



Flood Risk Assessment for Planning

Prepared for:

Mr D Dhunna

January 2021

Our reference:

90282-AlmaRd

Location:

43 Alma Road,
Windsor,
SL43HN



Document Issue Record

Project: Flood Risk Assessment for Planning
Client: Mr D Dhunna
Location: 43 Alma Road, Windsor SL4 3HN
Our reference: 90282- AlmaRd
Version: v1.0 140121

Lead Consultant: Mr Antony Rousou
Document Check: Mrs Emma Jeffery
Authorisation: Ms Jacqueline Stone

This report (including any enclosures and attachments) has been prepared for the exclusive use and benefit of the commissioning party and solely for the purpose for which it is provided. Unless we provide express prior written consent, no part of this report should be reproduced, distributed or communicated to any third party. We do not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report. Any data and information provided by third parties and referred to herein has not been checked or verified by us unless otherwise expressly stated within this report. This report was checked and approved on the date it was issued and is therefore valid on this date. Understanding, circumstances, regulations and professional standards do change, which could subsequently affect the validity of this report. This report is not to be used for detailed design of drainage systems. It is recommended that every drainage scheme uses hydraulic modelling software to finalise volume requirements and design details before drawings are produced.

Southpoint, Old Brighton Road, Gatwick, West Sussex, RH11 0PR

+44 (0) 1293 214 444

www.unda.co.uk

Contents

1. Key Facts	4
1.1 Flood Risk Posed:	4
1.2 Flood Risk Mitigation:	4
2. Introduction	5
3. Existing Situation	6
3.1 Site Usage:	6
3.2 Topography:	8
3.3 Geology and Soil:	8
3.4 Hydrology:	11
4. Development Proposal	12
5. Assessment of Flood Risk	13
5.1 Flood Zones:	13
5.2 Fluvial	14
5.2.1 The River Thames	14
5.2.2 Detailed flood modelling:	15
5.2.3 Flood defences:	15
5.2.4 Residual risk (breach or overtopping of flood defences):	16
5.2.5 Historical flood events:	16
5.3 Pluvial (Surface Water):	17
5.4 Groundwater:	18
5.5 Sewer Surcharge:	19
5.6 Other Sources:	19
6. Flood Risk Management	20
6.1 Vulnerability to flooding:	20
6.2 EA Standing Advice:	20
6.3 The Royal Borough of Windsor and Maidenhead F1 policy:	20
6.4 Physical Design Measures:	20
6.5 Safe Escape and Flood Action Plan:	21
6.6 Flood Warning:	22
6.7 Off-Site Impacts:	24
6.7.1 Fluvial floodplain storage:	24
6.7.2 Surface Water Drainage:	24
7. Sequential and Exception Test	25
8. Discussion and Conclusions	26
Appendix	28

1. Key Facts

1.1 Flood Risk Posed:

- EA Flood Zone 2 (Medium Risk).
- The risk would appear to be predominantly fluvial and originate from the River Thames 440m north of the site.
- The EA records show the partially within the historic flood extent from 1947.
- Alternative flood mapping is available in the Windsor and Maidenhead Strategic Flood Risk Assessment Level 1. This modelling places the site within Flood Zone 2, and entirely outside of Flood Zone 3a and 3b (Functional Floodplain).
- Modelled flood levels and flood extents have been requested from the EA as part of the Product 4 data request.
- No flood water encroaches onto the site from the modelled 1:100 year plus Upper End allowances for climate change, or 1:1000 year flood scenarios.
- The EA Risk of Flooding from Surface Water Map suggests that the site lies within an area of "Very Low" risk of flooding from surface water.
- Additionally, the risk of flooding posed to the site by reservoir and sewer surcharge flooding would appear to be low.

1.2 Flood Risk Mitigation:

- No new bedrooms will be created in the basement or on the ground floor.
- Internal access will be maintained from the basement and ground floor to the above floors of the development.
- Safe escape will be provided by the implementation of a flood warning and evacuation plan, which will be tied in with the existing emergency plans for the area and prepared in liaison with the Council's Emergency Planners.
- The applicant will register with the free Environment Agency Floodline Alert Direct service.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

2. Introduction

Unda Consulting Limited have been appointed by Mr D Dhunna (hereinafter referred to as “the applicant”) to undertake a Flood Risk Assessment for the proposed change of use at 43 Alma Road, Windsor SL4 3HN (hereinafter referred to as “the site”). The purpose of the study is to support a planning application for the proposed development.

This report presents our findings based on the readily available information and data relating to the site and surrounding drainage area.

The site appears to be located within Flood Zone 2 as defined by the Environment Agency (EA) on their Flood Map for Planning. Under the National Planning Policy Framework (NPPF), a FRA is required if a proposed development:

- includes building or engineering works in Flood Zone 2 or 3;
- includes building or engineering works on land classified by the Environment Agency as having critical drainage problem;
- changes the use of land or buildings in a location at risk of flooding from rivers or the sea, or with critical drainage problems;
- changes the use of land or buildings in a way that increases the flood vulnerability of the development where it may be subject to other sources of flooding;
- is larger than 1 hectare.

The assessment should demonstrate to the Local Planning Authority (LPA) and EA how flood risk will be managed now and over the development’s lifetime, taking climate change into account, and with regard to the vulnerability of its potential users.

- whether the proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate.

3. Existing Situation

3.1 Site Usage:

The site is occupied by a single residential dwelling.

A map showing the site location is presented below in Figure 1, existing site plan in Figure 2 and the aerial imagery of the site in Figure 3.



Figure 1: Site Location (Source: Mr D Dhunna)

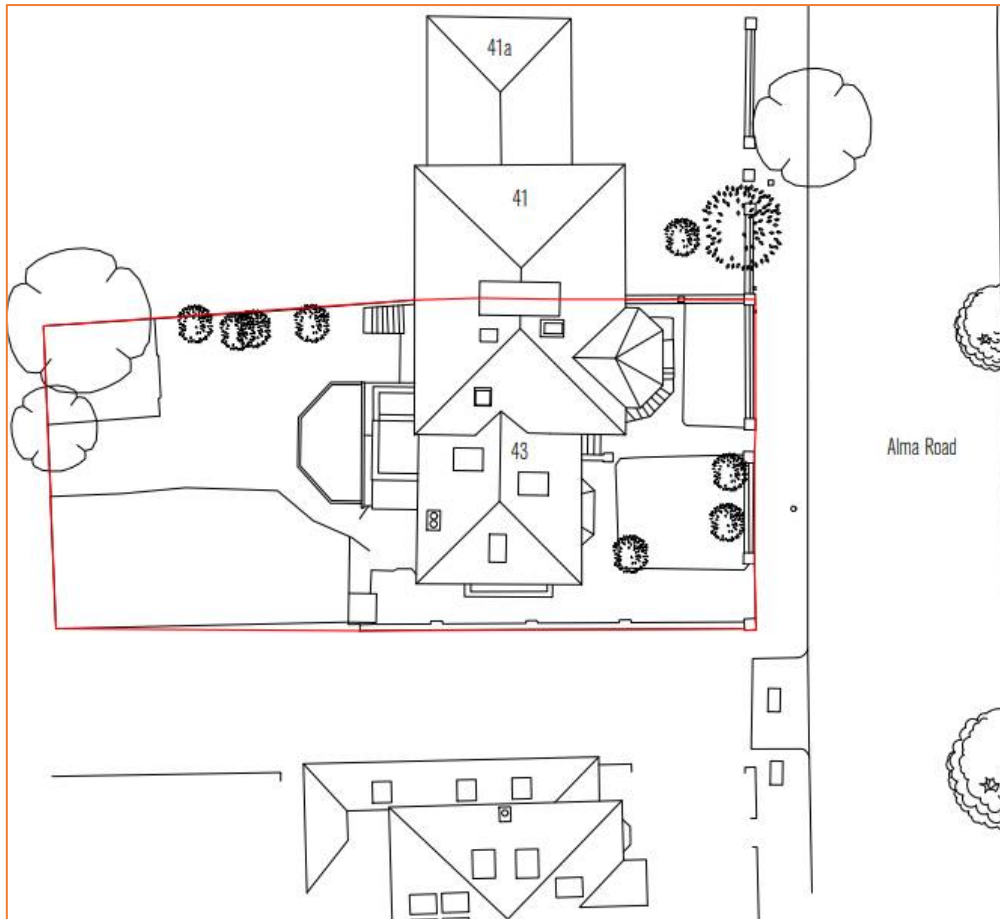


Figure 2: Existing Site Plan (Source: Mr D Dhunna)



Figure 3: Aerial view of the site and immediate surrounding area (Source: Google Earth)

3.2 Topography:

A topographical survey has been conducted by Icelabz and provided by the client for use within this report. The survey indicates that the site slopes from the west to the east with levels ranging from 21.79m AOD to 21.27m AOD.

3.3 Geology and Soil:

The British Geological Survey (BGS) Map indicates that the bedrock underlying the site is London Clay Formation - Clay, Silt and Sand. Sedimentary Bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period.

The British Geological Survey (BGS) Map indicates that the superficial deposits underlying the site are Shepperton Gravel Member - Sand and Gravel. Superficial Deposits formed up to 2 million years ago in the Quaternary Period.

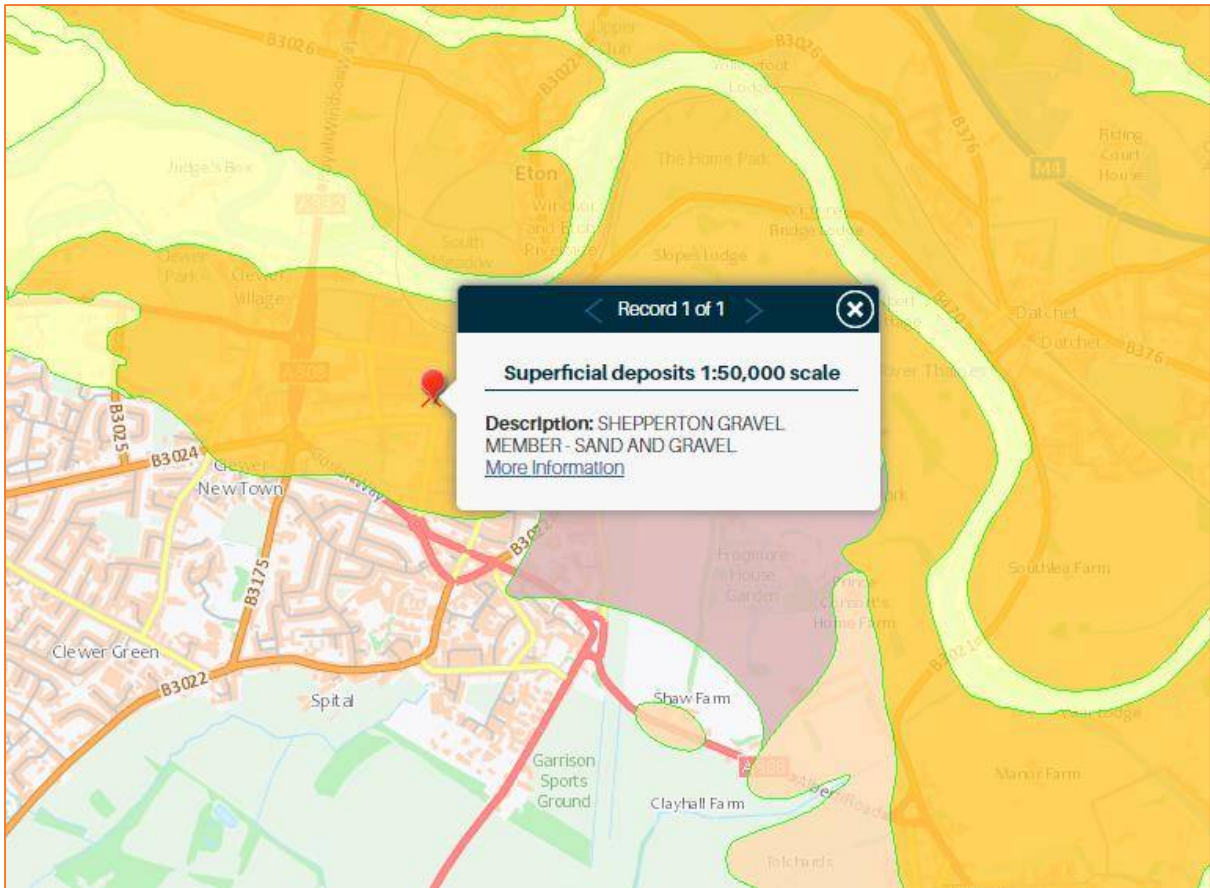


Figure 5: Superficial Deposits (Source: BGS)

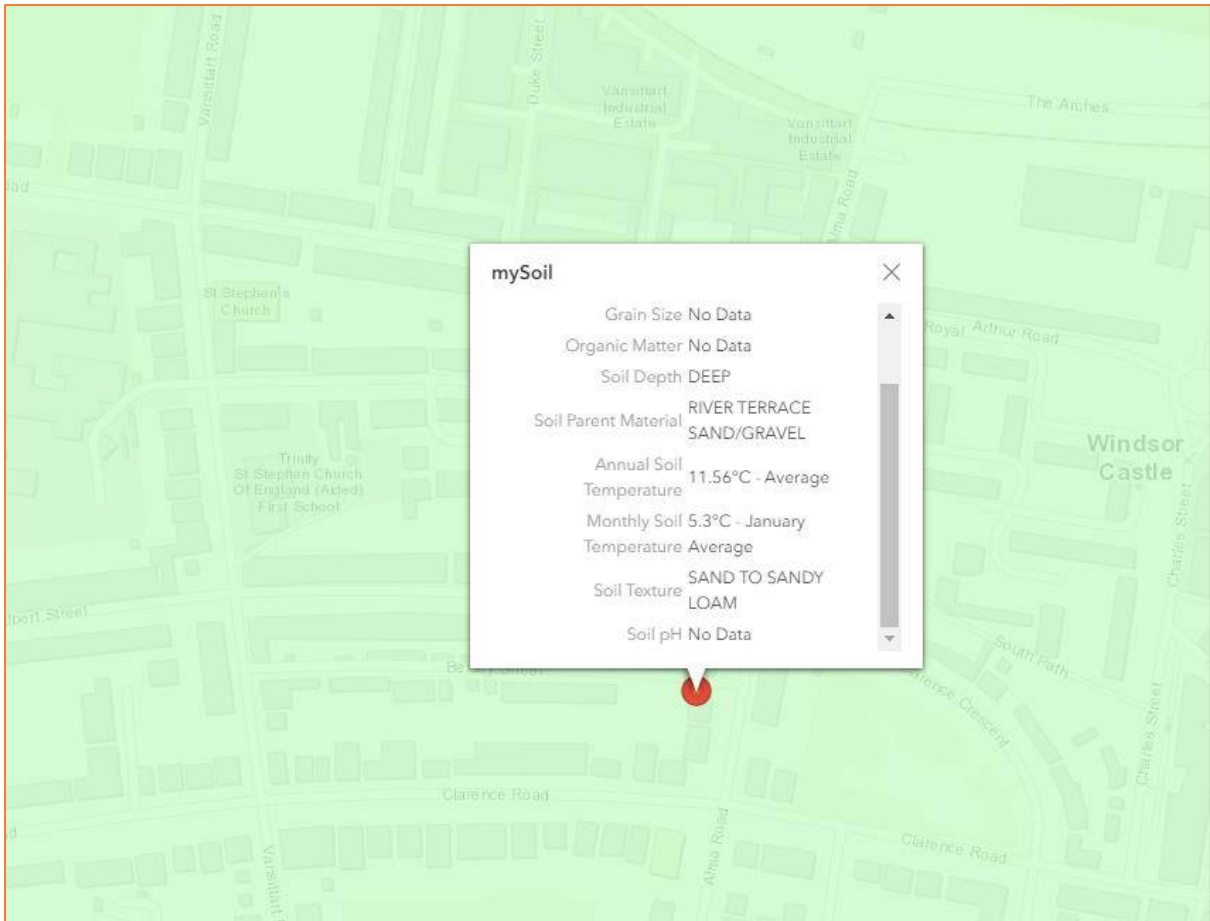


Figure 6: Soil type (Source: UK Soils)

3.4 Hydrology:

The nearest watercourse to the site is the River Thames 440m north of the site.

4. Development Proposal

The proposed planning application is for the change of use of a single dwelling into two dwellings. Floor plans for the dwelling are located within the Appendix.

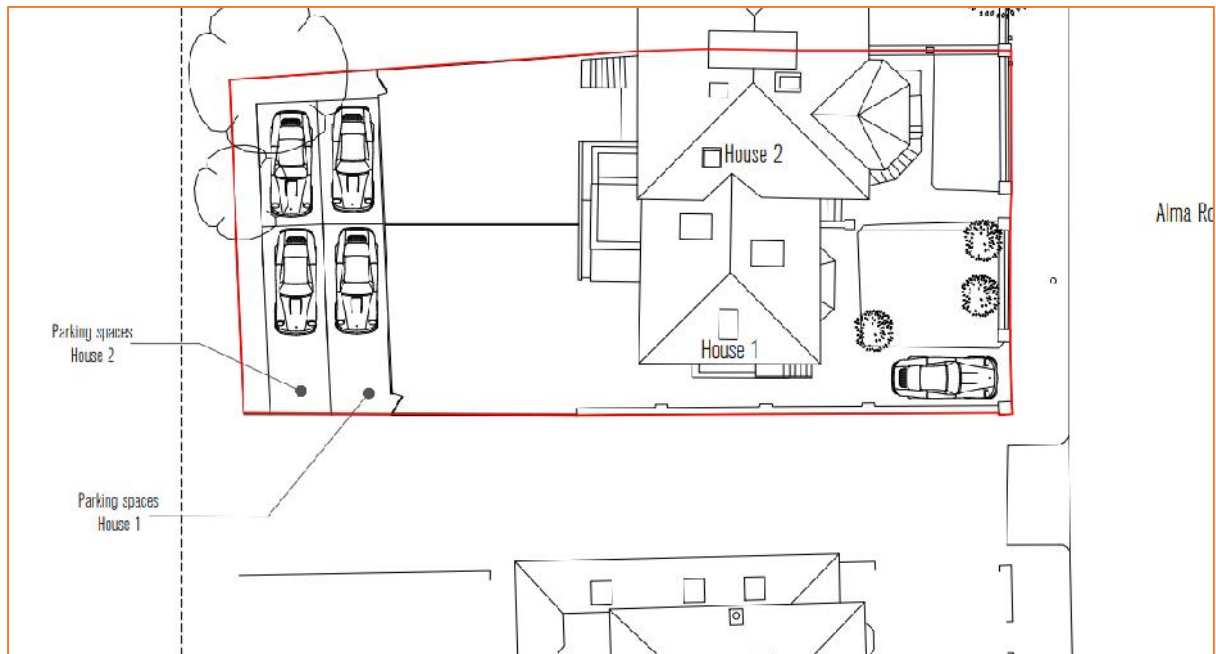


Figure 7: Proposed Site layout (Source: Mr D Dhunna)

5. Assessment of Flood Risk

5.1 Flood Zones:

Within planning, Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency’s Flood Map for Planning (Rivers and Sea), available on the Environment Agency’s website.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as ‘clear’ on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. 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)

Table 1: Flood Zones

The Flood Zones shown on the Environment Agency’s Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

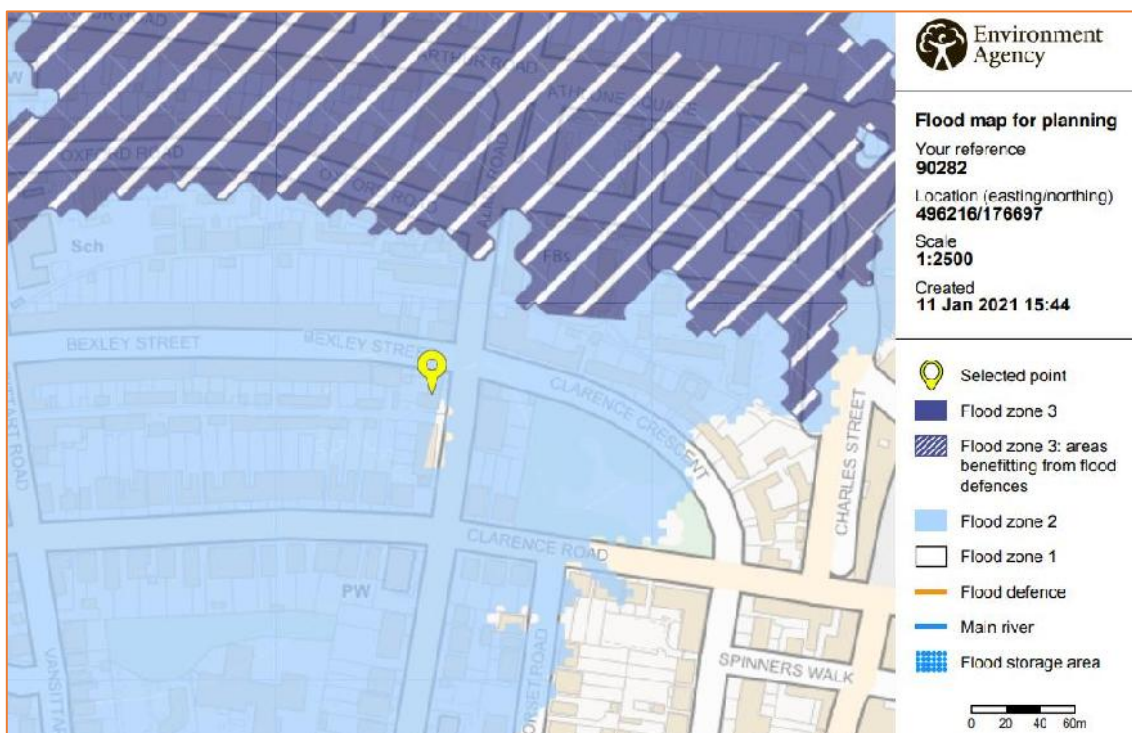


Figure 8: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

The site is located within Flood Zone 2 (Medium Probability), which means it is defined as land having between a 1 in 100 and 1 in 1000 annual probability of fluvial flooding

The risk would appear to be predominantly fluvial and originate from the River Thames 440m north of the site.

Windsor and Maidenhead Strategic Flood Risk Assessment mapping:

Alternative flood mapping is available in the Windsor and Maidenhead Strategic Flood Risk Assessment Level 1 June 2017 (Revision 07). This modelling places the site within Flood Zone 2, and entirely outside of Flood Zone 3a and 3b (Functional Floodplain).

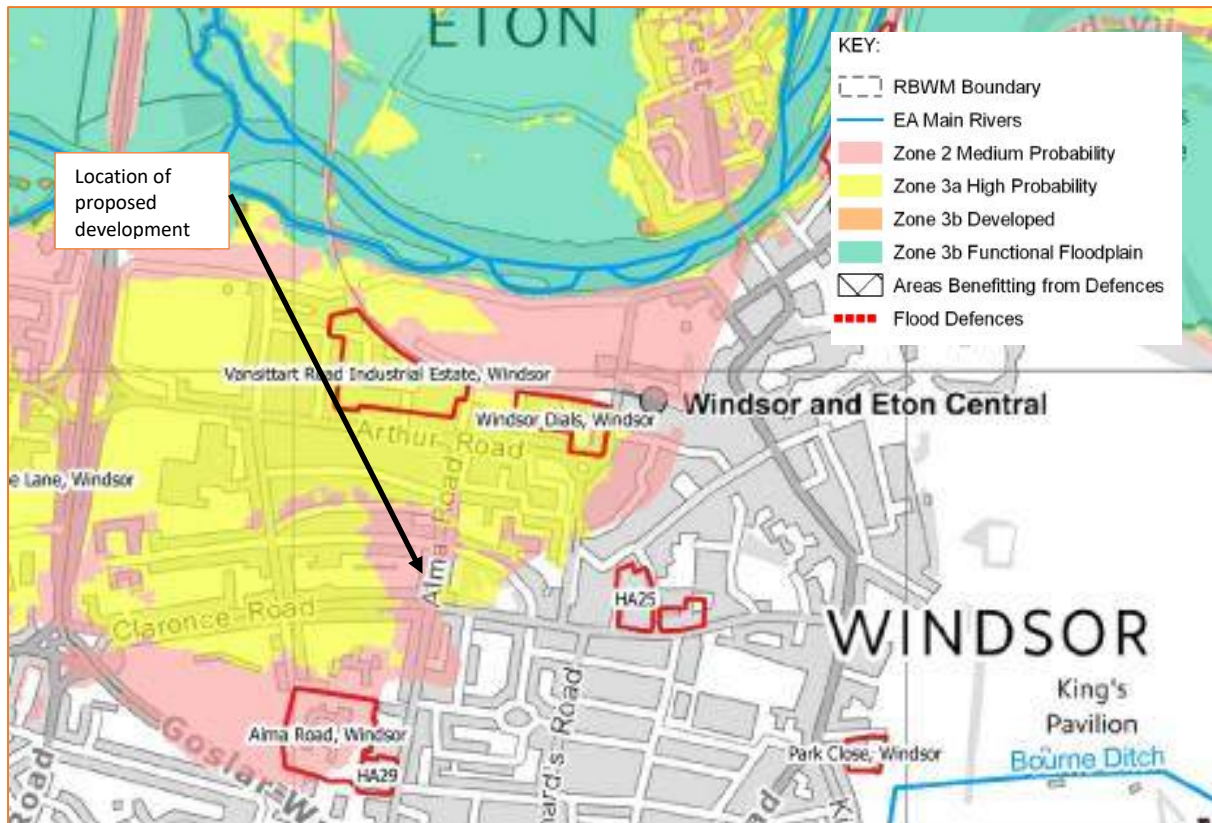


Figure 9: Windsor and Maidenhead Strategic Flood Risk Assessment mapping (Source: Windsor and Maidenhead SFRA)

5.2 Fluvial

5.2.1 The River Thames

The River Thames, known alternatively in parts as the Isis, is a river that flows through southern England including London. At 215 miles (346 km), it is the longest river entirely in England and the second-longest in the United Kingdom, after the River Severn.

It flows through Oxford (where it is called the Isis), Reading, Henley-on-Thames and Windsor. The lower reaches of the river are called the Tideway, derived from its long tidal reach up to Teddington Lock. It rises at Thames Head in Gloucestershire, and flows into the North Sea via the Thames Estuary. The Thames drains the whole of Greater London.

Its tidal section, reaching up to Teddington Lock, includes most of its London stretch and has a rise and fall of 23 feet (7 m).

5.2.2 Detailed flood modelling:

Modelled flood levels and flood extents have been requested from the EA as part of the Product 4 data request. The EA have provided the modelling from the Thames (Hurley to Teddington) 2019.

The most appropriate node for the site is 'Node 061_00_2018_24.022' which is located within the River Thames. The flood levels for the 1 in 20, 1:100 and 1:1000 year flood events are 19.50mAOD, 20.15mAOD and 20.79mAOD respectively.

Comparison of the modelled flood levels provided with topographic site levels (21.79mAOD to 21.27mAOD) shows that the site is above the modelled 1:20 year, 1:100 year and 1:1000 year levels for the River Thames.

The data provided by EA includes an allowance for climate change as required under the NPPF. In line with the climate change guidance published in February 2016, a 35% and 70% increase in river flows is required to allow for climate change (More Vulnerable development in Flood Zone 3 uses the Higher Central 35% and Upper End 70% allowances for the Thames River Basin District).

The EA has provided flood levels of 20.73mAOD and 20.79mAOD for the 1:100 year flood levels with 35% and 70% allowance for climate change respectively.

Comparison of the modelled 1:100 year flood levels with 35% and 70% allowance for climate change with topographic site levels (21.79mAOD to 21.27mAOD) confirms that the site is above the design flood levels.

In addition to in channel nodes, the EA has provided floodplain levels. The closest and therefore most appropriate node for the site is Flood Node 3. The flood levels provided for this node are 21.27mAOD and 21.17mAOD for the 1:100 year flood level with 70% allowance for climate change and 1000 year flood level respectively. When compared to the topographic levels of 21.79mAOD to 21.27mAOD the site is entirely above the 1 in 1000 year flood level. However, flood water could come up to the edge of the site (but not onto the site) as the flood level and lowest topographic level are the same for the 1:100 year flood level with 70% allowance for climate change.

Details of the Product 4 data are provided in the report Appendix.

5.2.3 Flood defences:

A flood defence or EA Asset is any man-made or natural feature – such as a raised defence, retaining structure, channel, pumping station or culvert – that performs a flood defence or land drainage function.

The EA has confirmed that this location is offered protection from the Maidenhead, Windsor and Eton Flood Alleviation Scheme consisting predominantly of the Jubilee River and the North Maidenhead Bund. The North Maidenhead Bund is a raised earth embankment (approx 1.5m). The Jubilee River is a diversion channel on the River Thames and carries high level flows away from the Maidenhead, Windsor and Eton area. The site is offered up to 1 in 25 standard of protection

(4% chance of occurring annually). Although it is given some protection from defences it is still in flood zone 3, we would strongly advise the owner to register to receive flood warnings to enable them to plan sufficiently in a flood event. Both defences are maintained by the Environment Agency. There are no other planned defences in this area.

5.2.4 Residual risk (breach or overtopping of flood defences):

Breaching of flood defences can cause rapid inundation of areas behind flood defences as flow in the river channel discharges through the breach. A breach can occur with little or no warning, although they are much more likely to concur with extreme river levels or tides when the stresses on flood defences are highest. Flood water flowing through a breach will normally discharge at a high velocity, rapidly filling up the areas behind the defences, resulting in significant damage to buildings and a high risk of loss of life. Breaches are most likely to occur in soft defences such as earth embankments although poorly maintained hard defences can also be a potential source of breach.

Overtopping of flood defences occurs when water levels exceed the protection level of raised flood defences. The worst case occurs when the fluvial or tidal levels exceed the defence level as this can lead to prolonged flooding. Less severe overtopping can occur when flood levels are below defence levels, but wave action causes cyclic overtopping, with intermittent discharge over the crest level of the defence. Flood defences are commonly designed with a freeboard to provide protection against overtopping from waves. The risk from overtopping due to exceedance of the flood defence level is much more significant than the risk posed by wave overtopping. Exceedance of the flood defence level can lead to prolonged and rapid flooding with properties immediately behind the defences at highest risk.

Flood defences act to defend the site from direct inundation, but there is residual risk from each (failure) and overtopping (exceedance) of flood defences.

In the event of failure (breach) or exceedance (overtopping) of the flood defences in place the site may be at risk of inundation.

5.2.5 Historical flood events:

The EA records show the site to be partially within the historic flood extent from 1947.



Figure 11: Extract from Environment Agency RoFSW map (Source: EA)

5.4 Groundwater:

Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground.

The Windsor and Maidenhead SFRA shows the site to be within an area with a $\geq 50\%$ to $< 75\%$ susceptibility groundwater flooding.

No records of groundwater flooding in the vicinity of the site have been provided.

5.5 Sewer Surcharge:

Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.

All Water Companies have a statutory obligation to maintain a register of properties/areas which have reported records of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the Water Company. The DG5 register records of flood incidents resulting in both internal property flooding and external flooding incidents. Once a property is identified on the DG5 register, water companies can typically put funding in place to address the issues and hence enable the property to be removed from the register. It should be noted that flooding from land drainage, highway drainage, rivers/watercourses and private sewers is not recorded within the register.

Thames Water is responsible for the management of urban drainage and sewerage within the Royal Borough.

No records of sewer flooding at the site previously have been provided.

5.6 Other Sources:

Reservoirs with an impounded volume in excess of 25,000 cubic metres (measured above natural ground level) are governed by the Reservoirs Act and are listed on a register held by the Environment Agency. The site lies outside the maximum inundation extent on the EA Reservoir Inundation Map. The EA also advise on their website that reservoir flooding is extremely unlikely. There has been no loss of life in the UK from reservoir flooding since 1925. All major reservoirs have to be inspected by specialist dam and reservoir Engineers. In accordance with the Reservoirs Act 1975 in England, these inspections are monitored and enforced by the EA themselves. The risk to the site from reservoir flooding is therefore minimal and is far lower than that relating to the potential for fluvial / tidal flooding to occur. The Environment Agency Reservoir Flood Map illustrated below, illustrates the largest area that might be flooded if the storage area were to fail and release the water it is designed to hold during a flood event.

Records of flooding from reservoirs and canals are erratic as there is no requirement for the Environment Agency to provide information on historic flooding from canals and raised reservoirs on plans. In particular, the NPPF does not require flood risk from canals and raised reservoirs to be shown on the Environment Agency flood zones.

Overflows from canals can be common as they are often fed by land drainage, and often do not have controlled overflow spillways. Occasionally, major bank breaches also occur, leading to rapid and deep flooding of adjacent land.

No further information has been provided to suggest the site is susceptible to from the failure of canals or other artificial infrastructure from the risk of flooding.

6. Flood Risk Management

6.1 Vulnerability to flooding:

The NPPF classifies property usage by vulnerability to flooding.

The existing site usage is classified as "more vulnerable" throughout, as it is a residential property.

Post development, the site will remain "more vulnerable", as the application is for the change of use of a single dwelling into two dwellings. However, there will be an intensification in use of the site (introduction of an additional residential dwelling).

6.2 EA Standing Advice:

The EA Standing Advice guidance is for domestic extensions and non-domestic extensions where the additional footprint created by the development does not exceed 250m². It should not be applied if an additional dwelling is being created, e.g. a self-contained annexe or additional commercial unit.

6.3 The Royal Borough of Windsor and Maidenhead F1 policy:

Policy F1 of the Adopted Local Plan will be applied to all development within the area liable to flood. Policy F1 indicates that new development or non-residential development, including extensions in excess of 30m² will not be permitted. The key to assessing any proposal for development is the calculation of ground covered area (GCA). The GCA is the calculation of gross external area of a building including any outbuildings that are non-floodable. For a house the GCA would include the additions to the property that have been completed since 26th September 1978 where they have resulted from the grant of planning permission.

The proposed planning application is for subdivision of the existing building and as such there will be no increase in built footprint post development. As such, the development as a whole is considered to fit within The Royal Borough of Windsor and Maidenhead F1 policy for domestic extensions.

6.4 Physical Design Measures:

The NPPF requires new residential floor levels be set at least 300mm above suitable modelled 1:100 year plus allowance for climate change flood levels.

Comparison of the modelled 1:100 year flood level with 70% allowance for climate change (Upper End climate change allowance) with topographic site levels shows that floodwater could come up to the edge of the site (but not onto the site) as the flood level and lowest topographic level are the same for the 1:100 year flood level with 70% allowance for climate change.

Given that the proposed application is for the change of use of a single dwelling into two dwellings and therefore uses the existing structure, finished floor levels will be set no lower than existing floor levels, and internal access will be maintained from the ground floor to the first floor of the property.

In addition, no new bedrooms are proposed in the basement or on the ground floor.

6.5 Safe Escape and Flood Action Plan:

The NPPF requires a route of safe escape for all residents and users to be provided from new residential properties in Flood Zone 3. Safe escape is usually defined as being through slow moving flood water no deeper than 25cm.

The site is located within Flood Zone 2 and comparison of modelled flood levels with topographic site levels shows that floodwater could come up to the edge of the site (but not onto the site) for the 1:100 year flood level with 70% allowance for climate change.

As such, the entire site acts as an area of safe refuge above modelled flood levels.

Comparison of the modelled 1:100 year plus 70% climate change flood level with topographic levels along the proposed escape route (south along Alma Street and then east along Victoria Street) shows that the depth of flooding only exceeds 25cm for approximately 25m of this route.

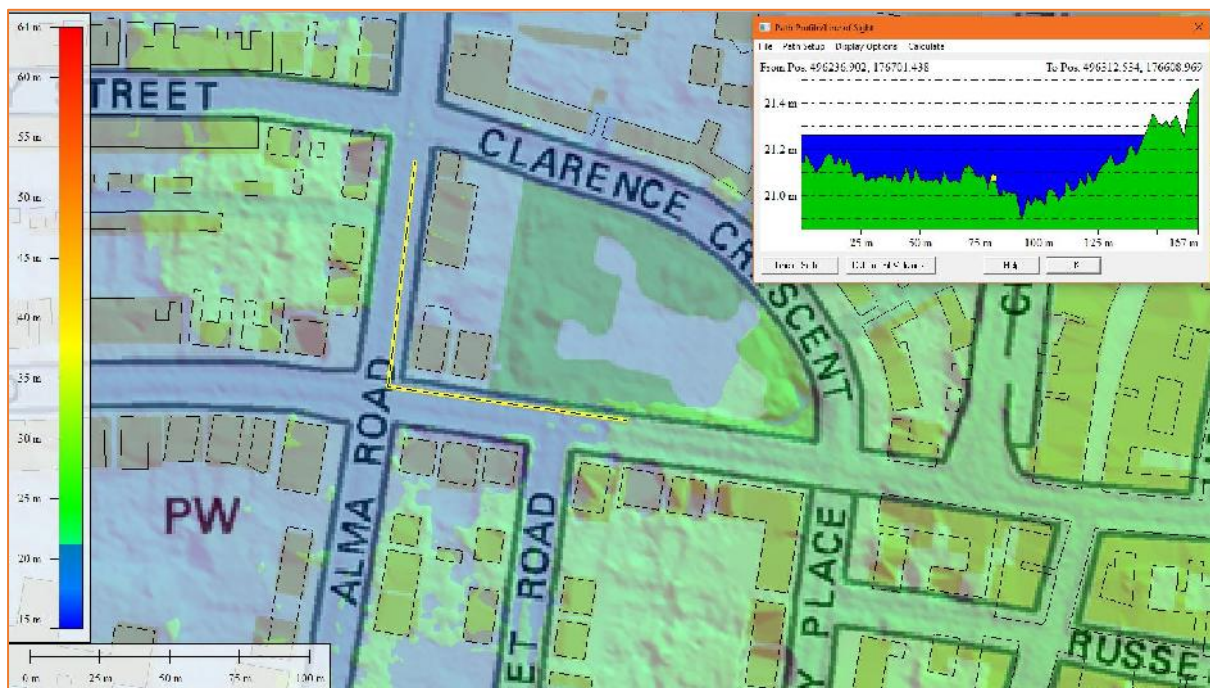


Figure 12: EA 1m LiDAR DTM with land below the modelled 1:100yr+70% climate change flood level (21.27mAOD) shaded blue. Escape route shown by yellow line. (Source: EA LiDAR, OS Mapping)

Safe escape will be provided by the implementation of a flood warning and evacuation plan, which will be tied in with the existing emergency plans for the area and prepared in liaison with the Council's Emergency Planners.

Residents and users should follow the warning and evacuation procedure detailed in the following section.

6.6 Flood Warning:

The EA is responsible for issuing flood warnings. Flood warnings are issued to the emergency services and local authorities. Both private individuals and organisations can sign-up to receive warnings via phone, text or email. This system of receiving warnings is currently voluntary.

Advice regarding severe flood warnings will generally be given during weather forecasts on local radio and TV. In the case of extreme events, warnings can also be disseminated via door to door visits by the police or locally appointed flood wardens.

The applicant has agreed to subscribe to the EA's flood warning service.

The flood warning service has three types of warnings that will help you prepare for flooding and take action:




Flood Warning	Flood Alert	Flood Warning	Severe Flood Warning
			
What it means?	Flooding is possible. Be prepared.	Flooding is expected. Immediate action required.	Severe flooding. Danger to life.
When it's used?	Two hours to two days in advance of flooding.	Half an hour to one day in advance of flooding.	When flooding poses a significant threat to life.
What to do?	Be prepared to act on your flood plan. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast on our website.	Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place.	Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger.

Table 2: EA Flood Warning Service

The applicant has prepared the following flood plan to protect life and property during a flood event:

Before a flood:

- Find out if you are at risk of flooding.

- Find out if you can receive flood warnings.
- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone.
- Think about what items you can move now and what you would want to move to safety during a flood such as pets, cars, furniture, and electrical equipment.
- Know how to turn off gas, electricity and water supplies.
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.
- Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property.

During a flood:

- Tune into your local radio station on a battery or wind-up radio.
- Fill jugs and saucepans with water.
- Grab your flood kit - if you have prepared one.
- Collect blankets, torch, first aid kit, medication and food.
- Move important documents, personal items, valuables, and lightweight belongings upstairs or to high shelves.
- Raise large items of furniture, or put them in large bags if you have them.
- Move people, outdoor belongings, cars and pets to higher ground.
- Switch off water, gas and electricity at mains when water is about to enter your home. Do not touch sources of electricity when standing in water.
- Fit flood protection products, if you have them, for example flood boards, airbrick covers, sandbags.
- Put plugs in sinks and baths. Weigh them down with a pillowcase or plastic bag filled with soil.
- If you do not have non-return valves fitted, plug water inlet pipes with towels or cloths.
- Move your family and pets upstairs or to a high place with a means of escape.
- Listen to the advice of the emergency service and evacuate if told to do so.
- Avoid walking or driving through flood water. Six inches of fast-flowing water can knock over an adult and two feet of water can move a car.

After a flood:

- If you have flooded, contact your insurance company as soon as possible.
- Take photographs and videos of your damaged property as a record for your insurance company.
- If you don't have insurance, contact your local authority for information on grants and charities that may help you.
- Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask.
- Have your electrics, central heating and water checked by qualified engineers before switching them back on.

6.7 Off-Site Impacts:

6.7.1 Fluvial floodplain storage:

The NPPF requires that where development is proposed in undefended areas of floodplain, which lie outside of the functional floodplain, the implications of ground raising operations for flood risk elsewhere needs to be considered. Raising existing ground levels may reduce the capacity of the floodplain to accommodate floodwater and increase the risk of flooding by either increasing the depth of flooding to existing properties at risk or by extending the floodplain to cover properties normally outside of the floodplain. Flood storage capacity can be maintained by lowering ground levels either within the curtilage of the development or elsewhere in the floodplain, in order to maintain at least the same volume of flood storage capacity within the floodplain.

In undefended tidal areas, raising ground levels is unlikely to impact on maximum tidal levels so the provision of compensatory storage should not be necessary.

For development in a defended flood risk area, the impact on residual flood risk to other properties needs to be considered. New development behind flood defences can increase the residual risk of flooding if the flood defences are breached or overtopped by changing the conveyance of the flow paths or by displacing flood water elsewhere. If the potential impact on residual risk is unacceptable then mitigation should be provided.

The site is situated in Flood Zone 2 when using the Environment Agency Flood Map for Planning (Rivers and Sea). Comparison of the modelled 1:100 year flood level with 70% allowance for climate change (Upper End climate change allowance) with topographic site levels shows that floodwater could come up to the edge of the site (but not onto the site) as the flood level and lowest topographic level are the same for the 1:100 year flood level with 70% allowance for climate change. In addition, the application is for a change of use with no increase in built footprint, and therefore there will be no unacceptable loss of floodplain storage.

6.7.2 Surface Water Drainage:

Due to the small scale of the development, a full Surface Water Drainage Strategy is not required at this stage of planning. However, SuDS features will be incorporated into the development where practically possible or will utilise the existing arrangement on site. Based on the plans provided, there will be no increase in built footprint. As such, there will be no change to the existing drainage system on site.

7. Sequential and Exception Test

The Sequential Test aims to ensure that development does not take place in areas at high risk of flooding when appropriate areas of lower risk are reasonably available.

The site is situated within Flood Zone 2 when using the Environment Agency Flood Map for Planning (Rivers and Sea).

Post development, the site will remain “more vulnerable”, as the application is for the change of use of a single dwelling into two dwellings

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required	✗	Exception Test required	✓	✓
Zone 3b	Exception Test required	✗	✗	✗	✓

Table 3: Flood risk vulnerability and flood zone ‘compatibility’

Using the table above, the proposed application is considered to be suitable within Flood Zone 2.

The Sequential and Exception Tests do not need to be applied to minor developments and changes of use (this application is for a change of use).

8. Discussion and Conclusions

Unda Consulting Limited have been appointed by Mr D Dhunna to undertake a Flood Risk Assessment for the proposed change of use at 43 Alma Road, Windsor SL4 3HN. The purpose of the study is to support a planning application for the proposed development.

The purpose of the study is to support a planning application for the proposed development.

The existing site usage is classified as "more vulnerable" throughout, as it is a residential property. Post development, the site will remain "more vulnerable", as the application is for the change of use of a single dwelling into two dwellings. However, there will be an intensification in use of the site (introduction of an additional residential unit).

The site is located within Flood Zone 2 (Medium Probability), which means it is defined as land having between a 1 in 100 and 1 in 1000 annual probability of fluvial or tidal flooding.

The risk would appear to be predominantly fluvial and originate from the River Thames 440m north of the site.

Alternative flood mapping is available in the Windsor and Maidenhead Strategic Flood Risk Assessment. This modelling places the site within Flood Zone 2 and entirely outside of Flood Zone and 3a and 3b (Functional Floodplain).

Modelled flood levels and flood extents have been requested from the EA as part of the Product 4 data request.

Comparison of the modelled flood levels provided with topographic site levels (21.79mAOD to 21.27mAOD) shows that the site is above the modelled 1:20 year, 1:100 year and 1:1000 year levels for the River Thames.

Comparison of the modelled 1:100 year flood levels with 35% and 70% allowance for climate change with topographic site levels (21.79mAOD to 21.27mAOD) confirms that the site is above the design flood levels.

In addition to in channel nodes, the EA has provided floodplain levels. The most appropriate node to use in Flood Node 3. The flood levels provided for this node are 21.27mAOD and 21.17mAOD for the 1:100 year flood level with 70% allowance for climate change and 1000 year flood level respectively. When compared to the topographic levels of 21.79mAOD to 21.27mAOD the site is entirely above the 1 in 1000 year flood level. However, flood water would come to the edge of the site (but not onto the site) as the flood level and lowest topographic level are the same for the 1:100 year flood level with 70% allowance for climate change.

The EA records show the site partially within the historic flood extent from 1947.

Given that the proposed application is for the change of use of a single dwelling into two dwellings finished floor levels will be set no lower than existing floor levels, and internal access will be maintained from the ground floor to the first floor of the property. In addition, no new bedrooms are proposed in the basement or on the ground floor.

The entire site acts as an area of safe refuge above modelled flood levels.

Comparison of the modelled 1:100 year plus 70% climate change flood level with topographic levels along the proposed escape route (south along Alma Street and then east along Victoria Street) shows that the depth of flooding only exceeds 25cm for approximately 25m of this route.

Safe escape will be provided by the implementation of a flood warning and evacuation plan, which will be tied in with the existing emergency plans for the area and prepared in liaison with the Council's Emergency Planners.

The EA Risk of Flooding from Surface Water Map suggests that the site lies within an area of "Very Low" risk of flooding from surface water.

The applicant has confirmed that:

- No new bedrooms will be created in the basement or on the ground floor.
- Internal access will be maintained from the basement and ground floor to the above floors of the development.
- Safe escape will be provided by the implementation of a flood warning and evacuation plan, which will be tied in with the existing emergency plans for the area and prepared in liaison with the Council's Emergency Planners.
- The applicant will register with the free Environment Agency Floodline Alert Direct service.

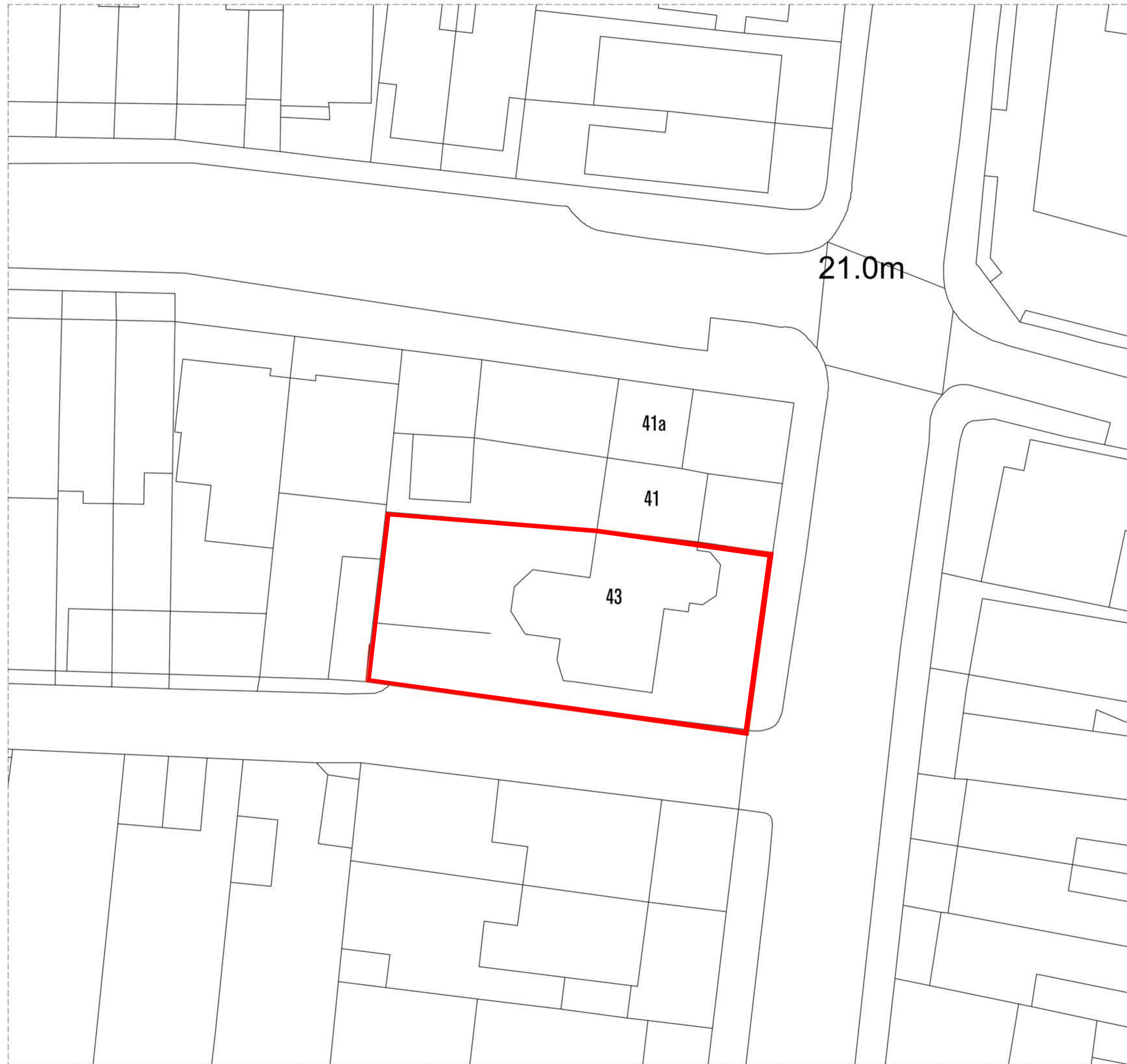
Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

Appendix

- Proposed Plans.
- EA Flood Data.

Location and Block Plan

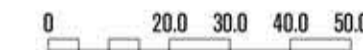
SCALE @ A1: On Sheet
SCALE @ A3: On Sheet



Ordnance Survey, (c) Crown Copyright 2020. All rights reserved. Licence number 100022432

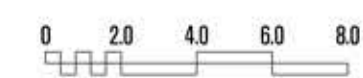
Location Plan

Scale: 1:1250 @ A1
1:2500 @ A3



Block Plan

Scale: 1:200 @ A1
1:400 @ A3



NOTES

- Default drawing size is A1
- To print at A3 please 'scale by 50%'
- Check printed scale against scale bar above

DRAWING DATE: 12/01/2021

This drawing must not be reproduced in part or whole without prior written consent. Scale to be checked against scale bar as this drawings has been provided electronically. Check and confirm all dimensions on site prior to commencing work. IF IN DOUBT ASK.

REV	DATE	NOTES
D1	07/01/2021	Draft Issue
P1	12/01/2021	Planning Issue

PROJECT	43 Alma Rd, Windsor, SL4 3HN
CLIENT	D Dhunna

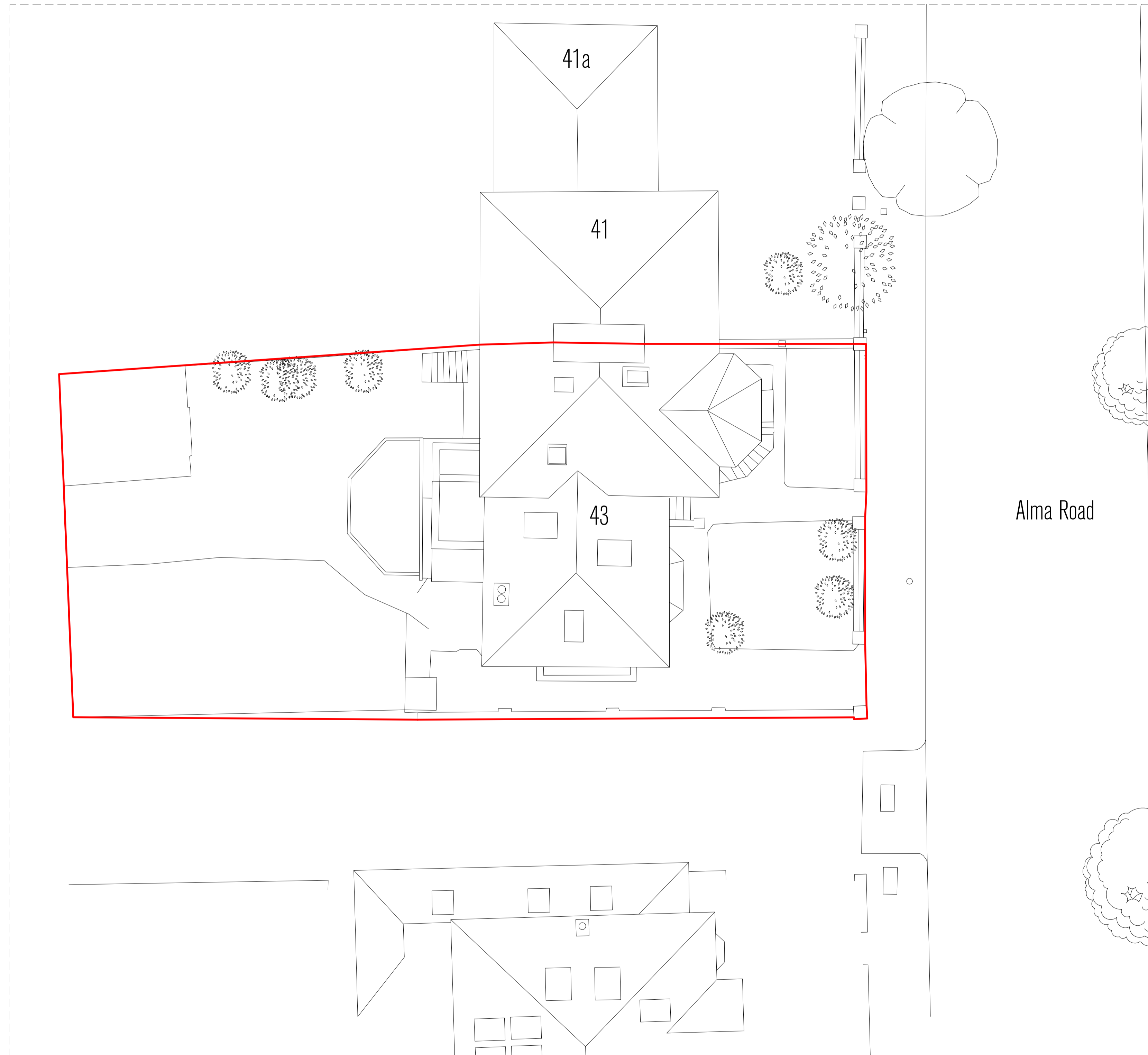
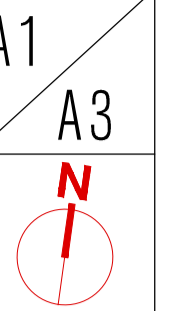


Tel: +44 7845777047
Email: rdoll.arch@gmail.com

STATUS	PLANNING	DRAWN BY	RD
JOB NO.	0001	DRAWING NO.	0001
		REV	P1
DRAWING TITLE			
Location and Block Plan			

Existing Site Plan

SCALE @ A1: 1:100
SCALE @ A3: 1:200



Alma Road

Overall Site = 430 Sqm

NOTES

- Default drawing size is A1
- To print at A3 please "scale by 50%"
- Check printed scale against scale bar above

DRAWING DATE: 12/01/2021

This drawing must not be reproduced in part or whole without prior written consent. Scale to be checked against scale bar as this drawings has been provided electronically. Check and confirm all dimensions on site prior to commencing work. IF IN DOUBT ASK.


REV	DATE	NOTES
D1	07/01/2021	Draft Issue
P1	12/01/2021	Planning Issue

PROJECT

43 Alma Rd, Windsor, SL4 3HN

CLIENT

D Dhunna

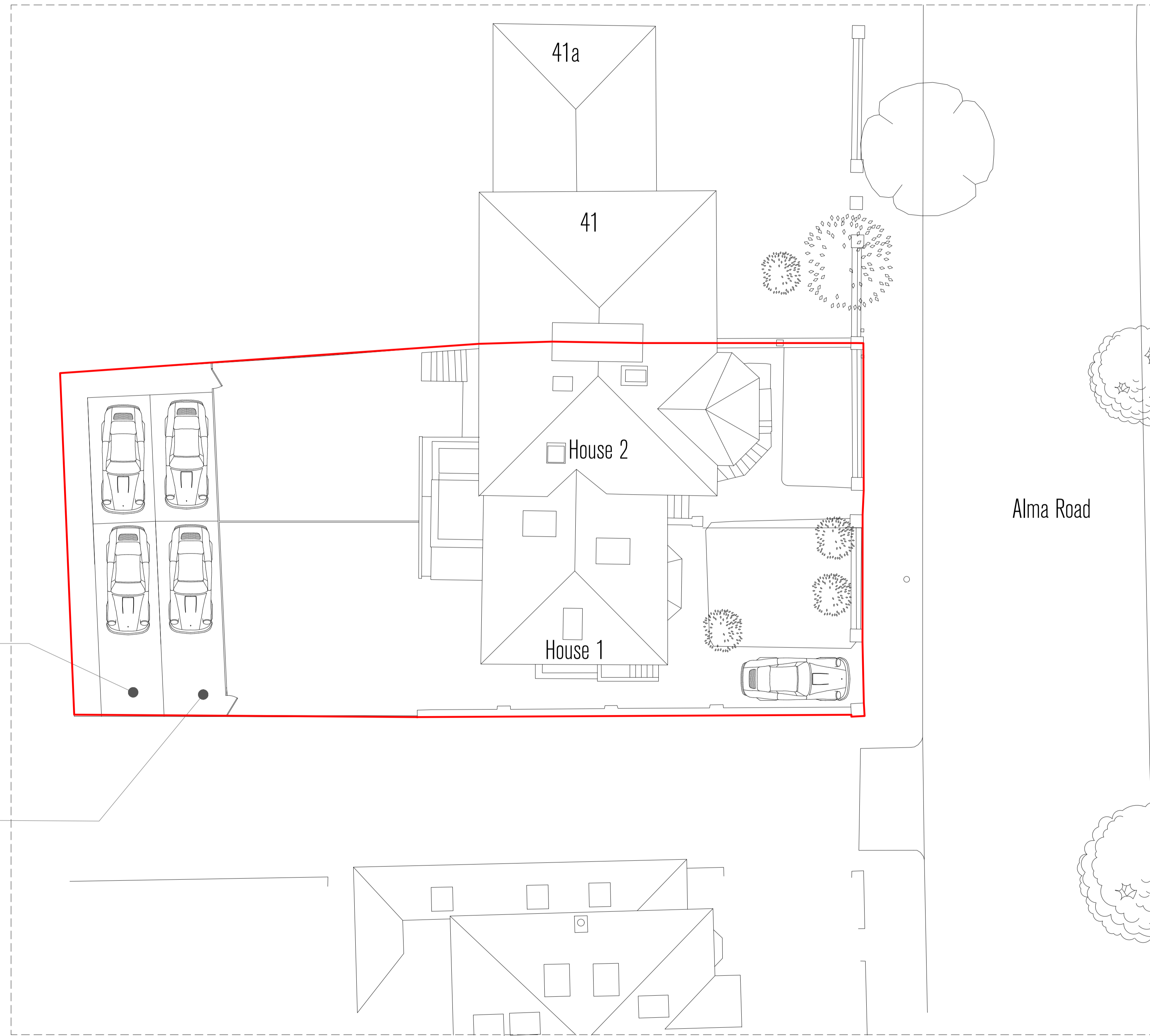
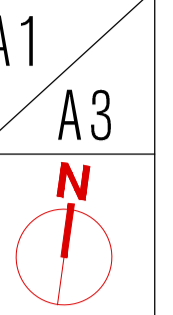


Tele: +44 7845777047
Email: rdoll.arch@gmail.com

STATUS	DRAWN BY	
PLANNING	RD	
JOB NO.	DRAWING NO.	REV
0001	1000	P1
DRAWING TITLE		
Existing Site Plan		

Proposed Site Plan

SCALE @ A1: 1:100
SCALE @ A3: 1:200



Parking spaces
House 2

Parking spaces
House 1

Alma Road

Overall Site = 430 Sqm
House 1 = 217 Sqm
House 2 = 213 Sqm

NOTES

- Default drawing size is A1
- To print at A3 please "scale by 50%"
- Check printed scale against scale bar above

DRAWING DATE: 12/01/2021

This drawing must not be reproduced in part or whole without prior written consent. Scale to be checked against scale bar as this drawings has been provided electronically. Check and confirm all dimensions on site prior to commencing work.
IF IN DOUBT ASK.

REV	DATE	NOTES
D1	07/01/2021	Draft Issue
P1	12/01/2021	Planning Issue

PROJECT

43 Alma Rd, Windsor, SL4 3HN

CLIENT

D Dhunna



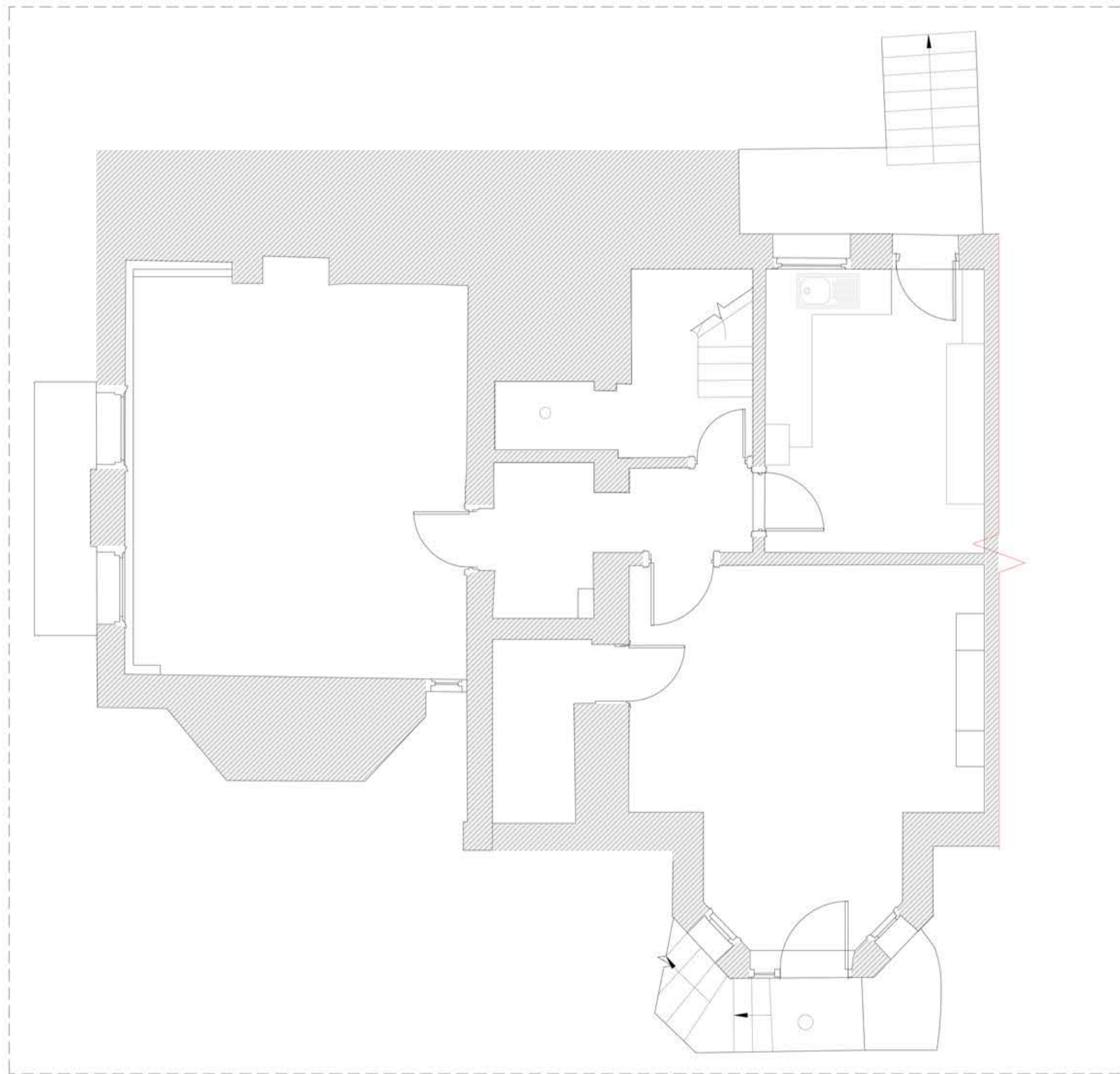
Tele: +44 7845777047
Email: rdoll.arch@gmail.com

STATUS	DRAWN BY	
PLANNING	RD	
JOB NO.	DRAWING NO.	REV
0001	1001	P1
DRAWING TITLE		
Proposed Site Plan		

Existing and Proposed Basement Floor Plan

SCALE @ A1: 1:50
SCALE @ A3: 1:100

A1
A3



Existing Basement Floor Plan



Proposed House 1 Basement Floor Plan

Proposed House 2 Basement Floor Plan

Key:
----- Proposed House Split (Party Wall)

NOTES

- Default drawing size is A1
- To print at A3 please 'scale by 50%'
- Check printed scale against scale bar above

DRAWING DATE: 12/01/2021

This drawing must not be reproduced in part or whole without prior written consent. Scale to be checked against scale bar as this drawings has been provided electronically. Check and confirm all dimensions on site prior to commencing work.
IF IN DOUBT ASK.

REV	DATE	NOTES
D1	07/01/2021	Draft Issue
P1	12/01/2021	Planning Issue

PROJECT
43 Alma Rd, Windsor, SL4 3HN

CLIENT
D Dhunna




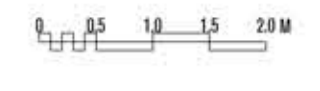
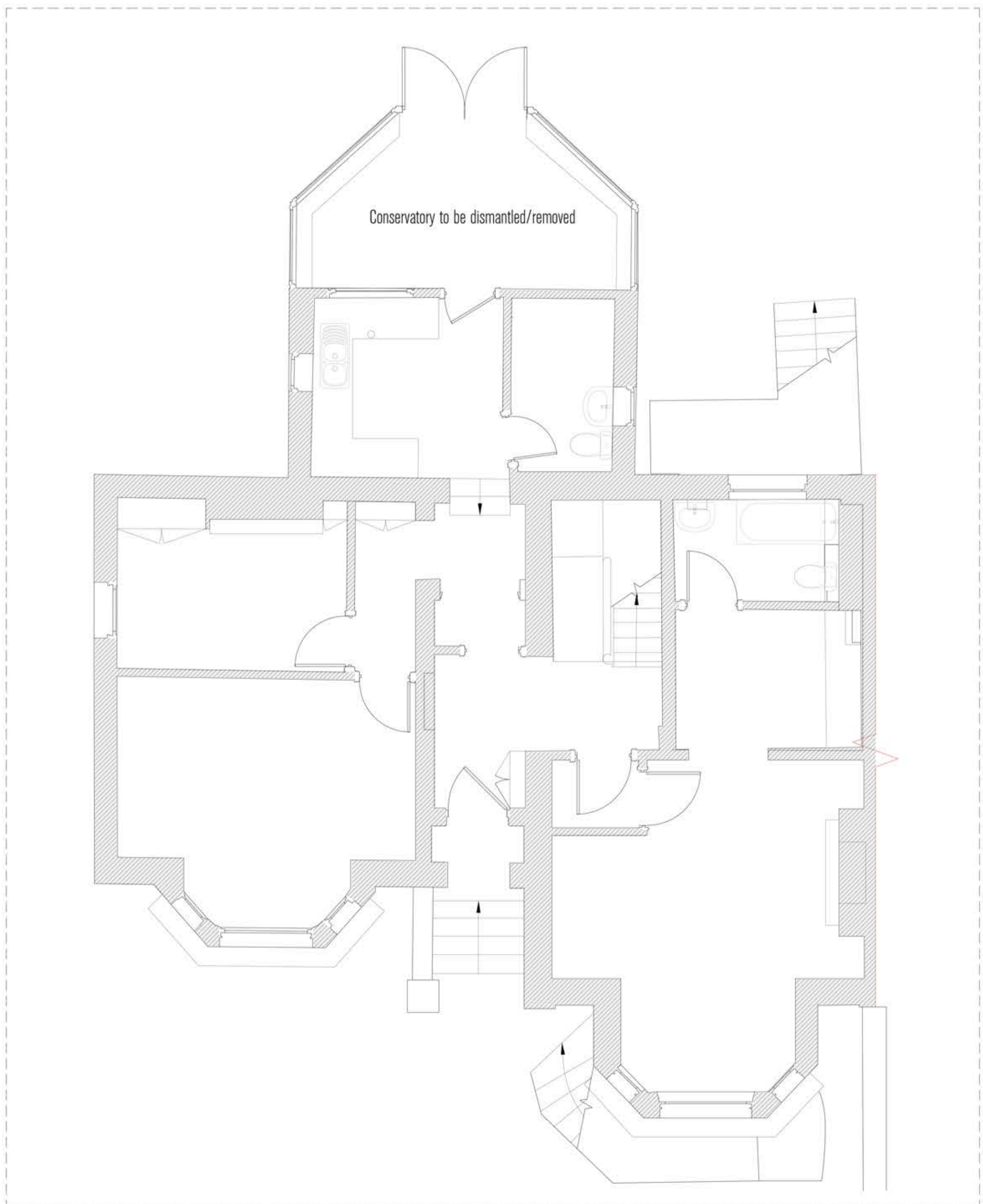
Tel: +44 7845777047
Email: rdoll.arch@gmail.com

STATUS PLANNING	DRAWN BY RD
JOB NO. 0001	DRAWING NO. 2000
	REV P1
DRAWING TITLE Existing & Proposed Basement Floor Plan	

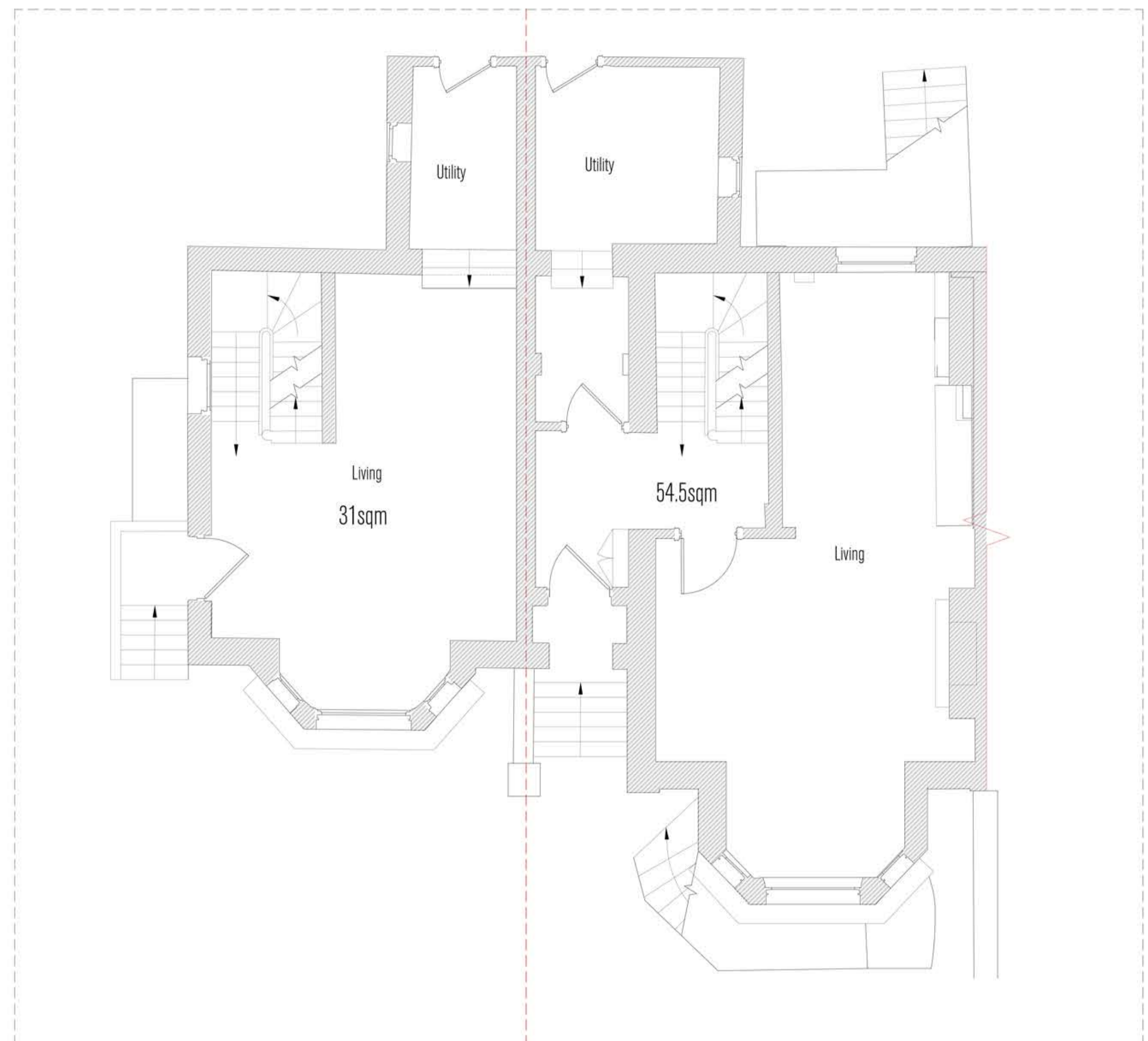
Existing and Proposed Ground Floor Plan

SCALE @ A1: 1:50
SCALE @ A3: 1:100

A1
A3

Existing Ground Floor Plan



Proposed House 1 Ground Floor Plan

Proposed House 2 Ground Floor Plan

Key:

----- Proposed House Split (Party Wall)

NOTES

- Default drawing size is A1
- To print at A3 please 'scale by 50%'
- Check printed scale against scale bar above

DRAWING DATE: 12/01/2021

This drawing must not be reproduced in part or whole without prior written consent. Scale to be checked against scale bar as this drawings has been provided electronically. Check and confirm all dimensions on site prior to commencing work. IF IN DOUBT ASK.

REV	DATE	NOTES
D1	07/01/2021	Draft Issue
P1	12/01/2021	Planning Issue

PROJECT
43 Alma Rd, Windsor, SL4 3HN

CLIENT
D Dhunna



Tel. +44 7845777047
Email. rdoll.arch@gmail.com

STATUS PLANNING	DRAWN BY RD
JOB NO. 0001	DRAWING NO. REV 2001 P1
DRAWING TITLE Existing & Proposed Ground Floor Plan	

Existing and Proposed First Floor Plan

SCALE @ A1: 1:50
SCALE @ A3: 1:100

A1
A3

NOTES

- Default drawing size is A1
- To print at A3 please 'scale by 50%'
- Check printed scale against scale bar above

DRAWING DATE: 12/01/2021

This drawing must not be reproduced in part or whole without prior written consent. Scale to be checked against scale bar as this drawings has been provided electronically. Check and confirm all dimensions on site prior to commencing work. IF IN DOUBT ASK.

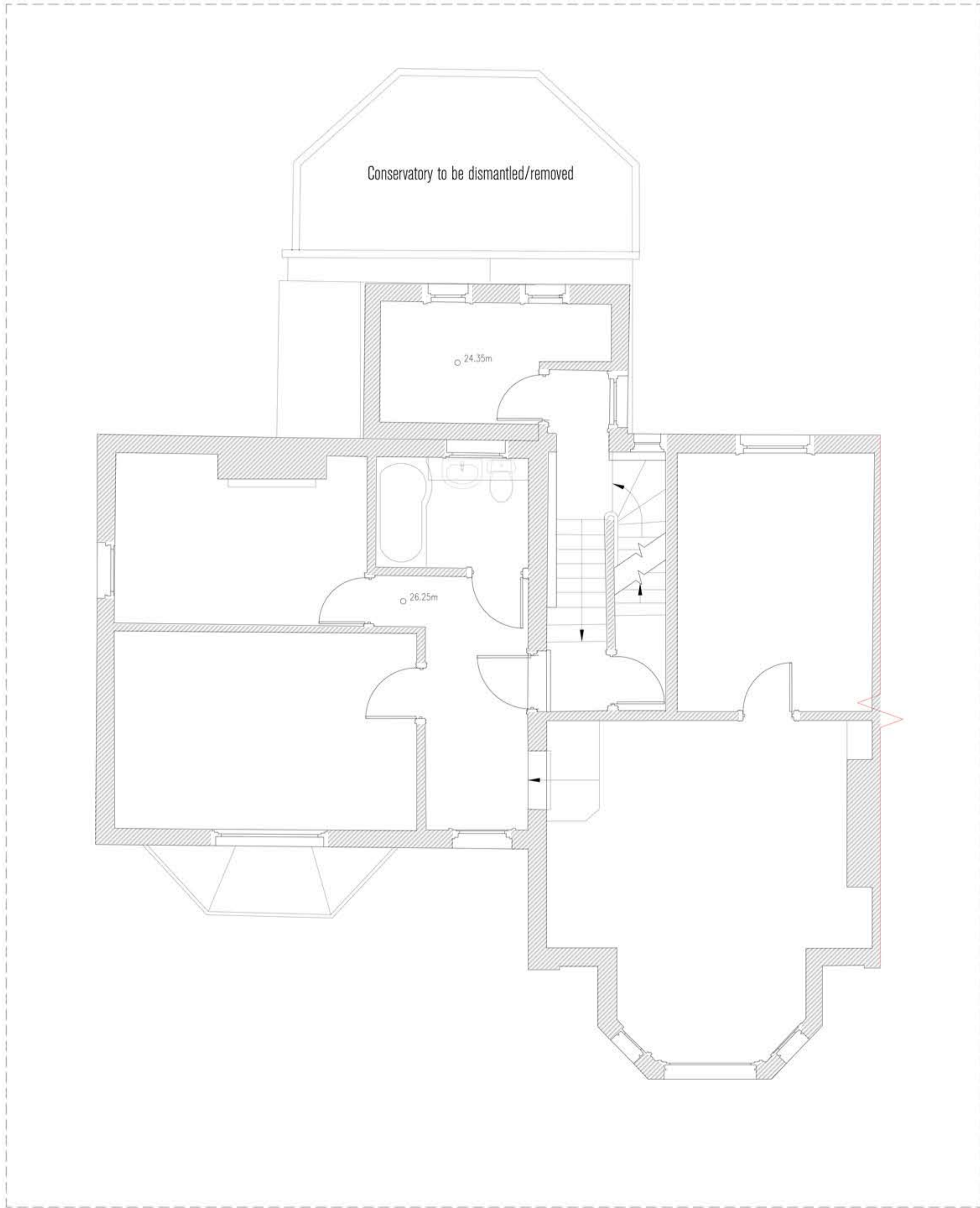
REV	DATE	NOTES
D1	07/01/2021	Draft Issue
P1	12/01/2021	Planning Issue

PROJECT
43 Alma Rd, Windsor, SL4 3HN

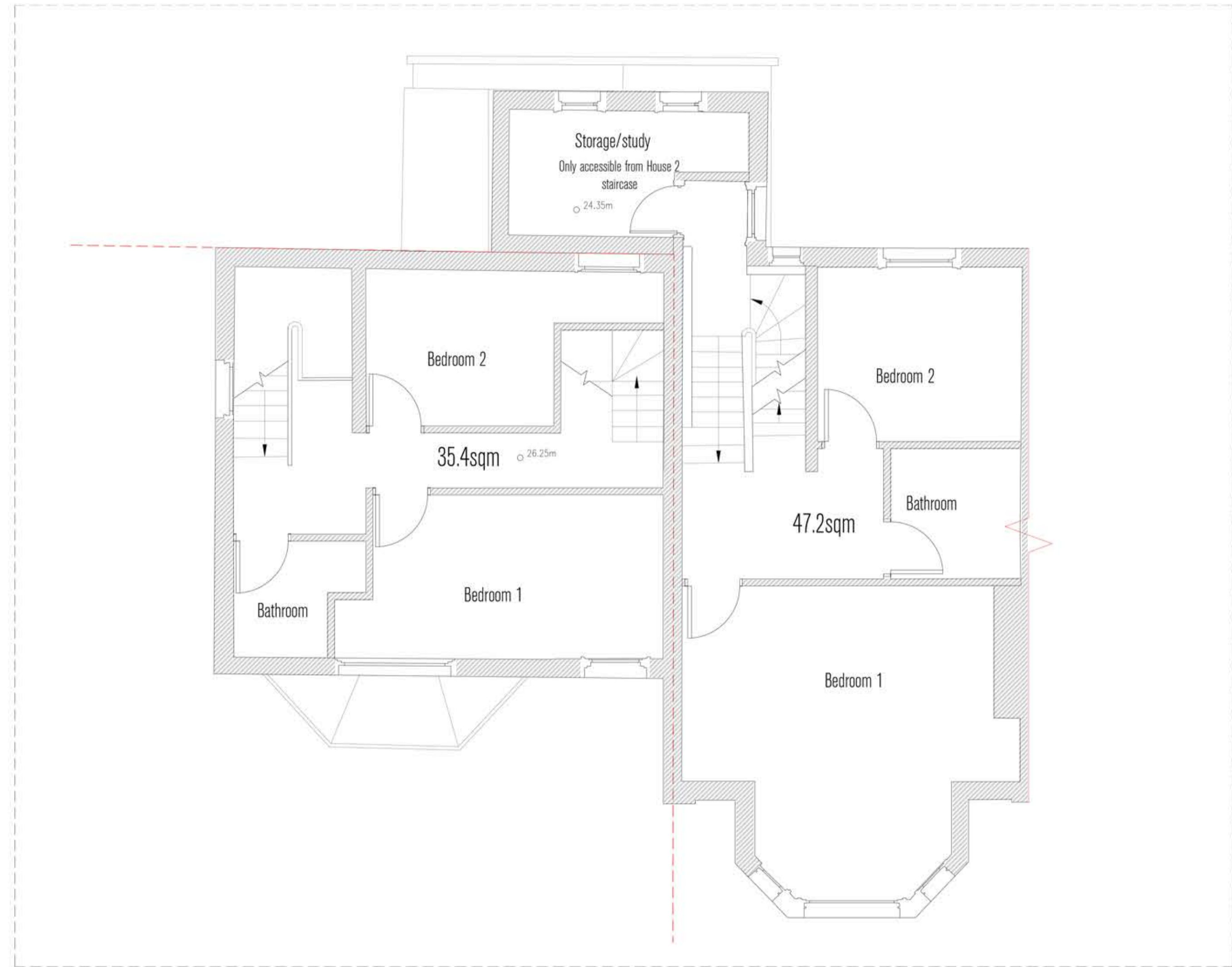
CLIENT
D Dhunna

Tel. +44 7845777047
Email. rdoll.arch@gmail.com

STATUS PLANNING	DRAWN BY RD
JOB NO. 0001	DRAWING NO. REV 2002 P1
DRAWING TITLE Existing & Proposed First Floor Plan	



Existing First Floor Plan



Proposed House 1 First Floor Plan

Proposed House 2 First Floor Plan


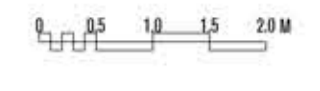
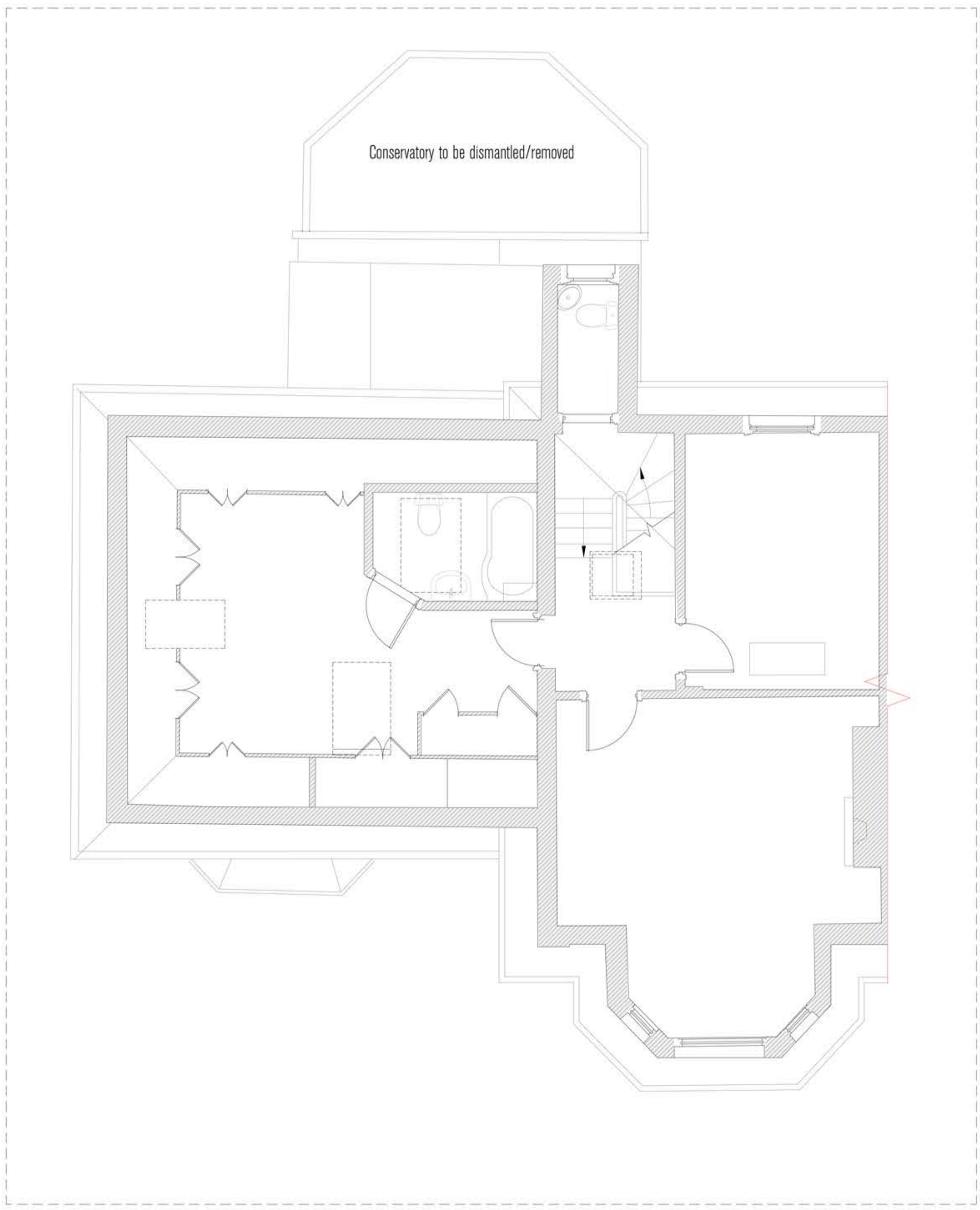
Key:

----- Proposed House Split (Party Wall)

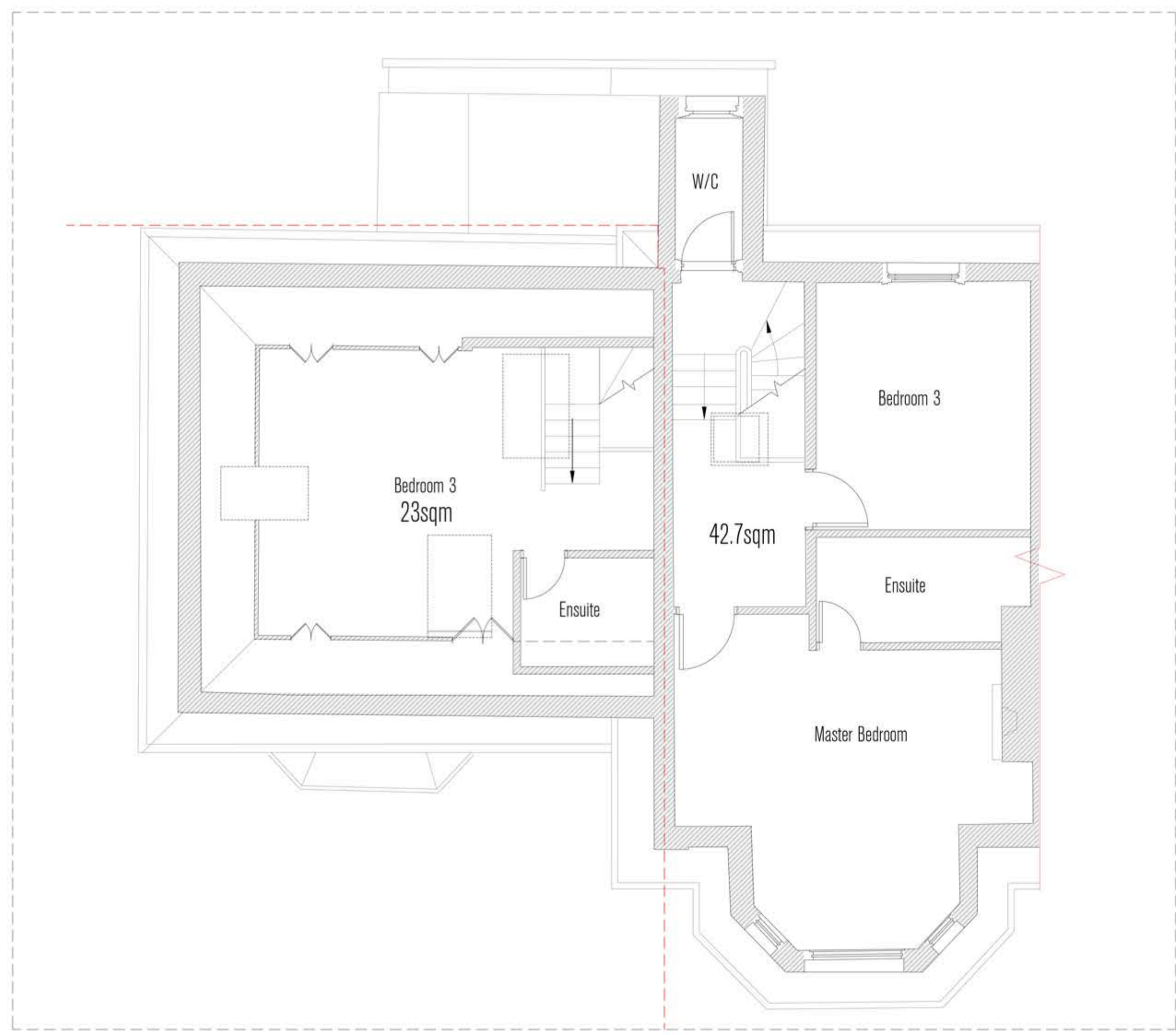
Existing and Proposed Second Floor Plan

SCALE @ A1: 1:50
SCALE @ A3: 1:100

A1
A3

Existing Second Floor Plan



Proposed House 1 Second Floor Plan

Proposed House 2 Second Floor Plan

Key:

----- Proposed House Split (Party Wall)

NOTES

- Default drawing size is A1
- To print at A3 please 'scale by 50%'
- Check printed scale against scale bar above

DRAWING DATE: 12/01/2021

This drawing must not be reproduced in part or whole without prior written consent. Scale to be checked against scale bar as this drawings has been provided electronically. Check and confirm all dimensions on site prior to commencing work. IF IN DOUBT ASK.

REV	DATE	NOTES
D1	07/01/2021	Draft Issue
P1	12/01/2021	Planning Issue

PROJECT
43 Alma Rd, Windsor, SL4 3HN

CLIENT
D Dhunna



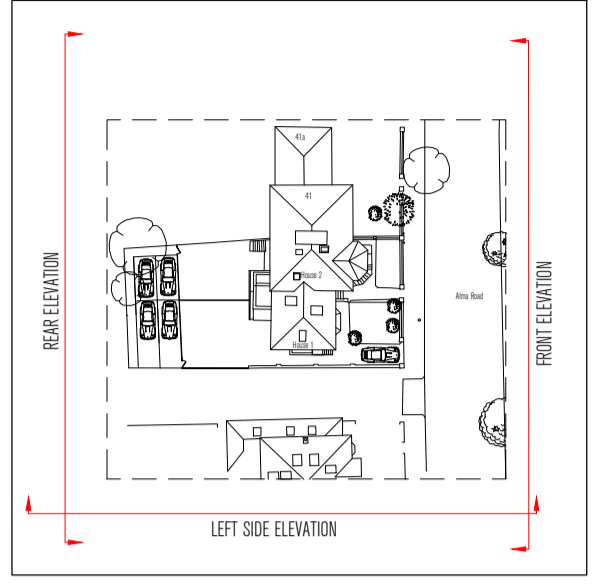
Tel. +44 7845777047
Email. rdoll.arch@gmail.com

STATUS PLANNING	DRAWN BY RD
JOB NO. 0001	DRAWING NO. REV 2003 P1
DRAWING TITLE Existing & Proposed Second Floor Plan	

Existing and Proposed Elevations

SCALE @ A1: 1:100
SCALE @ A3: 1:200

A1
A3



NOTES

- Default drawing size is A1
- To print at A3 please "scale by 50%"
- Check printed scale against scale bar above

DRAWING DATE: 12/01/2021

This drawing must not be reproduced in part or whole without prior written consent. Scale to be checked against scale bar as this drawings has been provided electronically. Check and confirm all dimensions on site prior to commencing work. IF IN DOUBT ASK.

REV	DATE	NOTES
D1	07/01/2021	Draft Issue
P1	12/01/2021	Planning Issue

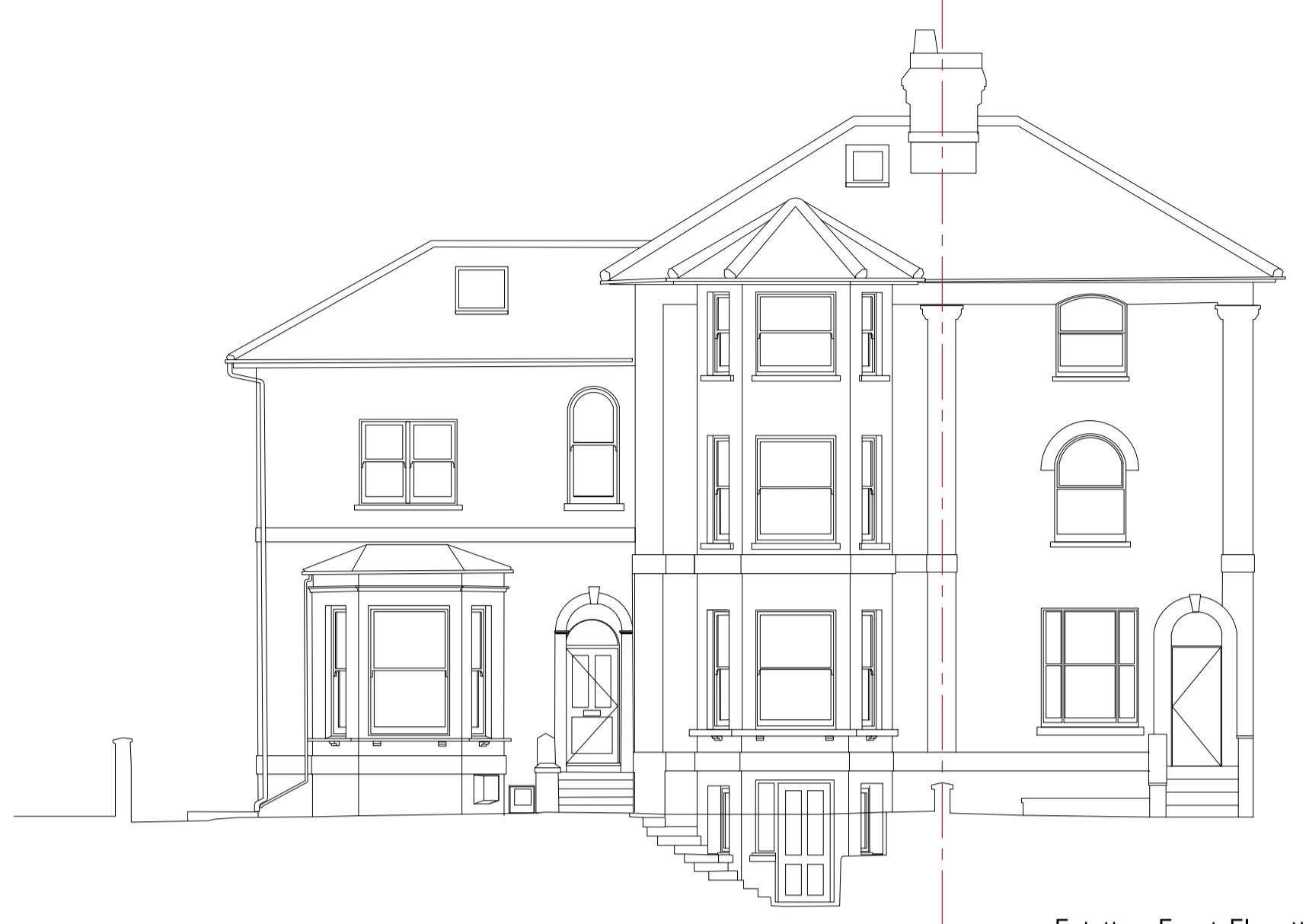
PROJECT
43 Alma Rd, Windsor, SL4 3HN

CLIENT
D Dhunna

Tele: +44 7845777047
Email: rdoll.arch@gmail.com

STATUS PLANNING	DRAWN BY RD
JOB NO. 0001	DRAWING NO. REV 3000 P1
DRAWING TITLE Existing & Proposed Elevations	

Key:
- - - Semi Detached Split



Existing Front Elevation



Proposed Front Elevation



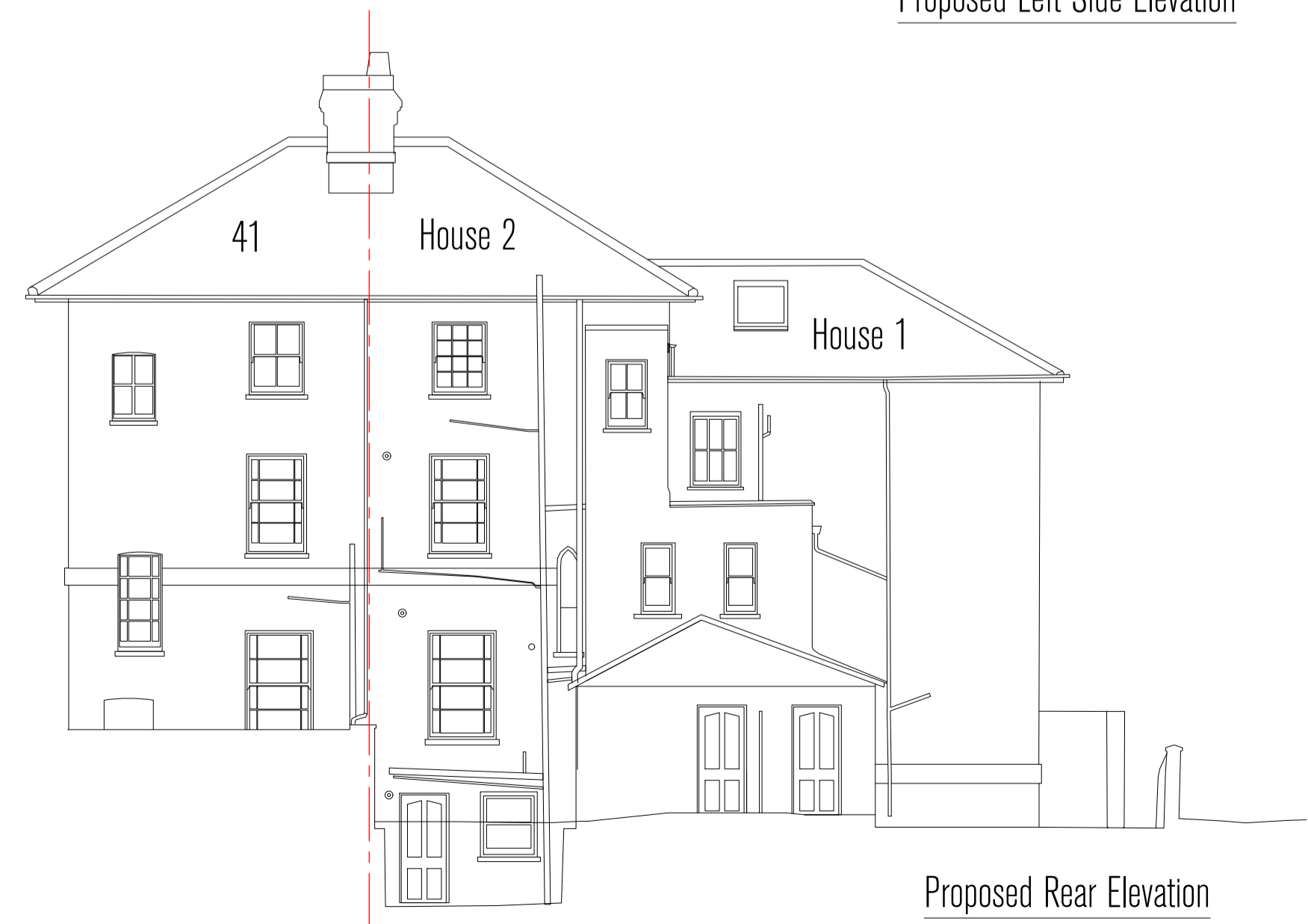
Existing Left Side Elevation



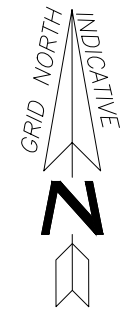
Proposed Left Side Elevation



Existing Rear Elevation



Proposed Rear Elevation



LEGEND

AIR CONDITIONING UNIT	AGU	FENCE DESCRIPTION	BWF
ADVERTISING BOARD	AB	CHAIN LINK FENCE	CLF
AIR VALVE	AV	CHESNUT FENCE	CF
BELTISHA BEACON	BB	CLOSE BOARD FENCE	CBF
BASEMENT LIGHT	BL	POST AND RAIL FENCE	PRF
BOUNDARY POST/PEG	BP	COACH BARRIER	CB
CABLE TELEVISION PIT	CTV	INTERLOCK FENCE	IF
CORNER LEVEL	CL	MISCELLANEOUS FENCE	MF
CROWN PILE	CP	PAVING FENCE	PF
DOWN WASTE BIN	DWB	SAILING FENCE	SF
ELECTRICITY CABLE PIT	ECP	PEDESTRIAN SAFETY BARRIER	PSB
ELECTRICITY CONTROL BOX	ECB	POST AND RAIL FENCE	PRF
ELECTRICITY INSPECTION COVER	EIC	RAIL FENCE	RF
ELECTRICITY Pylon	EPL	ROCK AND MESH FENCE	RMF
FIRE HYDRANT	FP	ROCK AND WIRE FENCE	RWF
FLAG STAFF	FS	WIRE MESH FENCE	WMF
FLOOR LIGHT	FL	HEIGHT	HT
FLOWER BED	FB	BRASS	BR
GAS TANK	GT	BRASS WATER PIPE	SW
GULL POST	GP	FOUL WATER PIPE	FWP
INSPECTION COVER	IC	NO VISIBLE CONNECTION	NVC
INSPECTION COVER UNKNOWN	ICU	UNABLE TO SURVEY	UTS
KERB OUTLET	KO	TAKEN FROM RECORDS	TRF
LAMP POST	LP	DRAINAGE CHANNEL (OPEN)	DC
LIGHTED SCULLARD	LS	DRAINAGE CHANNEL (COVERED)	DC
LITTER BIN	LB	OVERHEAD WIRE	OW
MANSARD	M	OVERHEAD WIRE (COVERED)	OC
MILESTONE	MS	BANKING	B
MOBILE PHONE	MP	EXTENT OF VEGETATION	EV
POSTING METER	PM	HEDGES	H
POTS BOX	PB	MARSH	M
REFLECTOR POST	RP	GATE	G
ROAD MARKER POST	RMP	RETAINING WALL	RW
SOILING VALVE	SV	SLOPING MASONRY	SM
SOIL & VENT PIPE	SVP	STILE	ST
SPOTLIGHT (GROUND)	SP	WALL (BRICK SPIRE RAILINGS)	WBR
STAIR DOWN BOX	SD	GLASS ROOFED	GR
TELEPHONE CABLE	TC	ARCHWAY	AR
TELEPHONE MAST	TM	CONTOURS SURVEY	CS
TELEPHONE CALL BOX	TBC	OSM	OSM
TRAFFIC LIGHT	TL		
TRAFFIC LIGHT CONTROL POST	TLCP		
VENT PIPE	VP		
WATER METER	WM		
WATER CONTROL PILLAR	WCP		
WATER TROUGH	WT		
LEVEL	Indicates pos. x 0.61	BENCH MARK	BM
TEMP LEVEL		TEMPORARY BENCH MARK	TBM
SURVEY STATION		SURVEY STATION	ST
Grass			
ROOF			
BUILDING			
WALL BRICK (WB)			
CLING LEVEL			

TREE LEGEND

ALDER	ALD	MAPLE	MAP
ASH	ASH	ORCHARD	ORCH
BEECH	BEE	PEAR	PEAR
BIRCH	BIR	PLUM	PLUM
CHERRY	CHY	RHODOCODENDRONS	RHO
CYPRESSUS	CYP	ROSE	ROSE
DOGWOOD	DOG	SALIX	SAL
ELM	ELM	SWEET CHESTNUT	SCH
FRUIT	FRU	SPRUCE	SPRU
HAWTHORN	HAW	UNKNOWN	UNK
HOLLY	HOL	WELLSH GARDEN	WEL
LARCH	LAR	WILLOW	WIL
LARBITUM	LBM	WALNUT	WAL
LOUST	LOU	MULTI TRUNK	MT
LONDON PLANE	LPM	0.2 / 0 / 3	
MAGNOLIA	MAG	Bale / Height	

NOTES

GRID THE SURVEY GRID IS BASED ON LOCAL COORDINATES

LEVELING ALL LEVELS ARE BASED ON A LOCAL DATUM

DRAINAGE INVERT LEVELS, PIPE SIZES AND PIPE CONNECTIONS HAVE BEEN SURVEYED BY VISUAL INSPECTION ONLY AND THEREFORE THE COMPLETE ACCURACY OF THIS INFORMATION CANNOT BE GUARANTEED

COPYRIGHT: This drawing is copyright and may not be altered, reproduced or used without the written permission of icelabz.

SCAN	SURVEYOR	DATE
01	AJ	08/12/2020
01	First Issue	PV BR 16/12/20
REV	DESCRIPTION	DRAWN APPR DATE

icelabz ICELABZ

Tel No: 02037443020 Fax No: 02089316849
 www.icelabz.co.uk info@icelabz.co.uk

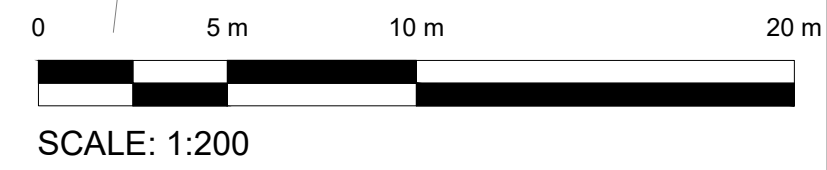
LAND SURVEYING MEASURED BUILDING SURVEY SETTING OUT

PROJECT TITLE
43 Alma Rd, Windsor SL4 3HN

DRAWING DETAIL
Topographical Survey

CLIENT
Amit Malhotra Scale 1:200

Page Size	Checked	Approved	INFORMATION
A3	YR	YR	FINAL
Drawing Number	Rev	Date	
MB-SURV-AR-TS-001	01	16/12/2020	



Product 4 (Detailed Flood Risk) for Alma Road, Windsor

Product 4 is designed for developers where Flood Risk Standing Advice FRA (Flood Risk Assessment) Guidance Note 3 Applies. This is:

- i) "all applications in Flood Zone 3, other than non-domestic extensions less than 250 sq metres; and all domestic extensions", and
- ii) "all applications with a site area greater than 1 ha" in Flood Zone 2.

Product 4 includes the following information:

Ordnance Survey 1:25k colour raster base mapping;
Flood Zone 2 and Flood Zone 3;
Relevant model node locations and unique identifiers (for cross referencing to the water levels, depths and flows table);
Model extents showing *defended* scenarios;
FRA site boundary (where a suitable GIS layer is supplied);
Flood defence locations (where available/relevant) and unique identifiers; (supplied separately)
Flood Map areas benefiting from defences (where available/relevant);
Flood Map flood storage areas (where available/relevant);
Historic flood events outlines (where available/relevant, not the Historic Flood Map) and unique identifiers;
Statutory (Sealed) Main River (where available within map extents);

A table showing:

- i) Model node X/Y coordinate locations, unique identifiers, and levels and flows for *defended* scenarios.
- ii) Flood defence locations unique identifiers and attributes; (supplied separately)
- iii) Historic flood events outlines unique identifiers and attributes; and
- iv) Local flood history data (where available/relevant).

Please note:

If you will be carrying out computer modelling as part of your Flood Risk Assessment, please request our guidance which sets out the requirements and best practice for computer river modelling.

This information is based on that currently available as of the date of this letter. You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

This information is provided subject to the enclosed notice which you should read.

This letter is not a Flood Risk Assessment. The information supplied can be used to form part of your Flood Risk Assessment. Further advice and guidance regarding Flood Risk Assessments can be found on our website at:

<https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities>

If you would like advice from us regarding your development proposals you can complete our pre application enquiry form which can be found at:

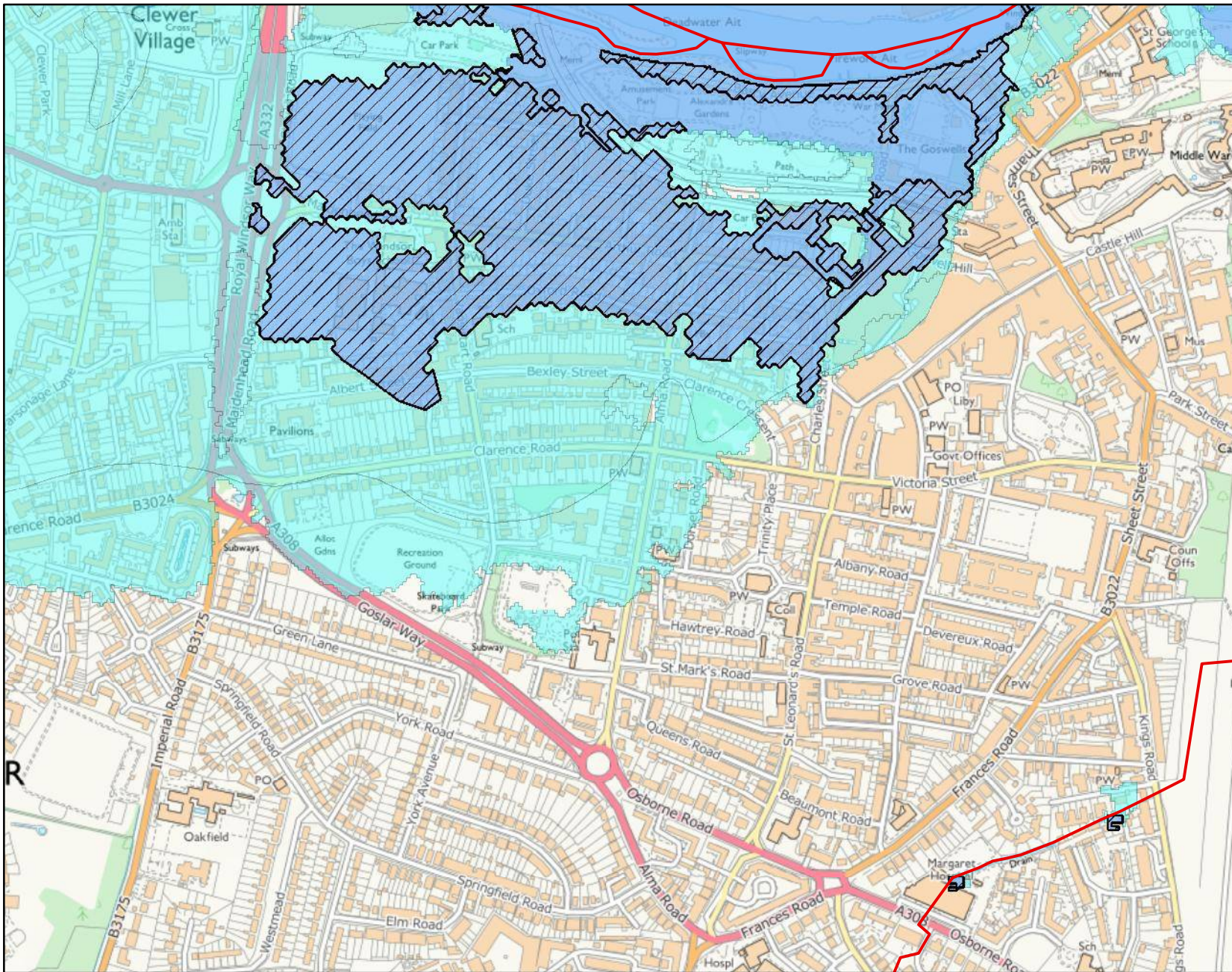
<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

Defence information

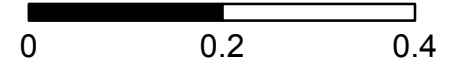
Defence Location: Jubilee Channel & Maidenhead Bund

Description: This location is offered protection from the Maidenhead, Windsor and Eton Flood Alleviation Scheme consisting predominantly of the Jubilee River and the North Maidenhead Bund. The North Maidenhead Bund is a raised earth embankment (approx 1.5m). The Jubilee River is a diversion channel on the River Thames and carries high level flows away from the Maidenhead, Windsor and Eton area. The site is offered up to 1 in 25 standard of protection (4% chance of occurring annually). Although it is given some protection from defences it is still in flood zone 3, we would strongly advise the owner to register to receive flood warnings to enable them to plan sufficiently in a flood event. Both defences are maintained by the Environment Agency. There are no other planned defences in this area.

Flood Map for Planning (Rivers and Sea) centred on Alma Road, Windsor



Kilometres



Legend

- Main River
- Flood defences
- Areas benefiting from flood defences
- Flooding from rivers or sea (FZ3)
- Extent of extreme flood (FZ2)
- Flood Map - flood storage areas

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:
 - from the sea with a 1 in 200 or greater chance of happening each year
 - or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Model information

Model: **Thames (Hurley to Teddington) 2019**

Description: The information provided is taken from the Lower River Thames Modelling Study which was completed in December 2019. The model was developed using ISIS-TUFLOW. The flood-frequency behaviour of the Lower Thames is assessed in this project using the multitude of river flow and level records that are available, concentrating mostly on the flow record at the Kingston/Teddington gauge site. Flow records are also available at other gauging sites along the modelled section of the River Thames.

This model fully supersedes the following models: Thames (Lower) Reach 1 & 2 – 2007;
Thames (Lower) Reach 3 – 2009; Thames (Lower) Reach 4 – 2010. And partially supersedes:
Thames (Henley to Hurley) 2002 (lower extent only)

This model includes the Jubilee River (part of the Maidenhead, Windsor and Eton Flood Alleviation Scheme). The design capacity for the Jubilee River is limited to approximately 180m³/s and is designed to remain in-bank irrespective of any increase in flows in the River Thames. Where appropriate this will need to be considered when assessing flood risk.

There are several points along the Lower Thames where there are interactions between the main river and tributaries. At these points, other local models will need to be additionally assessed to ensure the correct site specific values are being used. These locations include Chertsey Town, and along the extent of the Chalvey Ditches. The Lower Thames model explicitly modelled the tributary focused flood scenarios in particular the Battle Bourne in Old Windsor and Chertsey and its tributaries. These have been marked as - Battle Bourne/ Chertsey Bourne/ The Cut after the model name.

Throughout the majority of the catchment, the model has replicated the flow and level variations observed from gauges during flood events with a high degree of accuracy (± 150 mm), however at some sites this was not possible across the whole event. This reflects local variations rather than a fundamental issue with the model (e.g., Bray, Romney and Penton Hook Lock).

Model design runs:

1 in 2 / 50% Annual Exceedance Probability (AEP); 1 in 5 / 20% AEP; 1 in 10; 10% AEP;
1 in 20 / 5% AEP; 1 in 30 / 3.3% AEP; 1 in 40 / 2.5% AEP; 1 in 50 / 2% AEP; 1 in 75% / 1.33% AEP; 1 in 100 / 1% AEP; 1 in 100+15% / 1% AEP plus 15%; 1 in 100+25% / 1% AEP plus 25%; 1 in 100+35% / 1% AEP plus 35%; 1 in 100+70% / 1% AEP plus 70%; 1 in 1000 / 0.1% AEP

Mapped outputs:

1 in 5 / 20% AEP; 1 in 100 / 1% AEP; 1 in 100+25% / 1% AEP plus 25%; 1 in 100+35% / 1% AEP plus 35%; 1 in 100+70% / 1% AEP plus 70%

Model accuracy:

Levels ± 150 mm

Modelled in-channel flood flows and levels

The modelled flood levels and flows for the closest most appropriate model node points for your site that are within the river channel are provided below:

Node label	Model	Easting	Northing	Flood Levels (mAOD)							
				20% AEP	5% AEP	1% AEP	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
061_00_2018_24.022	Thames (Hurley to Teddington) 2019 - Thames Domain	496309	177192	18.88	19.50	20.15	0.00	20.52	20.73	20.79	20.79
061_00_2018_24.023	Thames (Hurley to Teddington) 2019 - Thames Domain	496296	177194	18.88	19.50	20.15	0.00	20.52	20.73	20.79	20.79
061_00_2018_24.029	Thames (Hurley to Teddington) 2019 - Thames Domain	496066	177331	18.89	19.52	20.18	0.00	20.54	20.73	20.80	20.80
061_00_2018_24.032	Thames (Hurley to Teddington) 2019 - Thames Domain	496039	177348	18.89	19.52	20.18	0.00	20.54	20.73	20.80	20.80
061_00_2018_24g.031A	Thames (Hurley to Teddington) 2019 - Thames Domain	496247	177169	18.88	19.50	20.15	0.00	20.52	20.73	20.79	20.79
061_00_2018_24g.035D	Thames (Hurley to Teddington) 2019 - Thames Domain	496066	177225	18.88	19.50	20.17	0.00	20.53	20.72	20.79	20.79
061_00_2018_24g.035U	Thames (Hurley to Teddington) 2019 - Thames Domain	496049	177230	18.88	19.51	20.18	0.00	20.54	20.73	20.79	20.79
061_00_2018_24g.040A	Thames (Hurley to Teddington) 2019 - Thames Domain	495880	177308	18.89	19.52	20.18	0.00	20.54	20.73	20.80	20.80
061_00_2018_24h.5U	Thames (Hurley to Teddington) 2019 - Thames Domain	495908	177412	18.94	19.56	20.34	0.00	21.15	21.39	21.52	21.47
061_00_2018_24h.6U	Thames (Hurley to Teddington) 2019 - Thames Domain	495977	177424	18.90	19.53	20.17	0.00	20.52	20.72	20.79	20.79

Node label	Model	Easting	Northing	Flood Flows (m3/s)							
				20% AEP	5% AEP	1% AEP	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
061_00_2018_24.022	Thames (Hurley to Teddington) 2019 - Thames Domain	496309	177192	194.78	241.81	339.83	0.00	367.98	368.40	370.06	368.91
061_00_2018_24.023	Thames (Hurley to Teddington) 2019 - Thames Domain	496296	177194	187.25	226.53	311.32	0.00	343.45	346.26	358.30	357.95
061_00_2018_24.029	Thames (Hurley to Teddington) 2019 - Thames Domain	496066	177331	187.28	226.38	333.14	0.00	387.38	409.61	430.88	430.43
061_00_2018_24.032	Thames (Hurley to Teddington) 2019 - Thames Domain	496039	177348	172.32	209.55	306.79	0.00	318.85	319.40	322.13	319.95
061_00_2018_24g.031A	Thames (Hurley to Teddington) 2019 - Thames Domain	496247	177169	8.21	15.29	28.52	0.00	28.88	28.87	54.13	54.20
061_00_2018_24g.035D	Thames (Hurley to Teddington) 2019 - Thames Domain	496066	177225	8.18	15.29	27.79	0.00	28.57	28.65	41.87	41.92
061_00_2018_24g.035U	Thames (Hurley to Teddington) 2019 - Thames Domain	496049	177230	8.18	15.29	27.79	0.00	28.57	28.65	41.87	41.92
061_00_2018_24g.040A	Thames (Hurley to Teddington) 2019 - Thames Domain	495880	177308	8.29	15.46	33.88	0.00	34.97	35.04	68.01	68.13
061_00_2018_24h.5U	Thames (Hurley to Teddington) 2019 - Thames Domain	495908	177412	18.93	23.30	70.96	0.00	149.80	170.12	182.96	178.75
061_00_2018_24h.6U	Thames (Hurley to Teddington) 2019 - Thames Domain	495977	177424	4.52	8.99	10.83	0.00	11.60	11.99	12.61	12.36

Note:

Due to changes in guidance on the allowances for climate change, the 20% increase in river flows should no longer to be used for development design purposes. The data included in this Product can be used for interpolation of levels as part of an intermediate level assessment.

For further advice on the new allowances please visit

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Modelled floodplain flood levels

The modelled flood levels for the closest most appropriate model grid cells for your site are provided below:

2D grid cell reference	Model	Easting	Northing	flood levels (mAOD)								
				20% AEP	5% AEP	1% AEP	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP	
Floodplain node 1	Thames (Hurley to Teddington) 2019 - Thames Domain	496194	176457								21.35	
Floodplain node 2	Thames (Hurley to Teddington) 2019 - Thames Domain	496157	176516								21.35	21.26
Floodplain node 3	Thames (Hurley to Teddington) 2019 - Thames Domain	496222	176616								21.27	21.17
Floodplain node 4	Thames (Hurley to Teddington) 2019 - Thames Domain	496198	176510								21.35	21.25

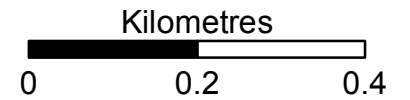
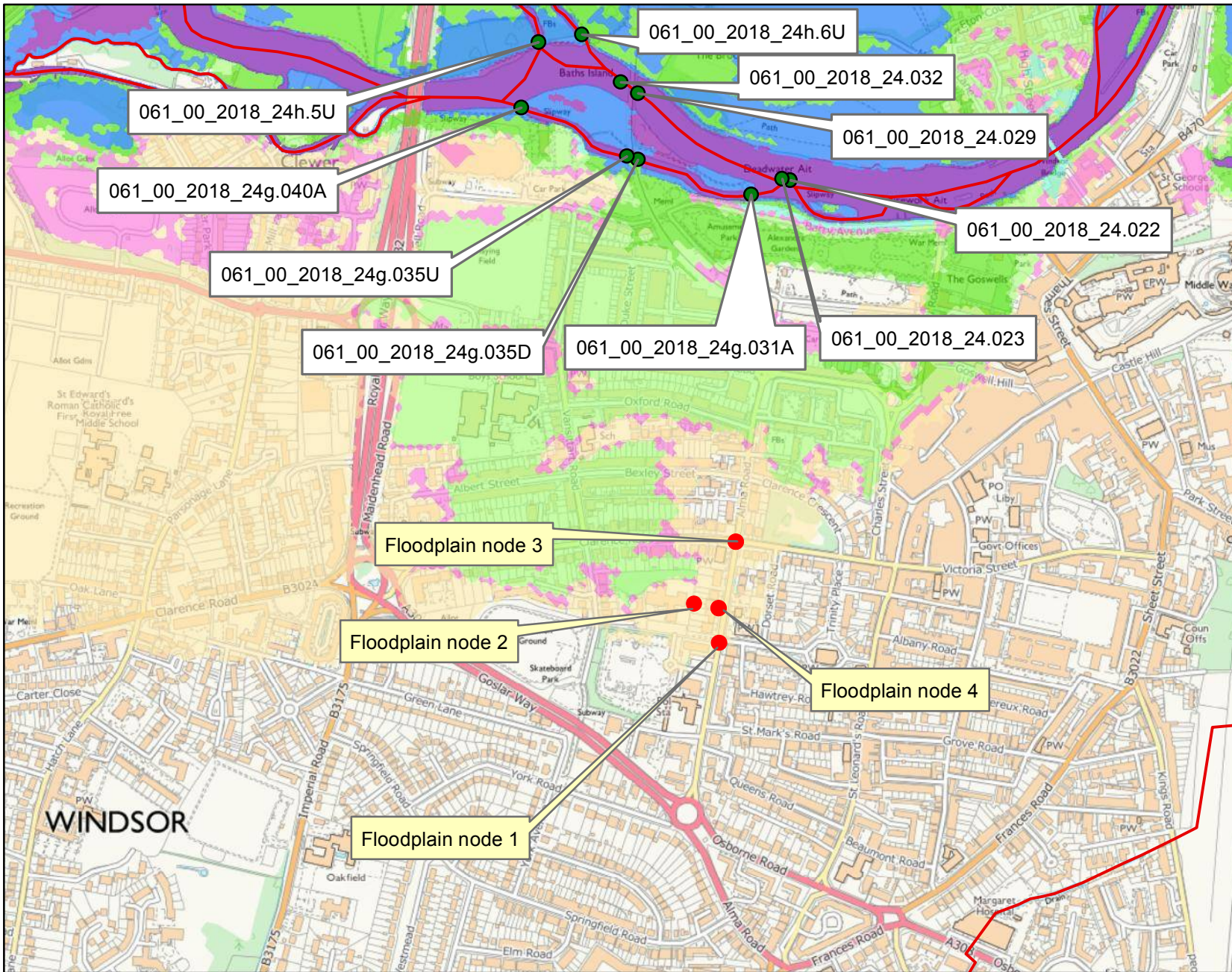
This flood model has represented the floodplain as a grid.
The flood water levels have been calculated for each grid cell.

Note:

Due to changes in guidance on the allowances for climate change, the 20% increase in river flows should no longer to be used for development design purposes. The data included in this Product can be used for interpolation of levels as part of an intermediate level assessment.

For further advice on the new allowances please visit <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Detailed flood map centred on Alma Road, Windsor



Legend

- THM_Model_Node_Data
- Main River
- 20% AEP Defended Flood Outline
- 5% AEP Defended Flood Outline
- 1% AEP Defended Flood Outline
- 1%+25% CC AEP Defended Flood Outline
- 1%+35% CC AEP Defended Flood Outline
- 1%+70% CC AEP Defended Flood Outline
- 0.1% AEP Defended Flood Outline

AEP = Annual Exceedance Probability
 The probability of a flood of a particular magnitude, or greater, occurring in any given year

Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

Hazard Mapping (for the 1%+35% climate change scenario)

Hazard Mapping methodology:

To calculate flood hazard with the debris factor we have used the supplementary note to Flood Risk to People Methodology (see below).

The following calculation is used:

$$HR = d \times (v+0.5) + DF$$

Where HR = flood hazard rating

d = depth of flooding (m)

v = velocity of floodwaters (m/sec)

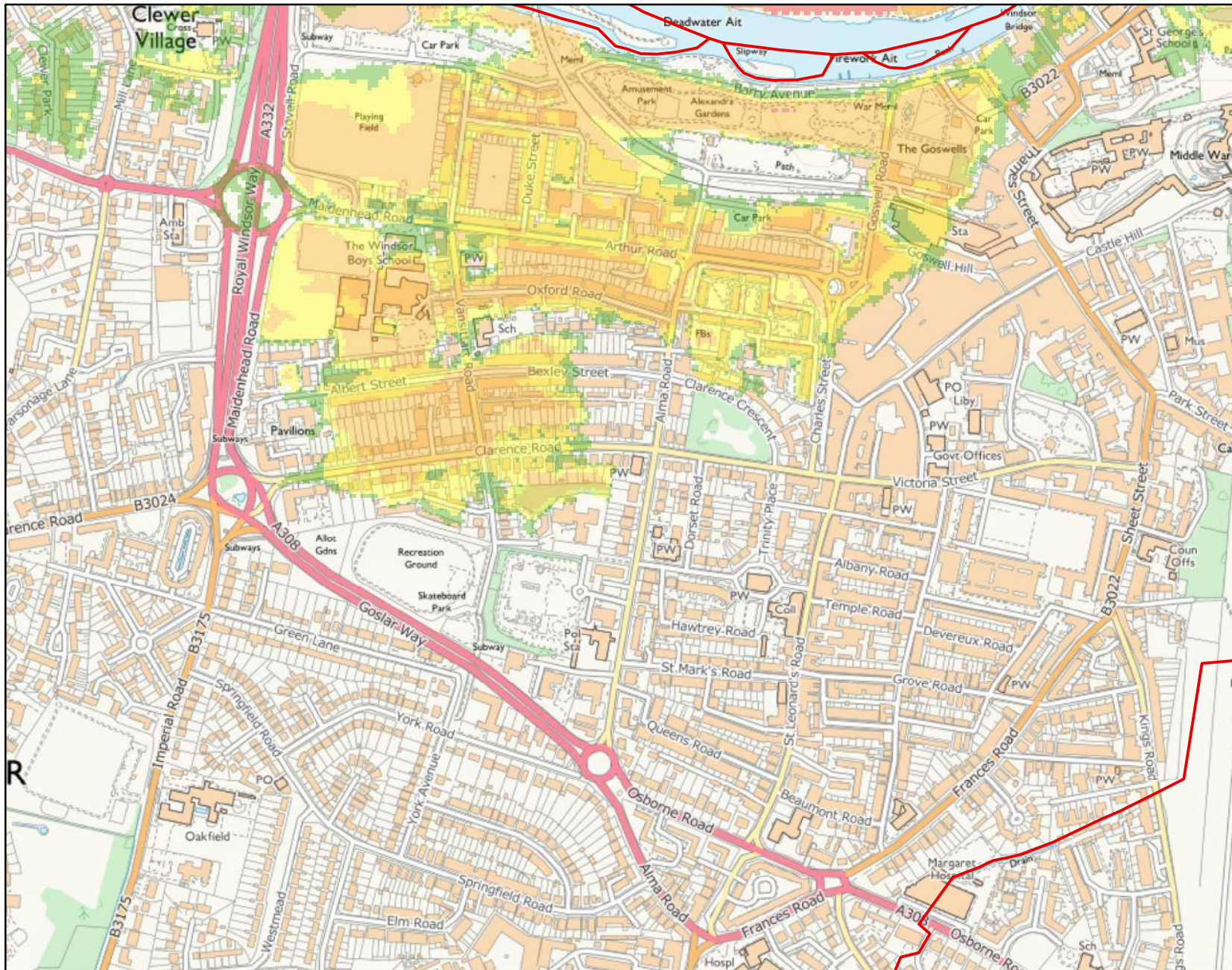
DF = debris factor calculated (0, 0.5, 1 depending on probability that debris will lead to a hazard)

The resultant hazard rating is then classified according to:

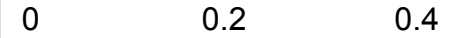
Flood Hazard	Colour	Hazard to People Classification
Less than 0.75	Green	Very low hazard - Caution
0.75 to 1.25	Yellow	Danger for some - includes children, the elderly and the infirm
1.25 to 2.0	Orange	Danger for most - includes the general public
More than 2.0	Red	Danger for all - includes the emergency services

REF: HR Wallingford and Environment Agency (May 2008) Supplementary note of flood hazard ratings and thresholds for development planning and control purpose – Clarification of the Table 113.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1

Hazard Mapping (1%+35% AEP climate change scenario) centred on Alma Road, Windsor



Kilometres



Legend

- Main River
- Low hazard
- Hazard to some
- Hazard for most
- Hazard to all

For hazard and debris factor we used HR Wallingford and Environment Agency (May 2008) supplementary note on flood hazard ratings and thresholds for development planning and control purpose. The following calculation is used:

$$HR = d \times (v+0.5) + DF$$

HR = flood hazard rating
 d = depth of flooding (m)
 v = velocity of floodwaters (m/sec)
 DF = debris factor calculated (0, 0.5, 1 depending on probability that debris will lead to a hazard)