FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

Proposed Residential Development

Land at Grange Farm
Cannington
Bridgwater
Somerset

Prepared for:
Mrs D. Yorke

18th September 2018

Project Number:
RMA-C1739b

RMA ENVIRONMENTAL

environmental planning consultancy

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1 INTRODUCTION

Background

1.1 RMA Environmental Limited was commissioned by Greenslade Taylor Hunt (GTH) on behalf of Mrs D. Yorke to prepare a Flood Risk Assessment (FRA) to support an outline planning application for a proposed residential development on land at Grange Farm in Cannington, near Bridgwater, Somerset, TA5 2LA.

1.2 This FRA has been prepared in accordance with the National Planning Policy Framework (NPPF), associated Planning Practice Guidance (PPG) and Environment Agency (EA) standing advice on flood risk for new development.

Site Location and Land Use

1.3 The site comprises greenfield land which is currently in agricultural use. It extends to an area of 3.0 hectares (ha) and is located at National Grid Reference ST 26200 39015 (refer to Figure 1.1).

1.4 The site is bordered by the following land uses:

- residential development is located at the northern and north-eastern boundaries of the site;
- a flood relief channel for the Cannington Brook and an unnamed track form the southern boundary of the site, beyond which lies Grange Farm and agricultural land; and
- the A39 forms the western boundary of the site, beyond which lies Hawker's Lane (track) and agricultural land.

1.5 Access to the site is currently via the track located in the south-western corner of the site. Further details on site topography, geology and hydrology are set out in Section 2.

Proposed Development

1.6 The proposed development will incorporate 73 residential dwellings with accompanying gardens, parking and Local Equipped Area for Play (LEAP) (refer to the illustrative layout at Appendix A). An access road would lead onto the roundabout of the A39 located along the western boundary of the site. A 8 m maintenance buffer for the flood relief channel is located along the southern boundary of the site.

Requirements for a Flood Risk Assessment

1.7 The requirements for FRA are provided in the NPPF and associated PPG. Paragraph 163 of the NPPF (2018) requires that a site-specific FRA should be submitted with planning applications for all sites greater than 1 ha in Flood Zone 1; for sites of any size within Flood Zones 2 or 3; in an area within Flood Zone 1 which has critical drainage problems; in an area within Flood Zone 1 which is identified in a strategic flood risk assessment as being at increased flood risk in the future; or an area within Flood Zone 1 that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

1.8 Flood Zone 1 is defined as land with little or no flood risk (an annual exceedance probability [AEP] of flooding of less than 0.1%); Flood Zone 2 is defined as having a medium flood risk (an AEP of between 0.1% and 0.5% for tidal areas or 0.1% and 1.0% for rivers); and Flood Zone 3 is defined as high risk (with an AEP of greater than 0.5% for tidal areas or greater than 1.0% for rivers).

1.9 FRAs should describe and assess all flood risks (from rivers, the sea, sewers and groundwater) to and from the development and demonstrate how they will be managed, including an evaluation of climate change effects.

Consultation

1.10 Pre-application consultation has been undertaken with the following organisations:

- Somerset County Council, the Lead Local Flood Authority (LLFA), regarding flooding history and sustainable drainage (refer to Appendix B);
- Wessex Water in relation to foul drainage (refer to Appendix C); and
- the Environment Agency with regard to flood risk and the maintenance access to the flood relief channel (refer to Appendix D).

2 BASELINE ENVIRONMENTAL CONDITIONS

Topography

2.1 The site slopes in a south-easterly direction with the highest elevation of 10.57 metres Above Ordnance Datum (mAOD) along the western boundary of the site and a low point of 8.42 mAOD in the south-eastern corner of the site (refer to Appendix E).

Hydrology

2.2 The closest 'main river'[1] is an unnamed watercourse located along the southern boundary of the site. It flows in an easterly direction before joining the Cannington Brook approximately 500 m downstream of the site, within the catchment of the River Parrett. This watercourse has been subject to modification through the construction of a new flood relief channel as part of the Cannington Flood Defence Scheme which was completed in 2017. This is discussed further below.

2.3 A second 'main river', the Cannington Brook, is located approximately 180 m to the north-east of the site at its closest point and flows in an easterly direction.

2.4 In addition to the Cannington Brook and the flood relief channel, there are a number of minor land drains (or rhynes) located approximately 270 m to the south-east of the site. These rhynes are used to drain the generally low-lying farmland to the east of the site.

2.5 Cannington Brook is classified as an Internal Drainage Board (IDB) Viewed Rhyne 920 m to the east of the site as well as a 'main river'. A Viewed Rhyne is defined as "*an ordinary watercourse that undertakes a significant function in the drainage or irrigation of an area*".

2.6 There are no other significant watercourses or water bodies within the surrounding area.

Geology and Hydrogeology

2.7 As reported on the British Geological Survey (BGS) online Geology of Britain Viewer, the site is not underlain by any superficial geology; however, it is underlain by the bedrock geology of the Mercia Mudstone Group, comprising mudstone and halite-stone.

2.8 The EA classify the bedrock geology as Secondary B Aquifer, which is defined as *"predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers".*

2.9 The SPRHOST value for the catchment surrounding the site is 40.62, indicating a high percentage runoff and low permeability; therefore, the soils on the site are considered to have limited drainage potential.

2.10 The site is not located within a Source Protection Zone (SPZ).

[1] Main river is defined by the EA as any watercourse that contributes significantly to the hydrology of a catchment.

3 EXTERNAL FLOOD RISK

Flooding Mechanisms

3.1 The EA's flood map for planning (refer to Appendix F) indicates that the site lies within Flood Zones 1 and 2 (low and medium risk, respectively). Consultation with the EA (refer to Appendix D) has confirmed that the area of Flood Zone 2 within the site will be removed as it is based on a historical event and not on detailed hydraulic modelling. Therefore, the majority of the application site is located within Flood Zone 1 with small areas of Flood Zone 2 along the northern and western boundaries of the site.

3.2 The EA's surface water flood risk map identifies that the majority of the site has a very low risk from surface water with a small area of up to high surface water flood risk.

3.3 The EA's reservoir flood risk map identifies that the site is located within an area at risk of reservoir flooding.

3.4 According to Somerset County Council historic flood records, the site is in close proximity to an area of the sewer flooding.

3.5 A review of the Strategic Flood Risk Assessment and EA flood maps has identified that there are no other significant sources of flooding at the site, i.e. from groundwater.

Historic Flooding

3.6 The Sedgemoor District Council SFRA (2015) has been reviewed to identify any records of flooding at or in close proximity to the application site; this indicates that there are a number of fluvial and surface water records immediately to the north and west of the site (refer to Figure 3A of the SFRA). The site area is shown as a location by Somerset County Council where past flooding has been recorded (refer to Figure 4 of the SFRA). A fluvial flood event occurred in November 2012 which resulted in roads and property flooding in areas of Cannington including Main Road and Southbrook, located immediately to the north of the site. The SFRA notes surface water flooding occurring in Cannington including five incidents in 2002 and reports a storm sewer surcharging during these events.

3.7 The EA's historic flood records identify a record of historic flooding occurring on 20th November 2012 affecting the eastern part of the site. This flood event appeared to originate from the watercourse to the north of the site exceeding its channel capacity.

3.8 Somerset County Council historic flood records show records of flooding that have occurred within the vicinity of the site (refer to Appendix B). The historic flood records affecting Northbrook Road, located approximately 25 m to the north-east of the site, are as follows:

- 1st August 1965 - flooding from the Cannington Brook;
- 10th July 1968 – surface water flooding and flooding from the Cannington Brook;

- 3rd August 1997 – surface water flooding due to a summer storm;
- 30th October 2000 and 7th December 2000 – surface water and sewer flooding affecting various houses along Northbrook Road; and
- 15th November 2000 – surface water flooding affecting 30 Northbrook Road.

3.9 A review of the above information has identified that historical flood records have had a direct impact on the site. However, with the implementation of the Cannington Flood Defence Scheme (2017) and appropriate mitigation measures, the risk of flooding from these sources is significantly less.

Tidal Flood Risk

3.10 Detailed flood data provided by the EA from the Wessex North Coast Model (EA, 2012) is included as Appendix F. The modelled tidal flood levels for the site during the defended and undefended scenarios are included in Table 3.1.

Table 3.1: Modelled Tidal Flood Levels for the Site

AEP Event	Flood Level (mAOD)
Defended	
0.5%	N/A
Undefended	
0.5%	N/A
0.1%	8.56

3.11 For the undefended scenario, the Wessex North Coast Model indicates that the site does not flood during the 0.5% AEP event.

3.12 For the 0.1% AEP undefended scenario, a small area of the south-eastern corner of the site would flood to a maximum depth of 0.14 m during the 0.1% AEP event. Therefore, the majority of the site is located within tidal Flood Zone 1, with a small area in the south-eastern corner being located within tidal Flood Zone 2.

3.13 The EA's flood defence map and defence information (Appendix F) shows that the Cannington Flood Defence Scheme consists of a culvert, revetted channel, natural banks, reno mattress revetment, concrete block revetted bank and reno mattress and rock armour revetted bank. For the majority of the southern boundary, the flood relief channel is an open channel and, in the south-western corner, it joins the existing channel. No crest levels of the flood defences have been provided.

3.14 The overall condition grades of the defences range from fair to very good in the most recent inspection (Appendix F).

3.15 For the 0.5% AEP event, the site would remain protected from tidal flooding for the operational lifetime of the development.

Fluvial Flood Risk

3.16 Detailed fluvial flood data provided by the EA from the Cannington FDS Model (EA, 2017) is included as Appendix F. The modelled fluvial flood levels for the site are shown in Table 3.2.

Table 3.2: Modelled Flood Depths for the Site

AEP Event	Maximum Flood Depth (m)
5%	Nil
1%	Nil
1% + 30% Climate Change (CC)	Nil
0.1%	0.44

3.17 The flood depths show that the site would not flood during the 5% AEP and 1% AEP events as the site is elevated above these flood levels. The floodplain for the 5% AEP event is located approximately 65 m to the east of the site. The floodplain for the 1% AEP event is located approximately 20 m to the south of the site near the south-eastern corner (refer to Figure 3.1). Therefore, the site is not located within Flood Zones 3a or 3b.

3.18 All proposed dwellings will be located within Flood Zone 1. The latest guidance on climate change for the South West states that a climate change allowance of 30% should be used for 'more vulnerable' development located in Flood Zone 1. The flood extent for the 1% AEP plus 30% CC event is located approximately 20 m to the south of the site near the south-eastern corner (refer to Figure 3.2).

3.19 The floodplain for the 0.1% AEP event includes areas along the western and northern boundaries (refer to Figure 3.3). During the 0.1% AEP event, the site could flood to a maximum depth of 0.44 m along the western boundary of the site. Flooding does not originate from the flood relief channel exceeding its capacity but originates from the Cannington Brook to the north of the site overtopping and flowing down the Main Road, Lonsdale Road and Southbrook towards the site.

3.20 Therefore, the majority of the site is located within fluvial Flood Zone 1 with small areas along the western and northern boundaries located within fluvial Flood Zone 2.

Surface Water Flood Risk

3.21 The majority of the site has a very low surface water flood risk which is defined where *"each year, this area has a chance of flooding of less than 1 in 1000 (0.1%)."*

3.22 An area of low surface water flood risk is located along the corridor of the watercourse alongthe southern boundary of the site. Low surface water flood risk is defined where "*each year, the area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%)".*

3.23 A small area of medium and high surface water flood risk is also located along the southern boundary of the site. Medium surface water flood risk is defined where *"each year, this*

area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).” High surface water flood risk is defined where *“each year, this area has a chance of flooding of greater than 1 in 30 (3.3%)”.*

3.24 The surface water flood risk on the site is considered to be strongly related to fluvial flooding from the existing channel. The majority of the site has a very low risk of flooding from surface water and with the Cannington Flood Defence scheme implemented, it is considered unlikely that surface water flooding would adversely affect the site.

Reservoir Flooding

3.25 The EA’s flooding from reservoir map indicates that the site is located within an area at risk of reservoir flooding from the Hawkridge Reservoir. According to the Sedgemoor District Council SFRA (2015), the Hawkridge Reservoir has a capacity of 864,000 m^3. All reservoirs over 25,000 m^3 capacity are regularly inspected and supervised by reservoir panel engineers, therefore ensuring that they are maintained in a stable condition.

3.26 The EA’s further information on reservoir flood risk also states that “*Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925*.” It is therefore considered that flood risk to the site from reservoirs is negligible to low.

Sewer Flooding

3.27 The Somerset County Council historic flood records and the SFRA (2015) show records of sewer flooding along Northbrook Road located approximately 25 m to the north-east of the site. However, the exact magnitude, extent and location of these flooding incidents are not recorded.

3.28 Mitigation against sewer flooding could be achieved through the provision of non-return valves which prevent water entering the properties from drains and sewers. Non-return valves can be installed with gravity sewers or drains, within the site’s private sewer system. Further information is provided in the CIRIA publication ‘*Low cost options for prevention of flooding from sewers’*. Therefore, the risk from sewer flooding is deemed to be low.

Mitigation Measures

Finished Floor Levels

3.29 In accordance with EA guidance, Finished Floor Levels (FFLs) for the site should be a minimum of 600 mm above the design flood level (i.e. 1% AEP event plus climate change) or 300 mm above existing ground level, whichever is higher. The proposed dwellings are located within Flood Zone 1 and the modelled flood extents indicate that during the 0.1% AEP flood event the floodwater remains within the flood relief channel and only the northern and western boundaries of the site are affected. The in-channel flood levels are currently unavailable for the flood relief channel and, therefore, the FFLs will be determined in the detailed design stage when these in-channel flood levels are available for a number of points immediately adjacent to the site. However, flood levels extracted from the 2D model domain at the nearest floodplain locations upstream and downstream of the site indicate

that the 1% AEP with climate change flood level ranges from 9.36 mAOD to 8.22 mAOD, respectively.

Safe Access/Egress

3.30 Safe access/egress would be across the A39 roundabout in a westerly direction towards an area of Flood Zone 1 located approximately 60 m to the west of the site along the A39. It has been demonstrated that the site and the access/egress route would not flood during the 1% AEP event or the 1% AEP event plus climate change. However, areas along the western boundary and the northern boundary of the site could flood during the 0.1% AEP event.

3.31 On this basis, it is concluded that future occupants of the development would be safe during the design flood event for the operational lifetime of the development.

Land Use Vulnerability

3.32 Table 2 of the NPPF PPG sets out a schedule of land uses based on their vulnerability or sensitivity to flooding. As set out in Table 2, the development is classified as a land use that is 'more vulnerable' to flooding. Referring to Table 3 of the PPG, 'more vulnerable' land use is considered appropriate within Flood Zone 1 and Flood Zone 2 subject to passing the Sequential Test.

3.33 However, all built development has been located on land within Flood Zone 1 and 'more vulnerable' development is considered acceptable within Flood Zone 1 without the need to apply the Sequential and Exception Tests.

3.34 Therefore, on the basis of land use vulnerability, the development should be deemed appropriate in planning policy terms in its proposed location.

4 DRAINAGE ASSESSMENT

Introduction

4.1 This drainage strategy has been prepared in accordance with Defra's *"Non-statutory technical standards for sustainable drainage systems"* (March 2015) to ensure that the proposed development does not increase flood risk to the site or elsewhere and where practicable reduces flood risk over the lifetime of the development.

4.2 Peak rainfall intensity is expected to increase as a result of climate change and, as such, storage calculations have included a 40% increase in rainfall depths in accordance with the current climate change guidance.

4.3 It should be noted that this report presents an outline strategy for managing surface water in accordance with current policy and will be refined though detailed design, which could be controlled by a suitably worded planning condition.

Existing Runoff Arrangements

4.4 The site is greenfield, comprising agricultural land. Currently any surface water runoff generated within the site flows overland towards the south-eastern corner of the site and into Cannington Brook which is located along the southern boundary of the site.

4.5 Greenfield runoff rates for the site (3.0 ha) have been estimated using the UK Sustainable Drainage Greenfield Runoff Estimation Tool. The calculation record is included in Appendix G and the results are summarised as follows:

- 1 in 1 year – 3.4 l/s/ha
- 1 in 30 years – 8.5 l/s/ha
- 1 in 100 years – 10.6 l/s/ha

Proposed Runoff Rates

4.6 The proposed development will introduce impermeable areas to the site which have been estimated as approximately 40% of the total site area; this corresponds to an area of 1.12 ha. The impermeable area has been used to calculate the proposed runoff rates for the site using the UK Sustainable Drainage Greenfield Runoff Estimation Tool. The calculation record is included in Appendix G and the results are summarised as follows:

- 1 in 1 year – 3.8 l/s
- 1 in 30 years – 9.5 l/s
- 1 in 100 years – 11.9 l/s

4.7 It is proposed to limit runoff to greenfield runoff rates up to and including 1 in 100 year storm plus 40% allowance for climate change.

Storage Estimate

4.8 The impermeable area is increased by 10% to account for urban creep over the lifetime of the development and an impermeable area of 1.23 ha has therefore been used to estimate the attenuation storage required.

4.9 A quick storage estimate has been undertaken using Micro Drainage to inform the outline drainage strategy; the results are included in Appendix G. This estimates that an attenuation volume of between 765 m^3 and 1,176 m^3 is required in order to limit the runoff rate to greenfield rates for all events up to and including the 1 in 100 year storm plus 40%.

Discharge Method

4.10 The reported hydrological characteristics of the site suggest that infiltration may not be feasible; however, this will be confirmed via infiltration testing during the detailed design stage. If the results prove favourable, the proposed drainage strategy will include infiltration techniques, where possible.

4.11 If infiltration techniques are confirmed to be unfeasible, then attenuation will be included in the detailed design of the drainage strategy to provide storage for the 1 in 100 year storm including a 40% allowance for climate change. A discharge to a watercourse could be achieved via a connection to the flood relief channel for the Cannington Brook located along the southern boundary of the site.

4.12 An attenuation-based strategy with a controlled discharge to the flood relief channel for the Cannington Brook along the southern boundary of the site is set out below.

Outline Drainage Strategy

4.13 The maximum attenuation volume of 1176 m^3 could be provided in the form of a swale along the southern boundary of the site to the north of the maintenance margin for the flood relief channel (refer to Figure 4.1). The swale would have a depth of 1 m, a width of 7.8 m, length of 245 m and side slopes of 1 in 3. It is recommended that a 6 m margin is kept clear of obstacles from the top of the bank in order to allow access for maintenance of the basin during its lifetime.

4.14 Other features, such as bio-retention areas, rain gardens and permeable paving could be considered during the detailed design stage to offset storage from the attenuation basin, provide water quality treatment and encourage infiltration and evapotranspiration losses.

Designing for Exceedance Events

4.15 If the proposed drainage system were to become blocked or an event above the design event occur, then exceedance flows would be routed along the road network towards the south-eastern corner of the site. This would mimic what would occur naturally on the site in its existing condition and would ensure that the proposed dwellings are safe during an exceedance event.

Long Term Maintenance of SuDS

4.16 Where SuDS features serve more than one property, it would be the responsibility of the developer to either maintain the SuDS features themselves or to negotiate with and secure the agreement of a third party to maintain the sustainable drainage system.

4.17 The maintenance requirements of the proposed SuDS features for use in the outline drainage strategy are detailed in the SuDS Manual and would be carried out accordingly.

Foul Drainage

4.18 Consultation was undertaken with Wessex Water to confirm capacity within the local foul sewerage network to serve the proposed development (refer to Appendix C). This identified that there is limited capacity within Cannington to accommodate the proposed flows and, therefore, upsizing and capacity improvements within the system would be required. The proposed point of connection is located to the north-west of the site on Main Road.

4.19 Given the site topography, it is likely that a pumping station will be required to connect to the foul sewer. Figure 4.1 demonstrates an indicative pumping station located in the south-eastern corner of the site and the required exclusion zone from the wet well. The pumping station will need to be located at a lower elevation than the proposed dwellings. A Type 3 pumping station (8 m x 12 m) is illustrated in Figure 4.1; further sizing consideration at the detailed design stage will be required, including the potential use of positive displacement pumps.

4.20 Alternatively, a package treatment plant with a discharge to the Cannington Brook to the south of the site could also be considered as a feasible solution.

5 CONCLUSIONS

5.1 The requirements for a Flood Risk Assessment are provided in the National Planning Policy Framework and its associated Planning Practice Guidance, together with the Environment Agency's Guidance Notes. This policy and associated guidance have been followed in the preparation of this FRA.

5.2 The EA's flood map for planning identifies that the application site lies within Flood Zones 1 and 2 and, therefore, flood risk from rivers and the sea is considered to be low to medium.

5.3 The EA's surface water map shows that the majority of the site has a very low risk of surface water flooding and with up to a high surface water flood risk located along the southern boundary. With the construction of the Cannington Flood Defence scheme, it is considered unlikely that surface water flooding would adversely affect the site.

5.4 The site is also potentially at risk of flooding from reservoirs; however, the flood risk to the site from these sources is considered to be negligible to low.

5.5 The site is potentially at risk of sewer flooding due to the close proximity of historic sewer flood records along Northbrook Road located 25 m to the north-east of the site. With mitigation, the risk from sewer flooding is deemed to be low.

5.6 A review of further EA maps and the SFRA have identified that there are no other significant sources of flooding at the site, i.e. from groundwater. There is a record of historical flooding occurring within the site in November 2012; however, with the implementation of the Cannington Flood Defence Scheme and appropriate mitigation measures, flood risk to the site has been significantly reduced.

5.7 Detailed tidal flood data from the EA indicates that during the undefended 0.1% AEP event, the site could flood to a maximum depth of 0.14 m; however, it would not flood during the undefended or defended 0.5% AEP event.

5.8 Detailed fluvial data from the EA indicates that the site would not flood during the 5%, 1% and the 1% AEP plus 30% CC events and therefore the site is not located within Flood Zones 3b or 3a. The fluvial flood extent for the 0.1% AEP event includes areas along the western and northern boundaries which are located in Flood Zone 2. However, the proposed houses will be located within Flood Zone 1.

5.9 The in-channel flood levels are currently unavailable for the flood relief channel and, therefore, the FFLs for individual dwellings will be either 600 mm above the design flood level or 300 mm above existing ground levels.

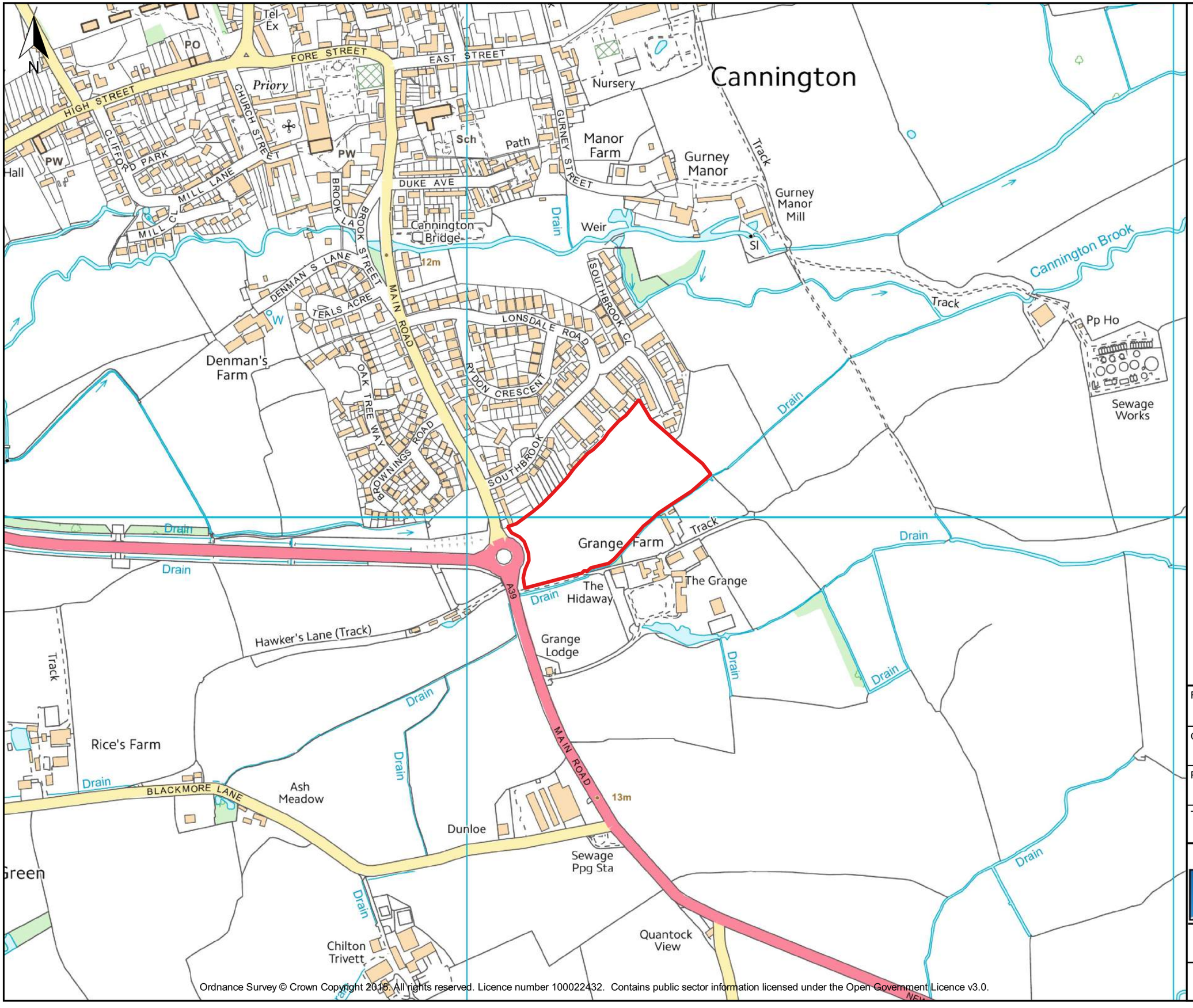
5.10 Safe access/egress would be along the A39 to the west of the site. The site and the access/egress route would not flood during the 1% AEP event or the 1% AEP event plus CC.

5.11 The proposed drainage strategy, including a swale, is considered feasible and would ensure that surface water runoff rates for the proposed development would be limited to equivalent greenfield runoff rates for the operational lifetime of the development. Surface

water runoff would discharge into the flood relief channel to the south of the site. Attenuation would be provided for all return periods up to and including the 1 in 100 year event inclusive of a 40% allowance for climate change with a maximum discharge rate for this event of 11.9 l/s.

5.12 This FRA has therefore demonstrated that the proposed development will be safe and that it would not increase flood risk elsewhere. Therefore, on the basis of land use vulnerability, the development should be deemed appropriate in planning policy terms in its proposed location, subject to passing the Sequential Test.

Figures



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Key

Application Site

Figure 1.1:	**Site Location Plan**
Client:	**Mrs D. Yorke**
Project:	**Grange Farm, Cannington**
Title:	**Flood Risk Assessment**

RMA ENVIRONMENTAL

Drawn:	Checked:	Date:	Scale:
RT	RM	03/04/2018	1:5,000@A3

Key

- Application Site

Fluvial Flood Depth

- Less than 0.2 m
- 0.2 m - 0.4 m
- 0.4 m - 0.6 m
- 0.6 m - 0.8 m
- 0.8 m - 1.0 m
- Greater than 1.0 m

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Figure 3.1:	**Fluvial Flood Depths for the 1% AEP Event**
Client:	**Mrs D. Yorke**
Project:	**Grange Farm, Cannington**
Title:	**Flood Risk Assessment**

RMA ENVIRONMENTAL

Drawn:	Checked:	Date:	Scale:
RT	NY	11/09/2018	1:1,000@A3

Key

- Application Site

Fluvial Flood Depth

- Less than 0.2 m
- 0.2 m - 0.4 m
- 0.4 m - 0.6 m
- 0.6 m - 0.8 m
- 0.8 m - 1.0 m
- Greater than 1.0 m

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Figure 3.2:	**Fluvial Flood Depths for the 1% plus 30% CC AEP Event**
Client:	**Mrs D. Yorke**
Project:	**Grange Farm, Cannington**
Title:	**Flood Risk Assessment**

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N

15m offset from wet well - no habitable buildings

6m buffer - no new trees

foul pumping station

LEAP (local equipped area for play)

flood alleviation channel with 8m maintenance buffer

Drain

swale (7.6m wide with 6m maintenance buffer)

Track

Grange Farm

Grange Barn

Hidaway Cottage

The Grange

GRANGE CLOSE

SOUTHBROOK

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Key

Application Site

Fluvial Flood Depth

- Less than 0.2 m
- 0.2 m - 0.4 m
- 0.4 m - 0.6 m
- 0.6 m - 0.8 m
- 0.8 m - 1.0 m
- Greater than 1.0 m

Figure 3.3: **Fluvial Flood Depths for the 0.1% AEP Event**

Client: **Mrs D. Yorke**

Project: **Grange Farm, Cannington**

Title: **Flood Risk Assessment**

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RT	NY	11/09/2018	1:1,000@A3

Key

- Application Site
- Swale
- Maintenance Margin

Figure 4.1: **Outline Drainage Strategy**

Client: **Mrs D.Yorke**

Project: **Grange Farm, Cannington**

Title: **Flood Risk Assessment**

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Appendix A: Proposed Development Layout

Note:
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Do not scale for construction purposes - use figured dimensions only.
Check dimensions on site before work proceeds.
Report discrepancies to the Architect.

Rev	Description	Date	By
A	transfered to topographical survey	20.06.18	lehm
B	position of tree and parking space numbers	16.07.18	lehm
C	layout amended for flood risk	07.08.18	lehm

N.B: approx. GIAs

2 bed - 76m2	x20	
3 bed - 88m2	x28	
3/4 bed - 115m2	x12	
4 bed - 120m2	x13	
TOTAL	73	
car parking spaces	176	
single garages	24	
TOTAL	200	
approx. site area	3.03ha	
housing density	24.1 dwellings/ha	
excluding swale, bufer strip & pumping station		
approx. site area	2.42ha	
housing density	30.2 dwellings/ha	

SCALE 1:1000

0 10 20 30 40 50m

gth Greenslade Taylor Hunt

LAND & PLANNING DIVISION
WINCHESTER HOUSE
DEANE GATE AVENUE
TAUNTON
SOMERSET
TA1 2UH

TEL: 01823 334466

PROJECT TITLE

Land at Grange Farm
Cannington

DRAWING TITLE

Proposed residential development

Site Plan

STATUS	sketch		
SCALE	1/1000	SHEET SIZE	A3L
DATE	May 2018	DRAWN	lehm
DWG NO.	2494-sk-01	REVISION	C

Appendix B: LLFA Consultation

Rosie Tutton

From: Flooding <Flooding@somerset.gov.uk>
Sent: 31 August 2018 13:47
To: Rosie Tutton
Subject: RE: Preliminary Enquiry - Land to the north of Grange Farm, Cannington
Attachments: Historical Flooding TA5 2JY.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Good afternoon Rosie

Thank you for your enquiry.

I have attached the flood data we have on the area you are looking at. The postcode is approximately 200m away from the one provided because we have no flood data on the exact postcode given.

Details of our requirements for SUDS and the West of England Developer Guide can be found on our webpage: http://www.somerset.gov.uk/environment-and-planning/flooding/sustainable-drainage-in-somerset/ All new drainage systems for new and redeveloped sites must, as far as practicable, meet the Non-Statutory Technical Standards for Sustainable Drainage Systems. There is a desire in the county for high-quality multi-functional SUDS.

Typical requirements include:

- A review of the existing surface water drainage regime at the site, including an assessment of baseline (greenfield) runoff, existing ground and site conditions, and any existing infrastructure and impermeable areas.
- Details of a preferred drainage strategy, to include information about the measures taken to prevent flooding and pollution of the receiving groundwater and/or surface waters. Planning policy stipulates a preference for developments that incorporate sustainable drainage techniques that achieve a number of benefits, including flood risk, water quality, amenity and biodiversity. We would expect to see a drainage proposal on this basis.
- A proof of concept with an alternative drainage proposal should the preferred strategy later prove to be unfeasible. More details on proof of concept can be found in the West of England SUDS guide.
- Provision of details of flood water exceedance routes both on and off site. No part of the site must be allowed to flood during any storm up to and including the 1 in 30 event, flooding during storm events in excess of this including the 1 in 100yr (plus 40% allowance for climate change) must be controlled within the designed exceedance routes demonstrated to prevent flooding or damage to properties. For developments in the catchment of the River Tone: The River Tone is particularly prone to flooding. Therefore, the maximum allowable runoff in the catchment of this river is 2 l/s/ha (or the Qbar greenfield runoff rate, whichever is lower).
- Details of any works required off site to ensure adequate discharge of surface water without causing flooding or pollution (which should include refurbishment of existing culverts and headwalls or removal of unused culverts where relevant).
- Details of phasing (where appropriate) and information of maintenance of drainage systems during construction of this and any other subsequent phases.
- A management and maintenance plan which shall include the arrangements for adoption by an appropriate public body or statutory undertaker, management company or maintenance by a Residents' Management Company and / or any other arrangements to secure the operation and maintenance to an approved standard and working condition throughout the lifetime of the development.

I hope the information answers your enquiry.

Regards

Andy Lambart
Flood Risk Management
Community Infrastructure Commissioning

Somerset County Council | PP B2E 2a | County Hall | The Crescent | Taunton | TA1 4DY |

Tel: 01823 – 359667 | **E-mail**: ALambart@somerset.gov.uk **Web**: www.somerset.gov.uk.

www.gov.uk/floodsdestroy

DO YOU KNOW WHAT TO DO?

FLOODS DESTROY BE PREPARED

From: Rosie Tutton [mailto:rosie.tutton@rma-environmental.co.uk]
Sent: 29 August 2018 08:49
To: Josian Lebrun; Flooding
Subject: RE: Preliminary Enquiry - Land to the north of Grange Farm, Cannington

Dear Flood Risk Management Team,

Please could you provide a response to the email below regarding a proposed residential development on land to the north of Grange Farm in Cannington, near Bridgwater, Somerset (see attached plan).

Kind regards,
Rosie

Rosie Tutton
Environmental Consultant

RMA ENVIRONMENTAL

Website: www.rma-environmental.co.uk

Exeter Office: Suite 4, Swallow Court, Devonshire Gate, Tiverton, EX16 7EJ
Phone: 01884 842740

From: Rosie Tutton
Sent: 03 April 2018 13:42
To: Josian Lebrun <JLebrun@somerset.gov.uk>

Cc: Nick Yeo <nick.yeo@rma-environmental.co.uk>
Subject: Preliminary Enquiry - Land to the north of Grange Farm, Cannington

Dear Josian,

We have been instructed to prepare a FRA and surface water drainage strategy for an outline planning application for a proposed residential development on land to the north of Grange Farm in Cannington, near Bridgwater, Somerset, TA5 2LA. The grid reference is ST 26200 39015 and I have attached the site location plan. It is understood that a new flood alleviation channel has been constructed for the watercourse along the southern boundary of the site and therefore the EA is updating their flood maps.

We will be preparing a surface water drainage strategy and will aim to limit runoff rates and volumes to greenfield equivalents. As infiltration testing has not yet been undertaken, we plan to demonstrate a feasible alternative with an attenuation-based system.

Does the LLFA have any information of flooding and drainage in the local area?

I would welcome any initial comments you have on the proposal and, whether there are any specific issues you would like us to look at.

Please let me know if you need any more information.

Kind regards,
Rosie

Rosie Tutton
Environmental Consultant, RMA Environmental

ENVIRONMENTAL PLANNING / EIA / FLOOD RISK / WATER QUALITY / HYDROLOGY

Office: 01884 842740
Direct: 01884 842748
Email: rosie.tutton@rma-environmental.co.uk
Web: www.rma-environmental.co.uk

Office Address: Suite 4, Swallow Court, Devonshire Gate, Tiverton, Devon, EX16 7EJ
Registered Office: 2 Chartfield House, Castle Street, Taunton, TA1 4AS
Registered in England No: 6915388

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Somerset County Council.

Extract from Somerset County Council's Historical Flood Database

Town Village: Cannington Location: Northbrook Road Location ID 46

Location ID: 46 **Postcode:** TA5 2JY **Event Ref:** FF 407 **Date:** 01/08/1965 **Types Affected:** Houses **Properties Affected:** 1
Flood Source: Cannington Brook **Frequency:** Regularly
Details: Northbrook Road flooded from Cannington brook

Location ID: 46 **Postcode:** TA5 2JY **Event Ref:** FF 413 **Date:** 10/07/1968 **Types Affected:** Houses **Properties Affected:** 4
Flood Source: Can. Brook/ Surface **Frequency:** Regularly
Details: Northbrook road flooded.

Location ID: 46 **Postcode:** TA5 2JY **Event Ref:** FF 726 **Date:** 03/08/1997 **Types Affected:** Houses **Properties Affected:** 1
Flood Source: Surface/ Drainage **Frequency:** Regularly
Details: Northbrook Road flood due to summer storm

Location ID: 46 **Postcode:** TA5 2JY **Event Ref:** FF 784 **Date:** 30/10/2000 **Types Affected:** Houses **Properties Affected:** 20
Flood Source: Surface/ Drainage **Frequency:** Regularly
Details: Sewerage & surface water flood various houses.

Location ID: 46 **Postcode:** TA5 2JY **Event Ref:** FF 787 **Date:** 15/11/2000 **Types Affected:** Houses **Properties Affected:** 1
Flood Source: Surface **Frequency:** Regularly
Details: 30 Northbrook Road

Location ID: 46 **Postcode:** TA5 2JY **Event Ref:** FF 788 **Date:** 07/12/2000 **Types Affected:** Houses **Properties Affected:** 19
Flood Source: Surface/ Drainage **Frequency:** Regularly
Details: Sewerage & surface water flood various houses.

NB: *Disclaimer: All information shown on this document is derived from electronic records obtained by third parties and held by Somerset County Council (SCC), this information are frequently updated and amended. Somerset County Council is not responsible for the accuracy of this information nor can it offer any assurance that the information provided is accurately reflected.*
The information derived from SCC's Historical Database cannot be used to identify individual properties that have flooded. This is provided for information purposes only and should not be published or distributed without written permission from Somerset County Council.

Appendix C: Wessex Water Consultation

Rosie Tutton

From: Teddy Takyi-Amuah <Teddy.Takyi-Amuah@wessexwater.co.uk>
Sent: 22 May 2018 11:32
To: Georgia Turner
Cc: Rosie Tutton
Subject: WW CAP RESP ; SC/ST23NE/ 137 : land at Grange Farm in Cannington

Follow Up Flag: Follow up
Flag Status: Completed

Good Afternoon Rosie,

Many thanks for your email. As requested, please review the comments below.

FW DISPOSAL

- Limited capacity within Cannington to accommodate the proposed flows.

- The proposed flows represent a significant increase in flows to the receiving Foul manhole within the catchment.

- Most adequate and closest point of connection can be discussed at MH 0002
  It is apparent that cumulative flows from development sites coming forward will trigger the need for upsizing and capacity improvements downstream of any agreed point of connection.

- On this basis we will be seeking to agree a foul and surface water drainage strategy with a scheme of works supporting the rate of development. We will need to work closely with the developer and the planning authority to ensure that we can plan design and construct the necessary improvements. Wessex Water will need a suitable period once outline planning consents are secured to develop a detailed design and construct any network upgrades.

- Prioritizing and programming these works will require consultation with all stakeholders to ensure that capacity improvements can be delivered to match the rate of development & available capacity.

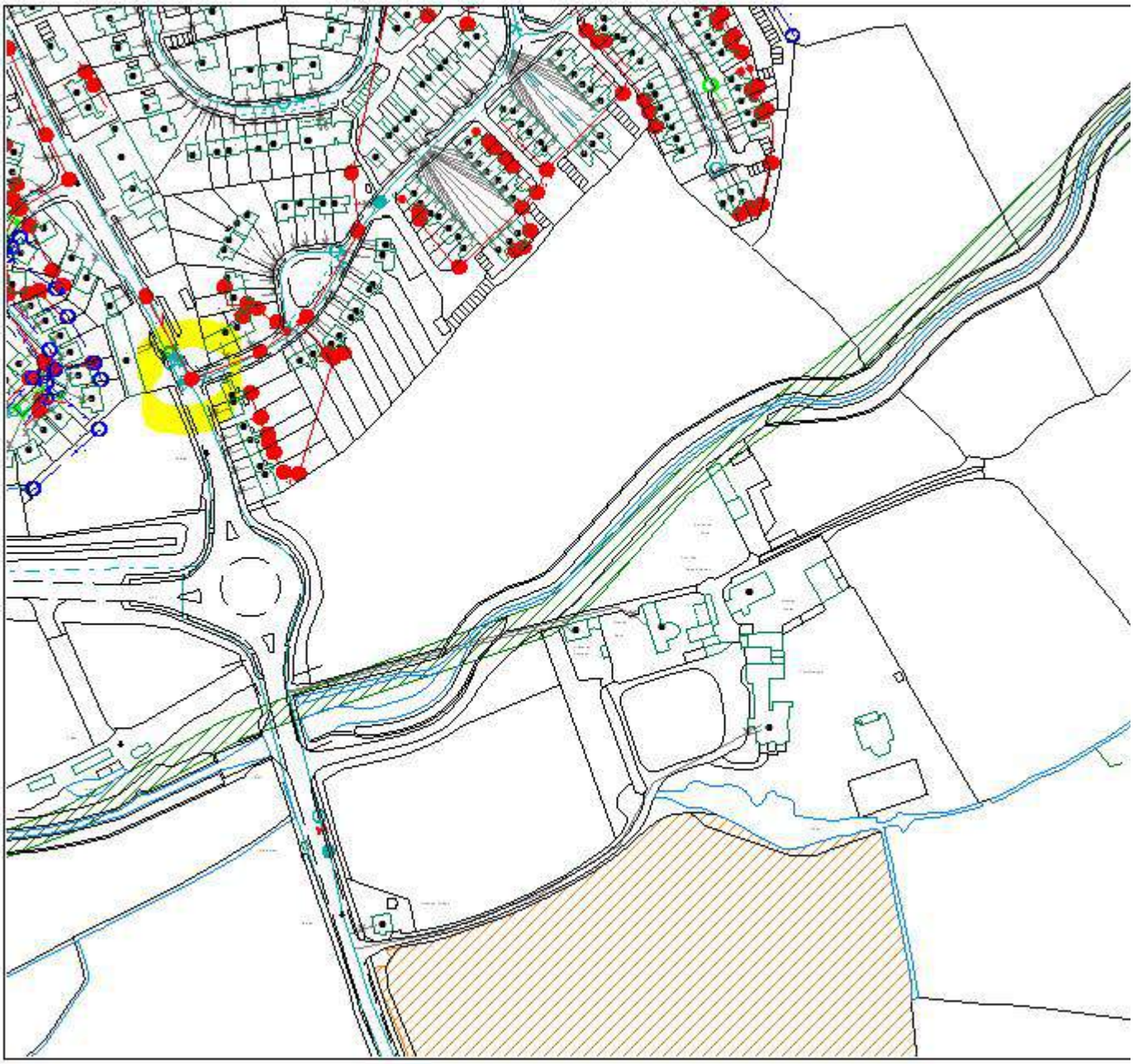
SW DISPOSAL

- There are no SW sewers in close proximity of the site.

- Surface water to be discharged to local land drainage systems, subject to approval by the Lead Local Flood Authority and any necessary flood risk measures.

- We anticipate that In accordance with NPPF Guidelines, surface water flows to be considered on site as far as possible with soakaways and other SuDS arrangements.

- Surface water will need to be disposed of in accordance with NPPF Guidelines and LLFA requirements as per above .



I hope the above response answers your enquiry for now.

Kind regards

Teddy Amuah

From: Georgia Turner
Sent: 09 May 2018 13:56
To: Teddy Takyi-Amuah <Teddy.Takyi-Amuah@wessexwater.co.uk>
Subject: SC/ST23NE/ 137 : Preliminary Enquiry- Surface and foul drainage for land at Grange Farm in Cannington

From: Rosie Tutton [mailto:rosie.tutton@rma-environmental.co.uk]
Sent: 18 April 2018 11:52
To: Teddy Takyi-Amuah <Teddy.Takyi-Amuah@wessexwater.co.uk>

Cc: Planning Liaison <planning.liaison@wessexwater.co.uk>; Nick Yeo <nick.yeo@rma-environmental.co.uk>
Subject: Preliminary Enquiry- Surface and foul drainage for land at Grange Farm in Cannington

Dear Wessex Water,

We've recently been instructed to prepare a FRA for a potential residential development on land at Grange Farm in Cannington, near Bridgwater, Somerset, TA5 2LA. The approximate grid reference is ST 26200 39015 and I have attached a site location plan. The proposed development is for a maximum of approximately 90 dwellings.

We are considering all options for surface water and will follow the surface water hierarchy (i.e we will use soakaways or discharging to a watercourse if possible). However information on the sewer capacity for surface water from the development would be helpful at this stage. Would you please be able to confirm if there is sewer capacity for surface water from the development?

We are also considering the foul drainage and it would be helpful if you could confirm the availability of capacity within the local foul sewerage network for the proposed development. It would be helpful if you would be able to provide me with records of the public sewers and any historic events of flooding for the area?

I look forward to hearing from you.

Kind regards,
Rosie

Rosie Tutton
Environmental Consultant, RMA Environmental

ENVIRONMENTAL PLANNING / EIA / FLOOD RISK / WATER QUALITY / HYDROLOGY

Office: 01884 842740
Direct: 01884 842748
Email: rosie.tutton@rma-environmental.co.uk
Web: www.rma-environmental.co.uk

Office Address: Suite 4, Swallow Court, Devonshire Gate, Tiverton, Devon, EX16 7EJ
Registered Office: 2 Chartfield House, Castle Street, Taunton, TA1 4AS
Registered in England No: 6915388

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Wessex Water Services Limited, Registered in England No 2366648. Registered Office – Wessex Water Operations Centre, Claverton Down Road, Claverton Down, Bath, BA2 7WW

Appendix D: EA Consultation

Ms Rosie Tutton
RMA Environmental Ltd
Swallow Court (Suite 4)
Sampford Peverell
Tiverton
EX16 7EJ

Our ref: WX/2018/131686/01-L01
Your ref:

Date: 03 May 2018

Dear Ms Tutton

****WITHOUT PREJUDICE** - PRELIMINARY OPINION - RESIDENTIAL DEVELOPMENT AT LAND NORTH OF GRANGE FARM, CANNINGTON, BRIDGWATER**

Thank you for your enquiry, received in this department on 24 April 2018.

The proposed residential development layout will require an 8m buffer strip to be provided between any new properties and gardens and the top of bank of the new flood relief channel. As this strip will need be used for access and maintenance of the flood relief channel by the Environment Agency and our contractors, there will need to be no obstructions within the 8m strip, including any lighting, fencing, tree planting or other structures. The continuation of safe and easy access to the buffer strip and flood relief channel will need to be demonstrated in any development proposals.

We would not permit any SuDS features within the 8m buffer strip. This is due to the risk of damage from machinery as well as causing a potential obstruction to maintenance works. It is therefore advised that any SuDS features are also located outside of this area.

Once the post flood scheme flood modelling results are available from ourselves, it will be important for the developer to ascertain the peak design flood water levels in the nearby flood relief channel in order to set safe minimum finished floor and ground levels across any development abutting the channel, and also assist with design of the surface water drainage system should it require connection via a new outfall into the flood relief channel. At this stage, we are unable to comment on the acceptability or otherwise of making any new discharges of surface water into the flood relief channel without seeing the site drainage strategy, likely flow rates and volumes, and further consultation with our Operations team. Additionally, we advise you consult with Somerset County Council as Lead Local Flood Authority on the proposed surface water drainage arrangements for the site.

Cont/d..

As the new flood relief channel (and the maintenance of it into the future) effectively alleviates/reduces the fluvial flood risk to the proposed development land, which was originally within the Flood Zone 3 outline of Cannington Brook, we will also require a commuted sum of monies (via section 106 agreement) to be agreed and paid to us by any developer of the site to help safeguard the future upkeep and maintenance of the flood relief channel for the benefit of the new properties.

Important information
Please note, we have now exhausted the advice we can offer through our free preliminary service. Provision of further pre-application advice, over and above the preliminary comments outlined in this letter and our previous correspondence to your colleague Nick Yeo dated 21 June 2017 ref WX/2017/130594/01 will fall under our discretionary chargeable advice service.

Our charged advice is provided through a formal agreement made up of an offer letter, a programme of advice and standard terms and conditions. We will discuss the advice you need with you, and agree a programme to specify the tasks that will be carried out.

The programme will also give the approximate timetable and cost for the advice. The programme can be varied by written agreement for any changes that need to be made. Charges are based on cost recovery and have been set at £100 VAT per hour, per officer.

Please note that the views expressed in this letter are made in response to an enquiry only and do not represent our final view in relation to any future planning application made in relation to this site. They are made entirely without prejudice and without liability accepted, implied or given by or on behalf of the Environment Agency. We reserve the right to review our position should new information, or updates to guidance occur, in relation to any such application.

You should seek your own expert advice in relation to technical matters relevant to any planning application before submission.

Please direct all further Environment Agency planning related enquiries for the Sedgemoor District Council area to the Wessex Sustainable Places team using the address details below. Please do not hesitate to contact me should you have any further queries.

Yours sincerely

Mark Willitts BA (Hons) MA
Sustainable Places - Planning Advisor

Direct dial 02030 250253
e-mail nwx.sp@environment-agency.gov.uk

End

creating a better place

Environment Agency

Rosie Tutton
RMA Environmental
rosie.tutton@rma-environmental.co.uk

Our ref: 89781-WX#2
Your ref:
Date: 30 July 2018

Dear Rosie Tutton

Information request **Grange Farm, Cannington**

Thank you for your enquiry which was received on 17 July 2018.

We agree that the presence of the new flood alleviation scheme, which does not rely on raised defences that could fail, would mean that a comparable rainfall event to November 2012 would not result in a comparable flood extent.

We will update our systems to remove the Cannington November 2012 event outline from our Flood Map for Planning (FMFP) Flood Zone 2. This event, however, will continued to be included in our Historic Flood Map for reference purposes.

The updated FMFP will be published on our external systems, following our quarterly update cycle, on 31st October 2018.

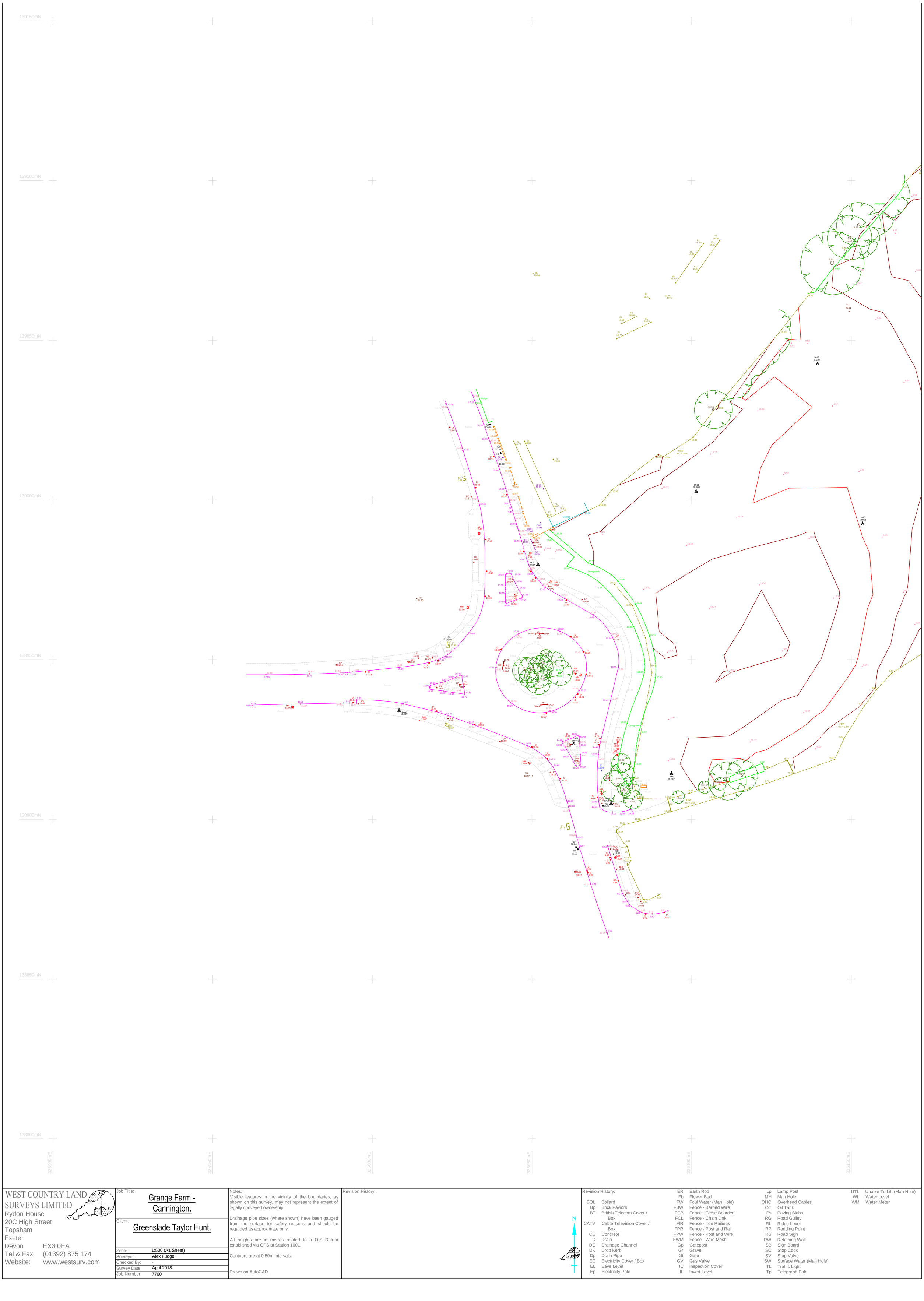
Further details about the Environment Agency information supplied can be found on our website: https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

We hope you find this information helpful and it is provided subject to the Open Government Licence, which we strongly recommend you read.

Yours sincerely

Chris Doyle
Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk
Telephone number: 03708 506 506

Appendix E: Topographical Survey



WEST COUNTRY LAND SURVEYS LIMITED
Rydon House
20C High Street
Topsham
Exeter
Devon EX3 0EA
Tel & Fax: (01392) 875 174
Website: www.westsurv.com

Job Title: Grange Farm - Cannington.

Client: Greenslade Taylor Hunt.

Scale:	1:500 (A1 Sheet)
Surveyor:	Alex Fudge
Checked By:	-
Survey Date:	April 2018
Job Number:	7760

Notes:
Visible features in the vicinity of the boundaries, as shown on this survey, may not represent the extent of legally conveyed ownership.

Drainage pipe sizes (where shown) have been gauged from the surface for safety reasons and should be regarded as approximate only.

All heights are in metres related to a O.S Datum established via GPS at Station 1001.

Contours are at 0.50m intervals.

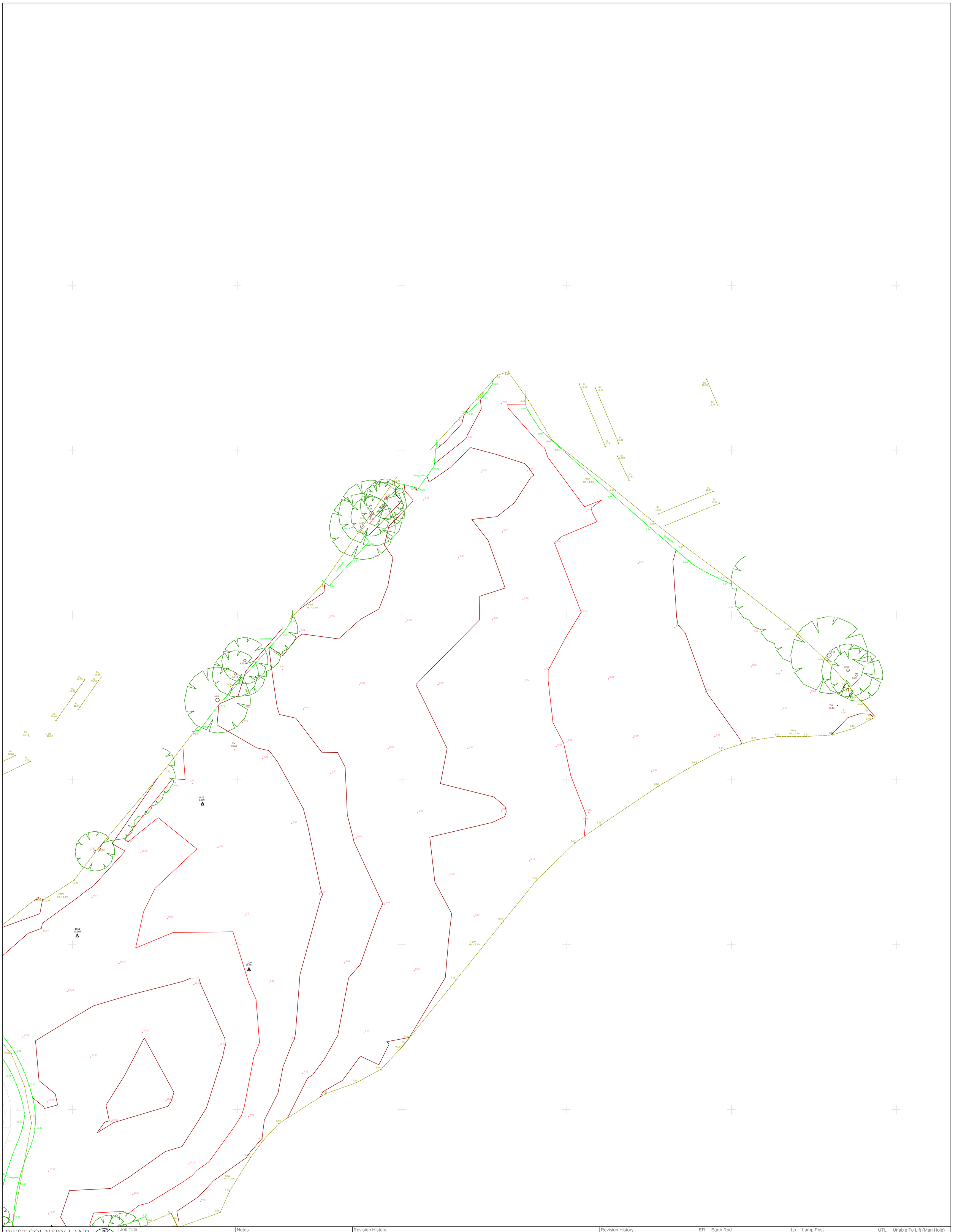
Drawn on AutoCAD.

Revision History:

N

Revision History:

		ER	Earth Rod	Lp	Lamp Post	UTL	Unable To Lift (Man Hole)
		Fb	Flower Bed	MH	Man Hole	WL	Water Level
BOL	Bollard	FW	Foul Water (Man Hole)	OHC	Overhead Cables	WM	Water Meter
Bp	Brick Paviors	FBW	Fence - Barbed Wire	OT	Oil Tank		
BT	British Telecom Cover / Box	FCB	Fence - Close Boarded	Ps	Paving Slabs		
		FCL	Fence - Chain Link	RG	Road Gulley		
CATV	Cable Television Cover / Box	FIR	Fence - Iron Railings	RL	Ridge Level		
		FPR	Fence - Post and Rail	RP	Rodding Point		
CC	Concrete	FPW	Fence - Post and Wire	RS	Road Sign		
D	Drain	FWM	Fence - Wire Mesh	RW	Retaining Wall		
DC	Drainage Channel	Gp	Gatepost	SB	Sign Board		
DK	Drop Kerb	Gr	Gravel	SC	Stop Cock		
Dp	Drain Pipe	Gt	Gate	SV	Stop Valve		
EC	Electricity Cover / Box	GV	Gas Valve	SW	Surface Water (Man Hole)		
EL	Eave Level	IC	Inspection Cover	TL	Traffic Light		
Ep	Electricity Pole	IL	Invert Level	Tp	Telegraph Pole		



WEST COUNTRY LAND SURVEYS LIMITED
Rydon House
20C High Street
Topsham
Exeter
Devon EX3 0EA
Tel & Fax: (01392) 875 174
Website: www.westsurv.com

Job Title: Grange Farm - Cannington.

Client: Greenslade Taylor Hunt.

Scale:	1:500 (A1 Sheet)
Surveyor:	Alex Fudge
Checked By:	-
Survey Date:	April 2018
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Contours are at 0.50m intervals.

Drawn on AutoCAD.

Revision History:

Revision History:

BOL	Bollard	ER	Earth Rod	Lp	Lamp Post	UTL	Unable To Lift (Man Hole)
Bp	Brick Paviors	Fb	Flower Bed	MH	Man Hole	WL	Water Level
BT	British Telecom Cover / Box	FW	Foul Water (Man Hole)	OHC	Overhead Cables	WM	Water Meter
CATV	Cable Television Cover / Box	FBW	Fence - Barbed Wire	OT	Oil Tank		
CC	Concrete	FCB	Fence - Close Boarded	Ps	Paving Slabs		
D	Drain	FCL	Fence - Chain Link	RG	Road Gulley		
DC	Drainage Channel	FIR	Fence - Iron Railings	RL	Ridge Level		
DK	Drop Kerb	FPR	Fence - Post and Rail	RP	Rodding Point		
Dp	Drain Pipe	FPW	Fence - Post and Wire	RS	Road Sign		
EC	Electricity Cover / Box	FWM	Fence - Wire Mesh	RW	Retaining Wall		
EL	Eave Level	Gp	Gatepost	SB	Sign Board		
Ep	Electricity Pole	Gr	Gravel	SC	Stop Cock		
		Gt	Gate	SV	Stop Valve		
		GV	Gas Valve	SW	Surface Water (Man Hole)		
		IC	Inspection Cover	TL	Traffic Light		
		IL	Invert Level	Tp	Telegraph Pole		

Appendix F: EA Flood Data

creating a better place

Environment Agency

Rosie Tutton
rosie.tutton@rma-environmental.co.uk

Our ref: 86906-WX
Your ref:
Date: 21June 2018

Dear Rosie Tutton,

Thank you for your enquiry which was received on 24 May 2018.

Abstract

Name	Product 4
Description	Detailed Flood Risk Assessment Map for **Grange Farm, Cannington**
Information Warnings	*The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply.*
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.

Flood Map for Planning
A Flood Map for Planning (Rivers and the Sea) is attached for spatial planning purposes. This map contains Flood Zones that show the areas of natural floodplain that would flood if there were no raised flood defences. Please be aware this information is also available for download on the following link.

Flooding history
Our historic records indicate the area flooded in 2012

Please see the attached Historic Map for the approximate outline of the event(s). We also attached a sheet providing further information regarding these flood events, such as dates, source and cause of flooding.

Please note: we cannot guarantee that it is an exhaustive list of all past flood events in this location. The extent of the flooded area was mapped and validated from the best available on-the-ground evidence collated by the authorities at the time of the event.

It is not always possible to be able to validate the accuracy of the extent of a given flooded area. For this reason we advise the historic flooding information should be used as a guide only. All reasonable care has been taken to ensure the historical flood event outline is as accurate as possible, but the Environment Agency will update the outline if new evidence emerges.

Open Data
Please note these and the following Environment Agency published datasets are now available on the weblink below as part of the Government's 'Open Data' project and are available for you to download free of charge.

Environment Agency published datasets:
https://data.gov.uk/data/search?publisher=environment-agency&unpublished=false

You will need to search and select the name of the following datasets to take you directly to the weblink to enable you to download the data:

- Flood Map for Planning (Rivers and the Sea) – Flood Zones 2 and 3
- Flood Map for Planning (Rives and Sea) – Areas Benefiting from Defences
- Flood Map for Planning (Rivers and Sea) Spatial Flood Defences
- Flood Map for Planning (Rivers and Sea) Flood Storage Areas
- Risk of Flooding (Rivers and Sea)
- Recorded Flood Outlines
- Historic Flood Map
- Risk of Flooding from Surface Water Extent for:
  - → 3 percent annual chance
  - → 1 percent annual chance
  - → 0.1 percent annual chance

If you have requested this information to help inform a development proposal, then you should also note the detail in the attached advisory text on the use of Environment Agency Information and Further Guidance for FRAs**.**

Strategic Flood Risk Assessment (SFRA)
When preparing a FRA to support a development proposal in this location you should refer to Sedgemoor District Council's SFRA Reports Level 1 and 2, which are available to download via the following link: http://www.sedgemoor.gov.uk/sfra

Planning
If you have questions regarding the planning nature of your enquiry, or require advice on floor levels, please contact our Sustainable Places team on NWX.SP@environment-agency.gov.uk.

Please be aware that we now charge for planning advice when consulted on pre-application enquiries. This new approach provides advice to developers in two ways. Firstly there is the provision of 'free' advice available to everyone where we give a preliminary opinion on a proposed development. This sets out the environmental constraints together with any issues this raises for us.

Should you wish us to review in detail any of these issues then we can do this through a chargeable scheme aimed at recovering our costs.

Flood Levels
Fluvial flood levels and depths
We are currently unable to provide 1D in-channel levels or depths as the data is still being processed.

Please see the table below for maximum 2D depth and level information for your site for a range of return periods from our recent Cannington FDS model. Please note that the maximum flood depths include all low points within your site of interest, which include watercourses, ditches, rhynes and low ground spots.

Please be aware that we have provided you with 20% and 30% climate change flood flow model results. These climate change allowances have been applied to the current day 1%AEP (1 in 100 year) flood flow estimates used in our Cannington FDS model.

If you intend undertaking a FRA for a planning application using climate change flood level information supplied in this letter, you should consider whether it is appropriate in light of a range of potential allowances for fluvial flood flow now advised in curent planning guidance on 'Flood risk assessments: climate change allowances'.

The relevant guidance is available at the following website address:
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

BASELINE

5% (1 in 20) AEP Fluvial Depth	0.00m
1% (1 in 100) AEP Fluvial Depth	0.00m
1% (1 in100) AEP +20%CC Fluvial Depth	0.00m
1% (1 in100) AEP +30%CC Fluvial Depth	0.00m
0.1% (1 in 1000) AEP Fluvial Depth	0.44m

5% (1 in 20) AEP Fluvial Level	0.00mAOD
1% (1 in 100) AEP Fluvial Level	0.00mAOD
1% (1 in100) AEP +20%CC Fluvial Level	0.00mAOD
1% (1 in100) AEP +30%CC Fluvial Level	0.00mAOD
0.1% (1 in 1000) AEP Fluvial Level	10.70mAOD

NB 0.00 (m or mAOD) indicates the data does not reach the site

The modelled extent of the River Cannington Brook is from upstream at ST to downstream at ST.

Levels and depths have been extracted based upon the site boundary plan provided.

Coastal/tidal flood levels and depths

The tables below show the maximum modelled tidal flood levels and depths for defended (actual situation) and undefended (natural floodplain) scenarios taken from our 2012 Wessex North Coast Model.

For the undefended scenarios the 0.5% (1 in 200 year return period) and 0.1% (1 in 1000 year return period) annual exceedance probability (AEP) is given. Only the 0.5% (1 in 200 year) AEP is available for the defended scenario.

Defended

AEP	Maximum depth (in metres)	Maximum level (mAOD)
0.5%	0.00	0.00

Undefended

AEP	Maximum depth (in metres)	Maximum level (mAoD)
0.5%	0.00	0.00
0.1%	0.11	8.56

Levels and depths have been extracted based upon the site boundary plan provided.

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Phone: 02030 250 376
Email: wessexenquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Environmental Permit for Flood Risk Activities
In addition to any other permission(s) that you may have already obtained e.g. planning permission, you may need an environmental permit for flood risk activities (formerly known as Flood Defence Consent prior to 06 April 2016) if you want to do work:

- in, under, over or near a main river (including where the river is in a culvert)
- on or near a flood defence on a main river
- in the flood plain of a main river
- on or near a sea defence

For further information and to check whether a permit is required please visit: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits.

For any further advice, please contact your local Environment Agency Office, at bridgwater.frap@environment-agency.gov.uk.

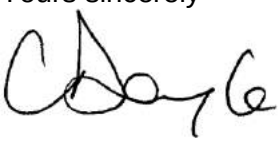
Further Information
We advise that you also contact the Flood Risk Management Team, by email flooding@somerset.gov.uk, or by telephone, 0300 123 2224 at Somerset County Council, County Hall, Taunton, Somerset as they may be able to provide further advice with respect to localised flooding and drainage issues.

Further details about the Environment Agency information supplied can be found on our website: https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for FRAs: https://www.gov.uk/planning-applications-assessing-flood-risk https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

We hope you find this information helpful and it is provided subject to the Open Government Licence, which we strongly recommend you read.

Yours sincerely



Chris Doyle
Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk
Telephone number: 03708 506 506

Enc: Use of Environment Agency Information for Flood Risk Assessments (below)
86906-WX Historic Map
86906-WX Historic Data
86906-WX Flood Map for Planning
86906-WX Defence Map
86906-WX Defence Data

Use of Environment Agency Information for Flood Risk Assessments (FRAs)

Important
Use of Environment Agency data: you should note that

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but the use of Environment Agency information does not constitute such an assessment on its own.

2. As part of your data request, we have provided all of the modelled data we hold for your location. Please note that some of our modelled information may have been produced for purposes other than for flood zone generation. This may mean that some of the modelled data you have been provided with has a lower confidence level, and has not been used in producing our flood map, nor definitively reflects the predicted flood water level at the property/development site scale. To check the suitability of the use of this information in your FRA please contact your local Partnership & Strategic Overview (PSO) team.

3. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. The information produced by the Local Planning Authority and the Lead Local Flood Authority (LLFA) may assist in assessing other sources of flood risk.

4. Where a planning application requires a FRA and this is not submitted or deficient, the Environment Agency may well raise an objection.

5. For more significant proposals in higher flood risk areas, we would be pleased to discuss details with you ahead of making any planning application, and you should also discuss the matter with your Local Planning Authority.

Pre-Planning Advice from the Environment Agency
If you have requested this information to help inform a development proposal, then we recommend that you undertake a formal pre-application enquiry using the form available from our website:

Pre-application Preliminary Opinion:
https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Pre-application Charged Service:
https://www.gov.uk/government/publications/planning-advice-environment-agency-standard-terms-and-conditions

Depending on the enquiry we may also provide advice on other issues related to our responsibilities, including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

Flood Risk Assessment (FRA) Guidance
You should refer to the Planning Practice Guidance of the National Planning Policy Framework (NPPF) and the Environment Agency's Flood Risk Standing Advice for information about Flood Risk Assessment (FRA) for new development in the different Flood Zones. These documents can be accessed via:

National Planning Policy Framework Planning Practice Guidance:
http://planningguidance.planningportal.gov.uk/

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Environment Agency advice on FRAs:
https://www.gov.uk/flood-risk-assessment-for-planning-applications#when-to-follow-standing-advice

https://www.gov.uk/government/publications/planning-applications-assessing-flood-risk

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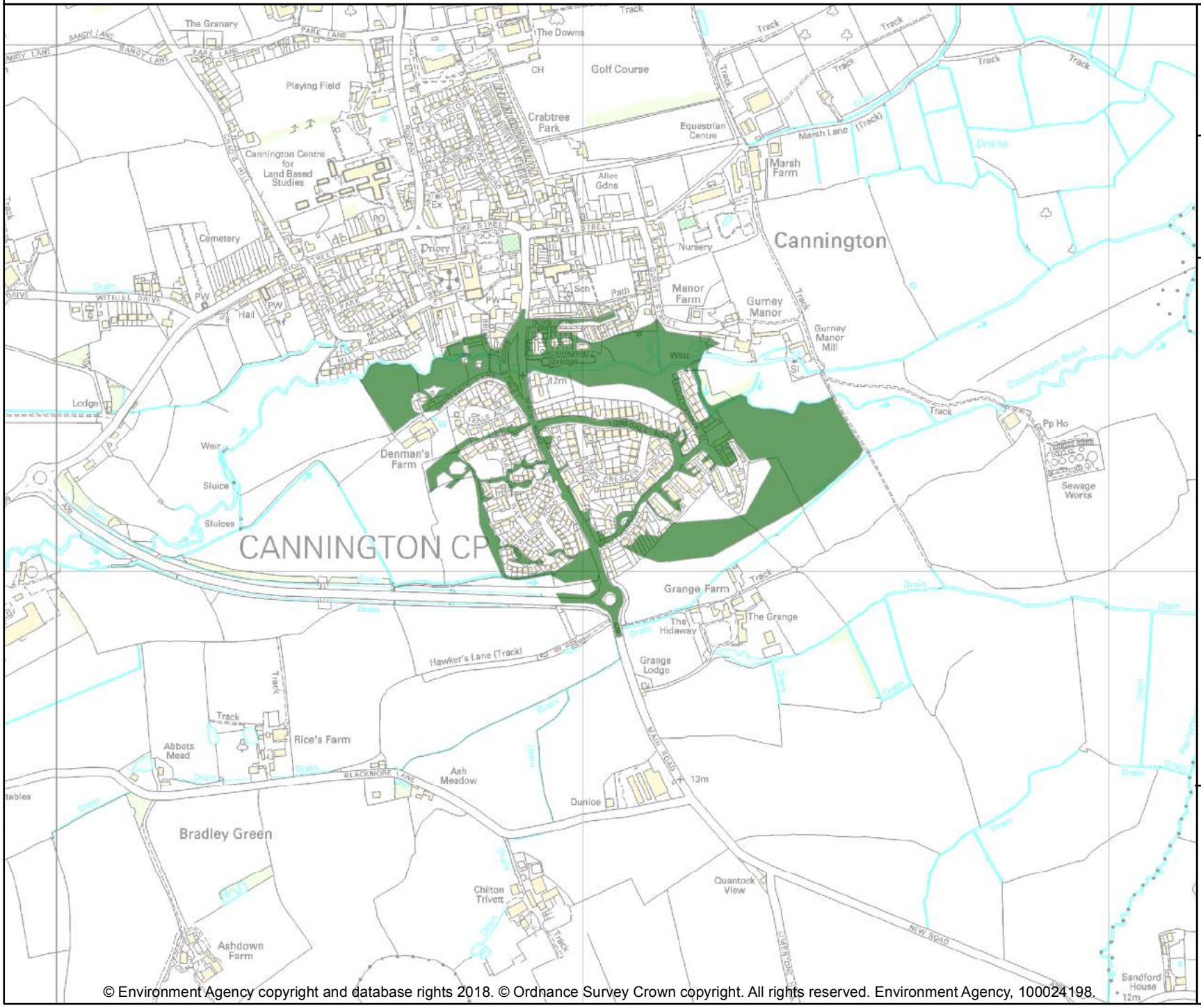
www.environment-agency.gov.uk

VAT No: **662 4901 34**

Historic flood events centred on ST 26200 39015 - created 20/06/2018 [Ref: 86906-WX]



Environment Agency

Scale at A4: 1:10,000

N

0 100 200 400

Meters

Legend

START_DATE

20/11/2012

Historic Flood Events

Please see the attached sheet for more information on the individual flood events, such as: dates, source and cause of flooding.

These events and outlines are taken from our Historic Flood Records. We cannot guarantee that it is an exhaustative list of all past flood events in this location.

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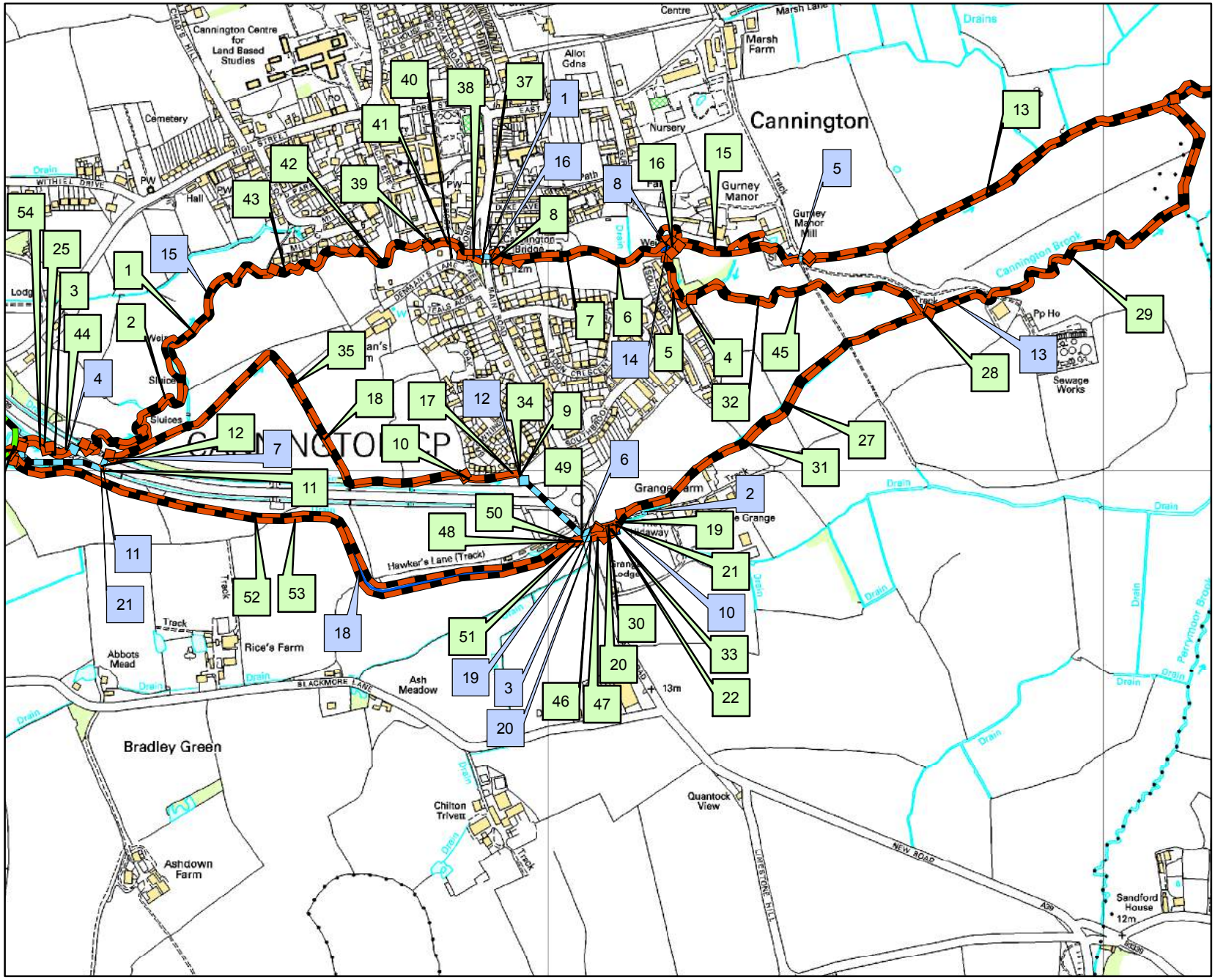
Start Date	End Date	Name	Comments	Source of Flooding	Cause of Flooding
20/11/2012	23/11/2012	EA112_Flood_Event_Nov_2012	aerial photography	main river	channel capacity exceeded (no raised defences)

Current Flood Defences centred on ST 26200 39015, created 11/06/2018 Ref: WX_86906



Environment Agency

Scale: 1:10,000

N W E S

Legend

DEFENCES

- bridge_abutment
- barrier_beach
- cliff
- demountable
- embankment
- flood_gate
- high_ground
- promenade
- quay
- wall
- beach
- dunes

CHANNELS

- open_channel
- simple_culvert

This data has been extracted from the Asset Information Management System (AIMS) which was created to draw various data sources into one database and has been populated with information of varying quality.

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Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Product 4 - AIMS Information **86906-WX** **Date:** **11/06/2018**

Map Ref	Asset ID	Asset Type	Asset Description	Approx length (m)	Right or left bank	Actual fluvial downstream crest level (mAOD)	Actual fluvial downstream crest level accuracy	Actual fluvial upstream crest level (mAOD)	Actual fluvial upstream crest level accuracy	Actual fluvial coastal crest level (mAOD)	Actual fluvial coastal crest level accuracy	NGR	Most recent inspection	Overall condition
1	102065	high_ground	Natural bank.	1042.23	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2532039223	13/04/2018	3
2	102066	high_ground	Natural bank.	722.83	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2529639116	13/04/2018	3
3	102068	high_ground	Natural bank.	61.52	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2511839025	18/12/2017	3
4	102686	high_ground	Bank defence.	46.83	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2623839301	13/04/2018	4
5	102687	high_ground	Natural bank.	69.29	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2621139370	13/04/2018	2
6	102689	high_ground	Natural bank.	285.06	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2610439382	13/04/2018	3
7	102690	high_ground	Natural bank.	339.99	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2612339379	13/04/2018	3
8	102691	high_ground	Bank protection.	40.11	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2591639378	13/04/2018	3
9	103113	high_ground	Flume.	12.16	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2594138992	03/04/2018	2
10	104548	high_ground	Natural bank.	102.02	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2585438984	03/04/2018	3
11	104550	high_ground	Natural bank.	7.83	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2519439000	03/04/2018	3
12	104551	high_ground	Natural bank.	3.68	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2519039004	03/04/2018	3
13	104747	high_ground	Natural bank.	729.75	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2683739520	13/04/2018	2
15	104143	high_ground	Natural bank.	469.78	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2629639398	13/04/2018	3
16	104144	high_ground	Natural bank.	248.13	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2638939399	13/04/2018	4
17	104546	high_ground	Natural bank.	100.96	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2585538987	03/04/2018	3
18	104547	high_ground	Natural bank.	833.72	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2550039204	03/04/2018	3
19	498245	high_ground	Reno mattress and rock armour revetted bank	6.25		DNR	DNR	DNR	DNR	DNR	DNR	ST2612338908	03/04/2018	1
20	498246	high_ground	Revetted bank	14.95		DNR	DNR	DNR	DNR	DNR	DNR	ST2611838903	03/04/2018	1
21	498248	high_ground	Concrete block revetted bank	7.63		DNR	DNR	DNR	DNR	DNR	DNR	ST2611738899	03/04/2018	1
22	498272	high_ground	Reno mattress revetment	5.79		DNR	DNR	DNR	DNR	DNR	DNR	ST2611338897	03/04/2018	1
25	497992	high_ground	Regraded channel	59.93		DNR	DNR	DNR	DNR	DNR	DNR	ST2505639056	18/12/2017	1
27	99235	high_ground	Flood relief channel	680.87	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2636039062	03/04/2018	1
28	99237	high_ground	Natural bank.	790.22	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2698239410	13/04/2018	3
29	99456	high_ground	Natural bank.	810.17	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2691339377	13/04/2018	3
30	99458	high_ground	Natural bank.	32.73	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2607538893	03/04/2018	3
31	99459	high_ground	Flood relief channel	738.50	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2637539067	03/04/2018	1
32	102064	high_ground	Natural bank.	611.04	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2641339326	13/04/2018	3
33	99234	high_ground	Natural bank.	33.43	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2609938894	03/04/2018	3
34	103114	high_ground	Flume.	14.58	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2594138995	03/04/2018	3
35	103115	high_ground	Natural bank.	843.98	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2549939211	03/04/2018	3
37	103316	high_ground	Natural bank.	17.39	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2586439381	13/04/2018	2
38	103317	high_ground	Bank protection.	34.96	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2584939383	13/04/2018	3
39	103318	high_ground	Bank protection.	120.92	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2581739414	13/04/2018	3
40	103319	high_ground	Natural bank.	21.02	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2583239403	13/04/2018	2
41	103320	high_ground	Bank protection.	49.41	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2578239403	13/04/2018	2
42	103321	high_ground	Natural bank.	167.58	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2570939393	13/04/2018	2
43	103322	high_ground	Bank protection.	171.46	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2555939375	13/04/2018	3
44	104142	high_ground	Natural bank.	44.62	left	DNR	DNR	DNR	DNR	DNR	DNR	ST2511339034	18/12/2017	3
45	104749	high_ground	Natural bank.	495.33	right	DNR	DNR	DNR	DNR	DNR	DNR	ST2642139320	13/04/2018	3
46	497891	high_ground	Revetted channel	51.48		DNR	DNR	DNR	DNR	DNR	DNR	ST2610238883	18/12/2017	1
47	497825	high_ground	Revetted channel	11.14		DNR	DNR	DNR	DNR	DNR	DNR	ST2607738875	18/12/2017	1
48	497978	high_ground	Revetted channel	15.72		DNR	DNR	DNR	DNR	DNR	DNR	ST2604738866	18/12/2017	1

Map Ref	Asset ID	Asset Type	Asset Description	Approx length (m)	Right or left bank	Actual fluvial downstream crest level (mAOD)	Actual fluvial downstream crest level accuracy	Actual fluvial upstream crest level (mAOD)	Actual fluvial upstream crest level accuracy	Actual fluvial coastal crest level (mAOD)	Actual fluvial coastal crest level accuracy	NGR	Most recent inspection	Overall condition
49	497979	high_ground	Revetted channel	15.89		DNR	DNR	DNR	DNR	DNR	DNR	ST2604438873	18/12/2017	1
50	497980	high_ground	Lined channel	10.16		DNR	DNR	DNR	DNR	DNR	DNR	ST2603438871	18/12/2017	1
51	497981	high_ground	Lined channel	11.46		DNR	DNR	DNR	DNR	DNR	DNR	ST2603638863	18/12/2017	1
52	497982	high_ground	Flood relief channel	1113.86		DNR	DNR	DNR	DNR	DNR	DNR	ST2552138916	18/12/2017	1
53	497983	high_ground	Flood Relief Channel	1137.82		DNR	DNR	DNR	DNR	DNR	DNR	ST2547738909	18/12/2017	1
54	497986	high_ground	Regraded channel	47.68		DNR	DNR	DNR	DNR	DNR	DNR	ST2506539049	18/12/2017	1
1	103315	simple_culvert	Culvert.	17.86		DNR	DNR	DNR	DNR	DNR	DNR	ST2589439384	13/04/2018	2
2	99236	simple_culvert	Culvert.	4.89		DNR	DNR	DNR	DNR	DNR	DNR	ST2617338923	07/10/2017	2
3	99457	simple_culvert	Culvert extension	16.59		DNR	DNR	DNR	DNR	DNR	DNR	ST2606038883	03/04/2018	2
4	102067	simple_culvert	Culvert carrying Cannington Brook below A39 bypass	25.24		DNR	DNR	DNR	DNR	DNR	DNR	ST2515339041	13/04/2018	2
5	102688	simple_culvert	Culvert.	9.08		DNR	DNR	DNR	DNR	DNR	DNR	ST2645039380	13/04/2018	2
6	103112	simple_culvert	Culvert.	155.56		DNR	DNR	DNR	DNR	DNR	DNR	ST2605338889	03/04/2018	3
7	104549	simple_culvert	Culvert.	14.60		DNR	DNR	DNR	DNR	DNR	DNR	ST2520039021	03/04/2018	2
19	470644	simple_culvert	Box culvert 4 lines 1.2 x 2 m.	14.85		DNR	DNR	DNR	DNR	DNR	DNR	ST2607638877	18/12/2017	1
21	498014	simple_culvert	Culvert	166.85		DNR	DNR	DNR	DNR	DNR	DNR	ST2506439014	18/12/2017	1

Notes

* Overall Condition has been taken from the most recent inspection
* Inspections are of a purely visual nature and do not necessarily reflect the true condition of the asset
* Condition 1 = very good, Condtion 2 = good, Condition 3 = fair, Condition 4 = poor, Condition 5 = very poor

DNR = data not recorded

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Environment Agency

Rosie Tutton
rosie.tutton@rma-environmental.co.uk

Our ref: 86906-WX
Your ref:
Date: 21 June 2018

Dear Rosie Tutton

Information request **Grange Farm, Cannington**

Thank you for your enquiry which was received on 24 May 2018.

In the accompanying letter and attachments you will find some Product 4 data which we been able to provide from our most recent, post-scheme modelling of Cannington Brook and flood relief channel.

Unfortunately we are still awaiting delivery of some of the data in the correct format and so are unable to provide the full range of outputs (1D nodes have yet to be provided). We have previously supplied to RMA 2D depth/level grids from this model, if you are no longer in possession of this data and require an additional copy please advise accordingly. We are now also able to provide shapefile flood outlines which can be downloaded here.

The shapefile outlines have been used to update our Flood Map for Planning which will has changed the Flood Zone designation of your site. The updated Flood Map for Planning in the vicinity of your site can be viewed in the attachment tagged UNPUBLISHED DRAFT. The update has been accepted but will not be visible on our public facing websites/viewers until 31st July.

Hopefully, the data provided will be sufficient for your purposes. If not the best we can advise is to contact us in the coming weeks with an additional request. Unfortunately, at this stage it is difficult to estimate when it may be delivered.

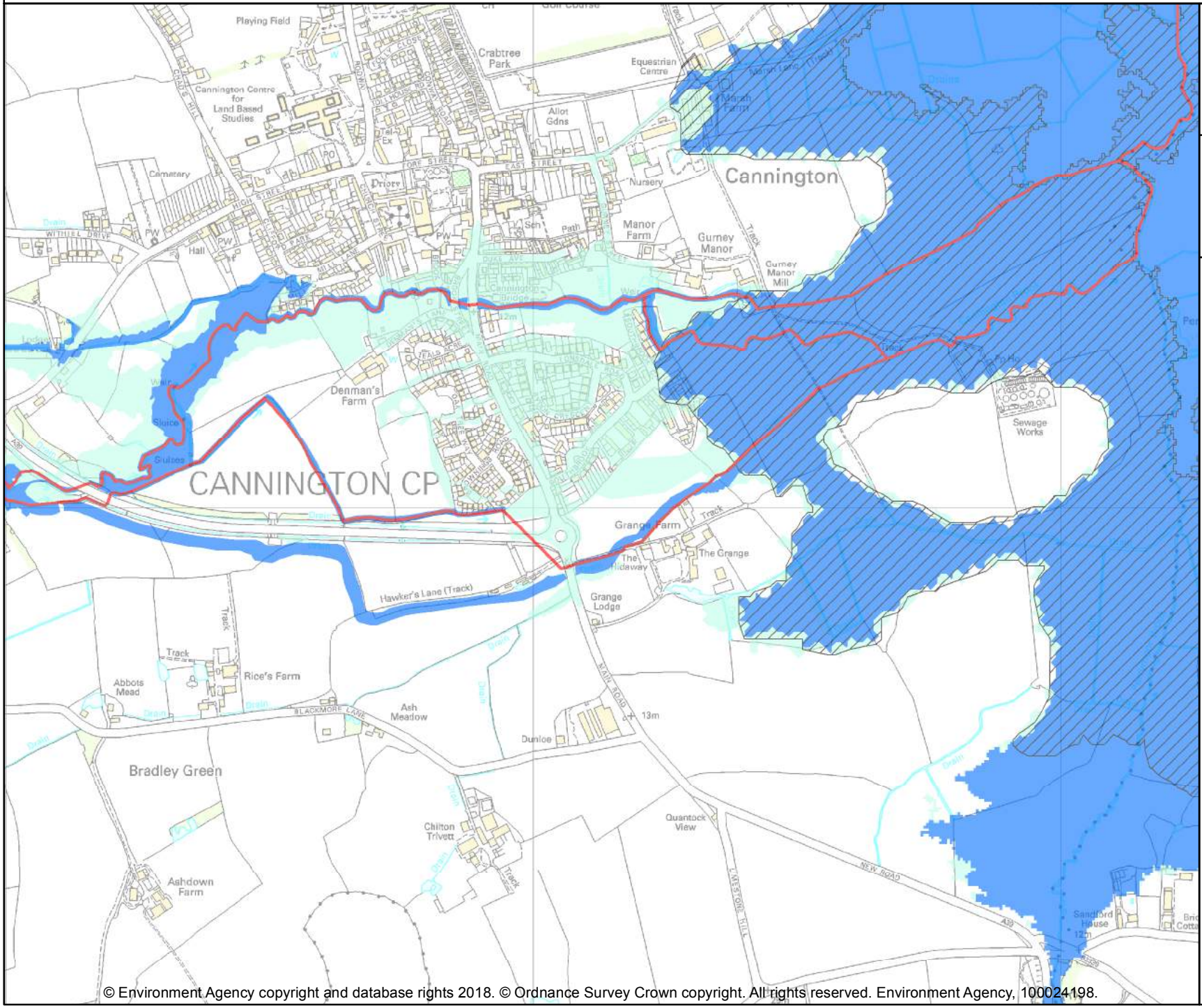
Further details about the Environment Agency information supplied can be found on our website: https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

We hope you find this information helpful and it is provided subject to the Open Government Licence, which we strongly recommend you read.

Yours sincerely

Chris Doyle
Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk
Telephone number: 03708 506 506

86906-WX - flood map for planning - (UNPUBLISHED DRAFT)



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Environment Agency

Rosie Tutton
rosie.tutton@rma-environmental.co.uk

Our ref: 89781-WX
Your ref:
Date: 6 July 2018

Dear Rosie Tutton

Information request **Grange Farm, Cannington**

Thank you for your enquiry which was received on 21 June 2018.

Please see our responses to your queries below;

• a number of point nodes within the site with the corresponding flood levels (in mAOD);
We are still waiting for the 1D node data to be provided from our consultant and so unfortunately are unable to provide these data at this time.

• the 2D model output files;
Please see Product 6 letter which contains a download link for these data.

• flows for the site from the model for each return period; and
We are still waiting for the 1D node data to be provided from our consultant and so unfortunately are unable to provide these data at this time.

• could you also confirm that the flood zone 2 area within the centre of the site is as a result of the historical flood event and not the modelled flood extents?
Yes, in cases where we have validated recorded outlines these will be used to augment the Flood Zone 2 data provided by hydraulic models. In this case the outline is from the Nov 2012 event.

Further details about the Environment Agency information supplied can be found on our website: https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

We hope you find this information helpful and it is provided subject to the Open Government Licence, which we strongly recommend you read.

Yours sincerely

Chris Doyle
Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk
Telephone number: 03708 506 506

creating a better place

Environment Agency

Rosie Tutton
rosie.tutton@rma-environmental.co.uk

Our ref: 89781-WX
Your ref:
Date: 6 July 2018

Dear Ms Tutton

Information request for **Grange Farm, Cannington**

Thank you for your enquiry which was received on 21 June 2018.

Model Data Download
Please use the following link to download the requested model data. This link will remain active for 30 days. https://ea.sharefile.com/d-sc3356990452499aa

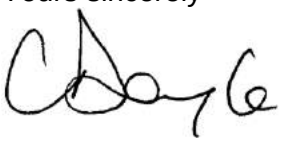
Name	Product 6
Description	Model Output Data for model Cannington FDS Model (2017)
Conditions	1 You may use the Information for your internal or personal purposes and may only sublicense others to use it if you do so under a written licence which includes the terms of these conditions and the agreement and in particular may not allow any period of use longer than the period licensed to you. 2 Notwithstanding the fact that the standard wording of the Environment Agency Conditional Licence indicates that it is perpetual, this Licence has a limited duration of 5 years at the end of which it will terminate automatically without notice. 3 We have restricted use of the Information as a result of legal restrictions placed upon us to protect the rights or confidentialities of others. In this instance it is because of third party data. If you contact us in writing (this includes email) we will, as far as confidentiality rules allow, provide you with details including, if available, how you might seek permission from a third party to extend your use rights. 4.1 The Information may contain some data that we believe is within the definition of "personal data" under the Data Protection Act 1998 but we consider that we will not be in breach of the Act if we disclose it to you with conditions set out in this condition and the conditions above. This personal data comprises names of individuals or commentary relating to property that may be owned by an individual or commentary relating to the activities of an individual. 4.2 Under the Act a person who holds and uses or passes to others personal data is responsible for any compliance with the Act and so we have no option but to warn you that this means you have responsibility to check that you are compliant with the Act in respect of this personal data. 5. The location of public water supply abstraction sources must not be published to a resolution more detailed than 1km2. Information about the operation of flood assets should not be published. 6.1 Where we have supplied model data which may include model inputs or outputs you agree to supply to the Environment Agency copies of any assessments/studies and related outputs, modifications or derivatives created pursuant to the supply to you of the Information, all of which are hereinafter referred to as "the Data".

	6.2 You agree, in the public interest to grant to the Environment Agency a perpetual royalty free non-exclusive licence to use the Data or any part thereof for its internal purposes or to use it in any way as part of Environment Agency derivative products which it supplies free of charge to others such as incorporation into the Environment Agency's Open Data mapping products.
Information Warnings	Please be aware that model data is not raw, factual or measured but comprises of estimations or modelled results based on the data available to us.
Attribution	Contains Environment Agency information © Environment Agency and/or database rights.

Further details about the Environment Agency information supplied can be found on our website: https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

We hope you find this information helpful and it is provided subject to the Open Government Licence, which we strongly recommend you read.

Yours sincerely



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Telephone number: 03708 506 506

Appendix G: Outline Drainage Strategy

HR Wallingford
Working with water

Greenfield runoff estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Rosie Tutton
Site name:	Grange Farm
Site location:	Cannington

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site coordinates

Latitude:	51.14522° N
Longitude:	3.05737° W

Reference:	6359324
Date:	2018-07-10T12:53:28

Methodology	FEH Statistical

Site characteristics

Total site area (ha)	1.12

Methodology

Qmed estimation method	Calculate from BFI and SAAR
BFI and SPR estimation method	Specify BFI manually
HOST class	N/A
BFI / BFIHOST	0.452
Qmed (l/s)	NaN
Qbar / Qmed Conversion Factor	1.08

Hydrological characteristics

	Default	Edited
SAAR (mm)	741	751
Hydrological region	8	8
Growth curve factor: 1 year	0.78	0.78
Growth curve factor: 30 year	1.95	1.95
Growth curve factor: 100 year	2.43	2.43

Notes:

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

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

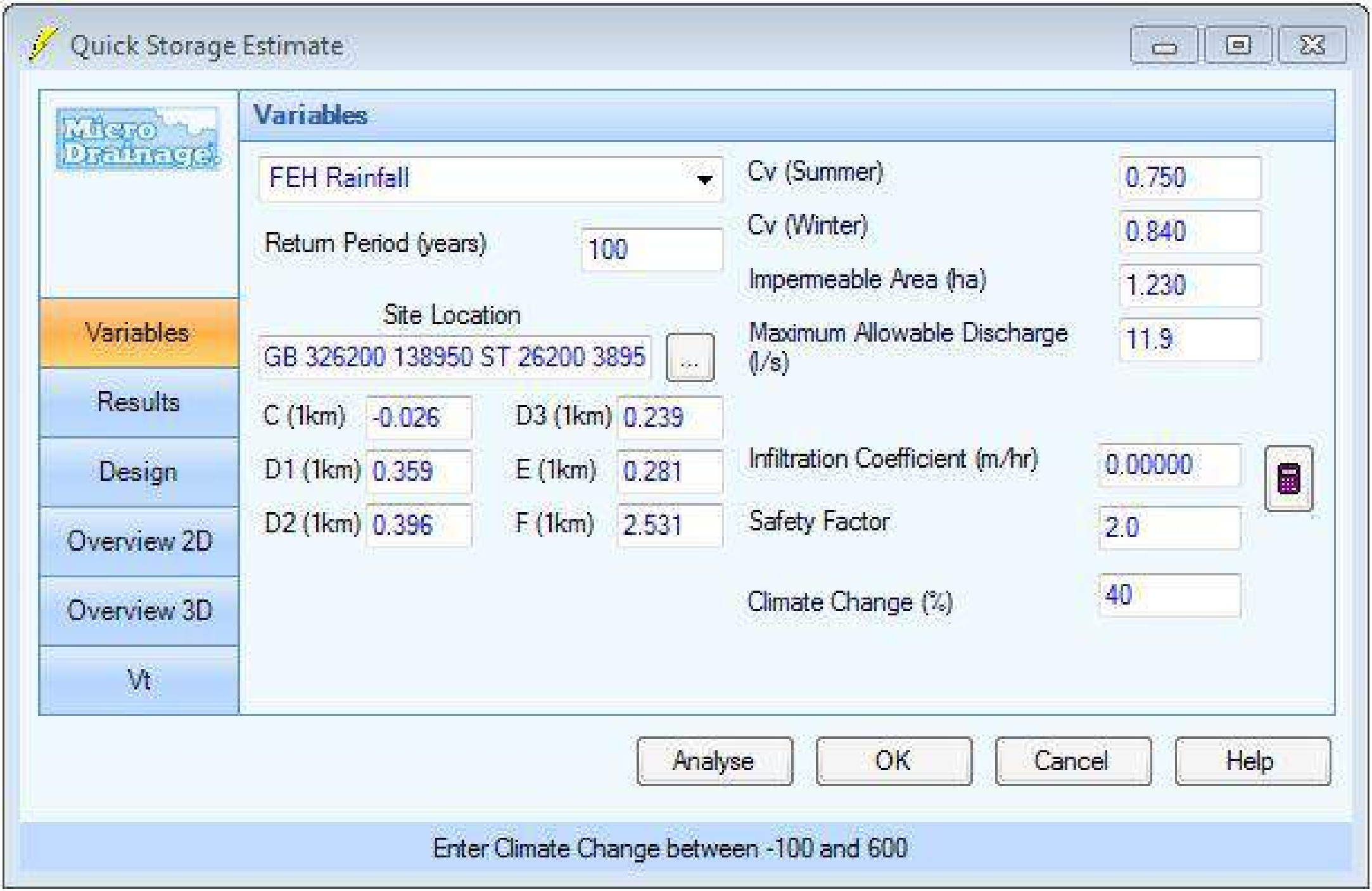
Where flow rates are less than 5.0 l/s consents are usually set at 5.0l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements

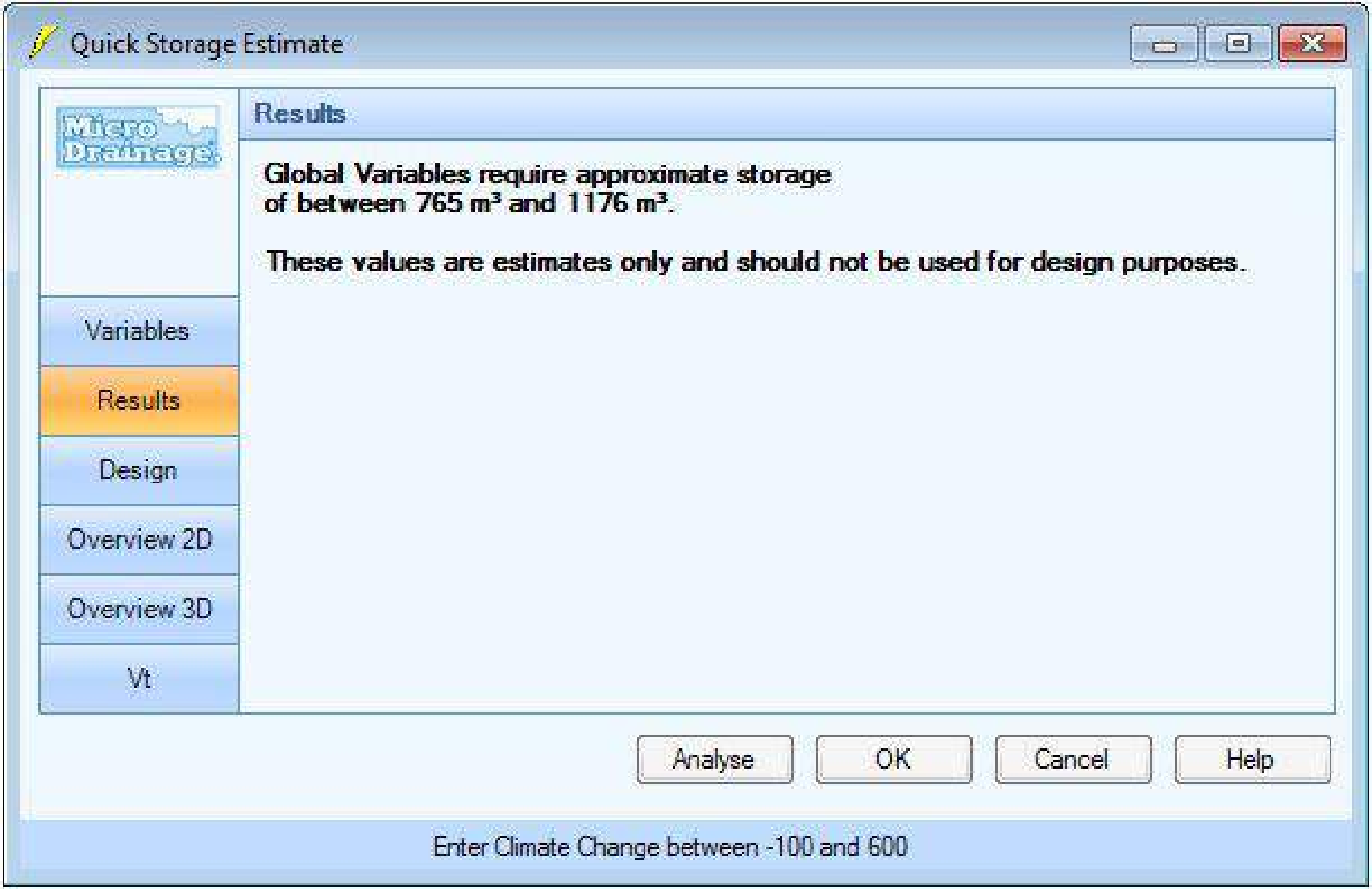
(3) Is SPR/SPRHOST ≤ 0.3?

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	NaN	4.88
1 in 1 year (l/s)	NaN	3.81
1 in 30 years (l/s)	NaN	9.51
1 in 100 years (l/s)	NaN	11.86

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at http://uksuds.com/terms-and-conditions.htm. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for use of this data in the design or operational characteristics of any drainage scheme.


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Site Location
GB 326200 138950 ST 26200 3895
...
C (1km) -0.026
D1 (1km) 0.359
D2 (1km) 0.396
D3 (1km) 0.239
E (1km) 0.281
F (1km) 2.531
Cv (Summer) 0.750
Cv (Winter) 0.840
Impermeable Area (ha) 1.230
Maximum Allowable Discharge (l/s) 11.9
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Climate Change between -100 and 600


Quick Storage Estimate
Results
Global Variables require approximate storage
of between 765 m³ and 1176 m³.
These values are estimates only and should not be used for design purposes.
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Analyse
OK
Cancel
Help
Enter Climate Change between -100 and 600