWING NUMBER: 1280-003

REVISION: C