

Appendix F

ECONOMIC ANALYSIS

NORTH HERTFORDSHIRE DISTRICT SWMP ECONOMIC ASSESSMENT

DATE: March 2017

Introduction

This Technical Note has been produced to summarise the potential construction costs and associated economic viability associated with each of the potential flood mitigation schemes identified through the detailed phase of the North Hertfordshire District SWMP.

The potential construction cost estimates have been undertaken at a strategic scale to enable the schemes to be assessed for viability, and where viable prioritised for further assessment. These cost estimates have been prepared based upon the mitigation schemes provided in Appendix E of the SWMP and the baseline modelling. At this time no post mitigation modelling has been undertaken to refine or test the performance of these options. Assumptions regarding the performance have therefore been made as part of this economic assessment, as detailed below.

The mitigation measures have been identified and their associated requirements sized using engineering judgement. For example, where this involves attenuation/relocation of flow paths the total volume has been estimated from the maximum flood extent maps, using an assessment of the area and average depth across the area to be protected.

The potential costs associated with the mitigation options have been determined using the Environment Agency's Long Term Costing Tool¹ which has been developed for this purpose. As these costs have been estimated at a strategic scale several broad assumptions were required, these were:

- All the land required is already within public control or will be allowed to flood more frequently/to greater depths;
- No allowance has been made for working with third parties to make them aware of the risks/measures to reduce these risks;
- No infrastructure constraints exist which would require diversion or alternative construction approaches;
- Any spoil can be re-used within the site/scheme; and
- Works to the highway to ensure that it functions as a preferential flow path would be limited and restricted to minor works, such as vegetation clearance, altering kerb arrangements or liaison with property owners to make minor changes to walls/fences to maintain flow routes. As such no provision has been made for this aspect. The scope of such works would need to be refined following a detailed site visit with appropriate engineers.
- All options considered have an optimism bias of 60% added to their present value costs to allow for uncertainty; this is standard for strategic/feasibility stage of design.

These costs have allowed for design and construction with operation and maintenance (where contained within the Environment Agency's tool).

¹ <https://www.gov.uk/government/publications/long-term-costing-tool-for-flood-and-coastal-risk-management>

Hotspot 6 - Hitchin

The Standard of Protection (SOP) assumed for this scheme is 1.33% (1 in 75 years) based on the baseline model results. The costs for providing this are detailed below:

MEASURE	ESTIMATED COST [£]
Charlton road area – Use fields to the east of Charlton road as storage area. Assumed to provide 10,000m ³ below ground storage	750,000
Hazelwood Close – Upsize pipes leading to the river	440,000
Sun Street/Bridge Street – PLP* for 50 commercial properties	1,390,000
Verulam Road/The Avenue – Upgrade pipes along Verulam Road and add connecting pipes between Verulam Road and The Avenue	1,630,000

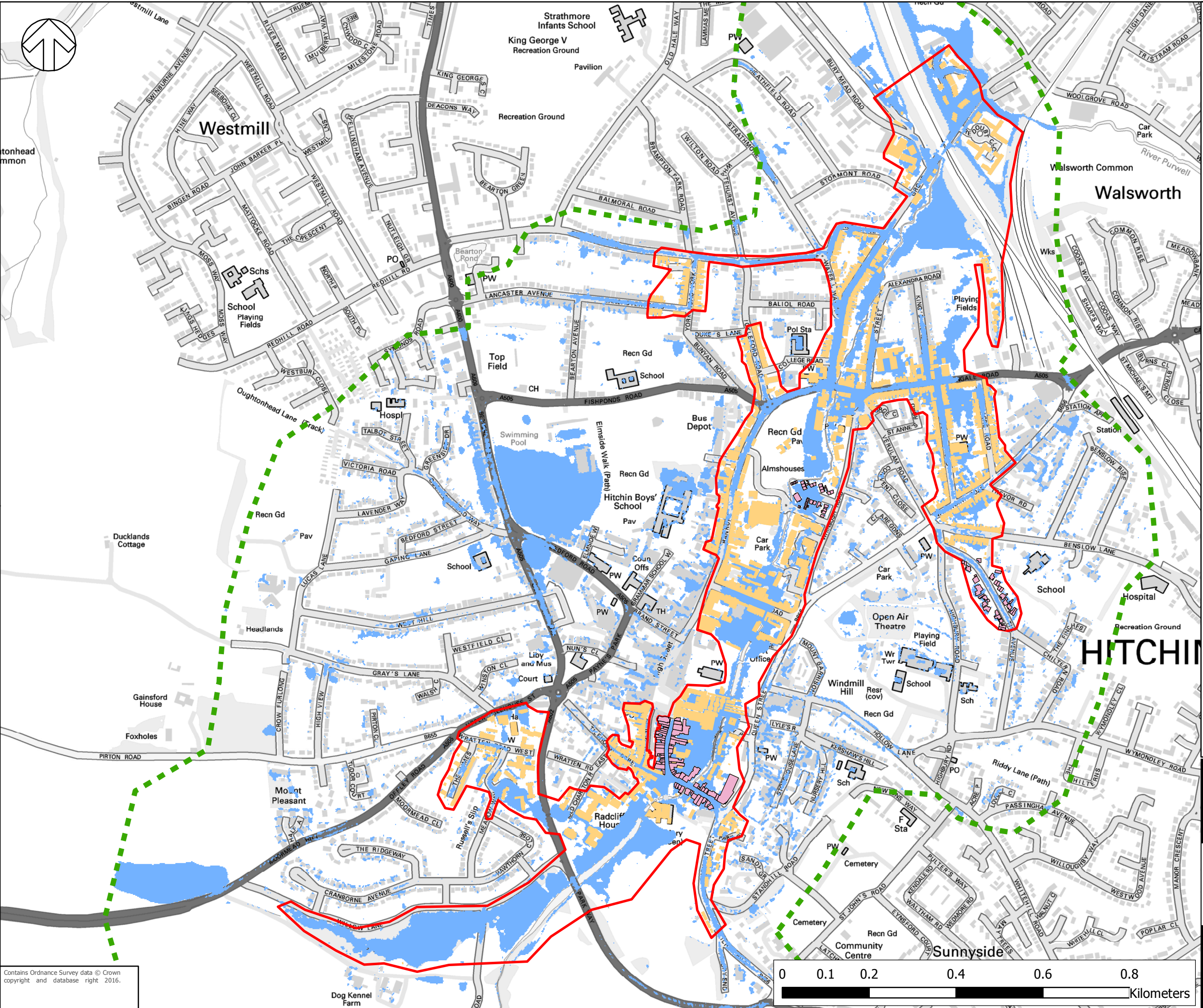
*PLP = Property Level Protection

Hitchin Assumptions

To provide a cost estimate for this hotspot several location specific assumptions were required, these are outlined below:

- Creating a large storage area to the east of Charlton Road will reduce river levels downstream, helping alleviate flooding throughout the town. Without hydraulic modelling the extents of the economic benefits of this option are unclear and have not been included in the benefits.
- The Charlton Road storage area has been developed based upon the SWMP modelling. Improvements to the fluvial model are required to confirm the required size and location of the storage.
- PLP costs have been based on:
 - Commercial properties being in the *medium* cost bracket
 - PLP protection being required for 100 years
 - Operational & Maintenance (O&M) costs being 5% of capital costs

Figure 1 shows the economic analysis map for Hotspot 6 - Hitchin.



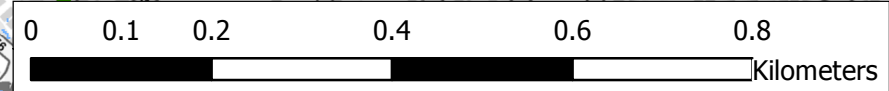
Key

- Properties benefitting from mitigation measures
- Model Extents
- Economic Analysis Zone
- Properties to be included in economic analysis

1 in 1000yr RP

-

Contains Ordnance Survey data © Crown copyright and database right 2016.



TITLE:
North Herts and Darcorum Surface Water Management Plan
Hotspot 6 - Economic Analysis

FIGURE No:
FIGURE 1

Hotspot 7 - Oakfield

The mitigation measures could be implemented to prevent flooding of the highway to a standard agreed with the Local Highway Authority (HCC). As no properties are shown to be flooding this does not prevent the costings from being developed at this stage. Indicative costs for providing a culvert upgrade are detailed below. Alternative options may be considered subject to meeting the Highway Authorities requirements:

MEASURE	ESTIMATED COST [£]
Stevenage Road – Install a new culvert with screen (900mm diameter, 25m long) next to the existing to increase conveyance under Stevenage Road.	85,000

Oakfield Assumptions

To provide a cost estimate for this hotspot several location specific assumptions were required, these are outlined below:

- There is no key infrastructure under the highway that would lead to increased costs of installation or maintenance of the proposed culvert;
- Increasing flows under Stevenage Road will not lead to any property flooding downstream. This would need to be tested using hydraulic modelling;
- A 900mm diameter culvert will allow sufficient additional flow under Stevenage Road to reduce flooding on the highway; and
- The screen will be cleaned and maintained manually as opposed to using plant/machinery.

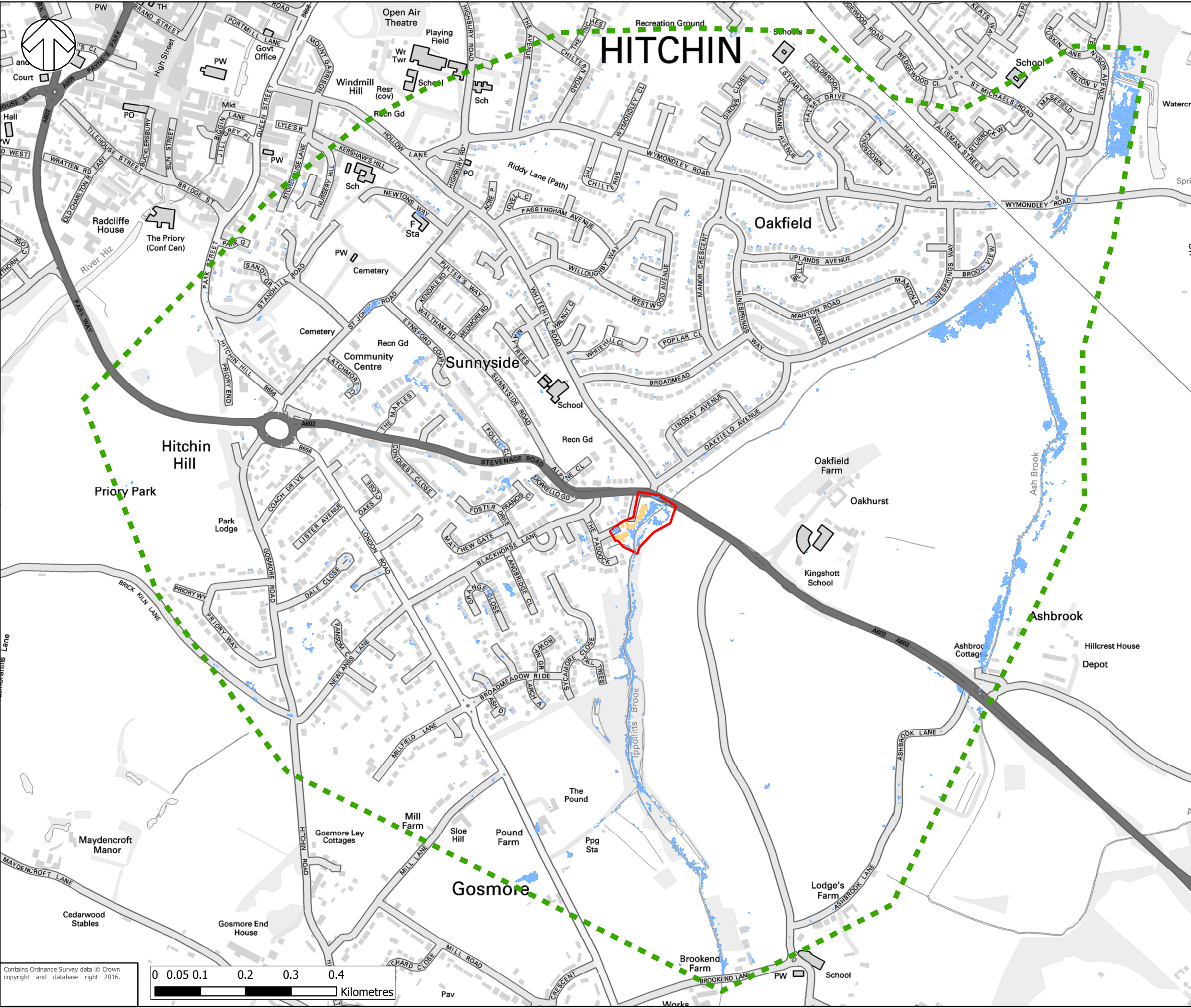
Alternative approaches

Other lower cost options could help alleviate flooding on Stevenage Road; however further hydraulic modelling is needed to understand the benefits. These options include:

- A storage area next to the existing culvert
- A new headwall for the existing culvert to increase conveyance.

Figure 2 shows the economic analysis map for Hotspot 7 - Oakfield.

File: Q:\WSP_UK\WSP_D\Basing\70006808_NorthHerts_Dacorum_SWMP\Map_Documents\Hotspot_7_Economic_Analysis.mxd
Date Modified: 14/04/2016
Drawn By: uksw100



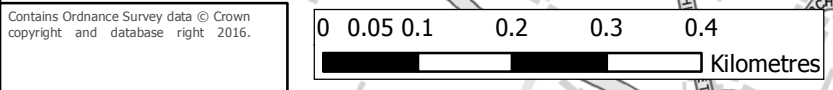
Key

- Model Extents
- Economic Analysis Zone
- Properties to be included in economic analysis
- 1 in 1000 yr RP



TITLE:
North Herts and Dacorum
Surface Water Management Plan
Hotspot 7 - Economic Analysis

FIGURE No:
FIGURE 2



Hotspot 12 - Baldock

The mitigation measures could be implemented to provide a 3.33% SOP (1 in 30 years). The cost for providing this are detailed below:

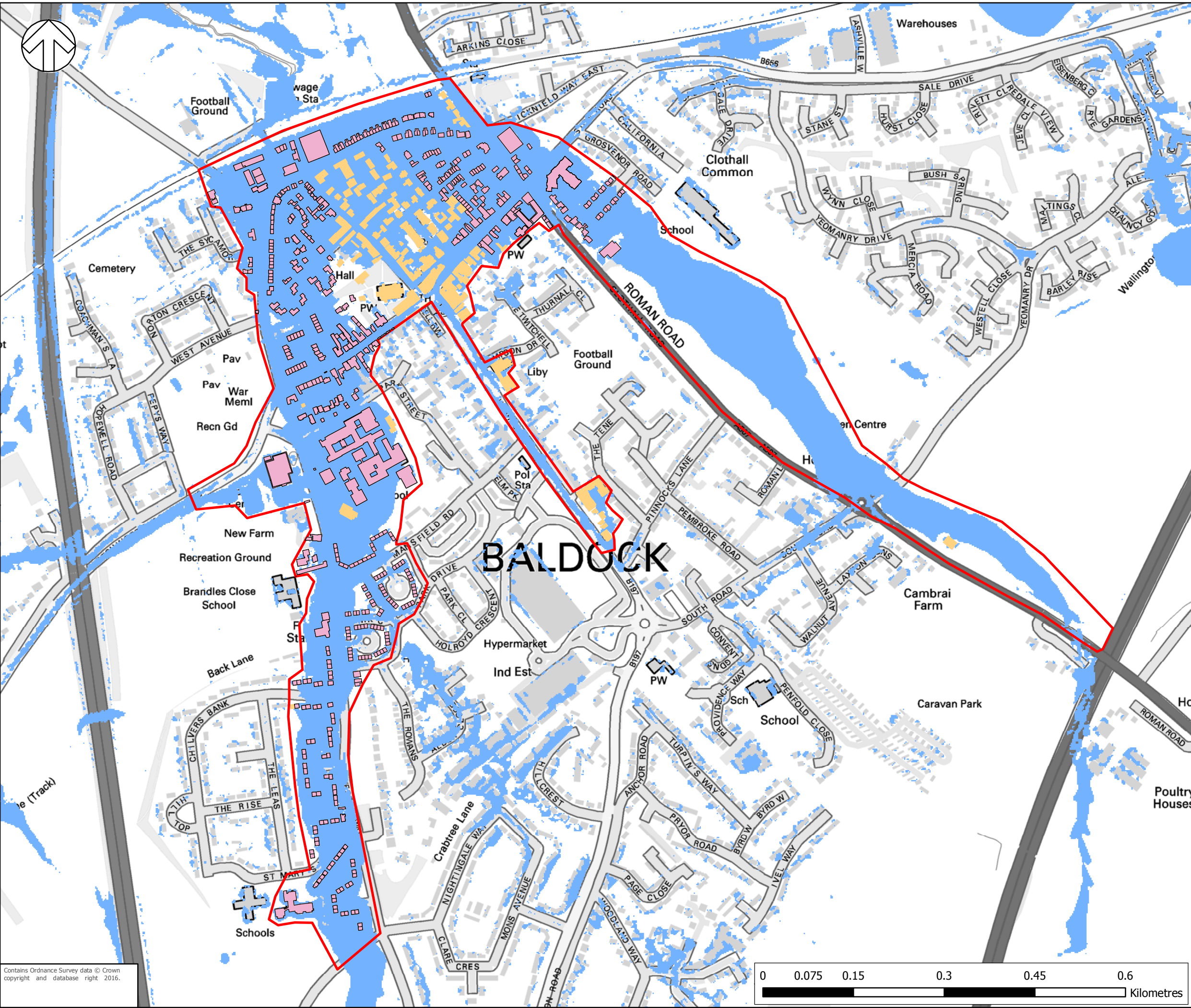
MEASURE	ESTIMATED COST [£]
<i>Footpath under railway</i> – Install a new surface water sewer under the footpath. 100m long with 2m ² cross-section	640,000
<i>White Horse Street</i> – PLP for 70 residential properties	1,260,000
<i>Western Way</i> – Two 400m ³ detention basins one in the fields of Knights Templar School, the other north of Baldock Lane	80,000
<i>Clothall Road</i> – 250m Bund across the field to create a storage area	700,000

Baldock Assumptions

To provide a cost estimate for this hotspot several location specific assumptions were required, these are outlined below:

- PLP costs have been based on:
 - Residential properties being in the *medium* cost bracket
 - PLP protection being required for 100yrs
 - O&M costs being 5% of capital costs
- The surface water sewer can be constructed in the footpath under the railway embankment without incurring additional costs. No discussions with Network Rail have been undertaken to date. Consultation would be required before this option is taken further.

Figure 3 shows the economic analysis map for Hotspot 12 - Baldock.



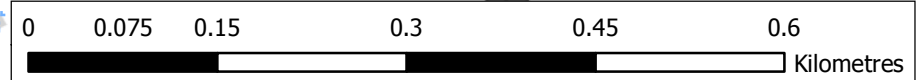
Key

- Properties benefitting from mitigation options
- Model Extents
- Economic Analysis Zone
- Properties to be included in economic analysis

1 in 1000yr RP

-

Contains Ordnance Survey data © Crown copyright and database right 2016.



TITLE:
 North Herts and Dacorum
 Surface Water Management Plan
 Hotspot 12 - Economic Analysis

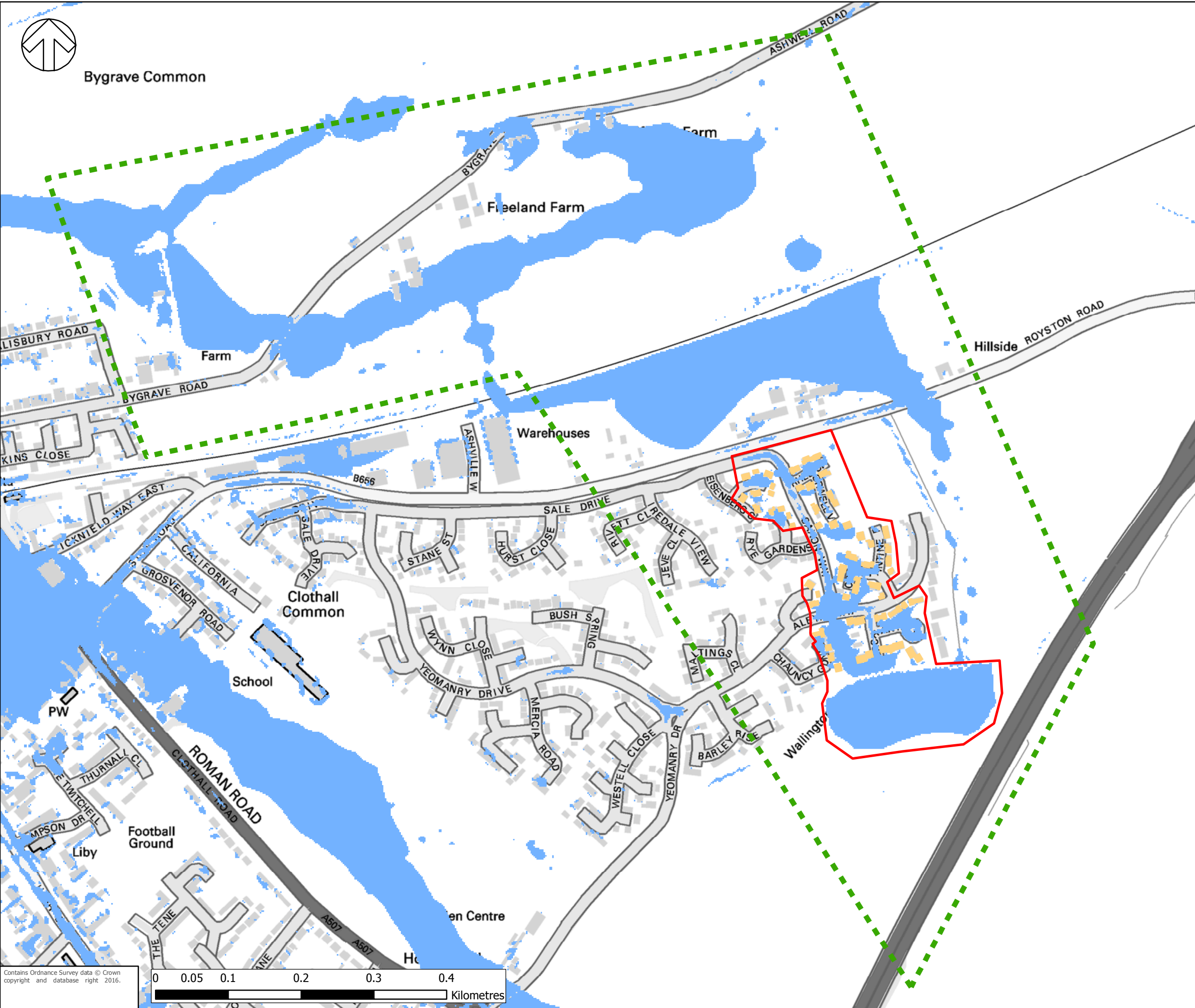
FIGURE No:
 FIGURE 3

Hotspot 13 - Clothall Common, Baldock




Flooding around Clothall Common is limited to potential development sites. Currently no mitigation is needed however it is recommended that the following measures are taken when working with developers:

MEASURE	ESTIMATED COST [£]
<i>Ensure a preferential flow path along highway network exists</i>	N/A
<i>Ensure attenuation/detention/soakaway are included in masterplan (if required following the drainage proposal)</i>	N/A
<i>Ensure awareness of wet area and method of discharge under the railway and the downstream ditch network</i>	N/A


Figure 4 shows the economic analysis map for Hotspot 13 – Clothall Common, Baldock.



Key

-  Model Extents
-  Economic Analysis Zone
-  Properties to be included in economic analysis

1in1000yr RP

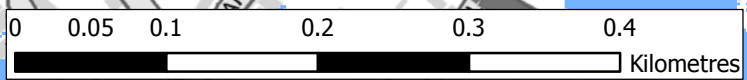
- 



TITLE:
 North Herts and Darcorum
 Surface Water Management Plan
 Hotspot 13 - Economic Analysis

FIGURE No:
 FIGURE 4

Contains Ordnance Survey data © Crown copyright and database right 2016.



Hotspot 17 - Knebworth

The SOP assumed for this scheme is 3.33% (1 in 30 years). The costs for providing this are detailed below:

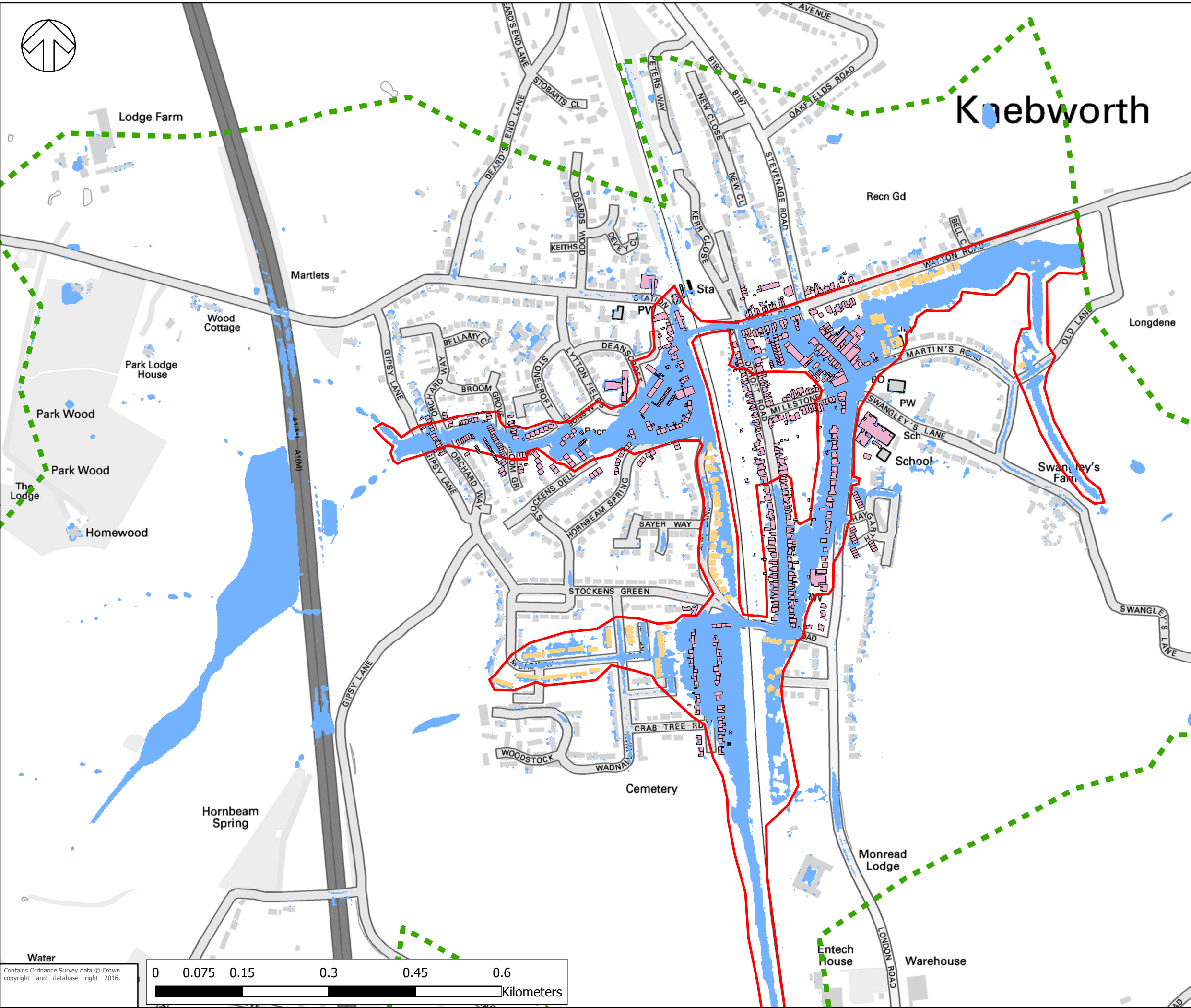
MEASURE	ESTIMATED COST [£]
<i>Field behind Gipsy Lane – Dig 2x 100m infiltration trenches</i>	35,000
<i>South of Gun Road Gardens – Dig 500m³ of storage basins</i>	60,000
<i>London Road – Improve local street drainage with connections to London Road drainage. 385m of added drainage network around the St Martins Road/Milestone Road intersection</i>	680,000

Knebworth Assumptions

To provide a cost estimate for this hotspot several location specific assumptions were required, as outlined below:

- 500m³ of storage is needed around Gun Road Gardens - the layout and location of the storage areas will need to be analysed further in the next stage of design.
- The highway drainage on London Road is in good condition and can be utilised without further improvements.

Figure 5 shows the economic analysis map for Hotspot 17 - Knebworth.



Key

- Properties benefiting from mitigation options
- Model Extents
- Economic Analysis Zone
- Properties to be included in economic analysis

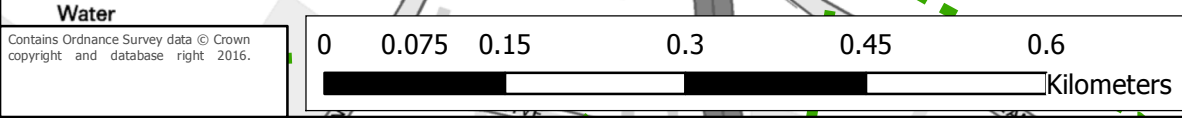
1in1000yr RP

-



TITLE:
 North Herts and Darcorum
 Surface Water Management Plan
 Hotspot 17 - Economic Analysis

FIGURE No:
 FIGURE 5



Hotspot 30 – Cambridge Road

The SOP assumed for this scheme is 3.33% (1 in 30 years). The costs for providing this are detailed below:

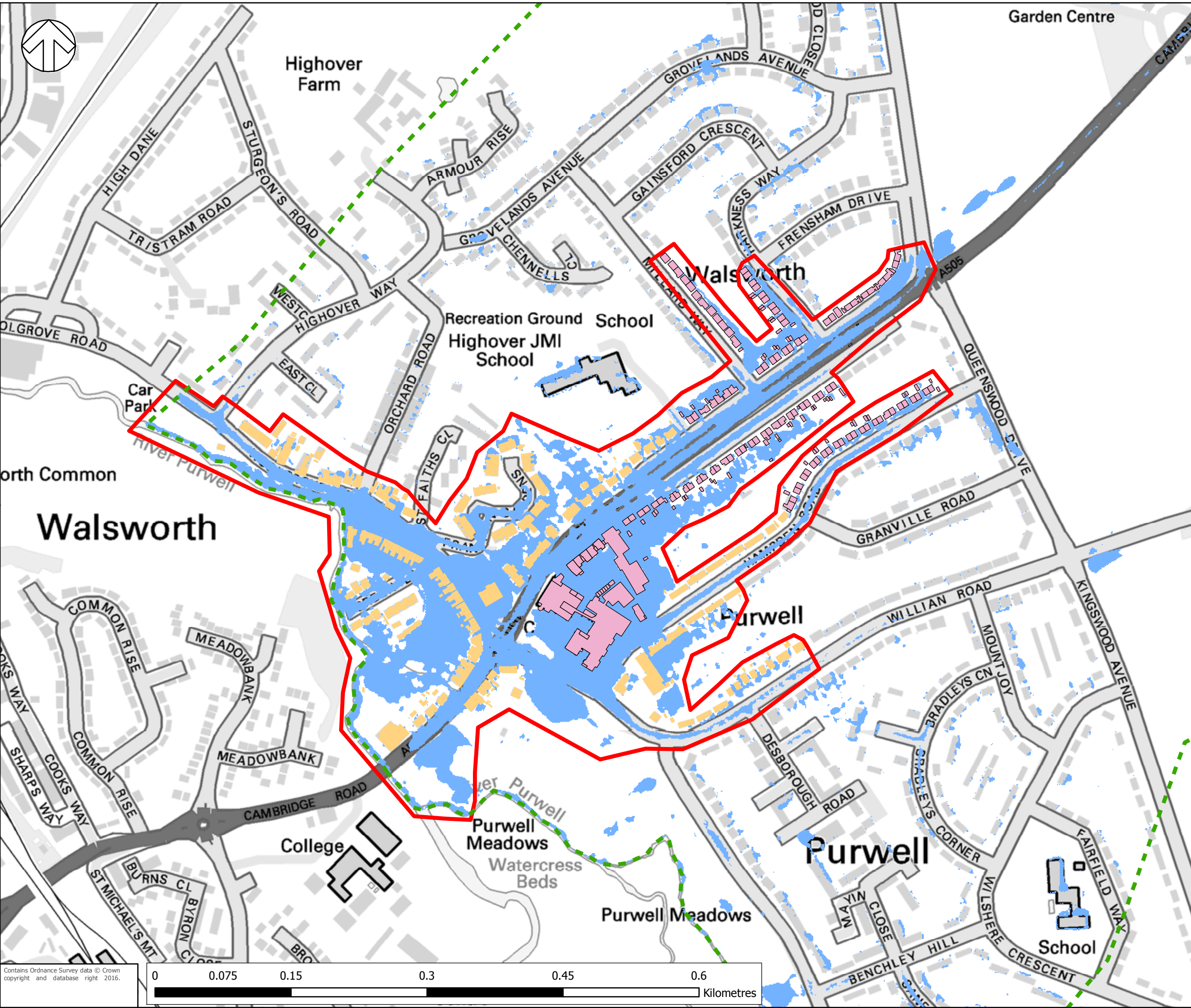
MEASURE	ESTIMATED COST [£]
<i>Cambridge Road, Queenswood Drive and Stotford Road – Widening/adding 1,050m of infiltration ditches</i>	190,000
<i>Cambridge Road/Stotford Road junction – Dig two 1,500m³ infiltration basins at the base of the ditches</i>	125,000
<i>Cambridge Road – Construct a swale along the 2,000m² greenfield area along the centre of the road</i>	70,000
<i>Cambridge Road – Dig attenuation basin and build a bund</i>	120,000
<i>Cambridge Road/Stotford road junction – 250m³ attenuation basin</i>	10,000

Cambridge Road Assumptions

To provide a cost estimate for this hotspot several location specific assumptions were required, as outlined below:

- Landowners of the fields adjacent to Queenswood Drive and Stotford Road are willing to have their ditches extended and drainage basins added to their land.
- The storage areas at the Cambridge Road/ Stotford Road junction have been developed based upon the SWMP modelling. Improvements to the fluvial model are required to confirm the required size of the storage areas.

Figure 6 shows the economic analysis map for Hotspot 30 – Cambridge Road.



Key

- Properties benefiting from mitigation options
- Model Extents
- Economic Analysis Zone
- Properties to be included in Economic Analysis

1in1000yr RP

-



TITLE:
 North Herts and Dacorum
 Surface Water Management Plan
 Hotspot 30 - Economic Analysis

FIGURE No:
 FIGURE 6

Contains Ordnance Survey data © Crown copyright and database right 2016.

