

Notes

1. This map only shows the predicted likelihood of surface water flooding (this includes flooding from sewers, drains, small watercourses and ditches that occurs in heavy rainfall) for defined areas, and due to the coarse nature of the source data used, are not detailed enough to account for precise addresses.
2. Users of this map should refer to section 3.2 of the Surface Water Management Plan for a complete description of limitations and accuracy of the flood/hazard extents shown.
3. This map provides a strategic overview of surface water flood risk and may be subject to further analysis in the future.

THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED

Legend	
	Borough Administrative Boundary
	Critical Drainage Area
	Permanent Water Bodies
	Main River
	Ordinary Watercourse
	Culverted Watercourse
Flood Depth	
	<0.1m
	0.1m to 0.25m
	0.25m to 0.5m
	0.5m to 1.0m
	1.0m to 1.5m
	>1.5m

Royal Borough of Kingston upon Thames



Surface Water Management Plan

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Group8_020 (Barwell Business Park) Surface Water Depth (m) 1 in 100 Chance of rainfall event occurring in any given year (1% AEP)

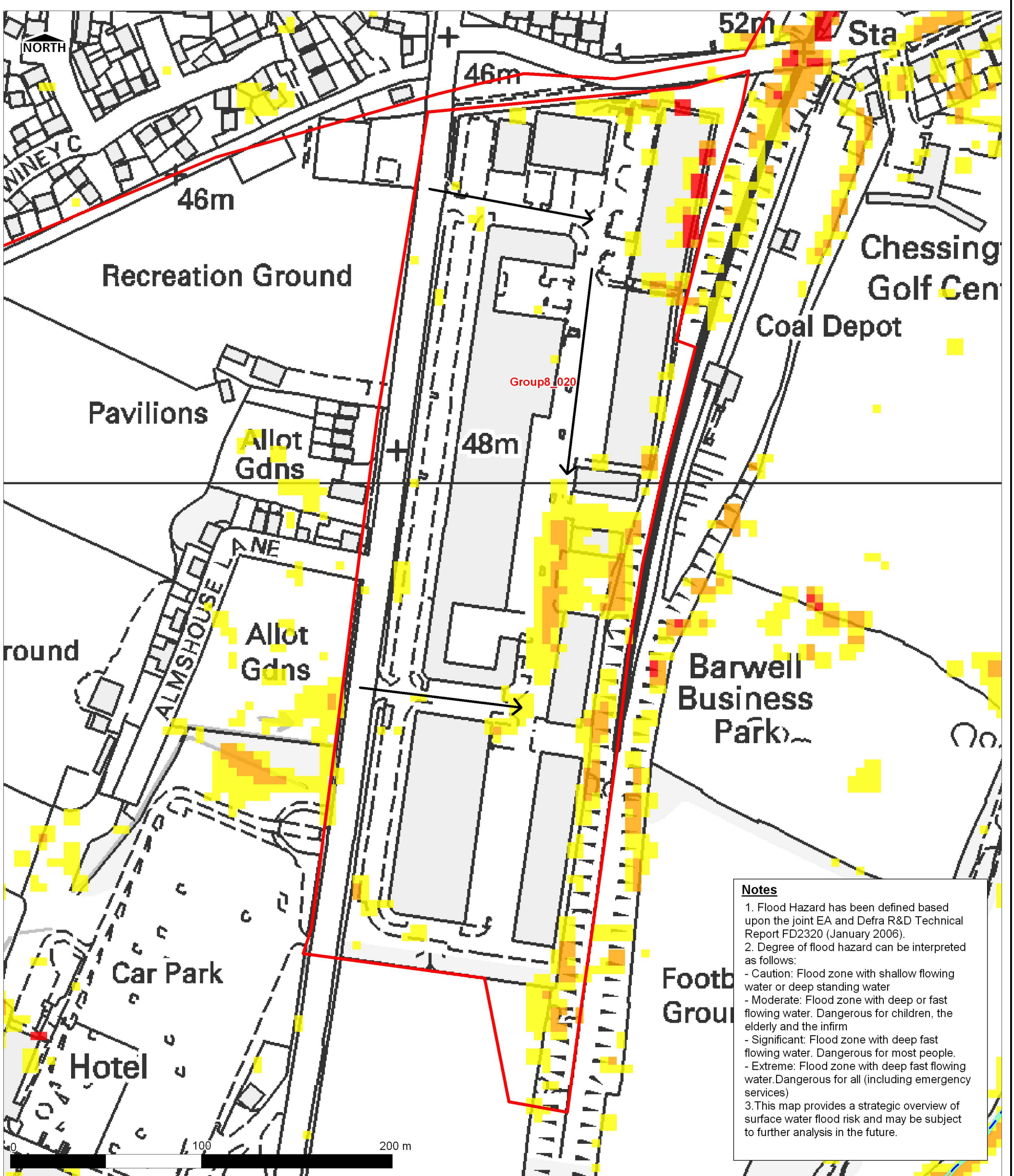
Consultants
CAPITA SYMONDS URS / Scott Wilson
 6 - 8 Greencoat Place
 London SW1P 1PL

Drain London Programme Board Members

GREATER LONDON AUTHORITY

Scale at A3 1:2,000	Date 20/07/2011	Drawn by D.SKILTON	Approved by E.CRAVEN
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FIGURE 3.8.13a



Notes

- Flood Hazard has been defined based upon the joint EA and Defra R&D Technical Report FD2320 (January 2006).
- Degree of flood hazard can be interpreted as follows:
 - Caution: Flood zone with shallow flowing water or deep standing water
 - Moderate: Flood zone with deep or fast flowing water. Dangerous for children, the elderly and the infirm
 - Significant: Flood zone with deep fast flowing water. Dangerous for most people.
 - Extreme: Flood zone with deep fast flowing water. Dangerous for all (including emergency services)
- This map provides a strategic overview of surface water flood risk and may be subject to further analysis in the future.

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	Borough Administrative Boundary
	Critical Drainage Area
	Permanent Water Bodies
	Main River
	Ordinary Watercourse
	Culverted Watercourse
	Flow Direction Arrows
Flood Hazard	
	<0.75 Caution (Very low hazard)
	0.75 - 1.25 Moderate (Danger for some)
	1.25 - 2.0 Significant (Danger for most)
	>2.0 Extreme (Danger for all)

Royal Borough of Kingston upon Thames



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Group8_020 (Barwell Buisness Park) Surface Water Flood Hazard Rating 1 in 100 Chance of rainfall event occurring in any given year (1% AEP)

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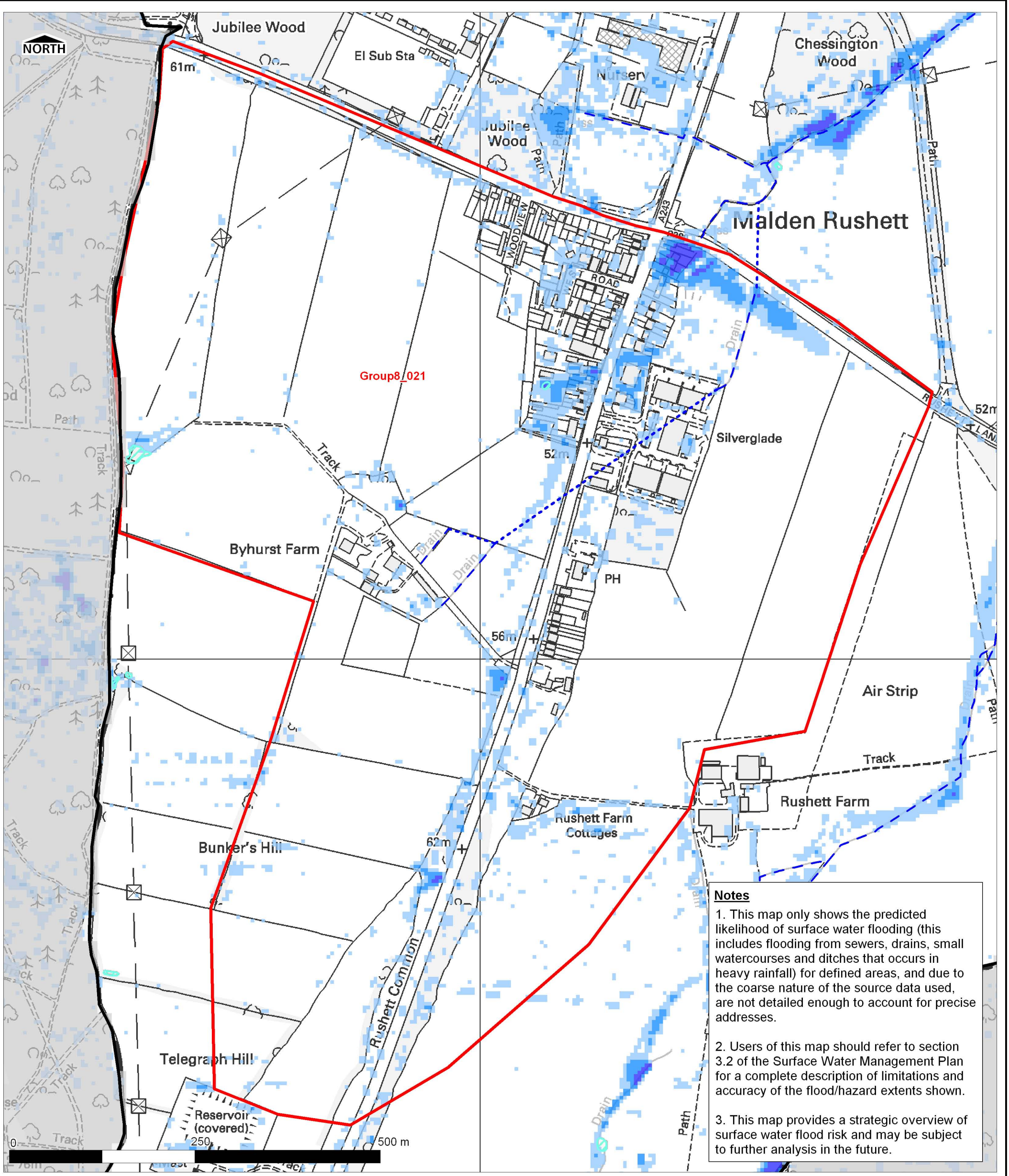
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FIGURE 3.8.13b

CDA 021 MALDEN RUSHETT

3.8.39 This CDA is located in the southern tip of the Borough. Surface water from the south flows towards Rushett Lane where it pools in a topographic low point. Historically, drainage ditches to the east of property at this location used to channel surface water to the head of the Bonesgate Stream. Over time these drainage ditches have been filled in, increasing the local surface water flood risk to property at this location. The Royal Borough of Kingston upon Thames has no records of surface water flooding at this location. Thames Water records show 6-10 records of sewer flooding in the south of the Borough. The CDA is not identified to be in an area at increased potential for groundwater flooding.

Summary Table – CDA 021 Malden Rushett	
LLFA	Royal Borough of Kingston upon Thames
Flood Risk Categorisation:	Surface water, sewer flooding
Property Count 1% AEP	<ul style="list-style-type: none"> • Approximately 82 non deprived households are identified to be at risk of flooding to a depth > 0.03m • 0 non deprived households with basements are identified to be at risk of flooding to a depth > 0.03m
	<ul style="list-style-type: none"> • 1 non deprived households are identified to be at risk of flooding to a depth > 0.5m. • 0 non deprived households with basements are identified to be at risk of flooding to a depth >0.5m
	There are no deprived households identified as being at risk within the CDA
Critical Infrastructure	There is no critical infrastructure within this CDA
Validation	The Council have no records of surface water flooding at this location.
Figures	Figure 3.8.14a – Surface Water Depth (1% AEP) Figure 3.8.14b – Surface Water Flood Hazard (1% AEP)



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2. Users of this map should refer to section 3.2 of the Surface Water Management Plan for a complete description of limitations and accuracy of the flood/hazard extents shown.
3. This map provides a strategic overview of surface water flood risk and may be subject to further analysis in the future.

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Royal Borough of Kingston upon Thames



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Group8_021 (Malden Rushett) Surface Water Depth (m) 1 in 100 Chance of rainfall event occurring in any given year (1% AEP)

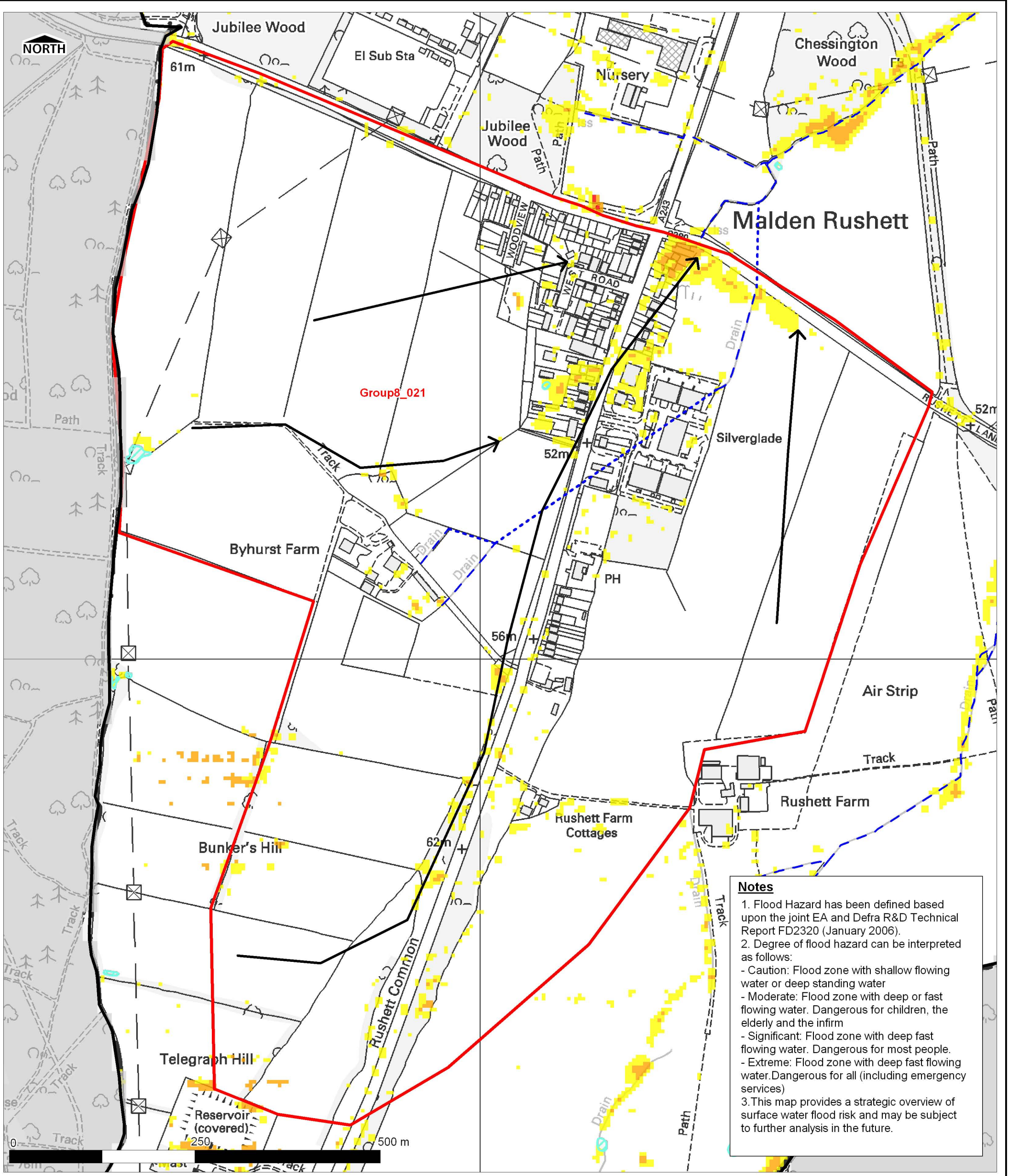
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FIGURE 3.8.14a



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Royal Borough of Kingston upon Thames



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Group8_021 (Malden Rushett) Surface Water Flood Hazard Rating 1 in 100 Chance of rainfall event occurring in any given year (1% AEP)

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FIGURE 3.8.14b

3.9 SUMMARY OF RISK

3.9.1 The following conclusions can be drawn from the Phase 2 assessment, which has involved pluvial modelling combined with site visits and review of historical flood records provided by the Royal Borough of Kingston upon Thames, Thames Water and the Environment Agency:

- Pluvial flooding is widely dispersed across the entire Borough;
- Flood depths in the 1% AEP (1 in 100 annual probability event) are largely to depths of less than 0.5m, however the potential impacts are still high especially where vehicles wash water into property;
- Higher flood depths are experienced at topographical low points such as railway crossings;
- Fourteen (14) CDAs have been identified within the Borough where the potential for surface water flooding is estimated to be greatest;
- Acre Road in North Kingston has the most comprehensive record of surface water flooding within the Borough;
- The London mainline Waterloo rail link and electricity substations have been identified within areas considered to be at higher risk of surface water flooding.

RISK TO EXISTING PROPERTIES & INFRASTRUCTURE

3.9.2 As part of the Phase 2 assessment, a quantitative assessment of the number of properties at risk of flooding has been undertaken for each CDA. The 1% AEP rainfall event has been used to inform this assessment, as specified in the Drain London Data and Modelling Framework.

3.9.3 A full summary of the results of the property count are included in Table 3-6 at the end of this Section.

- The only CDA where there are households identified to be at risk which are also considered to be deprived is CDA_010 Kingston Town Centre. The primary flood risk to this CDA has been identified as fluvial, associated with the River Hogsmill rather than surface water.
- The CDA with the greatest number of houses predicted to be at risk of flooding to a depth greater than 0.5m in the 1 in 100 year event is CDA_018 within Hook/Kelvin Grove. Surface water flood risk in this location is confined to a relatively small area due to the local topography, but this also causes an increase in potential flood depths.
- Acre Road/North Kingston has the largest number of properties identified as being at risk from surface water flooding when compared across the 14 CDAs. This CDA also has the greatest recorded surface water flood history.

RISK TO FUTURE PROPERTIES AND INFRASTRUCTURE

3.9.4 Findings of the SWMP study show that shallow depth pluvial flooding is experienced throughout widespread areas of the Royal Borough of Kingston upon Thames. It is essential that the impact of future development on existing infrastructure including drainage systems is assessed and adequately managed as part of the planning process.

3.9.5 In England, Planning Policy Statement 25 (PPS25), which covers development and flood

risk, aims to "ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall."

- 3.9.6 The London Plan is the spatial development strategy for London and provides the strategic framework for the Royal Borough of Kingston upon Thames' Local Development Framework and Core Strategy. The London Plan outlines the provision of 745 additional homes per year for the period up to 2016-17 with a 10 year target of an additional 7,450 new homes within the Borough.
- 3.9.7 The Core Strategy identifies three Key Areas of Change being:
- Kingston Town Centre;
 - Tolworth Regeneration Area; and,
 - Hogsmill Valley.
- 3.9.8 A significant proportion of Kingston Town Centre is located within the Environment Agency fluvial Flood Zones, which have been further assessed as part of the Kingston Town Centre SFRA report. In addition, pluvial modelling completed as part of this SWMP illustrates pooling of surface water at low points in the highway. There is also a potential for surface water flooding during periods of fluvial flooding due to blockage of drainage outfalls.
- 3.9.9 Tolworth is largely located within Environment Agency Flood Zone 1 and is at low risk of fluvial flooding. Drain London pluvial modelling has not identified any LFRZs within this area and drainage design should be progressed in line with current policy (PPS25) to ensure that future development does not have a negative impact on the local surface water drainage regime.
- 3.9.10 Fluvial flood risk needs to be fully understood in terms of redevelopment within the Hogsmill Valley. In addition, pluvial modelling completed as part of the Drain London study has shown that surface water flooding and fluvial flooding are interlinked due to the risk of blockage of surface water outfalls and surcharging through the local drainage network. Redevelopment of the Hogsmill Valley should be progressed in liaison with the Environment Agency. GIS layers of fluvial and surface water modelling data could be overlaid to clearly map flood risk from both sources.

3.10 COMMUNICATE RISK

PROFESSIONAL STAKEHOLDERS

- 3.10.1 There are various professional stakeholders who are interested in increasing their knowledge of risks from surface water flooding (e.g. Network Rail, TFL). It is essential that the SWMP partnership actively engages with these groups, where appropriate, to share the findings of this report. This will ensure that emerging plans and policies are informed by the latest an improved understanding of surface water flood risk issues.

LOCAL RESILIENCE FORUMS

- 3.10.2 In line with the Defra SWMP Technical Guidance it is strongly recommended that the information provided in the SWMP is issued to the Local Resilience Forum. Surface water

flood maps and knowledge of historic flood events should be used to update Incident Management Plans and Community Risk Registers for the area. In addition, maps showing the depth of pluvial flooding during a range of return period rainfall events can be used to inform operations undertaken by emergency response teams especially near public buildings and major routes through the Borough. This information can be used in parallel with Extreme Rainfall Alert (ERA) service provided by the Flood Forecasting Centre⁸.

COMMUNICATION AND ENGAGEMENT PLAN

3.10.3 It is recommended that a Communication and Engagement Plan should be produced for the Royal Borough of Kingston upon Thames to effectively communicate and raise awareness of surface water flood risk to different audiences, using a clearly defined process for internal and external communication with stakeholders and the public.

3.10.4 The Plan should:

- Develop clear key messages from the SWMP (and PFRA) relating to local surface water flood risk and management;
- Create simplified maps and meaningful data for communications materials;
- Clearly define a structure for multi-agency partnership working (based on the partnership structure identified in Phase 1 of the SWMP) and formalise through a Memorandum of Understanding; and,
- Provide innovative and 'bigger picture' communications and engagement techniques (e.g. Mayoral letter to all CEOs).

⁸ The Flood Forecasting Centre was set up in 2008 by the Met Office and the Environment Agency to provide services to emergency and professional partners.

Table 3-6 Phase 2 Summary of Risk

CDA ID	Scheme Location	Moderation		Infrastructure						Households						Commercial / Industrial				Totals				
		Primary	Secondary	Essential		Highly Vulnerable		More Vulnerable		Non-Deprived (All)		Non-Deprived (Basements)		Deprived (All)		Deprived (Basements)		All				Basements Only		
				All	> 0.5m Deep	All	> 0.5m Deep	All	> 0.5m Deep	All	> 0.5m Deep	All	> 0.5m Deep	All	> 0.5m Deep	All	> 0.5m Deep	All	> 0.5m Deep	All	> 0.5m Deep	All	> 0.5m Deep	
Group8_008	Acre Rd/North Kingston	No moderation proposed		6	0	0	0	8	0	2071	6	58	1	0	0	0	0	155	0	35	0	2333	7	
Group8_009	New Malden				6	0	0	0	2	0	1128	0	4	0	0	0	0	0	4	0	0	0	1144	0
Group8_010	Kingston Town Centre				2	0	1	0	9	0	816	2	24	0	112	0	0	0	114	0	12	0	1090	2
Group8_011	New Malden				1	0	0	0	1	0	278	0	7	0	0	0	0	0	68	0	15	0	370	0
Group8_012	Surbiton Crescent				0	0	0	0	0	0	344	7	11	0	0	0	0	0	13	0	1	0	369	7
Group8_013	Rail Main Line				1	0	0	0	6	0	1150	0	52	0	0	0	0	0	104	0	26	0	1339	0
Group8_014	Berrylands/Alexandra Drive				0	0	0	0	0	0	267	0	8	0	0	0	0	0	3	0	0	0	278	0
Group8_015	A3				0	0	0	0	0	0	56	0	0	0	0	0	0	0	0	0	0	0	56	0
Group8_016	Old Malden				0	0	0	0	0	0	539	0	0	0	0	0	0	0	10	0	0	0	549	0
Group8_017	King George Trade Est.				0	0	0	0	0	0	1	0	0	0	0	0	0	0	15	1	0	0	16	1
Group8_018	Hook/Kelvin Grove				1	0	0	0	4	0	1698	16	7	0	0	0	0	0	61	0	35	0	1806	16
Group8_019	Chessington Nth				1	0	0	0	2	0	399	0	0	0	0	0	0	0	20	0	0	0	422	0
Group8_020	Barwell Bus. Park				0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	20	0
Group8_021	Malden Rushett				0	0	0	0	0	0	82	1	0	0	0	0	0	0	2	0	0	0	84	1

Notes
 The Summary of Risk table is populated by calculating the total number of units from each sub-category that are affected by surface water flooding in the modelled scenario for the 1% AEP rainfall event. In accordance with the Drain London Data and Modelling Framework, the Environment Agency National Receptor Database (NRD) Version 1.0 has been used to identify receptors at risk of flooding within each CDA. The type of receptor has been identified based on definitions (MCM Codes) within Appendix 3.1 of the Multi-Coloured Manual⁹ and divided into sub-categories consistent with those within Planning Policy Statement 25: Development and Flood Risk¹⁰. A summary is provided in the following tables: Note : Values will not match property counts included in Table 3-5 as Table 3-5 covers the whole Borough, while Table 3-6 only relates to flooding within CDAs

Infrastructure Sub-Categories	
Category	Description
Essential Infrastructure	<ul style="list-style-type: none"> Essential transport infrastructure which has to cross the area at risk Mass evacuation routes Tube stations and entrances Essential utility infrastructure which has to be located in a flood risk area for operation reasons Electricity generating power stations and grid and primary substations Water treatment works
Highly Vulnerable	<ul style="list-style-type: none"> Police stations, Ambulance stations, Fire stations, Command Centres and telecommunications installations Emergency disposal points Installations requiring hazardous substances consent
More Vulnerable	<ul style="list-style-type: none"> Hospitals Health Services Education establishments, nurseries Landfill, waste treatment and waste management facilities for hazardous waste Sewage treatment works Prisons

Household & Basement Sub-Categories	
Category	Description
Households	<ul style="list-style-type: none"> All residential dwellings Caravans, mobile homes and park homes intended for permanent residential use Student halls of residence, residential care homes, children's homes, social services homes and hostels
Deprived Households	<ul style="list-style-type: none"> Those households falling into the lowest 20% of ranks by the Office of National Statistics' Indices of Multiple Deprivation.
Non-Deprived Households	<ul style="list-style-type: none"> Those households not falling into the lowest 20% of ranks by the Office of National Statistics' Indices of Multiple Deprivation
Basements	<ul style="list-style-type: none"> All basement properties, dwellings and vulnerable below ground structures (where identified in existing dataset including those provided by Thames Water and the Environment Agency's National Receptor Database).

⁹ Flood Hazard Research Centre, 2010, Multi-Coloured Manual
¹⁰ DCLG (Revised 2010) Planning Policy Statement 25: Development & Flood Risk