Appendix E

OPTIONS MAPS

Options:
1) Property Level Protection (PLP) for properties within the three areas shown in the southeast of the hotspot.
2) Property Level Protection in the business park.

Recommendations:
1) Investigation into measures to keep preferential flowpath along Station Road (e.g. raising kerbs, rills, reprofiling levels).
2) Roads are sloping north so rain naturally accumulates in the northern tip of the roads. Modification to drainage along the roads and introduce permeable pavements if financially viable.
3) Investigate option to upsize pipes to increase drainage into the River Rib.
4) Modification to drainage upstream of Snells Mead – investigate option to install a small drain to improve conveyance of flows towards pipe; upsize pipes along Snells Mead and Station Road to increase drainage into the River Rib.

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HOTSPOT 1 - OPTIONS (1 IN 30 YEAR)

EAST HERTS AND BROXBOURNE SURFACE WATER MANAGEMENT PLAN

Hertfordshire

WSP | PARSONS BRINCKERHOFF

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SF	AS	JB	FI	18/10/16	NTS	9115-H1-Q0030 - OPTIONS	A

Options:
1) Property Level Protection (PLP) for properties within the three areas shown in the southeast of the hotspot.
2) Property Level Protection in the business park.

Recommendations:
1) Investigation into measures to keep preferential flowpath along Station Road (e.g. raising kerbs, rills, reprofiling levels).
2) Roads are sloping north so rain naturally accumulates in the northern tip of the roads. Modification to drainage along the roads and introduce permeable pavements if financially viable.
3) Investigate option to upsize pipes to increase drainage into the River Rib.
4) Modification to drainage upstream of Snells Mead – investigate option to install a small drain to improve conveyance of flows towards pipe; upsize pipes along Snells Mead and Station Road to increase drainage into the River Rib.

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HOTSPOT 1 - OPTIONS (1 IN 100CC YEAR)

EAST HERTS AND BROXBOURNE SURFACE WATER MANAGEMENT PLAN

Hertfordshire

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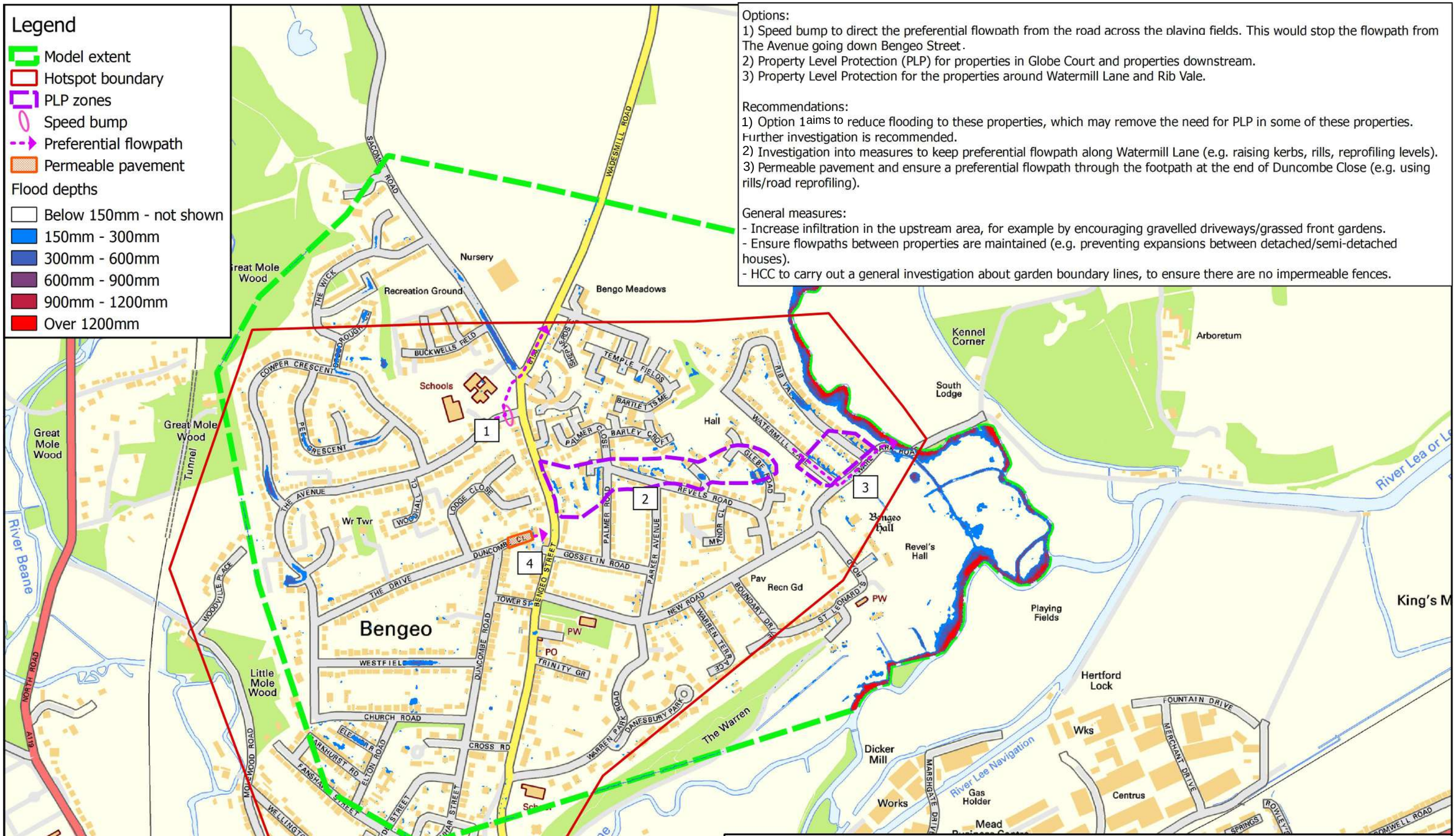
Options:
1) Speed bump to direct the preferential flowpath from the road across the playing fields. This would stop the flowpath from The Avenue going down Bengeo Street.
2) Property Level Protection (PLP) for properties in Globe Court and properties downstream.
3) Property Level Protection for the properties around Watermill Lane and Rib Vale.

Recommendations:
1) Option 1 aims to reduce flooding to these properties, which may remove the need for PLP in some of these properties. Further investigation is recommended.
2) Investigation into measures to keep preferential flowpath along Watermill Lane (e.g. raising kerbs, rills, reprofiling levels).
3) Permeable pavement and ensure a preferential flowpath through the footpath at the end of Duncombe Close (e.g. using rills/road reprofiling).

General measures:
- Increase infiltration in the upstream area, for example by encouraging gravelled driveways/grassed front gardens.
- Ensure flowpaths between properties are maintained (e.g. preventing expansions between detached/semi-detached houses).
- HCC to carry out a general investigation about garden boundary lines, to ensure there are no impermeable fences.



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HOTSPOT 40 - FLOOD OPTIONS (1 IN 30 YEAR)

EAST HERTS AND BROXBOURNE SURFACE WATER MANAGEMENT PLAN

Hertfordshire

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Legend

- Model extent
- Hotspot boundary
- PLP zones
- Speed bump
- Preferential flowpath
- Permeable pavement

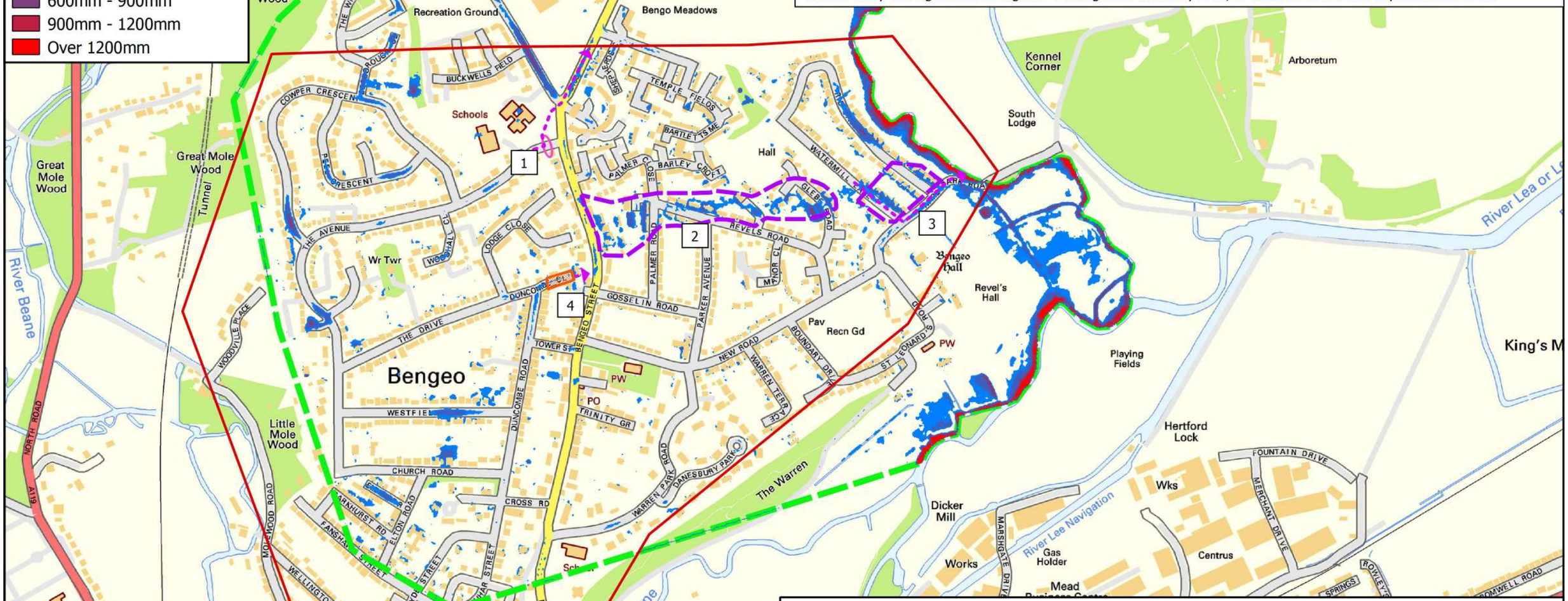
Flood depths

- Below 150mm - not shown
- 150mm - 300mm
- 300mm - 600mm
- 600mm - 900mm
- 900mm - 1200mm
- Over 1200mm

Options:
1) Speed bump to direct the preferential flowpath from the road across the playing fields. This would stop the flowpath from The Avenue going down Bengeo Street.
2) Property Level Protection (PLP) for properties in Globe Court and properties downstream.
3) Property Level Protection for the properties around Watermill Lane and Rib Vale.

Recommendations:
1) Option 1 aims to reduce flooding to these properties, which may remove the need for PLP in some of these properties. Further investigation is recommended.
2) Investigation into measures to keep preferential flowpath along Watermill Lane (e.g. raising kerbs, rills, reprofiling levels).
3) Permeable pavement and ensure a preferential flowpath through the footpath at the end of Duncombe Close (e.g. using rills/road reprofiling).

General measures:
- Increase infiltration in the upstream area, for example by encouraging gravelled driveways/grassed front gardens.
- Ensure flowpaths between properties are maintained (e.g. preventing expansions between detached/semi-detached houses).
- HCC to carry out a general investigation about garden boundary lines, to ensure there are no impermeable fences.



HOTSPOT 40 - FLOOD OPTIONS (1 IN 100CC YEAR)

EAST HERTS AND BROXBOURNE SURFACE WATER MANAGEMENT PLAN

Hertfordshire

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Legend

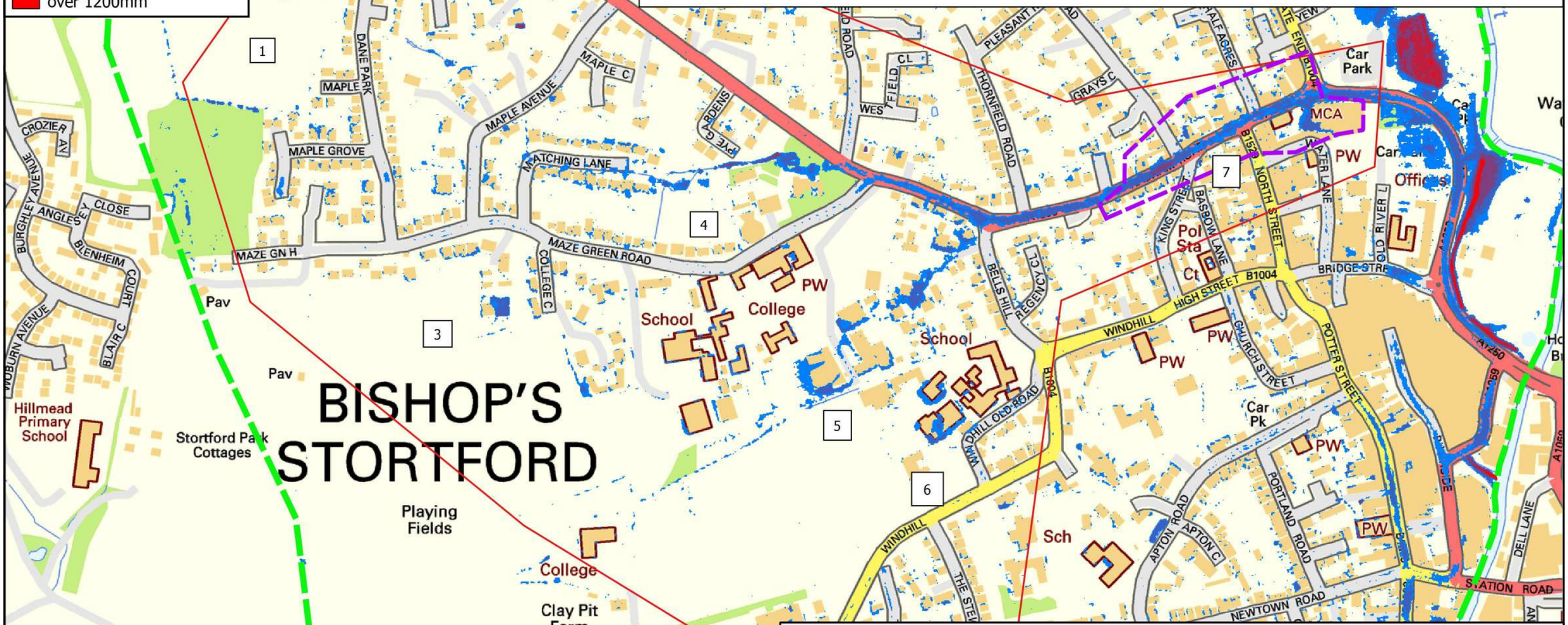
- Model extent
- Hotspot boundary
- PLP zones

Flood depths

- Below 150mm - not shown
- 150mm - 300mm
- 300mm - 600mm
- 600mm - 900mm
- 900mm - 1200mm
- over 1200mm

Options:
1) There is a preferential flowpath from NW to SE. Maintain a bund to attenuate water within the field.
2) The runoff from the recreation ground will likely spill into Hadham Road so maintain a bund or raise the kerb to attenuate water upstream and minimise water spilling into the road.
3) Maintain a bund to attenuate water within open areas.
4) There is water draining from the south towards Matching Lane houses. Upstream flow attenuation measures should reduce water draining into this area. Improve conveyance of adjacent ditches.
5) Attenuate water upstream to minimise flow across the school.
6) Maintain a bund to retain water within the car park and minimise flow across the school.
7) Introduce Property Level Protection, though measures upstream may reduce flooding of the road and property in this area (therefore low priority).

Recommendations:
- Review recommendations made by Draincare as part of a previous investigation undertaken in 2012 by East Hertfordshire District Council.
- Ensure suitable maintenance regime/prestorm action plan is in place to reduce the risks of the grilles becoming blinded.
- Work with the riparian owners to encourage deculverting, particularly along Matching Lane (properties 12-16).
- Consider increasing the attenuating capacities of the associated ponds.



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HOTSPOT 43 - OPTIONS (I IN 30 YEAR)

EAST HERTS AND BROXBOURNE SURFACE WATER MANAGEMENT PLAN

Hertfordshire

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SF	AS	JB	FI	17/10/16	NTS	9115-H43-OPTIONS-Q0030	A

Legend

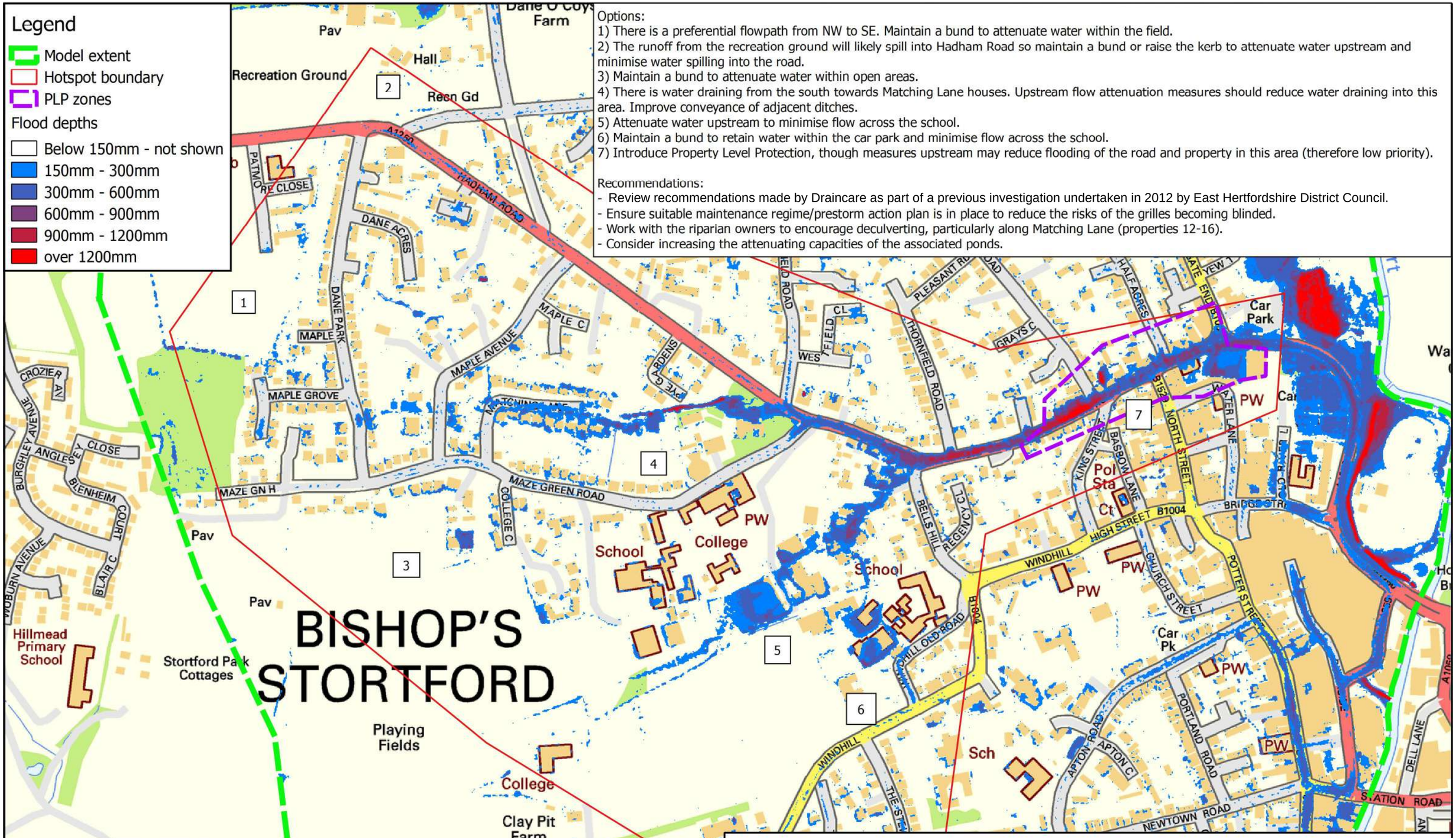
- Model extent
- Hotspot boundary
- PLP zones

Flood depths

- Below 150mm - not shown
- 150mm - 300mm
- 300mm - 600mm
- 600mm - 900mm
- 900mm - 1200mm
- over 1200mm

Options:
1) There is a preferential flowpath from NW to SE. Maintain a bund to attenuate water within the field.
2) The runoff from the recreation ground will likely spill into Hadham Road so maintain a bund or raise the kerb to attenuate water upstream and minimise water spilling into the road.
3) Maintain a bund to attenuate water within open areas.
4) There is water draining from the south towards Matching Lane houses. Upstream flow attenuation measures should reduce water draining into this area. Improve conveyance of adjacent ditches.
5) Attenuate water upstream to minimise flow across the school.
6) Maintain a bund to retain water within the car park and minimise flow across the school.
7) Introduce Property Level Protection, though measures upstream may reduce flooding of the road and property in this area (therefore low priority).

Recommendations:
- Review recommendations made by Draincare as part of a previous investigation undertaken in 2012 by East Hertfordshire District Council.
- Ensure suitable maintenance regime/prestorm action plan is in place to reduce the risks of the grilles becoming blinded.
- Work with the riparian owners to encourage deculverting, particularly along Matching Lane (properties 12-16).
- Consider increasing the attenuating capacities of the associated ponds.



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HOTSPOT 43 - OPTIONS (I IN 100CC YEAR)

EAST HERTS AND BROXBOURNE SURFACE WATER MANAGEMENT PLAN

Hertfordshire

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Legend

- Model extent
- Hotspot boundary
- PLP zones

Flood depths

- Below 150mm - not shown
- 150mm - 300mm
- 300mm - 600mm
- 600mm - 900mm
- 900mm - 1200mm
- over 1200mm

Options:

1) Property Level Protection (PLP) for the properties within the areas shown on the map.
2) Water is flowing from Claypitts Farm towards Great Hadham Road and into residential areas. Maintain a small bund around the farm to attenuate water upstream.
3) Retain water within the allotment area by maintaining a small bund along the eastern boundary. This will reduce water flowing into Ward Crescent and Waytemore Road.
4) Water is running north to south along Cemetery Road and west to east along Benhooks Avenue causing ponding at the intersection. Further investigation into reprofiling ground levels to improve conveyance into the drain downstream of Cemetery Road.
5) Property Level Protection (PLP) for the houses affected at this location. Recommended that HCC undertake a site visit to ensure preferential flowpath from Waytemore Road to Benhooks Avenue exists.
6) Property Level Protection (PLP) for the houses affected at this location.

Recommendations:

7) Modification to highway drainage along the road and introduce permeable pavements if financially viable.
8) Modification to highway drainage if required .

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HOTSPOT 44 - OPTIONS (1 IN 30 YEAR)

EAST HERTS AND BROXBOURNE SURFACE WATER MANAGEMENT PLAN

Hertfordshire

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Legend

- Model extent
- Hotspot boundary
- PLP zones

Flood depths

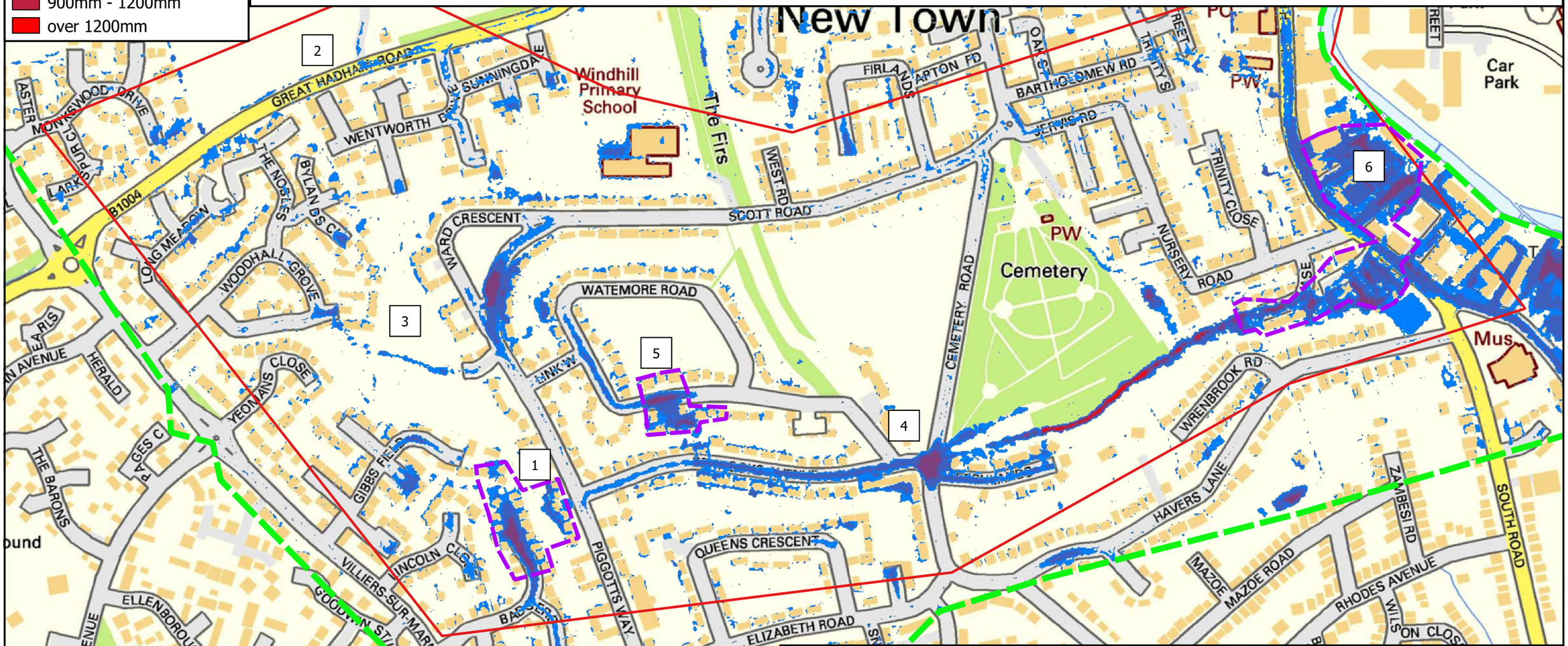
- Below 150mm - not shown
- 150mm - 300mm
- 300mm - 600mm
- 600mm - 900mm
- 900mm - 1200mm
- over 1200mm

Options:

1) Property Level Protection (PLP) for the properties within the areas shown on the map.
2) Water is flowing from Claypitts Farm towards Great Hadham Road and into residential areas. Maintain a small bund around the farm to attenuate water upstream.
3) Retain water within the allotment area by maintaining a small bund along the eastern boundary. This will reduce water flowing into Ward Crescent and Waytemore Road.
4) Water is running north to south along Cemetery Road and west to east along Benhooks Avenue causing ponding at the intersection. Further investigation into reprofiling ground levels to improve conveyance into the drain downstream of Cemetery Road.
5) Property Level Protection (PLP) for the houses affected at this location. Recommended that HCC undertake a site visit to ensure preferential flowpath from Waytemore Road to Benhooks Avenue exists.
6) Property Level Protection (PLP) for the houses affected at this location .

Recommendations:

7) Modification to highway drainage along the road and introduce permeable pavements if financially viable.
8) Modification to highway drainage if required .



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HOTSPOT 44 - OPTIONS (1 IN 100CC YEAR)

EAST HERTS AND BROXBOURNE SURFACE WATER MANAGEMENT PLAN

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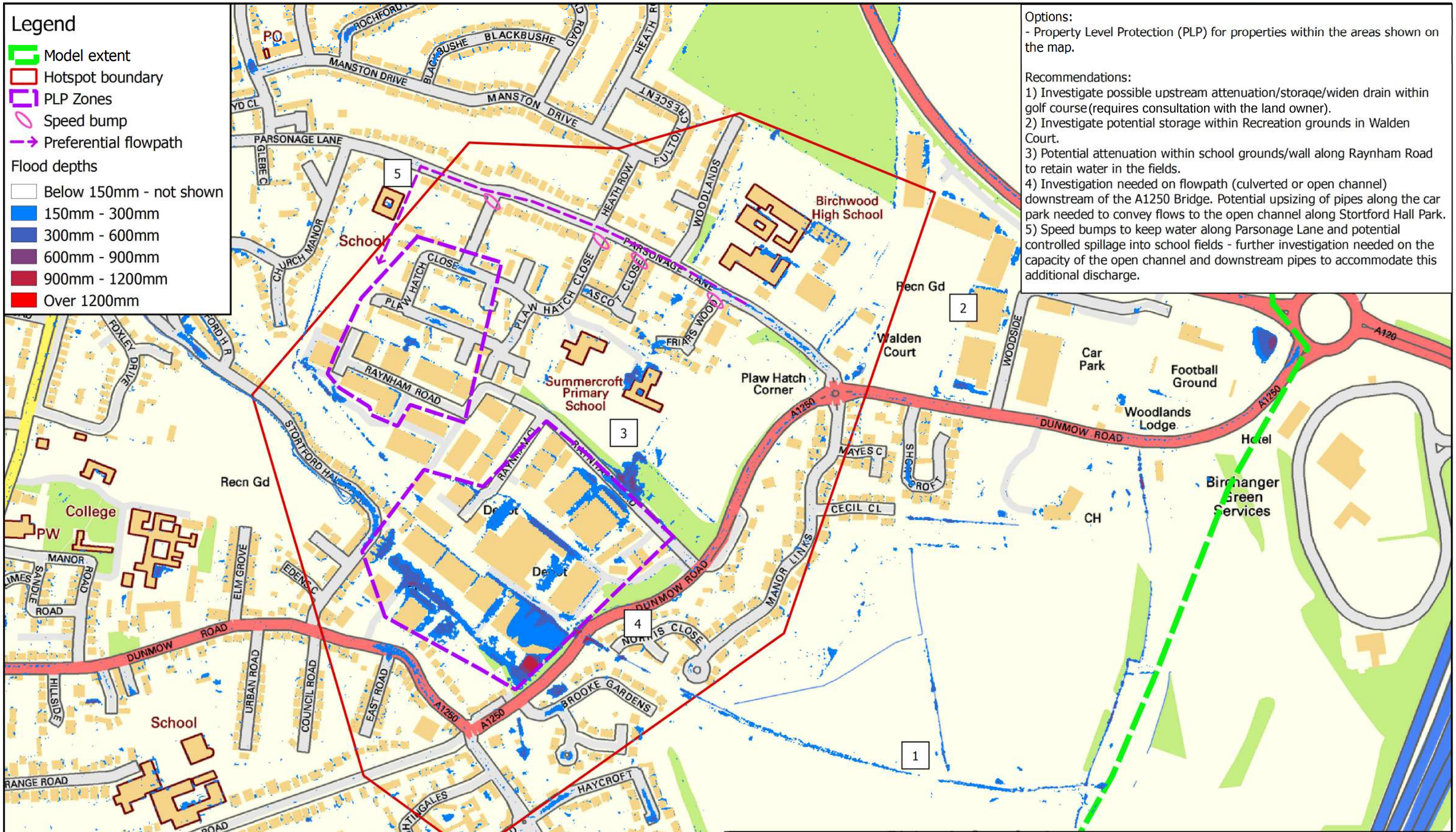

HOTSPOT 47 - OPTIONS (1 IN 30 YEAR)

EAST HERTS AND BROXBOURNE SURFACE WATER MANAGEMENT PLAN

Hertfordshire

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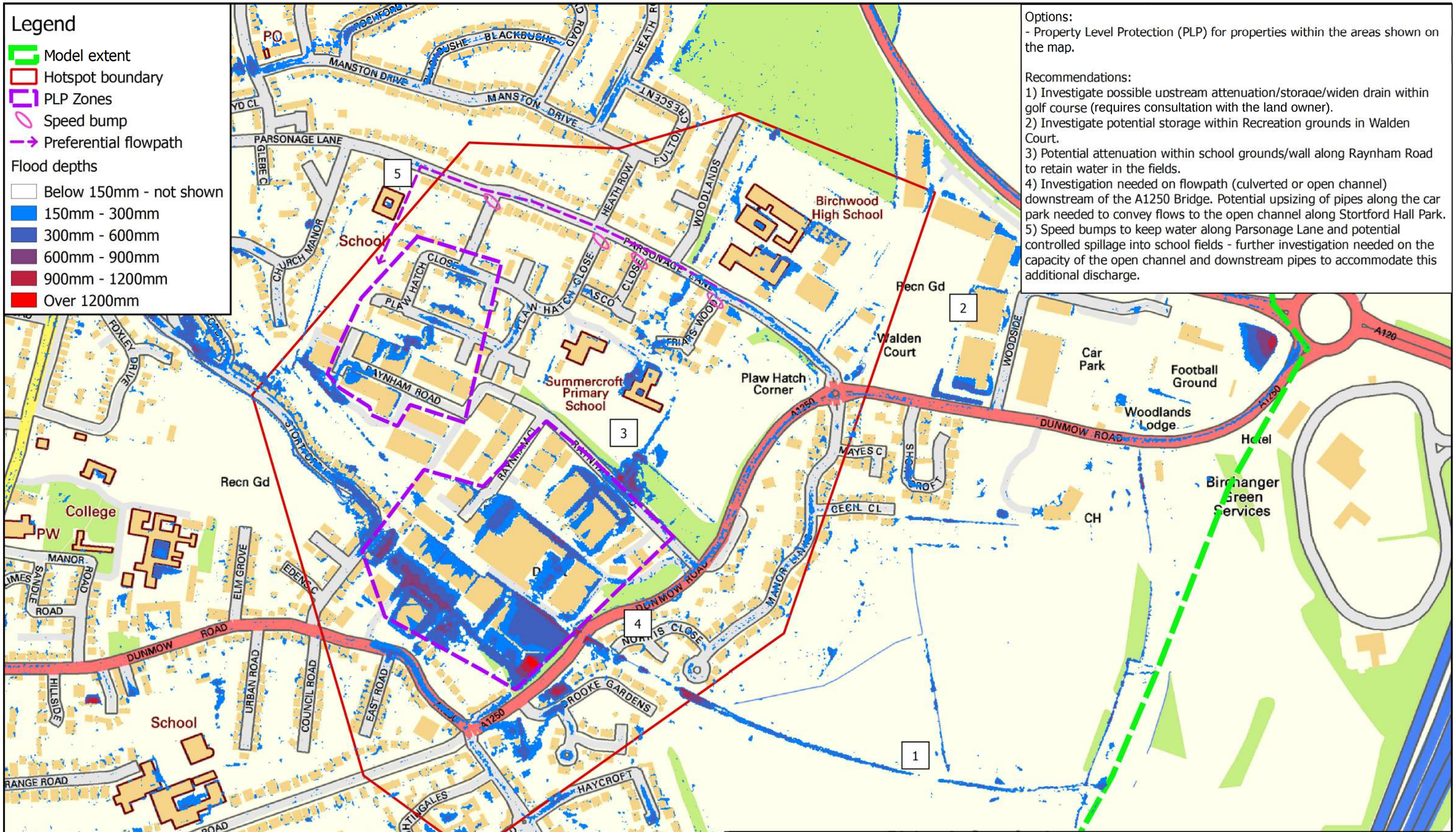
SF	AS	JB	FI	28/10/16	NTS	9115-Q-H47-OPT-Q0030	A



HOTSPOT 47 - OPTIONS (1 IN 100CC YEAR 40%)

EAST HERTS AND BROXBOURNE SURFACE WATER MANAGEMENT PLAN

Hertfordshire

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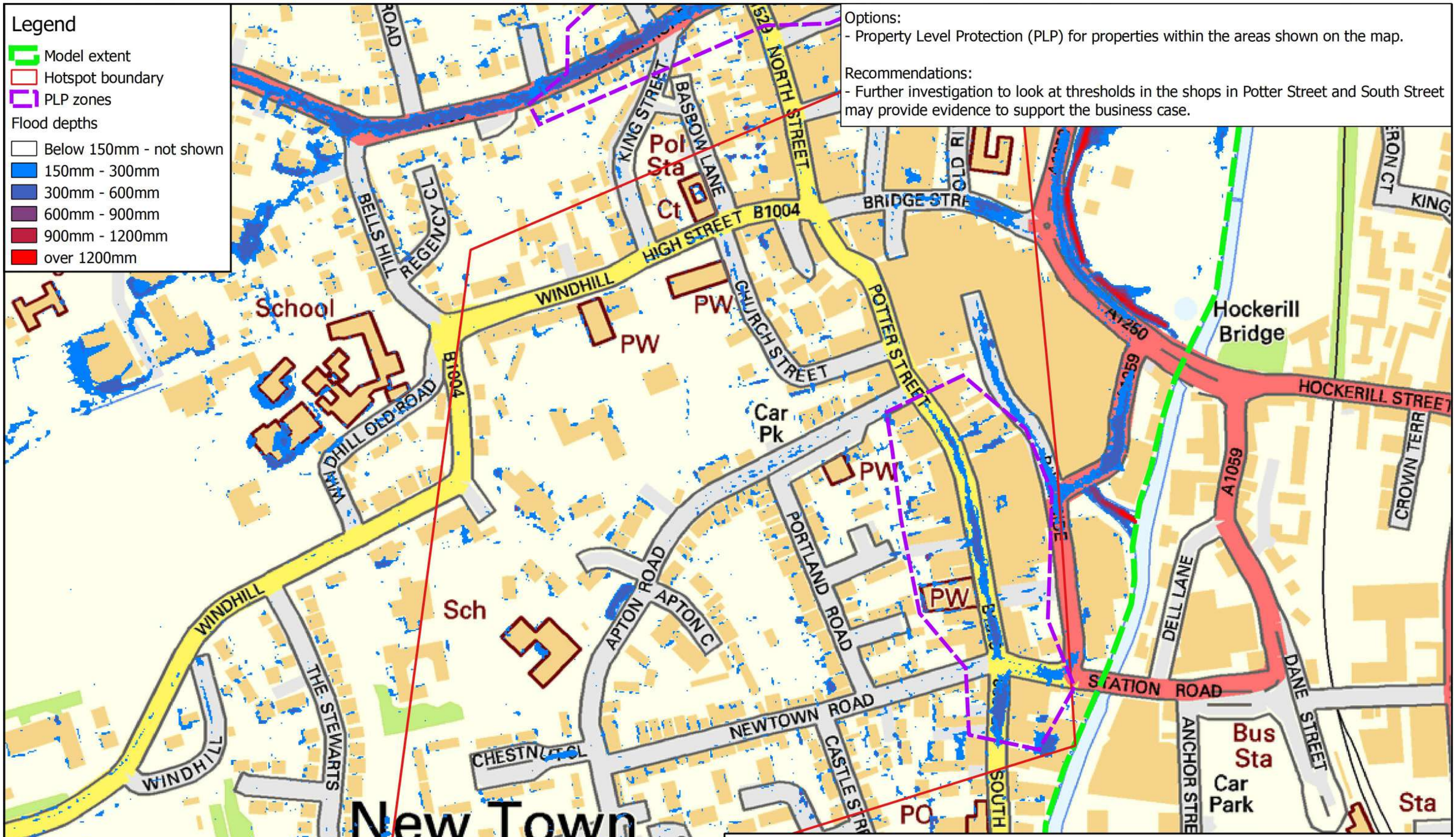
SF	AS	JB	FI	28/10/16	NTS	9115-Q-H47-OPT-Q0100CC	A

Options:
- Property Level Protection (PLP) for properties within the areas shown on the map.

Recommendations:
- Further investigation to look at thresholds in the shops in Potter Street and South Street may provide evidence to support the business case.



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HOTSPOT 60 - OPTIONS (1 IN 30 YEAR)

EAST HERTS AND BROXBOURNE SURFACE WATER MANAGEMENT PLAN

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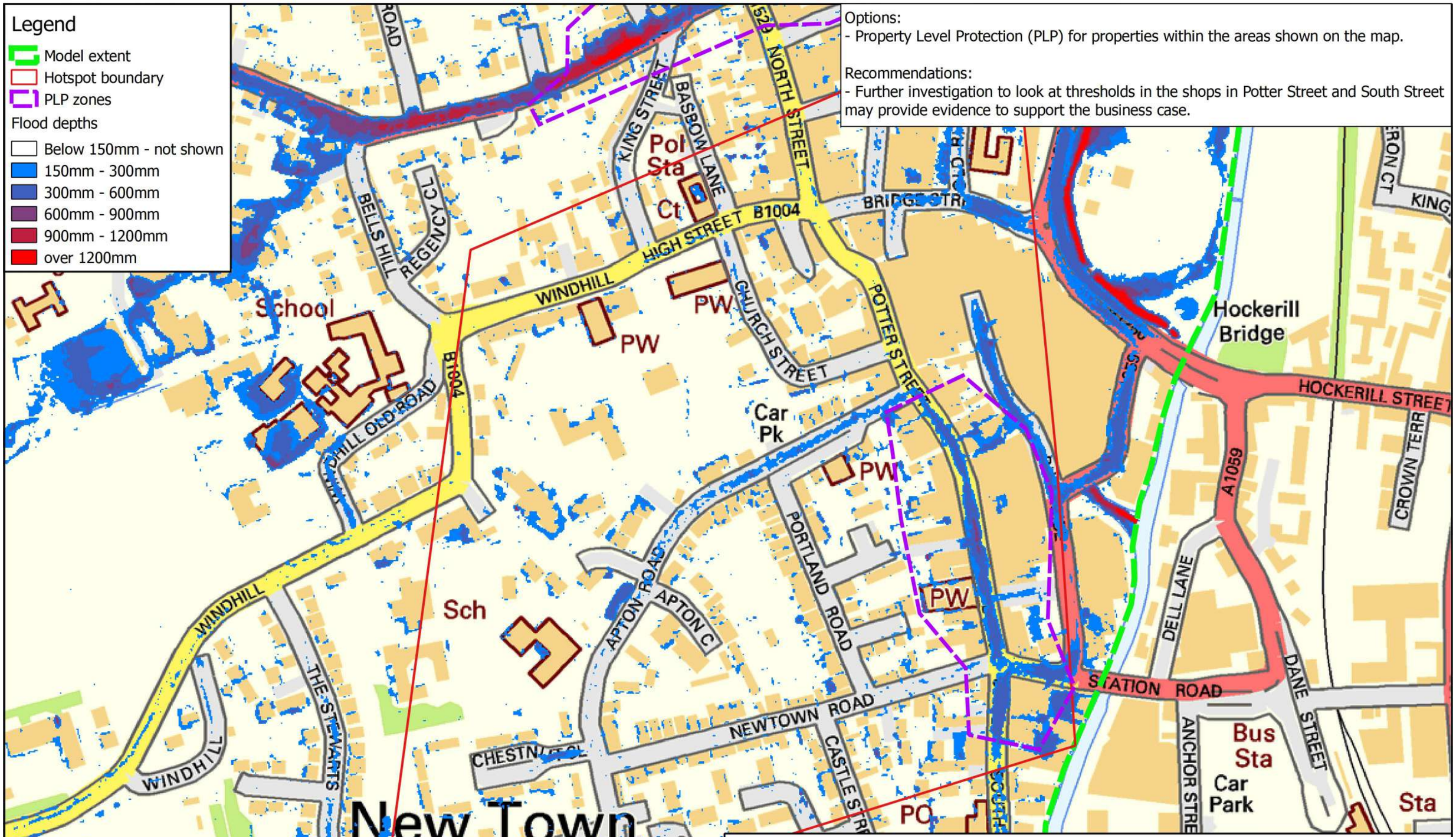
SF	AS	JB	FI	17/10/16	NTS	9115-H60-OPTIONS-Q0030	A

Options:
- Property Level Protection (PLP) for properties within the areas shown on the map.

Recommendations:
- Further investigation to look at thresholds in the shops in Potter Street and South Street may provide evidence to support the business case.



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HOTSPOT 60 - OPTIONS (1 IN 100CC YEAR)

EAST HERTS AND BROXBOURNE SURFACE WATER MANAGEMENT PLAN

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