



# Hildenborough Flood Alleviation Scheme

## EIA File Note Report

Version 3a, 9 August 2016



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## Quality Assurance

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Simon Keys	S J Keys	Associate Director	27 <sup>th</sup> May 2016	V3
Simon Keys	S J Keys	Associate Director	9 <sup>th</sup> August 2016	V3a

### EIA Quality Mark



This Environmental Statement, and the Environmental Impact Assessment (EIA) carried out to identify the significant environmental effects of the proposed development, was undertaken in line with the EIA Quality Mark Commitments.

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# 1 Background

## 1.1 Introduction

A screening opinion was received from Tonbridge and Malling Borough Council on 29 May 2015 advising that an Environmental Impact Assessment (EIA) under the Town and Country Planning (EIA) (England and Wales) Regulations 2011 was not required for construction of the Hildenborough Flood Alleviation Scheme (FAS). The works are unlikely to result in significant environmental effects and will therefore not require a statutory Environmental Statement. Refer to Appendix A.

This EIA File Note Report has been prepared in order to document the environmental constraints and opportunities which have been identified for the Hildenborough FAS (also referred to as the 'Proposed Development'). This document outlines background strategic information and alternative designs considered in the selection of the preferred option. It outlines the indicative construction methodology, environmental baseline conditions and identifies potential environmental impacts and associated mitigation measures to avoid, prevent, reduce/offset environmental effects. This EIA File Note Report does not however provide an assessment of the significance of environmental effects.

## 1.2 The problem

The Hildenborough FAS is situated approximately one kilometre (km) north-west of Tonbridge, Kent. Refer to Figures 1 and 2. The community have been subject to flooding from the River Medway, which is situated south of the Proposed Development. Hawden Stream and Hilden Brook also feed into the River Medway. There are currently 185 residential properties at risk of fluvial flooding in Hildenborough of which 181 of these properties were flooded during December 2013. As well as risk from the two tributaries, there is additional risk from the River Medway, which during very high flow, backs up the Hawden Stream and the Hilden Brook. This water then overflows across local fields and follows the low lying land into the village, flooding properties.

The Hildenborough FAS will comprise of construction of an embankment between the River Medway and the Hildenborough community to prevent flooding from the River Medway reaching the community. This embankment will be approximately 1450 metres (m) long, 6m to 15m wide and 0.9m to 2.4m high. There will be a combination of clay-cored material and sheet piling used.

There are no statutory designated sites within 2km of the Proposed Development. East Tonbridge Copses and Dykes Site of Nature Conservation Importance (SNCI) is located 1.8km east of Hildenborough FAS and River Medway South of Leigh SNCI is located 200m to the south. The site is known to contain protected and/or notable species including great crested newts, bats, reptiles, birds, fish and aquatic species. There is potential for the habitat to also support badgers. Hilden Brook and Mid Medway from Eden Confluence to Yalding at the east of the Proposed Development are both Water Framework Directive (WFD) waterbodies. The potential for the Proposed Development to contain previously unrecorded heritage assets has been assessed as low.

The current project objectives for Hildenborough FAS include the following:

- Increase the standard of protection (SoP) to the residents at risk of flooding in Hildenborough to a 1 in 100 year SoP (i.e. there is a 1 in 100 year (1%) chance of a flood event occurring in any given year);



- Ensure there is no detrimental impact on the surface water as a result of this Proposed Development;
- Minimise the operational and maintenance resource required for the whole life of the Proposed Development; and
- Ensure there is no detrimental impact on the environment including the source protection zone.

Figure 1: Location of Hildenborough Flood Alleviation Scheme in relation to Tonbridge

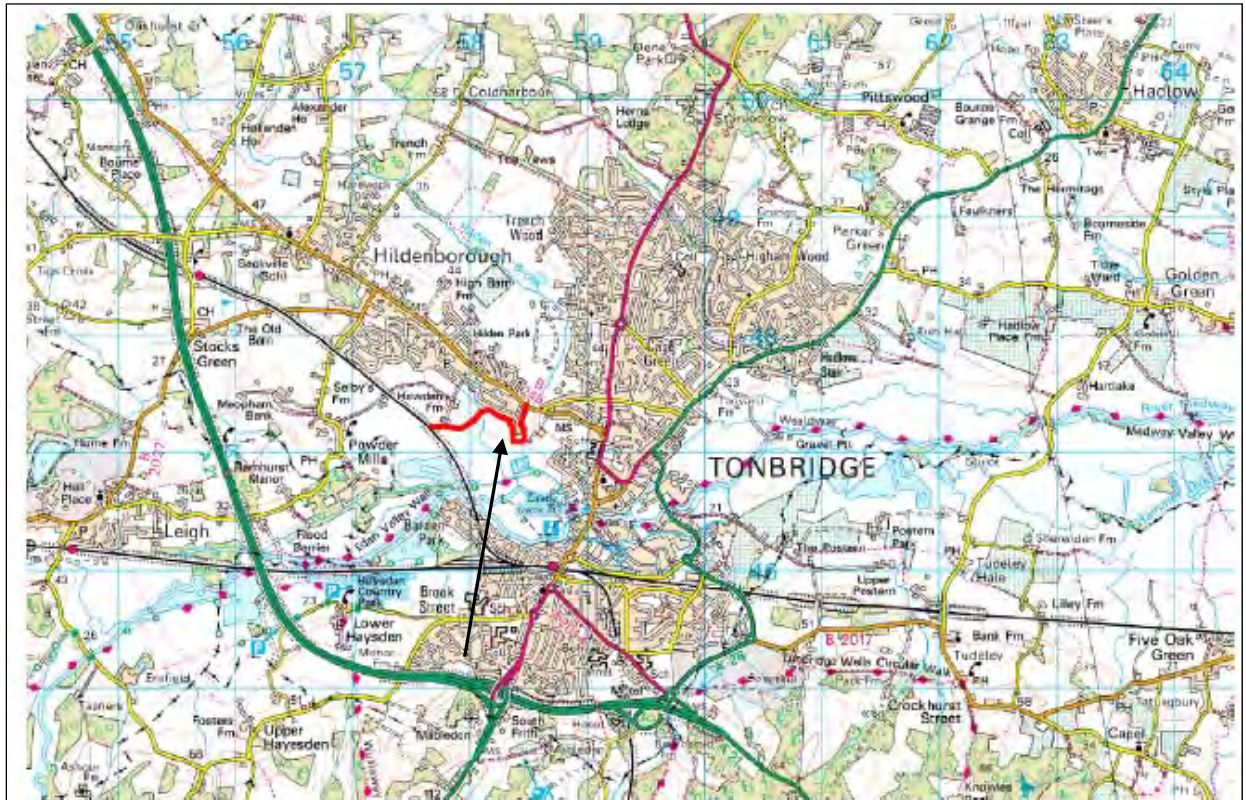
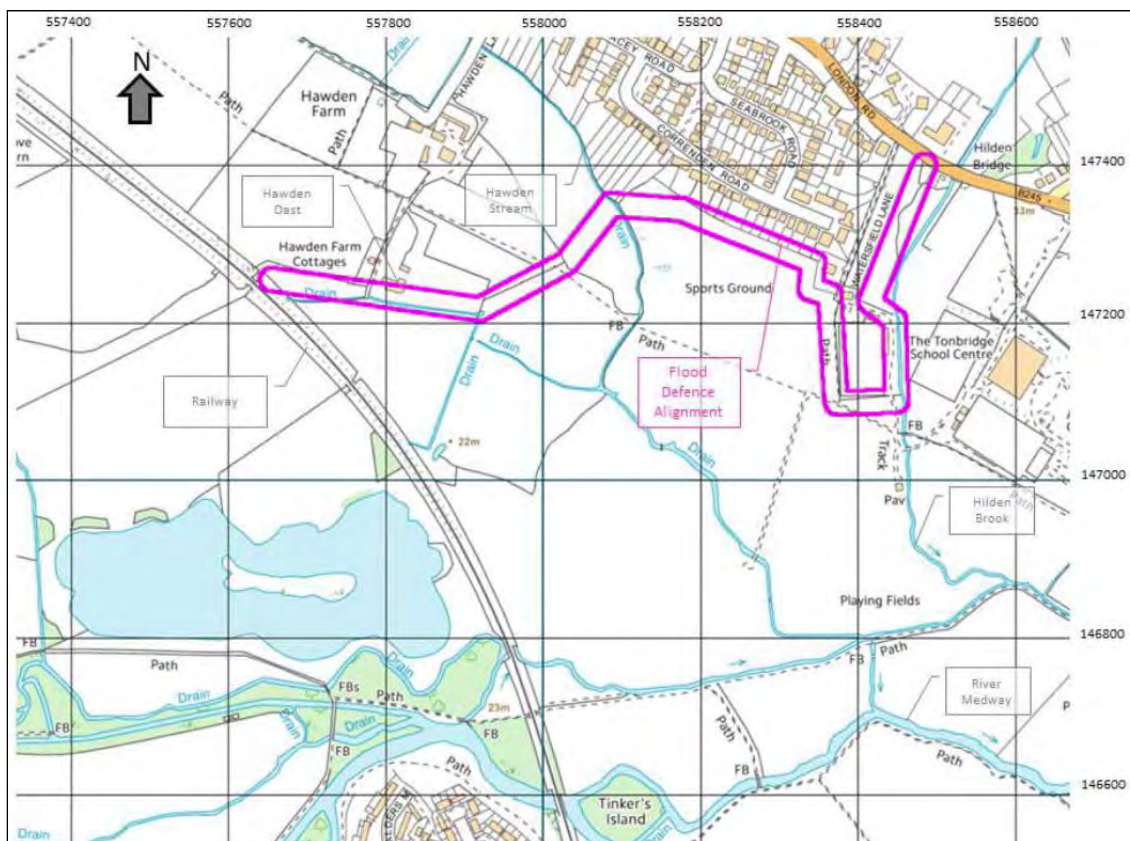


Figure 2: Hildenborough Flood Alleviation Scheme alignment



## 1.3 Structure of this report

This report has been separated into the following key areas of discussion.

Table 1: Report content

Section number	Description
Section 1	Background – provides an introduction to the Proposed Development including the reason for the flood defence works.
Section 2	Scheme Development – provides the strategy framework for development of the Proposed Development and summarises the alternative options considered in selection of the preferred option.
Section 3	The Proposed Development – summarises details of the preferred option including likely construction methodology.
Section 4	Consenting Regime - details relevant legislative consenting requirements.
Section 5	Scoping methodology – details the EIA methodology that has been used for the EIA File Note Report.
Section 6	Key Issues – environmental issues considered to be a key concern for this Proposed Development.
Section 7	Additional issues – environmental issues considered to be of less concern.
Section 8	Cumulative effects - details the potential environmental effects which may combine together to cause a cumulative effect on a single receptor (e.g. human beings) and an assessment of the potential cumulative effects of the Proposed Development in-combination with other developments in and

Section number	Description
	around Hildenborough.
Section 9	Environmental management – summarises the Environmental Action Plan and its purpose.
Section 10	Conclusion and next step
Appendix A	EIA Screening opinion from Tonbridge and Malling Borough Council
Appendix B	Phase 1 habitat survey
Appendix C	Great crested newt eDNA survey report
Appendix D	Great crested newt pitfall trapping report
Appendix E	Preliminary Water Framework Directive assessment
Appendix F	Cultural heritage desk-based report



# 2 Scheme Development

## 2.1.1 Strategic context

Tonbridge, to the south-west of Hildenborough has been identified within the Medway Catchment Flood Management Plan<sup>1</sup>. This catchment covers over 1388km<sup>2</sup> with the main cause of flooding from rivers and surface water and to a lesser extent, groundwater. The Medway is a heavily managed river with the Leigh Barrier, one of the largest flood storage reservoirs in the UK, providing flood protection. This is located 3km upstream of Tonbridge. Other flood control structures within the catchment include a series of sluices, flood walls and embankments. While the town of Tonbridge currently receives a standard of protection from the Leigh flood storage reservoir, flood risk is still considered large in terms of receptors including properties, people and infrastructure. Damages to these assets are also expected to double in the near future due to the effects of climate change.

As part of the Middle Medway Fluvial Strategy, A Strategy Environmental Assessment (SEA)<sup>2</sup> was also completed. The SEA assessed the impact of the relevant strategic policies and plans that might apply to the strategy. It recommended that increasing online storage at Leigh Barrier as well as local mitigation at Leigh was the preferred option from an environmental perspective. In addition, non-structural measures were also to be implemented including: improved flood warning, property level protection, improved development control and providing better education and public awareness.

## 2.1.2 Alternative options considered

An Options Appraisal Report was completed for Hildenborough FAS by Capita AECOM and submitted in February 2016. This provides more detail regarding the alternative options considered to date. As part of this process environmental considerations are taken into account.

Typically, during the outline design process, the following criteria is adopted:

- Technical – an evaluation of the suitability of construction of options in meeting the design objectives;
- Constructability – an assessment of the buildability and construction methodology of each option, including assumptions and other construction impacts;
- Environmental – a high level evaluation of the potential environmental constraints and opportunities resulting from each option;
- Potential cost and programme implications – an assessment of other potential costs and programme issues (excluding capital costs);
- Risk – an assessment of the residual risks associated with each option.

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<sup>1</sup> Environment Agency., 2009. River Medway Catchment Flood Management Plan Summary Report. Worthing.

<sup>2</sup> Environment Agency., 2002. Middle Medway Strategy for Flood Risk Management, Strategic Environmental Assessment.

The below summarises how environmental factors have been considered and influenced the selection of the preferred option:

- Material and appearance of Tonbridge School tennis court flood defence wall – material used for the concrete flood defence wall will be in keeping with the landscape character of the area. The design to be further discussed with the Local Planning Authority and key stakeholders, such as Tonbridge School;
- Design of the fish friendly flow control structure at Hawden Stream – various designs are still to be investigated regarding the fish friendly passage. This may include a flap valve or larger structure, such as a fish pass. The control structure will need to be passable by eel;
- Construction footprint and visual appearance – where possible, the construction footprint will be reduced and the embankment covered in topsoil and seeded to further reduce visual impacts on completion of works;
- Investigate opportunities for pond creation to the south of the Proposed Development in an area that currently comprises tall ruderal habitat. Agree a management plan to ensure long-term ecological value of such a feature;
- The margins of the Hilden Brook have invasive non-native species. Look at opportunities to enhance the environment adjacent to the embankment through thinning of the scrub along the Brook, and through eradication of invasive non-native Japanese knotweed and Indian balsam;
- A management plan to be developed to address enhancements along the Hilden Brook.

### **2.1.3 Consultation to date**

Early consultation has commenced with key stakeholders who will be affected by the Proposed Development including Tonbridge School, Network Rail, Tonbridge and Malling Borough Council and local residents.

The site lies within the boundary of Tonbridge School and as such construction works will need to be carefully managed to reduce impact on the school, along with the schools sporting facilities and recreational grounds.

Network Rail embankment asset may be affected by the impounding of flood water against the proposed flood defence. Consultation will continue with Network Rail throughout the design process.

It is recommended that consultation is undertaken early on in the design process with Natural England, assuming that the works will require a mitigation licence for potential impacts on great crested newt.

Tonbridge and Malling Borough Council were consulted during the screening process. They advised that an EIA will not be required for Hildenborough FAS. They will continue to be consulted throughout the design process.

Continued discussion with Southern Water is required due to the presence of a foul rising main which passes beneath and close to the Proposed Development. Initial communications with Southern Water has resulted in the advice that construction of an earthworks embankment over the alignment of the pipeline will not be acceptable.

# 3 The Proposed Development

The Hildenborough FAS will comprise of an embankment of approximately 1450m in length. It will extend from London Road (B245) running southwards, adjacent Waterside Lane, follow around the perimeter of Tonbridge School tennis courts, where a combination of sheet piling and a concrete wall will be constructed. The flood defences will then extend along the back of the residential properties of Correnden Road before heading west across Hawden Stream towards various residential detached properties including Hawden Oast, The Granary and Harden Cottage. At this point it will tie into high ground near the railway line. The preferred option will also include the provision for mobile pumping in the form of a 1m<sup>3</sup>/s pump or a permanent 2m<sup>3</sup>/s Archimedes pump. These alternative pumps require the same infra-structure in terms of hard standing and sumps..

The height of the embankment will range from between 0.9m near the eastern end (i.e. near Tonbridge School), to 2.4m in height near Hawden Oast, The Granary and Hawden Cottage, to the west. Its width will also range from between 6m to 15m to allow for a 1:3 slope, excluding the construction footprint.

## 3.1.1 Description of construction phase works

### a) Programme of works

The construction of Hildenborough FAS will take approximately six months to be completed.

### b) Indicative construction methodology:

The indicative construction methodology, yet to be confirmed by the contractor, is summarised as follows:

- Site set up including establishment of site compounds, fencing, etc;
- Removal and stripping of vegetation/topsoil within site boundary;
- For the embankment, topsoil will be stripped and the ground excavated to a depth of approximately one metre, layers of material will then be placed and the soil/clay profiled and compressed until the required embankment height is reached. Once completed, the embankment will then be covered with top soil and seeded;
- At Hawden stream, vegetation will need to be removed. A cofferdam will be put in place around the proposed location of the flow control structure to divert the water flow during works. A series of one-tonne gravel bags with polythene liner will be used to stank the flow in the channel and any flow will then be over-pumped. The permanent flow control structure at this location will be an upside down "T" shaped reinforced concrete wall and base. This will extend into the banks on either side. Further design will be required to incorporate a fish friendly structure;
- A permanent concrete hardstanding area of approximately 5m x 5m will be constructed to accommodate any pumps/vehicles on completion of works. This will be located next to the Hawden Stream flow control structure. Where possible, vegetation removal should be minimised where this hardstand area is located;

- In order to allow vehicle access to the flow control structure near Hawden stream, a permanent grasscrete (or similar) access track will be constructed along the back of the residential properties of Correnden road. The access track will be approximately four metres wide;
- For construction of the concrete wall and sheet piling near Tonbridge School tennis courts, plastic piles will be installed to approximate six metres depth using a large excavator with a vibrating attachment. The cladding material used for the concrete wall will be designed in consultation with the Local Planning Authority and Tonbridge School;
- On completion of works, fencing and the site compound will be removed and the site reinstated, as required.

*c) Temporary structures*

Stock piles of topsoil to a height of 1.5m will be present during construction.

*d) Location of site compound*

The site compound will be located next the Hildenborough School tennis courts. Where possible, the existing car park will be used.

*e) Access to site compounds*

From the site compound, access will most likely be from the B245 and onto Watersfield Lane. In order to allow vehicle access to the flow control structure near Hawden stream, a grasscrete (or similar) access track will also be constructed along the back of the residential properties of Correnden Road. This will remain on completion of works.

*f) Types and number of construction plant*

There is likely to be the following construction plant required: One, D6 bulldozer, three excavators (approximately five to ten tonne), one large tracked excavator (approximately 30 tonne), one small bomag roller, one movax system for piling, one foot roller (approximately 10 to 13 tonne), one concrete wagons, lorries containing clay and approximately two, five tonne dumpers.

*g) Source of material required*

The embankment would be constructed predominantly of imported material (approximately 4,000m<sup>3</sup>) from the nearby Cross Rail works, supplemented by a small amount of material from a recent building project by Tonbridge School, which is currently stockpiled on site.

Operational Phase:

The contractor will typically have one-three years correction/defect period after construction.

# 4 Consenting regime of the Proposed Development

## **a) Countryside and Rights of Way Act 2000**

There are several Public Rights of Way (PRoW) within the site boundary including the MU22, which extends south from London Road along Watersfield Lane and connects with PRoW Number MU23, south-west of the tennis courts. MU23 extends east and west, from near Hawden Farm (west) to The Crescent and Hawden Road (east). The Proposed Development may also intercept PRoW Number MT43 located to near Hawden Farm. (Refer to Section 7.1).

## **b) Habitat Regulations 2010**

Under the Habitat Regulations 2010, a European Protected Species Mitigation Licence may be required from Natural England for potential impact on great crested newt. Surveys are to be undertaken during 2016.

## **c) Water Framework Directive**

Delivering the Water Framework Directive (WFD) through the Water Environment (WFD) (England and Wales) Regulations 2003 is the responsibility of the Environment Agency. A preliminary WFD Assessment was undertaken (refer to Appendix E). The results of this are summarised in Section 6.2. Consent will be required from the Environment Agency under the Water Resources Act 1991 for works in, over, under or adjacent to main rivers.

## **d) Flood Defence Consent**

Since the Proposed Development will involve work adjacent to a main river, and to make changes to structures that control floods, Flood Defence Consent will be required.

## **e) Town and Country Planning (Environmental Impact Assessment) Regulations 2011**

The Proposed Development falls under Schedule 2, 10(h) *'Inland-waterway construction not included in Schedule 1, canalisation and flood-relief works'*. A screening request was submitted by the Environment Agency to Tonbridge and Malling Borough Council on 29 May 2015. The Council advised that no EIA (i.e. Statutory Environmental Statement) is required.



# 5 Scoping methodology

## 5.1.1 Approach

On-going assessment of environmental impacts has been an integral part of the design process for Hildenborough FAS. Environmental, financial and technical considerations have all influenced the evaluation of options, resulting in the selection of the preferred option. Environmental constraints and opportunities will continue to be further explored leading up to construction and following completion of works.

Given the level of information available to date, this EIA File Note Report highlights existing environmental baseline conditions and requirements for additional surveys. It provides an overview of potential key issues which may result from the Proposed Development and potential mitigation measures. Any relevant assumptions and limitations are discussed for each environmental topic within Section 6 and 7.

This document outlines background strategic information and alternative designs considered in the selection of the preferred option. It outlines the indicative construction methodology, environmental baseline conditions and identifies potential environmental impacts and associated mitigation measures to avoid, prevent, reduce/offset environmental effects.

***NOTE: This report does not provide an assessment of the significance of environmental effects resulting from the construction and operation of the works.***

## 6 Key environmental issues

As part of the EIA process, an 'EIA Screening and Scoping' exercise was undertaken to identify the key issues that need to be addressed in liaison with Environment Agency technical specialists.

The results of this exercise have informed the scope of this report the scheme design and also helped identify the possible effects which are likely to arise, and helped formulate appropriate mitigation measures to reduce those effects.

To aid the reader, a summary table has been provided of issues considered to be of a key risk to the project, as identified within Section 6 of this report. Those environmental considerations that are of less concern are contained within Section 7 – Additional issues.

Table 4: Summary table of environmental topics for this report

Topic	Is the topic considered a 'key risk'	Is the topic considered an 'additional issues'	Scoped out	Justification
Ecology	✓			
Water Environment	✓			
Archaeology and Cultural Heritage	✓ (construction only)			No archaeological impacts on completion of works
Landscape and Visual Amenity	✓			
Ground conditions	✓			
Traffic and Transport		✓ (construction only)		No change to traffic/transport on completion of works
Noise and Vibration		✓ (construction only)		No change to noise/vibration on completion of works
Community		✓		
Air Quality and Climate			✓	Limited construction impact from plant movement. No operational impacts.

## 6.1 Ecology

### 6.1.1 Method of assessment

A desk-based exercise has been completed. The location of statutory designated sites within a 2km radius of the study area was determined using the <http://magic.defra.gov.uk> website. Existing data of statutory and non-statutory designated sites for nature conservation and protected and/or notable species located within 2km of the study area (5km for bats) were obtained from the Kent & Medway Biological Records Centre (KMBRC). Species records held by KMBRC arise from a broad range of surveys, including species-specific and formal surveys. Only records of protected species dated from within the last 15 years were considered in the baseline. Data of fish, aquatic invertebrates, water vole and bats was obtained from the Environment Agency.

A Phase 1 habitat survey was also undertaken during June 2015, followed by an eDNA survey to determine the presence/absence of great crested newts. During September, a terrestrial pitfall trapping exercise was completed to determine the likely breeding of great crested newts and to confirm whether there was a 'chance' presence of eDNA (through for example, transfer of eDNA in water from pond to pond on birds feet).

### 6.1.2 Baseline conditions

#### *Designations:*

There are no statutory designated sites within 2km of the study area. There are two non-statutory designated sites within 2km including: East Tonbridge Copses and Dykes SNCI (1.8km east of the Proposed Development) and the River Medway South of Leigh SNCI (200m south of the Proposed Development).

#### *Habitat:*

As detailed within Appendix B<sup>3</sup>, habitats present within and adjacent to the Proposed Development include amenity grassland, improved grassland, dense and scattered scrub, tall ruderal, swamp, semi-natural broadleaved woodland, mature and semi-mature broadleaved and coniferous trees, species poor hedgerows, dry ditches, standing and running water with marginal banksides and stands of invasive species.

#### *Protected and/or notable species:*

Protected species recorded within 2km of the Proposed Development, as presented in Appendix B include: badger; grass snake; water vole; adder; various species of bat; slowworm; dormouse; great crested newt; and rough marsh mallow. These are further summarised below:

- a) Great crested newt – Following the Phase 1 habitat survey, the pond adjacent to the Proposed Development, (i.e. 10m to the north of the alignment), was considered to have potential to support newts. As such, an eDNA survey was undertaken in June 2015, (refer to Appendix C<sup>4</sup>). This concluded that great crested newts DNA was present in the water samples from the pond. In order to determine the population size, pitfall trapping surveys were then completed

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<sup>3</sup> Environment Agency., 2015. Hildenborough FAS Phase 1 habitat survey report, July 2015.

<sup>4</sup> Environment Agency., 2015. Hildenborough FAS Great crested newt eDNA survey report, July 2015.

during September 2015 (refer to Appendix D<sup>5</sup>). These concluded that there is the presence of a likely viable breeding population.

- b) Bats – Linear natural features recorded on site including tree lines, the streams, scrub along the railway embankment and bordering the stream and hedgerows that border the Proposed Development offer suitable commuting habitat for bats. Water-bodies, scrub and grassland habitats on site offer optimal foraging habitat for bats. There are several mature trees within the footprint which could have potential to support roosting bats. A bat roosting potential survey was undertaken by the Environment Agency during August 2015. This indicated that there were several trees which could support roosting bats.
- c) Reptiles - The mosaic of habitats including dense and scattered scrub, tall ruderal, and marginal vegetation in particular, on the banks of Hilden brook, located in the north-east section of the Proposed Development are considered suitable to support common reptiles, namely slow worm and grass snake. Additionally, other areas, such as the railway embankment, which runs immediately adjacent to the west of the Proposed Development provide potential habitat and commuting opportunities for reptiles.
- d) Birds – Semi mature and mature trees, hedgerows and dense and scattered scrub located throughout the area provide suitable foraging or roosting sites for common breeding bird species.
- e) Badgers - Scrub and woodlands may provide suitable foraging habitat for badgers and the potential to support badger setts, however, at the time of the survey, areas were inaccessible.
- f) Fish and aquatic invertebrates - At the time of the survey, there was no evidence of fish and aquatic invertebrates. However, it is considered that Hilden Brook has the potential to support fish species. A few records of European eel were obtained, although Hawden Stream forms part of the European migratory route. Bullhead (*Cottus gobio*) and notable brown/sea trout (*Salmo trutta*) were also recorded in desk-based data, although the turbid, muddy and sluggish nature of the Hawden Stream does not appear to be suitable for these species.
- g) Water vole - There is desk-based evidence of water vole in the area. A water vole survey was completed by the Environment Agency during June 2015 along Hawden Stream and Hilden Brook, which concluded that the habitat was not suitable for water voles and is of low risk.
- h) Otter - there is limited suitability of habitat for otter holts or resting places.

*Invasive species:*

Japanese Knotweed is located next to Hilden Brook adjacent the proposed embankment. This can be seen as Target Note 16 within Figure 2 of Appendix B. Himalayan balsam was also found south of the embankment (refer to Target Note 33, Figure 2 of Appendix B). There is also evidence of non-native invasive signal crayfish upstream based on a recent desk-based assessment. Signal crayfish were identified during the water vole survey.

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<sup>5</sup> Environment Agency., 2015. Hildenborough FAS Great crested newt survey report Oct 2015.

### 6.1.3 Further studies to be undertaken

**Great crested newt** – It is recommended that during March 2016 through to June 2016 a total of six visits are undertaken to determine the population of great crested newts. All suitable waterbodies within 250m of the construction site will need to be surveyed. Pending the results of this survey, a mitigation strategy will need to be completed and submitted along with the planning application. Once Hildenborough FAS has been approved by the Local Planning Authority, a European Protected Species Mitigation licence (EPSML) will be needed from Natural England. Once the licence is approved from Natural England, trapping/translocation of newts will commence to exclude them from the works area prior to construction. An indicative timescale of the approach includes the following:

- Pond surveys (including reporting) – March-June 2016;
- Mitigation Strategy production – July-August 2016 (pending planning submission dates);
- Application for mitigation licence – September 2016 to March 2017, allowing at least 30 working days for determination of the application;
- Implementation of mitigation licence – Spring/Summer 2017.

**Bat surveys** - Following on from the bat roost potential survey a number of trees will be targeted for emergence (dawn/dusk) surveys. This will confirm the presence/absence of bats to affected trees (i.e. greater than 0.25m diameter at breast height which require removal).

**Water vole** – Surveys are due to be undertaken on the ditch near Hawden Oast.

### 6.1.4 Potential key issues

The following potential impacts to fauna and flora have been identified relating to the Proposed Development:

- Construction works could potentially result in killing or injury of individual great crested newts and/or damage/destruction of great crested newt terrestrial habitat;
- Potential for habitat severance of Hawden Stream where the embankment intersects with the stream, this could have an impact upon fish and eel passage
- Potential for water pollution incident from construction works into the watercourses;
- Loss of terrestrial habitats, including dense scrub, scattered scrub, tall ruderal and improved grassland within the location of the embankment, hardstand area and access track;
- Potential loss of trees with a medium to high bat roost potential;
- Removal of vegetation may result in killing of reptiles and the loss of suitable habitat for reptile species;
- Potential for works to lead to loss of breeding and foraging habitat for birds;



- Potential spreading of non-native invasive signal crayfish (*Pacifastacus leniusculus*), Japanese knotweed and Himalayan balsam.

### 6.1.5 Potential mitigation measures

The following potential mitigation measures have been identified for ecology.

Table 5: Management of environmental issues during project development.

Objective	Action	Reference
Protection of habitat	Design the embankment to have a reduced construction footprint	Section 6.1.2 and 6.1.4 of this report, Appendix B, C and D
	Design to take account of and avoid or minimise losses to key habitats including the orchard area in NE of site and the mature tree line and ruderal swamp vegetation adjacent to Hawden Stream	
	Planting of herbaceous species on or near to the embankment with native species appropriate to the locality.	As Above
	Investigate mitigation for construction works via the opportunities and the benefits associated with pond creation to the south of the Proposed Development	As above
Protection of notable species – great crested newt	Undertake great crested newt surveys between March 2016 – June 2016, complete mitigation strategy for Planning submission, obtain mitigation licence once Proposed Development approved by Local Planning Authority. Undertake translocation/trapping of newts.	As above
Protection of /notable species – bats	Undertake bat emergence survey during May and September 2016 in trees identified in the bat potential survey as requiring further investigation	As above
Protection of aquatic invertebrates and ensure fish and eel passage	To further explore the design of a suitable fish and eel friendly structure where the embankment crosses the Hawden Stream. Ensure that any control structure is passable by European eel and fish.	As above
Reduce spread of invasive species.	The margins of the Hilden Brook have invasive non-native species. Look at opportunities to enhance the environment adjacent to the embankment through thinning of the scrub along the Brook, and through eradication of invasive non-native Japanese knotweed and Himalayan	As above

Objective	Action	Reference
	<p>balsam.</p> <p>A management plan to be developed to address enhancements along the Hilden Brook.</p>	

Table 6: Management of environmental issues during construction

Objective	Action	Reference
Protection of habitat	Planting of herbaceous species on or near to the embankment with native species appropriate to the locality.	Section 6.1.2 and 6.1.4 of this report, Appendix B, C and D
	Compliance with standard environmental legislation and Environment Agency Pollution Prevention Guidance;	As above
	Loss of areas of scrub and trees to be offset by planting in proximity to the embankment with native scrub species such as hawthorn and blackthorn ( <i>Prunus spinosa</i> ) in order to provide continuity with surrounding habitat.	As above
	In areas of grassland on or adjacent to the Proposed Development, an appropriate wildflower seed mix from a supplier such as Wildseed to be sown in order to create a habitat feature of value to invertebrates, reptiles and birds.	As above

Objective	Action	Reference
Protection / of notable species - Reptiles	<p>All clearance works to be undertaken when common reptiles are likely to be fully active.</p> <p>Clearance of walls, logs, brash, stones, rocks or piles of similar debris to be undertaken carefully and by hand. These should be piled up outside of the work area and left as reptile hibernacula;</p> <p>Clearance of tall vegetation should be undertaken using a strimmer or brush cutter with all cuttings raked and removed the same day;</p> <p>Cutting vegetation will take place over two days to a height of no less than 150mm at the first cut, and 30mm at the second cut (this should be done on a warm sunny day so that reptiles are warm enough to move);</p> <p>Remaining vegetation will be maintained at a height of 30mm through regular mowing or strimming to discourage reptiles from returning;</p> <p>Any building materials such as bricks, stone etc. will be stored on pallets to discourage reptiles from using them as shelter. Any demolition materials will be stored in skips or similar containers rather than in piles on ground.</p>	As above
Protection of notable species – birds	<p>Best practice will be applied i.e. the removal of vegetation out of the bird nesting season. If any nesting birds are identified during construction, a suitable buffer will be retained (dependent upon species) until all chicks have fledged.</p>	As above
Protection of notable species - badgers	<p>Areas that are currently inaccessible for survey could theoretically harbour badger setts. During vegetation clearance, an ecologist should be consulted to provide an ecological briefing to contractors including coverage of signs of badger presence and steps to be taken if badger setts are located during construction, such as stopping works and arranging for an ecologist to visit the site.</p>	As above

Objective	Action	Reference
Reduce spread of invasive species	<p>Vegetation clearance by contractors trained in recognition and avoidance of spread of Japanese knotweed.</p> <p>All material from the infected area to be classed as contaminated waste, and if treatment is required, it must be disposed of either off site at a licensed facility, or on site. Treatment options to involve using herbicidal treatment, potentially followed by storage in a bund or by burial either on or offsite. Environment Agency guidance recommends that chemical control using a bioactive formulation of glyphosate approved for use in or near water is the most effective treatment near water.</p> <p>For Himalayan balsam, control measures to aim to prevent flowering, and are best carried out before June for maximum effectiveness. Chemical control near water can be carried out with herbicides containing glyphosate or 2,4-D amine. Glyphosate will also kill grasses, but 2,4-D amine will kill only broadleaved weeds. For best results, use this treatment when the plant is small and actively growing, particularly in spring. Cutting, strimming or pulling on a regular basis for about three years will be effective and may even eradicate the plant from isolated sites. Plants must be cut below the lowest node to avoid re-flowering.</p> <p>Biosecurity methods are required to reduce the spread of non-native crayfish and crayfish plague. Contractor to produce a biosecurity method statement.</p>	As above.

### 6.1.6 Assumptions and limitations

Due to barriers to access a short section of the western end of the Proposed Development, this area was surveyed from a distance using binoculars. This is considered a constraint to the findings of the survey so far and as such requires further detailed ecological survey. Additionally, the banks of the Hilden Brook were overgrown with dense scrub and access to these areas was not possible. Whilst this area lies outside of the current alignment of the Proposed Development, it remains a constraint as species of relevance to the wider area may be present.

## 6.2 Water environment

### 6.2.1 Method of assessment

A preliminary Water Framework Directive (WFD) Assessment was completed as shown in Appendix E<sup>6</sup>. Desk-based information was also gathered from the Landmark Envirocheck® data obtained May 2015 and ground investigations.

### 6.2.2 Baseline conditions

#### *Land Drainage:*

Two small watercourses flow into the Proposed Development, the Hawden Stream, which flows from the north-west and the Hilden Brook, which flows from the north. The streams converge with a tributary of the River Medway approximately 750m south of the Proposed Development, which re-joins the main channel of the River Medway in Tonbridge town centre.

Two drainage ditches, terminate against the railway embankment and flow into a common channel that joins the Hawden Stream in the farmland in the west. A complex arrangement of drainage ditches and channels, are present alongside two large lakes on the western side of the railway embankment adjacent to the main channel of the River Medway.

#### *Water Framework Directive:*

The Hilden Brook and Mid Medway (from Eden Confluence to Yalding at the east of the site), are both WFD waterbodies. The Mid Medway (surface waterbody) (ID: GB106040018182) current status is 'moderate' with the objective of reaching 'good' status by 2027. Its hydromorphological designation and use is 'Heavily Modified' and the reasons for failing are due to mitigation measures being technically infeasible or disproportionately expensive. The Hilden Brook (surface waterbody) (ID: GB106040018170) current status is 'poor' with the objective of reaching 'good' status by 2027. Its hydromorphological designation and use is 'Not designated artificial or heavily modified'. The reason for it failing is due to natural conditions, being technically infeasible and disproportionately expensive. Finally, Kent Weald Western – Medway is a groundwater body in the location of the Proposed Development, ID: GB40602G502300. Its current status is 'poor' with the objective of reaching 'good' status by 2027. The site is within a Drinking Water Protected Area (i.e. Source Protection Zone) and the groundwater body has an upward trend in pollutant concentrations.

#### *Flood risk:*

The site is located within Zone 2 and 3 flood risk area.

#### *Water Resources:*

As detailed within the Hildenborough FAS Geotechnical desk study<sup>7</sup>, the Proposed Development is detailed as being within superficial Alluvium and River Terrace Deposits as a Secondary (Undifferentiated) aquifer and a Secondary A aquifer respectively. These are underlain by solid geology of the Tunbridge Wells Sand Formation, which is classified as a Secondary A Aquifer. The soils are classified as

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<sup>6</sup> Environment Agency, 2015. Preliminary Water Framework Directive Assessment.

<sup>7</sup> Environment Agency., 2015. Hildenborough FAS Geotechnical desk study.



having a High Leaching Potential and therefore the soils have the potential to readily transmit liquid discharges as they are either shallow, or susceptible to rapid by-pass flow directly to rock, gravel or groundwater.

According to the Environment Agency groundwater source protection zone maps the Proposed Development lies predominantly within a Source Protection Zone (SPZ) II designated for the protection of potable water supply. The southern extent is within a SPZ I (Inner Zone).

Seven potable groundwater abstractions are located within 1km (south to south-east) of the Proposed Development. The closest is located approximately 315m south-east of the Proposed Development.

### **6.2.3 Further studies to be undertaken**

At this stage there are no further studies to be undertaken. However, further ecological input will be required in the design of the fish friendly passage at Hawden stream.

### **6.2.4 Potential key issues**

The following potential impacts to the water environment have been identified relating to the Proposed Development:

- Removal and exposure of bare ground, earth movement, stockpiling, mobilising of sediment into surface water receptors through runoff from the site;
- Vehicle wheel washing run-off, or muddy run-off from construction access tracks within the site;
- Pollution due to vandalism of construction plant;
- Poor/inappropriate storage of materials and chemicals/fuels and wastes such as on permeable surfaces, adjacent to watercourses or without sufficient bunding capacity;
- Accidental spillages of fuels, oils, hydraulic fluid and polluting materials; and
- Creation of preferential pathways via piling operations.

#### *Preliminary WFD Assessment:*

- Kent Weald Western - Medway (Groundwater) waterbody is the most likely to be effected by the Proposed Development given its proximity.
- The proposed works, a flood embankment to defend local development, is small in scale relative to the size of the adjacent waterbodies. The nature of the works is not anticipated to directly impact the aquatic environment.
- Two areas of concern are bank habitats and the effects of piling on groundwater pollution.
  - 1. Deterioration of existing bank habitats. Natural banks could be degraded, which could have a non-temporary impact on habitat and WFD objectives. If sheet piling is used, it may be difficult to directly mitigate loss of bank habitat with like-for-like replacement or enhancement of banks elsewhere, but some equivalent form of compensation habitat should be provided to ensure that there is no overall deterioration. Existing bank conditions, the scale of deterioration,

and mitigation measures will need to be investigated further once preferred options are confirmed.

- 2. Impacts of piling on pollutant pathways to groundwater. Piling could open flow and contaminant pathways from surface water to groundwater, which could compromise improvement to the existing poor status groundwater body. The local groundwater body is currently under pressure from a range of sources including Pesticides, DrWPA, and Chlorinated Solvents. The scheme is within a Source Protection Zone and impacts on particularly sensitive groundwater are therefore likely, the effects of piling on groundwater will need be mitigated, therefore reducing any risk.

## 6.2.5 Potential mitigation measures

The following potential mitigation measures have been identified for the water environment.

Table 7: Management of environmental issues during project development.

Objective	Action	Reference
No deterioration in current status of WFD waterbody	If sheet piling is used, investigate opportunities for equivalent form of compensation habitat to ensure no overall deterioration. Existing bank conditions, the scale of deterioration, and mitigation measures will need to be investigated further.	Section 6.2.2, 6.2.4 of this report and Appendix E.
No deterioration in current status of WFD waterbody	Piling could open flow and contaminant pathways from surface water to groundwater, which could compromise improvement to the existing poor status groundwater body. Effects of piling on groundwater will need be mitigated through appropriate design.	As above.

Table 8: Management of environmental issues during construction

Objective	Action	Reference
Minimise impact on the water environment	Apply best practice measures, conform to the requirements of the relevant PPGs.	Section 6.2.2 and 6.2.4 of this report.

## 6.2.6 Assumptions and limitations

No site visit was undertaken by the water specialist for Hildenborough FAS. Only desk-based information was gathered and an assessment made of the current design information available.

## 6.3 Archaeology and cultural heritage

### 6.3.1 Method of assessment

A cultural heritage desk-based report was completed for Hildenborough FAS (Refer to Appendix F<sup>8</sup>). The collection and critical analysis of the heritage baseline data involved:

- The identification of key data sources;
- The collation of up-to-date data held by the Kent Historic Environmental Records (HER), data search dated 2nd June 2015 and the Historic England National Heritage List;
- A review and examination of available documentary and historic map sources held by Tonbridge Library and the Kent History and Library Centre and online sources; and,
- A visual assessment to identify any heritage assets within the Proposed Development and its immediate surroundings.

A site walkover survey and a detailed visual appraisal of heritage assets within the study area were undertaken during June 2015 in order to:

- Assess the setting of known heritage assets including listed buildings and Conservation Areas within the Proposed Development and the study area; and
- Identify areas of potential previous ground disturbance or areas where there may be potential for archaeological deposits to remain.

### 6.3.2 Baseline conditions

A summary of the Cultural Heritage Desk-based Assessment (Appendix F) is provided below.

#### *Designated assets:*

There are no World Heritage Sites, Scheduled Monuments, Registered Parks and Gardens or Registered Battlefields within the study area (i.e. a 500m buffer around the Proposed Development).

A total of 18 heritage assets are located within the study area comprising nine non-designated assets recorded on the Kent HER, three non-designated heritage assets identified from historic mapping, five listed buildings, and one Conservation Area. Only one asset, the site of a water tank noted on 19th century mapping is located within the study area, but this has negligible heritage interest.

#### *Upper Palaeolithic to Late Iron Age (30,000 BC to AD 43):*

There are no assets of prehistoric date recorded within the study area.

#### *Roman (AD 43 – AD 410):*

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<sup>8</sup> Environment Agency., 2015. Hildenborough FAS Cultural heritage desk-based assessment, August 2015.

There are no assets of Roman date within the study area.

*Early Medieval (AD 410 – AD 1066):*

There are no assets of early medieval date within the study area.

*Medieval (AD 1066 – AD 1540):*

There are two assets which contain elements dating from the medieval period within the study area. These are the medieval town defences and the Tonbridge Central Area Conservation Area which includes a number of medieval buildings and is formed around the core of the medieval street plan.

*Post-Medieval (1540 – 1901):*

There are 12 assets of post-medieval date within the study area. This includes four houses, all of which are Grade II listed buildings. Another surviving building is the oasthouse and granary to the south of Hawden, which lies close to the western end of the Proposed Development and which is also a Grade II listed building. A farmstead, a milestone and the railway line are recorded on the Kent HER, and three 19th century assets have been identified from historic maps. Tonbridge Central Area Conservation Area includes a large number of post-medieval buildings.

*Modern (1901 – Present):*

There are five assets of modern date within the study area. These comprise a milestone, which is of post-medieval or modern date, a George V pillar box, evidence of 20th century ground raising, a public park, and the Tonbridge Central Area Conservation Area, which has modern elements.

*Historic Landscape Characterisation:*

Historic landscape characterisation contributes to our understanding of the historic landscape and can show how historic processes have contributed to the present landscape. The land on which the Proposed Development lies has been characterised by the Kent HER as 'miscellaneous valley bottom paddocks and parcels' which likely originated as a result of Parliamentary enclosure. There are remnants of narrow post-medieval field enclosure near Hawden Lane to the east of the Proposed Development but there are no historic landscape features within the study area.

### **6.3.3 Further studies to be undertaken**

There are no further studies/surveys, such as an archaeological evaluation, required at this stage.

### **6.3.4 Potential key issues**

*Archaeological Potential:*

Where the ground has not been disturbed there may be the potential for previously unrecorded archaeological remains.

*Palaeoenvironmental Potential*

The Proposed Development is adjacent to an existing watercourse, Hilden Brook, and is located on a low lying flood plain close to the River Medway. There is a possibility that alluvium deposits containing palaeoenvironmental data associated with either historical flooding episodes or deposits associated with Hilden Brook are present. The potential for deposits containing palaeoenvironmental data to be present within the Proposed Development is assessed to be very low.

*Summary:*

The potential for the Proposed Development to contain previously unrecorded heritage assets has been assessed as **low**, including the potential for encountering sub-surface remains associated with the former brickworks. It is assumed that the Proposed Development will comprise of importing material to the site to create the embankment resulting in minimal impacts to sub-surface deposits. In addition, the height of the proposed embankment is unlikely to affect the setting of heritage assets in the study area.

Due to the low potential for the Proposed Development to contain heritage assets and the low level of impact arising from the Proposed Development, it is assessed that further archaeological evaluation is not required at this stage.

### 6.3.5 Potential mitigation measures

The following potential mitigation measures have been identified for archaeology and cultural heritage.

Table 9: Management of environmental issues during project development.

Objective	Action	Reference
	No actions identified	

Table 10: Management of environmental issues during construction

Objective	Action	Reference
Minimise impacts on unknown archaeology deposits.	.  If any unknown below-ground archaeological deposits are uncovered during constructions, works are to cease immediately and the County Archaeologist and Environment Agency NEAS Officer contacted. No works can commence until authorised by the client.	Section 6.3.2 and 6.3.4 of this report

### 6.3.6 Assumptions and limitations

Information is based upon data provided by others and on the assumption that all relevant information is accurate. Where assessments of works are made, such assessments are based upon the information available at the time and where



appropriate are subject to further investigations or information, which may become available.

## 6.4 Landscape and visual amenity

### 6.4.1 Method of assessment

A desk-based assessment has been undertaken of various websites to obtain information for this chapter. Effects relating to PRoW are presented within the Traffic and transport chapter (Section 7.1) of this report.

### 6.4.2 Baseline conditions

#### *National Character Areas:*

The Proposed Development lies within two National Character Areas (NCA): Wealden Greensand (NCA 120) and Low Weald (NCA 121)<sup>9</sup>. These are described below.

*'The long, curved belt of the Wealden Greensand runs across Kent, parallel to the North Downs, and on through Surrey. It moves south, alongside the Hampshire Downs, before curving back eastwards to run parallel with the South Downs in West Sussex. Around a quarter of the NCA is made up of extensive belts of woodland – both ancient mixed woods and more recent conifer plantations. In contrast, the area also features more open areas of heath on acidic soils, river valleys and mixed farming, including areas of fruit growing. The area has outstanding landscape, geological, historical and biodiversity interest.....'*

*'The Low Weald National Character Area (NCA) is a broad, low-lying clay vale which largely wraps around the northern, western and southern edges of the High Weald. It is predominantly agricultural, supporting mainly pastoral farming owing to heavy clay soils, with horticulture and some arable on lighter soils in the east, and has many densely wooded areas with a high proportion of ancient woodland.....'*

#### *Site Landscape Character:*

The area of Tonbridge, which is adjacent to the site is described as *'...a local difference in landscape character, which is an important strategic gap between Royal Tunbridge Wells and Tonbridge. Despite its proximity to the towns, this area retains a pleasant, rural, farmed character'.... 'The area is distinctive for the relative absence of settlement and despite the proximity of Royal Tunbridge Wells and Tonbridge there are surprisingly few houses'.... 'Outside the character area, the Tonbridge-Paddock Wood railway line exerts a strong influence. This runs in an east-west direction on slightly higher ground at the lip of the valley, severing the valley from the inhabited lower slopes of the High Weald plateau and further increasing the sense of isolation'<sup>10</sup>.*

#### *Visual Amenity*

The Proposed Development will be visible from the recreational facilities utilised by Tonbridge School, local residents along Correnden Road and Waterside Lane, the

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<sup>9</sup> Natural England., National Character Areas.

<http://publications.naturalengland.org.uk/publication/12332031?category=587130>. [Accessed October 2015]

<sup>10</sup> Tunbridge Wells Borough Council., 2011. Borough Landscape Character Area Assessment 2002, Adopted October 2011.

Hawden Farm Cottages and other residents along Hawden Lane. People utilising public footpaths for recreational purposes and passengers of the train line may also see the Proposed Development.

### 6.4.3 Further studies to be undertaken

An Indicative Landscape Plan and Landscape Visual Impact Assessment (LVIA) are yet to be completed for the Hildenborough FAS.

### 6.4.4 Potential key issues

The following potential impacts to landscape and visual amenity have been identified relating to the Proposed Development:

- Temporary, short-term changes to the landscape character and visual amenity during construction due to movement of construction plant and general construction activity;
- Potential visual impacts upon properties adjacent to the flood bank.
- Potential disturbance to users of recreational facilities, public footpaths, the school and to nearby residents;
- Temporary loss of terrestrial habitats, including dense scrub, scattered scrub, tall ruderal and improved grassland within the location of the embankment, hard stand area and access track; and
- On completion of works, the appearance of the new grassed embankment will be different to existing views and replanted vegetation may take some time to establish. In addition, there will be permanent infrastructure including Hawden Stream flow control structure, the concrete hardstand area and the grasscrete access track, which will be visible.

### 6.4.5 Potential mitigation measures

The following potential mitigation measures have been identified for landscape and visual amenity:

Table 11: Management of environmental issues during project development.

Objective	Action	Reference
Completion of relevant studies/plans/figures for planning submission	Complete an Indicative Landscape Plan (ILP) and Landscape Visual Impact Assessment (LVIA). Consultant yet to be appointed to undertake this work.	n/a
Manage the impacts upon local residents including views and access.	Undertake liaison with local residents. Give local residents opportunities to comment and input into scheme design.	n/a
Reduce construction footprint and vegetation loss	Design of embankment and hardstand area to be further investigated to reduce construction footprint and vegetation loss.	Section 6.1.5 of this report

Objective	Action	Reference
Minimise landscape and visual amenity impacts	Design of concrete flood defence wall around Tonbridge School tennis courts to be further investigated to ensure material used and its appearance is in keeping with the rural setting.	Section 6.4.2 and 6.4.4 of this report

Table 12: Management of environmental issues during construction

Objective	Action	Reference
To minimise impact on landscape and visual amenity	Mitigation measures as identified within the ILP and LVIA to be adopted.	ILP and LVIA.
Appropriate designed grassed embankment on completion of works.	In areas of grassland on or adjacent to the Proposed Development, an appropriate wildflower seed mix from a supplier such as Wildseed to be sown in order to create a habitat feature of value to invertebrates, reptiles and birds.	Section 6.1.5 of this report
Appropriate seed mix for areas which disturb public footpaths	Where public footpaths overlie the proposed earth embankments, these pathways will be seeded with a suitable amenity grass seed mixture to encourage rapid establishment.	As above

### 6.4.6 Assumptions and limitations

Information presented here is based on a desk-based assessment only. A Landscape specialist is yet to complete the ESAP and ILP, which will result in more up to date information.

## 6.5 Ground conditions

### 6.5.1 Method of assessment

Information presented in this chapter has been based on review of desk-based information including: Hildenborough FAS Geotechnical desk study<sup>11</sup>, the Landmark Envirocheck® data obtained May 2015 and the Geotechnical Interpretative Report<sup>12</sup>.

<sup>11</sup> Environment Agency., 2015. Hildenborough FAS Geotechnical desk study.

<sup>12</sup> Environment Agency., 2015 Hildenborough FAS Geotechnical Interpretative Report.

### 6.5.2 Baseline conditions

#### *Geology:*

The ground investigation broadly confirmed the anticipated superficial geology of the site comprising soft to firm silty sandy clay Alluvium over clayey, silty sand and gravel River Terrace Deposits.

Table 13: Generalised Ground Model

Strata Name	BGS Description	Occurrence
<b><i>Superficial Deposits</i></b>		
Alluvium	Clay, silt, sand and gravel	beneath site
River terrace deposits	Sand and gravel	beneath site
<b><i>Solid geology</i></b>		
Weald Clay		north of the site
Tunbridge wells sand formation	Sandstone, siltstone, mudstone and Limestone	beneath site

#### *Unexploded ordnances (UXO):*

A preliminary assessment of the unexploded ordnance (UXO) risk for the site was completed. The risk assessment resulted in a classification of low risk from UXO for the site.

#### *Historic Landfill site and contamination:*

There is no historic landfill sites within 500m of the Proposed Development. No significant potential sources of contamination have been identified for the Proposed Development.

### 6.5.3 Further studies to be undertaken

As detailed within the Geotechnical Interpretative Report, Section 10, various recommendations have been outlined including consultation, pumping tests and further ground investigations. The further ground investigations will reduce the risks to the project.

### 6.5.4 Potential key issues

As identified within the Geotechnical desk study, the following potential impacts have been identified for ground conditions relating to the Proposed Development:

- The risks to these human and controlled water receptors were classified as low since it is assumed that appropriate site control measures will be adopted and validation testing of imported soils will be undertaken.
  - Potential for human health pathway – particulate from ingestion, inhalation, dermal contact, with soil particulates. This is considered to

apply to direct contact with the imported/stockpiled soils rather than existing soils since only limited below ground excavations are envisaged;

- Migration pathways have the potential to cause pollution of sensitive controlled waters receptors, including: Leaching – that is, migration of chemicals of potential concern from imported/stockpiled soils into shallow and deep groundwater; and migration of chemicals of potential concern from imported/stockpiled soils surface water via surface water run-off.
- Both alluvium or river terrace deposits are likely to be encountered when constructing the embankment. The rate of seepage of flood water beneath the embankment will be dependent upon which of these strata are encountered. If on alluvium, it is likely that seepage could be limited to an acceptable level. However, if it is on river terrace deposits, which is more permeable, additional measures, such as cut offs (i.e. sheet piling), may be required or the embankment realigned to avoid these areas. At this stage, they have been identified near the Tonbridge School tennis courts.
- There is also potential for compaction difficulties of the initial layers of fill in an embankment where Alluvium forms the foundation as the result of its soft consistency.
- There is the potential for any sheet piling to influence groundwater flows.

### 6.5.5 Potential mitigation measures

The following potential mitigation measures have been identified for ground conditions.

Table 14: Management of environmental issues during project development.

Objective	Action	Reference
To inform design process	As detailed in the Geotechnical Interpretative Report – consult with Southern Water and Network Rail and undertake pumping tests in standpipes to be installed in WS01, WS02 and WS03 to obtain values of mass permeability of the ground beneath the site.	Geotechnical Interpretative Report (Section 10).
As above	Undertake a further phase of Ground Investigations.	As above

Table 15: Management of environmental issues during construction

Objective	Action	Reference
Reduce potential impact of pollution incident	A Pollution Response Plan to be drafted prior to the commencement of works on-site;  Directly and indirectly purchased bulk fuel and Control of Substances Hazardous to Health (COSHH) items will be stored in accordance with the relevant Environment	Section 6.5.2 and 6.5.4 of this report

Objective	Action	Reference
	<p>Agency Pollution Prevention Guidance notes;</p> <p>Piling will be carried out in accordance with Environment Agency Guidance Note on Piling/Penetrative Ground Improvement Methods on Land Affected by Contamination and ground investigations will inform the Foundation/Piling Works Risk Assessment which will define the appropriate piling methods and foundation design to mitigate risk;</p> <p>Waste materials will be disposed of by the contractor/s to appropriate recycling facilities or appropriately licensed landfills;</p> <p>Appropriate use of PPE and implementation and adherence to Health and Safety Protocols, Plans and Procedures. Demolition and construction workers will remain vigilant of ground conditions at all times and will report to the Principal Contractor, any suspect areas of potential contamination;</p> <p>Complaints about dust will be investigated at the earliest opportunity and appropriate action taken to control the source or remedy the impact as appropriate;</p> <p>During the construction stages of work, the contractor/s will employ dust suppression measures when necessary to prevent the potential mobilisation of contaminated dust particles and their migration off site;</p> <p>Waste effluent will be tested for appropriate physical and chemical parameters and where necessary, disposed of at the correctly licensed facility by a licensed specialist contractor/s;</p> <p>Advice should be sought by an environmental specialist should materials suspected of being contaminated be uncovered; and</p> <p>Static machinery and plant should include drip trays beneath oil tanks/engines/gearboxes/hydraulics.</p>	



#### **6.5.6 Assumptions and limitations**

Baseline information has been obtained from geotechnical desk studies and ground investigations completed to date. It is likely that further investigations planned during later design stages may provide more up-to-date information and allow the risk assessment to be revisited.

# 7 Additional issues

## 7.1 Traffic and transport

### 7.1.1 Method of assessment

Information presented in this chapter is based on a desk-based assessment only. Traffic and transport effects relate to construction activities only. There will be limited vehicle movement once the Proposed Development is operational for occasional maintenance and inspection visits, and as such the operational effects have been scoped out.

### 7.1.2 Baseline conditions

#### *Road Network:*

The main access to the site is via the A21, which runs north-west to south-east or the A26, which runs north-east to the south. From there, the site can be accessed from the B245, which passes through Hildenborough town centre. The B245 is also referred to as London Road.

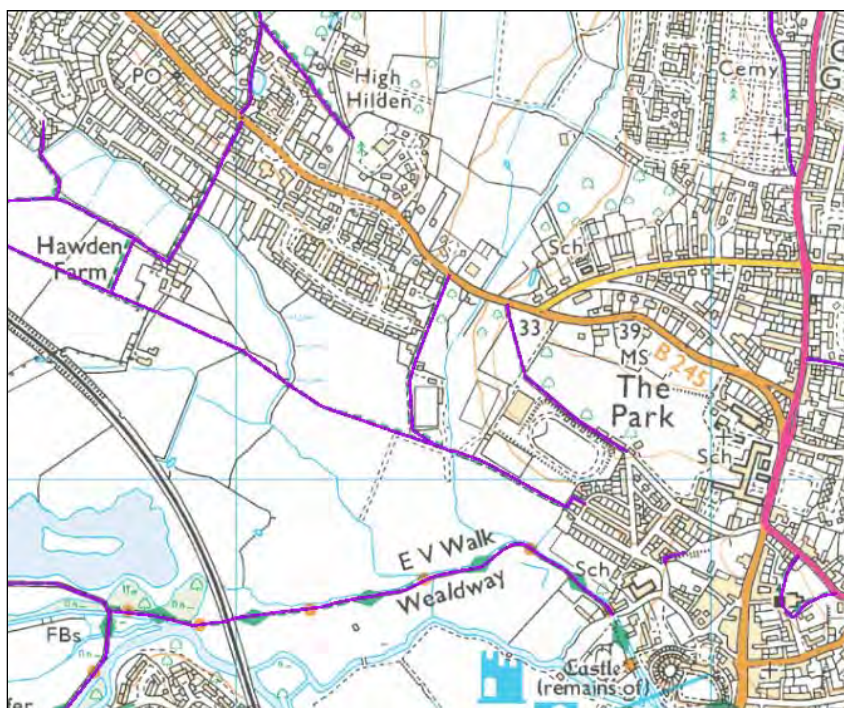
#### *Public Transport:*

The London to Dover main railway line is situated to the west of the Proposed Development. The Proposed Development will connect in with this railway line.

#### *Public Rights of Way:*

There are several PRoW within the site boundary including the MU22, which extends south from London Road along Watersfield Lane and connects with PRoW Number MU23, south-west of the tennis courts. MU23 extends east and west, from near Hawden Farm (west) to The Crescent and Hawden Road (east). The Proposed Development may also intercept PRoW Number MT43 located to near Hawden Farm.

Figure 3: Locations of Public Rights of Way



### 7.1.3 Further studies to be undertaken

No further surveys/studies have been identified for traffic and transport at this stage.

### 7.1.4 Potential key issues

The following potential impacts have been identified for traffic and transport relating to the Proposed Development:

- Potential diversion/closure of PRoW Numbers MU22, MU23 and MT43. Discussions will be required with the Local Planning Authority;
- Temporary disturbance along the B245 from construction plant entering/exiting the site;
- Potential tracking of mud/dirt onto local road network.

### 7.1.5 Potential mitigation measures

The following potential mitigation measures have been identified for traffic and transport.

Table 16: Management of environmental issues during project development.

Objective	Action	Reference
To minimise disruption to public footpaths	Temporary diversion/closure of PRoW to be agreed with the Local Planning Authority.	Section 7.1.2 and 7.1.4 of this report
To minimise	Agreement with the Environment	As above

Objective	Action	Reference
disruption to local residents/community	Agency/Local Planning Authority regarding the hours of construction activity work, such as 08:00 to 18:00 Monday to Friday.	
	To agree/inform timing of vehicles movements and access/haul routes with nearby landowners/Local Planning Authority.	As above
To minimise ecological impacts	No works/vehicle movement (including vegetation clearance) to take place outside the agreed works/compound footprint without prior client agreement.	Section 6.1.5 of this report.

Table 17: Management of environmental issues during construction

Objective	Action	Reference
To minimise disruption to users of public footpaths	Appropriate signage provided to users of footpaths when they are temporary closed/diverted.	Section 7.1.2 and 7.1.4 of this report
To minimise disruption to local residents	Local residents to be regularly updated of the likely construction programme, timing, access routes, site compounds.	As above
To reduce visual impacts	Site and access routes to be left in a clean and tidy condition.	As above
To reduce potential pollution incident	No equipment, materials or machinery stored outside of site compound.	As above
	Wheel cleaning and road cleaning to be undertaken, as required.	As above
To minimise disruption to local residents	A traffic management plan to be put in place should the client deem it necessary	As above

### 7.1.6 Assumptions and limitations

This chapter is based on design information and indicative construction methodology currently available for the Proposed Development. There may be subsequent updates following further design work.

## 7.2 Noise and vibration

### 7.2.1 Method of assessment

Information presented in this chapter is based on a desk-based assessment only. The noise levels generated by construction activities experienced by sensitive receptors depend upon a number of variables, including:

- The number and movement of plant or equipment used on site;
- The construction timeframes; and
- The distance between the noise source and the receptor; and the attenuation due to ground absorption and barrier effects, such as vegetation.

Vibration impacts are generally limited to impacts on buildings in terms of cosmetic damage or nuisance to occupiers.

There will be no operational effects associated with noise and vibration and as such this has been scoped out of the report.

### 7.2.2 Baseline conditions

As discussed with the 'Traffic and Transport' chapter, there are a network of small roads in and around Hildenborough and Tonbridge. The area is relatively rural in nature and limited noise is generated from local traffic movement.

Sensitive noise receptors are those in proximity to the Proposed Development including Tonbridge School, users of the recreational facilities and nearby public footpaths, residents along Correnden Road, Waterside Lane, the Hawden Farm Cottages and other residents along Hawden lane.

Existing noise sources include traffic/transport movement along London Road (B245) and the railway line.

### 7.2.3 Further studies to be undertaken

No further studies/surveys have been identified for noise and vibration at this stage.

### 7.2.4 Potential key issues

The following potential impacts have been identified for noise and vibration relating to the Proposed Development:

- There may be potential noise impact from construction activity experienced by nearby residents;
- There may be potential noise disturbance to people utilising the recreational fields, public footpaths and Tonbridge School. Receptors further away from construction activities may also experience disturbance during works but to a lesser extent;
- Vibration impacts may be experienced during piling operations of sheet piles. These may cause disturbance to people and nearby buildings; and
- The increased movement of construction plant on/off London Road may cause additional noise and vibration disturbance to nearby residents.

## 7.2.5 Potential mitigation measures

The following potential mitigation measures have been identified for noise and vibration.

Table 18: Management of environmental issues during project development.

Objective	Action	Reference
Reduce impacts of noise and vibration experienced by sensitive receptors	Agreement with the Environment Agency/Local Planning Authority regarding the hours of construction activity work, such as 08:00 to 18:00 Monday to Friday.	Section 7.1.5 of this report
	Agreement will be required with the Local Planning Authority regarding the acceptable noise level and construction timeframe near the School.	Section 7.2.2 and 7.2.4 of this report
Minimise disturbance on the local road network	To agree/inform timing of vehicles movements and access/haul routes with nearby landowners/Local Planning Authority.	Section 7.1.5 of this report.

Table 19: Management of environmental issues during construction

Objective	Action	Reference
Reduce impacts of noise and vibration experienced by sensitive receptors	Local residents to be regularly updated of the likely construction programme, timing, access routes, site compounds.	Section 7.1.5 of this report.
	A complaints register should be established on site during construction.	Section 7.2.2 and 7.2.4 of this report
	When undertaking piling works, the vibration technique to be adopted where possible to reduce noise and vibration impacts.	As above
	All plant and equipment should be properly maintained and operated in accordance with manufacturers' recommendations.	As above

## 7.2.6 Assumptions and limitations

Assessment of the effects of noise and vibration is dependent on receiving detailed methodology of site activities and their duration. Assumptions have therefore been



made on activities that have been undertaken on similar projects and current design information available.

## 7.3 Community

### 7.3.1 Method of assessment

Information presented within this chapter is based on desk-based information from other chapters contained within this report, such as Landscape and visual amenity, Traffic and transport and Noise and vibration.

### 7.3.2 Baseline conditions

*Economy, population, employment:*

The Proposed Development is within the ward of Tonbridge and Malling. The population density of Tonbridge is recorded at 120,805. A majority of this population work in wholesale and retail trade, followed by construction, human health and social work activities, education, professional and finance and insurance activities<sup>13</sup>.

*Land Use:*

The location of the Proposed Development is within a mixture of residential and agricultural/farmland. The eastern part of the Proposed Development passes through the grounds of the Tonbridge School Centre including the perimeter of its tennis courts and cricket pitches. The western part of the alignment passes through an area of pasture land. Three detached properties including Hawden Oast, The Granary and Hawden Cottage lie adjacent to the Proposed Development to the west. The Proposed Development terminates close to the London to Dover main railway line in the west and the B245, London Road through Hildenborough in the east.

Historical land use has comprised predominantly of agricultural pasture land since the earliest mapping (1870s). Offsite development has included a former “Brick Works” located adjacent to the eastern part of the site (present in the late 1880s), residential development adjacent north along London Road (late 1800s to present) and Tonbridge School adjacent east (present in the late 1880s)<sup>14</sup>.

### 7.3.3 Further studies to be undertaken

No additional surveys/studies have been identified at this stage.

### 7.3.4 Potential key issues

The potential impacts to the community are similar to those already identified within Section 6.4.4 (Landscape and visual amenity), 7.1.4 (Traffic and transport) and 7.2.4 (Noise and vibration).

---

<sup>13</sup> UK Census 2011., 2011. <http://www.ukcensusdata.com/tonbridge-and-malling-e07000115#sthash.JcuzDDhH.dpbs> [Accessed October 2015]

<sup>14</sup> Environment Agency., 2015. Hildenborough FAS Geotechnical desk study.

### **7.3.5 Potential mitigation measures**

The potential mitigation measures for the community are similar to those already identified within Section 6.4.5 (Landscape and visual amenity), 7.1.5 (Traffic and transport) and 7.2.5 (Noise and vibration).

### **7.3.6 Assumptions and limitations**

Information contained in this chapter is based on current design data available at the time of writing the report.

## 8 Cumulative effects

By definition, cumulative effects are those that result from incremental changes caused by other reasonably foreseeable actions together with the Proposed Development. For the cumulative assessment, two types of effects have been considered:

- The inter-relationships that occur between the individual environmental effects of the Proposed Development and the way that these effects have the potential to combine together to cause cumulative effects with one another at certain sensitive locations and lead to significant effects. For example noise, dust or traffic on a single receptor (such as human beings); and
- The potential for effects of the Proposed Development to combine with effects from other developments in close proximity and lead to significant effects.

In relation to the first point, it is considered the construction phase will have the greatest potential to result in combined effects of individual impacts on a single receptor. The receptors considered to be the most sensitive to cumulative impacts are nearby residents and ecological receptors. Sensitivity will depend on the nature of the receptor, proximity to the works, the extent of exposure to the impact and the potential for that impact to occur.

Potential adverse effect interactions during construction are largely related to noise/vibration, traffic/transport, water environment (i.e. surface or groundwater issues) and landscape/visual for both nearby residents and ecological receptors.

Compliance with the mitigation measures will reduce, as far as possible, these cumulative effects.

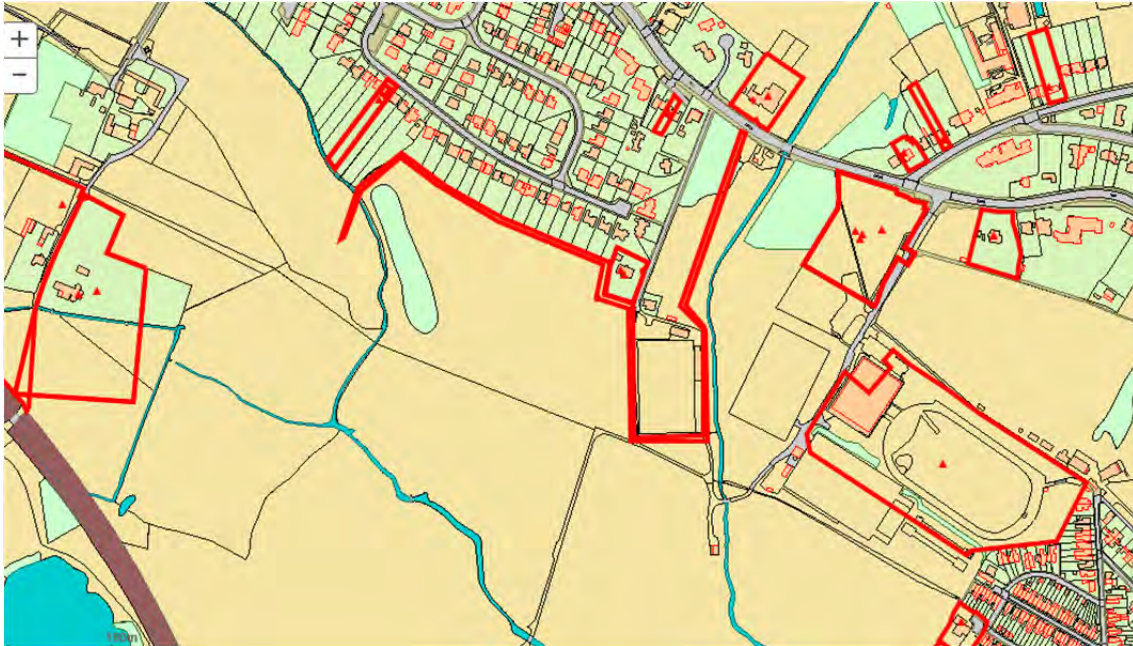
In relation to the second point, other developments which have been identified close to the Proposed Development are provided within Table 20 and shown in Figure 4.

Table 20: Other developments within 500 metres of the Proposed Development

Planning application name	Reference number	Description
Tonbridge School	15/00201/RD	Tree planting and footpath pursuant to conditions 2, 3, and 4 of planning permission TM/13/03834/FL.
	15/00903/RD	Details of lighting pursuant to condition 6 of TM/13/03834/FL for replacement carpark and landscaping.
	15/00208/NMA	Amendments to landscape design (replacement car park and associated landscaping).
	15/02845/FL	Replacement of flood lights around running track and erection of new lights. Variation of condition 2 of planning permission TM/96/00867/FL
Hawden Oast and the Granary, Hawden lane	15/00186/FL	Brick flood defence bund to Hawden Oast and The Granary.

Planning name	application	Reference number	Description
		15/01691/RD	Details of material to be used for the brick flood defence. (15/00186/FL)
Hawden Cottages		15/02198/FL	Concrete framed agricultural barn.

Figure 4: Location of other developments in close proximity to Hildenborough FAS<sup>15</sup>



Of the above mentioned developments, the only scheme that could potentially have a cumulative effect on the Proposed Development is Hawden Oast and Granary flood defence bund, located to the west. The design of the Hildenborough FAS will need to take this into account. If built at the same time, there may be cumulative effects by way of noise/vibration, traffic/transport and landscape/visual effects.

<sup>15</sup> [www.tmbc.gov.uk/online-applications](http://www.tmbc.gov.uk/online-applications). [Accessed November 2015]

## 9 Environmental management issues

An EAP will be completed prior to construction of the Hildenborough FAS. This will collectively detail the mitigation measures relating to environmental considerations. It will specify objectives and actions to manage impacts, prior to and during construction and when the Proposed Development is operational. Key responsibility will also be provided and, if relevant, on-going monitoring requirements, in order to assess the effectiveness of actions.

# 10 Conclusion and next steps

This EIA File Note Report has been produced to accompany the Options Appraisal Report of the preferred option for Hildenborough FAS. This report provides sufficient evidence to demonstrate how environmental constraints and opportunities have been considered. It presents existing environmental baseline conditions, summarises further surveys/studies required, identifies potential key issues (environmental effects) during the construction /operational phase and highlights proposed mitigation measures based on current design data available. The project will provide benefits to the community by reducing the risk of flooding.

The project will undergo further design work during 2016. This will include the further studies identified in this document most notably those covering landscape (LVIA and ILP) and additional ecology surveys. This EIA will be updated with the results of the additional work and any additional effects identified during the detailed design phase.

An EAP is yet to be completed, which will incorporate the mitigation measures outlined in Sections 6 and 7 of this report as well as any additional updates as a result of further design and consultation. The EAP will outline the objectives and actions to manage the environmental risks, prior to construction, during construction and on completion of works, and who is responsible for completing them. It will also detail any on-going monitoring requirements to assess the effectiveness of these actions.



# Appendix A – EIA Screening opinion from Tonbridge and Malling Borough Council



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Your ref  
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Date 15 June 2015

APPLICATION: TM/15/01798/EASC OS REF: TQ 558420 147352

VALIDATED: 29 May 2015 PARISH: Tonbridge

This was approved in accordance with the following submitted details: Letter Fm EA received 29.05.2015 and Aerial Photo received 29.05.2015.

APPLICANT: Environment Agency Joanna Saunders Endeavour Park London Road Addington Kent ME19 5SH

PROPOSAL: Request for Screening Opinion under Regulation 5 of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011 for raised embankment flood defence as part of the Hildenborough flood alleviation scheme

LOCATION: Land East Of Watersfield Lane And South Of Correnden Road Tonbridge Kent

**Town and Country Planning Act 1990  
Town and Country Planning (Environmental Impact Assessment) Regulations 2011**

I refer to the above request for a screening opinion, which has been considered by the Tonbridge and Malling Borough Council as Local Planning Authority.

The screening opinion of the Local Planning Authority is that an Environmental Impact Assessment **WOULD NOT BE REQUIRED.**

**Steve Humphrey**  
Director of Planning, Housing & Environmental Health

**Director of Planning, Housing & Environmental Health: Steve Humphrey MRTPI**

# Appendix B – Phase 1 habitat survey

Hildenborough FAS  
Phase 1 Habitat Survey Report  
July 2015



### Document overview

AECOM/ Capita was commissioned by the Environment Agency in March 2015 to undertake an ecological appraisal (incorporating Phase 1 Habitat Survey and scoping for protected species) for the Hildenborough Flood Alleviation Scheme.

### Document history

Version	Status	Issue date	Prepared by	Reviewed by	Approved by
1	Draft for comment (internal)	12/06/15	AK	GD	JR
2	Updated in response to client comments	17/07/15	GD	JR	JR

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# 1. Executive Summary

This report presents the results of a Phase 1 habitat survey for the Hildenborough Flood Alleviation Scheme (FAS) in Kent. The Phase 1 report is informed by a desk based data search and a field survey by two ecologists from AECOM (formerly URS Infrastructure & Environment UK Limited). The field survey was undertaken on the 1<sup>st</sup> June 2015. The scope of this walk-over survey was to assess the ecological potential of the Scheme Area identified by the Environment Agency (see Figure 1) and which falls within or has connectivity to the FAS.

The survey coverage is referred to within this Phase 1 as the 'study area'.

The objective of the walk-over survey was to identify broad habitat types within and directly adjacent to the study area, highlight the potential for protected or notable species, identify priority habitat and broadly outline mitigation strategies for various scenarios for protected species management. Such mitigation strategies are indicative at this point and would need refining once any recommended further survey work is complete.

The study area is centred on the southern edge of Hildenborough, near Tonbridge in Kent. Roads and residential properties form the north-east boundary of the study area; the north-west boundary is connected to grazed farmland and associated properties. To the immediate east is the Hilden Brook. To the south are the grounds of Tonbridge School and farmland, which eventually lead to the River Medway. The western boundary of the study area is a railway line.

The habitats within the study area include amenity grassland, improved grassland, species poor hedgerows, standing water, flowing water, tall ruderal vegetation, swamp, bare ground, dense and scattered scrub, mature and semi mature broadleaved trees and semi-mature woodland.

These habitats have potential to support protected and notable species including great crested newt (*Triturus cristatus*), bats, badger (*Meles meles*), common species of reptile, common breeding birds, invertebrates and fish.

Recommendations for further survey, mitigation strategies and opportunities for enhancements (where possible prior to more detailed survey) are made within the report and include:

- Surveys to determine presence or absence of bat roosts, reptiles, great-crested newts, aquatic invertebrates and breeding birds
- Avoidance or treatment of invasive non-native plants in proximity to the Hilden Brook
- Avoidance or compensation for loss of mature trees and scrub
- Careful design to enable fish passage where the proposed FAS embankment crosses the Hawden Stream
- Enhancement (in line with the National Planning Policy Framework) of the site through ecologically beneficial planting or habitats creation.

## 2. Introduction

### 2.1 Overview

This Phase 1 report has been prepared by AECOM on behalf of the Environment Agency to support the design of the proposed Hildenborough Flood Alleviation Scheme (FAS).

This report presents the results of a desk based data search and a walk-over survey by ecologists from AECOM which was undertaken on the 1<sup>st</sup> June 2015. The scope of this walk-over survey was to assess the Scheme Area identified by the Environment Agency (Figure 1) that falls within the FAS, and any relevant connected habitats. The area surveyed is referred to as the 'study area' in this report.

The objective of the walk-over survey was to identify broad habitat types within and directly adjacent to the Scheme Area, highlight the potential for protected or particularly notable species, identify priority habitat and propose further recommendations for further surveys, mitigation strategies and opportunities for enhancements (where possible prior to more detailed survey).

### 2.2 Background

Hildenborough, located north-east of Tonbridge in Kent, is situated at the confluence of the River Medway, the Hilden Brook and the Hawden Stream. Homes in Hildenborough are at risk of fluvial flooding, and potentially surface water flooding.

In order to address this issue the Environment Agency are considering the creation of a flood embankment of approximately 950m length to the south-east of Hildenborough.

It is understood that the embankment would be up to 1m in height and approximately 10m in width at the base and would cross the Hawden Stream thus necessitating the creation of a flow control structure in order to comply with regulations relating to eels and other fish species (see section 3.7).

Habitats present along the alignment of the proposed embankment and adjacent connected habitats may support protected and/ or notable species.

## 3. Wildlife Legislation

### 3.1 Great crested newt

Great crested newt (*Triturus cristatus*) is afforded protection under the Wildlife and Countryside Act 1981 (as amended)<sup>1</sup> and the Conservation of Habitats and Species Regulations 2010 (as amended)<sup>2</sup>.

Through the implementation of these Regulations, it is an offence to deliberately capture, injure, disturb or kill a great crested newt, or to deliberately take or destroy its eggs. It is also an offence to deliberately or recklessly damage, destroy or obstruct access to any structure which a great crested newt uses for shelter or protection. This protection includes both the breeding pond itself and terrestrial habitat utilised for foraging and hibernation which may be distant from the breeding pond itself.

Great crested newt habitat is widely considered to extend up to 500m (the accepted maximum roaming distance) from a breeding pond. As such the potential for offence under the above legislation should be considered for all areas within 500m of a breeding pond.

Great crested newt is listed as a Species of Principal Importance in England on Section 41 (S41) of the Natural Environment & Rural Communities (NERC) Act 2006<sup>3</sup>.

### 3.2 Bats

All UK native bat species and their roosts (whether bats are present or not) are protected under the Conservation of Habitats and Species Regulations 2010 (as amended) and under the Wildlife and Countryside Act 1981 (as amended). Taken together, under this legislation it is an offence to

- Deliberately, intentionally or recklessly capture, injure or kill a bat;
- Damage/destroy a breeding site or resting place of a bat;
- Deliberately, intentionally or recklessly disturb a bat;
- Intentionally or recklessly disturb access to any structure which a bat uses for shelter or protection.

A bat roost is defined as “any structure or place, which is used for shelter or protection” or a “breeding site or resting place”. Because bats commonly used the same roosts at particular times of the year after periods of absence, the roost is protected whether or not bats are resident.

Seven of the UK bat species are listed as Species of Principal Importance under S41 of the NERC Act (2006), with a species action plan prepared: namely, the barbastelle bat (*Barbastella barbastellus*), Bechstein's bat (*Myotis bechsteinii*), noctule bat (*Nyctalus noctula*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat (*Plecotus auritus*), greater horseshoe bat (*Rhinolophus ferrumequinum*) and lesser horseshoe bat (*Rhinolophus hipposideros*). Of these species, only the two horseshoe bat species are unlikely to be present in Surrey.

<sup>1</sup> Wildlife and Countryside Act 1981. London: HMSO. Wildlife and Countryside Act 1981 (as amended)

<sup>2</sup> Conservation of Habitats and Species Regulations (2010). HMSO.

<sup>3</sup> Natural Environment and Rural Communities (NERC) Act 2006, London: HMSO

### 3.3 Water vole

Water voles (*Arvicola amphibius*) are protected under the Wildlife and Countryside Act 1981 (as amended).

This legal protection makes it an offence to intentionally kill, injure or take water voles, intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection, and intentionally or recklessly disturb water voles whilst occupying a place used for that purpose.

The water vole is listed as a Species of Principal Importance in England on S41 of the NERC Act 2006.

### 3.4 Badger

Badgers (*Meles meles*) and their setts receive protection under the Protection of Badgers Act 1992<sup>4</sup> and the Wildlife and Countryside Act 1981 (as amended). Under the above legislation relevant offences include to:

- Wilfully kill, injure or ill-treat a badger;
- Cruelly ill-treat a badger,
- Damage, destroy or obstruct access to a sett or any part thereof;
- Disturb a badger when it is occupying a sett.

A badger sett is defined in the legislation as any structure or place, which displays signs indicating current use by a badger.

### 3.5 Widespread reptiles

The four common reptile species grass snake (*Natrix natrix*), slow worm (*Anguis fragilis*); common lizard (*Zootoca vivipara*) and adder (*Vipera berus*) are all protected under the Wildlife and Countryside Act 1981 (as amended). Under this legislation it is an offence to intentionally kill or injure these species.

All four common species of reptile are listed as Species of Principal Importance in England on S41 of the NERC Act 2006.

### 3.6 Birds

Birds are afforded protection under different tiers of legislation and policy in the UK.

All birds in the UK are protected under the EC Directive on the Conservation of Wild Birds 2009 (2009/147/EC)<sup>5</sup> and Part 1 Section 1(1) of the Wildlife and Countryside Act 1981 (as amended) . This gives protection to all species of wild bird from deliberate;

- killing, injuring or taking birds or their young and keeping in captivity;
- egg collecting or destroying eggs; and
- taking, damaging or destroying nests in use or being built.

<sup>4</sup> Protection of Badgers Act 1992. London: HMSO

<sup>5</sup> Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds. The European Parliament and Council of the European Union.

Specially protected birds are listed in Annex 1 of the Directive. Many are afforded protection by designation of land as Special Protection Areas (SPA). Special protection is also afforded to species listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). These birds are rare, endangered, declining or vulnerable species. In addition to the protection afforded to all bird species, it is an offence to cause reckless or intentional disturbance to the specially protected Schedule 1 listed species when they are building nests.

Bird species are also listed as species of principal importance for conservation in England under Section 41 of the Natural Environment and Rural Communities Act (2006) (NERC). Bird species listed under Section 41 of the NERC Act are to be given material consideration during planning.

### 3.7 Fish and Aquatic Invertebrates

EU Council Regulation 1100/2007<sup>6</sup>, more commonly known as the 'Eel Regulations', was adopted in September 2007 as part of international measures to arrest a rapid decline in global populations of the common eel (*Anguilla anguilla*). Following a sudden drop in numbers during the 1980s, eel populations across Europe have continued to fall at an alarming rate, to the point where the species is now classified as Critically Endangered by the International Union for the Conservation of Nature.

The EU Eel Regulations define the means by which EU member states will implement and monitor solutions to the problems that face their local eel populations. This implementation is now underway, with the development and delivery of Eel Management Plans. In the UK this is implemented through the Eels (England and Wales) Regulations 2009<sup>7</sup>. Each Eel Management Plan aims to reduce eel mortalities caused by human activity to a level where 40% of eels have a high probability of 'escapement' to the sea. The Eel Regulations suggest a number of methods to achieve this level of escapement, including restriction of commercial eel fishing, modification of man-made structures to improve eel passage, restocking measures and the deliberate transportation of eels from inland waters to areas where they can more easily access the sea.

Other species of fish and invertebrates found in fresh water receive legal protection under the Schedule 5 of Wildlife and Countryside Act 1981 (as amended), and additionally fish and invertebrate species listed under Section 41 of the NERC Act are to be given material consideration during planning.

### 3.8 Invasive Non-native Species

Due to their aggressive nature of establishment and spreading, for non-native plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) it is illegal to cause spread in the wild under the same Act, section 14(2). Although there is no statutory requirement for landowners to remove the plants from their property, it is an offence to plant or otherwise cause to grow in the wild.

Non-native animal species are also listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) and Section 14(1) of the WCA makes it illegal to release or allow to escape into the wild any animal which is not ordinarily resident in Great Britain and is not a regular visitor to Great Britain in a wild state, or is listed in Schedule 9 to the Act.

<sup>6</sup> COUNCIL REGULATION (EC) No 1100/2007 of 18 September 2007 establishing measures for the recovery of the stock of European eel. [http://www.dcalni.gov.uk/council\\_regulation\\_\\_ec\\_\\_no\\_1100-2007.pdf](http://www.dcalni.gov.uk/council_regulation__ec__no_1100-2007.pdf)

<sup>7</sup> The Eels (England and Wales) Regulations 2009. <http://www.legislation.gov.uk/uksi/2009/3344/contents/made>

## 4. Methodology

### 4.1 Desk study

The location of statutory designated sites within a 2km radius of the centre of the study area was determined using the <http://magic.defra.gov.uk> website.

Existing data of statutory and non-statutory designated sites for nature conservation and protected and/or notable species located within 2km of the study area (5 km for bats) were obtained from the Kent & Medway Biological Records Centre (KMBRC). Species records held by KMBRC arise from a broad range of surveys, including species-specific and formal surveys. Only records of protected species dated from within the last 15 years were considered in the baseline.

Data for fish and aquatic invertebrates was requested from the Environment Agency.

### 4.2 Phase 1 habitat survey

A field survey of the study area was undertaken on the 1st June 2015 by two ecologists from AECOM. The survey aimed to identify the broad habitats present within and adjacent to the FAS and the potential for these habitats to support protected or notable species.

### 4.3 Limitations

Due to barriers to access a short section of the western end of the proposed alignment of the embankment was surveyed from distance using binoculars. This is not considered to represent a significant constraint to the findings of the survey. Additionally, the banks of the Hilden Brook were overgrown with dense scrub and access to these areas was not possible. Whilst this area lies outside of the current alignment of the proposed FAS embankment, it remains a constraint as species of relevance to the wider area including the FAS embankment may be present.

## 5. Results

### 5.1 Statutory Designated Sites for Nature Conservation

There are no statutory designated sites for nature conservation within 2km of the centre of the study area.

### 5.2 Non-Statutory Designated Sites for Nature Conservation

There are two non-statutory designated Sites of Nature Conservation Importance (SNCI) within 2 km of the proposed embankment. These are East Tonbridge Copses & Dykes, which lies 1.8km east of the proposed FAS embankment and River Medway South of Leigh which lies 200m south of the embankment, but separated by a railway line. Their location relative to the study area is shown in Figure 1.

### 5.3 Protected or otherwise notable species – desk study

A table of desk study data of protected and notable species recorded within 2km of the study area is provided in Appendix A. No fish data were available within 2km of the study area, but data for the River Medway and nearest tributaries are presented in Appendix B.

Legally protected species under European or UK legislation and occurring within 2km of the study area boundary are listed in Table 1 below:

**Table 1. Legally protected species recorded within 2km of the Hildenborough FAS study area**

Common Name	Scientific Name	Distance and bearing of closest record
Eurasian badger	<i>Meles meles</i>	0.1 km E
Grass snake	<i>Natrix natrix</i>	0.1 km N
Water vole	<i>Arvicola amphibius</i>	0.2 km S
Adder	<i>Vipera berus</i>	0.4 km N
Leisler's bat	<i>Nyctalus leisleri</i>	0.6 km NE
Daubenton's bat	<i>Myotis daubentonii</i>	0.6 km S
Noctule bat	<i>Nyctalus noctula</i>	0.6 km SE
Common pipistrelle bat	<i>Pipistrellus pipistrellus</i>	0.6 km SE
Soprano pipistrelle bat	<i>Pipistrellus pygmaeus</i>	0.6 km SE
Brown long-eared bat	<i>Plecotus auritus</i>	0.7 km E
Slow-worm	<i>Anguis fragilis</i>	0.7 km N
Whiskered bat	<i>Myotis mystacinus</i>	0.9 km SE
Natterer's bat	<i>Myotis nattereri</i>	1.4 km NW
Hazel dormouse	<i>Muscardinus avellanarius</i>	1.4 km SW



Common Name	Scientific Name	Distance and bearing of closest record
Great crested newt	<i>Triturus cristatus</i>	1.8 km SW
Serotine bat	<i>Eptesicus serotinus</i>	2.0 km SW
Rough marsh mallow	<i>Althaea hirsuta</i>	Within 2km SW

There were also 33 legally protected species of birds recorded within 2 km of the study area along with 18 notable species – these are listed in Appendix A. Of these, the legally protected species most likely to occur as breeding species within 2km of the study area would be:

- Barn owl (*Tyto alba*) – within 1km of centre of FAS
- Kingfisher (*Alcedo atthis*) – within 2km of centre of FAS

## 5.4 Phase 1 survey

### 5.4.1 Habitats

The broad habitat types present within the study area are shown in Figure 2. Habitats present within and adjacent to the study area include amenity grassland, improved grassland, dense and scattered scrub, tall ruderal, swamp, semi-natural broadleaved woodland, mature and semi-mature broadleaved and coniferous trees, species poor hedgerows, dry ditches, standing and running water with marginal banksides and stands of invasive species.

At the north east extent of the study area a small section of broadleaved open woodland is present with species including ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*) and horse chestnut (*Aesculus hippocastanum*). To the south and west of the section of woodland lies scattered scrub; species include abundant common nettle (*Urtica dioica*) and false oat grass (*Arrhenatherum elatius*) with frequent apple trees (*Malus sp.*) representing a defunct orchard, bramble (*Rubus fruticosus*) and cow parsley (*Anthriscus sylvestris*) and occasional cleavers (*Galium aparine*), wood avens (*Geum urbanum*) and field bind weed (*Convolvulus arvensis*) (Plate 1). To the west of the scrub running down the edge of Watersfield Lane is a line of semi-mature ash and sycamore trees.



**Plate 1.** The north east corner of the study area showing scattered scrub (Facing North).

To the south of the scattered scrub is an area of occasionally managed (mown) poor semi-improved grassland (not grazed) (Plate 2) enclosed by dense scrub to the west and south and

by marginal vegetation to the east which borders Hilden Brook. Species present within the grassland include frequent annual meadow grass (*Poa annua*), cocksfoot (*Dactylis glomerata*) and Yorkshire fog (*Holcus lanatus*). The dense scrub contained hawthorn (*Crataegus monogyna*), immature ash, alder (*Alnus glutinosa*) and sycamore and abundant common nettle and cow parsley.



**Plate 2.** Area of poor semi-improved grassland managed by occasional mowing bordered by dense scrub. (Facing North East)

Marginal vegetation that could be seen running alongside the banks of Hilden brook included white dead nettle (*Lamium album*), common nettle, common osier (*Salix viminalis*), green alkanet (*Pentaglottis sempervirens*), creeping thistle (*Cirsium arvense*), garlic mustard (*Alliaria petiolata*), hedge bind weed (*Calystegia sepium*) and a horse tail species (*Equisetum* sp.) (Plate 3).

A stand of the invasive species Japanese knotweed (*Fallopia japonica*) was also observed along the bank of the brook (TN16) (Plate 3). Other stands may be present since it was not possible to thoroughly investigate the entirety of the bank due to dense vegetation. A small stand of the invasive species Indian balsam (*Impatiens glandulifera*) (TN33) was also observed further south along the bank of the brook to the south of a public footpath bridge.





**Plate 3.** Area of marginal vegetation alongside Hilden Brook. A stand of the invasive species Japanese knotweed can be seen in the centre of the picture. (Facing East)

To the south of the mown improved grassland the area is occupied by an AstroTurf covered tennis court enclosed by fencing and surrounded to the east by associated brick and wooden school owned buildings and hard standing pathways. Also to the east of the tennis court is an area of regularly mown amenity grassland (TN3) and scattered broadleaved trees including pedunculate oak (*Quercus robur*), ash, alder, and apple running alongside Hilden Brook (Plate 4).



**Plate 4.** Amenity grassland running along the west side of Hilden Brook east of the tennis court. Also shows associated school owned building, hard standing pathways, scattered broadleaved trees, marginal vegetation (Facing North)

A partial embankment is already present on site which runs along the south end of the tennis court (Plate 5) and is covered by amenity grassland (TN3). A managed species poor hedge also borders the tennis court to the south and west sides (Plate 5 and 6). The hedgerow species included hawthorn, holly (*Ilex aquifolium*) and garden privet (*Ligustrum sp.*).





**Plate 5.** Current embankment which runs along the south side of the tennis court and species poor hedgerow (Facing West)



**Plate 6.** Western edge of the tennis court with highly managed species poor hedgerow, amenity grassland school fields and fence line delineating the public footpath (Facing North)

The majority of the rest of the land east of Hawden Stream and west of the tennis court is made up of regularly mown species poor amenity grassland (TN3) (school sports fields) dominated by annual meadow grass with occasional perennial rye grass (*Lolium perenne*), white clover (*Trifolium repens*) and creeping buttercup (*Ranunculus repens*) (Plate 7).



**Plate 7.** Amenity grassland to the east of Hawden stream. Embankment to run along the boundary of the field to the right of the picture (Facing West).

An area of dense scrub with trees and tall ruderal vegetation is situated on the eastern bank of Hawden Stream. The dense scrub was not accessible, however species observed along the edge of the scrub area included hawthorn, crack willow (*Salix fragilis*), field maple (*Acer campestre*) and ivy (*Hedra helix*) (Plate 8). There is also a shallow ditch present within the section of tall ruderal and swamp vegetation, including meadowsweet (*Filipendula ulmaria*) and reed canary grass (*Phalaris arundinacea*) with little or no water present (Plate 9).



**Plate 8.** Tall ruderal and dense scrub area running along the eastern edge of Hawden Stream (Facing West)





**Plate 9.** Ditch running through the centre of the tall ruderal and swamp vegetation (South West)

Hawden Stream (Plate 10) was partially accessible from the western bank, which is situated within sheep grazed fields. The majority of the land on the western side of Hawden stream is comprised of sheep grazed improved grassland dominated by annual meadow grass, with occasional creeping thistle (Plate 11). The eastern bank is characterised by a line of trees including pedunculate oak, ash, field maple and crack willow. Two dry ditches with soft rush (*Juncus effusus*) also run through the field to the south east of the proposed embankment, the ditches running east to west with a third dry ditch running along the south western boundary of the field. The south western boundary is also bordered by a row of mature pedunculate oaks.



**Plate 10.** Hawden Stream viewed from the western bank at the location of a proposed embankment crossing





**Plate 11.** Sheep grazed improved grassland fields, surrounded by sheep fencing. The south western edge of the field is bordered by mature oaks (Facing South West)

To the north of the proposed embankment at the western end lies a rural private property (converted oast houses and outbuildings). An associated garden consisting of amenity grassland was not fully assessed for plant species as the land was not accessible. Within the property boundary was also a water body (Plate 12) which lies within 10 m of the proposed embankment.



**Plate 12.** Private property with amenity grassland and waterbody (Facing West)

The field to the west of the line of mature oaks (TN28) is also improved grassland, but was not being grazed. A railway line runs along the south western boundary of the study area and a dry ditch with reedmace (*Typha latifolia*) flows along the northern boundary of the improved grassland and immediately south of the private property and pond. The ditch continues to the railway embankment. The railway embankment was covered with dense scrub. This section of land was assessed from the line of mature oaks (TN28) due being inaccessible and therefore species composition was not fully assessed (Plate 13).





**Plate 13.** View of improved grassland and scrub covered railway embankment from the line of mature oak trees (TN28) (Facing West).

#### 5.4.2 *Protected and/or notable species*

##### *Great crested newt*

An area of standing water (garden pond) (TN 27) within a private property 10m north of the proposed embankment has the potential to support great crested newt.

The mosaic of terrestrial habitat associated with the above water-body, namely the dry ditches, un-grazed grassland, hedge and dense scrub are considered to hold some potential for terrestrial foraging and hibernation habitat for great crested newt.

Hawden Stream and Hilden Brook are not considered to have potential to support great crested newt due to the moving water flow within the streams. Flowing water discourages great crested newts.

Results from the desk study show that great crested newts have been recorded within 2 km of the study area as recently as 2012, but that no records exist within 1.8km of the study area.

##### *Bats*

Linear natural features recorded on site including tree lines, the streams, scrub along the railway embankment and bordering the stream and hedgerows that border the study area offer suitable commuting habitat for bats. Water-bodies, scrub and grassland habitats on site offer optimal foraging habitat for bats. There are several mature trees within the footprint of the proposed embankment which could have potential to support roosting bats.

Nine species of bats were returned within the desk study as being recorded within 2 km of the study area.

##### *Water vole*

Due to the dense scrub around the majority of Hawden Stream and the dense marginal vegetation on the banks of Hilden Brook, large sections of bank could not be assessed for water vole potential on this initial visit. However the desk study returned a record for water vole in Hawden Stream, in 2013, 0.2 km south of the boundary of the proposed embankment. Bank profiles observed ranged from steep sided to gradual slopes, and the extent of marginal

vegetation was variable. Therefore it is likely that water vole could be present.

#### *Common reptiles*

The mosaic of habitats including dense and scattered scrub, tall ruderal, and marginal vegetation in particular, on the banks of Hilden brook, located in the north east section of the study area are considered suitable to support common reptiles, namely slow worm and grass snake.

Additionally other areas of the study area such as the railway embankment which runs immediately adjacent to the west of the study area provide potential habitat and commuting opportunities for reptiles.

Grass snake is the reptile recorded closest to the study area within the desk study at 0.1 km N of the proposed embankment. A single record of an adder was also recorded 0.4 km N of the proposed embankment.

#### *Breeding and wintering birds*

Semi mature and mature trees, hedgerows and dense and scattered scrub located throughout the study area provide suitable foraging or roosting sites for common breeding bird species.

Hilden Brook may provide foraging and breeding areas for Kingfisher (*Alcedo atthis*) which has been recorded within 2 km of the site as recent as 2013.

Although 51 protected and notable bird species have been recorded within 2km of the study area, the majority of these would be unlikely to breed along the line of the proposed embankment or immediately adjacent to it. However, areas of scrub and aquatic habitats could provide nesting opportunities for some species such as grasshopper warbler (*Locustella naevia*), lesser redpoll (*Carduelis cabaret*) and spotted flycatcher (*Muscicapa striata*), whilst barn owls may hunt in the wider area.

#### *Badger*

Badger has been recorded previously within 0.1 km of the proposed embankment. However during the walk over survey no setts, snuffle holes or other signs of badger were found. The site has potential to support foraging badgers, however it is thought that there is negligible potential to support badger setts within accessible parts of the study area, since suitable areas of banked earth were not observed.

#### *Fish and aquatic invertebrates*

During the Phase 1 survey, no signs of fish or aquatic invertebrates were noted. The Hilden Brook, appeared to have greater flow than the Hawden Stream and was thus considered more likely to support fish species.

Ecological desk study data has indicated the recent presence of non-native signal crayfish (*Pacifastacus leniusculus*) within the Hilden Brook immediately upstream of the Phase 1 survey area.

## 6. Discussion and Recommendations

In the absence of a detailed design for the FAS it is not yet possible to provide firm recommendations on what further ecology inputs will be required.

The following section therefore identifies potential impacts of the FAS on ecological features. Recommendations are also given for further survey work which may be required to develop a robust ecological baseline. Depending on the details of the FAS, some of these studies may not prove to be necessary.

### 6.1 Potential impacts

#### *Designated sites*

There would be no likely effects on non-designated sites as a result of the proposed works.

#### *Habitats*

Due to the linear nature and narrow footprint of the proposed FAS the potential direct impacts on habitats are limited. No significant habitat severance is anticipated as a result of the current proposed alignment. The only habitat severance that requires further consideration based on the current alignment is the crossing of the Hawden Stream. The scheme is understood to include the creation of a structure that would allow continued water flow and fish passage and this will need to be designed such that it is appropriate for European eel. Assuming this takes place, no adverse effects on the habitat would be expected provided that standard construction practices are followed in order to avoid pollution of the water course.

Standard construction practices should also be followed for work in close proximity to the Hilden Brook, in order to avoid pollution of the water course.

Such practices should be stipulated in a Construction Environment Management Plan (CEMP) and would include:

- plans for waste management;
- commitments to maintain all plant;
- use of biodegradable oil;
- storage of fuel securely;
- any re-fuelling of vehicles in designated areas;
- education of workers; and
- carrying of spill kits.

The construction of an embankment would lead to temporary loss of terrestrial habitats, including dense scrub, scattered scrub, tall ruderal and improved grassland. However, there are also opportunities to enhance the existing habitat through the planting of herbaceous species on or near to the embankment with native species appropriate to the locality. Loss of areas of scrub should be minimised by keeping the embankment as narrow as possible through such habitat.

Loss of areas of scrub and trees should be offset by planting in proximity to the embankment with native scrub species such as hawthorn and blackthorn (*Prunus spinosa*) in order to provide continuity with surrounding habitat.

In areas of grassland on or adjacent to the FAS embankment, an appropriate wildflower seed mix from a supplier such as Wildseed should be sown in order to create a habitat feature of value to invertebrates, reptiles and birds. As an example of a diverse, general wildflower mix Wildseed mix EM3 (Special General Purpose Meadow Mixture) would contain an appropriate mix of

species<sup>8</sup>.

The Environment Agency have noted that there may be opportunities for pond creation to the south of the proposed FAS alignment in an area that currently comprises tall ruderal habitat. If this enhancement measure were to be adopted it would be important to agree a management plan to ensure long-term ecological value of such a feature.

Additionally, the margins of the Hilden Brook have become choked with scrub and invasive non-native species are present. There are opportunities to enhance the environment adjacent to the FAS embankment through thinning of the scrub along the Brook, and through eradication of invasive non-native Japanese knotweed and Indian balsam (see section below for invasive species). A management plan should be developed to address enhancements along the Hilden Brook.

### *Protected and/or notable species*

#### Great crested newt

The great crested newts are generally considered to travel up to 250m from breeding ponds<sup>9</sup> through terrestrial habitat may extend up to 500m (the accepted maximum roaming distance) where optimal habitat exists. The closest record of great crested newt to the study area is 1.8km. The pond identified on site was considered to have average potential to support great crested newts according to a Habitat Suitability Index undertaken (TN27)<sup>10</sup>. Surrounding terrestrial habitat was considered to be of limited value to great crested newts as the majority was short mown or grazed grassland, although the presence of seasonally inundated ditches and bank sides does provide some foraging and hibernating potential.

In order to provide confidence of the absence of great crested newts from this pond it is recommended that a single visit is made to the site in order to take water samples for analysis for the presence or absence of environmental DNA (eDNA) in accordance with recommended guidelines<sup>11</sup>. If the analysis proves negative this would be considered sufficiently robust by Natural England that no further great crested newt survey would be required.

#### Bats

##### *Bat roosting habitats*

On confirmation of the design and associated working areas, a review of the requirement for initial bat roost potential assessment of all suitable trees within the study area boundary should be undertaken by an ecologist. If the FAS will require the removal of mature or semi-mature trees then it will be necessary to undertake a bat roost potential survey of all affected trees above 0.25m diameter at breast height. This survey should also include all such trees located adjacent to works that have the potential to result in disturbance.

If the design of the FAS does not involve any disturbance to, or loss of any trees or potential commuting features on site, and appropriate working methods are put in place (e.g. directed construction lighting away from potential roosts and foraging/commuting areas), then no impacts on bats are likely to occur. However if intrusive works to any features suitable to support bats are required, then it will be necessary to undertake a detailed inspection of any features present to confirm the suitability of the structure to support roosts. Bat roost potential assessment surveys for structures can be conducted at any time of the year.

In the event that features potentially suitable to support roosting bats are located within trees scheduled to be subject to works then emergence surveys may be required to confirm the

<sup>8</sup> <http://wildseed.co.uk/mixtures/view/4>

<sup>9</sup> Langton, T.E.S., Beckett, C.L., and Foster, J.P. (2001), Great Crested Newt Conservation Handbook, Froglife, Halesworth.

<sup>10</sup> ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index May 2010

<sup>11</sup> Natural England and DEFRA (2015). Great crested newts: surveys and mitigation for development projects <https://www.gov.uk/great-crested-newts-surveys-and-mitigation-for-development-projects>

presence / absence of bats. These follow on surveys should be conducted during the period May to September when bats are active.

#### *Bat foraging and commuting habitats*

Although bats are likely to utilise the study area for commuting and foraging it is not considered that the alignment of the works would lead to severance or loss of significant linear features and therefore bat activity surveys are not recommended as being required. .

#### Otter

The Hilden Brook within the study area is considered to provide potentially suitable foraging and commuting habitat for otter but the shallow and narrow nature of the water courses mean that it is unlikely to provide significant attraction for resting sites or holts.

In this case a full survey of watercourses within the study site for otter is not considered necessary given the limited suitability of habitat for holts or resting places and the limited requirement for works adjacent to the Hilden Brook where suitable habitat exists.

#### Water vole

It is understood that the Environment Agency have undertaken a survey of the Hilden Brook and Hawden Stream on 30<sup>th</sup> June 2015, and found no evidence of water vole. Therefore no further survey is recommended.

#### Reptiles

The desk study data from KMBRC included records for reptile species. The alignment of the proposed FAS includes an area of scattered scrub in the north east of the study area that is assessed as having potential to support reptile species. Surveys are therefore recommended to determine presence or absence of species within the study area.

Surveys should be undertaken between when reptile species are active, and weather conditions suitable for survey (generally April-May and September-October) and should consist of 7 survey visits to determine presence/absence. This should involve the placement of and subsequent checking of artificial refugia (corrugated metal sheets and felt mats), which reptiles use for basking and shelter.

It is however noted that the EA consider that *“once the design of the embankment and access routes are known, then likely areas of impact can be cleared of scrub over winter 2015/16 and kept unfavourable for reptiles until works are complete.”*

This alternative approach, if undertaken in a manner that avoids killing or injuring of reptiles, could be followed, and may obviate the need for survey, unless such survey is requested as part of any planning application.

#### Birds

The habitats within close proximity to the study area are suitable to support breeding, bird species. Depending on the nature and extent of the proposed works, there is the potential for works to lead to the loss of breeding and foraging habitat and destruction or disturbance of active nests.

It is therefore recommended that site wide surveys for breeding birds are conducted to inform the proposed works and assess any mitigation requirements.

It is however noted that the EA consider that *“once the design of the embankment and access routes are known, likely areas of impact can be cleared of scrub over winter 2015/16. The two*



*areas of scrub with trees...can be managed for wildlife including birds following construction. “*

This alternative approach would avoid causing an offence under the Wildlife and Countryside Act (1981, as amended) through destruction of active bird nests and may obviate the need for survey, unless such survey is requested as part of any planning application.

Breeding bird surveys would require five survey visits to be undertaken from the start of April to the end of June in order to ensure recording of all bird species present and utilising the study area across the peak breeding season. A set survey transect would be devised to allow observation of all major areas of habitat within and adjacent to the proposed areas of activity and all bird species heard or seen subsequently recorded.

#### Badgers

Signs of badgers were absent within the parts of the study area that were accessible during the Phase 1 survey. Scrub and woodland habitat on site provides suitable foraging habitat for badger and has the potential to support badger setts. If present within the study area, works have the potential to adversely affect badgers, their setts and associated foraging habitats.

Areas that are currently inaccessible for survey could theoretically harbour badger setts. However, this will only become apparent during any vegetation clearance to be undertaken during construction. Therefore at the time of construction of the FAS, an ecologist should be consulted to provide an ecological briefing including to contractors including coverage of signs of badger presence and steps to be taken if badger setts are located (primarily to stop works and arrange for an ecologist to visit the site).

#### Aquatic invertebrates

Aquatic invertebrate communities may be present along the Hilden Brook and Hawden Stream, and although the currently proposed FAS is unlikely to result in large loss of aquatic habitats, the fact that the scheme will involve crossing of water bodies leads to the conclusion that a survey to characterise the aquatic invertebrate community is recommended in order to determine presence of any protected or notable species. Such a survey may be required by the local planning authority to inform any planning application. Ecological desk study data has indicated the recent presence of non-native signal crayfish (*Pacifastacus leniusculus*) within the Hilden Brook immediately upstream of the Phase 1 survey area. Although eradication of this invasive, non-native species is recommended, the presence of signal crayfish should not pose constraints to the undertaking of the FAS construction, as the works should not lead to further spread of this species.

#### Fish

The ecological desk study data for the River Medway and tributaries closest to the FAS (see Appendix B) indicates that the value of the study area of protected and notable species is limited. Few records of European eel were obtained, and although the legally protected bullhead (*Cottus gobio*) and notable brown/ sea trout (*Salmo trutta*) were present in desk study data, the turbid, muddy and sluggish nature of the Hawden Stream do not appear to be suitable for these species.

The FAS would only currently have potential effects on fish species through the crossing of the Hawden Stream or any works adjacent to the Hilden Brook that would result in significant vibration through the water body that would adversely affect species present.

The FAS is committed to including a suitable fish passage structure where the proposed embankment would cross the Hawden Stream and the design of this will be explored further in the design of the FAS. It will need to be ensured that any control structure is passable by European eel.

## Invasive non-native plant species

The Phase 1 survey has identified the presence of Japanese knotweed and Indian balsam alongside the Hilden Brook within the study area but currently outside the alignment of the proposed FAS embankment. Access to the banks of the Hilden Brook was restricted due to presence of dense scrub.

At present a more detailed assessment of the presence of these species along the Brook is restricted due to dense scrub presence. It is recommended that as part of an enhancement program associated with the FAS embankment construction, access to the Brook should be initially obtained through vegetation clearance by contractors trained in recognition and avoidance of spread of Japanese knotweed, such that an ecologist can accurately map and quantify the presence of the invasive species.

This will then inform the avoidance of invasive species during the construction of the FAS embankment, and the eradication of these species as part of a wider enhancement package.

As a general guide for Japanese knotweed the area within a 7m radius of above ground material and to a depth of 2m should be considered potentially infected. All material from the infected area should be classed as contaminated waste, and if treatment is required, be disposed of either off site at a licensed facility, or on site. Treatment options would involve using herbicidal treatment, potentially followed by storage in a bund or by burial either on or offsite. Environment Agency guidance<sup>12</sup> recommends that chemical control using a bioactive formulation of glyphosate approved for use in or near water is the most effective treatment near water.

For Indian balsam, where required, Environment Agency recommendations are that control measures should aim to prevent flowering, and are best carried out before June for maximum effectiveness. Chemical control near water can be carried out with herbicides containing glyphosate or 2,4-D amine. Glyphosate will also kill grasses, but 2,4-D amine will kill only broad-leaved weeds; for best effect, use when the plant is small and actively growing, particularly in springtime. Cutting, strimming or pulling on a regular basis for about three years will be effective and may even eradicate the plant from isolated sites. Plants must be cut below the lowest node to avoid re-flowering.

## 6.2 Summary of further surveys

A summary of surveys recommended for the study area are provided below.

**Table 2. Summary of further ecology surveys recommended**

Species/habitat	Survey period	Comments
Water vole presence/absence	April and September	Hilden Brook and Hawden Stream
Breeding birds	April to June	Entire site
Great crested newt presence/absence (eDNA method)	June	Pond on site

<sup>12</sup> Environment Agency (2010). Managing Invasive Non-native Plants. [www.nonnativespecies.org/downloadDocument.cfm?id=1010](http://www.nonnativespecies.org/downloadDocument.cfm?id=1010)



Species/habitat	Survey period	Comments
Reptile presence/absence	April/May and/or September	Areas of dense and scattered scrub, and tall ruderal habitat
Bat roost potential assessment	January to December	Semi mature and mature trees located throughout the site
Aquatic invertebrates	April to September	Hilden Brook and Hawden Stream
Invasive plants	April to October	Hilden Brook and Hawden Stream

# Appendix A – Desk study records of protected and notable species

Data obtained from Kent and Medway Biodiversity Records Centre (KMBRC) within 2km of study area boundary (5km for bat records). (\* legally protected)

Common name	Scientific name	Date of last record
<b>Mammals</b>		
Brown long-eared bat*	<i>Plecotus auritus</i>	2006
Common pipistrelle bat*	<i>Pipistrellus pipistrellus</i>	2014
Daubenton's bat*	<i>Myotis daubentonii</i>	2010
Eurasian badger*	<i>Meles meles</i>	2011
European water vole*	<i>Arvicola amphibius</i>	2013
Hazel dormouse*	<i>Musccardinus avellanarius</i>	2011
Leisler's bat*	<i>Nyctalus leisleri</i>	2006
Nathusius' pipistrelle bat*	<i>Pipistrellus nathusii</i>	2013
Natterer's bat*	<i>Myotis nattereri</i>	2004
Noctule bat*	<i>Nyctalus noctula</i>	2004
Serotine bat*	<i>Eptesicus serotinus</i>	2002
Soprano pipistrelle bat*	<i>Pipistrellus pygmaeus</i>	2014
Whiskered bat*	<i>Myotis mystacinus</i>	2014
<b>Reptiles &amp; Amphibians</b>		
Adder*	<i>Vipera berus</i>	2004
Common frog	<i>Rana temporaria</i>	2013
Common toad	<i>Bufo bufo</i>	2005
Grass snake*	<i>Natrix natrix</i>	2010
Great crested newt*	<i>Triturus cristatus</i>	2012
Palmate newt	<i>Lissotriton helveticus</i>	2013
Slow-worm*	<i>Anguis fragilis</i>	2011
Smooth newt	<i>Lissotriton vulgaris</i>	2011
<b>Birds</b>		
Arctic tern*	<i>Sterna paradisaea</i>	2013
Barn owl *	<i>Tyto alba</i>	2011
Barnacle goose*	<i>Branta leucopsis</i>	2013
Bittern*	<i>Botaurus stellaris</i>	2006

Common name	Scientific name	Date of last record
Black kite*	<i>Milvus migrans</i>	2009
Black redstart*	<i>Phoenicurus ochruros</i>	2008
Black-throated diver*	<i>Gavia arctica</i>	2006
Brambling*	<i>Fringilla montifringilla</i>	2012
Brent goose	<i>Branta bernicla</i>	2007
Common crossbill*	<i>Loxia curvirostra</i>	2012
Common tern	<i>Sterna hirundo</i>	2012
Curlew	<i>Numenius arquata</i>	2001
Fieldfare*	<i>Turdus pilaris</i>	2012
Firecrest*	<i>Regulus ignicapillus</i>	2008
Golden plover*	<i>Pluvialis apricaria</i>	2012
Grasshopper warbler	<i>Locustella naevia</i>	2008
Great white egret*	<i>Egretta alba</i>	2012
Green sandpiper*	<i>Tringa ochropus</i>	2012
Greenshank*	<i>Tringa nebularia</i>	2009
Hawfinch	<i>Coccothraustes coccothraustes</i>	2006
Hen harrier*	<i>Circus cyaneus</i>	2005
Herring gull	<i>Larus argentatus</i>	2012
Honey buzzard*	<i>Pernis apivorus</i>	2008
Hoopoe*	<i>Upapa epops</i>	2012
House sparrow	<i>Passer domesticus</i>	2012
Kingfisher*	<i>Alcedo atthis</i>	2013
Lesser redpoll	<i>Carduelis cabaret</i>	2012
Lesser-spotted woodpecker	<i>Dendrocopus minor</i>	2001
Linnet	<i>Carduelis cannabina</i>	2011
Little egret*	<i>Egretta garzetta</i>	2013
Little gull*	<i>Larus minutus</i>	2005
Little ringed plover*	<i>Charadrius dubius</i>	2008
Marsh harrier*	<i>Circus aeruginosus</i>	2012
Marsh tit	<i>Parus palustris</i>	2011
Peregrine*	<i>Falco peregrinus</i>	2003
Red kite*	<i>Milvus milvus</i>	2010
Red-breasted goose*	<i>Branta ruficollis</i>	2012

Common name	Scientific name	Date of last record
Redwing*	<i>Turdus iliacus</i>	2012
Ring ouzel	<i>Turdus torquatus</i>	2001
Scaup*	<i>Aythya marila</i>	2006
Short-eared owl*	<i>Asio flammeus</i>	2012
Spotted flycatcher	<i>Muscicapa striata</i>	2011
Starling	<i>Sturnus vulgaris</i>	2012
Tree pipit	<i>Anthus trivialis</i>	2012
Turtle dove	<i>Streptopelia turtur</i>	2008
Whimbrel*	<i>Numenius phaeopus</i>	2006
White stork*	<i>Ciconia ciconia</i>	2011
Woodlark*	<i>Lullula arborea</i>	2011
Wryneck*	<i>Jynx torquilla</i>	2009
Yellow wagtail	<i>Motacilla flava</i>	2010
Yellowhammer	<i>Emberiza citrinella</i>	2012
<b>Plants and fungi</b>		
Boletus legaliae	<i>Boletus legaliae</i>	2014
Early Meadow-grass	<i>Poa infirma</i>	2013
Elongated Sedge	<i>Carex elongata</i>	2011
Fringed water-lily	<i>Nymphoides peltata</i>	2004
Little-robin	<i>Geranium purpureum</i>	2012
Narrow-leaved water-dropwort	<i>Oenanthe silaifolia</i>	2010
Rough marsh-mallow*	<i>Althaea hirsuta</i>	2004
Shepherd's-needle	<i>Scandix pecten-veneris</i>	2010
True Fox-sedge	<i>Carex vulpina</i>	2013
<b>Invertebrates</b>		
Anaglyptus mysticus	<i>Anaglyptus mysticus</i>	2004
Criorhina ranunculi	<i>Criorhina ranunculi</i>	2000
Didineis lunicornis	<i>Didineis lunicornis</i>	2005
Dolichovespula (Dolichovespula) media	<i>Dolichovespula</i> <i>(Dolichovespula) media</i>	2007
Eupeodes nielsenii	<i>Eupeodes nielsenii</i>	2009
Girdled mining bee	<i>Andrena (Poecilandrena)</i> <i>labiata</i>	2009
Hylaeus (Abrupta) Cornutus	<i>Hylaeus (Abrupta)</i> <i>cornutus</i>	2004
Hypera (Dapalinus) meles	<i>Hypera (Dapalinus) meles</i>	2010

Common name	Scientific name	Date of last record
Lasioglossum (Evylaeus) Malachurum	<i>Lasioglossum (Evylaeus) malachurum</i>	2006
Lasioglossum (Evylaeus) Pauxillum	<i>Lasioglossum (Evylaeus) pauxillum</i>	2005
Lasioglossum (Evylaeus) Puncticolle	<i>Lasioglossum (Evylaeus) puncticolle</i>	2005
Lime beetle	<i>Stenostola dubia</i>	2007
Melandrya caraboides	<i>Melandrya caraboides</i>	2006
Nomada fucata	<i>Nomada fucata</i>	2005
Quedius (Microsaurus) Scitus	<i>Quedius (Microsaurus) scitus</i>	2010
Tasgius (Tasgius) pedator	<i>Tasgius (Tasgius) pedator</i>	2007
Volucella inanis	<i>Volucella inanis</i>	2005

## Appendix B – Fish and Aquatic Invertebrate Survey Records from the Environment Agency

Data obtained from the Environment Agency on fish surveys for the Hildenborough and Tonbridge area. Data from Sovereign Way, Tonbridge (TQ5918546207) from the River Medway. (\* legally protected)

Common name	Scientific name	Date of Survey				
		01/09/2010	14/09/2011	02/08/2012	11/09/2013	04/09/2014
3-spined stickleback	<i>Gasterosteus aculeatus</i>	0	0	0	1	0
Bleak	<i>Alburnus alburnus</i>	67	13	0	22	12
Bullhead*	<i>Cottus gobio</i>	7	0	5	12	1
Chub	<i>Leuciscus cephalus</i>	27	12	7	28	31
Common bream	<i>Abramis brama</i>	21	5	1	4	4
Dace	<i>Leuciscus leuciscus</i>	25	3	1	12	8
European eels* > elvers	<i>Anguilla anguilla</i>	2	0	0	1	0
Gudgeon	<i>Gobio gobio</i>	14	3	2	59	32
Minnow	<i>Phoxinus phoxinus</i>	11	0	1	74	8
Perch	<i>Perca fluviatilis</i>	28	24	12	27	36
Pike	<i>Esox lucius</i>	10	7	11	10	3
Roach	<i>Rutilus rutilus</i>	352	100	94	383	161
Roach x common bream hybrid	<i>Rutilus rutilus x Abramis brama</i>	0	0	0	5	0

Common name	Scientific name	Date of Survey				
Ruffe	<i>Gymnocephalus cernuus</i>	1	1	1	6	1
Silver bream	<i>Abramis bjoerkna</i>	0	0	0	8	1
Tench	<i>Tinca tinca</i>	0	2	0	0	1

Data obtained from the Environment Agency on fish surveys for the Hildenborough and Tonbridge area. Data from Stidolphins Farm (TQ5396049850) and upstream of Bid Bridge (TQ5532847475) from Weald Bid stream.

Common name	Scientific name	Date of Survey	
		05/05/11	17/05/11
3-spined stickleback	<i>Gasterosteus aculeatus</i>	0	1
Brown / Sea trout	<i>Salmo trutta</i>	31	7
Chub	<i>Leuciscus cephalus</i>	0	17
Dace	<i>Leuciscus leuciscus</i>	0	10

Invertebrate data was obtained for grid reference TQ585473, which lies immediately adjacent to the Phase 1 survey area upstream along the Hilden Brook. Data sets have been collected regularly between 1990 and 2014. A maximum of 26 taxa have been recorded during any one survey, with no notable or legally protected species noted (Wildlife and Countryside Act (1981, as amended), or NERC s41). However on 21<sup>st</sup> October 2014, two signal crayfish (*Pacifastacus leniusculus*), a non-native species listed on Schedule 9 of the Wildlife and Countryside Act (1981, as amended) were recorded at this location.

## Appendix C – Target Notes from Phase 1 Survey

Target Note	Description
TN 1	<p><b>Hilden Brook</b> - Stream with flow to the North (low to moderate). Water depth is around 1ft, with a combination of steep sides and gently sloping bank profiles.</p> <p><b>Aquatic species:</b> water lily sp. (<i>Nymphaeaceae</i> sp.)</p> <p><b>Marginal/Tall Ruderal species:</b> white dead nettle (<i>Lamium album</i>), Leyland cypress (<i>Cupressus × leylandii</i>), sycamore (<i>Acer pseudoplatanus</i>), elder (<i>Sambucus nigra</i>), dog rose (<i>Rosa canina</i>), ground ivy (<i>Glechoma hederacea</i>), green alkanet (<i>Pentaglottis sempervirens</i>), creeping thistle (<i>Cirsium arvense</i>), alder (<i>Alnus glutinosa</i>), ivy (<i>Hedera helix</i>), cocksfoot (<i>Dactylis glomerata</i>), ash (<i>Fraxinus excelsior</i>), hawthorn (<i>Crataegus monogyna</i>), common osier (<i>Salix viminalis</i>), common nettle (<i>Urtica dioica</i>), cow parsley (<i>Anthriscus sylvestris</i>), garlic mustard (<i>Alliaria petiolata</i>), wood avens (<i>Geum urbanum</i>), bramble (<i>Rubus fruticosus</i>), barren brome (<i>Bromus sterilis</i>), horsetail sp. (<i>Equisetum</i> sp.), hedge bindweed (<i>Calystegia sepium</i>), false oak grass (<i>Arrhenatherum elatius</i>), cleavers (<i>Galium aparine</i>), pedunculate oak (<i>Quercus robur</i>).</p>
TN 2	<p><b>Pedunculate oak</b> (<i>Quercus robur</i>): two callus rolls at three metres and five metres facing west. Potentially sealed? Low roost potential.</p> <p><b>Ash</b> (<i>Fraxinus excelsior</i>): 20 metres tall and 50 centimetres diameter at breast height. Low roost potential</p>
TN 3	<p><b>Amenity grassland – Mown:</b> smooth sow thistle (<i>Sonchus oleraceus</i>), white clover (<i>Trifolium repens</i>), perennial rye grass (<i>Lolium perenne</i>), shepherd's purse (<i>Capsella bursa-pastoris</i>), annual meadow grass (<i>Poa annua</i>), knotgrass sp. (<i>Polygonum</i> sp.), greater plantain (<i>Plantago major</i>), creeping buttercup (<i>Ranunculus repens</i>), pineappleweed (<i>Matricaria discoidea</i>), ribwort plantain (<i>Plantago lanceolata</i>), yarrow (<i>Achillea millefolium</i>), common daisy (<i>Bellis perennis</i>), dove's-foot cranesbill (<i>Geranium molle</i>), common field-speedwell (<i>Veronica persica</i>), spotted medick (<i>Medicago arabica</i>).</p>

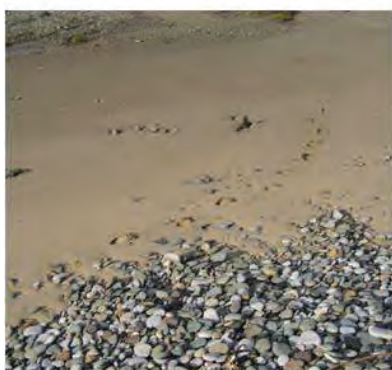
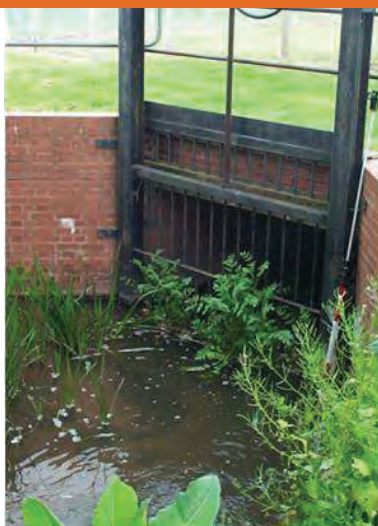
Target Note	Description
TN 4	<b>Pedunculate oak</b> ( <i>Quercus robur</i> ): 20 metres tall and 50 centimetres at breast height. Tree is ivy ( <i>Hedera helix</i> ) clad. Low roost potential.
TN 5	<b>Alder</b> ( <i>Alnus glutinosa</i> ): 20 centimetres diameter at breast height. The tree is ivy ( <i>Hedera helix</i> ) clad. Low roost potential.
TN 6	<b>Apple</b> ( <i>Malus sp.</i> ): 15 metres tall and between 25-30 centimetres diameter at breast height. There was no obvious access for bats observed during the Phase 1. Negligible potential for roosts.
TN 7	<b>Ash</b> ( <i>Fraxinus excelsior</i> ): Tree is between 25-30 centimetres diameter at breast height and ivy ( <i>Hedera helix</i> ) clad. Low roost potential.
TN 8	<b>Lawson's/Leyland cypress</b> ( <i>Chamaecyparis lawsoniana</i> / <i>Cupressus × leylandii</i> ): Tree was numbered: 0843 and was 80 centimetres diameter at breast height. There was no obvious access for bats observed during the Phase 1. Negligible potential for roosts.
TN 9	<b>Ash</b> ( <i>Fraxinus excelsior</i> ): Tree is 50 centimetres diameter at breast height and ivy ( <i>Hedera helix</i> ) clad. Low roost potential.
TN 10	<b>Dense scrub</b> : hawthorn ( <i>Crataegus monogyna</i> ), bramble ( <i>Rubus fruticosus</i> ), common nettle ( <i>Urtica dioica</i> ).
TN 11	<b>Hedge</b> : managed, native, species poor hedge – 0.5 metres by 0.5 metres. hawthorn ( <i>Crataegus monogyna</i> ), holly ( <i>Ilex aquifolium</i> ), garden privet ( <i>Ligustrum ovalifolium</i> ), common lime ( <i>Tilia × europaea</i> ).
TN 12	<b>Common lime</b> ( <i>Tilia × europaea</i> ): Tree is 20 centimetres diameter at breast height. Negligible roost potential.
TN 13	<b>Hedge</b> : short section of managed hawthorn ( <i>Crataegus monogyna</i> ) hedge along a property line adjacent to Watersfield Lane.
TN 14	<b>Leyland cypress</b> ( <i>Cupressus × leylandii</i> ): short section of managed Leyland cypress ( <i>Cupressus × leylandii</i> ) along a property line adjacent to the school fields.
TN 15	<b>Improved grassland – Mown</b> : cow parsley ( <i>Anthriscus sylvestris</i> ), creeping buttercup ( <i>Ranunculus repens</i> ), cocksfoot ( <i>Dactylis glomerata</i> ), Yorkshire fog ( <i>Holcus lanatus</i> ), dandelion ( <i>Taraxacum officinale</i> ), annual meadow grass ( <i>Poa annua</i> ), common sorrel ( <i>Rumex acetosa</i> ), yarrow ( <i>Achillea millefolium</i> ), broad-leaved dock ( <i>Rumex obtusifolius</i> ), sweet vernal grass ( <i>Anthoxanthum odoratum</i> ).
TN 16	<b>Japanese knotweed</b> ( <i>Fallopia japonica</i> ): A moderate stand of Japanese knotweed ( <i>Fallopia japonica</i> ) was observed growing along the banks of Hilden brook, opposite the mown improved grassland (TN15). There may have been more stands along Hilden brook, however, if there, these were not observed due to the dense marginal/tall ruderal vegetation along the banksides. The entirety of the brook was not accessible for surveying.
TN 17	<b>Dense scrub/Tall ruderal</b> : common nettle ( <i>Urtica dioica</i> ), cow parsley ( <i>Anthriscus sylvestris</i> ), alder ( <i>Alnus glutinosa</i> ), sycamore ( <i>Acer pseudoplatanus</i> ), hawthorn ( <i>Crataegus monogyna</i> ), hedge bedstraw ( <i>Galium mollugo</i> ), willowherb sp. ( <i>Epilobium sp.</i> ), ash ( <i>Fraxinus excelsior</i> ), ground ivy ( <i>Glechoma hederacea</i> ).
TN 18	<b>Scattered scrub (defunct orchard)</b> : common nettle ( <i>Urtica dioica</i> ), apple ( <i>Malus sp.</i> ), cow parsley ( <i>Anthriscus sylvestris</i> ), bramble ( <i>Rubus fruticosus</i> ), false oat grass ( <i>Arrhenatherum elatius</i> ), curled dock ( <i>Rumex crispus</i> ), ash ( <i>Fraxinus excelsior</i> ), pedunculate oak ( <i>Quercus robur</i> ), wood avens ( <i>Geum urbanum</i> ), Yorkshire fog ( <i>Holcus lanatus</i> ), cleavers ( <i>Galium aparine</i> ), sycamore ( <i>Acer pseudoplatanus</i> ), bindweed ( <i>Convolvulus arvensis</i> ), common hogweed ( <i>Heracleum sphondylium</i> ), spear thistle ( <i>Cirsium vulgare</i> ), rough meadow grass ( <i>Poa trivialis</i> ), green alkanet ( <i>Pentaglottis sempervirens</i> ), creeping buttercup ( <i>Ranunculus repens</i> ), meadow buttercup ( <i>Ranunculus acris</i> ), vetch sp. ( <i>Vicia sp.</i> ), male fern ( <i>Dryopteris filix-mas</i> ), hazel ( <i>Corylus avellana</i> ).
TN 19	<b>Woodland</b> : Open woodland alongside Hilden brook. Broadleaved, with ash ( <i>Fraxinus excelsior</i> ), sycamore ( <i>Acer pseudoplatanus</i> ) and horse chestnut ( <i>Aesculus hippocastanum</i> ).
TN 20	<b>Treeline</b> : Line of broadleaved trees bordering Watersfield Lane and the scattered scrub. Species included ash ( <i>Fraxinus excelsior</i> ) and sycamore ( <i>Acer pseudoplatanus</i> ).



Target Note	Description
TN 21	<b>Hedge and Fence:</b> Occasional sections of beech ( <i>Fagus sylvatica</i> ) and hawthorn ( <i>Crataegus monogyna</i> ) hedge of around 10 metres, interspersed with fencing demarcating residential gardens from the amenity grassland.
TN 22	<b>Stream:</b> Hawden stream; there was no evident flow within the river, which was turbid and partly shaded with a steep sided bank profile. The water is approximately two foot deep, in a one and a half metre wide channel, with half a metre of bank above the water line. There was little aquatic or marginal vegetation. Common nettle ( <i>Urtica dioica</i> ) was observed at the field edge with occasional hemlock water dropwort ( <i>Oenanthe crocata</i> ). The stream is thought to have potential for water vole ( <i>Arvicola amphibius</i> ).
TN 23	<b>Dense scrub with trees:</b> Section of dense scrub along Hawden stream. Trees in this section require bat roost potential survey as they were inaccessible during the Phase 1 survey. Within the scrub there was an area towards the scrubs southern extent which consisted of damp tall ruderal and swamp species and a dry ditch. <b>Scrub species:</b> hawthorn ( <i>Crataegus monogyna</i> ), crack willow ( <i>Salix fragilis</i> ), field maple ( <i>Acer campestre</i> ) and ivy ( <i>Hedera helix</i> ).
TN 24	<b>Dry ditch</b>
TN 25	<b>Improved grassland – sheep grazed:</b> dominant species was annual meadow grass ( <i>Poa annua</i> ) with occasional creeping thistle ( <i>Cirsium arvense</i> ).
TN 26	<b>Hedge with Fence:</b> A leggy hawthorn ( <i>Crataegus monogyna</i> ) hedge around two metres high by half a metre wide. Hedge is grown over the top of wire sheep fencing.
TN 27	<b>Pond:</b> Single pond situated within a private property. The pond was approximately ten metres by ten metres with sloping banks. One common osier ( <i>Salix viminalis</i> ) was shading around 10% of the pond. Vegetation cover was approximately 50% of the pond with amenity grassland to the west and north and improved grassland to the south and east. There was also a dry ditch to the south of the pond with bull rush ( <i>Typha latifolia</i> ). <b>HSI Scores for pond:</b> scores of 1, 0.2, 0.9, 0.67, 1, 1, 0.67, 0.6, 0.33, 0.8 give a value of 0.65 = average potential for great crested newt ( <i>Triturus cristatus</i> ).
TN 28	<b>Pedunculate oak (<i>Quercus robur</i>):</b> Two pedunculate oaks ( <i>Quercus robur</i> ). One with a diameter at breast height of 40 centimetres, which has a cavity at five metres high facing north. There is a broken branch above the cavity, which is north east facing and therefore it may be damp. There is low to moderate potential for bats.
TN 29	<b>Dry ditch:</b> Dry ditch with soft rush ( <i>Juncus effusus</i> ).
TN 30	<b>Ditch:</b> Ditch with abundant bull rush ( <i>Typha latifolia</i> ). Ditch is currently dry at the east end, but with water could have potential for water vole ( <i>Arvicola amphibius</i> ) and great crested newt ( <i>Triturus cristatus</i> ). The ditch was not accessed during the Phase 1.
TN 31	<b>Dense scrub:</b> Dense scrub along the railway embankment. Not accessed during the Phase 1. Requires checking for any drainage channels present and for bat roost potential.
TN 32	<b>Fence:</b> Fenceline with discontinuous hedge and trees – pedunculate oak ( <i>Quercus robur</i> ).
TN 33	<b>Indian Balsam (<i>Impatiens glandulifera</i>):</b> A small stand of Indian Balsam ( <i>Impatiens glandulifera</i> ) was observed on the bank of Hilden brook next to the public footpath bridge. There is the possibility that other stands of this invasive species are present along the brook however, not all the brook was assessed as access was limited.

# Appendix C – Great crested newt eDNA survey report

Hildenborough FAS  
Great crested newt eDNA  
Survey Report  
July 2015



## Document overview

AECOM/ Capita was commissioned by the Environment Agency in June 2015 to undertake an eDNA survey for the presence of great crested newts, following the Phase 1 Habitat survey and protected species scoping for the Hildenborough Flood Alleviation Scheme.

## Document history

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1	Draft for comment (internal)	22/07/14	AK Ecologist	GD Consultant Ecologist	JR Principal Ecologist

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# 1. Introduction

## 1.1 Overview

This report has been prepared by AECOM on behalf of the Environment Agency to support the design of the proposed Hildenborough Flood Alleviation Scheme (FAS).

A Phase 1 Habitat survey was conducted on the 1<sup>st</sup> June 2015 which identified a single pond in close proximity to the proposed FAS alignment (see Figure 1). This report presents the results of a follow-up survey to determine presence or absence of great crested newt environmental eDNA (eDNA) in this pond. The survey was undertaken by ecologists from AECOM on the 23<sup>rd</sup> June 2015. The area surveyed is referred to as the 'study area' in this report.

The results of the survey are presented in this report along with proposed recommendations for further surveys.

## 1.2 Background

Hildenborough, located north-east of Tonbridge in Kent, is situated at the confluence of the River Medway, the Hilden Brook and the Hawden Stream. Homes in Hildenborough are at risk of fluvial flooding, and potentially surface water flooding.

In order to address this issue the Environment Agency are considering the creation of a flood embankment of approximately 950m length to the south-east of Hildenborough.

It is understood that the embankment would be up to 1m in height and approximately 15m in width at the base.

Habitats present along the alignment of the proposed embankment and adjacent connected habitats were assessed during a Phase 1 survey and recommendations made for surveys to determine presence of protected and/ or notable species, including great crested newts.



## 2. Wildlife Legislation

### 2.1 Great crested newt

Great crested newt (*Triturus cristatus*) is afforded protection under the Wildlife and Countryside Act 1981 (as amended)<sup>1</sup> and the Conservation of Habitats and Species Regulations 2010 (as amended)<sup>2</sup>.

Through the implementation of these Regulations, it is an offence to deliberately capture, injure, disturb or kill a great crested newt, or to deliberately take or destroy its eggs. It is also an offence to deliberately or recklessly damage, destroy or obstruct access to any structure which a great crested newt uses for shelter or protection. This protection includes both the breeding pond itself and terrestrial habitat utilised for foraging and hibernation which may be distant from the breeding pond itself.

Great crested newt habitat is widely considered to extend up to 500m (the accepted maximum roaming distance) from a breeding pond. As such the potential for offence under the above legislation should be considered for all areas within 500m of a breeding pond.

Great crested newt is listed as a Species of Principal Importance in England on Section 41 (S41) of the Natural Environment & Rural Communities (NERC) Act 2006<sup>3</sup>.

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<sup>1</sup> Wildlife and Countryside Act 1981. London: HMSO. Wildlife and Countryside Act 1981 (as amended)

<sup>2</sup> Conservation of Habitats and Species Regulations (2010). HMSO.

<sup>3</sup> Natural Environment and Rural Communities (NERC) Act 2006, London: HMSO

## 3. Methodology

### 3.1 eDNA Survey

The ecologists were provided with a sterile eDNA kit from Surescreen Scientifics containing all necessary equipment to carry out the survey. Twenty water samples were taken from the whole of the perimeter of the pond without stirring the sediment and placed onto a collection bag. After collecting the samples, the water within the collection bag was mixed and then decanted using a syringe into six test pots filled with ethanol and then sealed. The test pots were then transported to Surescreen via a courier for quantitative Polymerase Chain Reaction (qPCR) testing. qPCR testing amplifies any great crested newt DNA within the sample, which is then identified via its unique genetic coding.

## 4. Results

### 4.1 eDNA PCR testing

Samples sent to Surescreen underwent qPCR testing of twelve replicate subsamples. The results for the pond at Hildenborough indicated one positive and eleven negative results.

This result indicates that great crested newt eDNA was present within the pond.

## 5. Discussion and Recommendations

In June 2015 water samples were collected from a single pond adjacent to the proposed FAS. These samples were tested for presence of great crested newt DNA. The results of this test indicate that great crested newt DNA was present in the water samples collected. This indicates presence of great crested newt in the pond, but does not give an indication on population size.

Great crested newts are a legally protected species and in order to determine whether the proposed works would need to be undertaken with a Natural England mitigation licence in place, it is necessary to gain a greater understanding of the population size of the newts that may potentially be affected by the development.

Due to the proposed start date of April 2016 for construction of the FAS, we propose that in order to determine the value of this pond and surrounding terrestrial habitat for great crested newt, two options are available.

### 5.1 Option 1: terrestrial pitfall trapping surveys in September 2015

These surveys would be undertaken under a level 2 class survey licence for great crested newts. The survey would be undertaken in accordance with Natural England guidance, in order to determine whether newts emerge from the pond following the breeding season and if great crested newts are foraging in terrestrial habitat within the 50m radius of the pond. This survey would involve the establishment of a discontinuous line of amphibian fencing of 20m total length, to the south of the pond (the side on which the FAS would be constructed). The fencing would be lined with up to 15 pitfall traps, which would be checked daily during September, for 20 days, before removal. This will provide an indication of the value of the pond for breeding newts by establishing an estimate of the number leaving the pond. It should be noted that this option is dependent on the landowner agreeing to the installation of fencing and pitfall traps.

If the results indicate an absence of newts, or indicate that the pond is unlikely to be of value for a breeding population, then it may be possible to proceed with the FAS construction as per programme and without a Natural England mitigation licence. If the results indicate presence of a likely viable breeding population of great crested newts, then option two would be required as an additional step.

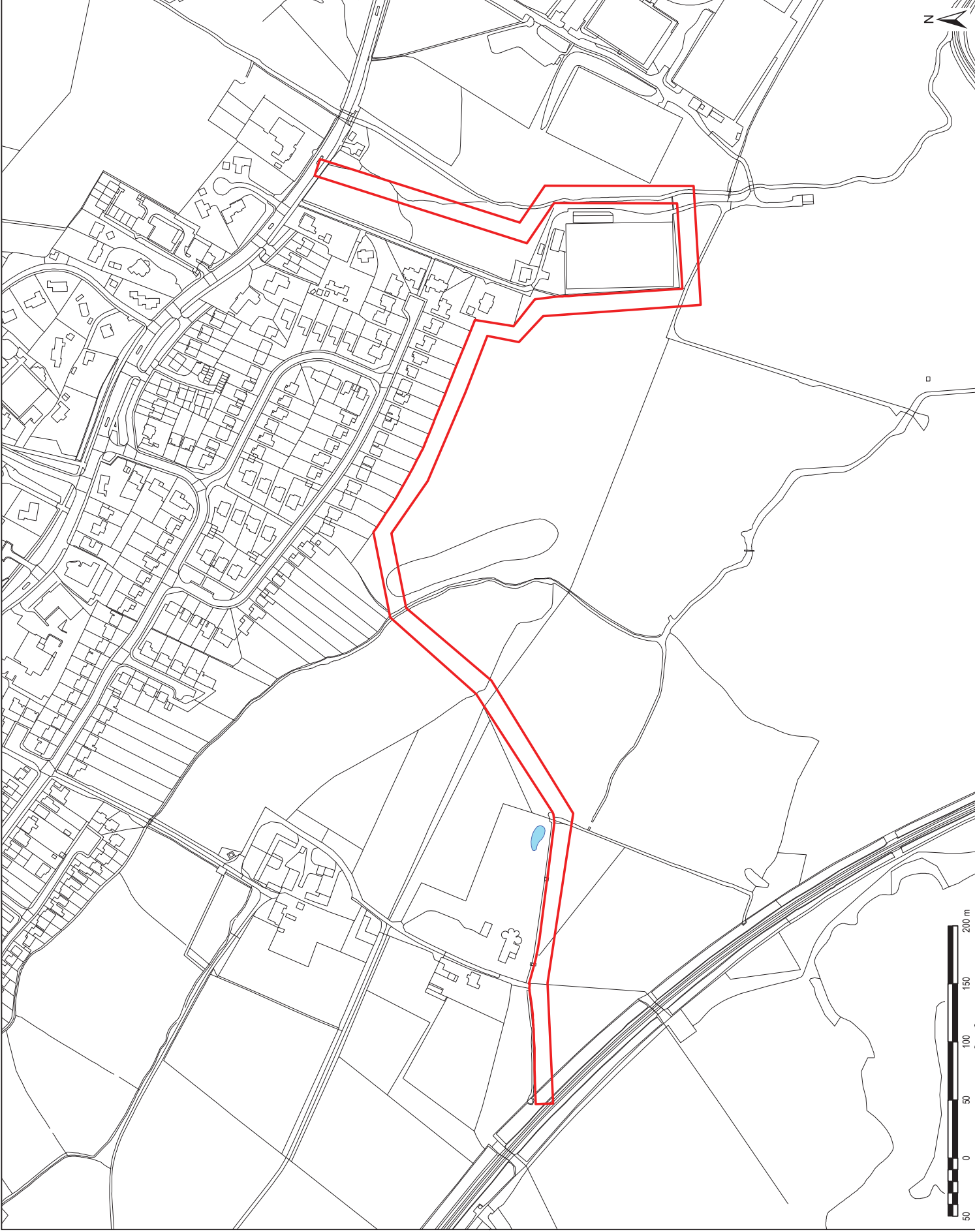
### 5.2 Option 2: surveys of the relevant pond during the great-crested newt breeding season (mid-March to mid-June) 2016

Two ecologists should, under a Level 1 class survey licence for great crested newts, conduct a total of six visits to determine the population of great crested newts using at least three of the following four established techniques:

- Bottle trapping
- Torching
- Netting
- Egg searching.

The surveys would take place between mid-March and mid-June with at least three visits between mid-April and mid-May.

This option may be undertaken as an alternative to option one or may be required following option one dependent on survey results.



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LEGEND

- Indicative works boundary
- Great Crested Newt Pond

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Purpose of Issue

DRAFT

Client



Project Title

HILDENBOROUGH  
FLOOD ALLEVIATION SCHEME

Drawing Title

GREAT CRESTED NEWT POND  
SURVEY JUNE 2015

Drawn	Checked	Approved	Date
JW	AK	GD	22/07/2015
URS Internal Project No.			Scale @ A3
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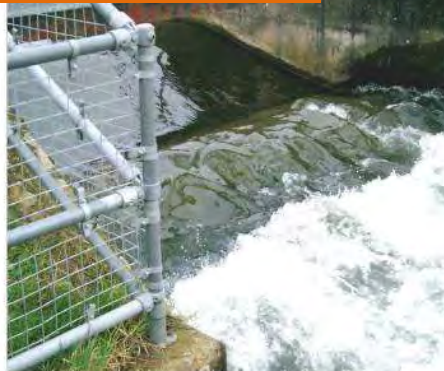
FIGURE 1

A

# Appendix D – Great crested newt pitfall trapping report



Hildenborough FAS  
Great Crested Newt Survey  
Report  
October 2015





**Document overview**

AECOM/ Capita was commissioned by the Environment Agency in August 2015 to undertake a survey for the presence of great crested newts, following environmental DNA confirmation of the species presence in ecological surveys prior to planning application for a Flood Alleviation Scheme at Hildenborough, Kent.

**Document history**

Version	Status	Issue date	Prepared by	Reviewed by	Approved by
1	Draft for comment (internal)	09/10/15	GD Consultant Ecologist	JF Principal Ecologist	JR Associate Director

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# 1. Introduction

## 1.1 Overview

This report has been prepared by AECOM on behalf of the Environment Agency to support the design of the proposed Hildenborough Flood Alleviation Scheme (FAS).

A Phase 1 habitat survey was conducted on the 1<sup>st</sup> June 2015, which identified a single pond in close proximity to the proposed FAS alignment that could support great crested newt (*Triturus cristatus*). A follow-up survey to determine the presence/absence of great crested newt using environmental DNA (eDNA) was undertaken in this pond on 23<sup>rd</sup> June 2015 which provided a positive result.

In order to confirm whether this finding related to the likely breeding of great crested newt in the pond or if this related to chance presence of eDNA (through for example, transfer of eDNA in water from pond to pond on a birds feet), a terrestrial pitfall trapping exercise was undertaken in September 2015. This pitfall survey is the subject of this report which presents methodology, results and recommendations.

## 1.2 Background

Hildenborough, located north-east of Tonbridge in Kent, is situated at the confluence of the River Medway, the Hilden Brook and the Hawden Stream. Homes in Hildenborough are at risk of fluvial flooding, and potentially surface water flooding.

In order to address this issue the Environment Agency are considering the creation of a flood embankment of approximately 1,250m length to the south-east of Hildenborough.

It is understood that the embankment would be up to 1m in height and approximately 15m in width at the base, excluding the construction footprint.

Habitats present along the alignment of the proposed embankment and adjacent connected habitats were assessed during a Phase 1 habitat survey and recommendations made for surveys to determine presence of protected and/or notable species, including great crested newts.

A follow-up survey to determine presence of great crested newt eDNA in this pond on 23<sup>rd</sup> June 2015 proved positive. Samples sent to SureScreen for laboratory analysis underwent quantitative Polymerase Chain Reaction testing of twelve replicate sub-samples. The results for the pond at Hildenborough indicated one positive and eleven negative results.

On the basis of the positive finding, further survey effort was considered necessary in order to confirm the value of the pond in supporting breeding great crested newt.

## 2. Wildlife Legislation

### 2.1 Great crested newt

Great crested newt is afforded protection under the Wildlife and Countryside Act 1981 (as amended)<sup>1</sup> and the Conservation of Habitats and Species Regulations 2010 (as amended)<sup>2</sup>.

Through the implementation of these Regulations, it is an offence to deliberately capture, injure, disturb or kill a great crested newt, or to deliberately take or destroy its eggs. It is also an offence to deliberately or recklessly damage, destroy or obstruct access to any structure which a great crested newt uses for shelter or protection. This protection includes both the breeding pond itself and terrestrial habitat utilised for foraging and hibernation which may be distant from the breeding pond itself.

Great crested newt habitat is widely considered to extend up to 500m (the accepted maximum roaming distance) from a breeding pond. As such the potential for offence under the above legislation should be considered for all areas within 500m of a breeding pond.

Great crested newt is listed as a Species of Principal Importance in England on Section 41 (S41) of the Natural Environment & Rural Communities (NERC) Act 2006<sup>3</sup>.

---

<sup>1</sup> Wildlife and Countryside Act 1981. London: HMSO. Wildlife and Countryside Act 1981 (as amended)

<sup>2</sup> Conservation of Habitats and Species Regulations (2010). HMSO.

<sup>3</sup> Natural Environment and Rural Communities (NERC) Act 2006, London: HMSO

## 3. Methodology

### 3.1 Survey

Great crested newt pitfall trapping survey visits were undertaken of one pond at Hawden Lane, Hildenborough, Kent (hereafter referred to as 'the site'). The survey was undertaken following the conditions set out in a Natural England licence<sup>4</sup> allowing survey for GCN using pitfall trapping as an accepted technique. In accordance with Natural England requirements, notification of the intention to pitfall trap was provided in advance of undertaking the survey.

Twenty metres of plastic drift fencing was installed along part of the south and east sides of the pond. Fifteen pitfall traps with removable lids and containing mammal escape ladders, damp vegetation and floats, were sunk at equidistance into the ground, flush with the drift fencing, facing the pond. Fencing and pitfall traps were both installed in accordance with the Great Crested Newt Mitigation Guidelines (English Nature, 2001) on 2nd September 2015.

Pitfall traps were checked over 20 visits (see Table 1), excluding the majority of weekends, when the traps were closed. When open, pitfall traps were checked at least once each day between 06:00 and 11:00 and the sex and life-stage of each great crested newt captured was recorded. Other species found in the pitfall traps were also recorded. Captured great crested newts and any other animals, were carefully placed outside of the drift fencing to the south of the pond, in an area of cover.

Thirty artificial refugia (0.5m x 0.5m pieces of roof felt) were also placed along the drift fence and around the north and west sides of the pond. The refugia were also checked during each visit. Following the completion of the survey, the pitfall traps were closed and the fencing removed.

**Table 1. Details of GCN Pitfall Trapping Survey**

Visit Number	Date	Weather during survey	Weather previous night
1	3 <sup>rd</sup>	13C, dry, 50% cloud, wind force 4	7C, dry
2	4 <sup>th</sup>	13C, dry, 75% cloud, wind force 2	8C, dry
3	5 <sup>th</sup>	13C, dry, 50% cloud, wind force 1	Dry
4	6 <sup>th</sup>	15C, dry, 50% cloud, wind force 1	Dry
5	7 <sup>th</sup>	13C, dry, 5% cloud, wind force 1-2	6C, dry
6	8 <sup>th</sup>	11C, dry, 75% cloud, wind force 3	8C, dry

<sup>4</sup> Class 2 WML-CL09 survey licence number 2015-14542-CLS-CLS

Visit Number	Date	Weather during survey	Weather previous night
7	9 <sup>th</sup>	13C, dry, 95% cloud, wind force 2	11C, dry
8	10 <sup>th</sup>	16C, dry, no cloud, no wind	11C, dry
9	11 <sup>th</sup>	15C, dry, 10% cloud, no wind	12C, dry
10	14 <sup>th</sup>	15C, moderate rain, wind force 1	10C, heavy rain
11	15 <sup>th</sup>	11C, rain by end, wind force 2-3	9C, dry
12	16 <sup>th</sup>	18C, rain by end	10C, dry
13	17 <sup>th</sup>	12C, dry, 25% cloud, wind force 1	10C, drizzle
14	18 <sup>th</sup>	19C, rain by end, no wind	11C, dry
15	21 <sup>st</sup>	14C, rain by end, no wind	12C, dry
16	22 <sup>nd</sup>	9C, rain, no wind	9C, dry
17	23 <sup>rd</sup>	12C, dry, no cloud, wind force 1	7C, dry
18	24 <sup>th</sup>	15C, rain, wind force 3	13C, light rain
19	25 <sup>th</sup>	10C, dry, 80% cloud, no wind	8C, light rain
20	28 <sup>th</sup>	13C, dry, 5% cloud, wind force 1	7C, dry



## 4. Results

Table 2 provides a summary of the results of the great crested newt pitfall trapping survey.

**Table 2. Results of great crested newt Pitfall Trapping Survey at Hildenborough, Kent**

Date (September 2015)	Species
3 <sup>rd</sup>	--
4 <sup>th</sup>	1 juvenile smooth newt ( <i>Lissotriton vulgaris</i> )
5 <sup>th</sup>	--
6 <sup>th</sup>	--
7 <sup>th</sup>	--
8 <sup>th</sup>	--
9 <sup>th</sup>	--
10 <sup>th</sup>	--
11 <sup>th</sup>	--
14 <sup>th</sup>	--
15 <sup>th</sup>	--
16 <sup>th</sup>	--
17 <sup>th</sup>	--
18 <sup>th</sup>	<b>1 adult female great crested newt; 1 adult common toad (<i>Bufo bufo</i>)</b>
21 <sup>st</sup>	--
22 <sup>nd</sup>	<b>1 adult male great crested newt</b>
23 <sup>rd</sup>	--
24 <sup>th</sup>	--
25 <sup>th</sup>	--
28 <sup>th</sup>	--

A total of two adult great crested newts were trapped, both during periods of heavy rainfall.

**Photograph 1 – Female great crested newt, caught on 18<sup>th</sup> Sept 2015**



**Photograph 2 – Male great crested newt, caught on 22<sup>nd</sup> Sept 2015**



## 5. Discussion and Recommendations

In June 2015 water samples were collected from a single pond adjacent to the proposed FAS. These samples were tested for presence of great crested newt eDNA. The results of this test indicated that great crested newt eDNA was present in the water samples collected.

Great crested newts are a legally protected species and in order to determine whether the proposed works would need to be undertaken with a Natural England mitigation licence in place, it was necessary to gain a greater confirmation of the use of the pond by newts that may potentially be affected by the development.

At the time of undertaking the surveys, it was understood that the proposed construction start date was April 2016. For this reason, terrestrial pitfall trapping was undertaken as surveys of the potential breeding pond in spring 2016 would conflict with the proposed construction programme.

The results indicate the presence of a likely viable breeding population of great crested newts in the pond surveyed, which is adjacent to the proposed FAS.

### Recommendations for Further Work

Given the proximity of a likely viable breeding population of great crested newts adjacent to area of habitat to be affected by the proposed FAS, it is considered highly likely that construction works could result in killing or injury of individual great crested newts and/or damage/destruction of great crested newt terrestrial habitat. It is therefore advised that in order to undertake the FAS construction a European Protected Species Mitigation Licence (EPSML) from Natural England is obtained in order to ensure that the works comply with relevant legislation and avoid offences under the Wildlife and Countryside Act 1981 (as amended)<sup>5</sup> and the Conservation of Habitats and Species Regulations 2010 (as amended)<sup>6</sup>.

In order to inform any EPSML application, Natural England usually require an accurate estimation of the size of the great crested newt breeding population affected, so that mitigation approaches may be accurately appraised, in line with guidance (English Nature, 2001)<sup>7</sup> to maintain favourable conservation status.

Current best practice (English Nature, 2001) states that ecological surveyors should, under a Level 1 class survey licence for great crested newts, conduct a total of six visits to determine the population of great crested newts using at least three of the following four established techniques:

- Bottle trapping
- Torching
- Netting
- Egg searching.

The surveys would take place between mid-March and mid-June with at least three visits between mid-April and mid-May.

Given the confirmed presence of great crested newt in a probable breeding pond, and based on an understanding that this pond is of recent construction, it is recommended that spring 2016 surveys should include other potentially suitable water bodies within 250m of the works in order to determine the overall metapopulation that may be affected by the FAS construction. This is the

<sup>5</sup> Wildlife and Countryside Act 1981. London: HMSO. Wildlife and Countryside Act 1981 (as amended)

<sup>6</sup> Conservation of Habitats and Species Regulations (2010). HMSO.

<sup>7</sup> Great crested newt mitigation guidelines (2001). English Nature.

distance over which it is considered most likely that great crested newt will move between breeding ponds and between ponds and terrestrial habitat suitable for hibernation.

Following completion of spring 2016 surveys, an approach to mitigation would be designed and an application for an EPSML would be made to Natural England; the granting of which would allow works to proceed. The details of the works which would be subject to EPSML would be included within the planning submission for the FAS. The actual EPSML application would then need to follow planning approval, as the actions permitted by the licence could not be undertaken without planning permission to undertake the works. In general, Natural England requires c. 30 working days to grant a licence, assuming it does not require amendment. A delay in planning permission being granted would therefore have an effect on the time window available for newt trapping works during 2016.

The EPSML application would be likely to involve a need to trap and move great crested newts from the works area and, during periods of migration to and from ponds, immediately adjacent to the works area. The level of effort involved in this approach is stipulated in guidance (English Nature, 2001), and would be dependent on the estimate of population size of great crested newt present derived from spring 2016 sampling.

An indicative timescale of this approach would therefore be:

- Pond surveys (including reporting) – March-July 2016
- Mitigation Strategy production – July-August 2016 (pending planning submission dates)
- Application for EPSML licence – September 2016 to March 2017, allowing at least 30 working days for determination of the application
- Implementation of EPSML licence – Spring/Summer 2017.

# Appendix E – Preliminary water framework directive assessment

# Appendix E – Preliminary Water Framework Directive Assessment





# Appendix F – Cultural heritage desk-based report

## Hildenborough Flood Alleviation Scheme

### Cultural Heritage Desk-based Assessment

July 2015



## Document overview

URS was commissioned by the Environment Agency in June 2015 to undertake a Cultural Heritage Desk-based Assessment.

## Document history

Version	Status	Issue date	Prepared by	Reviewed by	Approved by
001	Draft v001	03.06.15	Coralie Acheson	Laura Garcia	
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## Tables

Table 1 Archaeological Potential in the Study Area and Site

## Appendices

Appendix A Figures  
Appendix B Gazetteer of Heritage Assets  
Appendix C Site Photographs



# 1. Executive Summary

URS and AECOM joined together as one company in October 2014. AECOM has been commissioned to undertake an heritage desk-based assessment for a proposed flood alleviation scheme at Hildenborough, Kent. This will include construction of an embankment, which is 15m wide, 1m in height, and approximately 1250m in length, extending through a narrow area of woodland and along the edges of agricultural fields and playing fields. The baseline has collated data from the Kent Historic Environment Record, Tonbridge Library, the Kent History and Library Centre and the National Heritage List for England.

The Site is situated on the low-lying flood plain of the River Medway and is likely to have been agricultural or woodland throughout its history. Eighteen heritage assets which range in date from medieval to modern have been recorded within the study area. These include a 19th century brickworks, and associated buildings. The only feature noted within the Site is a water tank which is present on 19th century historic maps and has negligible heritage interest. No evidence was found to suggest that previously unrecorded heritage assets are present within the Site and the potential for encountering heritage remains is assessed to be low. The proposed development may result in changes to the setting of two Grade II listed buildings and the magnitude of this impact will be assessed during the impact assessment process, at a later date.

## 2. Project Description

### 2.1 Scope of Report

The desk-based assessment presents the baseline evidence for the historic environment (archaeological remains and built heritage) corresponding to the proposed development site, hereafter referred to as the 'Site'. The purpose of the report is to document the archaeological background and historical development of the Site and accurately map the location of known archaeological assets in relation to the Site and its surrounding area. In accordance with national and local planning policy the report will assess the potential for previously unrecorded archaeological remains to be present within the Site and will describe the significance of assets, including the contribution made by their setting that may be affected by future development proposals. The report and appendices have been informed through desk-based assessment and a site walkover survey undertaken on the 1<sup>st</sup> June 2015.

### 2.2 Site Location and Proposed Development

The Site is located to the south-east of Hildenborough, a village two miles north-east of Tonbridge in Kent. It is proposed to construct an embankment for the purposes of flood alleviation. The proposed embankment is 15m wide, 1m in height, and approximately 1250m in length starting at approximately TQ 58484 47407 and ending at approximately TQ 57686 47228. The embankment will head south from London Road through an area of woodland, extend around the perimeter of a playing field and then follow the perimeter of field boundaries before heading south-west to the railway embankment (Figure 1).

### 2.3 Topography and Geology

2.3.1 The Site is located on a low lying flood plain close to the River Medway and is very flat. The only changes in ground level noticeable on the site visit were in the vicinity of the Hilden Brook, in the eastern part of the Site, where the ground undulates slightly.

The solid geology of the Site comprises of Tunbridge Wells Sand Formation. The Site is overlain by alluvial deposits laid down in the floodplain of the River Medway (<http://mapapps.bgs.ac.uk>). The National Soil Map of England and Wales shows the area as a mix of loamy soils with naturally high groundwater and loamy and clayey floodplain soils with naturally high groundwater (<http://mapapps2.bgs.ac.uk>).

### 3. Legislation, Planning Policy and Guidance

#### 3.1 Legislative Context

The Planning (Listed Buildings and Conservation Areas) Act 1990 deals with work to listed buildings and to areas designated as Conservation Areas. It also deals with required consents. Buildings within Conservation Areas are afforded similar levels of protection to listed buildings, whether they are listed or not. Work to listed buildings and within Conservation Areas is restricted without appropriate consents.

#### 3.2 National Planning Policy and Guidance

- 3.2.1 The National Planning Policy Framework (NPPF) (2012) provides the guiding principles for conserving and enhancing the historic environment. It sets out criteria for establishing the significance of heritage assets, including the contribution setting makes to significance, and sets out the principles which the Local Authority should consider when assessing the effects of development upon the significance of cultural heritage assets.
- The Planning Practice Guidance (PPG) was launched on the 6th March 2014 and provides a web-based resource in support of the NPPF, with particular guidance on matters relating to protecting the historic environment in the section: Conserving and Enhancing the Historic Environment.

#### 3.3 Local Development Framework

Planning policy for Tonbridge and Malling Borough Council is laid out in the Local Development Framework, which contains the Core Strategy, Development Land Allocations DPD, the Tonbridge Central Area Action Plan, the Managing Development and the Environment DPD, Saved Policies from the Local Plan and the Local Plan Proposals Map. Extracts from the policies relevant to cultural heritage within and in the vicinity of the site are included below:

##### Policy CP1 Sustainable Development

The policy states that the need for development will be balanced against the need to protect and enhance the natural and built environment. In selecting locations for development and determining planning applications the quality of the natural and historic environment, the countryside, residential amenity and land, air and water quality will be preserved and, wherever possible, enhanced.

##### Policy CP25 Mitigation of Development Impacts

Policy CP25 states that where development that causes material harm to a natural or historic resource is exceptionally justified, appropriate mitigation measures will be required to minimise or counteract any adverse impacts. Where the implementation of appropriate mitigation is still likely to result in a residual adverse impact then compensatory measures will be required.

Managing Development and the Environment Development Plan Document (adopted April 2010)

Relevant policies include SQ1 Landscape and Townscape Protection and Enhancement which states: that all new development should protect, conserve and, where possible, enhance:

- (a) the character and local distinctiveness of the area including its historical and architectural interest and the prevailing level of tranquillity;

- (b) the distinctive setting of, and relationship between, the pattern of settlement, roads and the landscape, urban form and important views; and
- (c) the biodiversity value of the area, including patterns of vegetation, property boundaries and water bodies.

#### Policy SQ2 Locally Listed Buildings

This policy states that buildings included within the Local List of Buildings of Architectural or Historic Interest adopted by the Council will be retained wherever possible and protected from development that would harm their setting or local historic or architectural interest.

### 3.4 Relevant Guidance

The Historic England (formerly English Heritage) has published a number of relevant guidance documents that should be taken into account when assessing the historic environment.

English Heritage produced a small number of good practice advice (GPA) guides which have replaced the Planning Policy Statement 5; Planning Practice Guide. To date only three notes have been produced; GPA1: The Historic Environment in Local Plans, GPA2: Managing Significance in Decision Taking and GPA3: The Setting of Heritage Assets. Of relevance to this assessment are GPA2 and GPA3.

#### *GPA 2: Managing Significance in Decision Taking (English Heritage 2015a)*

GPA2 provides guidance on decision making within the historic environment. The document makes clear the need to establish the significance of the heritage resource to enable informed decision making. It sets out the principles for identifying heritage significance, in line with the NPPF, reinforcing the contribution that setting can make to this significance. The document sets out a staged approach to establishing significance and assessing impacts on that significance; progressing from understanding significance, through processes for avoiding or mitigating impacts and seeking opportunities for enhancement, to the justification and/ or offsetting any residual harm. The document reinforces the requirement of the NPPF that the information provided should be proportionate to the significance of the asset and sufficient to make an informed decision.

#### *GPA 3: The Setting of Heritage Assets (English Heritage 2015b)*

GPA3 replaces the 2011 Setting of Heritage Assets document (English Heritage) and has been specifically written to address the complexities associated with making decisions associated with the setting of heritage assets. The document describes the key terms of curtilage, character and context and explains the extent of setting and that it is not a fixed concept and changes depending on the asset. The document also highlights the importance of views to the understanding of setting and states which views could contribute to understanding the significance of a heritage asset. It then offers a staged approach to proportional decision-taking.

#### *Conservation Principles (English Heritage 2008)*

The aim of this guidance is to ensure consistency of approach in English Heritage's role as the Government's statutory advisor on the historic environment in England. It aims to set out a logical approach to decision making and offers guidance about all aspects of the historic environment and reconciling its protection with the economic and social needs and aspirations of the people who live in it.

## 4. Assessment Methodology

### 4.1 Study Area

The study area for this assessment was defined as a 500m buffer corridor from the Site boundary. This allows the Site to be placed in a broad archaeological context in order to establish baseline conditions, but also allows only the most relevant information to be considered. The extent of the study area was also informed by the nature of the development and observations made during the site visit and considered the setting of heritage assets that may be affected by development proposals.

### 4.2 Aims and Objectives

4.2.1 The aims of the desk-based assessment are to establish the baseline conditions for the cultural heritage resource and the significance of the heritage assets within the Site and study area. The objectives of the study are:

- to identify the heritage assets within the proposed development Site and study area;
- to identify the significance and setting of heritage assets within the Site and study area;
- to assess the likely potential of finding previously unrecorded archaeological remains with the Site boundary; and
- to make recommendations for further work, if required.

### 4.3 Methodology

This desk-based assessment has been carried out in accordance with the published Standard and Guidance for Historic Environment Desk-based Assessment (CIfA 2014a) and the Code of Conduct (CIfA 2014b) of the Chartered Institute for Archaeologists (CIfA). AECOM is a Registered Archaeological Organisation of CIfA.

The collection and critical analysis of the heritage baseline data involved:

- the identification of key data sources;
- the collation of up-to-date data held by the Kent HER, data search dated 2<sup>nd</sup> June 2015 and the Historic England National Heritage List;
- a review and examination of available documentary and historic map sources held by Tonbridge Library and the Kent History and Library Centre and online sources; and,
- a visual assessment to identify any heritage assets within the Site and its immediate surroundings.

A Site walkover survey and a detailed visual appraisal of heritage assets within the study area were undertaken on 1<sup>st</sup> June 2015 in order to:

- assess the setting of known heritage assets including listed buildings and Conservation Areas within the Site and the study area; and
- identify areas of potential previous ground disturbance or areas where there may be potential for archaeological deposits to remain.

### 4.4 Data Sources

4.4.1 Data sources consulted in the course of research included:

- Historic England National Heritage List (NHL) for World Heritage Sites, Scheduled Monuments, Registered Battlefields, Registered Parks and Gardens, and Listed Buildings;

- Kent Historic Environment Record (HER), which holds a database of known archaeological sites, findspots, historic buildings and previous archaeological works;
- Tonbridge Library and the Kent History and Library Centre for published documentary sources and historic maps;
- online sources including the Tonbridge and Malling planning website <https://www.tmbc.gov.uk/landing/planning>; and
- visual assessment of upstanding archaeological, built heritage and historic landscape assets within the Site and the study area.

## 4.5 Assessment of potential

An historic map regression exercise was undertaken to assess the historic development of the Site since the 18<sup>th</sup> century and to identify where any potential archaeological features might survive within the study area.

The potential for an area to contain archaeological remains is rated high, medium, low, negligible, or unknown. This rating is based on an understanding of the archaeological resource as a whole and its local context. This includes the number, character and proximity of known archaeological/historical sites or finds spots within the Site and its surrounding study area, and is also informed by the results of the Site walkover survey and by professional judgement.

## 4.6 Research Agendas

Consideration of research agendas is key to understanding the potential significance of archaeological remains.

Although the specific regional research objectives of the South East Research Framework are still forthcoming, the broad principles of a number of existing archaeological research agendas are also applicable, including those for the prehistoric period (English Heritage 2008; Lithic Studies Society 2004), the Bronze Age (Roberts 2008), the Iron Age (Champion *et al.* 2001), the Roman period (James & Millett 2001) and the medieval period (Hinton 1987). Key archaeological research agendas include:

- Research Frameworks for the Palaeolithic and Mesolithic of Britain and Ireland (English Heritage 2008);
- Research Frameworks for Holocene Lithics in Britain (Lithic Studies Society 2004);
- Understanding the British Iron Age: an agenda for action (Champion *et al.* 2001);
- Britons and Romans: advancing an archaeological agenda (James & Millett 2001);
- Recommendations by the Society for Medieval Archaeology to the Historic Buildings and Monuments Commission for England (Hinton 1987); and
- Research framework for industrial archaeology (Gwyn & Palmer 2005; Nevell 2009).



## 5. Heritage Baseline

### 5.1 Overview

There are no World Heritage Sites, Scheduled Monuments, Registered Parks and Gardens or Registered Battlefields within the study area. Heritage assets referenced in the baseline are identified by their Asset number (in brackets) and are shown on Figure 2. The Asset number has been allocated by AECOM and the corresponding HER number is identified in Appendix A.

### 5.2 Baseline Conditions

A total of 18 heritage assets are located within the study area comprising nine non-designated assets recorded on the Kent HER, three non-designated heritage assets identified from historic mapping, five listed buildings, and one Conservation Area. Only one asset, the site of a water tank noted on 19<sup>th</sup> century mapping is located within the Site.

The listed buildings are all Grade II listed and consist of four houses (2-5 inclusive) and an oasthouse and granary (1). All of the heritage assets are discussed in the text below.

#### 5.2.1 *Upper Palaeolithic to Late Iron Age (30,000 BC to AD 43)*

There are no assets of prehistoric date recorded within the study area. Excavations in Tonbridge, beyond the study area, have found occasional residual artefacts during the excavation of sites from later periods, including a number of lithics, but very little evidence of occupation or other land use.

The Medway valley would have been important for its resources during the Palaeolithic and Mesolithic periods, but the valley bottom around the Site would have been unsuitable for early farming. Any settlement is likely to have been on the higher, dryer ground further up the valley sides. The reuse of this area for settlement and other activities during later periods may have removed traces of earlier, prehistoric settlement.

#### 5.2.2 *Roman (AD 43 – AD 410)*

There are no assets of Roman date within the study area, although Roman artefacts have been found outside of the study area in Tonbridge. However, there is very little evidence for Roman activity in the immediate area around the Site.

#### 5.2.3 *Early Medieval (AD 410 – AD 1066)*

There are no assets of early medieval date within the study area. The Domesday Book includes references to the Lowy (Liberty) of Tonbridge, which would have included the area of the modern town and the lands around it. The total population was quite large, with over twenty households although this may have been derived from dispersed settlement over a wide area (<http://opendomesday.org>). The land was a mixture of pasture, arable and woodland (*ibid*).

The name Tonbridge is derived from the Old English ‘*tun brycg*’ meaning the bridge at or near the settlement or manor, indicating that there was, at least, small scale settlement in the area of the modern town (TMBC 2009, 5).

The Site is situated on low lying ground within the floodplain of the River Medway, and may have been part of the pasture land described in the Domesday Book. Given this location, it is unlikely that permanent settlement would have been located here. Rather, any settlement would have been situated on higher ground that was less liable to flooding.

#### 5.2.4 *Medieval (AD 1066 – AD 1540)*

There are two assets which contain elements dating from the medieval period within the study area. These are the medieval town defences (12) and the Tonbridge Central Area Conservation Area which includes a number of medieval buildings and is formed around the core of the medieval street plan (18).

The Conservation Area includes the core of the medieval town of Tonbridge, which emerged in the 12<sup>th</sup> century around the castle. The castle was built in the years immediately following the Norman Conquest, and defended a key strategic position where a major road from London to the Kentish coast crossed the River Medway (Chalkin 1975, 2; Wilson 2005, 13-14). In the 13<sup>th</sup> century Henry III granted a license to enclose the town with a wall. An earthwork bank and ditch was constructed which can still be traced today (12). Portions of the earthwork defences are designated as a Scheduled Monument, however the Scheduled sections lie outside of the study area.

Hildenborough was also established in the medieval period, but was initially a rural area of manors, farms and clusters of cottages (TMBC 2011, 2). The name is thought to be derived from '*hilden*' meaning a clearing at the bottom of a hill. In the medieval period it consisted of a number of separate manors and their domains, including 'Hylden Manor' which is represented in the study area by a later post-medieval manor house (4).

In the medieval period the area around Tonbridge was mostly small farms and woodland and it is likely that the Site would have been either meadow or woodland (Chalkin 1975, 2).

#### 5.2.5 *Post-Medieval (1540 – 1901)*

There are 12 assets of post-medieval date within the study area. This includes four houses, all of which are Grade II listed buildings (2-5). Another surviving building is the oasthouse and granary to the south of Hawden, which lies close to the western end of the proposed embankment and which is also a Grade II listed building (1). A farmstead (6), a milestone (7) and the railway line (11) are recorded on the Kent HER, and three 19<sup>th</sup> century assets have been identified from historic maps (15-17). Tonbridge Central Area Conservation Area includes a large number of post-medieval buildings (18).

At the beginning of the post-medieval period the majority of the parish of Tonbridge was owned by the Duke of Buckingham, and maintained as woodland for hunting. After his execution the land was leased for charcoal and timber industries, and was mostly cleared for farming (Wilson 2005, 23).

Tonbridge continued to develop in the post-medieval period, with the Conservation Area containing a number of post-medieval buildings (18). This expansion in the settlement began in 1720 when the Medway was made navigable and a town quay was built. This allowed the town to take advantage of trade along both the river and the road (Chalkin 1975, TMBC 2009, 5). The arrival of the railway in the later 19<sup>th</sup> century further transformed the area, transforming it from a relatively small, nucleated settlement with an economy primarily based on agriculture to a

rapidly expanding town with an economy centred on commerce and light industry (11) (TMBC 2009, 6).

Hildenborough gradually developed from a group of separate manors into an elongated settlement along the London Road, although this largely occurred in the 20<sup>th</sup> century (TMBC 2011, 2). The road was an important route from London to the coast. A post-medieval or modern milestone is located on the road within the study area (7).

The study area, which mostly lies beyond the edges of Tonbridge, would have had a rural character throughout the post-medieval period. Hasted's map of 1798 shows the area around the Site as lying within open fields scattered with occasional trees. 'Hilden House', possibly Hilden Manor (4) is shown on a hill to the north of the Site. An estate map of the lands in 'Hilden' belonging to Thomas Marsten Esquire (1822) shows the area of the Site, including details of buildings and landuse. Part of the Site lies in land not detailed on the map as it was owned by an adjacent estate. These areas are blank, but annotated, saying the land was owned by John Alljoe Esquire, and were part of the lands of Hilden Farm. The line of the proposed embankment is shown to run along a hedged field boundary before crossing several fields of pasture close to the oasthouses and granary buildings south of Hawden's Farm (1 and 2). To the east of the Site it is noted that the land belonged to Pot Kiln Farm, which is recorded on the HER (6).

The Tithe Map for the Parish of Tonbridge (1838) shows little change since the earlier Estate Map, but provides details of landowners and field names in the accompanying Award. The north eastern end of the Site, to the south of Hilden Bridge, is occupied a small wooded area a small orchard, which was part of Pot Kiln Farm (6).

The eastern and central parts of the Site, the area currently occupied by tennis courts and the rear of the houses facing Correnden Road, were also part of the Manor Farm lands. The fields were all pasture, and were called 'Lower Slip', 'Little Cooks Meadow', and 'Great Cooks Meadow'. All of the Manor Farm lands were under the tenancy of Thomas Parfect Charlton, and the Pot Kiln Farm lands were under the tenancy of John Jells Charlton.

The western part of the Site, currently occupied by pasture, and the area south of the granary and oasthouses (1), were part of Great Hawden Farm. The four fields shown on the Tithe Map are all pasture fields, and were called 'Little Bushy Buddles', 'Middle Buddles', 'Upper Buddles' and 'Upper Long Sayers'. 'Buddles' is another name for the corn marigold and the field name indicates that this was likely grown here. These fields were under the tenancy of William Hilder.

The majority of the land within the Site was pasture in the earlier part of the 19<sup>th</sup> century, but hop farming became increasingly important in the area (Wilson 2005, 41).

Tonbridge became a centre for light industry in the 19<sup>th</sup> century, producing gunpowder, Tunbridge Ware<sup>1</sup> and cricket balls (Wilson 2005, 11). The growth of the town in the 19<sup>th</sup> century also led to an increase in the need for building materials and a number of brickworks were established in the low lying clay areas around the town. The 1851 Census shows that there were six brickmakers based in Tonbridge, two of which were located in Hildenborough (Chalkin 1975, 14).

The Ordnance Survey 25" mile map of 1880 shows the presence of buildings associated with a brickworks to the west of the Site (16), and on the northern side of the modern playing fields (15). The buildings no longer survive and no evidence of them was found during the Site

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<sup>1</sup> Tunbridge Ware – a form of decoratively inlaid woodwork

walkover survey. The brickworks was relatively short lived, and is not shown on later maps. It was owned by Dennis Charlton in the 1870s, perhaps a descendant of the Charltons who farmed both Pot Kiln and Manor Farm in the earlier 19<sup>th</sup> century (Wilson 2005, 44).

The brickworks would have been used for the handmade manufacture of bricks. Clay would have been extracted from shallow pits, moulded into shape in wooden moulds, dried in rows under cover of hacks and then fired in clamps or kilns (Wilson 2005, 41). There are no upstanding remains of the brickworks surviving within the study area and the former structures did not extend into the Site boundary. The only potential evidence of the former brickworks was noted during the site visit and entailed crushed tile and brick within the surface layer of Watersfield Lane (Appendix B, Photographs 1 and 2), which may have derived from the demolished brickworks.

The Ordnance Survey 25" mile map of 1880 shows that the Site was rural in character and mostly agricultural. The northernmost part of the Site, adjacent to London Road, is shown as being a mixture of marshy ground and woodland on the 1880 map. The principal settlement at Hildenborough was still, at this time, focused to the north-west of the Site, and in the vicinity of the Site there are only isolated farmsteads along London Road. As well as the brickworks, the map shows a water tank within the Site to the south of London Road (17). The Ordnance Survey 25" mile map dated 1897 shows the small building located to the west of the Site which is associated with the former brickworks (16).

#### 5.2.6 *Modern (1901 – Present)*

There are five assets of modern date within the study area. These comprise a milestone, which is of post-medieval or modern date (7), a George V pillar box (10), evidence of 20<sup>th</sup> century ground raising (13), a public park (14), and the Tonbridge Central Area Conservation Area, which has modern elements (18).

The milestone (7) and the George V pillar box (10) are both examples of early 20<sup>th</sup> century street furniture, although the milestone may actually be of late post-medieval date. They are both within the Tonbridge Central Conservation Area (18). Another element of the Conservation Area which is of modern date is the public park at Tonbridge Castle and sports grounds. During the Second World War, the Medway was heavily fortified at Tonbridge. There is one pillbox within the study area to the south of the site (8), part of a longer line of pillboxes which lie beyond the study area and are sited at strategic points along the River Medway. To the south-east of the Site the HER records the presence of an air raid shelter (9).

Aerial imagery of the Site taken during the 1940s shows a predominantly agricultural landscape. Large topsoil bunds appear to be present in the field to the north-west of the current tennis courts. A small structure is located to the south-east of the bunds which may relate to a pill box. However the structure is also in the same location as one of the buildings associated with the former brickworks (15). No evidence for this structure was present during the Site walkover survey.

Tonbridge School has been an established presence within the area since the 16<sup>th</sup> century. In the modern period the school required larger playing fields and obtained agricultural land in the eastern half of the Site for this purpose (Halstead 1798, 241). These are first labelled on the Ordnance Survey 1:25,000 scale map of 1993.

The land-use within and round the Site remained largely unchanged until the latter part of the 20<sup>th</sup> century, when the eastern part of the site became playing fields associated with Tonbridge School. The woodland, shown on the late 19<sup>th</sup> century Ordnance Survey maps, as described

above (4.3.25), was replaced by brushwood on the Ordnance Survey 25":mile map of 1908. On the Ordnance Survey 1:1250 scale map of 1960 the north-eastern part of the Site, immediately adjacent to London Road, is shown as an orchard. The area immediately to the north of the Site was developed for housing in 1974 (Ordnance Survey 1:10,000 scale map of 1974). The only other heritage asset from this period recorded on the HER relates to late 20<sup>th</sup> century deposits associated with raising the ground level above the flood level which were recorded during a watching brief to the south-east of the Site (13).

### 5.3 Archaeological Investigations in the Study Area

There have been two archaeological investigations in the study area, both of which have been watching briefs. The first investigation took place at Hilden Manor to the north of the Site and found no archaeological remains (4). The second investigation took place to the south-east of the Site and only found evidence of late 20<sup>th</sup> century ground raising for the purposes of flood defence (13).

### 5.4 Historic Landscape Characterisation

Historic landscape characterisation contributes to our understanding of the historic landscape and can show how historic processes have contributed to the present landscape. The land on which the Site lies has been characterised by the Kent HER as 'miscellaneous valley bottom paddocks and parcels' which likely originated as a result of Parliamentary enclosure. There are remnants of narrow post-medieval field enclosure near Hawden Lane to the east of the proposed embankment but there are no historic landscape features within the proposed Site.

### 5.5 Walkover Survey

The walkover survey was carried out on the 1<sup>st</sup> June 2015 by an Archaeologist. The route of the proposed embankment was assessed in order to assess the presence/ absence of features of potential archaeological interest. In addition, the site visit assessed the setting of relevant heritage assets in the study area.

The Site has four principal areas. The northern end of the Site, adjacent to the Hilden Brook and London Road, is a mixture of woodland, improved pasture and scrub land, with several areas where burning has taken place recently (Appendix B, Photographs 3-5). Watersfield Lane runs along the western side of this area, and crushed tile and brick, possibly deriving from the demolished 19<sup>th</sup> century brickworks, is present within the surface material of the footpath (Appendix B, Photographs 1 and 2).

The central and eastern parts of the Site are owned by Tonbridge School and are used as playing fields (Appendix B, Photographs 6 and 7). There is a large spoil heap in the south eastern corner of the Site, on the southern edge of one of the playing fields, which is likely up-cast deriving from the construction and levelling of the sports pitches (Appendix B, Photographs 8 and 9). This area is a mix of well-maintained grass and hardstanding.

The western part of the site is a mixture of improved pasture and a well maintained garden (Appendix B, Photographs 10 and 11). There is evidence of a recent bonfire in the garden area south of the granary and oasthouses (Appendix B, Photograph 12). Between the second and third areas there is an area of dense scrub with a small stream running through it from north to south (Appendix B, Photograph 13). Other than the possible evidence of the brickworks, there were no indication of possible buried archaeological features and no other heritage assets were identified.

Hilden Manor (4) and Manor Cottages (5) are to the south of London Road approximately 490m and 300m respectively north of the proposed embankment. Hilden Manor is a 2-storey house with two forward facing gables constructed of red brick. The house faces London Road which is a principal component of the house's setting. The house is currently a restaurant and its current setting is defined by the associated space around it, comprising a car park to the rear and an unenclosed garden area to front. The cottages (5) are 2-storey timber framed with a red brick lower storey and a rendered first floor and their setting is defined by their position as part of the streetscape along London Road. Both of these assets are set within the residential sprawl of Tonbridge and their setting is unlikely to be affected by the proposed development.

Grove Cottage (3) is located to the west of the railway embankment, approximately 480m west of the proposed embankment. The cottage is set within a narrow strip of enclosed land with clear views out towards the surrounding agricultural landscape which contributes to its setting. The setting of the cottage to the east, towards the proposed embankment, is dominated by the tree-lined railway line embankment.

The setting of Hawden farm (2) and the oasthouses and granary south of Hawden (1) is defined by their relationship to the low-lying agricultural landscape that surrounds them. The site visit concluded that the proposed development may introduce a new linear earthwork into this setting.



## 5.6 Archaeological Potential

There are no designated heritage assets. Two assets have been identified from 19<sup>th</sup> century mapping as being in close proximity to the western edge of the Site to the south of London Road. These comprise the site of a brickworks and ancillary buildings (15) and a small building to the north of the brickworks which is also likely to be associated with it (16). Within the northern limit of the Site, to the immediate south of London Road, a water tank is shown on historic OS maps (17). The tank is no longer extant and is assessed to have no historic value (Plate 1).



Plate 1: Extract from Ordnance Survey map published 1871. Brickworks' buildings to the west of the Site (red line) and location of small water tank in the north of the Site

The Site has been subject to little development or activity as demonstrated by analysis of historical mapping. The majority of the Site has probably only been used for agricultural purposes, and, in recent years, as playing fields for Tonbridge School. The Site mostly follows the line of existing field and edge of settlement boundaries and as such buried archaeological deposits in this area may have been disturbed by the construction of boundary fencing. The northern part of the Site, adjacent to London Road, appears to have been woodland since at least the mid-19<sup>th</sup> century and it is likely that any archaeological deposits in this area will have been disturbed as a result of tree planting.

Where the ground has not been disturbed there may be the potential for previously unrecorded archaeological remains. Table 1 below summaries the current visibility of archaeological sites within the study area and the predicted likelihood of further discover. Further details on the reasoning for these predictions can be found below.

Table 1: Archaeological Potential in the Study Area and Site

<i>Period</i>	<i>Visibility</i>	<i>Presence/Absence</i>	<i>Likelihood of Further Discovery in Study Area</i>	<i>Likelihood of Further Discovery in Site</i>
Prehistoric	Limited – Generally revealed only by field investigation and chance finds of artefacts	Absent	Low	Low
Roman	Limited – Generally revealed only by field investigation and chance finds of artefacts	Absent	Low	Low
Early Medieval	Limited – Generally revealed only by field investigation and chance finds of artefacts	Absent	Low	Low
Medieval	Moderate – Occasional building remains survive but mostly revealed only by field investigation and chance finds of artefacts	Present – Limited	Low	Low
Post-Medieval	Frequent – Good building survival and cartographic coverage	Present – Frequent	Medium	Low

There is no evidence of prehistoric, Roman and early medieval activity in the study area. During these periods the Site is likely to have been too marshy to support permanent settlement, although it may have been used seasonally during dryer summer months, and the valley's resources may have been exploited and perhaps used as pasture. Prehistoric settlement focus is likely to have been on the higher, drier ground beyond the study area. The likelihood of encountering previously unrecorded prehistoric, Roman and early medieval remains in the Site is considered to be low.

There is evidence for activity during the medieval period, with Tonbridge becoming well established as a settlement. The area of the Site, if utilised, is likely to have been used for agriculture, most likely pasture. The Site is located away from known settlement foci and the

likelihood of encountering previously unrecorded medieval remains within the Site is considered to be low.

The Site continued to be used primarily for agriculture throughout the post-medieval period. Two heritage assets have been identified in close proximity to the Site dating from the 19<sup>th</sup> century, comprising a brickworks and a small building, and a water tank noted from historic OS maps was present in the north of the Site. It is possible that sub-surface remains of these features survive below current ground level; however historic mapping confirm that there are no buildings within the footprint of the Site and the site walkover assessed that the potential for heritage assets to be present in the Site is extremely unlikely. The potential for encountering previously unrecorded post-medieval remains is considered to be very low.

## **5.7 Palaeoenvironmental Potential**

The Site is adjacent to an existing watercourse, Hilden Brook, and is located on a low lying flood plain close to the River Medway. There is a possibility that alluvium deposits containing palaeoenvironmental data associated with either historical flooding episodes or deposits associated with Hilden Brook are present within the Site. Boreholes excavated at Tonbridge School Sports Centre car park to the east of the Site recorded clay and clay-sand deposits above sand and gravel (Capita URS 2015). The clay may represent alluvium above river terrace deposits; however organic-rich deposits, such as peat, were not recorded during the investigations. The potential for deposits containing palaeoenvironmental data to be present within the Site is assessed to be very low.

## 6. Conclusions and Recommendations

The potential for the Site to contain previously unrecorded heritage assets has been assessed as low, including the potential for encountering sub-surface remains associated with the former brickworks.

It is assumed that the proposed development will entail importing material to the Site to create the bund resulting in minimal impacts to sub-surface deposits. In addition, the height of the proposed bund which is approximately 1m is unlikely to affect the setting of heritage assets in the study area.

Due to the low potential for the Site to contain heritage assets and the low level of impact arising from the proposed development it is assessed that further archaeological evaluation is not required at this stage.

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# Appendix A

## A.1 Figures

## Appendix B

### B.1 Gazetteer of Heritage Assets

<i>Reference</i>	<i>Grid Reference</i>	<i>Period</i>	<i>Description</i>	<i>No. on Fig 2</i>
1337033 TQ 54 NE 267	TQ 57810 47246	Post-Medieval	Oasthouses and Granary to the south of Hawden. The west end of the granary is dated 1899 but the east end and oasthouses may be older. <b>Listed Building Grade II</b>	1
1069944 TQ 54 NE 156 MKE81749	TQ 57839 47446	Post-Medieval	Hawden. L-shaped, probably timber framed building, refaced in 17 <sup>th</sup> to 18 <sup>th</sup> centuries. <b>Listed Building Grade II</b>	2
1248428 TQ 54 NE 148	TQ 57256 47451	Post-Medieval	Grove Cottage, Powder Mill Lane. Small house. Late 18 <sup>th</sup> or early 19 <sup>th</sup> century. A good example of a small traditional house with an unspoiled exterior. <b>Listed Building Grade II</b>	3
1111751 TQ 54 NE 72 MKE81748 EKE9732 EKE10255	TQ 58068 47656	Post-Medieval	Hilden Manor. 17 <sup>th</sup> century or earlier. An archaeological watching brief here found no finds or features of archaeological significance. <b>Listed Building Grade II</b>	4
1363423 TQ 54 NE 285	TQ 58208 47599	Post-Medieval	Manor Cottages, 1 and 2 London Road. Timber-framed cottages. <b>Listed Building Grade II</b>	5
MKE81750	TQ 5848 4725	Post-Medieval	Pot Kiln Farm. Post-Medieval farmstead. Now demolished.	6
TQ 54 NE 255	TQ 5895 4728	Post-Medieval to	Milestone	7

<i>Reference</i>	<i>Grid Reference</i>	<i>Period</i>	<i>Description</i>	<i>No. on Fig 2</i>
		Modern		
TQ 54 NE 293	TQ 57890 46715	Modern	Type 24 Pillbox (wood shuttered) situated in woodland close to River Medway, on north side of the river, defending against advance from the south.	8
TQ 54 NE 3340	TQ 58861 46793	Modern	Second World War air raid shelters at Slade Primary School. One shelter consists of a square arrangement of tunnels, the other had a square core and tunnels extending from this with escape hatches at the ends of these.	9
TQ 54 NE 318	TQ 5884 4683	Modern	A George V pillar box, Stafford Road/Lodge Road. Dates from 1911-1922.	10
TQ 46 SE 6	Linear (centred TQ 4803 6113)	Post-Medieval	Tonbridge Main Line railway. The line between St Johns Station and Tonbridge was opened in 1862.	11
TQ 54 NE 3	Linear (centred on TQ 59022 46716)	Medieval	Tonbridge Town Defences (course of). License to enclose the town of Tonbridge with a wall was granted by Henry III in 1259. The wall was either not built or does not survive, but parts of the ditch remains and the whole of the course may be traced. The enclosure is completed by the Medway on the south and a tributary stream on the west. Parts of the banks are a Scheduled Monument, but none of these are within the study area.	12
EKE9987	TQ 58747 46752	Modern	A watching brief found evidence of late 20 <sup>th</sup> century ground raising to elevate the area off the floodplain.	13
DKE19681	TQ 5850 4654	Modern	Tonbridge Castle and Sports Ground. Public garden containing the Norman Castle (outside of the study area), sports pitches, tennis and bowling and a swimming pool.	14

<i>Reference</i>	<i>Grid Reference</i>	<i>Period</i>	<i>Description</i>	<i>No. on Fig 2</i>
Historic Mapping	TQ 5835 4722	Post-Medieval	Building associated with brickworks shown on Ordnance Survey map of 1866-69.	15
Historic Mapping	TQ 5844 4730	Post-Medieval	Building associated with brickworks shown on Ordnance Survey map of 1897	16
Historic Mapping	TQ 5848 4739	Post-Medieval	Tank shown on Ordnance Survey map of 1880	17
TMBC	-	Medieval, Post-Medieval and Modern	Tonbridge Central Area Conservation Area.	18

## Appendix C

### C.1 Site Photographs



**Photograph 1: Crushed brick and tile within footpath, possibly deriving from demolished remains of former brickworks on Watersfield Lane**





**Photograph 2: Crushed brick and tile within footpath, possibly deriving from demolished remains of former brickworks**



**Photograph 3: Area of pasture in northern part of the Site**





**Photograph 4: Area of scrub in northern part of the Site**



**Photograph 5: Evidence of recent burning in the northern part of the Site**





**Photograph 6: Playing fields in the central part of the Site**



**Photograph 7: Playing field buildings in the south eastern part of the Site**





**Photograph 8: Spoil heap in the south eastern part of the Site; likely up-cast derived during construction and levelling of the sports pitches**



**Photograph 9: Spoil heap in the south eastern part of the Site (detail)**





**Photograph 10: Pasture in the western part of the Site**



**Photograph 11: Garden south of the oasthouses and granary in the western part of the Site (1)**



**Photograph 12: Evidence of recent burning in the western part of the Site**



**Photograph 13: Area of scrub dividing pasture from playing field**





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# List of abbreviations

Table 21: List of abbreviations relevant to this PEI Report

Abbreviation	Description
CFMP	Catchment Flood Management Plan
COSHH	Control of Substances Hazardous to Health
EAP	Environmental Action Plan
EIA	Environmental Impact Assessment
EPSML	European Protected Species Mitigation Licence
ESAP	Environmental Site Appraisal Plan
FAS	Flood Alleviation Scheme
HER	Heritage Environment Record
ILP	Indicative Landscape Plan
KMBRC	Kent & Medway Biological Records Centre
NCA	National Character Area
PEA	Preliminary Ecological Appraisal
PPE	Personal Protective Equipment
PRoW	Public Rights of Way
SEA	Strategic Environmental Assessment
SNCI	Site of Nature Conservation Interest
SPZ	Source Protection Zone
SoP	Standard of Protection
SSSI	Site of Special Scientific Interest
UXO	Unexploded ordnance
WFD	Water Framework Directive

# Glossary

Table 22: Glossary of terms

Topic	Description
Air quality management area (AQMA)	Area defined by the local authority as an area requiring management because air quality levels do not meet national air quality objectives
Aquifer	An underground layer of rock with water storage capability.
Area of Outstanding Natural Beauty (AONB)	Areas formally designated under the National Parks and Access to the Countryside Act (1949) to protect parts of the countryside of high scenic quality that cannot be selected for National Park status as they do not have opportunities for outdoor recreation. The Countryside Agency is the government agency responsible for designating AONBs and advising the government.
Archaeological Priority Areas	An area specified by Local Planning Authorities to help protect archaeological remains that might be affected by development.
Baseline	A description of the present state of the environment with the consideration of how the environment would change in the future in the absence of the plan/programme/project as a result of natural events and other human activities.
Baseline studies/survey	Collection of information about the environment which is likely to be affected by the project
Biodiversity Action Plan (BAP)	An agreed plan for a habitat or species, which forms part of the UK's commitment to biodiversity in response to the Convention on Biological Diversity, Rio de Janeiro 1992
Brownfield site	A site which has been previously developed, often a disused factory site or industrial area.
Catchment	A surface water catchment is the total area that drains into a river. A groundwater catchment is the total area that supplies the groundwater part of the river flow.
Catchment Flood Management Plan (CFMP)	A high level plan carried out by the Environment Agency in order to manage the risk of flooding to people, property and the environment in an integrated way. These plans form the basis of future flood risk management proposals.
Character area	An area of land with distinctive landscape features resulting from an interaction of wildlife, landforms, geology, land use and human activity as defined by the Countryside Agency.
Conservation Area	An area designated under the Town and Country Planning Act, 1990 to protect its architectural or historic character.
Countryside and Rights of Way (CROW) Act 2000	This Act applies to England and Wales and has five parts: - Access to the countryside Public rights of way and road traffic Nature conservation and wildlife protection Areas of outstanding natural beauty Miscellaneous and Supplementary This act increases the protection of SSSIs. Environment Agency plans/programmes/projects must gain consent for works in or near SSSIs using a CROW form.
Countryside Character Areas	Sub-divisions of England into areas with similar landscape character as categorised by the Countryside Agency. These are used when assessing the impact of a plan/programme/project on its local landscape.
Cumulative Impacts	The combined impacts of several projects within an area, which individually are not significant, but together amount to a significant impact.
Department for Environment, Food	The government department responsible for flood management policy in England

Topic	Description
and Rural Affairs (DEFRA)	
Ecological Impact Assessment (EcIA)	An assessment of the potential effects of a proposed development on species, habitats and sites that are of value to conservation or protected by national and/or international legislation.
English Heritage (EH)	Government statutory advisor on the historic environment, funded jointly by the government and by revenue from properties and members.
Environmental Action Plan (EAP)	A standalone report or Section within another environmental impact assessment document which ensures that constraints, objectives and targets set in the main Environmental Report/Statement are actually carried out on the ground. Actions are separated into those to be carried out before, during and after construction.
Environmental Impact Assessment (EIA)	"EIA is an assessment process applied to both new development proposals and changes or extensions to existing developments that are likely to have significant effects on the environment. The EIA process ensures that potential effects on the environment are considered, including natural resources such as water, air and soil; conservation of species and habitats; and community issues such as visual effects and impacts on the population. EIA provides a mechanism by which the interaction of environmental effects resulting from development can be predicted, allowing them to be avoided or reduced through the development of mitigation measures. As such, it is a critical part of the decision-making process." <a href="http://www.iema.net/eiareport">www.iema.net/eiareport</a>
Environmentally Sensitive Area (ESA)	An area of particularly high landscape, wildlife or historical importance within which DEFRA offered inducements to encourage farmers to adopt agricultural practices to safeguard or enhance those features. Payments have now been superseded by the ESS
Environmental Statement (ES)	The document produced to describe the environmental impact assessment process where statutory environmental impact assessment is required.
Flood alleviation scheme (FAS)	Scheme designed to reduce the risk of flooding in a given area
Flood Cell	A discrete area subject to flooding from failure of defences at a specific point or length.
Flood defence	A structure (or system of structures) that reduce flooding from rivers or the sea
Floodline	Environment Agency flood warning system, accessible by telephone or internet and updated every 15 minutes
Flood risk management strategy (FRMS)	A long term (50 years or more) plan for coastal or river management to reduce the risk of flooding and carry out. They are more detailed than CFMPs.
Flood risk mapping	A system of maps created by the Environment Agency to show areas that are at risk of a flood that has a 1 in 100 chance (or higher) of occurring in any given year
Geographical Information Systems (GIS)	A computer based system for capturing, storing, integrating, manipulating, analysing and displaying data spatially.
General Permitted Development Order (GPDO)	The Town and Country Planning (General Permitted Development) Order 1995 sets out what may be built without needing planning permission. Part 15 applies specifically to the Environment Agency
Habitats Directive	EC Directive (92/43/EEC) on the Conservation of natural habitats and of wild flora and fauna. Implemented (with the Birds Directive (79/409/EEC)) in the UK as the Conservation (Natural habitats and wild flora and fauna) Regulations (1994). This establishes a system of protection of certain flora, fauna and habitats considered to be of International or European conservation importance. Sites are designated as Special areas of conservation (SACs), special protection areas (SPAs) and/or Ramsar sites. Any developments in or close to

Topic	Description
	these designated areas are subject to the Habitat Regulations for approval of English Nature. Together these sites are referred to as the Natura 2000 network.
Indicative landscape plan (ILP)	Overlay of existing environment and scheme proposals to highlight environmental constraints and opportunities including designated sites and landscape character.
Land Drainage Regulations	The Environmental Impact Assessment (Land Drainage Improvement Works) Regulations (SI 1999 No. 1783) apply to improvement works to land drainage infrastructure undertaken by land drainage bodies, including the Environment Agency. Such works are permitted development and therefore not subject to the Town and Country Planning EIA requirements.
Local Biodiversity Action Plan (LBAP)	A local plan with targets to protect and enhance biodiversity to achieve national targets and also to protect locally important species
Local Nature Reserve (LNR)	Nature reserves designated under the National Parks and Countryside Act (1949) for locally important wildlife or geological features. They are controlled by local authorities in liaison with English Nature.
Main river	A watercourse designated by DEFRA. The Environment Agency has permissive powers to carry out flood defence works, maintenance and operational activities on main rivers. Responsibility for maintenance rests on the riparian owner.
Marine Management Organisation	An executive non-departmental public body established under the Marine and Coastal Access Act 2009 with responsibilities including marine licensing and working with Natural England and others to manage a network of marine protected areas (marine conservation zones and European marine sites).
Mitigation measures	Actions that are taken to minimise, prevent or compensate for adverse effects of the development.
National Nature Reserve (NNR)	Nature reserves designated under the National Parks and Countryside Act (1949) for nationally important wildlife or geological features (these may be the best examples in the country). They are controlled by English Nature.
National Rivers Authority (NRA)	A predecessor of the Environment Agency.
Natural Areas	Sub-divisions of England, characterised by wildlife and natural features. There are 120 Natural Areas in England. Designations are managed by English Nature.
Natural England	Natural England is an Executive Non-departmental Public Body responsible to the Secretary of State for Environment, Food and Rural Affairs. Their purpose is to protect and improve England's natural environment and encourage people to enjoy and get involved in their surroundings. Their aim is to create a better natural environment that covers all of our urban, country and coastal landscapes, along with all of the animals, plants and other organisms that live with us.
Nature Improvement Areas	12 new nature zones in England covering hundreds of thousands of hectares receiving Government funding to create wildlife havens, restore habitats and encourage local people to get involved with nature.
Nitrate vulnerable zone (NVZ)	Area where surface or ground waters are above the standards set by the Nitrates Directive (91/676), as implemented in England and Wales by SI2164/2002
Ordinary water course	A watercourse not designated as main river. The local authority or Internal Drainage Board has permissive powers to maintain them.
Ramsar site	Wetland site of international importance listed under the Convention on Wetlands of International Importance under the Conservation of Waterfowl Habitat (Ramsar) Convention 1973.
Riparian	Area of land or habitat adjacent to rivers and streams
Scheduled monument	Nationally important historic sites, buildings or monuments identified by English Heritage and designated by the Secretary of State for Culture, Media and Sport. Any work affecting a scheduled monument must gain



Topic	Description
	consent from English Heritage under the Ancient Monuments and Archaeological Areas Act (1979).
Scoping	The process of deciding the scope or level of detail of an EIA/ SEA. During this stage the key environmental issues (likely significant effects) of a project/strategy are identified so that the rest of the process can focus on these issues. Issues may result from the proposal itself or from sensitivities of the site.
Screening	(1) For environmental impact assessment, the process of deciding which developments require an environmental impact assessment to be carried out and whether this will be statutory. (2) For strategic environmental assessment, the decision on which plans, strategies or programmes require strategic environmental assessment to be carried out and whether this will be statutory.
Screening opinion	Statutory opinion from the competent authority as to whether a proposed project requires statutory environmental impact assessment according to the Environmental Impact Assessment Regulations.
SEA Directive	European Directive 2001/42/EC "on the assessment of the effects of certain plans and programmes on the environment"
SEA Regulations	The regulations transposing the SEA Directive into UK law
Site of Special Scientific Interest (SSSI)	Nationally important sites designated for their flora, fauna, geological or physiographical features under the Wildlife and Countryside Act (1981) (as amended) and the Countryside Rights of Way (CROW) Act (2000).
Special Area for Conservation (SAC)	Sites of European importance for habitats and non bird species. Above mean low water mark they are also SSSIs.
Special Protection Area (SPA) and proposed Special Protection Area (pSPA)	An area designated for rare or vulnerable birds, or migratory birds and their habitats, classified under Article 4 of the EC Directive on the Conservation of Wild Birds (79/409/EEC). They are also SSSIs. Proposed sites receive the same protection as fully protected sites
Standard of protection (SoP)	The level of protection from flooding, for example an SoP of 1 in 100 means that the flood defences in an area provide protection from floods up to a size of flood with a probability of occurring of 1 in 100 in any year
Strategic Environmental Assessment	SEA is a process designed to ensure that significant environmental effects arising from proposed plans and programmes are identified, assessed, subjected to public participation, taken into account by decision-makers, and monitored. SEA sets the framework for future assessment of development projects, some of which require Environmental Impact Assessment (EIA). SEA is carried out according to the requirements of the SEA Directive 2001/42/EC
Strategy	See Flood Risk Management Strategy
Sustainable urban drainage systems (SuDs)	A system of controlling the quality and quantity of water run-off so as to prevent flooding or pollution.
Washland	Area of land adjacent to a watercourse, which is allowed to flood when the watercourse overtops its banks.
Water Framework Directive (WFD)	EC Directive (2000/60/EC) on integrated river basin management. The WFD sets out environmental objectives for water status based on ecological and chemical parameters, common monitoring and assessment strategies, arrangements for river basin administration and planning and a programme of measures in order to meet the objectives.
Water level management plan (WLMP)	A plan that sets out water level management requirements in a defined floodplain area (usually an SSSI) which is designed to reconcile different needs for drainage.

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