Civil Engineers & Transport Planners

16-18 Oatlands Drive, Weybridge

Flood Risk Assessment

November 2022

221584/FRA/MK/RS/01

Rev B

Civil Engineers & Transport Planners

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CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

1.1 Scope

1.1.1 Lanmor Consulting Ltd has been appointed to prepare a Flood Risk Assessment (FRA) report for the proposed development site at 16-18 Oatlands Drive, Weybridge, Surrey, KT13 9JL.

1.1.2 This report describes the existing and proposed development, the implications of flooding and the impact of the development will have on the flood plan in accordance with the governments guidance document; National Planning Policy Framework (NPPF) and its planning practice guidance.

1.1.3 This report will consider the following:

- Location of the site;
- Development Proposals;
- Existing information on extents and depths of flood events or on flood predictions;
- Sources of Flooding;
- The impact of flooding on site;
- Safe access and egress from the site and;
- An assessment of the run-off likely to be generated

1.1.4 This Flood Risk Assessment report has been prepared in accordance with the requirements of the National Planning Policy Framework and will demonstrate that the proposed development will be safe and will not increase the risk of flooding in the surrounding areas.

1.1.5 This report has been updated to reflect recent comments from the Environment Agency (EA). In their response dated 16th May 2023, the EA state that to overcome their objection a revised FRA should be submitted which will need to:

- Determine the 1% AEP plus a 47% allowance for climate change flood extent and level and use this as the design flood event.

- Finished floor levels should then be raised to be a minimum of 300mm above the estimated design flood level, so the development will be safe from flooding.

- The applicant should also demonstrate the proposed built footprint will be located outside the flood event. We recommend that a plan is submitted comparing the proposed buildings to a topographical survey and the design flood level.

1.1.6 The FRA was prepared having regard to the LPA's SFRA which shows the site not to be in the functional floodplain. Therefore, we consider the 35% allowance has been correctly applied and there is no need to apply 47%. However, noting the comments of the EA, this FRA has been updated as requested.

1.1.7 In the EA's most recent response of 2 June 2023, they maintain that the site must be assessed with the 47% allowance for climate change due a portion of it being in Flood Zone 3b – Functional Floodplain. They also state that the assessment must use the best available data which in this case shows the site partially lies within the 5% annual exceedance probability flood event (Flood Zone 3b – Functional Floodplain) and therefore the FRA must assess the higher central climate change allowance of 47%.

1.1.8 We consider such an approach goes against the advice in Table 1 of paragraph 078 of the PPG that states "*Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)*".

1.1.9 The LPA's SFRA acknowledges the above point in paragraph 2.3.12 of the SFRA. The SFRA under paragraph 1.6 Living Documents states that "*New information may influence future development management decisions within these areas. Therefore it is important that the SFRA is adopted as a 'living' document and is reviewed regularly in light of emerging policy directives, flood risk datasets and an improving understanding of flood risk within the Borough".*

1.1.10 The updated flood data mentioned by the EA has been available for the last 3 years however unfortunately the LPA have not updated their SFRA to incorporate the comments from the EA in relation to the functional floodplain. Whilst we consider our original approach was correct, this FRA has been updated following the EA's request to consider the 47% climate change allowance.

2 BASELINE PARAMETERS

2.1.1 This site is currently developed with 2 residential properties, it has an area of approximately 0.65hectares. The application site is situated on Oatlands Drive, an area highly developed with residential dwellings and is to the east of Engine River and approximately 245m from the River Thames. The site compromises of 2 residential houses with individual accesses, garages and landscaping. Figure 2.1 below shows the location of the site. The topographical survey of the site by JAS is included within Appendix A.

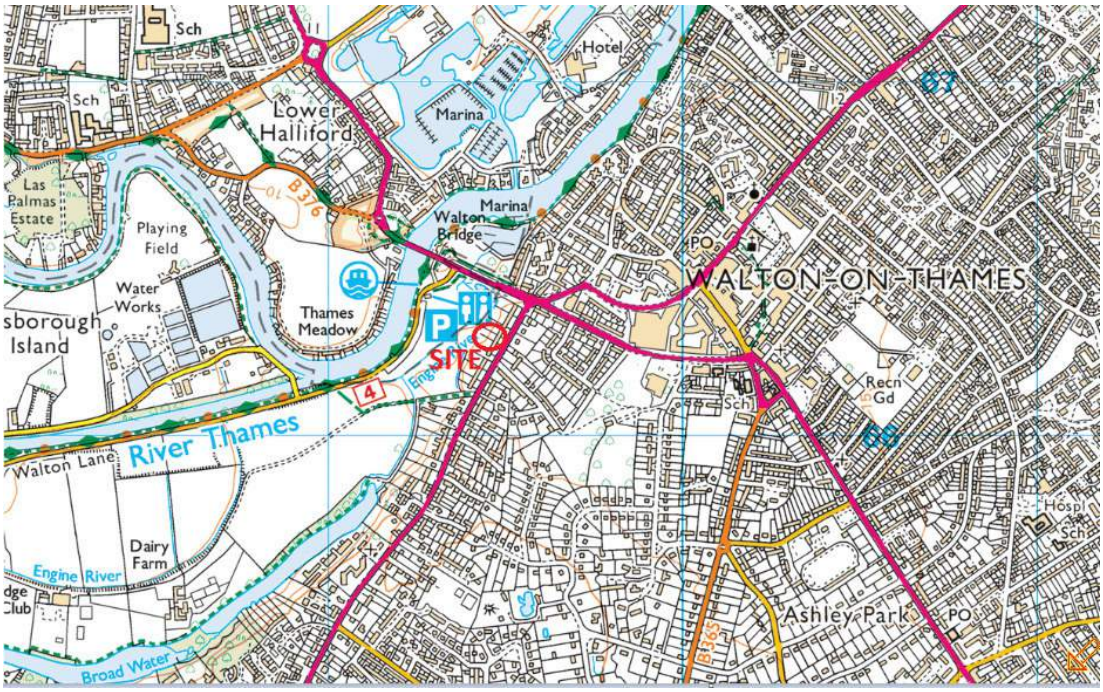


Figure 2.1 – Site Location

2.2 Geology

2.2.1 The British Geological Survey indicates that the site sits on a sedimentary bedrock formation of Bagshot Formation containing sand formed approximately 48 to 56 million years ago in the Palaeogene Period.

2.2.2 Superficial deposits of Taplow Gravel Member have been recorded overlaying the bedrock which contains sand and gravel formed up to 2 million years ago in the Quaternary Period. These rocks were formed from rivers depositing mainly sand and gravel detrital material in channels to form river terrace deposits, with fine silt and clay from overbank floods.

2.2.3 The Elmbridge Borough Council's SFRA (2019) provides both a bedrock geology and superficial geology map and confirms the site's bedrock is Bagshot Formation overlaid with superficial deposits of Taplow Gravel. SFRA Figures B2 and B3 are provided within Appendix A.

2.3 Proposed Development

2.3.1 The proposed development will seek to demolish the existing 2 residential dwellings to make way for two blocks of apartments, the Front Block fronting onto Oatlands Drive will contain 15 apartments and the Rear Block 18 apartments. The development will consist of 3 one-bedroom units, 24 two-bedroom units and 6 three-bedroom units, a total of 33 units. Parking for 32 vehicles and cycle storage will also provided within the development. The proposed site plans have been enclosed within Appendix A as drawings MA212-250 to 255.

3 SOURCES OF FLOODING

3.1 Fluvial/Tidal Flooding

3.1.1 Detailed flood information was requested from the Environment Agency (EA) for the site. The National Planning Policy Framework (NPPF) defines the flood zones as follows:

- Zone 1: 'Low Probability' – This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (less than 0.1%) in any year.
- Zone 2: 'Medium Probability' – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%-0.1%) in any year.
- Zone 3a: 'High Probability' – This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of sea flooding (>0.5%) in any year.
- Zone 3b: 'The Functional Floodplain' – This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes.

3.1.2 The most significant source of fluvial flooding to the development comes from the River Thames which is located approximately 250m to the west. The Thames presents the greatest risk of fluvial flooding to the site and the Environment Agency (EA) flood mapping indicates the application site lies within the Flood Zones 1, 2 and 3 however the majority of the site is in Flood Zone 1. Figure 3.1 below shows the location of the site and its relationship to the flood zones, provided by the EA. The SFRA Figure C1 – Flood Risk from Rivers is also provided in Appendix B outlining the majority of the site is within Flood Zone 1.

Figure 3.1 – EA Flood Map

3.2 Surface Water and Groundwater Flooding

3.2.1 The surface water flood mapping provided by the EA is the best available source of national information on surface water flooding. It is a starting point for understanding patterns and probability of surface water flooding. The EA accept that the mapping has limitations and state that "these maps cannot definitively show that an area of land or property is, or is not, at risk of flooding, and the maps are not suitable for use at an individual property level".

3.2.2 The site is indicated as having a very low risk of surface water flooding, as shown in Figure 3.2 below for the 1.0% event. The site and Oatlands Drive is not highlighted to be at risk, nor has there been any records of past surface water flooding incidents. The SFRA mapping provided by Elmbridge Borough Council also outlines the site to be at very low risk of surface water flooding, SFRA Figure F1 is provided in Appendix B and shows the flood risk from surface water flooding in Weybridge, It is therefore considered the site is to be in a location where there is low risk of surface water flooding.

Figure 3.2 – Surface Water Flood Map

3.2.3 Mapping provided from Elmbridge Borough Council's SFRA, indicates that the area around the site has a greater than or equal to a 75% susceptibility to groundwater flooding to occur however the site is elevated compared to the land to the west, there have been no historic groundwater flooding incidents on site. Therefore, the risk is considered to be low as any groundwater flooding if any is likely to occur on the land to the west of the site. The SFRA Figure B5 indicates the BGS susceptibility to groundwater flooding and is included in Appendix B.

3.3 Flood from Reservoirs

3.3.1 To the north west of the site is Queen Mary Reservoir and to the north east is Knight Reservoir, Bessborough Reservoir, Queen Elizabeth 2 Storage Reservoir and Island Barn Reservoir. Therefore, a failure of one of these could be disastrous to the surrounding area. Despite this, reservoirs in the UK have an extremely good safety records with no fatal incidents since 1925. Following this incident, reservoirs are maintained with more care which reduces the probability of reservoirs flooding significantly. Reservoirs are regularly inspected and any essential safety work is carried out by Thames Water – reservoir panel engineers must inspect and supervise all large reservoirs regularly. The risk of a major failure is therefore highly unlikely and the risk of flooding is considered low.

3.3.2 The application site is located on the border of the maximum extent of flooding for the reservoirs – Figure 3.3 below shows the extent of flooding that could occur if the local reservoirs were to fail. The figure shows that the site is defined as having a high risk by the EA.

3.3.3 Elmbridge Borough Council's SFRA states that Thames Water have provided assurance that the reservoirs are actively managed and that all required safety standards are met. On the basis of the possible risk of failure of these reservoirs is considered to be minimal, the risk of flooding is considered low.

Figure 3.3 – EA Reservoir Flood Map

3.4 Sewer Flooding

3.4.1 Sewer flood mapping prepared for the SFRA shows that in the wider area there have been some incidents of sewer flooding. This mapping however does not indicate specific sites that were affected, it does however show that the area around the site had 0 recorded incidents of internal and external sewer flooding. Figures B7 and B8 from the SFRA is included in Appendix B and outlines the areas of historic internal and external sewer flooding.

3.5 Flood Defences

3.5.1 According to the SFRA mapping provided by Elmbridge Borough Council, there is one maintained flood defence on the River Thames which is identified as 'high ground'. The SFRA Figure C1 outlines the maintained flood defences and is provided in Appendix B.

3.5.2 The EA has confirmed that they are currently working on The River Thames Scheme from Datchet to Teddington. The scheme proposes measures to reduce the risk of flooding to the 15,000 properties which are currently at risk from flooding in the area. These measures include the construction of three flood diversion channels, increasing the capacity to Desborough Cut and improvements to Sunbury and Mosely Weirs and Teddington Lock. Further information on these proposals are provided in the EA's Product 4, included in Appendix C.

3.6 Historical Flooding

3.6.1 Records of historical flood event that affected the local area have been provided by the Environment Agency as well as Elmbridge Borough Council as part of their SFRA. The mapping shows that the site may have been affected by three events of historical flooding, which occurred in 1947, 1968 and 2002/2003 due to an exceedance in the channel capacity (no raised defences). The flood extents of these events did not affect the properties and only slightly entered the rear gardens of the dwellings. The SFRA Figure E1 is included within Appendix B and shows the historic flood incidents.

4 FLOOD PROBABILITY AND CLIMATE CHANGE

4.1 Flood Probability

4.1.1 The main source of flooding for the site is the River Thames which is located approximately 250m away. Furthermore, information provided from the EA states that the site is situated in Flood Zones 1, 2 and 3 however much of the site including the residential properties are in Flood Zone 1.

4.1.2 Detailed site-specific flood information has been provided by the EA, this consists of Product 5, 6 and 7 data. The flood data provided shows the flood levels associated with flood events for different return periods.

4.1.3 Figure 4.1 & 4.2 below shows an extract from the EA flood model, the site is shown as being within flood zone 1, 2 and 3, with zones 2 and 3 confined to west of the site along the river corridor. Flood outlines were provided for the defended and undefended scenarios for the 1 in 100 & 1000 return periods and also the 1in100+35% allowance for climate change.

Figure 4.1 – Undefended Flood Extents

Figure 4.2 – Defended Flood Extents

4.1.4 Figure 4.3 below shows the flood extent for the 1.0%+35% allowance and the flood level from the JBA model for the Lower Thames 2019 (issued July 2020) for each scenario at flood point 1 are tabulated below.

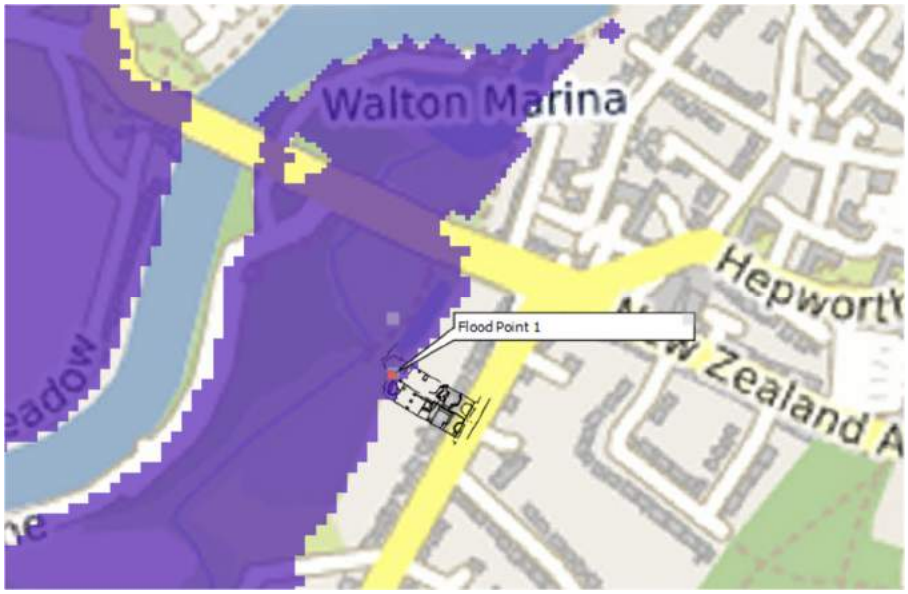


Figure 4.3 – 1.0% Flood Extent Plus 35% CC

	Flood Levels (mAOD)				
Node Label	1% AEP (FZ3) Defended	1% AEP (FZ3) Undefended	0.1% AEP (FZ3) Defended	0.1% AEP (FZ3) Undefended	1% AEP (+35% CC)
Flood Point 1	10.871	10.873	11.559	11.149	11.472

Table 4.1 – River Thames Flood Levels

4.2 Climate Change

4.2.1 The Environment Agency have published new climate change allowances. The allowance to be implemented is based on the management catchment area, flood zone and site vulnerability. The site is within the Maidenhead and Sunbury Management Catchment Area, as identified on the Department for Environment Food & Rural Affairs climate change allowances website.

4.2.2 The site lies partially within Flood Zones 1, 2 and 3, it is residential use and is considered a more vulnerable use. Based on the "Flood Risk Assessment: Climate Change Allowance guidance". The EA consider the lower ground floor to be basement dwellings which is not accepted as these apartments are cut into the slope of the land, they are not subterrain to be considered basements. However as there is no difference between the uses when considering the application of climate change allowances, whether the development is considered a more or highly vulnerable use the allowance for climate change will be the same.

4.2.3 The EA also insist that the higher central allowance should be used as part of the site falls within the functional floodplain. Under Flood Risk Assessment: Climate Chance Allowances, Guidance "using peak river flow allowances for flood risk assessments" more vulnerable uses are not permitted in Flood Zone 3b, however it goes on to state "*If the local planning authority consider the development is appropriate, even though it will not follow the flood zone compatibility categories for flood zones 2, 3a or 3b, use the higher central allowance*".

4.2.4 The DEFRA website provides climate change allowances for the Management Catchment and area, for the central and higher allowance the following percentage increase in peak river flows should be allowed.

Climate Change Allowance		
	Central	Higher
2020's	14%	19%
2050's	17%	25%
2080's	35%	47%

Table 4.2 – Climate Change Allowance

4.2.5 The proposed development is a residential use so will have a life span of 100 years and the EA have stipulated the use of higher allowance of 47% be used for assessing the application site. The EA have not provided flood levels for the 47% allowance only for the 35% climate change scenario, therefore, to assess the flood level for the 47% allowance a discharge rating curve has been prepared. The flood level for the 1.0% + 47% allowance has been estimated at 11.570m AOD.

4.2.6 Drawing 221489/FRA/10 in Appendix C shows the flood extents map for the 1.0% and 0.1% events based on the topographical survey and flood levels from the latest EA flood model.

4.2.7 The proposed flood level for the application site has been estimated at 11.570mAOD, the finished floor level for the residential blocks has been set at a minimum of 11.925mAOD, 350mm above the estimated flood level and indicated on the section plan included in Appendix A. The design flood level has been taken as the 1% AEP +47%CC therefore flood waters will not exceed the finished floor level and the dwellings will be safe from flooding even when the new climate change allowances set out by the NPPF are included.

4.2.8 Drawing 221489/FRA/11 in Appendix C shows the flood extents for the 1.0% and 1.0% + 47% climate change allowance over laid on the development layout. Based on the assessments undertaken it is considered that the buildings would not be subject to flooding with a probability of 1.0% +47% CC. Only the northern corner of the building will project into the 1.0%+47% event, the area of building in the flood extent is less than 1sqm.

4.2.9 This will have no impact on the current or future flood regime, but an area has been allocated on site to be reduced in level to compensate for any potential loss, therefore the proposed development will not have any impact on the free flow of flood waters or result in the loss of flood storage volumes across the site.

4.2.10 According to flood modelling carried out by the EA the building floor level will be 300mm above the flood level and, therefore the proposed development is not at risk of damage from flooding for an event with a probability of 1.0% +CC and will not put residents at risk.

5 IMPACTS OF FLOODING

5.1 Impact on Flood Waters

5.1.1 The proposed development involves the demolition of the existing 2 properties and construction of two new residential bocks to provide 3 one-bedroom, 24 two-bedroom and 6 three-bedroom apartments. The buildings will be situated in Flood Zone 1 and there is no history of the existing properties being subject to fluvial flooding or from any other source.

5.1.2 The proposed buildings have a combined footprint of approximately 1,145m^2 the buildings will be located within Flood Zone 1 and above the maximum estimated flood level. Drawing 221489/FRA/11 shows the proposed buildings in relation to the design flood level extent. This clearly demonstrated that the development will not have any impact on the flow of flood waters for events up to a probability of 1.0% including climate change allowances.

5.2 Impact on Storage Volumes

5.2.1 The footprint of the proposed development will be larger than the existing buildings on site, but the proposed buildings will be located above the design flood levels for a 1.0% probability event including climate change allowances. The existing ground levels will not be altered by the proposals consequently, although an area of land has been identified to be lowered to compensate for any potential loss of flood storage volumes for storm events up to 1.0% +CC probability.

5.2.2 The proposals will therefore not result in the loss of any flood storage volumes.

5.3 Impact of Flood on Development

5.3.1 According to flood modelling carried out within this assessment based on the design flood level the proposed buildings will be 300mm above the flood level. All habitable rooms have been assessed as being elevated above the flood level from the nearest fluvial sources and all other sources of flooding, therefore the proposed development is not at risk of damage from flooding for an event with a probability of 1.0% +CC and will not put residents at risk.

5.4 Safe Access

5.4.1 Since the residential units on the lower ground floor will be a minimum of 300mm above the 1.0% +CC flood level and the other apartments will be one storey higher a dry access from the site can be provided from the site to Oatlands Drive. Oatlands Drive is indicated to be in flood zone 1 so a safe access can always be provided during flood events.

5.4.2 Overall, the residual risk is considered extremely minimal as a dry access can be provided to Flood Zone 1.

6 DRAINAGE

6.1 Existing Drainage

6.1.1 The Thames Water Sewer Records show there are existing foul and surface water sewers in Oatlands Drive to the east of the site.

6.2 Proposed Drainage

6.2.1 The proposals will see an increase to the existing built footprint a separate Drainage Strategy report has been prepared by Lanmor Consulting ref:- 221584/DS/MS/RS/01 for the site and covers all aspects of drainage for the new development and should be read in conjunction with this report.

6.2.2 The drainage strategy has clearly demonstrated that the development can be drained without increasing the risk of flooding in the area.

7 SEQUENTIAL TEST

7.1.1 The principal of the sequential test is to assess locations and prioritise development to areas at less risk of flooding. National Planning Policy Framework suggests that Regional Planning Bodies and Local Planning Authorities should ensure their spatial strategies include a broad consideration of flood risk.

7.1.2 The application site could be subject to some flooding along it western boundary. This assessment has shown that the extent of flooding is limited, and the majority of the site is at low risk (flood zone 1). A sequential approach has been taken with regards to development of the site and the proposed buildings will be located within zone 1 the low flood risk areas of the site.

7.1.3 Table 3 of the "Flood Risk and Coastal Change" guidance published by Department for Communities and Local Government as part of the Planning practice guidance categorizes what developments are appropriate based on their vulnerability and flood zone. This table indicates that more vulnerable developments located in Flood Zone 1 are appropriate and the exception test is not required.

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

Table 7.1 – Flood Risk Vulnerability and Flood Zone Compatibility

7.1.4 The proposals therefore meet the requirements of the sequential test to allocated development to lower flood risk areas.

8 SUMMARY AND CONCLUSION

8.1.1 The proposed application seeks to demolish the existing 2 residential dwellings to make way for two blocks of apartments containing 3 one-bedroom units, 23 two-bedroom units and six three-bedroom units with associated private outdoor space and parking.

8.1.2 The greatest risk of flooding comes from the River Thames, which is located approximately 250m to the west. The majority of the site is however identified as being located within Flood Zone1 (low risk), land assessed as having less than 1 in 1000 annual probability of river flooding in any year. This assessment has assessed the flood risk comparing the topographical survey with the EA flood levels. The risk of flooding from all sources to the site is considered to be minimal.

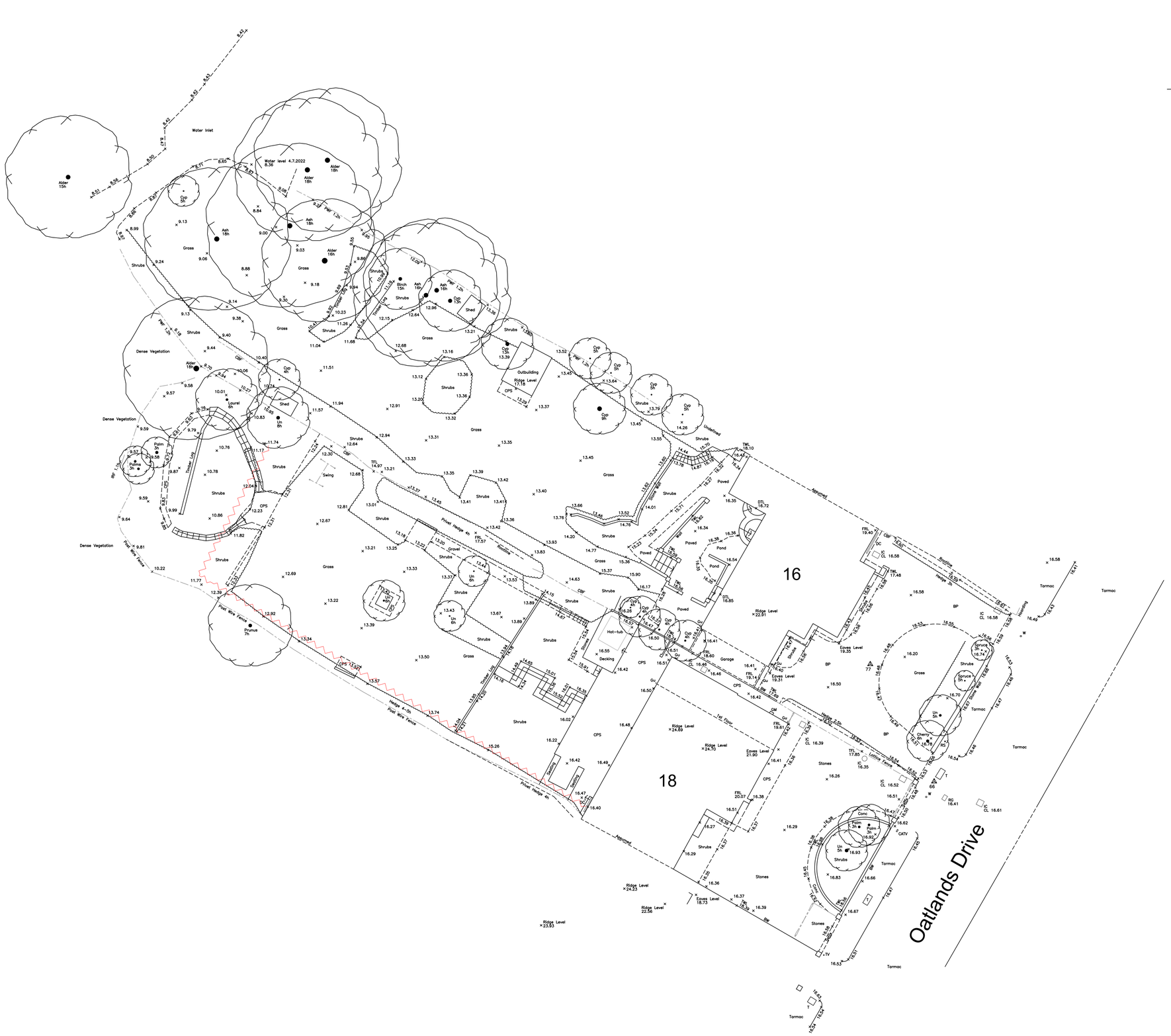
8.1.3 The proposals will increase the built footprint area, however the buildings will be located outside of the flood extent for a 1.0% + CC probability event. The lowest floor level within the development will be 11.925mAOD, a minimum of 350mm above the estimated design flood level, so the development will be safe from flooding. Given the proposed buildings will be outside of the flood extent for a 1.0% + CC event so it will not restrict the flow of flood waters or result in a loss of storage volumes.

8.1.4 The development is located to a low flood risk area, so the proposals meet the requirements of the sequential test. Access to the site is provided to Flood Zone 1 along Oatlands Drive and therefore a safe and dry route is available during flood events.

8.1.5 This assessment has demonstrated the proposals will be safe at low risk of flooding from all sources. The proposals will not result in an increase in flood risk to the site or the surrounding area. A safe and dry access to and from the site can be provided at all times during a flood event. Therefore, for these reasons we feel the site is suitable for development in terms of flooding.

APPENDIX A

JAS Topographical Survey



Note:

For safety reasons all underground drainage details are by visual inspection only.

Drainage must be verified on site before the commencement of any works.

All tree information is indicative and if required should be verified by a specialist .

Surveyed boundary features are not necessarily legal boundaries

Oct 22: Position of electrical supply to lamp columns

Abbreviations:

BE	Bare Earth	OBF	Open Board Fence
Bol	Bollard	O/H	Overhead
BP	Brick Paving	OHC	Overhead Cable
BRW	Brick Retaining Wall	P	Post
BS	Bus Stop	PCF	Post & Chain Fence
BW	Brick Wall	PWL	Parapet Wall Level
CATV	Cable TV	PRF	Post & Rail Fence
CBF	Close Board Fence	PWF	Post & Wire Fence
CL	Cover Level	RE	Rodding Eye
Cyp	Cypress	RG	Road Gully
Conc	Concrete	RL	Ridge Level
CPS	Concrete Paving Slabs	RNP	Road Name Plate
DPC	Damp Proof Level	RS	Road Sign
Dk	Drop Kerb	RW	Retaining Wall
DTL	Door Theshold	RWP	Rain Water Pipe
E	Electricity	SB	Silver Birch
EL	Eaves Level	SP	Sign Post
EP	Electricity Pole	SC	Stop Cock
ER	Earthing Rod	SPF	Stock Proof Fence
FH	Fire Hydrant	SRW	Stone Retaining Wall
FRL	Flat Roof Level	St	Stump
G	Gas	SV	Stop Valve
GP	Gate Post	SW	Stone Wall
Gu	Gully	Syc	Sycamore
h	Height (metres)	T	Telephone
IL	Invert Level	TFL	Top of Fence Level
IR	Iron Railing	TWL	Top of Wall Level
IRF	Iron Railing Fence	U	Unidentified
JB	Junction Box	UTL	Unable to Lift
LB	Letter Box	V	Vent
LP	Lamp Post	VP	Vent Pipe
Mkr	Marker	W	Water
IC	Inspection Cover		
MPF	Metal Palisade Fence		

Benchmark Details:

Survey Grid set to Ordnance Survey Grid via RTK network.
All Levels related to Ordnance Survey Datum via RTK network.

Drawing Title:

Topographical Survey

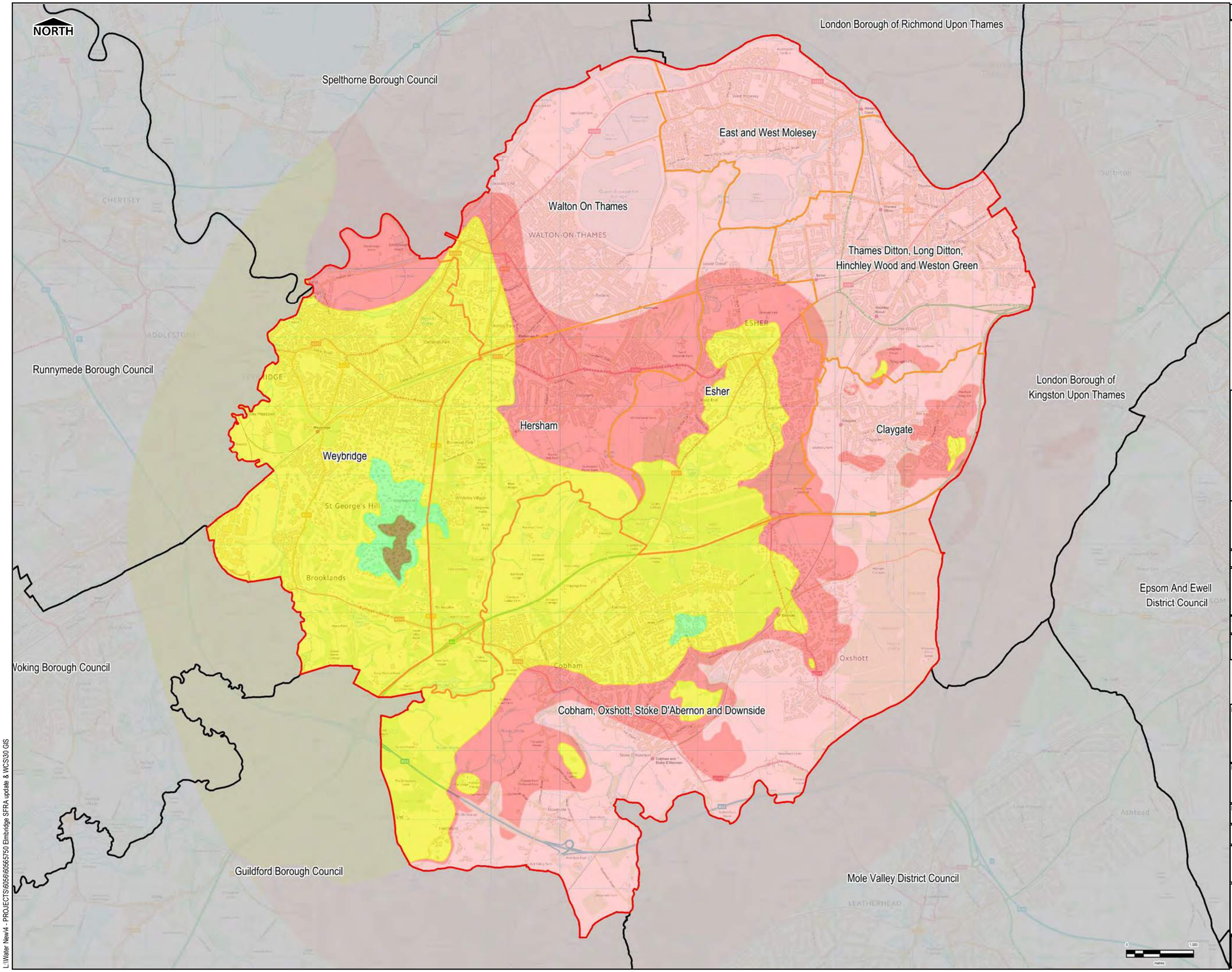
Job Title:

16-18
Oatlands Drive
Weybridge
KT13 9JL

Scale:	Size:	Date:
1/200	A1	Oct 2022

jasplaNservices
great plans for your property

SFRA Figure B2 – Bedrock Geology



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Elmbridge BC boundary
- Settlement Area boundary
- Local Planning Authority boundary

Bedrock Formation

- Bedrock Bagshot Formation
- London Clay
- Windlesham Formation
- Camberley Sand
- Claygate Member

Notes

1. Bedrock geology (formerly known as 'solid' geology by BGS) is the term used for the main mass of rocks forming the earth and is present everywhere, where exposed at the surface, or concealed beneath superficial deposits or water.
2. The data shown is the BGS Bedrock Geology data.
3. Further information on Bedrock Geology can be found within Section 2.3 of the Level 1 SFRA report

Intended Use

The 1:50 000 scale digital map data is generalised and the geological interpretation should be used only as a guide to the geology at a local level, not as a site-specific geological plan based on detailed site investigations.

Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Elmbridge Borough Council

Project Title: Elmbridge Borough Council Level 1 Strategic Flood Risk Assessment

Drawing Title: Bedrock Geology

Drawn	Checked	Approved	Date
HB	SL	SK	September 2018

Internal Project No.	Scale at A3
60565750	1:50,000

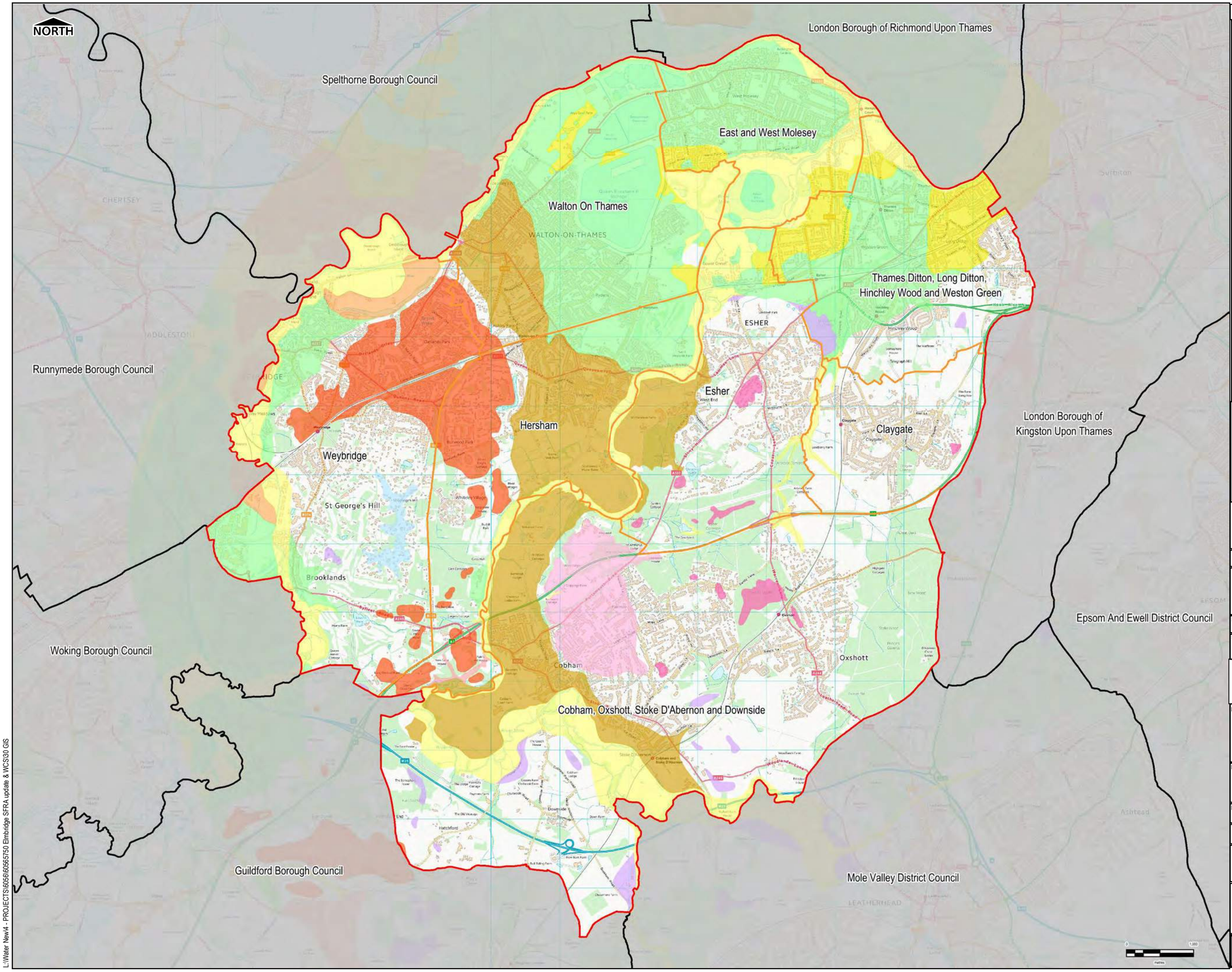
AECOM Infrastructure & Environment UK Limited
Midpoint
Alencon Link
Basingstoke
RG21 7PP
Telephone 01256 310300

Drawing Number: FIGURE B2

Rev: 01

L:\Water New\4 - PROJECTS\60565750 Elmbridge SFRA update & WCS\30 GIS

SFRA Figure B3 – Superficial Geology



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE AND IS SUBJECT TO AMENDMENT

LEGEND

- Elmbridge BC boundary
- Settlement Area boundary
- Local Planning Authority boundary

Superficial Deposits

- Sand and Gravel
- River Terrace Deposits
- Head
- Black Pearl Gravel
- Boyn Hill Gravel
- Taplow Gravel
- Lynch Hill Gravel
- Shepperton Gravel
- Langley Silt
- Kempton Park Gravel
- Alluvium

Notes

1. Superficial deposits (formerly known as 'drift' by BGS) are the youngest geological deposits formed during the most recent period of geological time, the Quaternary, which extends back about 2.6 million years from the present. They rest on older deposits or rocks referred to as bedrock.
2. The data shown is the BGS Superficial Deposits Geology data.
3. Further information on Superficial Deposits Geology can be found within Section 2.3 of the Level 1 SFRA report

Intended Use

The 1:50 000 scale digital map data is generalised and the geological interpretation should be used only as a guide to the geology at a local level, not as a site-specific geological plan based on detailed site investigations.

Revision Details	By	Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Elmbridge Borough Council

Project Title: Elmbridge Borough Council Level 1 Strategic Flood Risk Assessment

Drawing Title: Superficial Geology

Drawn	Checked	Approved	Date
HB	SL	SK	September 2018

Internal Project No.	Scale at A3
60565750	1:50,000

AECOM Infrastructure & Environment UK Limited
Midpoint
Alencon Link
Basingstoke
RG21 7PP
Telephone 01256 310300

Drawing Number: FIGURE B3

Rev: 01

L:\Water New\4 - PROJECTS\60565\60565750 Elmbridge SFRA update & WCS\30 GIS

Drawing MA212-250-255 - Proposed Site Plan (Basement, Lower Ground and Ground Floor)

Please note that these drawings are for planning purposes only. This document has been prepared for the sole use of the client. All dimensions should be checked on site. The client should be aware of their duties under the CDM regulations

Drawing : Proposed Site Basement Plan
Drawing No. : MA212 250
Revision : P7

Scale : 1:200 @ A1 / 1:400 @ A3
Date : June 2023

16-18 Oatlands Drive,
Weybridge, Surrey
KT13 9JL

MAYD ARCHITECTURE
22 Beacon Close
Wrecclesham
Farnham
Surrey
GU10 4PA
Tel : 07776 168635

Please note that these drawings are for planning purposes only. This document has been prepared for the sole use of the client. All dimensions should be checked on site. The client should be aware of their duties under the CDM regulations

Drawing : Proposed Site Lower Ground
Drawing No. : MA212 251
Revision : P6

Scale : 1:200 @ A1 / 1:400 @ A3
Date : June 2023

16-18 Oatlands Drive,
Weybridge, Surrey
KT13 9JL

MAYD ARCHITECTURE
22 Beacon Close
Wrecclesham
Farnham
Surrey
GU10 4PA
Tel : 07776 168635

Please note that these drawings are for planning purposes only. This document has been prepared for the sole use of the client. All dimensions should be checked on site. The client should be aware of their duties under the CDM regulations

Drawing : Proposed Site Ground
Drawing No. : MA212 252
Revision : P7

Scale : 1:200 @ A1 / 1:400 @ A3
Date : June 2023

16-18 Oatlands Drive,
Weybridge, Surrey
KT13 9JL

MAYD ARCHITECTURE
22 Beacon Close
Wrecclesham
Farnham
Surrey
GU10 4PA
Tel : 07776 168635

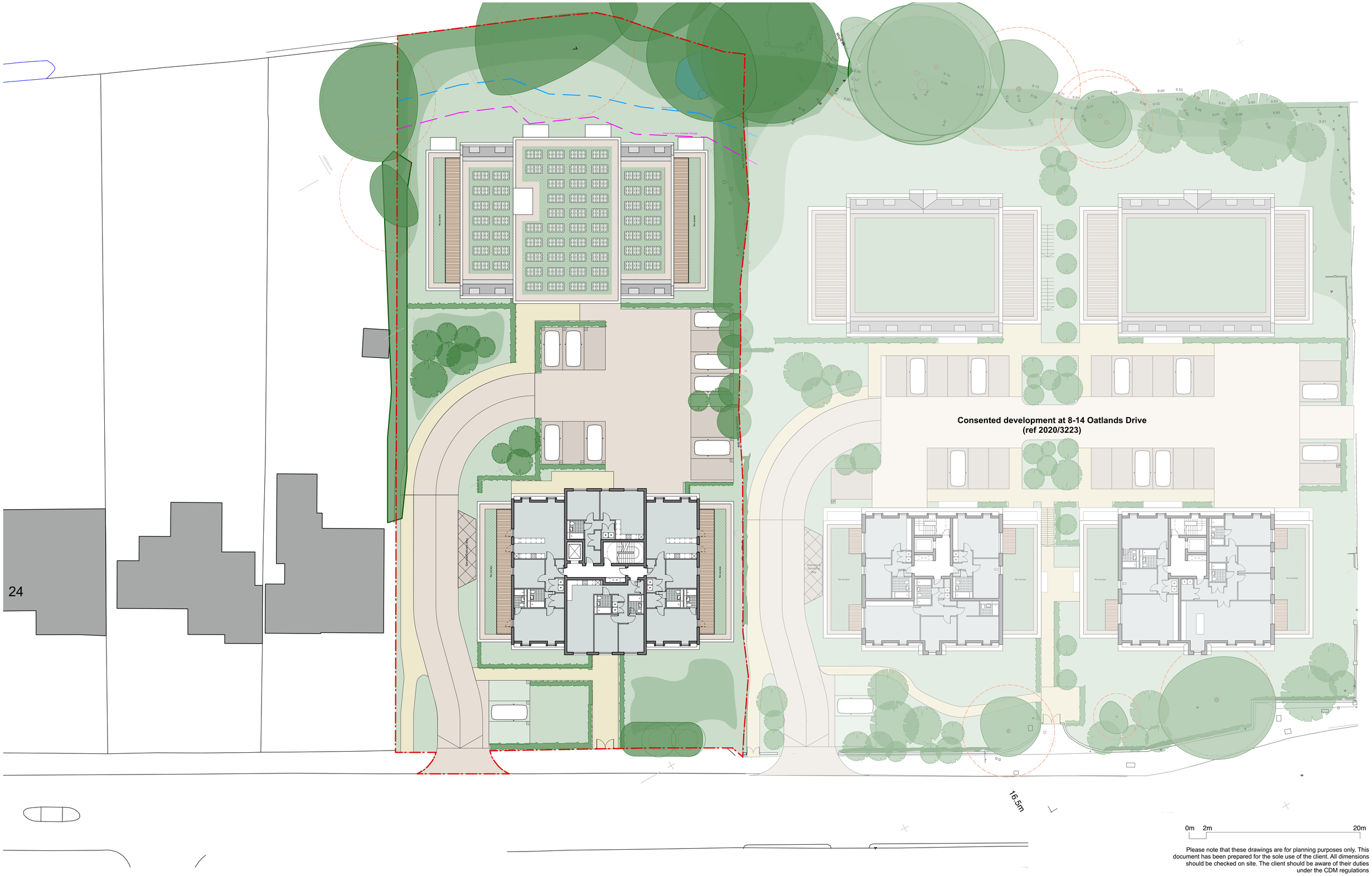
Please note that these drawings are for planning purposes only. This document has been prepared for the sole use of the client. All dimensions should be checked on site. The client should be aware of their duties under the CDM regulations

Drawing : Proposed Site 1st Floor
Drawing No. : MA212 253
Revision : P6

Scale : 1:200 @ A1 / 1:400 @ A3
Date : June 2023

16-18 Oatlands Drive,
Weybridge, Surrey
KT13 9JL

MAYD ARCHITECTURE
22 Beacon Close
Wrecclesham
Farnham
Surrey
GU10 4PA
Tel : 07776 168635



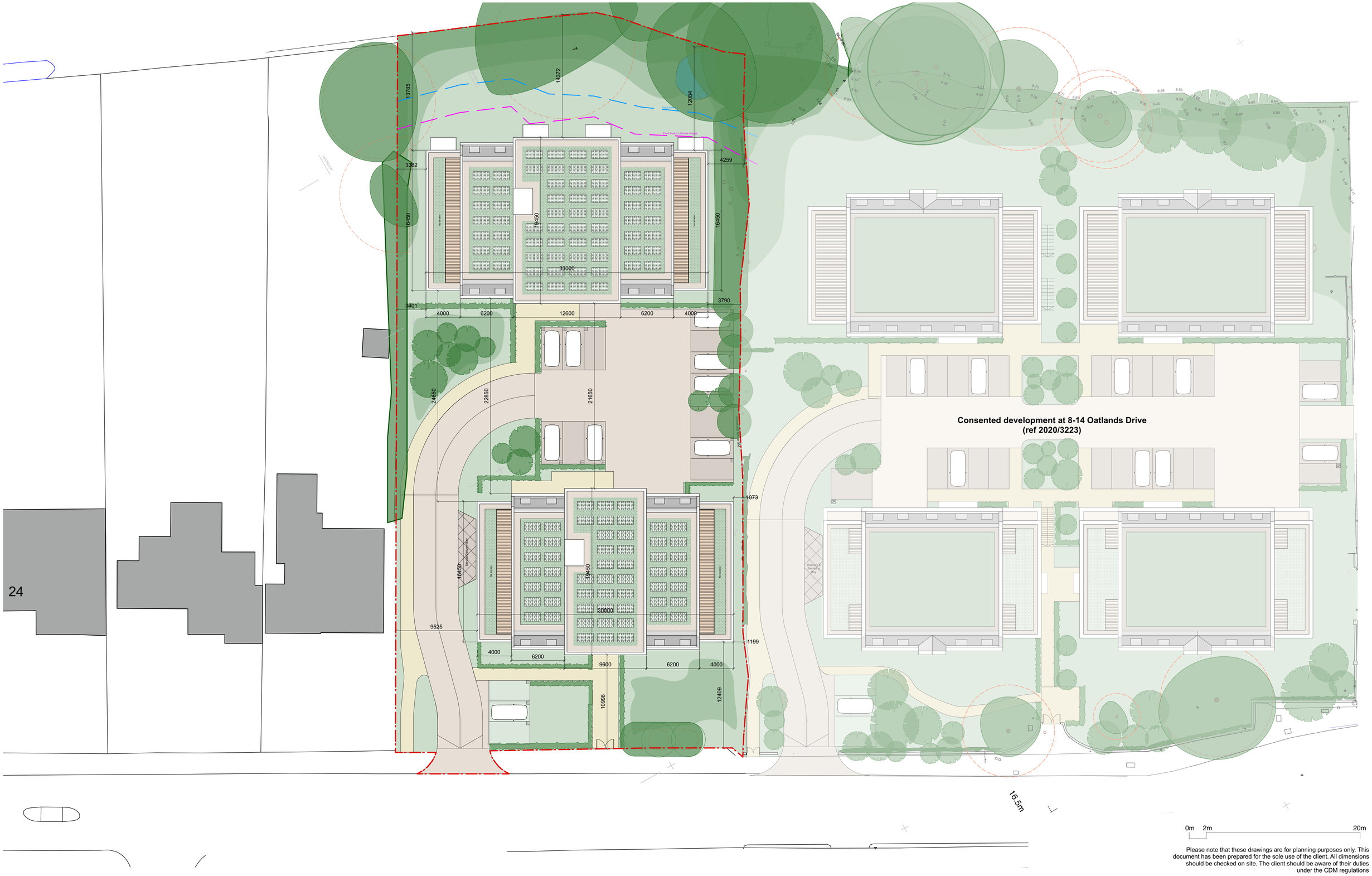
Please note that these drawings are for planning purposes only. This document has been prepared for the sole use of the client. All dimensions should be checked on site. The client should be aware of their duties under the CDM regulations

Drawing : Proposed Site 2nd Floor
Drawing No. : MA212 254
Revision : P6

Scale : 1:200 @ A1 / 1:400 @ A3
Date : June 2023

16-18 Oatlands Drive,
Weybridge, Surrey
KT13 9JL

MAYD ARCHITECTURE
22 Beacon Close
Wrecclesham
Farnham
Surrey
GU10 4PA
Tel : 07776 168635



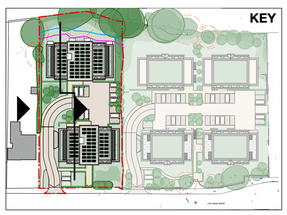
Please note that these drawings are for planning purposes only. This document has been prepared for the sole use of the client. All dimensions should be checked on site. The client should be aware of their duties under the CDM regulations

Drawing : Proposed Site Roof Plan
Drawing No. : MA212 255
Revision : P7

Scale : 1:200 @ A1 / 1:400 @ A3
Date : June 2023

16-18 Oatlands Drive,
Weybridge, Surrey
KT13 9JL

MAYD ARCHITECTURE
22 Beacon Close
Wrecclesham
Farnham
Surrey
GU10 4PA
Tel : 07776 168635



0m 1.5m 15m

Please note that these drawings are for planning purposes only. This document has been prepared for the sole use of the client. All dimensions should be checked on site. The client should be aware of their duties under the CDM regulations

Drawing : Side Elevation and Section 01
Drawing No. : MA212 360
Revision : P2

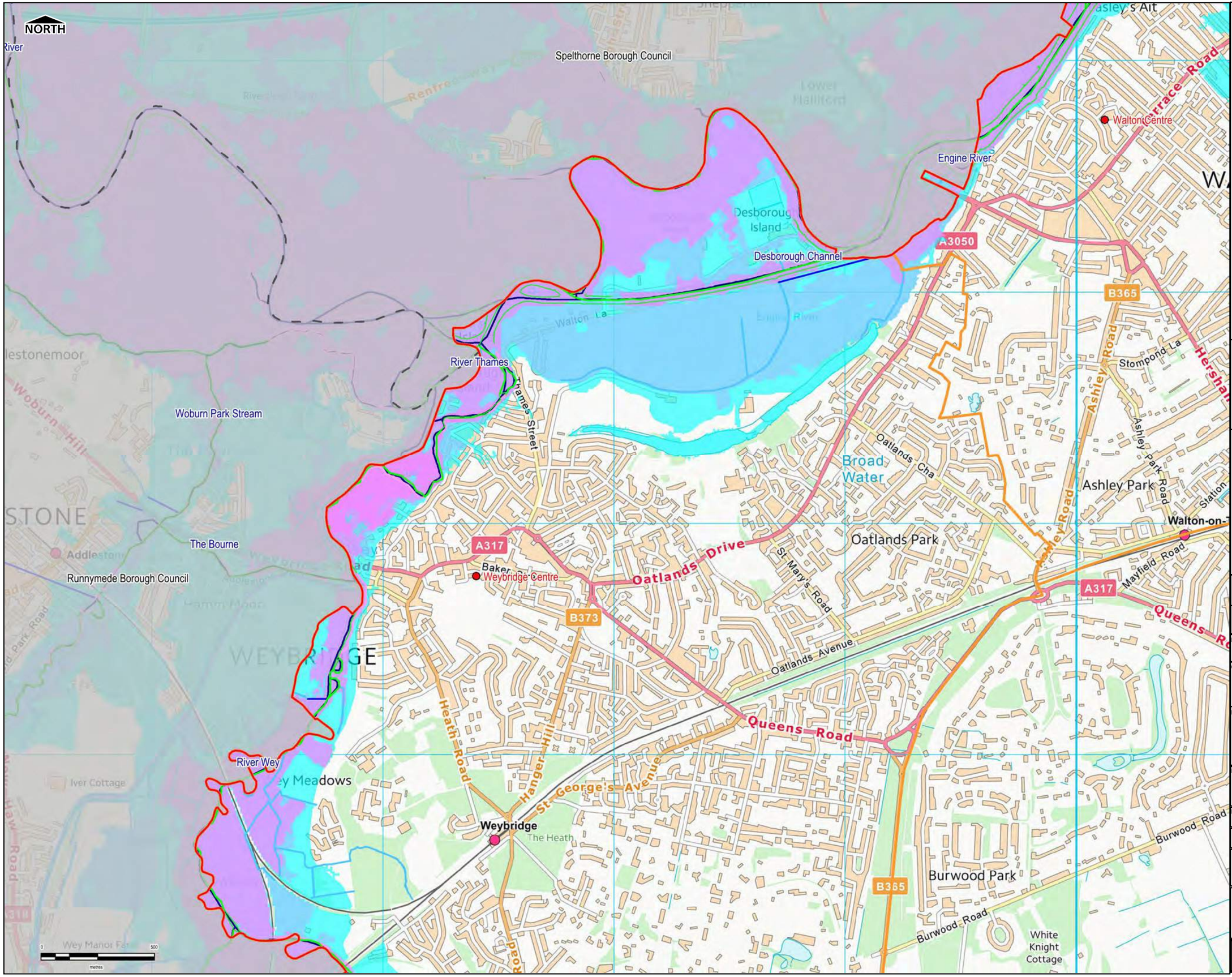
Scale : 1:150 @ A1 / 1:300 @ A3
Date : June 2023

16-18 Oatlands Drive, Weybridge, Surrey KT13 9JL

MAYD ARCHITECTURE
22 Beacon Close
Wrecclesham
Farnham
Surrey
GU10 4PA
Tel : 07776 168635

APPENDIX B

SFRA Figure C1 – Flood Risk from Rivers



LEGEND

- Borough Boundary
- LPAS
- Settlement Areas

Watercourses

- Main River
- Ordinary Watercourses- Culverted
- Ordinary Watercourses- Surface

Environment Agency Flood Zones

- Flood Zone 2
- Flood Zone 3
- Modelled Flood Zone 3b

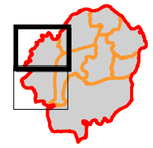
Environment Agency Maintained Flood Defences

- Embankment
- High Ground
- Wall

Third Party Maintained Defences

- Embankment
- High Ground
- Wall

- Areas Benefiting from Defences
- Elmbridge Primary Rest Centres



Notes

1. This map shows the predicted likelihood of fluvial flooding based on the Environment Agency's Flood Map for Planning (Rivers and the Sea) and catchment modelling studies, which may be subject to revision in the future. The Flood Map for Planning is provided on the Environment Agency website (www.gov.uk/environment-agency).
2. The probability of fluvial flooding is divided into the following categories:
Flood Zone 1 - Land having a less than 0.1% annual exceedence probability (AEP) of river flooding (<1 in 1,000 chance each year). Shown as clear on the Flood Map - all land outside Flood Zones 2 and 3.
Flood Zone 2 - Land having between a 1% and 0.1% AEP of river flooding (between 1 in 100 and 1 in 1,000 chance each year).
Flood Zone 3 - Land having a 1% AEP or greater of river flooding (>1 in 100 chance).
3. Flood Zone 3b Functional Floodplain is defined as land where water has to flow or be stored in times of flood, or land purposely designed to flood in an extreme event (0.1% AEP). For the purpose of this SFRA, land modelled to have a probability of flooding of 5% AEP or greater has been used by Elmbridge BC as a starting point for identifying areas of Functional Floodplain. Refer to Section 2.3 of the SFRA Report for further detail of the modelling studies used to define the extents of Flood Zone 3b.

Intended Use

This map is intended to provide a strategic overview of fluvial flood risk and should not be used to assess flood risk for individual properties.

Purpose of Issue

FINAL

Client

Elmbridge Borough Council

Project Title

Elmbridge Borough Council Level 1 Strategic Flood Risk Assessment

Drawing Title

Flood Risk from Rivers Weybridge (View 1)

Drawn	Checked	Approved	Date
HB	SL	SK	September 2018

Internal Project No.	Scale at A3
60565750	1:15,000

AECOM Infrastructure & Environment UK Limited
Midpoint
Alencon Link
Basingstoke
RG21 7PP
Telephone 01256 310300

Drawing Number

FIGURE C1

Rev

01

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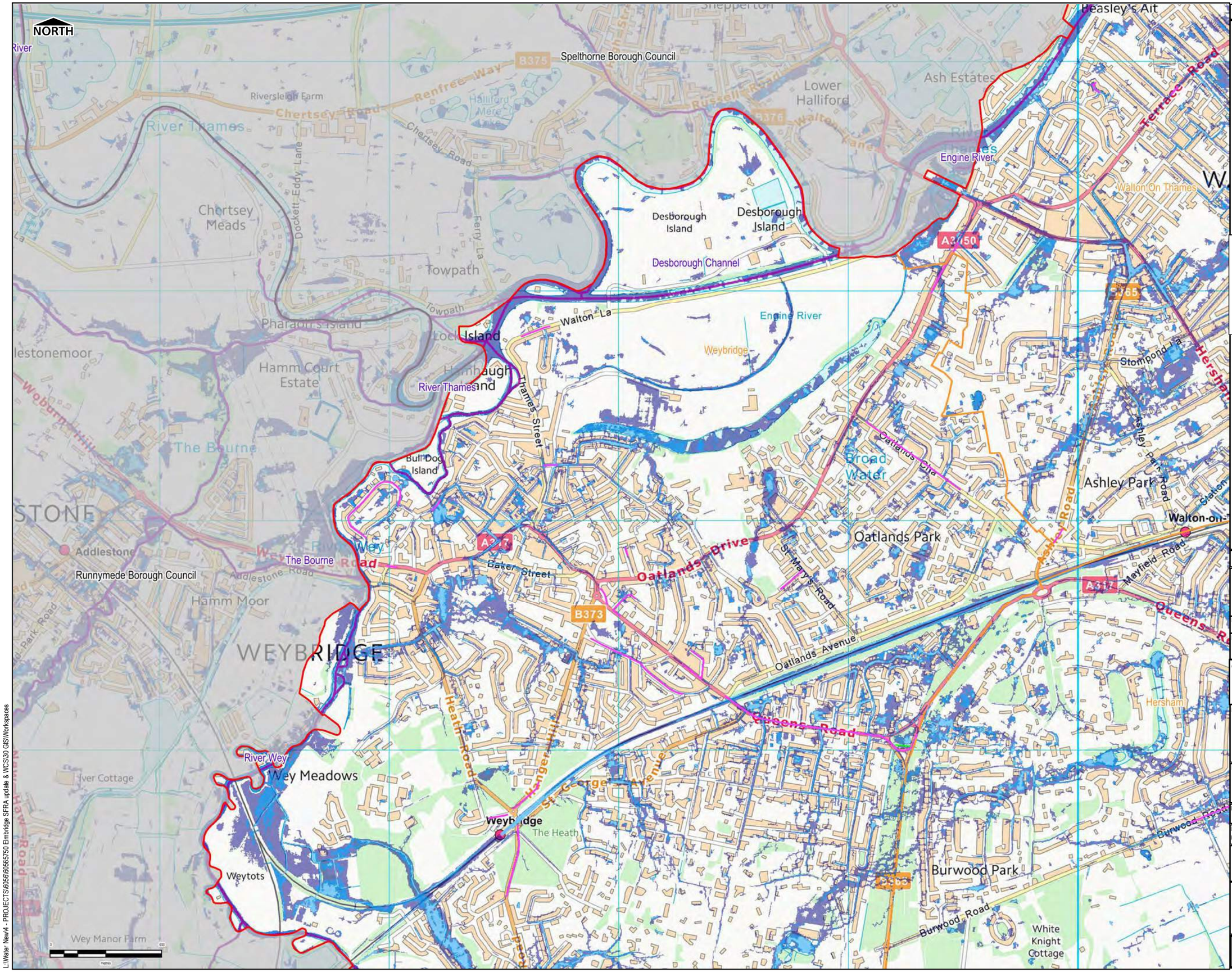
SFRA Figure F1 – Flood Risk from Surface Water



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

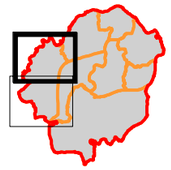
- Borough Boundary
- LPAS
- Settlement Areas

Watercourses

- Main River
- Elmbridge Ditches

Risk of Flooding from Surface Water

- High Risk of Flooding
- Medium Risk of Flooding
- Low Risk of Flooding
- Surrey Wetspots



Notes

1. This map shows the predicted likelihood of surface water flooding based on the Environment Agency's Risk of Flooding from Surface Water (ROFSW) data, which may be subject to further analysis in the future. Further information is provided on the Environment Agency website (www.gov.uk/environment-agency).
2. The Risk from Surface Water Flooding is divided into categories:
High: each year, the chance of flooding is greater than 1 in 30 (3.3%).
Medium: each year, the chance of flooding is between 1 in 100 (1%) and 1 in 30 (3.3%).
Low: each year, the chance of flooding is between 1 in 1000 (0.1%) and 1 in 100 (1%).
Very Low: each year, the chance of flooding is less than 1 in 1000 (0.1%).
3. The potential impact of surface water flooding can vary according to the depth of the water, and its velocity (speed and direction that it is flowing in).
4. Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead. This type of flooding can be difficult to predict as it is hard to forecast exactly where or how much rain will fall in any storm.

Intended Use

This map is intended to provide a strategic overview of surface water flood risk and should not be used to assess flood risk for individual properties.

Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Elmbridge Borough Council

Project Title: Elmbridge Borough Council Level 1 Strategic Flood Risk Assessment

Drawing Title: Flood Risk from Surface Water Weybridge (View 1)

Drawn	Checked	Approved	Date
HB	SL	SK	Sept 2018

Internal Project No.	Scale at A3
60565750	1:15,000

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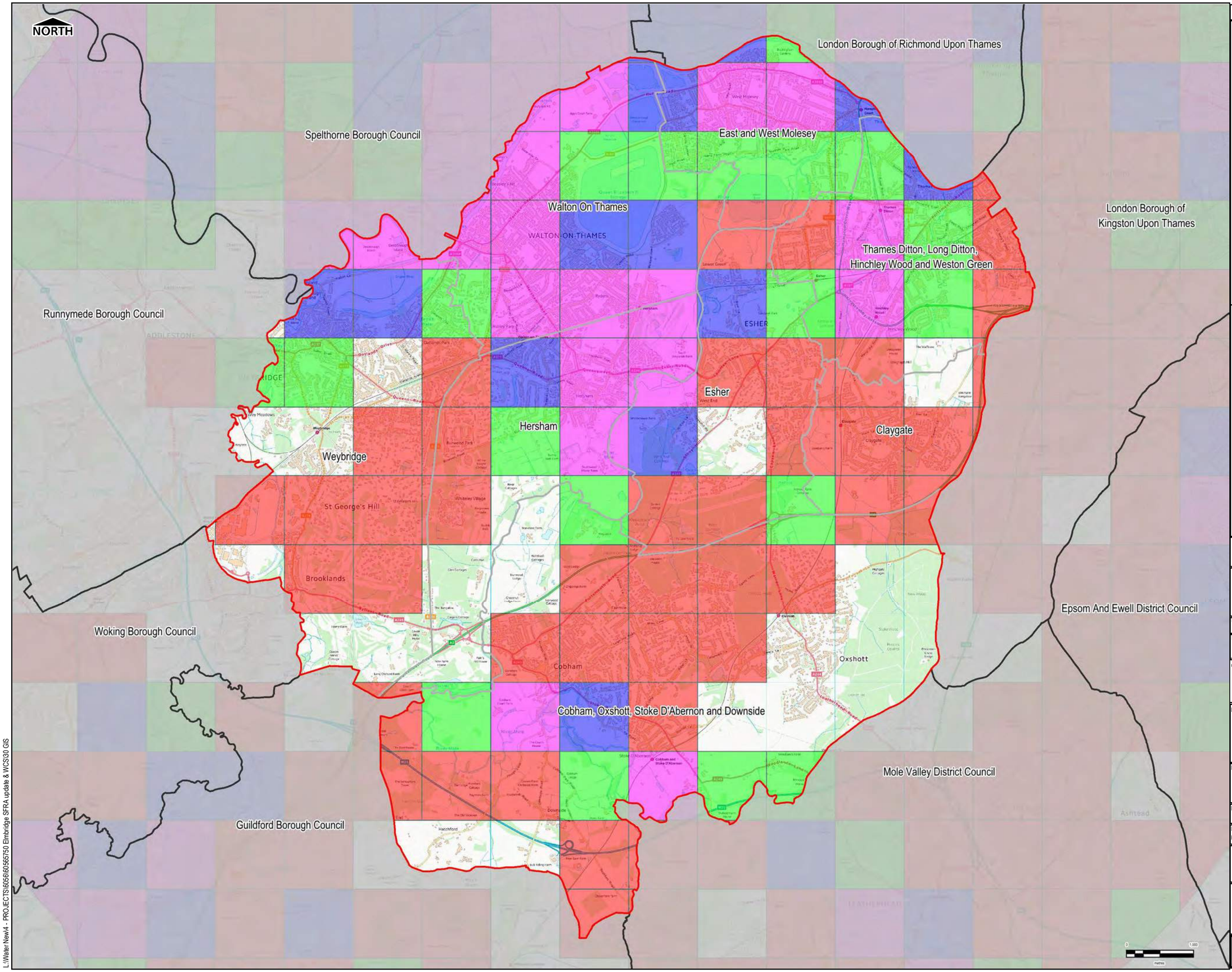
Basingstoke
RG21 7PP
Telephone 01256 310300

Drawing Number: FIGURE F1

Rev: 01

L:\Water New\4 - PROJECTS\60565\60565750 Elmbridge SFRA update & WCS\30 GIS\Workspaces

SFRA Figure B5 – Areas Susceptible to Groundwater Flooding



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE AND IS SUBJECT TO AMENDMENT

LEGEND

- Elmbridge BC boundary
- Settlement Area boundary
- Local Planning Authority boundary

Areas Susceptible to Groundwater Flooding

- < 25%
- >= 25% <50%
- >= 50% <75%
- >= 75%
- Not considered to be prone to groundwater flooding

Notes

1. Areas Susceptible to Groundwater Flooding (AStGWF) is a strategic scale map showing where groundwater flooding could occur on a 1km square grid. It shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater flooding could occur. The susceptible areas are represented by one of four categories showing the proportion of each 1km square that is susceptible to groundwater emergence. It does not show the likelihood of groundwater flooding occuring.
2. The absence of values for any grid square means that no part of that square is identified as being susceptible to groundwater emergence.
3. The map identifies areas where further investigation is needed to assess whether groundwater flooding may affect property or infrastructure.
4. This data shown is the Environment Agency dataset 'Areas Susceptible to Groundwater Flooding.
5.Further information on Groundwater Flooding can be found within Section 2.3 of the Level 1 SFRA

Intended Use

The 1:50 000 scale digital map data is generalised and the geological interpretation should be used only as a guide to the geology at a local level, not as a site-specific geological plan based on detailed site investigations.

This map is intended to provide a strategic overview of susceptibility to groundwater flooding and should not be used to assess flood risk for individual properties.

Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Elmbridge Borough Council

Project Title: Elmbridge Borough Council Strategic Flood Risk Assessment

Drawing Title: Areas Susceptible to Groundwater Flooding

Drawn	Checked	Approved	Date
HB	SL	SK	September 2018

Internal Project No.	Scale at A3
60565750	1:50,000

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Basingstoke
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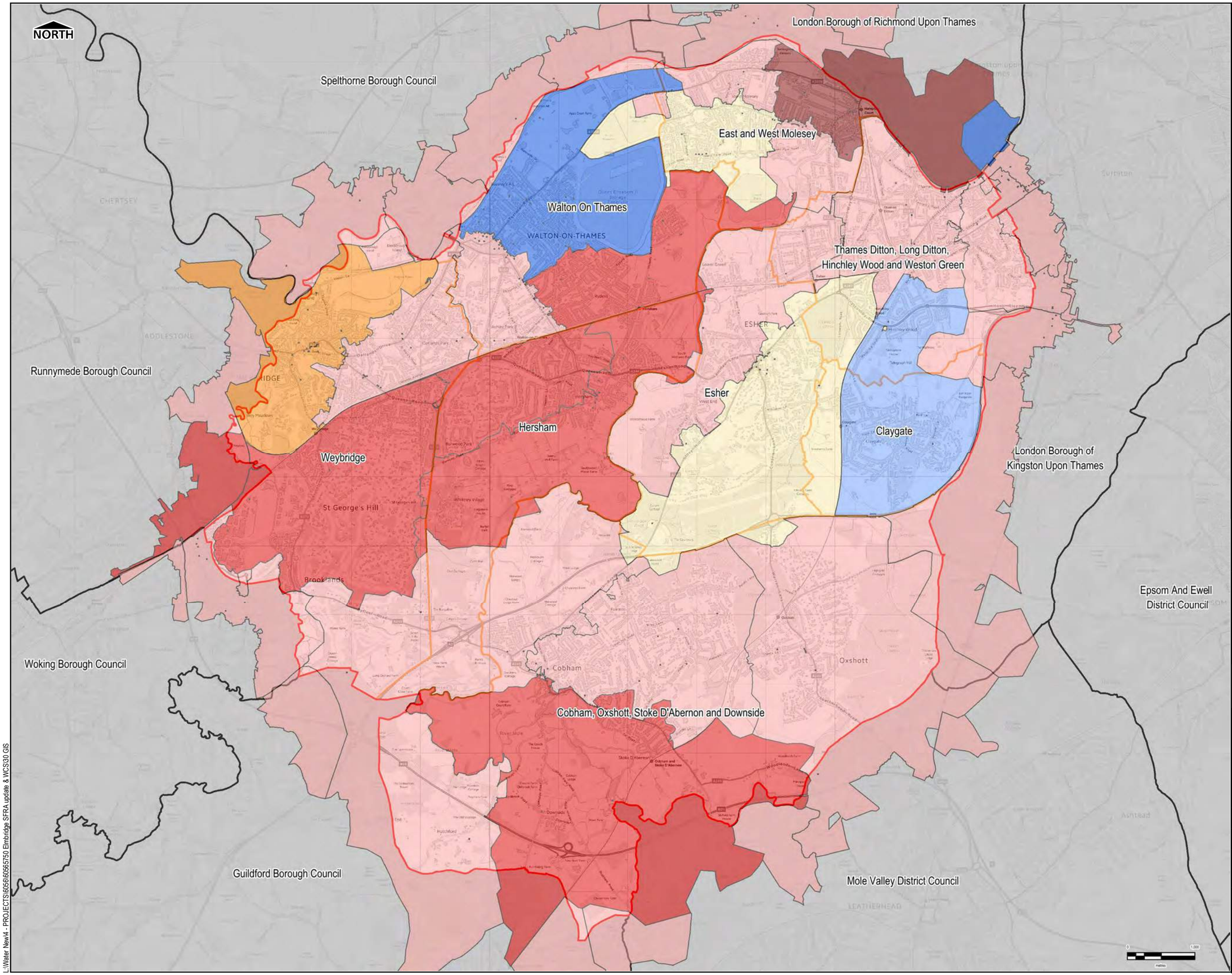
Telephone 01256 310300

Drawing Number: FIGURE B5

Rev: 01

L:\Water New\4 - PROJECTS\60565660565750 Elmbridge SFRA update & WCS\30 GIS

SFRA Figure B7 – Recorded Incidents of Internal Sewer Flooding



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Elmbridge BC boundary
- Local Planning Authority boundary
- Settlement Area boundary
- Post Code Sector Boundary

No. of TWUL Sewer Records by postcode

- 0
- 1
- 2
- 3
- 4
- 5
- 28

Notes

1. TWUL has supplied records of sewer flooding for the Borough through their DG5 register on the total number of properties affected by and at risk of sewer flooding based on historic flooding. This data has been displayed using the 4 digit postcode boundaries in the Borough.

Intended Use

This map is intended to provide a strategic overview of historic sewer flooding and should not be used to assess flood risk for individual properties

Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Elmbridge Borough Council

Project Title: Elmbridge Borough Council Level 1 Strategic Flood Risk Assessment

Drawing Title: Recorded Incidents of Internal Sewer Flooding

Drawn	Checked	Approved	Date
HB	SL		September 2018

Internal Project No.	Scale at A3
60565750	1:50,000

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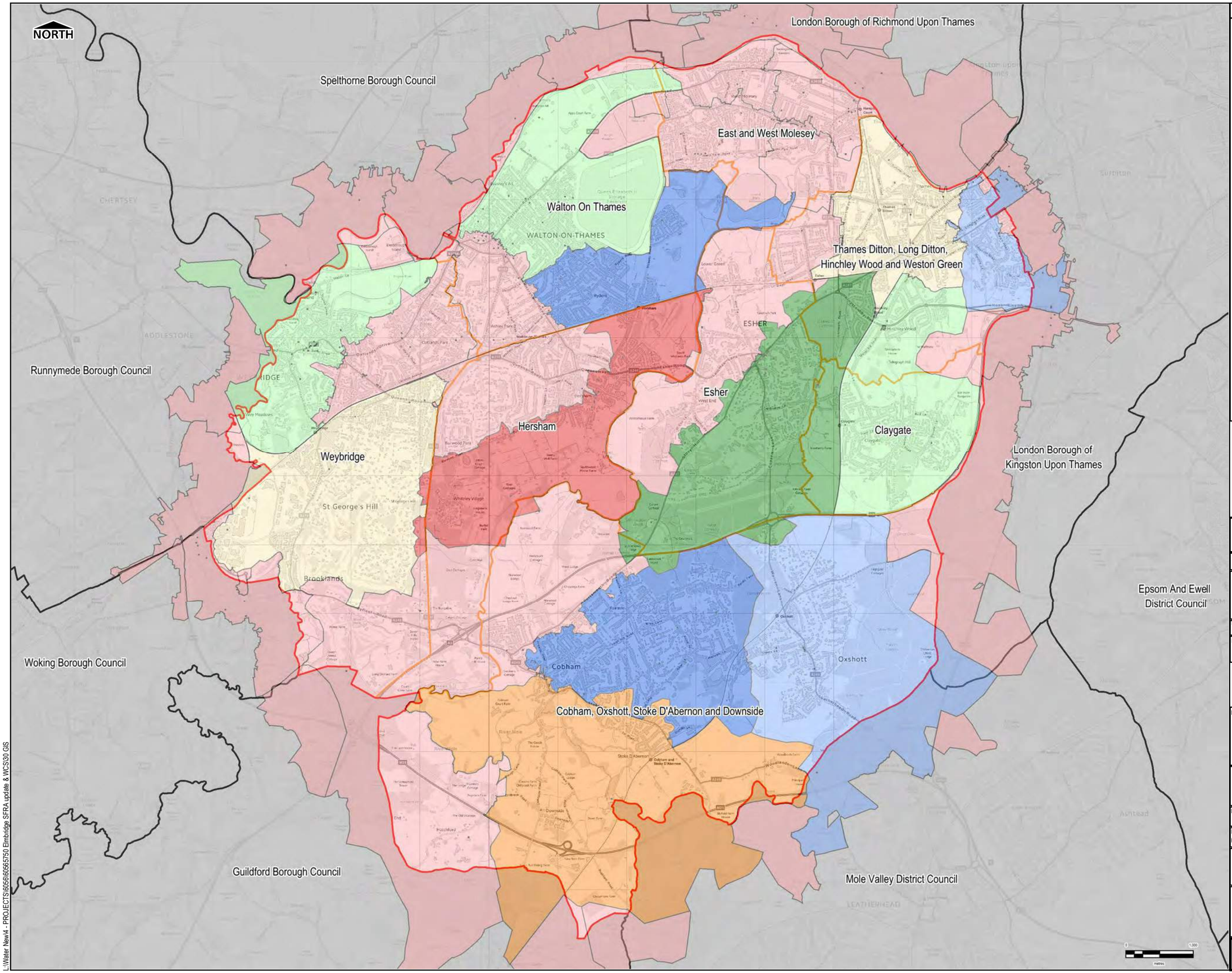
Midpoint
Alencon Link
Basingstoke
RG21 7PP
Telephone 01256 310300

Drawing Number: FIGURE B7

Rev: 01

L:\Water New\4 - PROJECTS\60565\60565750 Elmbridge SFRA update & WCS\30 GIS

SFRA Figure B8 - Recorded Incidents of External Sewer Flooding



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Elmbridge BC boundary
- Local Planning Authority boundary
- Settlement Area boundary
- Post Code Sector Boundary

No. of TWUL Sewer Records by postcode

- 0
- 1
- 2
- 3
- 4
- 6
- 7
- 18

Notes

1. TWUL has supplied records of sewer flooding for the Borough through their DG5 register on the total number of properties affected by and at risk of sewer flooding based on historic flooding. This data has been displayed using the 4 digit postcode boundaries in the Borough.

Intended Use

This map is intended to provide a strategic overview of historic sewer flooding and should not be used to assess flood risk for individual properties.

Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Elmbridge Borough Council

Project Title: Elmbridge Borough Council Level 1 Strategic Flood Risk Assessment

Drawing Title: Recorded Incidents of External Sewer Flooding

Drawn	Checked	Approved	Date
HB	SL		September 2018

Internal Project No.	Scale at A3
60565750	1:50,000

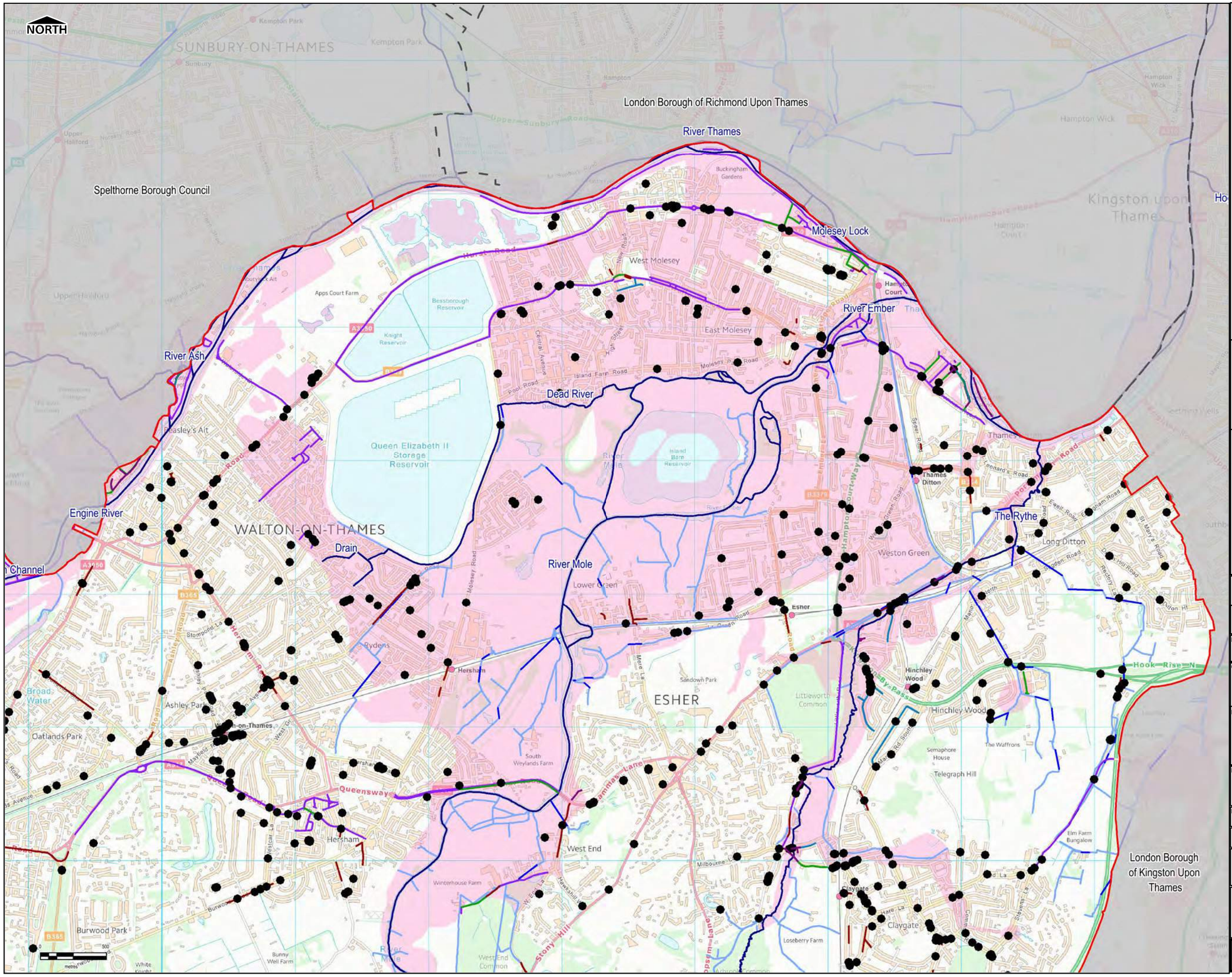
AECOM Infrastructure & Environment UK Limited
Midpoint
Alencon Link
Basingstoke
RG21 7PP
Telephone 01256 310300

Drawing Number: FIGURE B8

Rev: 01

L:\Water New\4 - PROJECTS\60565\60565750 Elmbridge SFRA update & WCS\3D GIS

SFRA Figure E1 – Historic Flood Incidents



LEGEND

Borough Boundary

LPAS

Watercourses

- Main River
- Ordinary Watercourses- Culverted
- Ordinary Watercourse- Surface

Environment Agency Historic Flooding

- Historic Flood Map
- West Thames Properties Affected

Elmbridge Borough Council

- Register of Flooded Properties

Surrey County Council (LLFA)

- Highways Enquiries
- Surrey Wetspots
- Internal Property Flooding
- External Property Flooding
- Historic Flooding Incidents

Notes

1. Flood Incidents data has been provided by the Environment Agency, Surrey County Council (Lead Local Flood Authority) and Elmbridge Borough Council. Further information on these flood records is provided within the Level 1 SFRA report

Intended Use

This map is intended to provide a strategic overview of fluvial flood risk and should not be used to assess flood risk for individual properties.

Purpose of Issue

FINAL

Client

Elmbridge Borough Council

Project Title

Elmbridge Borough Council Level 1 Strategic Flood Risk Assessment

Drawing Title

Historic Flood Incidents (View 1)

Drawn	Checked	Approved	Date
HB	SL	SK	September 2018

Internal Project No.	Scale at A3
60565750	1:26,000

AECOM Infrastructure & Environment UK Limited
Midpoint
Alencon Link
Basingstoke
RG21 7PP
Telephone 01256 310300

Drawing Number

FIGURE E1

Rev

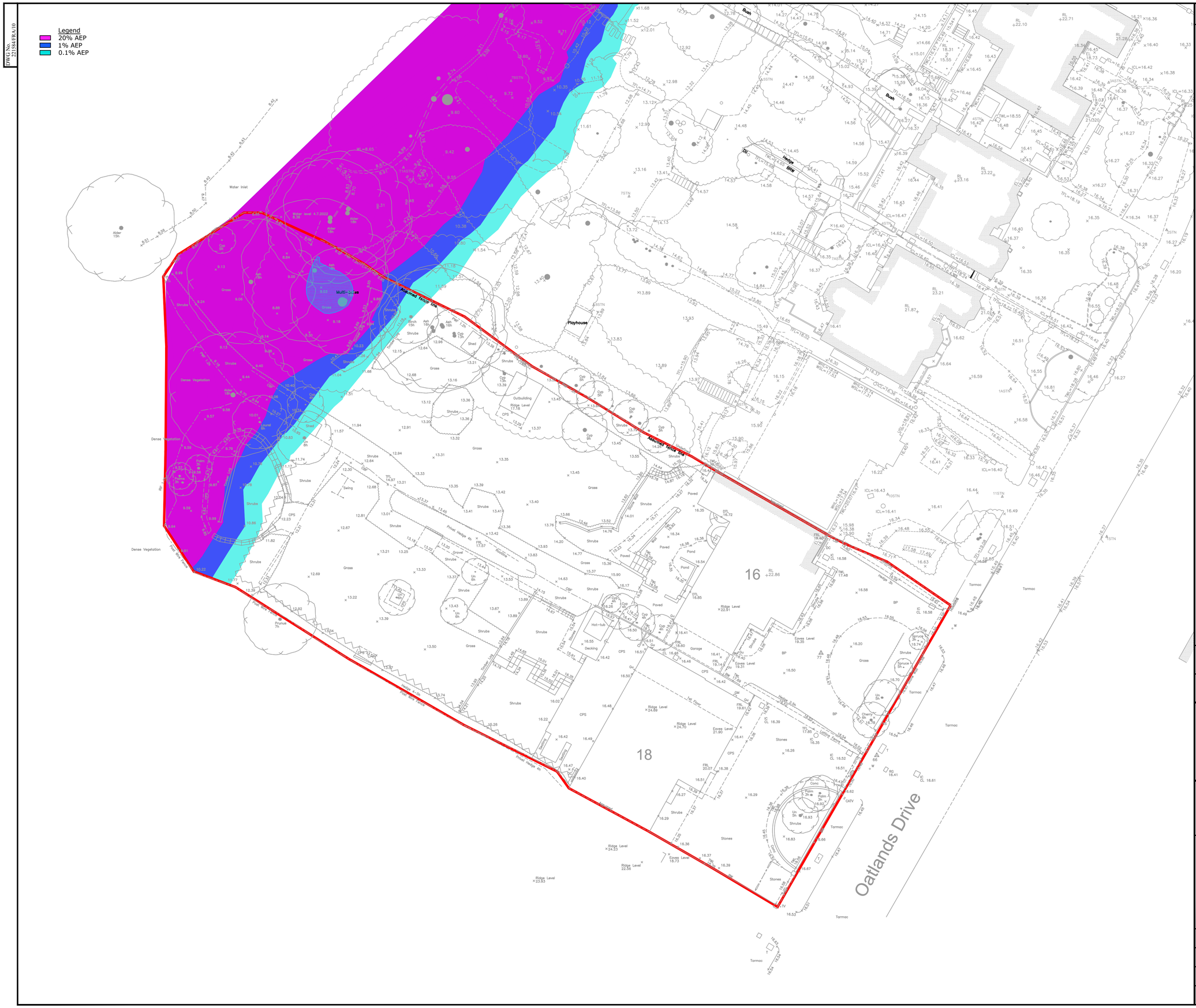
01

L:\Water New\4 - PROJECTS\60560\60565750 Elmbridge SFRA update & WCS\30 GIS

APPENDIX C

221584/FRA/10 – Detailed Flood Extents Map for Existing Site

DWG No. 221584/FRA/10



NOTES

Rev	Amendment	Drawn	Checked	Approved	Date
B	Pond added to rear garden	RS	KBL	KBL	15/6/23
A	20% Flood Outline Added	RS	KBL	KBL	16/5/23

LANMOR Consulting
Civil Engineers & Transport Planning
Thorogood House, 34 Tolworth Close, Surbiton, Surrey, KT6 7EW
Telephone: 0208 339 7899 Fax: 0208 339 7898
e-mail: info@lanmor.co.uk
www.lanmor.co.uk

16-18 Oatlands Drive
Weybridge

Detailed Flood Extents Map
for Existing Site

DRAWN KBL	CHECKED RS	APPROVED KBL	
DATE Dec-22	DATE Dec-22	DATE Dec-22	
SCALE 1:200	PRJ No. 221584	SIZE	REV
DWG No. 221584/FRA/10		A1	B

221584/FRA/11 – Detailed Flood Extents Map for Proposed Site

DWG No. 221584/FRA/11

NOTES

Rev	Amendment	Drawn	Checked	Approved	Date
B	Pond added	RS	KBL	KBL	15/6/23
A	1.0+47% AEP Flood Outline Added	RS	KBL	KBL	16/5/23

LANMOR Consulting
Civil Engineers & Transport Planning
Thorogood House, 34 Tolworth Close, Surbiton, Surrey, KT6 7EW
Telephone: 0208 339 7899 Fax: 0208 339 7898
e-mail: info@lanmor.co.uk
www.lanmor.co.uk

16-18 Oatlands Drive
Weybridge

Detailed Flood Extents Map
for Proposed Development

DRAWN	CHECKED	APPROVED
KBL	RS	KBL
DATE Dec-22	DATE Dec-22	DATE Dec-22

SCALE	PRJ No.	SIZE	REV
1:200	221584	A1	B

DWG No. 221584/FRA/11