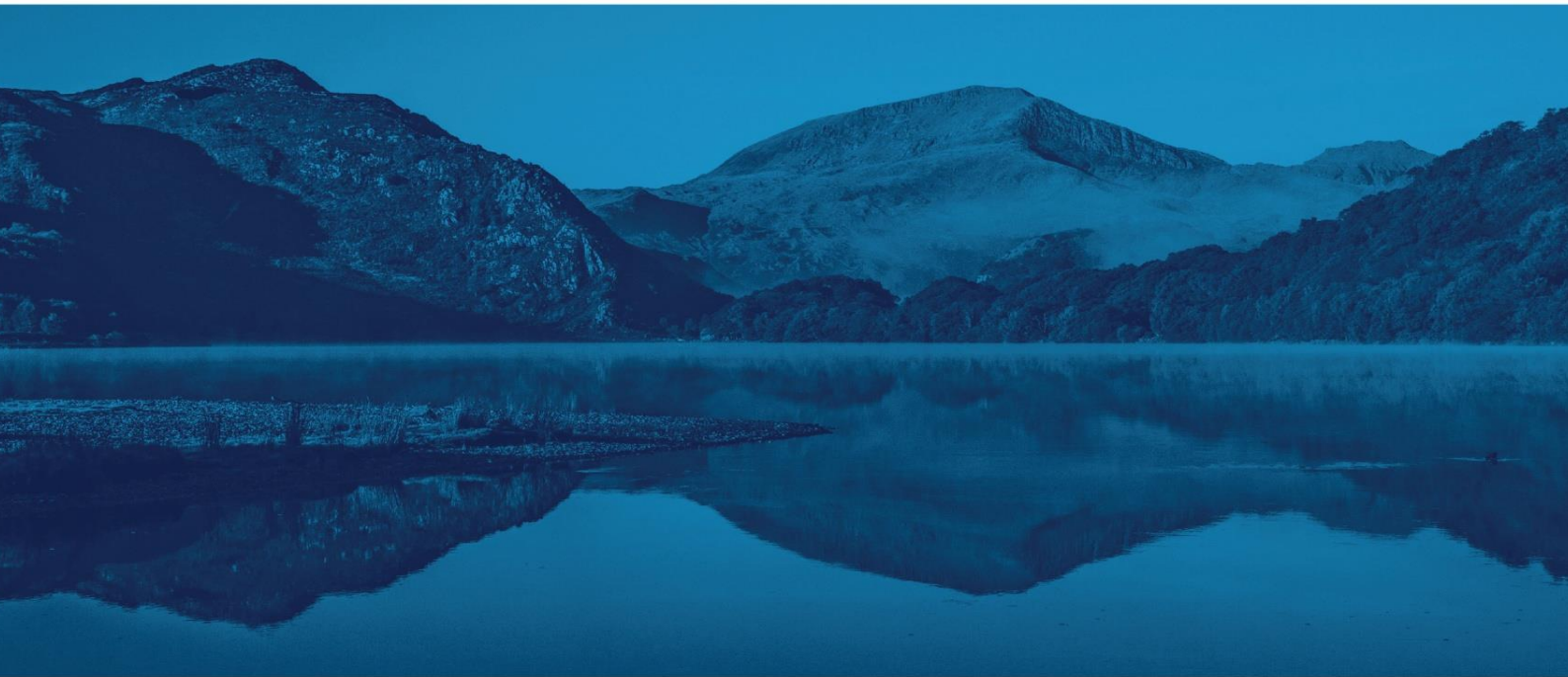




King's Somborne

Flood Risk Study

December 2018



Assessment / Modelling / Design

waterco.co.uk

DOCUMENT VERIFICATION RECORD

CLIENT:	King's Somborne Parish Council
SCHEME:	Proposed residential developments at King's Somborne – Flood Risk Study
INSTRUCTION:	The instruction to carry out this Flood Risk Study was received from Graham Searle on behalf of King's Somborne Parish Council.

DOCUMENT REVIEW & APPROVAL

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ISSUE HISTORY

ISSUE DATE	COMMENTS
14/08/2018	First issue
17/12/2018	Second issue – Updated following EA & local residents' comments

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Introduction

Waterco Consultants have been commissioned to undertake a Flood Risk Study in relation to proposed residential development sites at King's Somborne, Stockbridge, SO20 6PW.

The purpose of this report is to outline the potential flood risk to five designated sites, the impact of proposed future developments on the sites on flood risk elsewhere, and the proposed measures which could be incorporated to mitigate the identified risk. This report is not intended to form a Sequential Test.

This report has been prepared in accordance with the guidance contained in the revised National Planning Policy Framework (NPPF) (July 2018) and the National Planning Practice Guidance (NPPG). Reference has also been made to the Hampshire County Council Preliminary Flood Risk Assessment (PFRA) (April 2011).

Existing Conditions

The proposed development sites are located on five separate undeveloped land parcels located within the village of King's Somborne. The five sites are identified as KS3, KS5, KS6, KS7 and SHELLA 81. Online aerial imagery (accessed July 2018) shows that:

Site KS3 covers an area of approximately 1.8hectare (ha) and is located at National Grid Reference: 435880, 131094. The site is bordered by agricultural land to the north and residential dwellings to the east, south and west.

Site KS5 covers an area of approximately 0.89ha and is located at National Grid Reference: 436440, 131301. The site is bordered by agricultural land to the north and east, residential dwellings to the south and Muss Lane (road) to the west with residential dwellings beyond. Access to the site is provided from Muss Lane to the west.

Site KS6 covers an area of approximately 0.39ha and is located at National Grid Reference: 436517, 131115. The site is bordered by Winchester Road with residential dwellings beyond to the north, residential dwellings to the east and west, and agricultural land to the south. Access to the site is provided by Winchester Road.

Site KS7 (grid reference: 436608, 131310) is located north of Winchester Road and covers an area of approximately 1.5ha. The site is bordered by agricultural land to the north, New Lane to the east, Winchester Road and Manor Farm House to the south and residential dwellings to the west.

SHELAA 81 (grid reference: 436700, 131253) is located south of Winchester Road and covers an area of approximately 0.54ha. It is bordered by Winchester Road and residential dwellings to the north, agricultural land to the east and south and residential dwellings to the west.

A location plan and an aerial image are included in Appendix A.

Local Topography

Topographic levels to metres Above Ordnance Datum (m AOD) have been derived from a 1m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). A review of LiDAR data shows that:

Site KS3 slopes from approximately 37m AOD in the north to 32.16m AOD in the south. Site KS5 slopes from approximately 44m AOD in the north to 37m AOD in the south. Site KS6 slopes from approximately 40m AOD in the south to 34.688m AOD in the north. Site KS7 slopes from approximately 38m AOD in the north to 34.496m AOD in the south. SHELAA 81 slopes from approximately 39.745m AOD in the south to 35.311m AOD in the north-west. LiDAR extracts are included in Appendix B.

Ground Conditions

Reference to the British Geological Survey online mapping (1:50,000 scale) indicates that sites KS3, KS6, SHELAA 81 and the majority of site KS7 are underlain by superficial deposits of Head, generally comprising clay, silt, sand and gravel. No superficial deposits are recorded at site KS5 and within the northern extent of site KS7. The bedrock underlying all sites is identified as the Newhaven Chalk Formation.

The EA online 'Groundwater Source Protection Zones' map indicates that the sites are not located within a Groundwater Source Protection Zone.

According to the EA's online Groundwater Vulnerability Mapping, the superficial Head deposits are classified as a Secondary (undifferentiated) aquifer – assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

The underlying bedrock is classified as a Principal aquifer. These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

The Cranfield University 'Soilscapes' map indicates that the development sites are underlain by freely draining soils.

Development Proposals

The proposed development is for approximately 24 dwellings at site KS3, 11 to 14 dwellings at sites KS5, KS7 and SHELAA 81, and approximately 5 dwellings at site KS6. Residential dwellings on each site will be in the following proportion: 2 bedroom – 45%, 3 bedroom – 45%, 4 bedroom – 10%.

Flood Zone Classification

The EA 'Flood Map for Planning', included in Appendix C, shows that the southern extent of site KS3 and the southern extent of site KS7 are located within Flood Zone 3 – an area considered to be at flood risk with a 1% (1 in 100) or greater annual probability of fluvial flooding. The northern extent of site KS3, the northern extent of site KS7, the majority of KS6 and the entirety of KS5 and SHELAA 81 are located within Flood Zone 1 – an area considered to have the lowest risk of fluvial flooding with a less than 0.1% annual probability of flooding.

Winchester Road, which provides access to the majority of the sites, and also provides access to several existing properties in King's Somborne, is shown within Flood Zone 3.

Policy Context

In accordance with Table 2 of the NPPG: Flood Risk and Coastal Change, residential developments are considered to be 'more vulnerable'. Table 3 of the NPPG: Flood Risk and Coastal Change, states that 'more vulnerable' development is considered appropriate within Flood Zones 1 and 2. However the Sequential and Exception Tests must be satisfied for development within Flood Zone 3.

The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. For the exception test to be passed it should be demonstrated that:

- a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and
- b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Taking a sequential approach to flood risk, and to satisfy the Exception Test, it is understood that all dwellings and developable areas will be located within Flood Zone 1. This report does not include a Sequential Test.

Local Policy

The Test Valley Borough Council Local Plan (adopted January 2016) contains the following policy relating to flood risk and drainage:

Policy E7: Water Management

Development will be permitted provided that:

- a) it does not result in the deterioration of and, where possible, assists in improving water quality and be planned to support the attainment of the requirements of the Water Framework Directive;*
- b) it complies with national policy and guidance in relation to flood risk;*
- c) it does not result in a risk to the quality of groundwater within a principal aquifer, including Groundwater Source Protection Zones and there is no risk to public water supplies;*
- d) all new homes (including replacement dwellings) achieve a water consumption standard of no more than 110 litres per person per day; and*
- e) all new non-residential development of 500sqm or more achieve the BREEAM 'excellent' credit required for water consumption (reference Wat 1).*

Criteria d) – e) need to be satisfied unless it can be demonstrated that it is not financially viable.

Correspondence

Following review of the first issue of this Flood Risk Study, the EA have provided comments which are included in Appendix C. In summary, the EA comments state that:

- The NPPF Sequential Test should be applied to determine whether there are any alternative sites in Flood Zone 1 (lowest risk) suitable for development;
- Once the Sequential Test is passed, the NPPF flood risk Exception Test should be met;
- The areas at greatest risk of groundwater flooding are those in the valley bottom;
- Below ground attenuation storage should be designed to be resilient against groundwater pressure. Below ground drainage systems should be designed so that they do not cause an obstruction to groundwater.

Sources of Flooding and Probability

Fluvial

The nearest watercourse is Somborne Stream which flows south-west through King's Somborne to its confluence with Park Stream approximately 1.2km from site KS3. There are no other watercourses in the vicinity of the sites. Somborne Stream originates from a spring source located approximately 660m north-east of site KS7. It is understood that Somborne Stream is ephemeral and that other spring sources feed into the stream when groundwater levels are high. Somborne Stream is culverted beneath a number of roads and driveways within King's Somborne.

Fluvial flooding could occur if Somborne Stream overtopped its banks during or following an extreme rainfall event and / or when groundwater levels are high.

The EA 'Historical Flood Map', included in Appendix C, contains records of historical fluvial flooding in the southern extent of site KS7. Historical flooding is also recorded along Winchester Road and Old Vicarage Lane. Online records show that flooding of Somborne Stream occurred in February 2014.

According to 'King's Somborne Draft Neighbourhood Development Plan (NDP)' *'The most troubling events to have occurred in King's Somborne in the last twenty years were the floods of 2000 and 2014. Many houses lying in the village valley were flooded, caused mainly by rising groundwater.'* No further information is available regarding the extent of the 2000 floods.

The Flood Zone 3 extent on the EA 'Flood Map for Planning' is derived from a national scale modelling approach undertaken using JFLOW modelling software. JFLOW modelling typically provides conservative estimates of flood extents and does not account for the shape / capacity of the river

channel or any flow paths within the floodplain. The JFLOW modelling is informed by simplified methods of peak flow calculation.

JFLOW data is not considered suitable for use in a site-specific FRA and is not distributed by the EA. No detailed modelled data is therefore available to make a quantitative assessment of flood risk to the sites. In absence of modelled data, a qualitative assessment of flood risk has been made using the EA Flood Map for Planning.

The Flood Zone extent has been overlain on the LiDAR extract (see Appendix D) and shows that for site KS3, the Flood Zone 2 and 3 extents (0.1% annual probability and 1% annual probability flood extents) do not extend above 33m AOD. Somborne Stream is situated at approximately 32m AOD in its location adjacent to site KS3.

The Flood Zone 2 and 3 extents in the southern extent of site KS7 generally correspond with the 35m AOD contour. In the north-eastern extent of the site, the Flood Zone 2 and 3 extents do not extend beyond 35.5m AOD.

Based on JFLOW modelling data, it can be concluded that the southern extents of sites KS3 and KS7 are at potential fluvial flood risk. In order to accurately determine the fluvial flood risk from Somborne Stream to the development sites, a detailed hydraulic model will need to be undertaken. The detailed model should include: channel cross section survey of Somborne Stream; detailed hydrological and hydrogeological analysis to calculate model inflows; and, assessment of climate change allowances.

Tidal

The sites are situated at a minimum of 32m AOD and are significantly above sea level. Therefore, there is no risk from tidal flooding.

Surface Water

Surface water flooding occurs when rainwater does not drain away through the normal drainage system or soak into the ground. It is usually associated with high intensity rainfall events, however, can also occur with lower intensity rainfall or melting snow where the ground is saturated, frozen or developed, resulting in overland flow and ponding in depressions in topography. Surface water flooding can occur anywhere without warning. However, flow paths can be determined by consideration of contours and relative levels.

The EA 'Flood Risk from Surface Water' map (Appendix C) corroborates with the EA Flood Map for Planning and indicates a surface water flow route (associated with Somborne Stream) flowing from east to west through King's Somborne.

The EA surface water risk classifications are as follows:

- Very Low Risk - less than 0.1% annual probability of flooding
- Low Risk - between a 1% and 0.1% annual probability of flooding
- Medium Risk - between a 3.3% and 1% annual probability of flooding
- High - greater than 3.3% annual probability of flooding

The northern extent of site KS3 has a very low risk of surface water flooding with the lower southern extent identified to have a low to medium risk.

Both sites KS5 and KS6 are at very low risk to surface water flooding. The majority of KS7 is at very low risk of surface water flooding. The lower eastern and western extents of site KS7 are at low to medium risk. The majority of SHELAA 81 is at very low risk, with the north-western boundary of the site, adjacent to Winchester Road, shown at low risk.

The SFRA contains no records of surface water flooding at or near to the sites. The developable areas of all sites are shown at very low risk of surface water flooding.

Groundwater Flooding

Groundwater flooding occurs when water levels underneath the ground rise above normal levels. Prolonged heavy rainfall soaks into the ground and can cause the ground to become saturated. This results in rising groundwater levels which leads to flooding above ground.

The PFRA states: *'Test Valley is the main borough affected by the Test catchment, and is another that is highly controlled by the groundwater in the chalk. It also affects the northern part of the New Forest where several smaller tributaries join the River Test...*

...The upper and middle sections of the catchment can be prone to groundwater flooding when levels are high after prolonged rainfall. The main areas of concern are all within Test Valley Borough, such as Andover in the north and towns which straddle the river such as Stockbridge....

...Most of the groundwater flow through the aquifers is directed to the Rivers Test, Itchen and Meon. During prolonged periods of wet weather the aquifer levels rise and this is what causes groundwater flooding. This is a serious problem in Hampshire because a large proportion of the county is underlain by chalk....

There is a risk of flooding from groundwater in the district. Recharge may increase in wetter winters, or decrease in drier summers.'

The PFRA contains records of groundwater flooding in Hampshire. The PFRA states:

'In 2000 – 2001, there was exceptional rainfall within Hampshire with return periods ranging from 1:50 to 1:200. Following this exceptional rainfall flooding occurred in 76 parishes with flooding at 713 properties to varying extents. Flooding was primarily caused by high groundwater levels and springflows in the Upper and Middle Test, Itchen, Meon, Wallington and Lavant valleys. Flooding incidents in the lower reaches of these valleys were more commonly associated with rainfall runoff from saturated ground. This was also the main trigger in the New Forest and Hamble catchments although springflows from local minor aquifers also contributed to flooding in some locations.'

According to 'King's Somborne Draft Neighbourhood Development Plan (NDP)' *'The most troubling events to have occurred in King's Somborne in the last twenty years were the floods of 2000 and 2014. Many houses lying in the village valley were flooded, caused mainly by rising groundwater.'*

It can therefore be concluded that the sites are at potential risk of groundwater flooding. In accordance with EA correspondence (Appendix C); *'the areas at greatest from groundwater flooding are those in the valley bottom, where groundwater levels will rise and intercept those areas first (i.e. the areas located within Flood Zone 2 and 3). This is because Kings Somborne is underlain by Chalk with a thin drift of Head (recent valley sand and gravel) present above the Chalk along the Somborne Valley. There will be hydraulic continuity between the Head deposits in the valley and the Chalk. Therefore, those sites on the drift deposits cannot be excluded from being at risk of groundwater flooding.*

As the groundwater level rises within the Chalk, it intercepts the bottom of the valley and the Somborne Stream flows (via springs and seepages (baseflow)). The higher the groundwater levels rise, the further upstream the winterbourne migrates.

At times of extremely high groundwater level, it is expected that a range of groundwater levels from between 0-2 metres below ground level will be found across sites 3, 6, 7 and SHELAA 81. It is expected that site 5 may have more unsaturated depth (between 1-5 metres unsaturated (approx.)).

There is also a ford that runs across New Lane at its junction with Winchester Road (the north eastern corner of KS7) when the winterbourne has migrated that far up the valley.'

Summary of Potential Flooding

It can be concluded that fluvial and groundwater flooding are the main potential sources of flood risk to the sites. Both sources of flooding are interlinked. The associated risk has been used to inform mitigation design.

Mitigation

In order to mitigate the fluvial and groundwater flood risk from Somborne Stream, all developable areas of the sites will be located outside of the extreme 0.1% annual probability flood extent and within Flood Zone 1.

Hydraulic modelling should be undertaken to accurately establish the flood extent and to assess the impact of future climate change.

In order to mitigate against potential groundwater flooding, finished ground floor levels should be set a minimum 300mm above surrounding ground levels. Solid concrete floor slabs should be used for all properties and engineering bricks should be used to a height of 600mm above surrounding ground levels.

Groundwater monitoring should be undertaken as part of any ground investigation works. The ground investigation works will inform foundation design and design of the drainage system.

Surface Water Management

The sites currently comprise undeveloped land and are not formally drained.

In order to ensure the proposed development sites will not increase flood risk elsewhere (through the introduction of hardstanding), surface water discharge will be controlled.

Surface water discharge rates should be restricted to greenfield runoff rates. As infiltration will likely be limited due to potential high groundwater levels, it is likely that discharge to Somborne Stream will be required.

In order to achieve limited greenfield runoff rates, attenuation storage will be required. Attenuation storage systems should be designed to accommodate runoff during all storm events up to and including the 1 in 100 year plus 40% climate change event.

Attenuation Storage Systems

Given the potential for a high-water table at the sites, attenuation storage should be provided within below ground attenuation tanks or modular storage with sufficient mitigation provided within the design to prevent uplift (floatation) of the tanks when the groundwater table is high and to prevent ingress of groundwater.

Tank uplift can be prevented through employing the following measures:

- Anchoring the tank in place;
- Providing a suitable depth of cover;
- Applying ballast to the tank during the construction phase;
- Pumping groundwater during construction until the excavation around the tank is backfilled.

To facilitate gravity drainage, attenuation tanks will be located at the lowest point of the site. However, attenuation tanks should not be placed within the Flood Zone 2 or 3 extents.

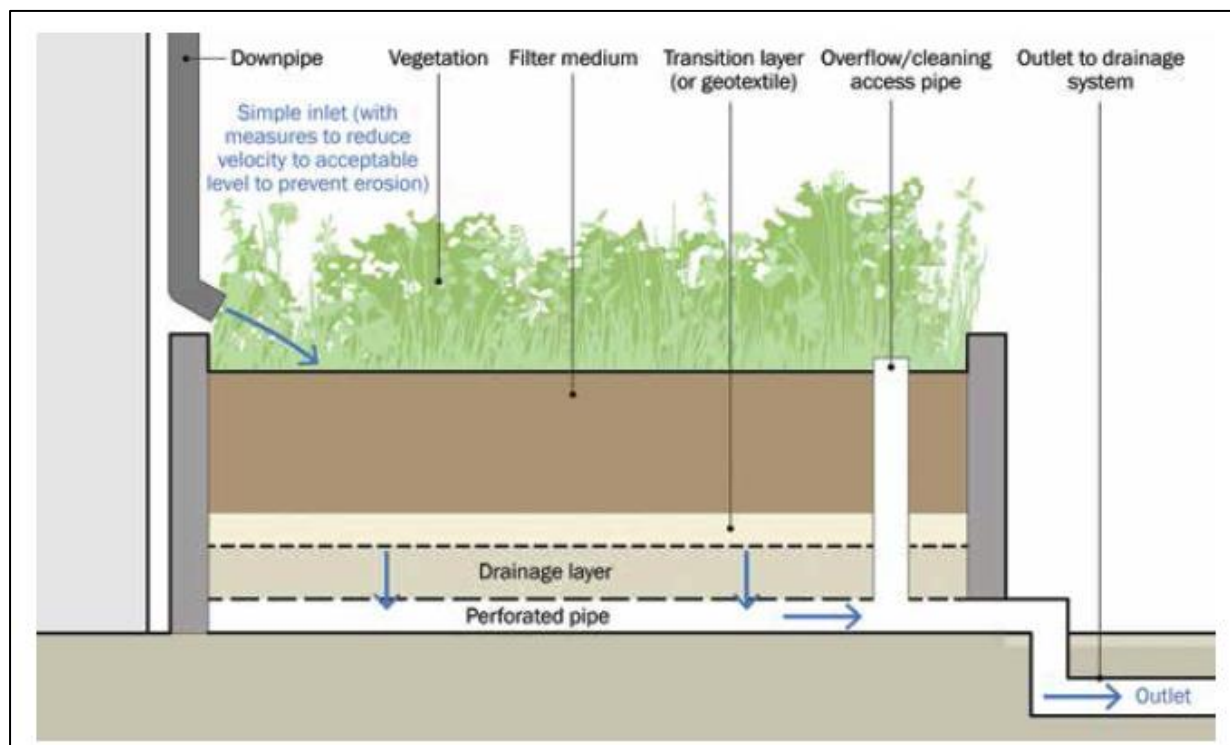
The attenuation tanks should be designed as sealed systems which prevent groundwater ingress and are able to withstand external groundwater pressure.

In addition to attenuation storage systems, and in order to reduce runoff volumes entering Somborne Stream, the following sustainable drainage systems could be incorporated:

Box Planters

Raised (box) planters are constructed above the surrounding ground surface (and as such would not be impacted by high groundwater levels), with a planted soil mix and an underdrain to collect filtrated water. Runoff rates are reduced through the filtration process and runoff volume reduced through uptake by plants.

A typical cross section through a raised (box) planter, extracted from the SuDS Manual (2015), is provided overleaf for reference:



SuDS Manual (2015) – ‘Figure 18.5 Section through a raised planter’

Rainwater Harvesting

Rainwater harvesting would serve to re-use water for internal (toilet flushing) and external applications. Rainwater re-use will significantly limit the amount of rainfall runoff leaving the sites. Rainwater harvesting could be provided above or below ground. Similar to attenuation tanks, suitable mitigation measures should be undertaken to avoid floatation of below ground rainwater harvesting tanks.

Water butt

A water butt is a small-scale garden water storage device that collects rainwater from the roof via the downpipe. The water collected is suitable for external re-use.

Summary

Through the inclusion of flow control, attenuation storage and sustainable drainage measures i.e. rainwater harvesting, it can be concluded that the proposed developments will not increase flood risk elsewhere. Mitigation measures can be employed to ensure the drainage system is fully functional when groundwater levels are high.

Conclusions

This flood risk study assesses the potential flood risk to a number of potential development sites in King's Somborne. This study also details the measures which can be undertaken to mitigate the potential flood risk and ensure no increase in flood risk elsewhere.

The Environment Agency 'Flood Map for Planning' shows that the southern extent of site KS3 and the southern extent of site KS7 are located within Flood Zone 3 – an area considered to be at flood risk with a 1% (1 in 100) or greater annual probability of fluvial flooding. The Flood Zone 3 extent is derived from Somborne Stream which flows through King's Somborne. Somborne Stream is fed by a spring source located approximately 660m north-east of the village. Flows within Somborne Stream are heavily influenced by local groundwater levels.

Historical flooding of Somborne Stream has been recorded in 2000 and 2014.

The developable areas of all sites are located within Flood Zone 1 – an area considered to have the lowest risk of fluvial flooding with a less than 0.1% annual probability of flooding.

The Flood Zone 3 extent on the EA 'Flood Map for Planning' is derived from a national scale modelling approach (JFLOW modelling). The outputs of JFLOW modelling are not considered suitable for use in a site-specific Flood Risk Assessment. In order to accurately determine the fluvial flood risk from Somborne Stream to the development sites, a detailed hydraulic model will need to be undertaken. The detailed model should include: channel cross section survey of Somborne Stream; detailed hydrological analysis to calculate model inflows; and, assessment of climate change allowances.

To mitigate the potential fluvial / groundwater flood risk, all properties will be located outside of the extreme 0.1% annual probability flood extent. Furthermore, and in order to mitigate against potential groundwater flooding, finished ground floor levels should be set at a minimum 300mm above surrounding ground levels. Solid concrete floor slabs should be used for all properties and engineering bricks should be used to a height of 600mm above surrounding ground levels.

In order to ensure no impact on flood risk elsewhere, surface water generated from the development will be controlled. Surface water discharge will be limited to greenfield runoff rates and attenuation storage systems will be provided to accommodate runoff during all storm events up to and including the 1 in 100 year plus 40% climate change event.

Given the potential for a high-water table at the sites, attenuation storage should be provided within below ground attenuation tanks or modular storage with sufficient mitigation provided within the design to prevent uplift (floatation) of the tanks when the groundwater table is high. Mitigation against uplift of the tanks includes anchoring, suitable cover, ballast (at construction phase) and pumping (at construction phase). The below ground tanks and the wider drainage system should be designed as a sealed system to prevent groundwater ingress and be resilient to groundwater pressure.

In addition to attenuation storage systems, and in order to reduce runoff volumes entering Somborne Stream, sustainable drainage system such as rainwater harvesting and box planters should be used.

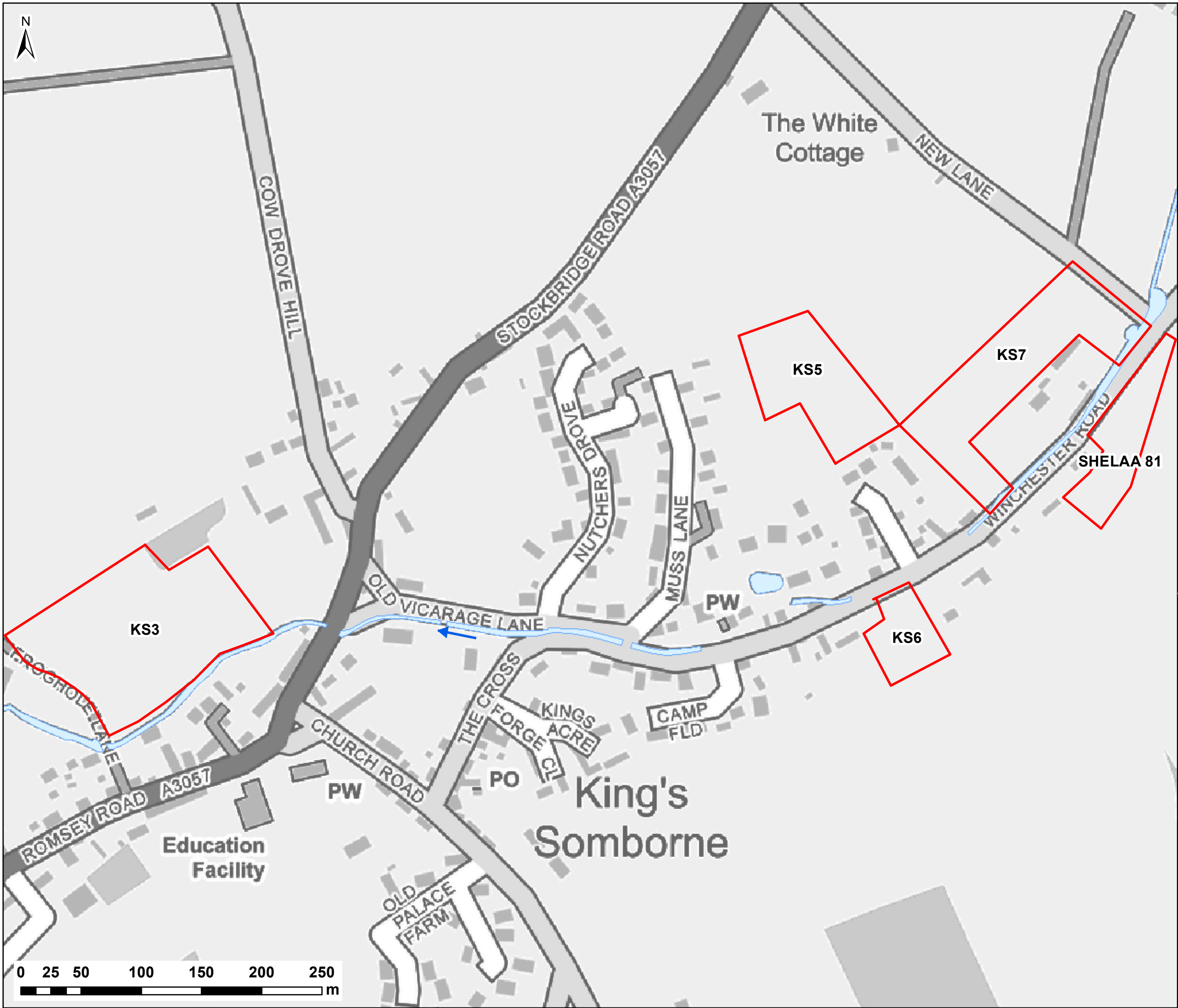
A document detailing questions from local residents with answers provided in relation to flood risk and drainage is included in Appendix E.

Recommendations

To support a future planning application at the sites, the following additional works should be undertaken:

1. Detailed hydraulic modelling of Somborne Stream which flows through the village. The detailed model should include: channel cross section survey of Somborne Stream; detailed hydrological analysis to calculate model inflows; and, assessment of climate change allowances.
2. Ground investigations to include groundwater monitoring. This will inform foundation design and flood mitigation measures.
3. A detailed Flood Risk Assessment based on the findings of the hydraulic modelling. The Flood Risk Assessment should also include a Drainage Strategy detailing how surface water will be managed on each site.

Appendix A – Location Plan and Aerial Image



NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

Site Boundary

Watercourses / Water Bodies

CLIENT:

KING'S SOMBORNE PARISH COUNCIL

www.waterco.co.uk

SCHEME:

KING'S SOMBORNE FLOOD STUDY

PLOT TITLE:

LOCATION PLAN

PLOT STATUS:			DATE:
FINAL			17/12/2018

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE @ A3:
CM	AW	JR	1:3,000
			(UNLESS STATED OTHERWISE)

PLOT NAME:	REV:
w10712-Location_Plan	-



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

Site Boundary

CLIENT:

**KING'S SOMBORNE
PARISH COUNCIL**

www.waterco.co.uk

SCHEME:

**KING'S SOMBORNE
FLOOD STUDY**

PLOT TITLE:

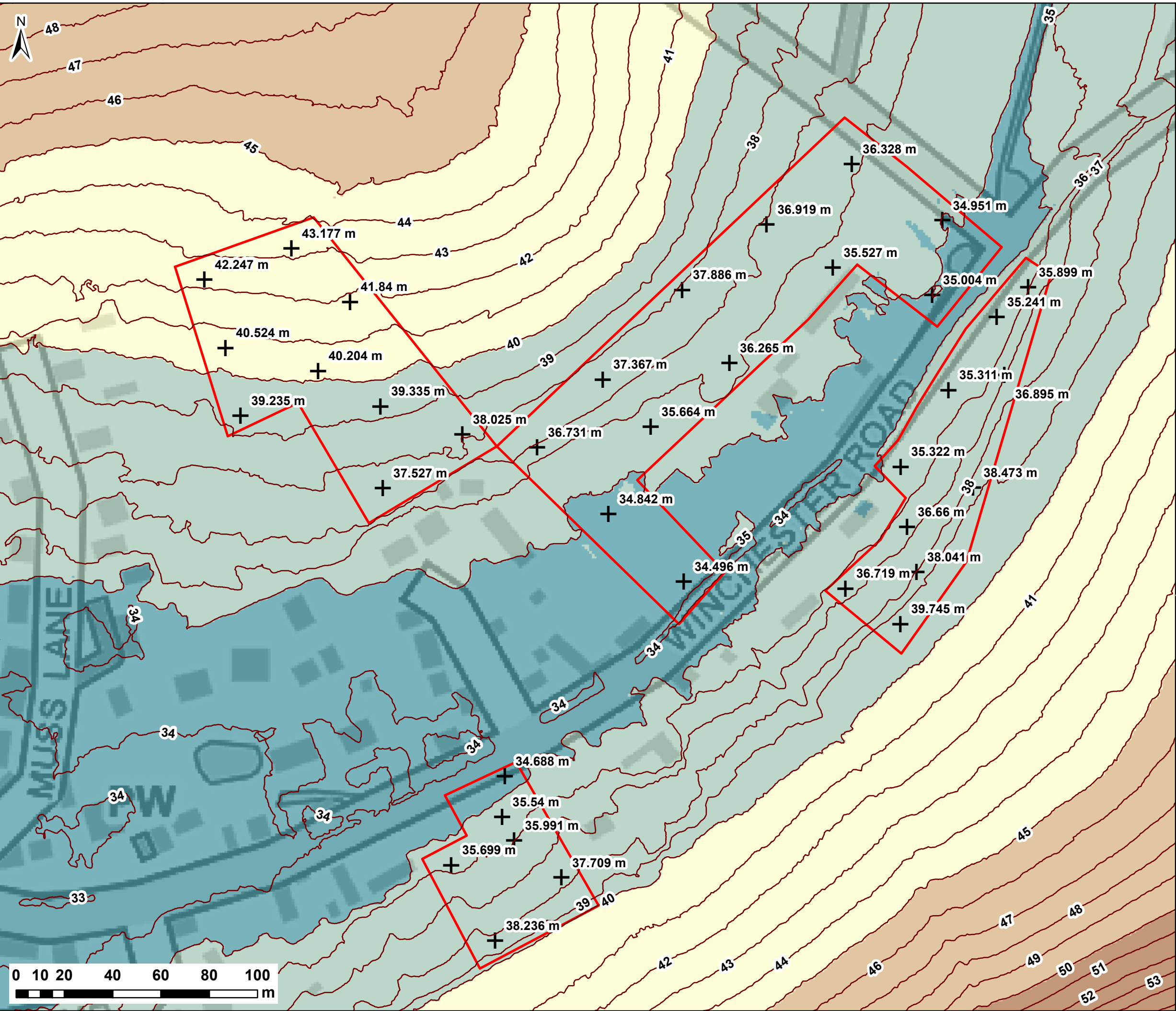
AERIAL PLAN

PLOT STATUS:			DATE:
FINAL			17/12/2018

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE @ A3:
CM	AW	JR	1:3,000
(UNLESS STATED OTHERWISE)			

PLOT NAME:	REV:
w10712-Aerial_Plan	-

Appendix B – LiDAR Extract



NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

Site Boundary

Site Levels

Ground Elevations (m AOD)

< 35

35 - 40

40 - 45

45 - 50

> 50

CLIENT:
KING'S SOMBORNE PARISH COUNCIL

waterco
consultants
www.waterco.co.uk

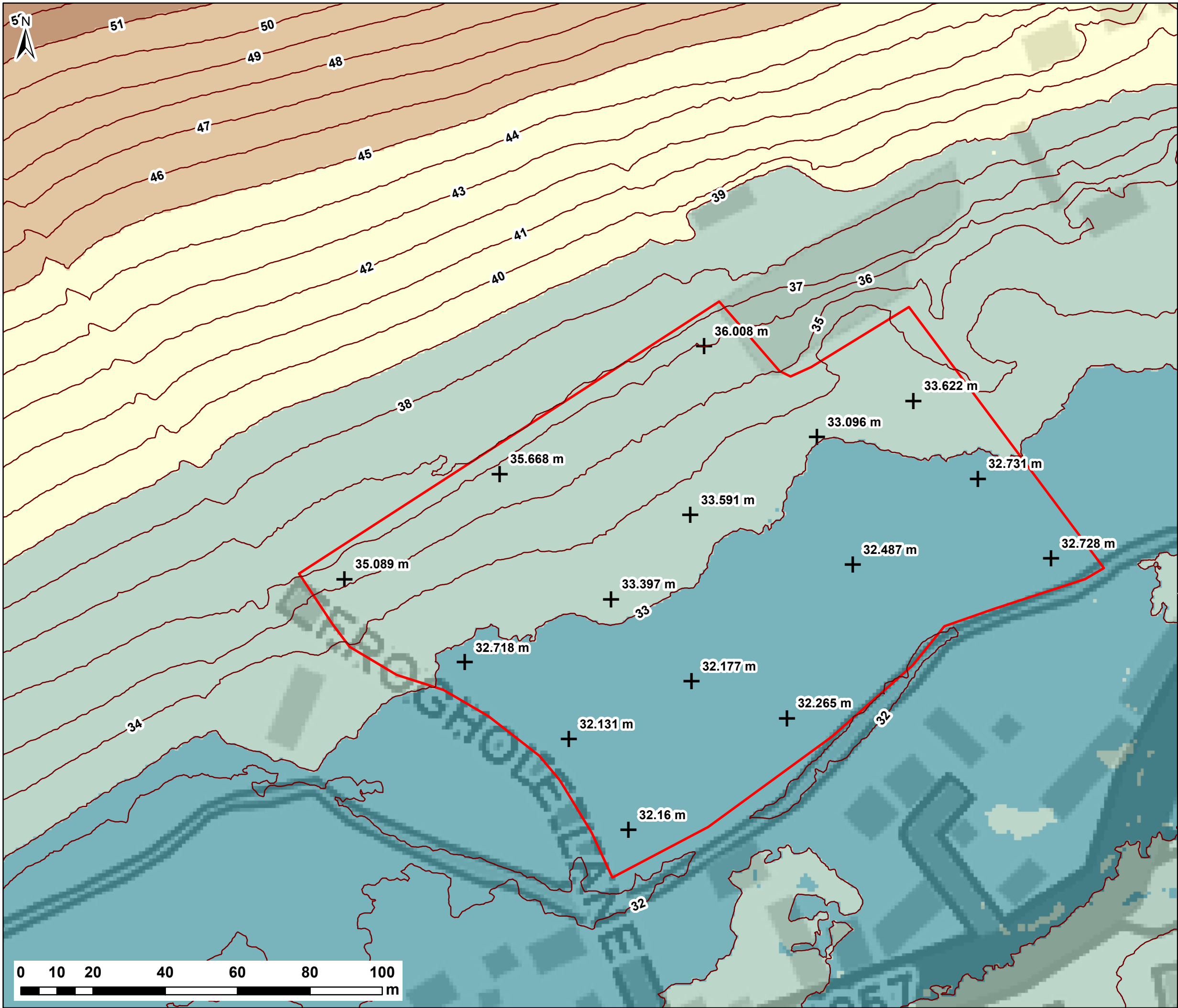
SCHEME:
KING'S SOMBORNE FLOOD STUDY

PLOT TITLE:
LIDAR ELEVATIONS
1m RESOLUTION

PLOT STATUS: **FINAL** DATE: 12/07/2018

DRAWN: HW CHECKED: AW APPROVED: JR PLOT SCALE @ A3: 1:1,500 (UNLESS STATED OTHERWISE)

PLOT NAME: w10712-LIDAR REV: -



NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

Site Boundary

+ Site Levels

Ground Elevations (m AOD)

	< 33
	33 - 39
	39 - 45
	45 - 51
	> 51

CLIENT:

**KING'S SOMBORNE
PARISH COUNCIL**

www.waterco.co.uk

SCHEME:

**KING'S SOMBORNE
FLOOD STUDY**

PLOT TITLE:

LIDAR ELEVATIONS
1m RESOLUTION

PLOT STATUS:			DATE:
FINAL			12/07/2018

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE @ A3:
HW	AW	JR	1:1,000
			(UNLESS STATED OTHERWISE)

PLOT NAME:	REV:
w10712-LIDAR1	-

Appendix C – Environment Agency Correspondence & Flood Maps

Mr Graham Searle
Waterco Consultants

Our ref: HA/2006/000293/OR-03/IS1-L01
Your ref: /

Date: 29 August 2018

Dear Mr Searle,

King's Somborne Neighbourhood Plan - Flood Risk Study

Thank you for consulting the Environment Agency on your draft Flood Risk Study (August 2018) for the King's Somborne Neighbourhood Plan (NP).

Please find our position and comments set out below.

Environment Agency Position

Summary of the requirements under the NPPF

In accordance with paragraph 155 of the National Planning Policy Framework ("NPPF"), inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future).

In accordance with paragraph 157 of the NPPF, all plans should apply a sequential, risk based approach to the location of development – taking into account the current and future impacts of climate change so to avoid, where possible, flood risk to people and property through the application of the Sequential Test.

Paragraph 022 (Flood risk and coastal change) of the Planning Practice Guidance for the NPPF requires, through the Sequential Test and Sustainability Appraisal process, that where other sustainability criteria outweigh flood risk issues, the decision making process should be transparent, with reasoned justifications, for any decisions to allocate land in areas at high flood risk given in the Sustainability Appraisal report.

Our position

1. We have not seen any evidence that the Sequential Test process has been applied with regards to the proposed sites in accordance with the NPPF (paragraph 157 a –d). Therefore, we consider that as it stands **the emerging NP is unsound**.
2. It is our opinion that the submitted Flood Risk Study has not sufficiently demonstrated that there are no reasonably alternative sites in Flood Zone 1 (lowest flood risk).

Environment Agency
Canal Walk, ROMSEY, Hampshire, SO51 7LP.
Customer services line: 03708 506 506
www.gov.uk/environment-agency

Cont/d..

3. Once the Sequential Test has been passed (which cannot be determined in this case given point 1 above), there is a requirement for the Exceptions Test to be met (as set out in paragraphs 159 to 161 of the NPPF). As part of the passing the Exception Test, the sequential approach will be taken on site, therefore directing development away from the high flood risk areas.

In particular, paragraph 160 of the NPPF says:

“...For the exception test to be passed it should be demonstrated that:

- a) The development would provide wider sustainability benefits to the community that outweigh the flood risk; and*
- b) The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.”*

“Both elements of the exception test should be satisfied for the development to be allocated or permitted”.

It is our opinion that the evidence presented has not adequately demonstrated that the allocation of these sites provides wider sustainability benefits to the community that outweigh flood risk in accordance with the Exceptions Test.

Given the history of flooding in Kings Somborne, further modelling maybe required to ensure that development will be safe for its lifetime, taking account of the vulnerability of its uses, without increasing flood risk elsewhere, and, where possible, that development will reduce flood risk overall.

Climate Change Allowances

Please be advised that as mentioned in our previous response dated 22 June 2018, the Test Valley Borough Council's Strategic Flood Risk Assessment needs to be updated taking into account new Climate Change allowances. This would also apply to the Hampshire County Council Preliminary Flood Risk Assessment (dated April 2011) that has been mentioned in the introduction to the Flood Risk Study.

Detailed Comments

Notwithstanding our comments above, the level of detail contained within this study should be used to inform site specific policy.

Pages 5 & 11

The report refers to flooding in 2000/01 and 2014 for one site, but only refers to 2014 for other sites. It is clear that both years should be referenced throughout.

Fluvial section

Page 4

This page incorrectly says the nearest water course unnamed - it is called the "Somborne Stream". This should be corrected.

Page 8 - First paragraph

The assumption that the areas of greatest risk from groundwater flooding are those on the unconfined Chalk (5 and 7 [1]) is flawed. The areas at greatest risk from groundwater flooding are those in the valley bottom, where groundwater levels will rise and intercept those areas first (i.e. the areas located within Flood Zone 2 and 3). This is because Kings Somborne is underlain by Chalk with a thin drift of Head (recent valley sand and gravel) present above the Chalk along the Somborne Valley. There will be hydraulic continuity between the Head deposits in the valley and the Chalk. Therefore, those sites on the drift deposits cannot be excluded from being at risk of groundwater flooding.

As the groundwater level rises within the Chalk, it intercepts the bottom of the valley and the Somborne Stream flows (via springs and seepages (baseflow)). The higher the groundwater levels rise, the further upstream the winterbourne migrates.

At times of extremely high groundwater level, it is expected that a range of groundwater levels from between 0-2 metres below ground level will be found across sites 3, 6 and 7 (parcels 1 and 2). It is expected that site 5 may have more unsaturated depth (between 1-5 metres unsaturated (approx.)).

There is also a ford that runs across New Lane at its junction with Winchester Road (the north eastern corner of KS7 [1]) when the winterbourne has migrated that far up the valley.

The paragraph should be revised to take account of the above.

Page 9 - Below Ground Attenuation Storage

It should be noted that, depending on the location of the storage tanks and how they are used, the storage tanks may be empty some of the time when groundwater levels are high (and/or above the base of the storage tank). Therefore, the storage tanks would need to be designed so that they are able to withstand the pressure from the rising groundwater. Any obstruction of groundwater flow may lead to a build-up of groundwater on the upgradient side of a structure. Any drainage systems proposed for such structures should also be capable of allowing groundwater flows to bypass the structure without any unacceptable change in groundwater levels, or flow in groundwater-fed streams, ditches or springs.

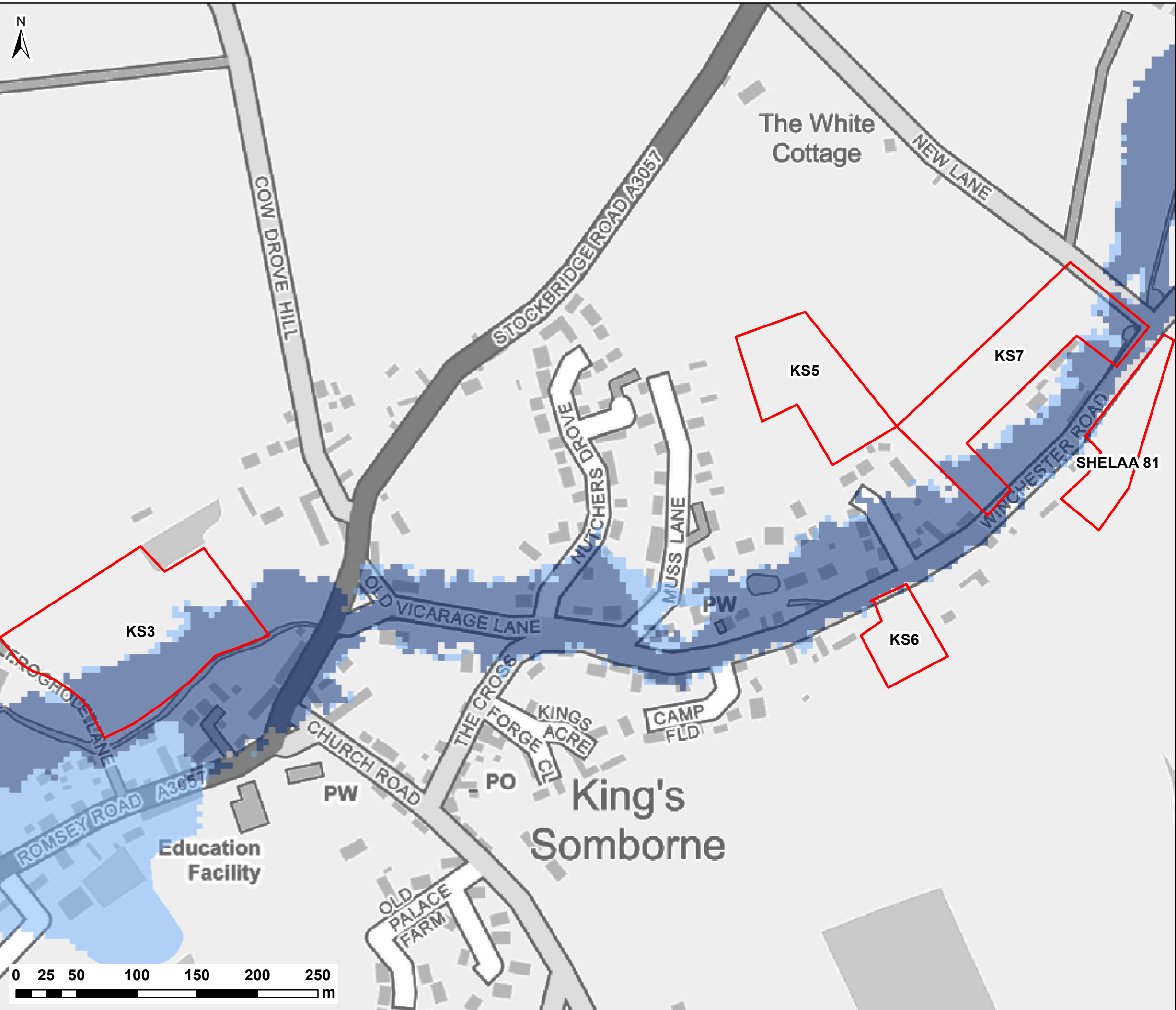
The above should be recognised within the Flood Risk Study.

We would advise that the Lead Local Flood Authority (Hampshire County Council) be consulted as they may have more information on groundwater risk in Kings Somborne.

Should you have any further queries regarding the above comments on the draft Flood Risk Study, please do not hesitate to contact me using the contact details shown below.

Yours faithfully,

Mrs Charlotte Lines
Senior Planning Advisor



NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

- Site Boundary
- EA Flood Zone 3
- EA Flood Zone 2

CLIENT:

KING'S SOMBORNE PARISH COUNCIL

www.waterco.co.uk

SCHEME:

KING'S SOMBORNE FLOOD STUDY

PLOT TITLE:

EA FLOOD MAP FOR PLANNING
DECEMBER 2018

PLOT STATUS:			DATE:
FINAL			17/12/2018
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE @ A3:
CM	AW	JR	1:3,000 (UNLESS STATED OTHERWISE)
PLOT NAME:			REV:
w10712-EA_FZ			-



NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

Site Boundary

Historic Flood Map

CLIENT:

KING'S SOMBORNE PARISH COUNCIL

www.waterco.co.uk

SCHEME:

KING'S SOMBORNE FLOOD STUDY

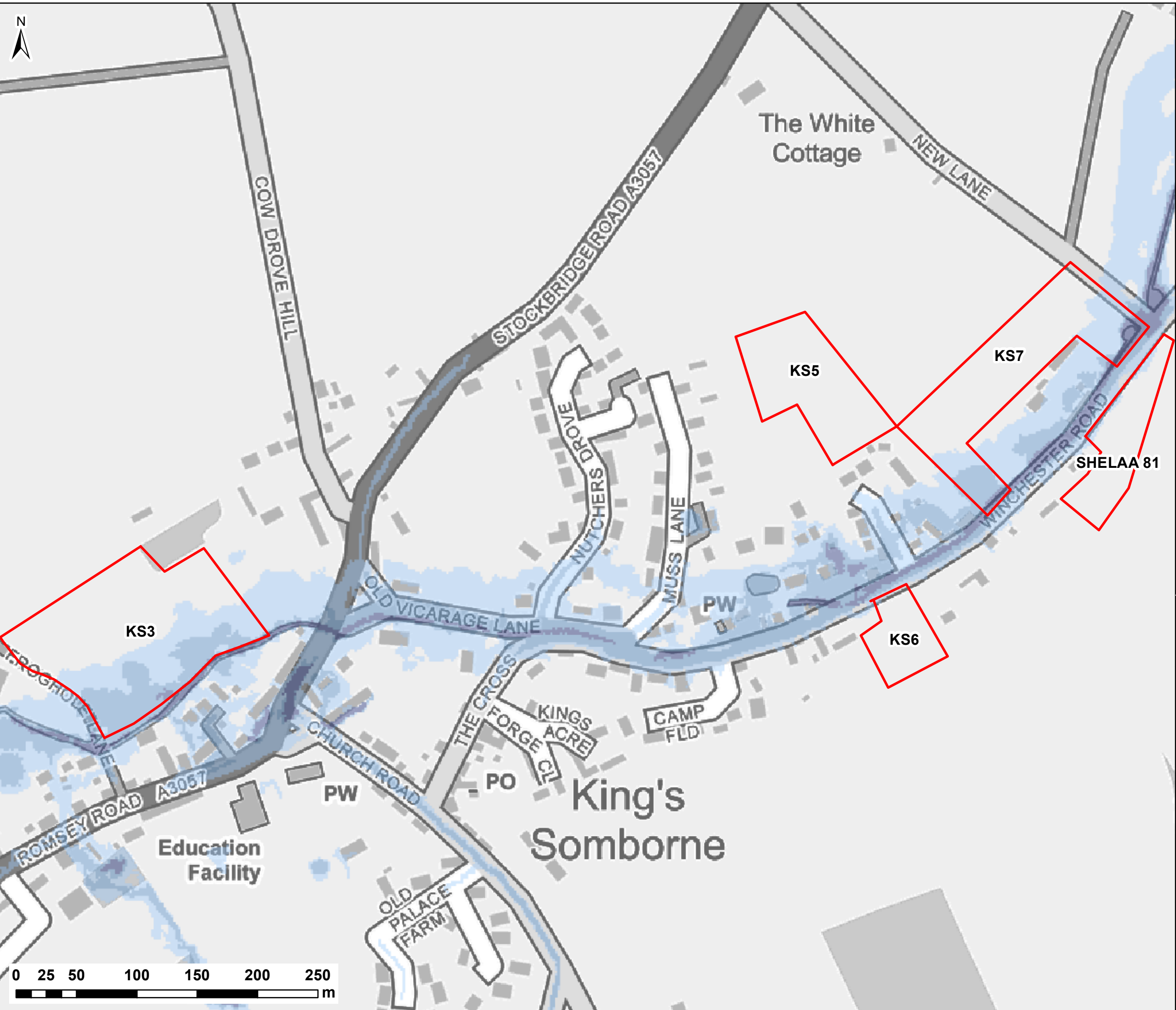
PLOT TITLE:

EA HISTORIC FLOOD MAP

PLOT STATUS:			DATE:
FINAL			17/12/2018

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE @ A3:
CM	AW	JR	1:3,000
			(UNLESS STATED OTHERWISE)

PLOT NAME:	REV:
w10712-EA_HIST	-



NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

- Site Boundary
- Very Low (less than 0.1%)
- Low (between 0.1% and 1.0%)
- Medium (between 1.0% and 3.3%)
- High (3.3% or greater)

CLIENT:

KING'S SOMBORNE PARISH COUNCIL

www.waterco.co.uk

SCHEME:

KING'S SOMBORNE FLOOD STUDY

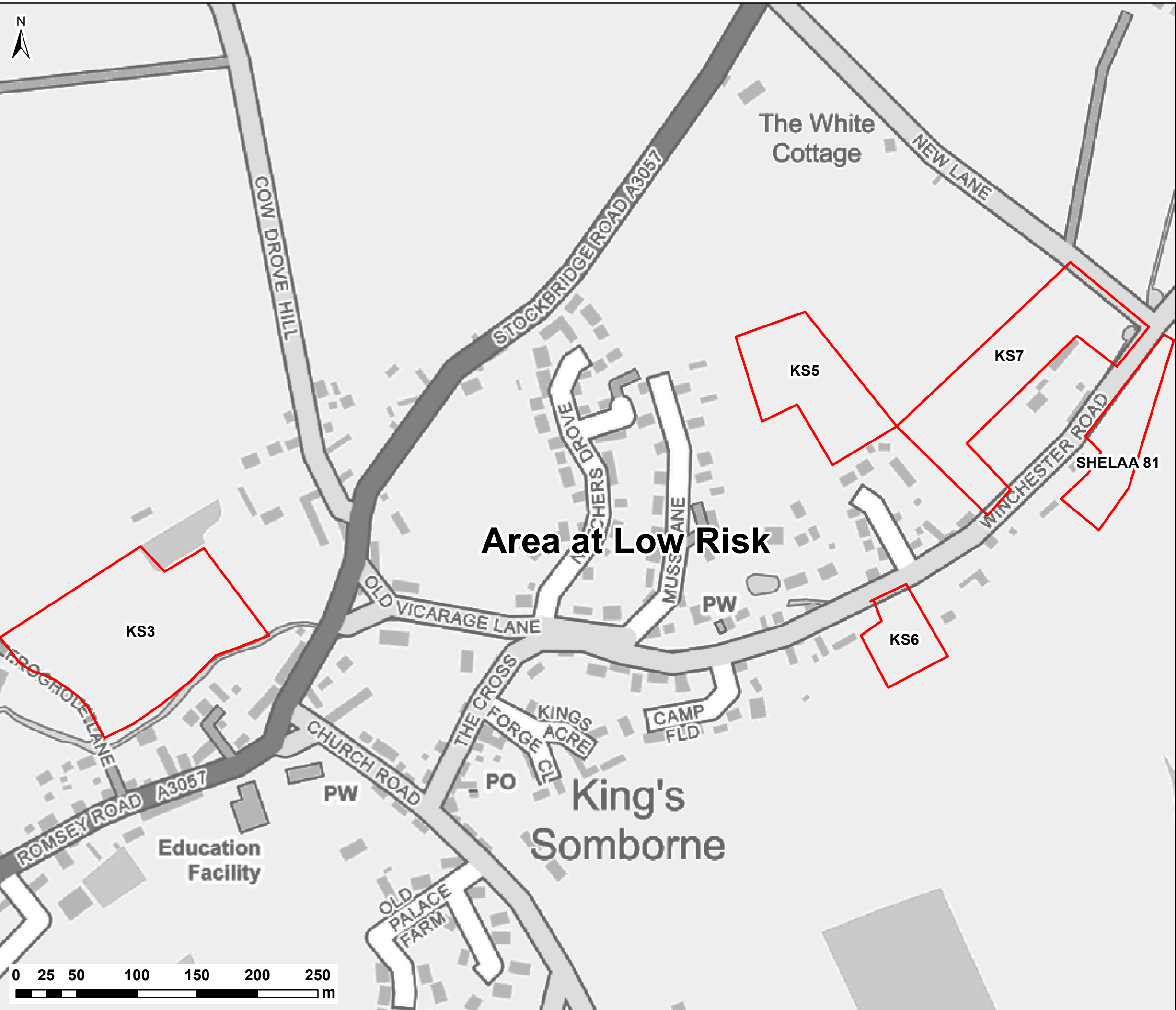
PLOT TITLE:

EA FLOOD RISK FROM SURFACE WATER
DECEMBER 2018

PLOT STATUS:			DATE:
FINAL			17/12/2018

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE @ A3:
CM	AW	JR	1:3,000
			(UNLESS STATED OTHERWISE)

PLOT NAME:	REV:
w10712-EA_SW	-



NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

Site Boundary

EA Reservoir Flood Map

CLIENT:

**KING'S SOMBORNE
PARISH COUNCIL**

www.waterco.co.uk

SCHEME:

**KING'S SOMBORNE
FLOOD STUDY**

PLOT TITLE:

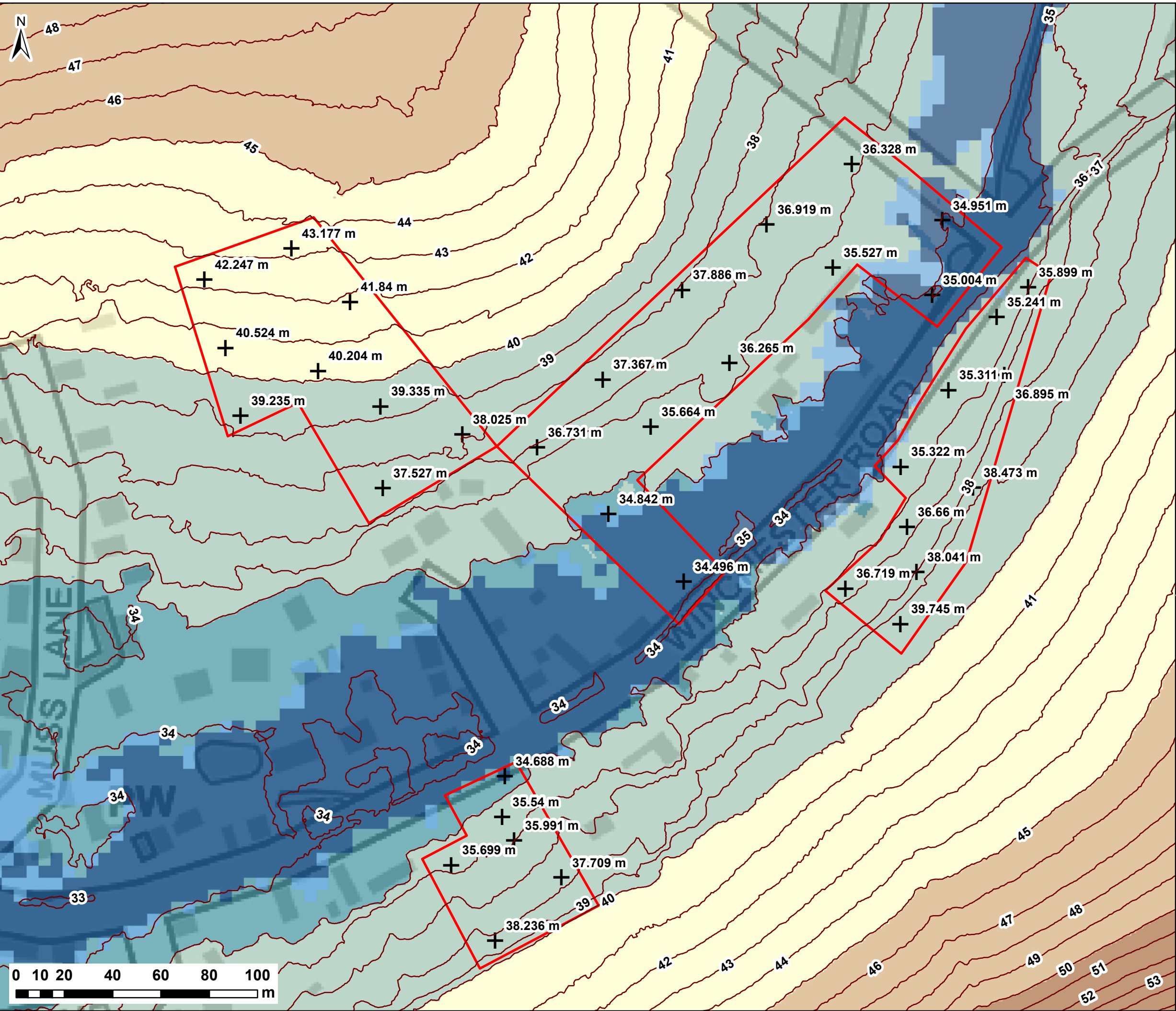
**EA FLOOD RISK
FROM RESERVOIRS
DECEMBER 2018**

PLOT STATUS:			DATE:
FINAL			17/12/2018

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE @ A3:
CM	AW	JR	1:3,000
			(UNLESS STATED OTHERWISE)

PLOT NAME:	REV:
w10712-EA_RES	-

Appendix D – Environment Agency Flood Maps with LiDAR



NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

- Site Boundary
- Site Levels
- EA Flood Zone 3
- EA Flood Zone 2

Ground Elevations (m AOD)

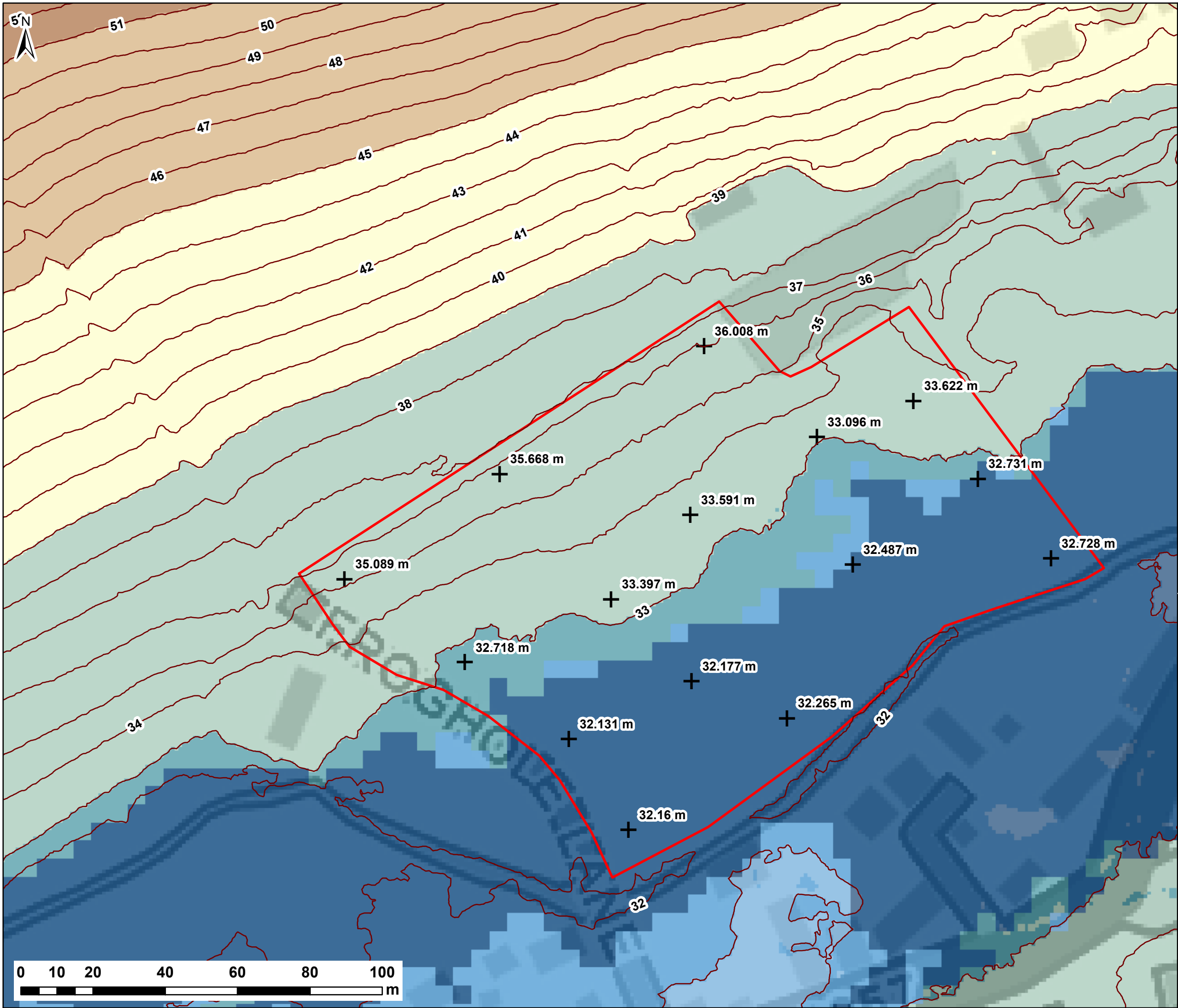
- < 35
- 35 - 40
- 40 - 45
- 45 - 50
- > 50

CLIENT:
KING'S SOMBORNE PARISH COUNCIL

SCHEME:
KING'S SOMBORNE FLOOD STUDY

PLOT TITLE:
EA FLOOD MAP FOR PLANNING AND LIDAR

PLOT STATUS: FINAL			DATE: 13/07/2018
DRAWN: HW	CHECKED: AW	APPROVED: JR	PLOT SCALE @ A3: 1:1,500 (UNLESS STATED OTHERWISE)
PLOT NAME: w10712-LIDAR-FZ			REV: -



NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

- Site Boundary
- Site Levels
- EA Flood Zone 3
- EA Flood Zone 2

Ground Elevations (m AOD)

- < 33
- 33 - 39
- 39 - 45
- 45 - 51
- > 51

ton
dge
King's Somborne

CLIENT:
KING'S SOMBORNE PARISH COUNCIL

waterco
consultants
www.waterco.co.uk

SCHEME:
KING'S SOMBORNE FLOOD STUDY

PLOT TITLE:
EA FLOOD MAP FOR PLANNING AND LIDAR

PLOT STATUS: FINAL			DATE: 13/07/2018
DRAWN: HW	CHECKED: AW	APPROVED: JR	PLOT SCALE @ A3: 1:1,000 (UNLESS STATED OTHERWISE)
PLOT NAME: w10712-LIDAR1-FZ			REV: -

Appendix E – Residents Questions & Answers

KINGS SOMBORNE FRA CLARIFICATIONS

Please find below my formal question to WaterCo regarding the Flood Study. I am pleased we can submit questions to WaterCo. Clearly, I have received some responses to enquiries already from both them and the Parish Council. This has been very helpful, but there remain some questions that I would be grateful to formally pose and to be formally responded to by WaterCo. These are:

- 1) Is it WaterCo's opinion, based upon the documents made available to them, that a Strategic Flood Risk Assessment has been completed in the development of the draft King's Somborne NDP across all potential sites (beyond the five reviewed in the Study) as required by policy and as noted by WaterCo within the "Policy Context" section (pages 3-4) of the report? Are they satisfied that an appropriate Sequential Test has been completed?

Response by KSPC

The Sequential Test was originally undertaken based on the developments taking place in FZ1 – so no test required, but this was not made clear in the NDP, and following feedback the Sequential Test will be done for the entire site and other sites adjacent to the settlement boundary.

- 2) WaterCo have commented that "Taking a sequential approach to flood risk, and to satisfy the Exception Test, it is understood that all dwellings and developable areas will be located within Flood Zone 1." Several of the sites will likely require access infrastructure to be built within Flood Zone 3 (e.g. access from Winchester Road) as stated in their respective site assessment documents. WaterCo have kindly confirmed to me that "Developable Area" includes "all roads, gardens, buildings etc." and as such would include these access routes. Given this fact would WaterCo believe that the Study would require amendment on this basis, and/or the basis for any Sequential Test and application of the Exception Test would need to be revised.

Response by KSPC

The SFRA will take into account the issues outlined above.

- 3) On page 8 of the Study it states "In order to mitigate the fluvial flood risk from the unnamed bourne, all developable areas of the sites will be located outside of the extreme 0.1% annual probability flood extent and within Flood Zone 1". Could WaterCo confirm whether this is a recommendation from them, or a statement of fact they were given it order to complete the report? (Please note question 2)

Response by KSPC

Waterco were advised that development will be limited to Flood Zone 1. See Appendix 2.4 para 2.3 of Draft NDP prior to commissioning the study

Response by Waterco

As above, Waterco were advised that all development will be limited to Flood Zone 1 with any land within Flood Zone 2 / 3 left undeveloped i.e. for public open space. However, Waterco also recommend that all developable areas (dwellings, new access roads, gardens etc.) are limited to Flood Zone 1. This follows the principles of the NPPF flood risk Sequential and Exception tests.



Can I assume that after this opportunity to offer questions and receive responses to WaterCo there will be an opportunity to summarise formal feedback points on the Study to the Parish Council for inclusion in the review of the draft NDP? How will this work - will we get the responses to question back and then be able to put final comment to the P

Response by KSPC

The Final Study will be incorporated into the NDP. Questions in regard to the NDP may be addressed to the Parish Council at their meetings

Questions to be raised with Waterco

Question 1

The River Test Site of Special Scientific Interest lies adjacent to the west of King's Somborne NDP area. Natural England has made the following observation regarding the stream:

"This classic chalk stream is one of the most species-rich lowland rivers in England. In view of the winterbourne tributary, which passes through King's Somborne Village, we advise that the NDP acknowledges the designated status of the River Test and that development proposals within the NDP area should be assessed for impacts on the interest features for which the SSSI has been designated."

In the light of this information does Waterco consider that, given the proximity of the SSSI downstream to KS3, additional discharge to the bourne (either from SuDS or surface run off) is acceptable?

Response by Waterco


Discharge to the bourne currently occurs within King's Somborne. Within any future planning applications for all sites (not just KS3) a Flood Risk Assessment and Drainage Strategy will be required. As part of a Drainage Strategy, detail would be provided on how discharge to the bourne will be restricted (by flow control and attenuation storage) to mimic existing greenfield runoff rates. Detail will also be provided on how surface water treatment can be provided i.e. through inclusion of sediment removal, oil interceptors etc.

Waterco can confirm that through mitigation, surface water discharge from the development sites will have negligible impact on the SSSI.




Question 2


In preparing and writing its report Waterco did not make any site visits to the village. I believe this was a cost saving measure imposed by the NDP steering group. However, given the importance of this issue it is a surprising outcome and far from acceptable to a number of residents.

Response by KSPC	
In discussion with Waterco prior to commissioning the study it was determined no added value would be made by site visits at this stage of the planning process.	
Waterco confirm that a site visit would not have provided added value to the study. Information available online including topographical data, aerial imagery and detailed Environment Agency mapping provides sufficient detail to inform the report.	
As part of any future planning applications (where a more detailed assessment is necessary) a detailed survey of the bourne would be undertaken to inform hydraulic modelling.	
	


In formulating its original proposal to KSPC did Waterco recommend including site visits as part of the project work?

Response by KSPC	
See above	
No – see above.	
	

Did the NDP steering group make any attempt to preclude a site visit by Waterco as a condition (either explicit or implicit) to its formal request to Waterco for a project proposal?

Response by KSPC	
See above	
As above	
	

Does Waterco believe that site visits would have assisted its assessment and helped shape its recommendations?

See above	Response by KSPC
<p>Response by Waterco</p> <p>No – viewing the bourne and the sites (undeveloped fields) would not change the findings of the report.</p> 	

Question 3

Waterco's report states that the bourne originates from a spring source located approximately 660m north-east of site KS7. This is only partially correct as there are other springs (close to KS3) which arise each year. There are therefore several sources of the bourne along its track through the village.

Should these other sources of water have been considered in Waterco's report? This is one of the matters which a site visit may have clarified before Waterco's report was finalised.

The spring source 660m north-east of site KS7 is shown as the main spring source of the bourne. This does not mean there are no other spring sources / tributaries along its route.

A site visit may have identified other incoming sources; however it is unlikely that the conclusions and recommendations of the report would change.



Question 4

All SuDS systems require regular maintenance, service and repair. It is unlikely that the costs for these will fall on the developer but rather to KSPC. Financial provision therefore needs to be made for:

- Monitoring and post construction inspection;**
- Regular planned maintenance (at least annual, possibly more frequent); • Intermittent, refurbishment, repair/remedial maintenance; and • Cleaning and discharge of sludge.**

Response by KSPC
Apportioning of maintenance costs is a matter for detailed planning

Responsibility for maintenance will fall with the future site owner / developer. KSPC would only be responsible for maintenance costs should they develop the site or offer to adopt the drainage system (which is unlikely). Where a sewerage undertaker does not adopt a shared drainage system, the normality is for the developer to arrange for maintenance (through a management company) and residents of the new development site pay a service charge to cover costs.



Please provide an indication as to the likely amount of such regular costs. It is appreciated that this will be dependent upon the precise nature if any scheme which is installed. However, it is worth making an assessment as to bith the scale of ongoing costs (which will remain for a significant time) and also the monitoring required so as to ensure adequate servicing and repair of the system.

Providing costs for maintenance is outside of Waterco's scope and is dependant on the drainage scheme. Drainage systems are typically inspected monthly once first constructed to establish the rate of sedimentation. A site-specific schedule for maintenance is then prepared.



The following quote is taken from an Environment Agency Report which summarises the whole life cost estimation of SuDS installations:

"Maintenance costs (of SuDS)

Operation and maintenance costs may be significant due to the requirements for regular maintenance and inspections to ensure that the SuDS components are delivering the required attenuation and water quality benefits."

In addition, to facilitate regular maintenance it would seem logical that provision needs to be made for "service" access and this could mean the inclusion of further surfaced trackways/access rights over undeveloped areas of the site (including parts of flood zone 2 & 3).


Response by KSPC

The matter of access for SUDS components is a matter of detailed design and further trackways and their routing is conjecture.

As above, however no SuDS (shared drainage systems which provided attenuation storage) will be located in Flood Zone 2 / 3 and as such no access in flood zone 2 & 3 will be necessary.



Does Waterco accept that this is a potential requirement of a SuDS installation at KS3? If so, would these additional facilities have an additional impact on water run-off and discharge into the bourne?

Response by KSPC
See above
As above, there is no proposal or requirement for SuDS (or access to SuDS) to be located in Flood Zones 2 or 3.


Question 5

The Environment Agency has recommended to Test Valley Borough Council that, to comply with the National Planning Policy Framework, a sequential flood test is undertaken when allocating sites to ensure that development is directed to the lowest areas of flood risk.

Waterco has not made a similar recommendation and I can find no mention of a sequential test in its report. What is Waterco's view on the advisability of conducting a sequential flood test?

Response by KSPC
See response above in regard to SFRA

Question 6

It was originally anticipated that Waterco would present its report, engage with residents and address questions at an open meeting in King's Somborne. The written Q&Q format which has been adopted is likely to restrict comment and limit the opportunity for the community to participate in the feedback from the Flood Risk Study. In addition, the publicity given by KSPC to the publication of Waterco's report has been low.

Response by KSPC
No commitment has ever been made to hold an open forum on flooding. The written format is in line with the requirements of NDP preparation. An open forum does not track and give an auditable trail in the same way as written Q & A. The purpose of the study is limited to determining the potential of increased flood risk by development of the 5 proposed sites not a study of the existing flooding potential of K S.

Would Waterco agree that, community engagement, communication and the objective of addresses issues as fully as possible would have been better served by arranging a public meeting?

See above	Response by KSPC
	Response by Waterco As per KSPC response



Under heading Development Proposals: I note “proposed development is for approximately 24 dwellings at KS3”. I understand that the Waterco report was commissioned by Mr Searle, Deputy Chairman of the NDP Steering Group and therefore the information regarding the numbers of dwellings involved was given by him as part of the proposal. This also confirms the statement I heard him make at the last NDP Meeting I attended on 4 July 2018, that the density of dwellings for KS3 could be up to 24. This number was disclosed **subsequent to the closure of the Public Consultation period.**

Response by KSPC
It is confirmed that KSPC provided the number of houses to Waterco. As sites KS3 and KS 6 can be combined to achieve the requisite housing number for one of the 3 phases. A maximum number was provided to provide the worst case scenario for potential flooding impact

Since January I have attended several NDP Steering Group Meetings and two of the four Public Consultations Meetings. At every meeting I have attended both Mr Searle and Councillor Brock have stated clearly that no site in the proposed plan would have more than 11-14 houses. This position has been repeatedly maintained despite questioning by many individual

I have also studied the Waterco report and it states nothing to mitigate the concerns of local residents concerning flooding. I have been apprised of the Waterco feedback that has been sent to yourselves by Mr K Smart, 3 Old Iron Foundry, Kings Somborne and I firmly believe that his letter makes a very strong case as to why the issues of potential future flooding has not been properly addressed. Mr Smart has asked that Waterco are fully apprised of his concerns and I fully endorse his request that this is properly addressed.

Response by KSPC
The purpose of the study is to assess if development on the 5 proposed development sites within the NDP has the potential for increasing flood risk. It cannot address the existing flood risk due to silting up of the bourne for example or lack of riparian maintenance.
Response by Waterco
As per the KSPC response, the Waterco study assesses the potential for increase in flood risk from development and also provides a qualitative study of flood risk.
Our report does make recommendations for further works at the detailed planning stage which include a detailed hydraulic model of the bourne (quantitative analysis of flood risk) and detailed

(intrusive) analysis of groundwater levels. The detailed works would accurately determine flooding extents (including an assessment of future risk associated with climate change) and inform future site layouts and mitigation measures. This level of detailed assessment is beyond the agreed scope of works.



At this point I would also like to know why all the feedback forms submitted following the Public Consultation period have not been published, unredacted save for personal details? Councillor Brock clearly stated in July that this would be done within four to five weeks, ie mid August. Please advise when these feedback forms will be in the public domain.

Response by KSPC

The publication of the forms and responses will be made when all feedback forms have been satisfactorily analysed and evaluated. Much of the work is performed by volunteers who will require to liaise with professional advisors and statutory bodies. No definitive estimate can be provided.

A few comments regarding Waterco's flood risk study and their conclusions:

Firstly, I agree with Ken Smart's comments in his letter dated 13 September, regarding the need for Sequential Testing due to flooding issues in the vicinity, and reiterate that this needs to be in regard to all fourteen sites, rather than just the four assessed by Waterco.

Response by KSPC

See above in relation to the sequential test. Only sites adjacent to the existing settlement boundry will be evaluated.

Secondly, given Waterco's conclusions, I wonder whether keeping KS3 within the Neighbourhood Plan is a viable option? Would a developer make money when taking into account the following requirements for:

Detailed hydraulic modelling to include: channel cross section survey of the bourne; detailed hydrological analysis to calculate model inflows; and, assessment of climate change allowances.

Ground investigations to include groundwater monitoring

A detailed Flood Risk Assessment based on the findings of the hydraulic modelling including a Drainage Strategy detailing how surface water will be managed on each site.

Response by KSPC

It is not the purpose of the NDP to evaluate profit from developers. The cost of the activities highlighted above is however low compared with the price of housing within KS.

Response by Waterco

As above, however it is noted that Waterco have worked on several schemes, some for 1 dwelling, which included the above requirements.



In addition to the above, I wonder if any development in KS3, given the proximity of Rivermead, which required a watching brief as evidenced:

<http://archaeologydataservice.ac.uk/library/browse/issue.xhtml?recordId=1031277&recordType=GreyLit>

would be viable for a developer:

<https://commercialarchaeology.co.uk/625-watching-brief-can-become-expensive-for-a-developer/>

Response by KSPC

See above. Clearly it was viable in the case of Rivermead a single dwelling. It should also be noted that alternatives to watching briefs are feasible as highlighted in the referenced article.

Response by Waterco

No further comments.




1. Why has Waterco not recommended a Sequential Test?

The UK Government web site quotes the following in respect of requirements to undertake a sequential test ...

You also don't need to do a sequential test for a development in flood zone 1 unless there are flooding issues in the area of your development.

There are clearly "flooding issues" in the areas of proposed development as evidenced by the 2014 floods. This must mean that sequential tests are therefore required. There were fourteen sites identified with potential for development in King's Somborne, but only KS3, KS5, KS6 and KS7 were in scope for the Waterco study. The 10 sites not included in scope should surely be included in a sequential test before formal submission of the Plan.

Response by KSPC See above in relation to the sequential test.
Response by Waterco As above. Our works were specific to the sites identified by KSPC. 

2. Would Waterco please explain how SuDS would work on KS3 under the circumstances set out below.

Following are verbatim, page-referenced extracts from the report in italics, followed by a logical presentation of facts leading to the request for an explanation.

Page 6

*Surface water flooding occurs when rainwater does not drain away through the normal drainage system or soak into the ground. It is usually associated with high intensity rainfall events, however, can also occur with lower intensity rainfall or melting snow where the **ground is saturated**, frozen **or developed**, resulting in overland flow and ponding in depressions in topography.*

Page 8

In order to ensure the proposed development sites will not increase flood risk elsewhere (through the introduction of hardstanding), surface water discharge will be controlled.

Surface water discharge rates should be restricted to greenfield runoff rates.

As infiltration will likely be limited due to potential high groundwater levels, it is likely that discharge to the unnamed bourne will be required.

Page 9

In order to achieve limited greenfield runoff rates, attenuation storage will be required.

Attenuation Storage Systems

Given the potential for a high-water table at the sites, attenuation storage should be provided within below ground attenuation tanks ...

To facilitate gravity drainage, attenuation tanks will be located at the lowest point of the site. However, attenuation tanks should not be placed within the Flood Zone 2 or 3 extents.

Page 2

Site KS3 slopes from approximately 37m AOD in the north to 32.16m AOD in the south.

Page 5

... for site KS3, the Flood Zone 2 and 3 extents (0.1% annual probability and 1% annual probability flood extents) do not extend above 33m AOD. The bourne is situated at approximately 32m AOD in its location adjacent to site KS3.

Given the extracts above, please explain how attenuation tanks (or any other form of SuDS) would work in the case of a development on the Flood Zone 1 extent of KS3, during a 1 in 100 year flood event such as was experienced in February 2014.

Response by Waterco

See report extract below:

'Given the potential for a high-water table at the sites, attenuation storage should be provided within below ground attenuation tanks or modular storage with sufficient mitigation provided within the design to prevent uplift (floatation) of the tanks when the groundwater table is high.

- Tank uplift can be prevented through employing the following measures:
- Anchoring the tank in place;
- Providing a suitable depth of cover;
- Applying ballast to the tank during the construction phase;
- Pumping groundwater during construction until the excavation around the tank is backfilled.'

Furthermore, it is noted that an attenuation tank will form a sealed system i.e. it can be placed in an impermeable concrete surround and / or wrapped with an impermeable geo-textile material. Therefore, groundwater ingress / egress to / from the attenuation tank would not occur.

The attenuation tank can be sized to ensure that it accommodates rainfall in times where water levels in the bourne are high and the drainage outlet submerged. A non-return valve can be placed on the outlet to prevent backflow from the bourne.



Rationale for the request is as follows ...

1. In February 2014, the water depth in the KS3 section of the bourne was approximately 1m, so the water surface was at approximately 33m AOD.
2. If attenuation tanks were to be located at the lowest point of the Flood Zone 1 extent on KS3 (in line with Waterco's recommendations), they would, by definition, be at the edge of the Flood Zone 2 extent where the ground level is at 33m AOD.
3. An internet search reveals that attenuation tanks should be sunk to a minimum 500mm below ground level with compacted back-fill above.
4. That means that the top of the attenuation tanks would be at a maximum 32.5m AOD.
5. During the next 2014 level fluvial flood (to 33m AOD), the attenuation tanks would be full of ground water so would surely be ineffective as mitigators against run-off, as would box planters for the same reason.
6. The Flood Zone 1 extent of KS3 covers approximately half of KS3, i.e. approximately 0.9 ha. With 24 dwellings, that represents "medium density" housing with a significant proportion of hardstanding.
7. The fall of this Zone is 4m, from 37m AOD to 33m AOD, so surely runoff water during a downpour would flow (dangerously?) fast towards KS3 Flood Zones 2 and 3, running straight over the top of full attenuation tanks.
8. **Therefore, the requirements that
surface water discharge will be controlled
and
surface water discharge rates should be restricted to greenfield
runoff rates
will surely not be met.**

If the logic in 1. – 8. above (using data from the Flood Risk Study) is incorrect, please explain why.

Response by Waterco

As explained above. The tank would be below ground with the invert (base on the tank) up to 1.5m below ground level. However, the rationale above assumes that groundwater can freely flow in and out of the tank which is not the case, the tank will be a sealed unit with inflow only from piped drainage serving dwellings and roads.

