



Colthrop Village, Thatcham

Flood Mitigation Strategy

On behalf of **Colthrop Village Consortium**



Project Ref: 332511438-4001 | Rev: - | Date: February 2023

Registered Office: Buckingham Court Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire, HP11 1JU
Office Address: Caversham Bridge House, Waterman Place, Reading, Berkshire RG1 8DN
T: +44 (0)118 950 0761 E: Reading.uk@stantec.com

Document Control Sheet

Project Name: Colthrop Village, Thatcham

Project Ref: 332511438-4001

Report Title: Flood Risk Mitigation Strategy

Doc Ref: -

Date: February 2023

	Name	Position	Signature	Date
Prepared by:	Richard Fisher	Senior Associate	R. Fisher	31/01/23
Reviewed by:	John Pulsford	Senior Associate	J. Pulsford	31/01/23
Approved by:	Richard Fisher	Senior Associate	R. Fisher	31/01/23
For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved

This report has been prepared by Stantec UK Limited ('Stantec') on behalf of its client to whom this report is addressed ('Client') in connection with the project described in this report and takes into account the Client's particular instructions and requirements. This report was prepared in accordance with the professional services appointment under which Stantec was appointed by its Client. This report is not intended for and should not be relied on by any third party (i.e. parties other than the Client). Stantec accepts no duty or responsibility (including in negligence) to any party other than the Client and disclaims all liability of any nature whatsoever to any such party in respect of this report.

Contents

1	Introduction.....	5
2	Site Setting	7
2.1	Site Description	7
2.2	Topography	8
2.3	Watercourses and Flood Defences	8
2.4	Development Proposals	8
3	Planning Policy.....	9
3.1	National Policy and Guidance	9
3.2	Climate Change Allowances Guidance	9
3.3	Local Policy and Guidance	11
3.4	West Berkshire Council Strategic Flood Risk Assessment	12
4	Overview of Flood Risk.....	13
4.1	EA Flood Zone Map.....	13
4.2	EA Surface Water Flood Risk Map.....	14
4.3	EA Reservoir Flood Risk Map	14
4.4	West Berks Level 1 SFRA.....	14
4.5	EA Modelled Flood Data	15
5	Stantec 2D Modelling	19
5.1	Baseline EA 1D Model	19
5.2	Stantec 2D Model Improvements	19
5.3	Revised Baseline.....	20
5.4	Design Option Modelling	22
5.5	EA Liaison	23
6	Flood Mitigation Strategy	24
6.1	Floodplain Storage and Flow Routes	24
6.2	Ground Floor Levels	24
6.3	Safe Access Arrangements.....	24
6.4	Residual Risk of Canal Breach.....	25
6.5	Environmental Permitting Regulations (Flood Risk Activities Permit)	25
6.6	Surface Water and SuDS	25
7	Conclusions	27

Figures

Figure 2.1: Site Location	7
Figure 3-1: Kennet and Tributaries Management Catchment	10
Figure 4-1: EA Flood Zone Map	13
Figure 4-2: WBC SFRA Appendix E – Recorded Flood Outlines.....	14
Figure 4.3: EA Modelled Flood Extents	16
Figure 4.3: Extract from EA River Kennet Model Operation Manual ('Areas of Uncertainty')....	18
Figure 5-1: 2D Model Boundary	20
Figure 5.2: Revised Baseline 1 in 100 (1.0%) Annual Probability Flood Extent.....	21
Figure 5.3: Revised Baseline 1 in 100 (1.0%) Annual Probability +35% Flood Extent	21
Figure 5.4: Design Option 1 in 100 Annual Probability +35% Flood Extent	22
Figure 5.5: Graph Showing Increase in Flood Flow Attenuation for Design Option	23
Figure 6.1: View west along northern site boundary (site on left hand side)	25

Tables

Table 4.1: EA Modelled Flood Levels – 1 in 100 (1.0%) Annual Probability Event	16
Table 4.2: EA Modelled Flood Levels – 1 in 100 (1.0%) plus 20% Climate Change Event	17

Appendices

Appendix A	Draft Master Plan by JSA
Appendix B	Environment Agency Data
Appendix C	Stantec 2D Model Figures

1 Introduction

- 1.1.1 This 'Flood Mitigation Strategy' has been prepared by Stantec UK Ltd ('Stantec'), on behalf of our clients, Colthrop Village Consortium, in relation to the Colthrop Village site at Thatcham.
- 1.1.2 This is an update to the earlier version of the report issued by Peter Brett Associates (PBA), now Stantec, in December 2016 (report reference 30738/4001 rev B), updated to latest planning policy.
- 1.1.3 The report outlines the proposed mitigation measures for future development over the site to mitigate fluvial flood risk, and demonstrate the development is safe and the site is appropriate for allocation by West Berkshire Council.
- 1.1.4 The requirements for new development in relation to flood risk are contained within the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance released in March 2014.
- 1.1.5 Local planning policy is contained within the West Berkshire Core Strategy (adopted July 2012), which forms part of the Local Plan and sets out the Council's overall planning strategy to the year 2026. Policy CS:16 'Flooding' addresses flood risk and the report confirms that future development would meet the requirements of this policy (subject to the Sequential Test, which is beyond the remit of this document).
- 1.1.6 The eastern part of the site is shown on the Environment Agency (EA) Flood Zones map as lying within Flood Zone 1 'Low Probability' (less than 1 in 1000 (0.1%) annual probability of river flooding or sea flooding). The western part of the site lies within Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability' (greater than 1 in 100 (1%) annual probability of river flooding).
- 1.1.7 Review of the EA's 1D hydraulic model of the River Kennet (Kennet (Marlborough to Tyle Mill) & Lambourn-Enbourne 2007 Study) confirms that it is inappropriate to accurately simulate the flood risk across the area, due to inherent weaknesses in 1-dimensional modelling when simulating complex floodplain flows, as acknowledged by the EA in the provided Middle Kennet 'Model Operation Manual'.
- 1.1.8 Stantec subsequently constructed a hybrid 1d-2d model to more accurately simulate the flow routes and resulting flood levels over the site, which is used as a basis for the Flood Mitigation Strategy. The EA have confirmed that their 2007 model remains the best available information; work has begun to update this modelling, but it is at an early stage and no outputs are expected until late 2024.
- 1.1.9 This report focusses on:
- Identification of impact of fluvial flooding (as the primary flood risk) to the site and the assessment of this flood risk, both current and including the future potential impact of climate change (other sources of flooding – i.e. surface water, groundwater, sewers and artificial sources – canals and reservoirs – will be thoroughly considered as part of any future Flood Risk Assessment (FRA));
 - Overview of 1d-2d modelling works to provide the best available information on flood risk over the site, to establish a revised baseline and design option, taking into account the potential allowance for climate change over the lifetime of the development;
 - The identification of flood risk constraints and the proposed mitigation strategy to ensure the development is safe.

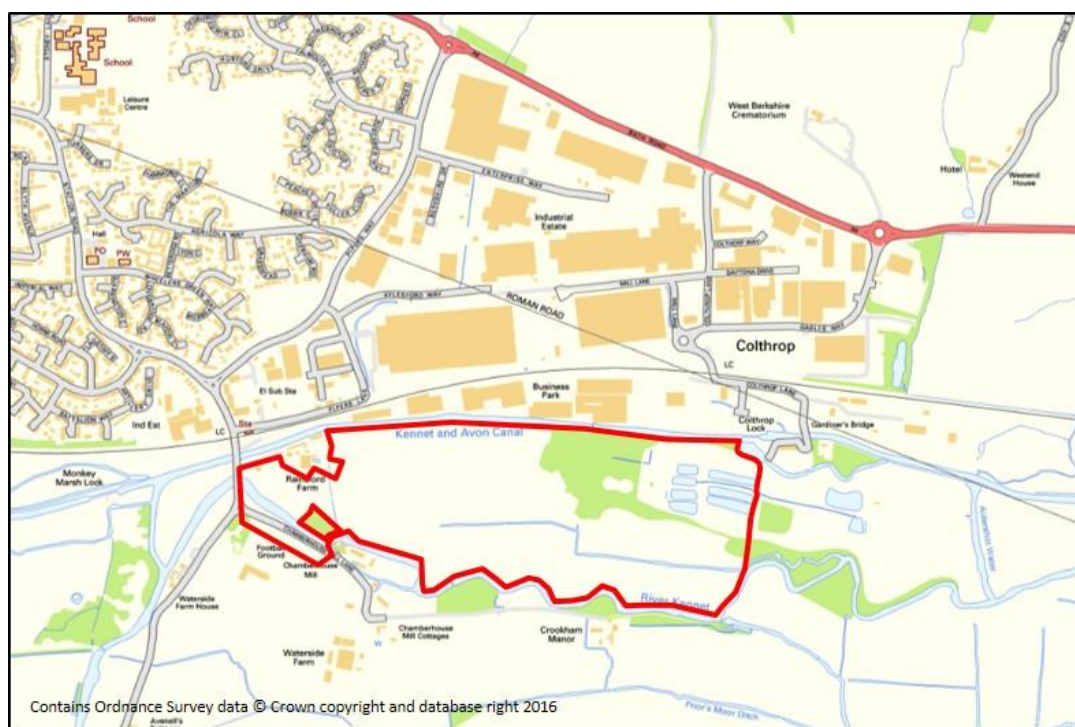
- 1.1.10 The surface water drainage arrangements for new development over the site are considered in the PBA report 'Surface Water Concept Strategy'. This details how the surface water runoff can be contained over the site utilising SuDS attenuation measures and discharged into the surrounding fluvial system at a controlled rates so as not to increase flood risk from existing. The scheme also provides an opportunity to remove the existing straight concrete channel into which the Thames Water syphon outfalls, and instead redirect the flow into the green corridor.
- 1.1.11 Stantec has undertaken this report using experienced flood risk management staff chartered with the Institution of Civil Engineers (ICE) and the Chartered Institution of Water and Environmental Management (CIWEM). Stantec has many years of experience in, amongst other areas, the assessment of flood risk, hydrology, flood defence and river engineering.

2 Site Setting

2.1 Site Description

- 2.1.1 The Colthrop Village site consists of a 36.2 hectare area of land south of Colthrop, on the south-eastern fringe of Thatcham within the administrative boundary of West Berkshire Council (WBC).
- 2.1.2 The site is centred on OS grid reference 453,440m E, 166,200m N, nearest postcode RG19 4PA (see **Figure 2.1**).

Figure 2.1: Site Location



- 2.1.3 The site is bordered by Kennet and Avon Canal in the north and the River Kennet in the south. Kennetholme Quarry, a minerals treatment and processing plant, lies to the east whilst agricultural land lies to the west.
- 2.1.4 The western part of the site consists of agricultural land which forms part of Rainsford Farm. This part of the site is accessed via Station Road, to the immediate west of the site (directly south of Thatcham train station).
- 2.1.5 The Rainsford Farm site, a small peninsula of land in the north-western end of the site (predominantly in Flood Zone 1), previously secured outline planning permission for a 13-unit residential development (ref: 09/02370/OUTMAJ), which has now been implemented.
- 2.1.6 The north-eastern part of the site consists of the former Colthrop Paper Mill, with its associated grounds. The buildings in this area have been cleared (other than the old water tower) but hard standing remains. This area is accessed via Colthrop Lane to the north (passing over the Canal into the site from the Colthrop Business Park and Industrial Estate).

2.2 Topography

- 2.2.1 A level survey of the central and eastern part of the site was undertaken by Midland Survey Ltd in November 2014. The survey was supplemented by additional levels covering the western end of the site and the canal towpath (Midland Survey Ltd, June 2015).
- 2.2.2 In general, ground levels over the former paper mill in the north-eastern part of the site are between 66.0m AOD and 67.0m AOD.
- 2.2.3 The survey indicates ground levels along the northern boundary of the site (i.e. the canal towpath) at approximately 66.0m AOD, with a shallow fall south across the site to the drainage channel through the middle of the site (at 65.0m AOD in the centre of the site, falling as it flows to the east). A slight rise in levels is observed to the south of this drainage channel, with ground levels increasing slightly up to the southern boundary with the River Kennet.
- 2.2.4 Ground levels of between 66.0m AOD and 67.0m AOD over the western part of the site, falling towards the drainage channel in the centre of the site.

2.3 Watercourses and Flood Defences

- 2.3.1 The dominant watercourse in the Thatcham area is the River Kennet, which flows east along the southern boundary of the site in a natural channel. This passes through Chamberhouse Mill in the south-western part of the site, where the side channel of the mill forms the site boundary.
- 2.3.2 The Kennet and Avon Canal borders the site to the north. The River Kennet and the Canal are interconnected throughout the wider area, with the River flowing within the Canal in numerous places. In the vicinity of the site, a link channel between the two watercourses lies immediately upstream of the site (west of Station Road), while further east of the site is another link channel referred to as the 'Aldershot Water'.
- 2.3.3 The Canal passes through the Colthrop Lock in the north-east corner of the site.
- 2.3.4 On the east side of the Rainsford Farm site, a syphon passes under the Canal; part of the Thames Water surface water sewer system serving the area to the north. The syphon emerges a short distance south of the Canal into a trapezoidal concrete channel, which runs south to outfall into the River Kennet on the downstream side of the sluice/weir structures at Chamberhouse Mill.
- 2.3.5 An unnamed drainage channel runs through around field boundaries in the centre of the site, flowing east to outfall into the River Kennet along the southern site boundary.
- 2.3.6 A second drainage channel (potentially an overflow from the Canal) runs south across the western part of the site from the Rainsford Farm site, draining into the River Kennet at Chamberhouse Mill.
- 2.3.7 There are no formal flood defences in the vicinity of the site.

2.4 Development Proposals

- 2.4.1 The proposal is to provide a mixed-use redevelopment comprising in the region of 850 to 950 dwellings, commercial units, shops and services, a new school, a sports club and new public open space. The draft masterplan by JSA is included in **Appendix A** for reference.

Importantly, the proposed redevelopment would also provide a new bridge to facilitate the permanent closure of Thatcham level crossing, alleviating the traffic problems in south Thatcham.

3 Planning Policy

This Strategy has been prepared in accordance with the relevant national, regional and local planning policy and statutory authority guidance as detailed below.

3.1 National Policy and Guidance

- 3.1.1 National policy in relation to flood risk is contained within the **National Planning Policy Framework (NPPF)**, updated July 2021, issued by the Department for Levelling Up, Housing and Communities, with reference to Section 14 'Meeting the challenge of climate change, flooding and coastal change'.
- 3.1.2 The associated **Planning Practice Guidance (PPG)** was released in March 2014 (with reference to the 'Flood Risk and Coastal Change' section) and also last updated August 2022.
- 3.1.3 The NPPF and PPG demonstrate a flood risk management approach for the lifespan of the proposed development considering the effects of climate change. The document sets the framework to minimise vulnerability, provide resilience to the impacts of climate change, and to fully consider the potential impacts of climate change for the lifetime of the development within the mitigation measures.
- 3.1.4 The guidance on the application of climate change allowances in FRAs is linked via the PPG and was most recently updated in May 2022:

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>.
- 3.1.5 The guidance provides contingency allowances for the potential increases in peak river flow, peak rainfall intensity and sea level rise which are considered accordingly subject to the site conditions – discussed further in **Section 3.2**.
- 3.1.6 The NPPF sets out the requirement for the Sequential Test and Exception Test in paragraphs 162 and 163 respectively – see below.

"162. The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding).

163. If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3"

- 3.1.7 These tests are to be applied where appropriate, depending on the proposed development flood risk 'vulnerability', the Flood Zone in which it is located and the risk of flooding from other sources.

3.2 Climate Change Allowances Guidance

- 3.2.1 The NPPF and PPG place emphasis on the need to fully consider – and design for – the impacts of climate change as set out in the 'Flood risk assessments: climate change allowances'

planning guidance. This guidance provides contingency allowances for potential increases due to climate change in:

- Peak river flow;
- Rainfall intensity;
- Sea level rise.

3.2.2 The peak river flow allowances provide a range of allowances based on percentile (i.e. the degree of certainty of an event occurring, based on the range of climate change scenarios assessed through scientific investigations). The applicable values for a site are dependent on the 'River Management Catchment' in which the site is located, which can be confirmed via the online mapping tool embedded within the guidance.

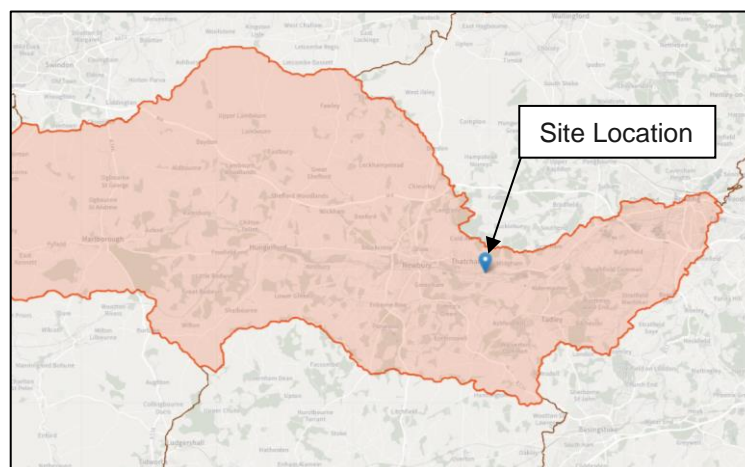
3.2.3 The peak river flow allowances provide a range of scenarios based on percentile (i.e., the degree of certainty of an event occurring, based on the range of climate change scenarios assessed through scientific investigations). The provided allowances are subject to the sub-catchments of river basin district (known as management catchments) and the vulnerability classification of the proposed use of the site.

3.2.4 The Central allowance is identified as the design standard for most forms of proposed development in all appropriate Flood Zones. The peak river flow allowances to be considered as part of the FRA are as detailed in **Table 3-1**. The Kennet and Tributaries Management Catchment is shown in **Figure 3-1**.

Table 3-1: Climate Change – Peak River Flow - Central Allowances

River Management Catchment	Central Climate Change Allowance - Epoch		
	2020s	2050s	2080s
<i>Kennet and Tributaries Management Catchment</i>	+10%	+8%	+21%

Figure 3-1: Kennet and Tributaries Management Catchment



3.2.5 Hydraulic modelling has been undertaken to provide a more accurate representation of the floodplain over the site, and to generate new flood levels based on the increased climate change allowances to the peak river flows set out above, as detailed in **Section 5**.

- 3.2.6 The previous version of the Climate Change Allowances guidance specified a 'Higher Central' peak river flow allowance of +35% (i.e. higher than the latest guidance) and the Strategy has therefore been designed to the 1 in 100 annual probability +35% climate change scenario – i.e. more precautionary than the requirements of the latest guidance.

3.3 Local Policy and Guidance

West Berkshire Council Local Plan

- 3.3.1 Local planning policy is contained within the **West Berkshire Council Local Plan – Core Strategy 2006-2026** (adopted July 2012), with particular reference to **Policy CS 16 - 'Flooding'** which states as follows:

Core Strategy Policy CS 16 - Flooding

"The sequential approach in accordance with the NPPF will be strictly applied across the District. Development within areas of flood risk from any source of flooding, including Critical Drainage Areas and areas with a history of groundwater or surface water flooding, will only be accepted if it is demonstrated that it is appropriate at that location, and that there are no suitable and available alternative sites at a lower flood risk.

When development has to be located in flood risk areas, it should be safe and not increase flood risk elsewhere, reducing the risk where possible and taking into account climate change.

Proposed development will require a Flood Risk Assessment for:

- *Sites of 1 ha or more in Flood Zone 1.*
- *Sites in Flood Zone 2 or 3.*
- *Critical Drainage Areas.*
- *Areas with historic records of groundwater and/or surface water flooding.*
- *Areas near ponds or the Kennet and Avon Canal, that may overtop.*
- *Sites where access would be affected during a flood. Areas behind flood defences.*
- *Sites with known flooding from sewers.*

Development will only be permitted if it can be demonstrated that:

- *Through the sequential test and exception test (where required), it is demonstrated that the benefits of the development to the community outweigh the risk of flooding.*
- *It would not have an impact on the capacity of an area to store floodwater.*
- *It would not have a detrimental impact on the flow of fluvial flood water, surface water or obstruct the run-off of water due to high levels of groundwater.*
- *Appropriate measures required to manage any flood risk can be implemented.*
- *Provision is made for the long-term maintenance and management of any flood protection and or mitigation measures.*
- *Safe access and exit from the site can be provided for routine and emergency access under both frequent and extreme flood conditions(80).*

On all development sites, surface water will be managed in a sustainable manner through the implementation of Sustainable Drainage Methods (SuDS)(81)in accordance with best practice and the proposed national standards and to provide attenuation to greenfield run-off rates and volumes, for all new development and re-development and provide other benefits where possible such as water quality, biodiversity and amenity."

3.4 West Berkshire Council Strategic Flood Risk Assessment

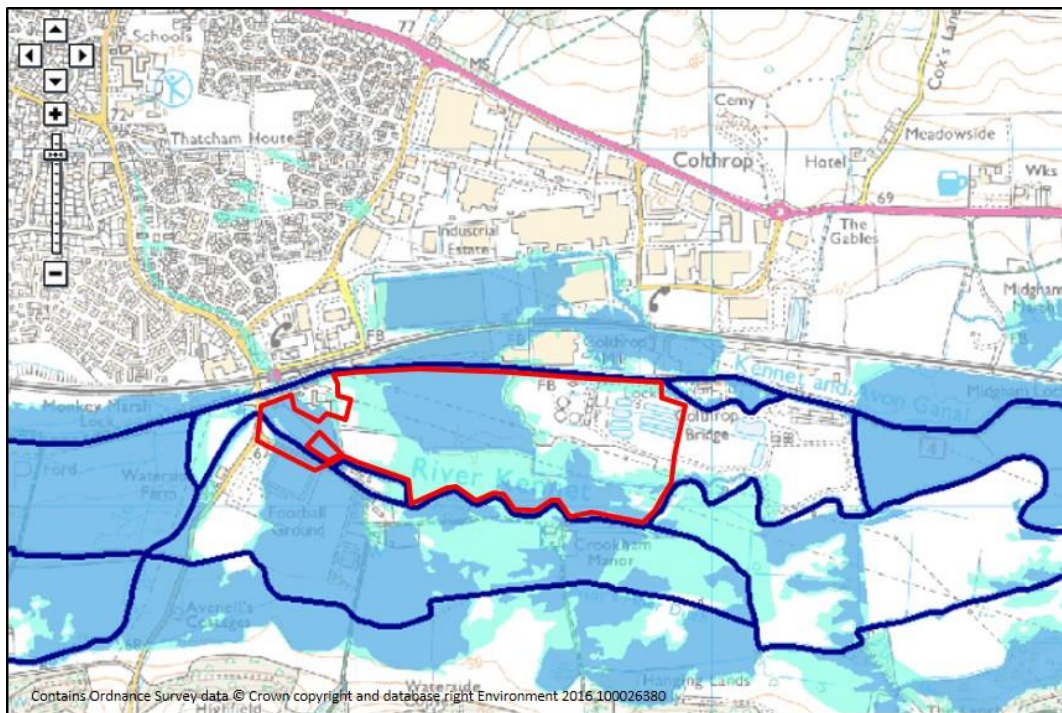
- 3.4.1 The WBC **Strategic Flood Risk Assessment (SFRA)** was released in 2022 and forms part of the Local Plan evidence base, to inform future spatial planning and to assist in developing planning policies to address flood risk. Moreover, the document provides an overall understanding of the flood risk within the study area taking into account all potential sources.
- 3.4.2 It is essential therefore that the Council are in a position to take informed decisions, providing a careful balance between the risk of flooding and other unrelated planning constraints that may place pressure upon '*at risk*' areas.

4 Overview of Flood Risk

4.1 EA Flood Zone Map

- 4.1.1 The first phase in identifying whether a site is potentially at risk of flooding is to consult the EA's online Flood Zone map. This provides an initial indication of the probability of fluvial/tidal flooding to an area, which is refined by the use of more detailed site-specific level survey and modelled flood levels (see **Figure 4-1** below).

Figure 4-1: EA Flood Zone Map



- 4.1.2 The Flood Zone map indicates the following:

- The central and eastern parts of the site lie within **Flood Zone 1 'Low Probability'** (less than 1 in 1000 (<0.1%) annual probability of river flooding or sea flooding) - unshaded.
- A significant part of the site, running from the north-western boundary through the centre of the site, lies within **Flood Zone 2 'Medium Probability'** (between 1 in 100 (1.0%) and 1 in 1000 (0.1%) annual probability of river flooding) – light blue/green
- Areas of land at the western end of the site, alongside the River Kennet on the southern boundary, and in the north-western part of the site lie within **Flood Zone 3 'High Probability'** (greater than 1 in 100 (>1.0%) annual probability of river flooding) – dark blue.

- 4.1.3 The land to the north of the site is mainly Flood Zone 1 (with areas of Zone 2 and 3 around Colthrop Mill). The land to the south lies within Zones 2 and 3.

- 4.1.4 The historic flood data provided as part of the EA Product 4 information in **Appendix B** indicates that the site was affected by flooding in the events of 1971 and 1979. However, the flooding was limited to along the banks of the River Kennet (1971) or isolated ponding (1979).

4.2 EA Surface Water Flood Risk Map

- 4.2.1 The EA 'Risk of Surface Water Flooding' (RoSWF) map shows that the majority of the site lies in an area at 'Very Low' risk of flooding from surface water (unshaded - less than 1 in 1000 (0.1%) annual probability of surface water flooding). The map indicates thin corridors of medium/high risk of surface water flooding, which correspond with the network of small drainage channels running through the site.
- 4.2.2 Surface water flood risk, and the associated proposed mitigation for any new development, is discussed further in the PBA report 'Surface Water Concept Strategy' (Rev A, October 2016).

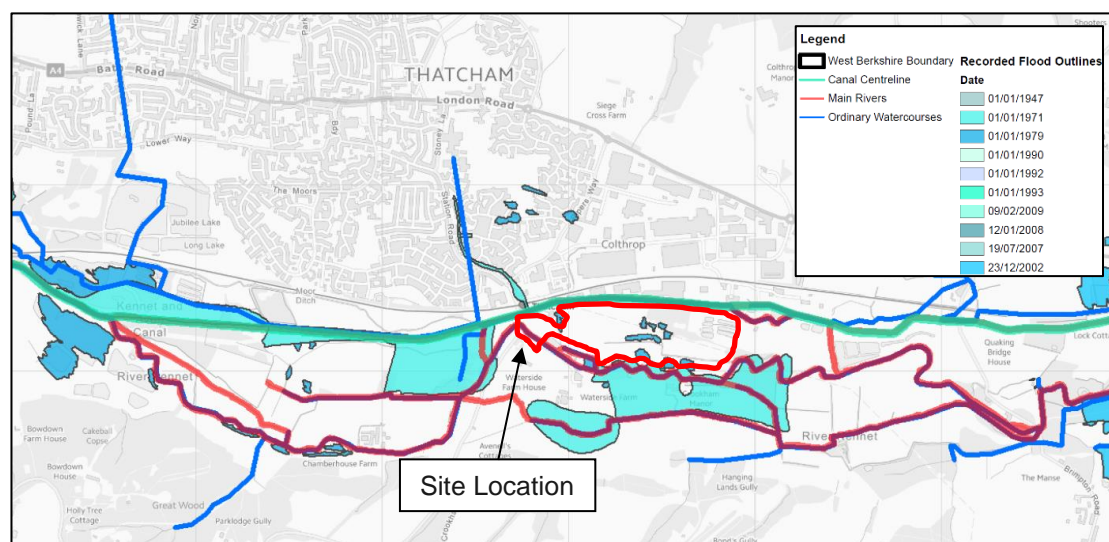
4.3 EA Reservoir Flood Risk Map

- 4.3.1 The EA website provides a 'Flood Risk from Reservoirs' map. This shows that the site does not lie in an area potentially at risk of flooding if a breach occurred in a reservoir.

4.4 West Berks Level 1 SFRA

- 4.4.1 The current WBC Strategic Flood Risk Assessment (SFRA) Level 1 report was prepared in 2022 and provides advice to WBC on flood risk issues within the county. This document has been reviewed and key information of relevance to the site has been extracted.
- **Sewers:** Appendix B (*Sewer Flooding Records*) shows the postcode area of Colthrop (RG194) has had a total of 7 properties affected by sewer flooding. Internal sewer flooding affected 3 properties and external sewer flooding affected 4 properties.
 - **Historic Flooding:** Appendix C (*Flood History*) indicates that Thatcham was affected by surface water flooding in 2007, which affected 1107 properties. However, no site-specific data is provided. Map B2 in *Appendix E (Recorded Flood Outlines)* shows that the eastern and southern sides of the site have been impacted by the flood events of 1971 and 1979 – see **Figure 4-2**.

Figure 4-2: WBC SFRA Appendix E – Recorded Flood Outlines



- **Flood Zones:** Map B2 in SFRA Appendix F (*Flood Zones*) shows the eastern and southern areas of the site lie within Flood Zones 2 and 3, associated with the River Kennet. There is also a Flood Zone 3b extent in the south-eastern corner of the site. The general pattern of the Flood Zones shown in Map B2 is consistent with the latest EA Flood Zones shown in Figure 4-1.

- **Flood Warning Areas:** Map B2 in Appendix H (*Flood Warning Areas*) indicates that the eastern and southern sides of the site lie within a Flood Alert and Warning Area.
- **Modelled Flood Extents:** Map B2 in SFRA Appendix I (*Flood Zone 3 + Climate Change*) shows the southern and eastern areas of the site are affected by the Flood Zone 3 +35% and +70% allowances for climate change flood extents, which are associated with the River Kennet. The north-eastern corner of the site is affected by the Flood Zone 3 +70% allowance for climate change flood event.
- **Surface Water:** Map A1 in Appendix J (*Risk of Flooding from Surface Water*) is consistent with the data discussed in [Section 4.2](#).
- **Groundwater Emergence:** Map B2 in SFRA Appendix K (*Groundwater Emergence Mapping*) shows the site does not lie within an area where groundwater is likely to emerge.
- **Groundwater Flooding:** Map B2 in Appendix L (*Groundwater Flood Mapping*) indicates that the site is not at risk of groundwater flooding.
- **Reservoir Breach:** Map B2 in SFRA Appendix M (*Risk of Flooding from Reservoirs*) shows the site is not at risk of flooding from reservoirs. This is consistent with the data discussed in [Section 4.3](#).

- 4.4.2 The SFRA provides an overview of flood risk in the Thatcham area in Section 4.5.2, which states the following:

“Thatcham is at greatest risk from surface water flooding, with runoff conveyed rapidly through the town via culverted watercourses, drainage systems and the road network⁴⁷. The most significant recent event occurred on 20 July 2007, where approximately 1,100 homes were flooded.

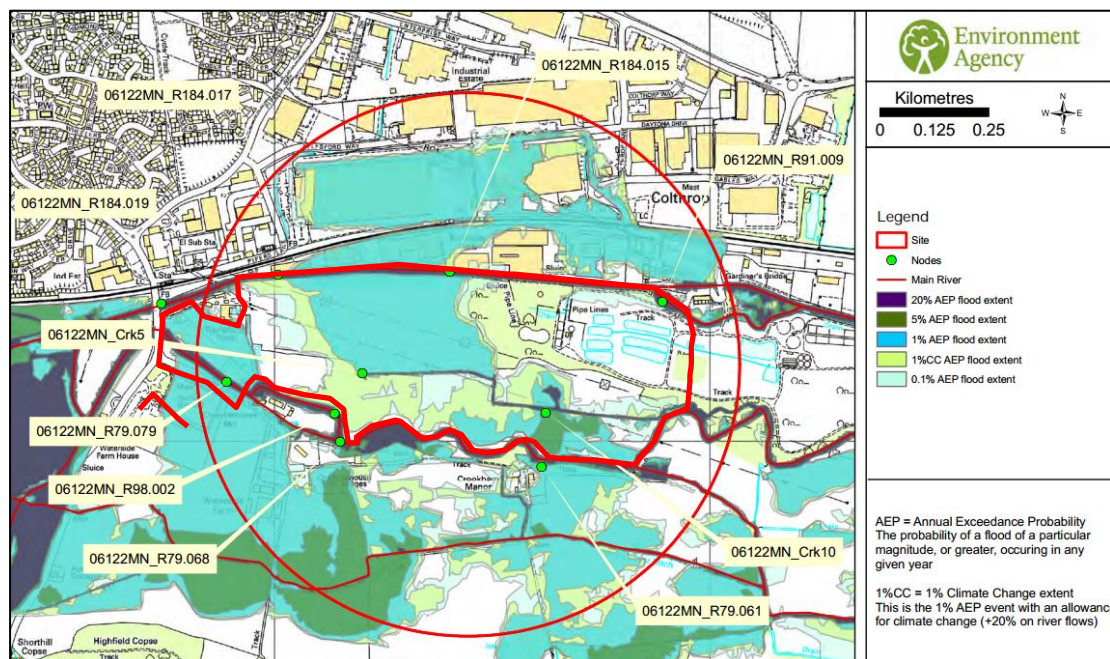
Two areas of the town particularly affected were south east Thatcham, covering the A4, Pipers Way and Station Road, and northwest Thatcham, including land north of Bath Road, Northfield Road and Henwick Lane/Gordon Road. These areas were subsequently identified as Critical Drainage Areas within the 2008 Level 1 SFRA. The EA RoFSW identifies significant surface water flow paths generated in these catchments during the 1 in 30-year rainfall event and higher return periods. Following the course of former river valleys to the River Kennet, runoff drains through residential and commercial areas, restricted by culverted watercourses and the southern railway embankment.”

- 4.4.3 No reference is made to the site, as the reporting is mainly concerned with the number of flooded properties affected.
- 4.4.4 In summary, the SFRA indicates that there are specific historic flooding records over the eastern side of the site, otherwise the identified areas at high probability of flooding from fluvial and surface water sources are consistent with current EA data.

4.5 EA Modelled Flood Data

- 4.5.1 The EA provided modelled flood data for the area from their Kennet (Marlborough to Tyle Mill) & Lambourn-Enbourne 2007 Study – see Product 4 data in [Appendix B](#).
- 4.5.2 The EA have confirmed that their 2007 model remains the best available information; work has begun to update this modelling, but it is at an early stage and no outputs are expected until late 2024 (see EA email dated 9th February 2023 in [Appendix B](#)).
- 4.5.3 The modelled EA flood extents in the vicinity of the site are shown in [Figure 4.3](#).

Figure 4.3: EA Modelled Flood Extents



- 4.5.4 The flood extents in Figure 4.3 above indicate the site is largely outside the modelled events up to the 1 in 20 (5%) annual probability event, apart from a small area of flooding in the centre via the drainage channel.
- 4.5.5 More significant areas on the western side of the site are impacted in the flood events of 1 in 100 (1.0%) annual probability and greater severity, the impacts of which are considered in detail based on the available ground level survey and the modelled flood levels shown in **Table 4.1** and **Table 4.2**.

Table 4.1: EA Modelled Flood Levels – 1 in 100 (1.0%) Annual Probability Event

River Channel	Modelled Flood Level (m AOD) and Location		
	Upstream (western limit)	Centre of site	Downstream (eastern limit)
Kennet & Avon Canal	67.08 (node R184.019)	66.80 (node R184.015)	64.85 (node R91.009)
Central Drainage Channel	-	63.94 (node Crk10)	-
River Kennet	66.93 (node R79.081d)	64.37 (node R79.061)	63.54 (node R45.028d)

Table 4.2: EA Modelled Flood Levels – 1 in 100 (1.0%) plus 20% Climate Change Event

River Channel	Modelled Flood Level (m AOD) and Location		
	Upstream (western limit)	Centre of site	Downstream (eastern limit)
Kennet & Avon Canal	67.13 (node R184.019)	66.83 (node R184.015)	64.89 (node R91.009)
Central Drainage Channel	-	64.26 (node Crk10)	-
River Kennet	66.98 (node R79.081d)	64.40 (node R79.061)	63.59 (node R45.028d)

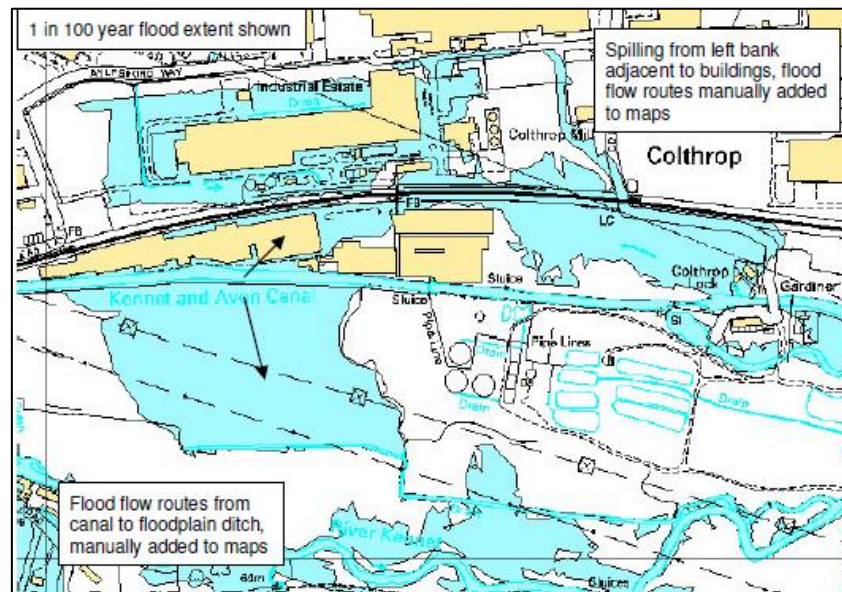
- 4.5.6 It should be noted that the accuracy of the modelled EA flood extents is doubtful in this area, due to the inherent weaknesses in the 1-dimensional hydraulic modelling methodology from which the data has been output.
- 4.5.7 While 1-dimensional (1-d) modelling is appropriate for simulation of flows confined within a channel, or within a floodplain corridor running parallel to the channel, it has difficulty simulating flows across the floodplain, particularly where there are gradients across the floodplain which would route the overland flood flows in varying directions. This specific issue is raised in Section 4 'Areas of Flood Mapping Uncertainty' of the EA 'Middle Kennet Flood Mapping (Volume III Model Operation Manual, October 2007)', which states:

"Areas of Uncertainty

...Around Colthrop, the model contains reaches of perched canal which make the mapping of the flood flow routes over the right bank [i.e. the location of the proposed development] difficult using 1D methods i.e. spilling from a perched channel and then floodplain 'sheetflow' to the flood level of the adjacent channel..."

- 4.5.8 The accompanying Figure in the EA report explicitly identifies the site as this 'area of uncertainty' in the model schematisation – see Extract of Figure from EA River Kennet Model Operation Manual.

Figure 4.3: Extract from EA River Kennet Model Operation Manual ('Areas of Uncertainty')



- 4.5.9 The vicinity of the site is such a location, where in a severe flood event there is overtopping of the canal and floodwater spills south towards the lower lying River Kennet and central drainage channel. The 1-dimensional model identifies where the spill out of the canal occurs, but the route from this point and extent of flooding is largely down to interpretation of the ground levels rather than the modelling output.
- 4.5.10 As such, the site was the subject of a new modelling exercise by Stantec using 2-dimensional TUFLOW modelling software, linked to the surrounding 1-dimensional EA model, to create a '1d-2d model' which confirms the flood routes over the site and more accurately establish the impacts of flooding in the modelled events. TUFLOW is the industry standard for 2d hydraulic modelling and is used extensively throughout the UK by the EA. This modelling work is discussed further in **Section 5**.

5 Stantec 2D Modelling

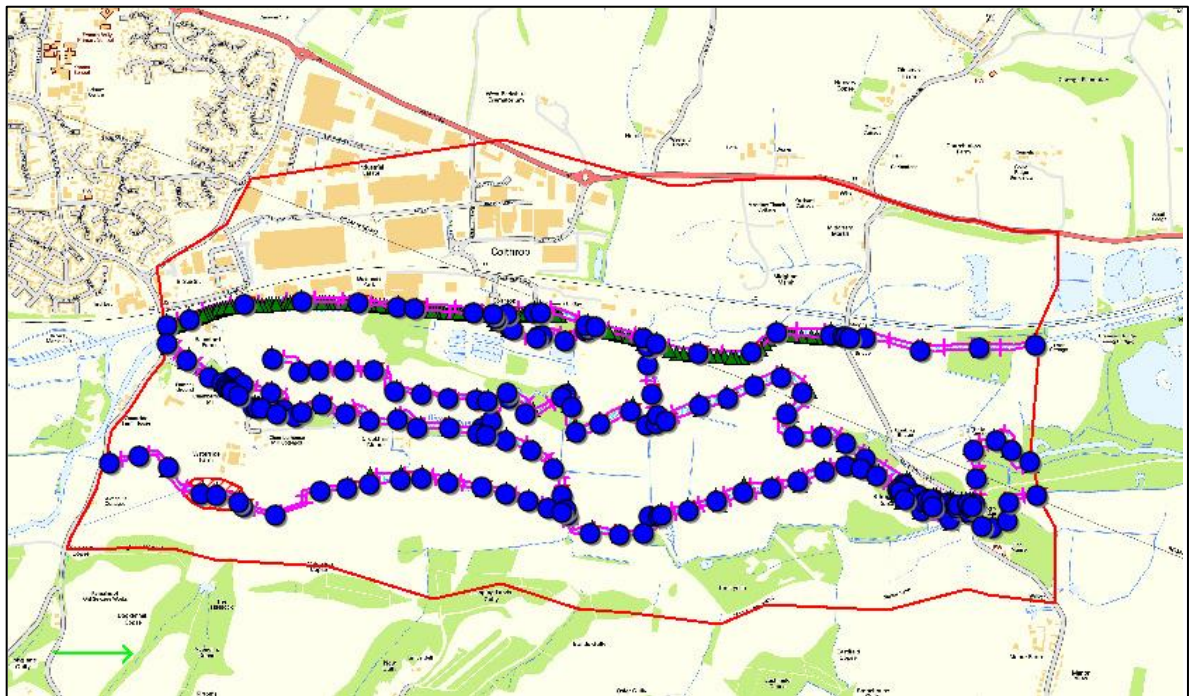
5.1 Baseline EA 1D Model

- 5.1.1 The EA commissioned a flood risk mapping project of over 53km of the middle River Kennet as part of the EA's Strategic Flood Risk Management Framework (SFRM) and was completed in July 2007 (Halcrow Group Ltd, 2007). The information provided by the EA and discussed in **Section 4.6** is extracted from this study.
- 5.1.2 The 1-d model was constructed using topographical survey data for the watercourse channels and LiDAR data for floodplain storage areas and extended floodplain sections. The topographical survey was carried out in 1992.
- 5.1.3 The whole of the existing 1-d ISIS Newbury to Tyle Mill model was used for the present study with modifications.

5.2 Stantec 2D Model Improvements

- 5.2.1 As detailed in **Section 4.6**, the 1-d format of the existing EA hydraulic model is not appropriate to represent the floodplain over the site, due to the site characteristics and the inherent weaknesses in 1-D modelling of floodplain areas.
- 5.2.2 Part of the existing 1-d ISIS model was modified by removing the representation of the floodplain. The modifications involved de-activating cross section data to the left and right of top of bank and the removal of spill and reservoir units.
- 5.2.3 The extent of the modifications was from Station Road to approximately 250m downstream of Brimpton Road bridge on the River Kennet. These modifications allowed the floodplain to be represented in a 2-d 'TUFLOW' model, which was dynamically linked to the 1-d ISIS model.
- 5.2.4 The extent of the TUFLOW model is shown in **Figure 5.1**.
 - The upstream boundary is at Station Road (452720, 166300);
 - The downstream boundary is a short distance downstream of Brimpton Road (455750, 166240).

Figure 5-1: 2D Model Boundary



5.2.5 The blue dots in the figure above show the location of the 1-d model cross sections in the original 1D model. The pink lines alongside the channels denote the interface between the 1-d in-channel model and the 2-d domain over the surrounding floodplain.

5.2.6 The digital elevation model (DEM) was created using LiDAR data over the whole region of the TUFLOW domain. Additional topographical survey data was used for the banks of the Kennet and Avon Canal and other channels within the model area.

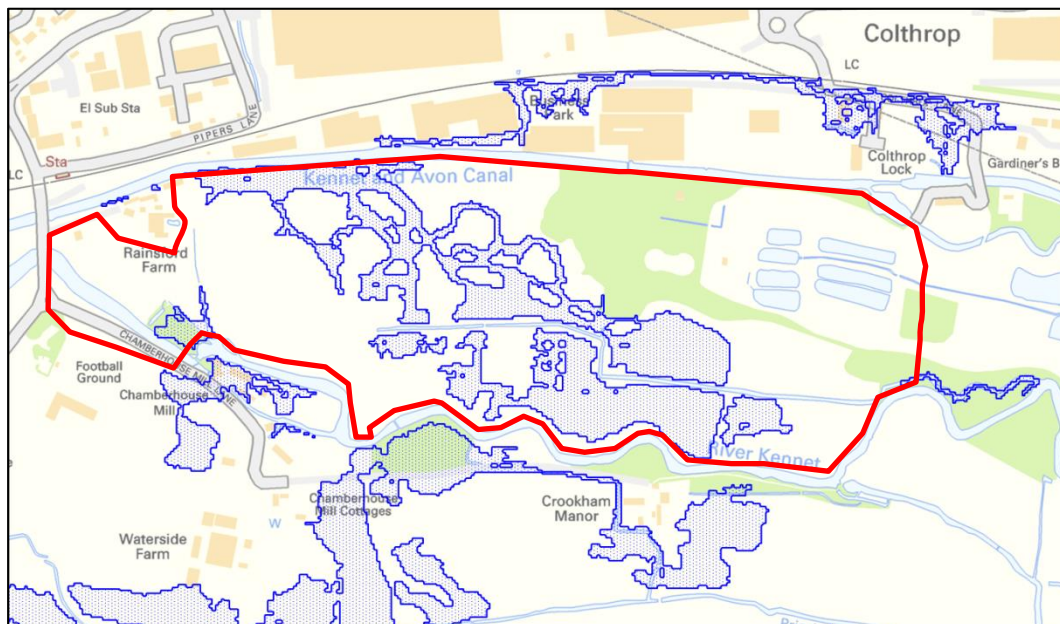
5.3 Revised Baseline

5.3.1 The improved 1D-2D model was run using the 1 in 100 (1.0%) annual probability event to establish an updated Flood Zone 3a flood extent (in the absence of formal flood defences in the area).

5.3.2 The revised 1 in 100 (1.0%) annual probability flood extent is shown in **Figure 5.2**. This extent shows that the flow overtopping the right bank of the canal follows localised low areas within nominal braided channels over the development site, forming a braided extent. This flood water flows overland in a south-easterly direction towards the drainage channel running through the centre of the site and re-enters the River Kennet via this channel.

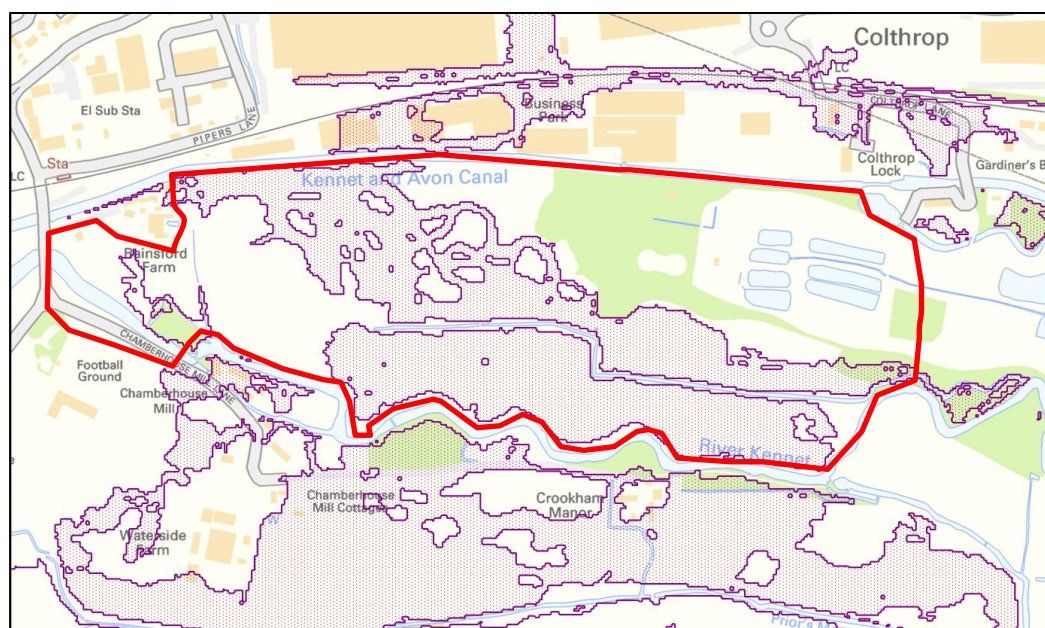
5.3.3 The extent confirms that there is no direct flow route into the Kennet over the right (southern) bank of this drainage channel. This is due to the fact that the left bank of the River Kennet along this reach is higher than the drainage channel and its immediate surrounding land (and, critically, higher than the resulting flood levels in either the Kennet or the drainage channel during this event).

Figure 5.2: Revised Baseline 1 in 100 (1.0%) Annual Probability Flood Extent



- 5.3.4 As detailed in **Section 3.2**, the model was run using the previous guidance on climate change allowances, which resulted in the requirement to establish the 1 in 100 annual probability +35% floodplain extent for the development site. In order to establish this outline, the 1 in 100 (1.0%) annual probability inflow boundaries were increased by 35% and the model was re-run.
- 5.3.5 The 1 in 100 annual probability +35% climate change extent is shown in **Figure 5.3** below. This figure shows that the 1 in 100 (1.0%) annual probability +35% outline is similar in form to the 1 in 100 (1.0%) annual probability outline but is slightly more extensive.

Figure 5.3: Revised Baseline 1 in 100 (1.0%) Annual Probability +35% Flood Extent

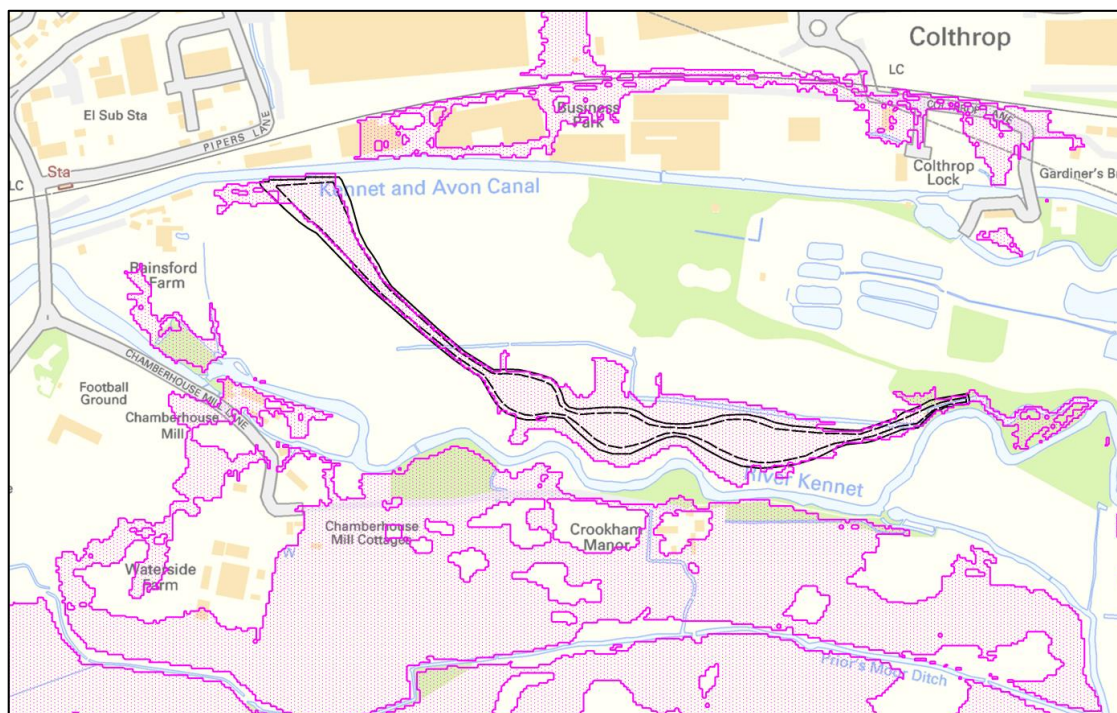


- 5.3.6 It is noted, with reference to the updated climate change allowances in **Section 3.2**, that the latest Climate Change Allowances guidance provides a 2080's epoch peak river flow value of +21%. The model has not been rerun for this +21% scenario, so the modelled +35% scenario event represents a precautionary approach.

5.4 Design Option Modelling

- 5.4.1 As can be seen from **Figure 5.2** and **Figure 5.3**, the hydraulic modelling indicates that during an extreme event, overtopping can occur over the right bank of the Kennet and Avon Canal.
- 5.4.2 This flood water flows overland in a south-easterly direction following localised low areas and forming a braided extent, before flowing into the River Kennet. As part of the development, a rationalisation of this flood extent is proposed, thus providing a more formalised flood corridor between the canal and the River Kennet during extreme flood events.
- 5.4.3 In order to rationalise the flood extent, it is proposed to provide a landscaped green corridor through the development – centred on a swale feature – which would convey any flood water overtopping the canal during an extreme flood event, as well as provide an amenity feature (e.g. potential incorporation of a wetland area).
- 5.4.4 An initial design has been included within the improved 1d-2d hydraulic model and run using the 1 in 100 annual probability +35% event to establish the viability of this option. **Figure 5.4** shows the resulting flood extent (magenta) and the initial outline of the proposed swale corridor (black), which is subject to further refinement.

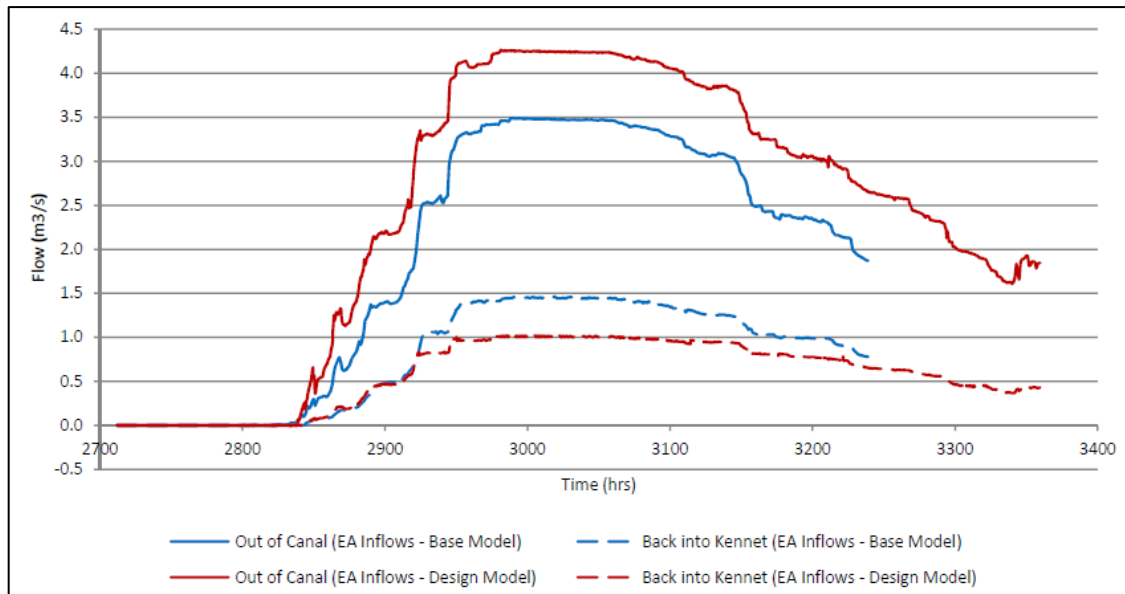
Figure 5.4: Design Option 1 in 100 Annual Probability +35% Flood Extent



- 5.4.5 The amount of water overtopping the right bank of the canal in the baseline and design scenarios has been extracted from both the baseline and design option models. In addition, the amount of water flowing into the River Kennet via the drainage channel in the baseline scenario and the swale corridor in the design scenario has also been extracted from the model results. These results have been plotted on a graph (see **Figure 5.5**) and they demonstrate that **the**

conservative design option will provide more attenuation of the flood flow – i.e. on-site floodplain storage - than in the baseline scenario.

Figure 5.5: Graph Showing Increase in Flood Flow Attenuation for Design Option



- 5.4.6 An initial review of the results of the design option modelling indicates that water levels are generally unchanged or lowered as a result of the proposals. However, there are some minor localised anomalies that will require further investigation and refinement to establish the final design option.
- 5.4.7 Figures showing the baseline modelled 1 in 100 annual probability +35% flood extent, details of the initial proposed swale corridor and the resulting design flood extent are included in **Appendix D**. As noted from the JSA Masterplan in **Appendix A**, the latest proposals for the site fully address fluvial flood risk through the incorporation of this swale feature.

5.5 EA Liaison

- 5.5.1 The revised baseline Stantec 2d model was submitted to the EA in 2016 for their review and approval as part of a formal 'Flood Zone Challenge' process. The EA responded with some comments and queries on the baseline hydrology and the model construction which were subsequently addressed and were incorporated into the updated model by Stantec.
- 5.5.2 In addition, as mentioned in **Section 5.3**, since the original EA submission of the 2d model there has been changes to the national climate change guidance since the original submission. The model has been re-run for the 1 in 100 annual probability +35% climate change allowance scenario, and this guidance has been further updated to provide a 'design' +21% climate change allowance – as such, the model outputs are inherently conservative.
- 5.5.3 As a result of this additional work, the revised 2d model (including the updated climate change results) will be re-submitted to the EA for their approval in due course.

6 Flood Mitigation Strategy

The following section provides an overview of the flood mitigation strategy for the proposed development, with reference to the proposals in the JSA Masterplan in **Appendix A**.

6.1 Floodplain Storage and Flow Routes

- 6.1.1 Any development located in the vicinity of a watercourse should be constructed such that it does not detrimentally impact on flow routes or reduce the available floodplain storage over a site; either of which could potentially cause an increase in flood levels on-site or elsewhere. This is considered up to the benchmark of the 1 in 100 (1.0%) annual probability plus appropriate allowance for climate change fluvial floodplain.
- 6.1.2 The 1d-2d hydraulic model has been run for the 1 in 100 annual probability +35% allowance for climate change event to establish the new baseline and determine impacts of the scheme. This will be further refined in due course to consider the applicable +21% climate change allowance.
- 6.1.3 The proposed scheme results in a rationalised floodplain contained within a green corridor running through the site. The results of the design event demonstrate an improvement in the level of on-site attenuation and that water levels are generally unchanged or lowered as a result of the proposals. As noted, there are some minor localised anomalies that will require further investigation as the model is finalised.

6.2 Ground Floor Levels

- 6.2.1 Standard requirements for ground floor levels of new development are set out in BS8533:2011 'Assessing and managing flood risk in new development – Code of practice'. This recommends floor levels are set a minimum of 300mm above the modelled 1 in 100 (1.0%) annual probability fluvial flood level, including an appropriate allowance for climate change.
- 6.2.2 Accordingly, ground floor levels will be set a minimum of 300mm above the 1 in 100 annual probability +35% allowance for climate change flood levels.
- 6.2.3 It is also recommended that ground floor levels are set a suitable freeboard above surrounding ground (minimum 150mm) to mitigate the residual flood risk associated with excess surface water runoff in an extreme rainfall event. Similarly, exterior ground levels across the site should also be appropriately contoured to direct surface water away from dwellings in such a scenario.

6.3 Safe Access Arrangements

- 6.3.1 The provision of continuous safe access is a key requirement, particularly for new residential development, and has been considered in the development of the current masterplan. The site is constrained by the presence of the Canal along the northern boundary and the River Kennet along the southern boundary.
- 6.3.2 The proposed rationalised floodplain proposals ensure any fluvial flooding over the site is contained within the green corridor running diagonally through the site and over which the main access road will pass. As such, all dwellings will have continuous safe access throughout any flood event, via the access points from the site – either to the north via the new crossing over the Canal or to the south-west via the new crossing over the River Kennet.
- 6.3.3 The crossing of the new access road bridge over the floodplain conveyance route will a clear span structure, with the underside set above the reference flood level. The new crossings over the Canal and the River Kennet will be constructed according to the requirements of the Canal and River Trust (CaRT) or the EA respectively and will be incorporated as appropriate into subsequent iterations of the hydraulic model.

6.4 Residual Risk of Canal Breach

- 6.4.1 The site falls gradually in elevation from the Kennet and Avon Canal, which is embanked as it runs along the northern boundary.
- 6.4.2 A site walkover confirmed that the ground across the site falls very gradually from this northern boundary. However, it was noted that the towpath along the Canal was in some locations embanked slightly above the ground level in the site – typically by between 500mm and 1 metre.

Figure 6.1: View west along northern site boundary (site on left hand side)



- 6.4.3 The risk of a breach in the canal is considered to be low, as the system is maintained by the Canals and Rivers Trust.
- 6.4.4 The risk is also considered to be low as ground levels over the site rise toward the northern boundary (which from observation is not significantly lower than the maintained water level in the canal).
- 6.4.5 However, a residual risk does exist, and it is proposed that this is reduced through strategic ground raising of a corridor along the northern boundary of the site to ensure the site levels in this zone are set no lower than the canal tow path level – thereby negating the risk of breach.

6.5 Environmental Permitting Regulations (Flood Risk Activities Permit)

- 6.5.1 The site is bordered by the Kennet and Avon Canal to the north and the River Kennet to the south. Both watercourses are denoted as 'main river' channels on the EA Flood Zone map and as such any works within 8 metres of the bank tops will require a Flood Risk Activities Permit (FRAP) under the Environmental Permitting Regulations.

6.6 Surface Water and SuDS

- 6.6.1 The NPPF recognises that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface runoff from development sites, and

recommends that priority is given to the use of Sustainable Drainage Systems (SuDS) in new development, this being complementary to the control of development within the floodplain.

- 6.6.2 As the intention of SuDS is to mimic the natural drainage regime of the undeveloped site, the NPPF PPG states the following (consistent with the Building Regulations H3 hierarchy):

...the aim should be to discharge surface water runoff as high up the following hierarchy of drainage options as reasonably practicable:

- into the ground (infiltration),***
- to a surface water body,***
- to a surface water sewer, highway drain or another drainage system,***
- to a combined sewer***

- 6.6.3 In relation to the interaction with the fluvial flood risk impacts, the key requirement is ensuring that any on-site surface water attenuation is located outside the fluvial (1 in 100 (1.0%) annual probability plus climate change) floodplain, to avoid one compromising the storage capacity of the other.
- 6.6.4 The surface water drainage arrangements for new development over the site are considered in the separate PBA (now Stantec) report 'Surface Water Concept Strategy' (Rev A, October 2016).
- 6.6.5 As discussed in **Section 2.3**, on the east side of the site a syphon passes under the Kennet and Avon Canal and emerges a short distance south of the Canal into a trapezoidal channel, which runs directly south through the site to outfall into the River Kennet on the downstream side of the Chamberhouse Mill.
- 6.6.6 The incorporation of a green corridor through the site provides an opportunity to remove the existing straight concrete channel into which the Thames Water syphon outfalls, and instead redirect the flow into this green corridor. This would provide further enhancement to the green corridor and would remove the artificial and highly engineered existing feature (which does not provide any benefit to the native ecology). Such works would be subject to further investigation and liaison with Thames Water.

7 Conclusions

- 7.1.1 This Flood Mitigation Strategy has been undertaken to outline the proposed mitigation measures incorporated into any future development over the Colthrop Village site to mitigate flood risk, and outline the detailed 2D hydraulic modelling undertaken by Peter Brett Associates (PBA), now Stantec, on which this Strategy is based.
- 7.1.2 The Environment Agency (EA) Flood Zones map indicates that the eastern part of the site lies within Flood Zone 1 'Low Probability' (less than 1 in 1000 (<0.1%) annual probability of river flooding). Parts of the central and western area of the site are within Flood Zone 3 'High Probability' (greater than 1 in 100 (>1.0%) annual probability of river flooding) and Flood Zone 2 'Medium Probability' (between 1 in 100 (1.0%) and 1 in 1000 (0.1%) annual probability of river flooding).
- 7.1.3 A review of the site topography and flow regime concluded that the EA hydraulic modelling in the area is inappropriate to accurately simulate the flood risk across the area, due to inherent weaknesses in 1-dimensional modelling when simulating complex floodplain flows (confirmed by the EA in their River Kennet 'Model Operation Manual'). Stantec have constructed a hybrid 1d-2d model to more accurately simulate the flow routes and resulting flood levels over the site.
- 7.1.4 The new 1d-2d model provides the best available representation of the flow routes over the site in a major fluvial flood event, and the resulting modelled floodplain extents on which to base mitigation requirements.
- 7.1.5 The Strategy has been designed for the 1 in 100 annual probability +35% allowance for climate change flood event, based on the previous planning guidance. The latest guidance specifies a +21% allowance for the area (Kennet and tributaries Management Catchment, 2080s epoch, Central allowance), and therefore the provided outputs represent a precautionary approach.
- 7.1.6 Flooding over the site is caused by from an isolated area of overspill from the Kennet and Avon Canal at a low point in the towpath level, resulting in shallow braided channels across the site. Design modelling has been undertaken which proposes to rationalise this floodplain into a green corridor, centred on a nominal channel, which runs through the site.
- 7.1.7 The flood mitigation strategy of the proposed development consists of the following:
- Provision of a remodelled floodplain to convey floodwater through the site in an extreme event, which demonstrates no loss in floodplain storage and no detrimental impact to third parties, up to the 1 in 100 annual probability plus 35% allowance for climate change flood event;
 - Ground floor levels elevated a suitable freeboard above the 1 in 100 annual probability plus climate change floodplain, in accordance with EA and West Berks Council (WBC) requirements;
 - Provision of safe access arrangements for all dwellings across the site;
 - Incorporation of a surface water drainage strategy, designed to the 1 in 100 (1.0%) annual probability plus allowance for climate change rainfall event.
- 7.1.8 In conclusion, the proposed flood risk mitigation strategy will ensure the majority of the site is in an area with low probability of flooding and future development would meet the requirements of national and local planning policy with regard to flood risk.

Appendix A Draft Master Plan by JSA

Drawing PL-106 'Colthrop Village – Draft Master Plan' (January 2020)



Notes:

- 1) ALL DIMENSIONS, LEVELS AND CLEARANCES TO BE CHECKED ON SITE PRIOR TO WORKS COMMENCING
- 2) THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER PROJECT RELATED DRAWINGS, SPECIFICATIONS AND DOCUMENTS
- 3) ANY DISCREPANCY BETWEEN THE DRAWING, OTHER DRAWINGS FORMING PART OF THIS CONTRACT, OR THE SPECIFICATION/BILLS OF MATERIALS MUST BE CLARIFIED BEFORE COMMENCEMENT OF ANY WORK OR ORDERING OF ANY MATERIALS
- 4) PLEASE CONSULT THE AUTHOR OR PROJECT MANAGER SHOULD THE READER REQUIRE CLARIFICATION ON ANY PART OF THE DRAWING
- 5) THE COPYRIGHT OF THE DRAWING AND DESIGN IS THE PROPERTY OF JSA ARCHITECTS LTD. THIS INFORMATION HAS BEEN ISSUED UNDER SPECIFIC TERMS FOR THIS PROJECT AND MAY ONLY BE USED AND REPRODUCED ACCORDINGLY

0 10 20 40 60m

1:1000

N

REV:	DESCRIPTION:	BY:	DATE:
STATUS:			

j sa architects

Tavistock House
Walham Road
Maidenhead SL6 3NH
01628 828 241-4
reception@jsaarchitects.com
www.jsaarchitects.com

SITE: Colthrop Village, Colthrop			
CLIENT: Thorney Farm Development			
TITLE: Colthrop Village: Draft Master Plan			
SCALE AT A3: 1:1000	DATE: Jan 2020	DRAWN: ASM	CHECKED: CP
PROJECT: TCVC	DRAWING NO: PL-106	REVISION:	

Appendix B Environment Agency Data

EA Product 4 data (ref WT18882/WT19544)

- Flood Zone map
- Model information
- Modelled extents
- Modelled in-channel levels
- Historic Flood Map
- Historic flood data

EA email of 09/02/23 confirming status of River Kennet modelling

Product 4 (Detailed Flood Risk) for Land west of Kennetholme Quarry, Thatcham (Eastern Side)

Our Ref: WT 19544

Product 4 is designed for developers where Flood Risk Standing Advice FRA (Flood Risk Assessment) Guidance Note 3 Applies. This is:

- i) "all applications in Flood Zone 3, other than non-domestic extensions less than 250 sq metres; and all domestic extensions", and
- ii) "all applications with a site area greater than 1 ha" in Flood Zone 2.

Product 4 includes the following information:

Ordnance Survey 1:25k colour raster base mapping;
Flood Zone 2 and Flood Zone 3;
Relevant model node locations and unique identifiers (for cross referencing to the water levels, depths and flows table);
Model extents showing *defended* scenarios;
FRA site boundary (where a suitable GIS layer is supplied);
Flood defence locations (where available/relevant) and unique identifiers; (supplied separately)
Flood Map areas benefiting from defences (where available/relevant);
Flood Map flood storage areas (where available/relevant);
Historic flood events outlines (where available/relevant, not the Historic Flood Map) and unique identifiers;
Statutory (Sealed) Main River (where available within map extents);

A table showing:

- i) Model node X/Y coordinate locations, unique identifiers, and levels and flows for *defended* scenarios.
- ii) Flood defence locations unique identifiers and attributes; (supplied separately)
- iii) Historic flood events outlines unique identifiers and attributes; and
- iv) Local flood history data (where available/relevant).

Please note:

If you will be carrying out computer modelling as part of your Flood Risk Assessment, please read the enclosed guidance which sets out our requirements and best practice for computer river modelling.

This information is based on that currently available as of the date of this letter. You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

This information is provided subject to the enclosed notice which you should read.

This letter is not a Flood Risk Assessment. The information supplied can be used to form part of your Flood Risk Assessment. Further advice and guidance regarding Flood Risk Assessments can be found on our website at

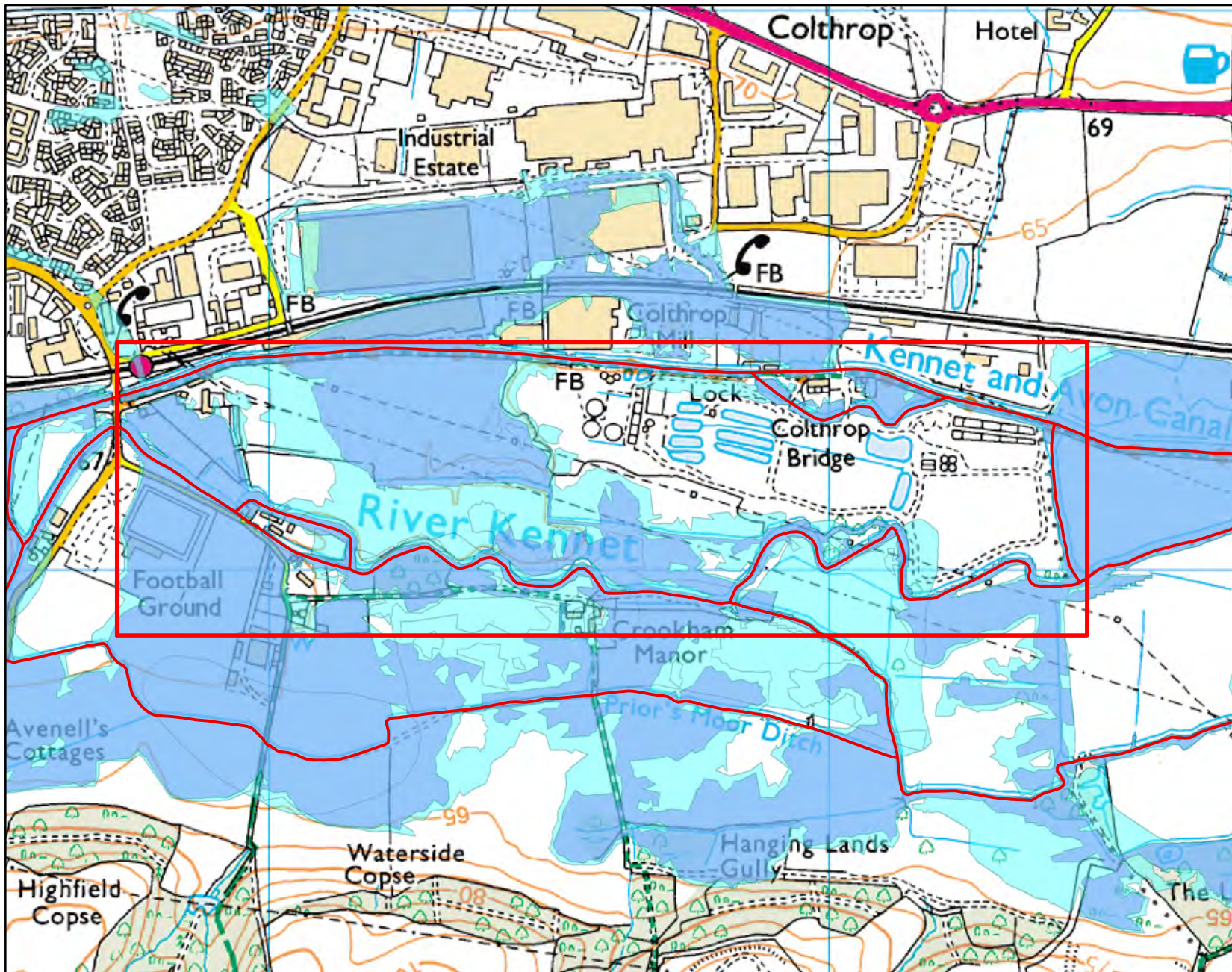
<http://www.environment-agency.gov.uk/research/planning/82584.aspx>

If you would like advice from us regarding your development proposals you can complete our pre application enquiry form which can be found at

<http://www.environment-agency.gov.uk/research/planning/33580.aspx>

Flood Map for Planning centred on Land west of Kennetholme Quarry, Thatcham (Eastern Side)

Created on 10/03/2015 REF: WT 19544



Kilometres
0 0.15 0.3



Legend

- Site
- Main River
- Flood defences
- Areas benefiting from flood defences
- Flooding from rivers or sea (FZ3)
- Extent of extreme flood (FZ2)
- Flood Map - flood storage areas

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Defence information

Defence Location: No defences on Main River

Description: This location is not currently protected by any formal defences and we do not currently have any flood alleviation works planned for the area. However we continue to maintain certain watercourses and the schedule of these can be found on our internet pages.

Model information

WT 19544

Model: Kennet (Newbury to Tyle Mill) 2007

Description: The information provided is taken from the Kennet (Marlborough to Tyle Mill) & Lambourn-Enbourne 2007. The study consisted of five model areas:
Kennet (Marlborough to Newbury) using 1D modelling software (ISIS)
Kennet and Lambourn (Newbury) now superceeded by the project Kennet & Lambourn (Newbury) 2010
Kennet (Newbury to Tyle Mill) using 1D modelling software (ISIS)
Lambourn (MRL to Shaw) using 1D modelling software (ISIS)
Enbourne (MRL to confluence with Kennet) using 1D modelling software (ISIS)

Model design runs:

1 in 5 / 20% AEP; 1 in 10 / 10% AEP; 1 in 20 / 5% AEP; 1 in 50 / 2% AEP; 1 in 100 / 1% AEP; 1 in 100+20% / 1% AEP with climate change; 1 in 200 / 0.5% AEP and 1 in 1000 / 0.1% AEP

Mapped Outputs:

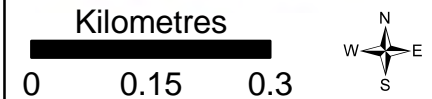
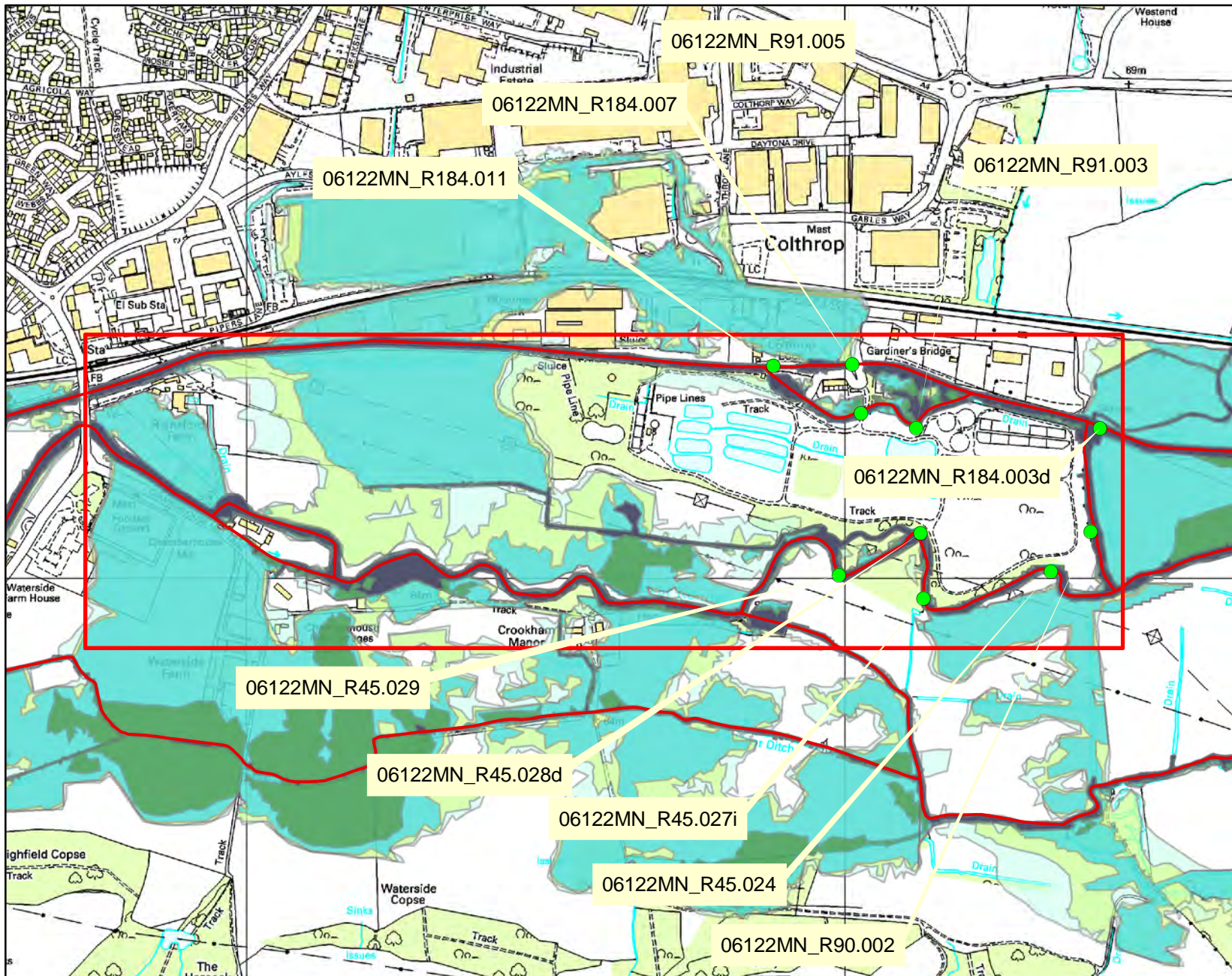
1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 100 / 1% AEP; 1 in 100+20% / 1% AEP with climate change and 1 in 1000 / 0.1% AEP

Model accuracy:

Levels \pm 250mm

Detailed FRA Map centred on Land west of Kennethholme Quarry, Thatcham (Eastern Side)

Created on 10/03/2015 REF: WT 19544



Legend

- Site
- Nodes
- Main River
- 20% AEP flood extent
- 5% AEP flood extent
- 1% AEP flood extent
- 1%CC AEP flood extent
- 0.1% AEP flood extent

AEP = Annual Exceedance Probability
The probability of a flood of a particular magnitude, or greater, occurring in any given year

1%CC = 1% Climate Change extent
This is the 1% AEP event with an allowance for climate change (+20% on river flows)

Modelled in-channel flood flows and levels

WT 19544

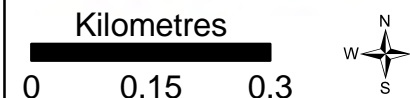
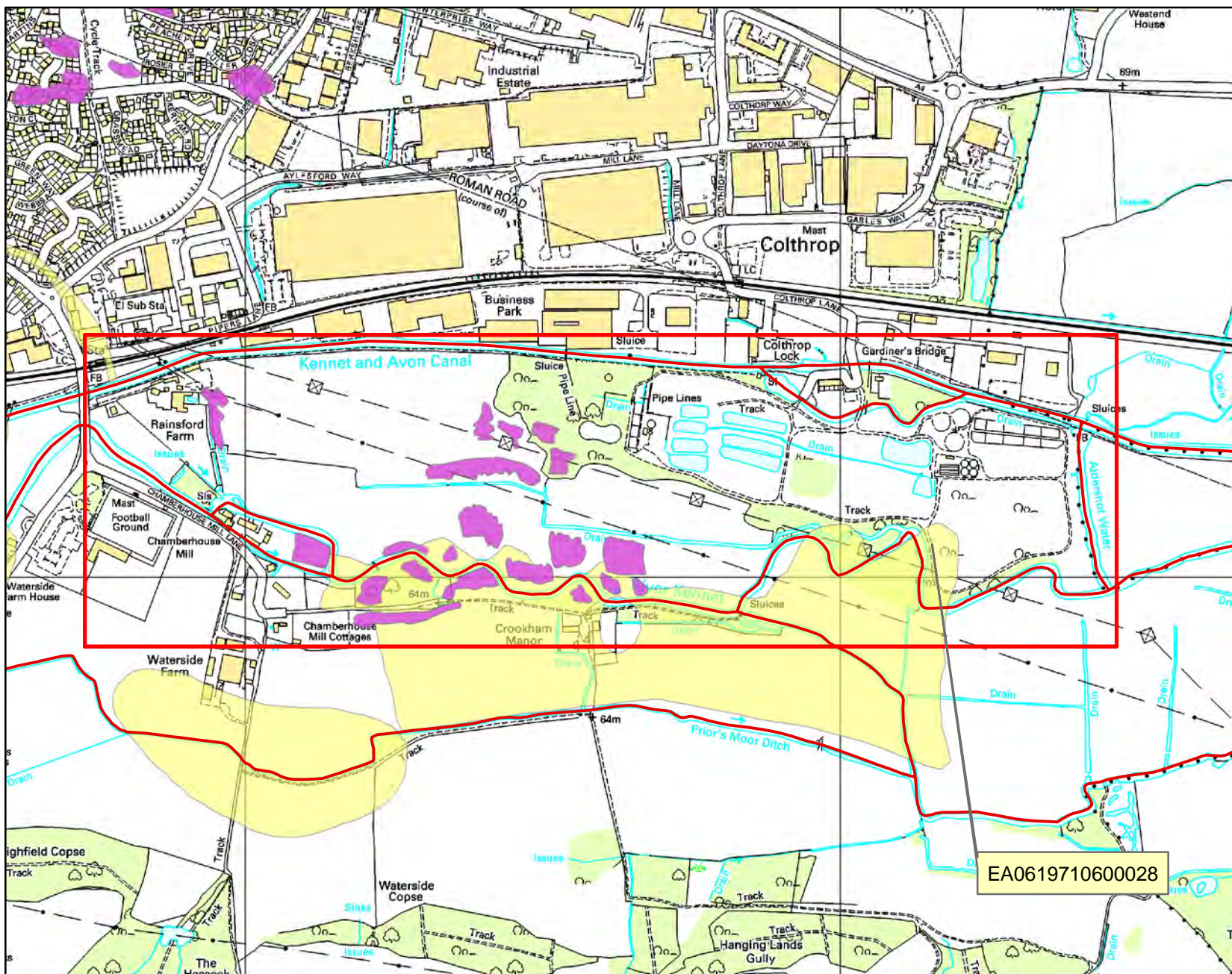
The modelled flood levels and flows for the closest most appropriate model node points for your site that are within the river channel are provided below:

Node label	Model	Easting	Northing	Flood Levels (mAOD)				
				20% AEP	5% AEP	1% AEP	1% AEP with climate change allowance (+20% on river flows)	0.1% AEP
06122MN_R184.011	Kennet (Newbury to Tyle Mill) 2007	453880	166354	66.51	66.51	66.51	66.51	66.54
06122MN_R184.007	Kennet (Newbury to Tyle Mill) 2007	454012	166357	64.46	64.51	64.55	64.57	64.59
06122MN_R91.005	Kennet (Newbury to Tyle Mill) 2007	454027	166275	64.54	64.62	64.70	64.73	64.75
06122MN_R91.003	Kennet (Newbury to Tyle Mill) 2007	454119	166251	64.49	64.56	64.62	64.64	64.66
06122MN_R184.003d	Kennet (Newbury to Tyle Mill) 2007	454426	166250	64.41	64.44	64.47	64.48	64.48
06122MN_R45.029	Kennet (Newbury to Tyle Mill) 2007	453990	166005	63.57	63.72	63.85	63.88	63.91
06122MN_R45.028d	Kennet (Newbury to Tyle Mill) 2007	454126	166075	63.28	63.41	63.54	63.59	63.64
06122MN_R45.027i	Kennet (Newbury to Tyle Mill) 2007	454131	165965	62.97	63.14	63.28	63.34	63.39
06122MN_R45.024	Kennet (Newbury to Tyle Mill) 2007	454344	166010	62.51	62.68	62.82	62.88	62.92
06122MN_R90.002	Kennet (Newbury to Tyle Mill) 2007	454411	166077	62.38	62.53	62.67	62.72	62.76

Node label	Model	Easting	Northing	Flood Flows (m3/s)				
				20% AEP	5% AEP	1% AEP	1% AEP with climate change allowance (+20% on river flows)	0.1% AEP
06122MN_R184.011	Kennet (Newbury to Tyle Mill) 2007	453880	166354	9.66	12.16	14.51	15.24	15.71
06122MN_R184.007	Kennet (Newbury to Tyle Mill) 2007	454012	166357	0.86	0.86	0.90	1.26	1.52
06122MN_R91.005	Kennet (Newbury to Tyle Mill) 2007	454027	166275	8.82	11.35	13.77	14.53	15.01
06122MN_R91.003	Kennet (Newbury to Tyle Mill) 2007	454119	166251	8.82	11.35	13.77	14.53	15.01
06122MN_R184.003d	Kennet (Newbury to Tyle Mill) 2007	454426	166250	1.73	3.45	5.38	6.30	6.90
06122MN_R45.029	Kennet (Newbury to Tyle Mill) 2007	453990	166005	12.24	15.91	19.44	20.25	20.98
06122MN_R45.028d	Kennet (Newbury to Tyle Mill) 2007	454126	166075	12.34	16.01	19.66	21.41	23.27
06122MN_R45.027i	Kennet (Newbury to Tyle Mill) 2007	454131	165965	12.34	16.01	19.66	21.41	23.27
06122MN_R45.024	Kennet (Newbury to Tyle Mill) 2007	454344	166010	12.35	16.01	19.66	21.29	22.82
06122MN_R90.002	Kennet (Newbury to Tyle Mill) 2007	454411	166077	7.94	8.71	9.26	9.49	9.64

Historic Flood Map centred on Land west of Kennetholme Quarry, Thatcham (Eastern Side)

Created on 10/03/2015 REF: WT 19544



Legend

- Site
- Main River
- 1979
- 1971

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

EA0619710600028

Historic flood data

WT 19544

Our records show that the area of your site has been affected by flooding. Information on the floods that have affected your site is provided in the table below:

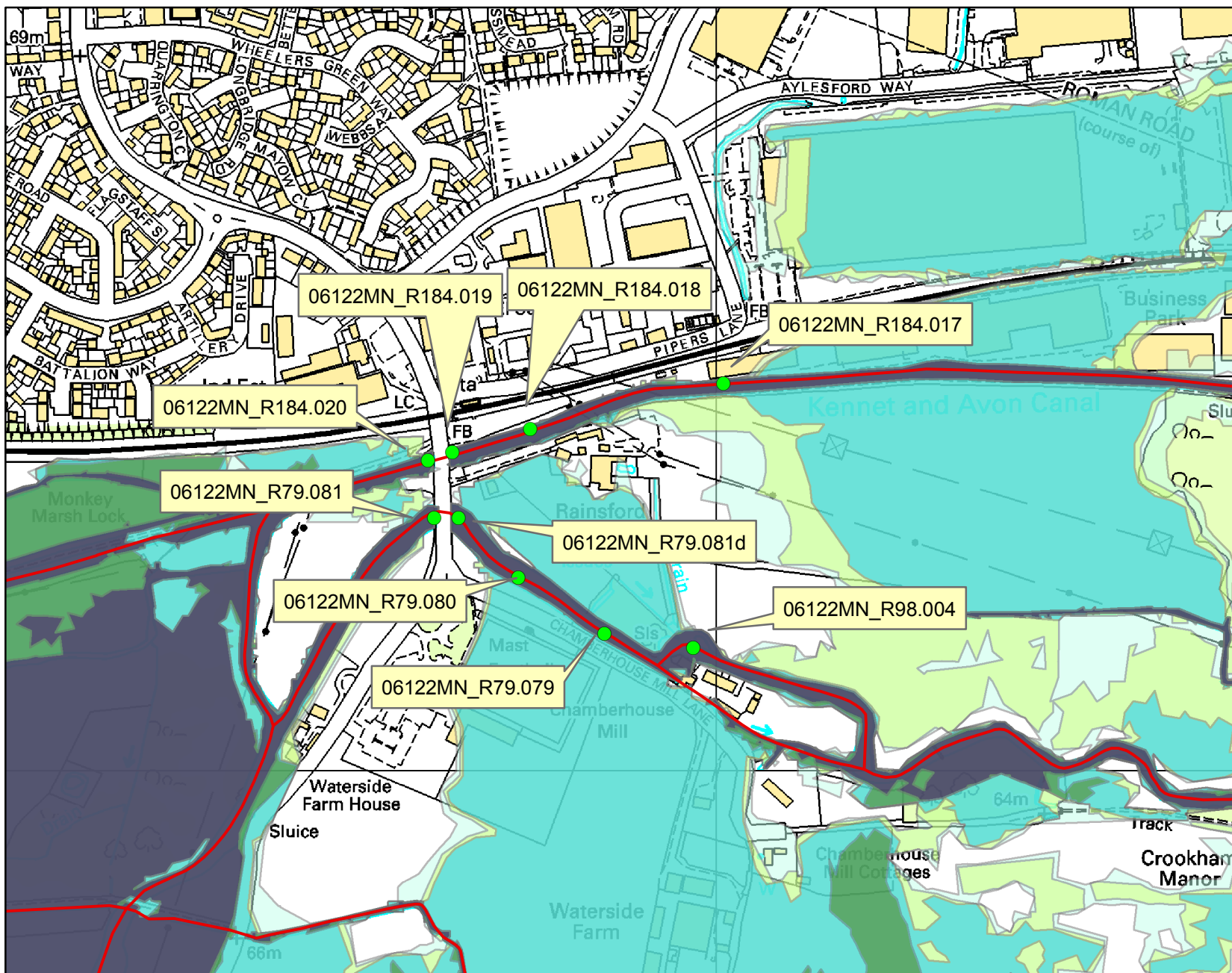
[illegible]

Please note the Environment Agency maps flooding to land not individual properties. Floodplain extents are an indication of the geographical extent of a historic flood. They do not provide information regarding levels of individual properties, nor do they imply that a property has flooded internally.

Start and End Dates shown above may represent a wider range where the exact dates are not available.

Detailed FRA centred on Land west of Kennetholme Quarry, Thatcham

Created on 17/03/2015 REF: WT18882



Kilometres
0 0.05 0.1



Legend

- Nodes
- Main River
- 20% AEP flood extent
- 5% AEP flood extent
- 1% AEP flood extent
- 1%CC AEP flood extent
- 0.1% AEP flood extent

AEP = Annual Exceedance Probability
The probability of a flood of a particular magnitude, or greater, occurring in any given year

1%CC = 1% Climate Change extent
This is the 1% AEP event with an allowance for climate change (+20% on river flows)

Modelled in-channel flood flows and levels

WT18882

The modelled flood levels and flows for the closest most appropriate model node points for your site that are within the river channel are provided below:

Node label	Model	Easting	Northing	Flood Levels (mAOD)				
				20% AEP	5% AEP	1% AEP	1% AEP with climate change allowance (+20% on river flows)	0.1% AEP
06122MN_R79.079	Kennet (Newbury to Tyle Mill) 2007	452889	166135	66.63	66.65	66.70	66.76	66.80
06122MN_R79.080	Kennet (Newbury to Tyle Mill) 2007	452804	166190	66.70	66.74	66.83	66.88	66.92
06122MN_R79.081	Kennet (Newbury to Tyle Mill) 2007	452721	166249	66.76	66.83	66.93	66.98	67.03
06122MN_R79.081d	Kennet (Newbury to Tyle Mill) 2007	452745	166249	66.76	66.83	66.93	66.98	67.03
06122MN_R98.004	Kennet (Newbury to Tyle Mill) 2007	452977	166121	64.90	65.08	65.25	65.32	65.37
06122MN_R184.017	Kennet (Newbury to Tyle Mill) 2007	453007	166382	66.77	66.87	66.98	67.01	67.03
06122MN_R184.018	Kennet (Newbury to Tyle Mill) 2007	452816	166337	66.82	66.93	67.05	67.09	67.13
06122MN_R184.019	Kennet (Newbury to Tyle Mill) 2007	452739	166314	66.85	66.96	67.08	67.13	67.18
06122MN_R184.020	Kennet (Newbury to Tyle Mill) 2007	452715	166306	66.86	66.98	67.10	67.16	67.22

Node label	Model	Easting	Northing	Flood Flows (m3/s)				
				20% AEP	5% AEP	1% AEP	1% AEP with climate change allowance (+20% on river flows)	0.1% AEP
06122MN_R79.079	Kennet (Newbury to Tyle Mill) 2007	452889	166135	16.40	20.60	25.24	27.24	28.99
06122MN_R79.080	Kennet (Newbury to Tyle Mill) 2007	452804	166190	16.40	20.60	25.26	27.57	29.95
06122MN_R79.081	Kennet (Newbury to Tyle Mill) 2007	452721	166249	16.40	20.60	25.26	27.57	29.95
06122MN_R79.081d	Kennet (Newbury to Tyle Mill) 2007	452745	166249	16.40	20.60	25.26	27.57	29.95
06122MN_R98.004	Kennet (Newbury to Tyle Mill) 2007	452977	166121	16.09	20.28	24.84	26.87	28.69
06122MN_R184.017	Kennet (Newbury to Tyle Mill) 2007	453007	166382	9.68	12.16	14.85	16.86	18.98
06122MN_R184.018	Kennet (Newbury to Tyle Mill) 2007	452816	166337	9.68	12.16	14.85	16.86	18.98
06122MN_R184.019	Kennet (Newbury to Tyle Mill) 2007	452739	166314	9.68	12.16	14.85	16.86	18.98
06122MN_R184.020	Kennet (Newbury to Tyle Mill) 2007	452715	166306	9.68	12.16	14.85	16.86	18.98

Fisher, Richard

From: Enquiries_THM <enquiries_THM@environment-agency.gov.uk>
Sent: 09 February 2023 17:38
To: Fisher, Richard
Subject: THM298255 RE: Request for update on River Kennet modelling (Thatcham area)

Dear Richard,

We have now heard back from our technical teams regarding your query, they write:

Dear Richard,

Thank you for your email of 04/01/2023.

Apologies for the delay in response to this.

We are currently working on a project to update the Kennet (Marlborough to Tyle Farm) 2007 modelling, however it is currently at a very early stage and not expected to be delivered until Winter 2024 at the earliest.

If you have any further questions please feel free to get in touch with by email at alice.roberts@environment-agency.gov.uk

Kind regards,

Alice

Alice Roberts MCIWEM C.WEM
Flood & Coastal Risk Management Advisor
Partnership and Strategic Overview Team (Berkshire & Buckinghamshire)

Customers & Engagement Team - **Thames**



External: 0203 0259 804



enquiries_THM@environment-agency.gov.uk



Environment Agency | Red Kite House, Howbery Park, Wallingford, OX10 8BD

ARE YOU AT RISK FROM FLOODING?
Check your flood risk today

From: Fisher, Richard <richard.fisher@stantec.com>
Sent: 04 January 2023 09:50
To: Enquiries_THM <enquiries_THM@environment-agency.gov.uk>
Subject: Request for update on River Kennet modelling (Thatcham area)
Importance: High

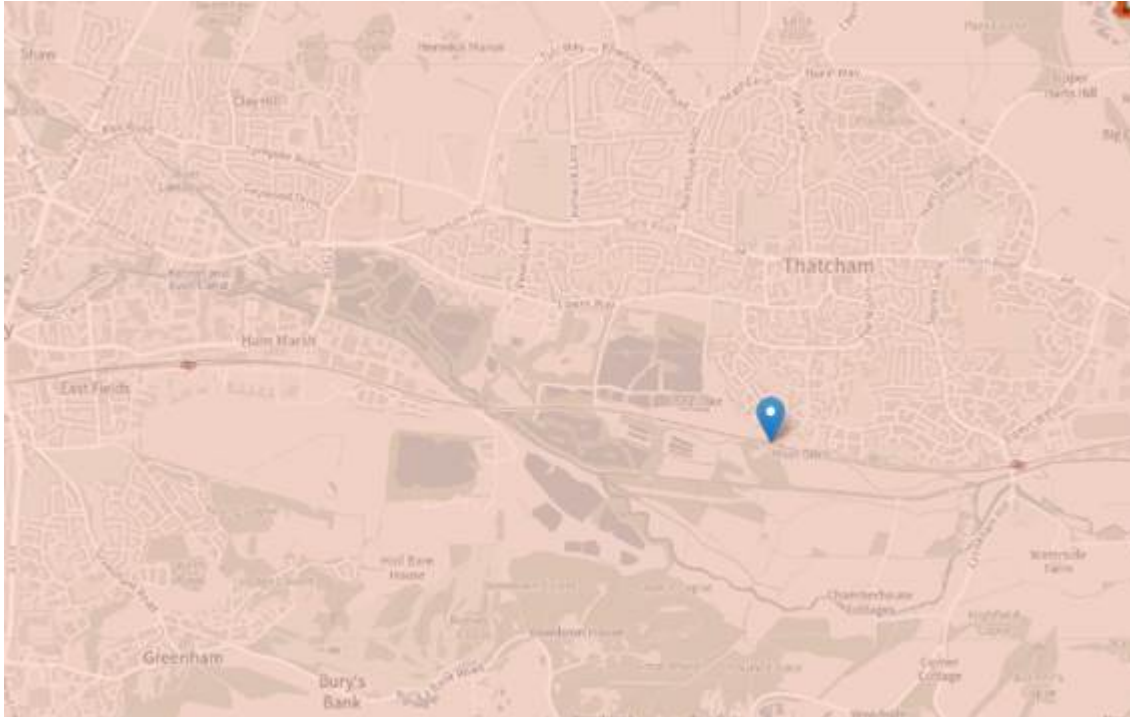
Morning,

We're currently assessing the flood risk impacts to a site in Thatcham, on the River Kennet/Kennet and Avon Canal (see below).

The flood risk data for the area is currently based on the EA's **Kennet (Marlborough to Tyle Mill) & Lambourn-Enbourne 2007 Study** – and a review of the current 'Flood Map for Planning' website confirms the Flood Zones in the area are still based on this model.

A colleague enquired below regarding updates to the Kennet modelling in the Newbury area but is yet to receive a response. Similarly, can I enquire as to whether the 1D model above through Thatcham is subject to any current update, or is planned to be updated in the near future?

Many thanks



Regards,

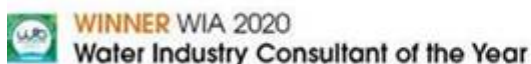
Richard Fisher

Senior Associate

+44 (0)118 9520 612 | direct
+44 (0)782 5130 514 | mobile

Stantec UK Ltd
Caversham Bridge House
Waterman Place
Reading RG1 8DN

richard.fisher@stantec.com



Do you know about our full environmental services offering? Visit our **website** to find out more

Please visit [stantec.com/uk](https://www.stantec.com/uk) to learn more about how Stantec designs with community in mind.

From: Pulsford, John
Sent: 18 November 2022 10:00
To: enquiries_thm@environment-agency.gov.uk
Subject: Product 4 Data Request for Newbury Leisure Park RG13 3AL

Dear Sirs

Please can you provide a standard P4 data set for the Newbury Leisure Park

We are acting on behalf of a purchaser of the site

The postal address is Lower Way, Newbury RG13 3AL and location plans attached

We are aware of the 2007hydraulic model and a 2017 update in the Newbury area that was undertaken post the Newbury FAS

We believe this latter model extends to the site but is a 1-D domain

We have also been advised that you are in the process of updating the 2007 model, presumably including the hydrology

Any update you could give us on the progress of any model update and public release would be very welcome

John Pulsford

Senior Associate
Caversham Bridge House
Waterman Place
Reading
RG1 8DN
Direct: +44 1189520344
Mobile: +44 7720883714
john.pulsford@stantec.com



The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.

Please consider the environment before printing this email.

Disclaimer: The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately. This communication may come from a variety of legal entities within or associated with the Stantec group. For a full list of details for these entities please see our website at www.stantec.com. Where business communications relate to the Stantec UK Limited entity, the registered office is Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire HP11 1JU Tel: 01494 526240 and the company is registered in England as registration number 01188070.

Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else. We have checked this email and its attachments for viruses. But you should still check any attachment before opening it. We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.

Caution: This email originated from outside of Stantec. Please take extra precaution.

Attention: Ce courriel provient de l'extérieur de Stantec. Veuillez prendre des précautions supplémentaires.

Atención: Este correo electrónico proviene de fuera de Stantec. Por favor, tome precauciones adicionales.

Appendix C Stantec 2D Model Figures

Figure 30738/4001/003 – Modelled Baseline 100yr +35% Flood Extents

Figure 30738/4001/004 – Modelled Initial Design 100yr +35% Flood Extents

Figure 30738/4001/005 – Location of Sections through Proposed Swale

Proposed Swale Cross-sections



www.peterbrett.com
Peter Brett Associates LLP
READING
Tel: 0118 950 0761 Fax: 0118 959 7498

Client

Colthrop Village Consortium

Contains Ordnance Survey data © Crown copyright
and database right 2015

Land West of Kennetholme Quarry

Modelled Baseline 100yr+35% Flood Extent
(using PBA 1D-2D ISIS-Tuflow Model adapted from EA 1D Model)

Date: 10/06/2016

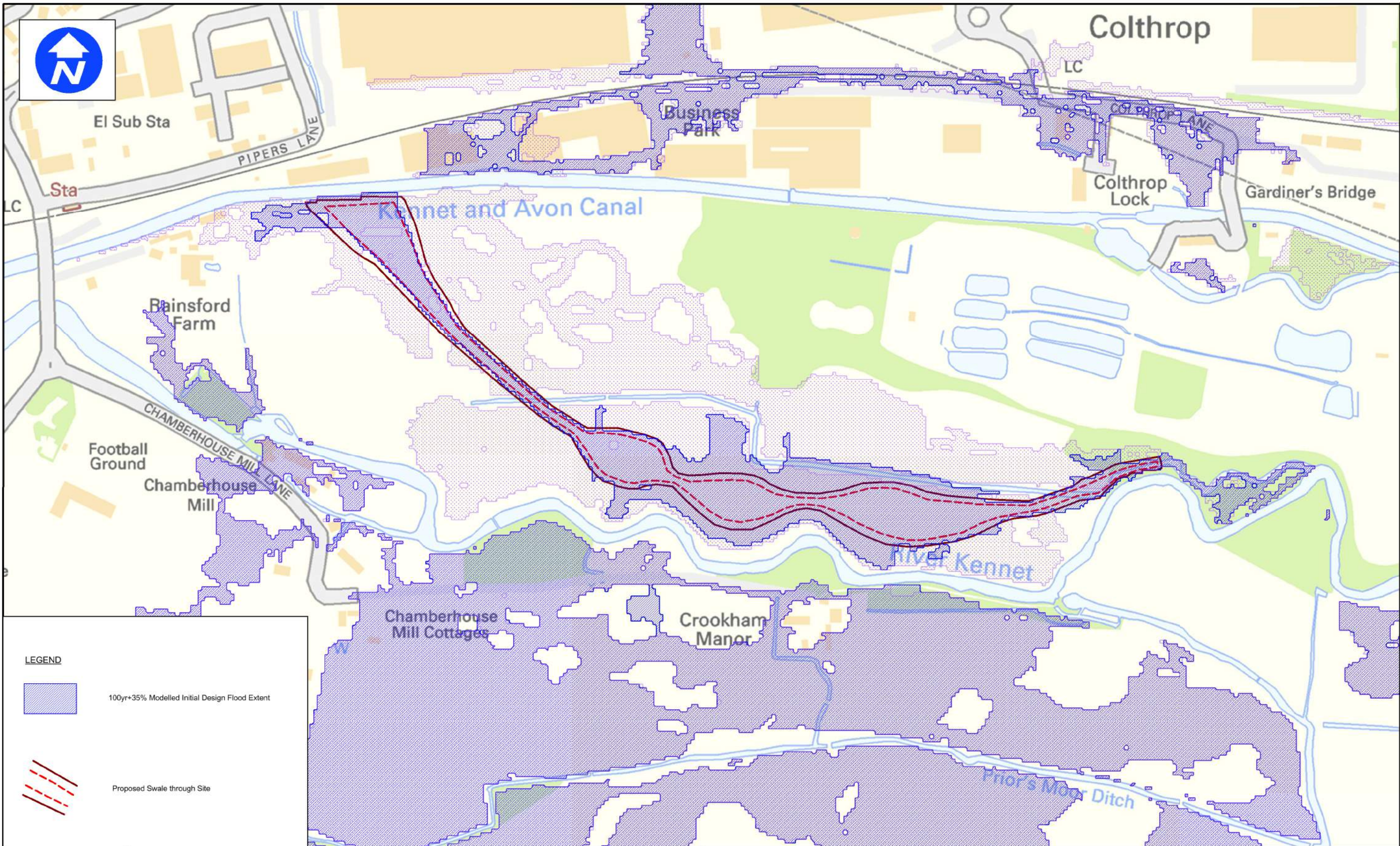
Scale: NTS

Drawn By: HF Checked By: RF

Rev: -

Figure Number

30738/4001/003



www.peterbrett.com
Peter Brett Associates LLP
READING
Tel: 0118 950 0761 Fax: 0118 959 7498

Client

Colthrop Village Consortium

Contains Ordnance Survey data © Crown copyright
and database right 2015

Land West of Kennethholme Quarry

Modelled Initial Design 100yr+35% Flood Extent
(using PBA 1D-2D ISIS-Tuflow Model adapted from EA 1D Model)

Date: 10/06/2016

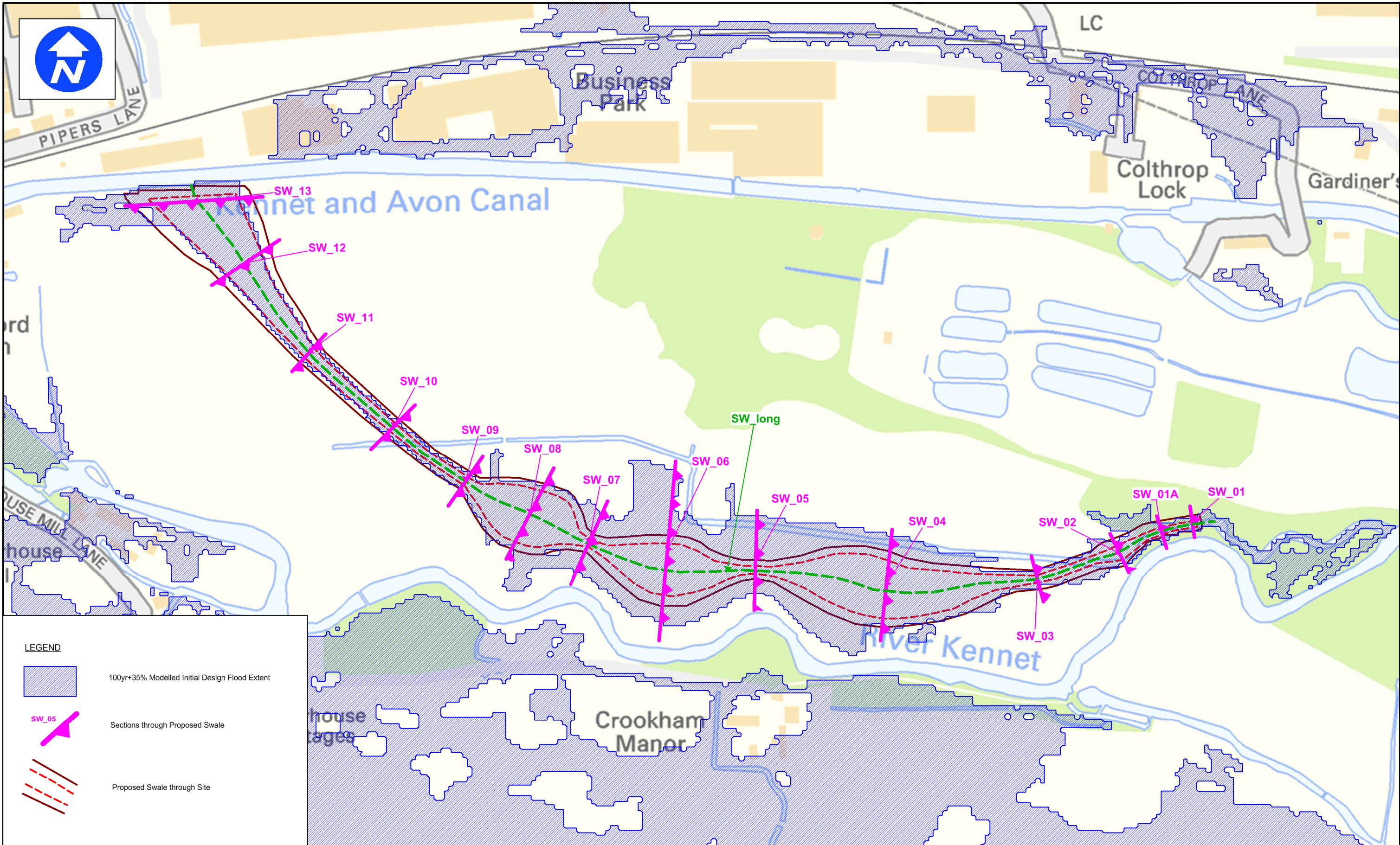
Scale: NTS

Drawn By: HF Checked By: RF

Rev: -

Figure Number

30738/4001/004



www.peterbrett.com
Peter Brett Associates LLP
READING
Tel: 0118 950 0761 Fax: 0118 959 7498

Client	Colthrop Village Consortium
Contains Ordnance Survey data © Crown copyright and database right 2015	

Land West of Kennetholme Quarry

Location of Sections through Proposed Swale

Date: 16/06/2016
Scale: NTS
Drawn By: HF Checked By: RF
Rev: -
Figure Number
30738/4001/005

