



DREADNOUGHT, KENNET SIDE

Reading, RG1 3LU

FLOOD RISK ASSESSMENT

Project No	25-382-60
Revision No	00
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Control Sheet

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1 INTRODUCTION

1.1 Background

1.1.1 Calibro has been appointed to undertake a Flood Risk Assessment (FRA) for the renovation and conversion of the existing Dreadnought building for residential use.

1.1.2 The National Planning Policy Framework (NPPF) requires that the planning system takes full account of flood risk. This requires that:

- Within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
- The development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;
- It incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
- Any residual risk can be safely managed;
- Safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

1.1.3 Footnote 63 of the NPPF states that a site-specific FRA will be required for proposals:

- a) that are greater than 1 hectare in area within Flood Zone 1;
- b) that are located in Flood Zones 2 and 3;
- c) in an area within Flood Zone 1 which has critical drainage problems;
- d) in an area within Flood Zone 1 identified in a Strategic Flood Risk Assessment (SFRA) as being at flood risk now or in the future;
- e) in an area in Flood Zone 1 that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

1.1.4 The site falls within Flood Zone 2 with a very small part in Flood Zone 3, consequently an FRA is a planning validation requirement.

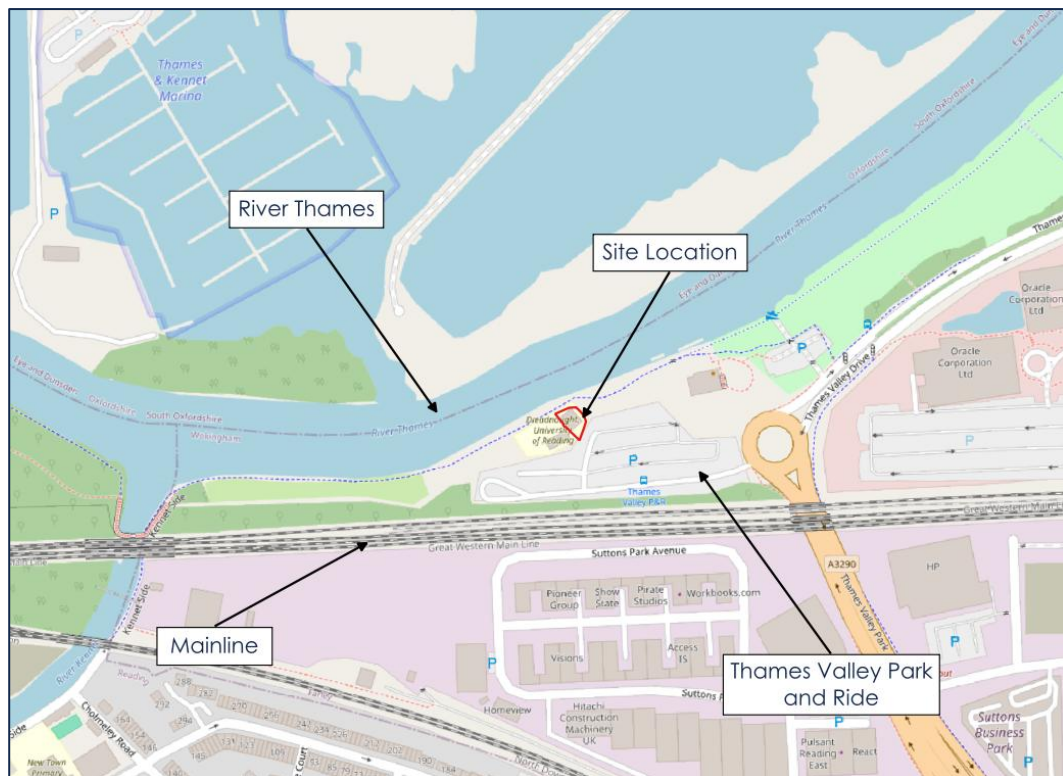
1.1.5 This assessment considers the risks of all types of flooding to the site for the lifetime of the development and assess if there would be an impact of flooding to third parties, recommending mitigation if a risk is identified.

2 EXISTING SITE AND HYDROLOGY CHARACTERISTICS

2.1 Site Description

- 2.1.1 The site is located to the east of central Reading, adjacent to the River Thames and the Thames Valley Park and Ride. The approximate coordinates at the centre of the site are 473440, 173920 and the closest postcode is RG1 3LU. Figure 2-1 shows site location.

Figure 2-1 Local Context



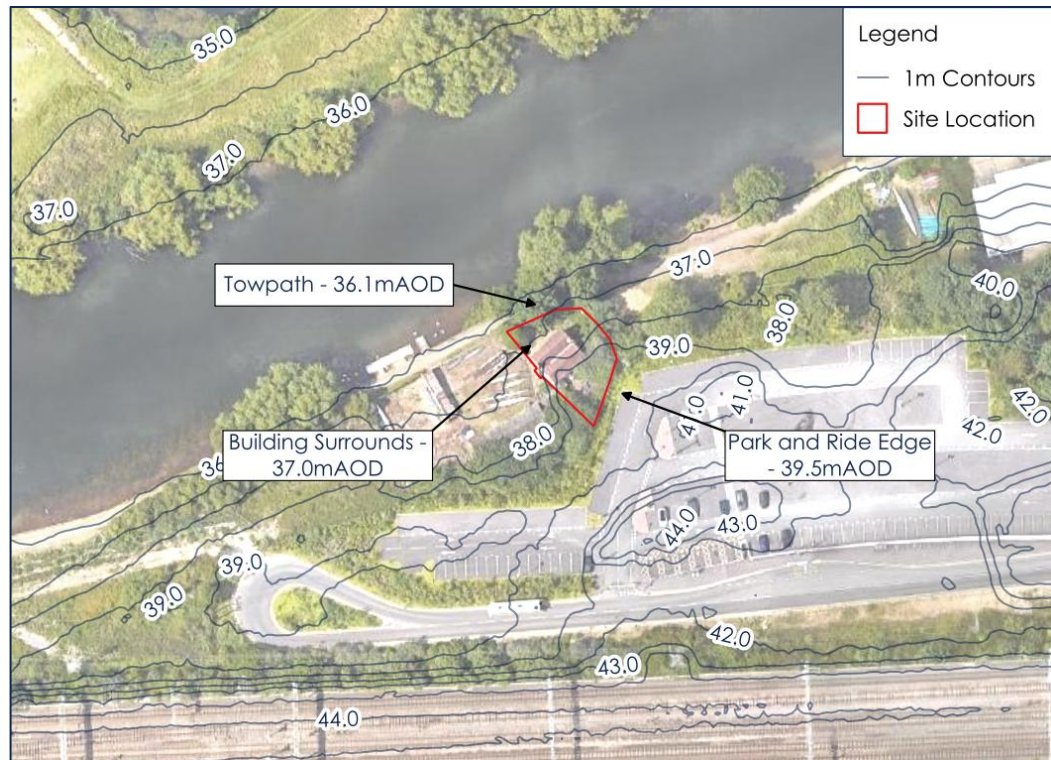
- 2.1.2 The site is currently occupied by the existing Dreadnought building, which is currently unoccupied on the groundfloor and residential accommodation on the first.

2.2 Hydrology and Topography

- 2.2.1 The River Thames is located approximately 15m north of the existing building, with a riverside towpath between the river and the building. There are no other known watercourses within the vicinity of the site.
- 2.2.2 The plans of the existing site, provided in Appendix A, shows the Finished Floor Level (FFL) of the ground floor to be 37.13mAOD, with the first floor being 39.64mAOD. In the absence of a topographic survey of the building exterior, LiDAR data has been used to determine the topography of the site.

- 2.2.3 As shown in Figure 2-2, the site slopes in a northwesterly direction down to the River Thames.
- 2.2.4 The site plans and LiDAR data shows the existing (and proposed) building to be elevated above the towpath. The towpath has a level of approximately 36.1mAOD. The ground steps up at the northern edge of the building to approximately 37.0mAOD. Presumably this is a result of the cut and fill activities when the building was constructed. Beyond the site to the southeast the ground continues to rise to the park and ride, where levels are approximately 39.5mAOD.

Figure 2-2 Topography



2.3 Geology and Soils

- 2.3.1 Geological data held by the British Geological Survey (BGS) shows that the entire site and surrounding area is underlain by 'Seaford Chalk' bedrock. Geological data also shows no mapped superficial deposits beneath the site, but the River Thames and its towpath are underlain by 'Alluvium – Clay, silt, sand and gravel'.
- 2.3.2 The BGS Hydrogeology aquifer classification (625k) records the bedrock geology under the site and immediate surrounding areas being a 'Highly Productive Aquifer'.
- 2.3.3 No springs are identified by relevant OS mapping within the vicinity of the site.
- 2.3.4 SoilScapes mapping records the soil type beneath the site as being 'Loamy and clayey floodplain soils with naturally high groundwater'.

3 PROPOSED DEVELOPMENT

3.1 Site Proposals

- 3.1.1 The proposal is for the renovation and conversion of the existing Dreadnought building to provide residential accommodation. No basement accommodation is proposed but ground floor sleeping accommodation is.
- 3.1.2 Given the site location, it is intended to be car-free and only accessible via active travel methods (walk, wheel, cycle etc.).
- 3.1.3 The redline boundary extends beyond the building to cover external works to facilitate pedestrian access to and from the site.
- 3.1.4 As a residential development, it is anticipated to have a lifetime of over 100 years.
- 3.1.5 As the proposal is for a renovation of an existing building with residential use, the proposal is outside the scope of the Sequential and Exception Tests.

4 FLOOD RISK

4.1 National Planning Policy Framework (NPPF)

4.1.1 In accordance with the NPPF, this FRA considers the following sources of flooding:

1. Tidal Flooding – from the sea;
2. Fluvial Flooding – from rivers and streams;
3. Surface Water Flooding – from intense rainfall events;
4. Groundwater flooding – from elevated groundwater levels or springs;
5. Flooding from sewers – from existing sewer systems; and
6. Artificial sources – from reservoirs, canals etc.

4.2 Flood Zones

4.2.1 The Flood Zones are based on the assessed probability of the site flooding from rivers and the sea, ignoring the presence of flood defences. The flood zone classifications from the PPG are presented in Table 4-1 below.

Table 4-1 Flood Zone Classification

Flood Zone	Risk	Fluvial Flooding Chance	Tidal Flooding Chance
1	Low	> 1 in 1,000 year	
2	Medium	Between 1 in 100 and 1 in 1,000 year	Between 1 in 200 and 1 in 1,000 year
3	High	Up to 1 in 100 year	Up to 1 in 200 year
3b	Functional Floodplain	Land where water has to flow or be stored in times of flood. This is defined in the relevant SFRA.	

4.2.2 The 2025 iteration of the Flood Map for Planning defines the site as falling within Flood Zone 2 with a very small part in Flood Zone 3 of the redline boundary, as shown in Figure 4-1. The building itself falls in Flood Zone 2.

Figure 4-1 Flood Map for Planning



4.3 Fluvial Flooding

- 4.3.1 The site is located adjacent to the River Thames, which is a fluvial watercourse with the site being beyond its tidal limits.
- 4.3.2 As shown above in Figure 4-1, the site is located within Flood Zone 2 with a small part in Flood Zone 3. The building itself falls within Flood Zone 2.
- 4.3.3 In order to assess fluvial flooding in greater detail, outputs from the Environment Agency's (EA's) Thames Mapledurham to Hurley Modelling Study have been utilised.
- 4.3.4 According to the Environment Agency Flood Risk Assessments: Climate Change Allowances Guidance, the site is located within the Thames and Southern Chilterns Management Catchment. For residential development in Flood Zone 3, the central allowance for the 2080s epoch is applied which results in a 31% uplift to peak river flows.
- 4.3.5 The nearest equivalent uplift modelled by the Thames Mapledurham to Hurley Modelling Study was a 35% uplift. Therefore, to promote a precautionary approach, this uplift has been applied by this FRA.
- 4.3.6 As a result, the **design event is considered to be the 1 in 100 year + 35% event.**

- 4.3.7 Inspection of the data from the Thames Mapledurham to Hurley Modelling Study shows that flood levels at the site in the design event are expected to reach approximately 36.70mAOD.
- 4.3.8 Comparing this level with the information in Section 2.2 shows the ground level around the building (37.0mAOD) are at least 300mm above the design flood level. The FFLs of the ground floor are over 400mm above the design flood level.
- 4.3.9 The model predicts the present day 1 in 1,000 year event to be approximately 36.75mAOD. Therefore, both the building and immediate surrounds are elevated above this level, and the building should be reclassified as being in Flood Zone 1.
- 4.3.10 The future 1 in 1,000 year event was not modelled but the 1 in 100 year +70% was. This event is similar to the Upper End allowance for the management catchment, which is +76%. This resulted in a level of approximately 36.88mAOD at the site, over 200mm below the FFLs.

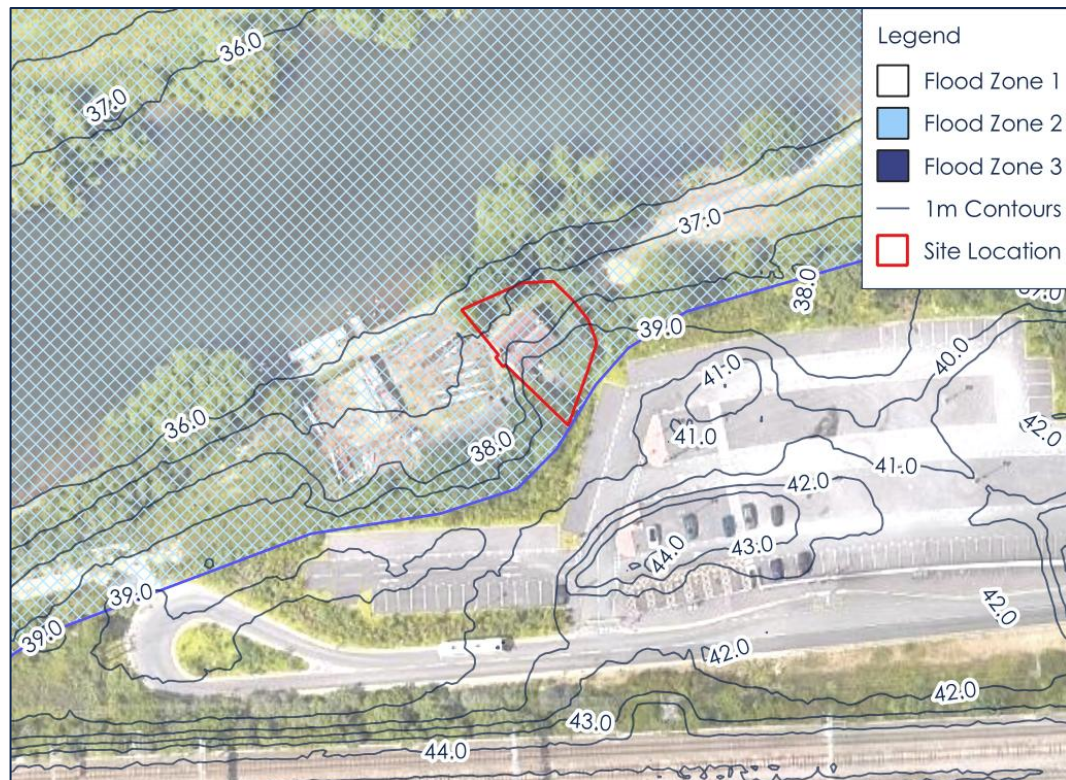
Residual Uncertainty

- 4.3.11 Hydraulic models inherently include a number of assumptions and, given the size and scale of the Mapledurham to Hurley model, are unable to fully represent specific local conditions. Furthermore, climate change uplifts are subject to many factors that could impact them. Consequently, it is important to ensure these uncertainties are allowed for in the site design. This is typically achieved through addition of a 'freeboard' allowance above the design flood level.
- 4.3.12 Section 4.7 the Reading Borough Council SFRA states that *'Typically, it [freeboard] is set to 300 or 600mm above the design flood level. The freeboard allowance should be agreed with the EA, LLFA and/or local authority depending on the scale of the development and flood risks present.'*
- 4.3.13 The ground around the building is above the design event, which is based on a higher climate change scenario than the EA guidance requires. It is also above the 1 in 1,000 year event. The FFLs are slightly elevated above the ground level. Therefore, considering the proposal is for renovation of a single building, it is considered appropriate to apply a 300mm freeboard.
- 4.3.14 Furthermore, the FFLs are elevated above the 1 in 100 year event +70% demonstrating the site is not sensitive to a variation in climate change uplift.
- 4.3.15 The design flood level is 36.70mAOD and FFLs are 37.13mAOD, more than 300mm above the design level and almost 300mm above the 1 in 1,000 year level. This is an appropriate level of freeboard allowance, in accordance with the SFRA recommendations.

4.4 Recorded Flooding

- 4.4.1 The EA 'Recorded Flood Outlines' dataset shows flood extents from flooding from the River Thames in 1947, shown in Figure 4-2.

Figure 4-2 Recorded Flood Outlines



- 4.4.2 The mapped flooding extends to the Thames Valley Park and Ride, the level of which is approximately 39.5mAOD. This is approximately 2.75m above the modelled 1 in 1,000 year level and is therefore likely to be erroneous, especially given since it dates from 1947.
- 4.4.3 Comparison of Figure 4-2 with Figure 4-1 shows that the extent of Flood Zone 2 has been derived from the recorded flood event extent and is therefore assessed as being overestimated.
- 4.4.4 This does not affect the conclusion above that the site should be classed as being in Flood Zone 1.

4.5 Surface Water Flooding

- 4.5.1 The January 2025 iteration of the Risk of Flooding from Surface Water (RoFSW) dataset indicates areas where surface water is likely to flow and accumulate. The mapping is derived by simulation of rainfall events over a digital terrain model (DTM) and includes an uplift of 20% to account for climate change.
- 4.5.2 The RoFSW dataset, shown in Figure 4-3, demonstrates that the site is not predicted to flood during a 1 in 1,000 year rainfall event. Therefore, the site has been assessed as being at a **Very Low** risk of surface water flooding.

Figure 4-3 RoFSW + 20% Climate Change Extents



4.6 Groundwater Flooding

- 4.6.1 The Reading SFRA has limited information regarding groundwater flooding. It does note that areas of the borough that are underlain by chalk can be susceptible to elevate groundwater during prolonged wet weather.
- 4.6.2 It is unlikely that the extent of groundwater flooding would exceed that of fluvial flooding.
- 4.6.3 In addition, the elevated nature of the site above the towpath means that groundwater inundation is unlikely.
- 4.6.4 There are no subsurface elements in the proposed development, therefore the proposal have been assessed as being at a **Low** risk of groundwater flooding.

4.7 Flooding from Sewers

- 4.7.1 The area upstream of the site is unlikely to be served by a significant sewer network. The risk of sewer flooding is therefore considered to be **Negligible**.

4.8 Flooding from Artificial Sources

- 4.8.1 The Environment Agency 'Reservoir Flood Extents – Wet Day' national dataset shows part of the site to be at risk if a reservoir breach coincides with a 'wet day', when

ivers are experiencing a 1 in 1,000 year flood, which is unlikely. There are no other known artificial sources within the vicinity of the site.

- 4.8.2 Since the introduction of the Reservoirs Act in 1975 there have been no recorded catastrophic failures of reservoirs in the UK. All reservoirs are subject to rigorous inspection and maintenance regimes, meaning the chance of failure is extremely low.
- 4.8.3 Although the consequences of failure can be severe, the likelihood of failure is extremely low, meaning the risk of flooding from artificial sources is concluded to be **Low**.

4.9 Development Vulnerability

- 4.9.1 Table 2 of the Flood Risk and Coastal Change Planning Practice Guidance (PPG) defines which types of development are acceptable in each flood zone and is reproduced in Table 4-2. In accordance with Annex 3 of the NNPF, the proposal is considered to be More Vulnerable. The site is assessed as falling in Flood Zone 1. All forms, including More Vulnerable, of development are appropriate in Flood Zone 1.

Table 4-2 Flood Risk Vulnerability

Flood Zone	Flood Risk Vulnerability				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1	✓	✓	✓	✓	✓
2	✓	Exception Test Required	✓	✓	✓
3a	Exception Test Required	x	Exception Test Required	✓	✓
3b	Exception Test Required	x	x	x	✓

4.10 Access and Egress

- 4.10.1 The proposed dwelling would be elevated above the design and extreme flood levels, meaning it would operate as a place of safe refuge during such flood conditions.
- 4.10.2 As explained in Section 3.1, the development would be car-free with the primary access along the towpath, as per the existing site. Comparing the topographic levels in Section 2.2 with the design flood level shows that towpath would be inundated to approximately 700mm, which would be in the 'Danger for Most' hazard classification

according to Table 4 in Defra's Supplementary Note On Flood Hazard Ratings and Thresholds For Development Planning And Control Purpose.

- 4.10.3 Therefore, an alternative access is proposed that would lead to high ground to the east and the park and ride. It should be noted that given the sites elevation above the flood level, this route would only be needed in an emergency, i.e. access to the site for the emergency services during peak flood conditions, which is unlikely.

5 IMPACT ON LOCAL DRAINAGE

- 5.1.1 The existing site is understood to discharge roof runoff unattenuated although the destination is unknown.
- 5.1.2 The proposal would result in a negligible alteration to the impermeable footprint of the site. It is therefore proposed to retain the same general drainage arrangements for the site.
- 5.1.3 However, in order to ensure the proposal result in betterment in terms of runoff, it is recommended that the detailed designs for the site consider discharging the building downpipes to raised beds sustainable drainage (SuDS) planters. These are simple, prefabricated raised beds that accommodate flows from downpipes, slowing the flow of water before discharging to the existing discharge arrangements at low rates. They are planted to provide additional biodiversity and amenity benefits and provide water cleansing.
- 5.1.4 According to the CIRIA SuDS Manual, ideally the surface area of bioretention areas such as SuDS planters should be 2% – 4% of the area it is draining. The existing and proposed roof area measures a total of approximately 85m² and therefore, the total surface area of the planters should be at least 1.7m² (2% of the total area).
- 5.1.5 If space allows, water butts could be installed to provide further betterment, promoting the reuse of water collected from rainstorms in order to maintain garden areas. However, the capacity provided in water butts cannot be relied upon to provide attenuation storage as they may be at capacity when storms occur.
- 5.1.6 If implemented, the proposed planters would be considered a betterment compared to the existing drainage arrangements of the building and therefore strongly align with the core aims of the NPPF.
- 5.1.7 The inclusion of, specific distribution and location of the SuDS planters is subject to detailed design considerations. For example, they will need to be located so as to not impede access.

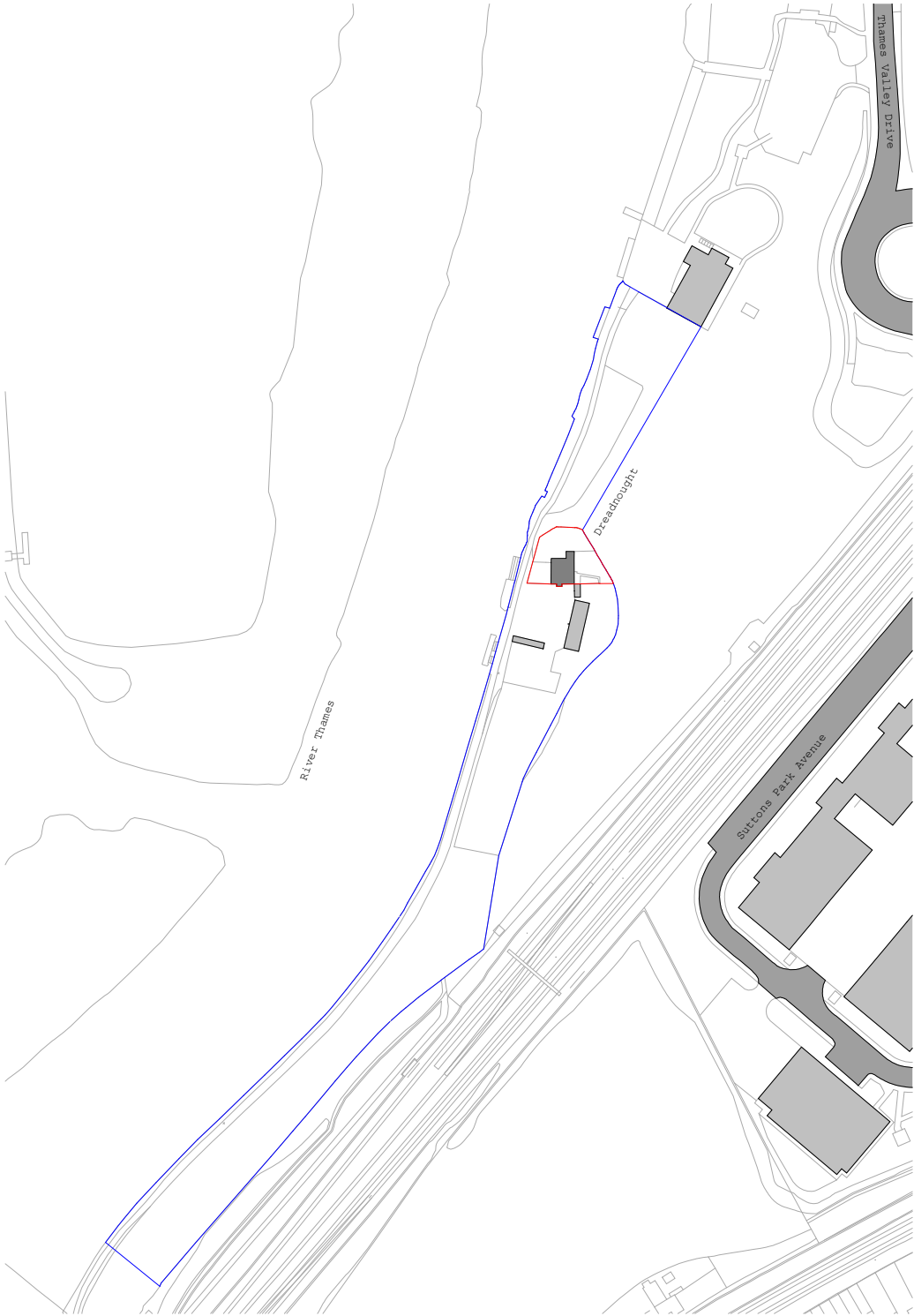
6 SUMMARY

- 6.1.1 It is proposed to renovate and convert the existing Dreadnought building to provide additional residential accommodation. There would be negligible change to the impermeable footprint of the site
- 6.1.2 The site is situated on land that slopes in a northwesterly direction towards the western bank of the River Thames.
- 6.1.3 According to the Flood Map for Planning, the site is located in Flood Zone 2, with a very small portion in Flood Zone 3. The existing and proposed building falls within Flood Zone 2.
- 6.1.4 Analysis of the Environment Agency's Thames Mapledurham to Hurley Modelling Study shows the building and its surrounds to be elevated above the 1 in 100 year +35% design event level as well as the present day 1 in 1,000 year level and the 1 in 100 year +70% event.
- 6.1.5 The site has been assessed as being at a Very Low risk of surface water flooding.
- 6.1.6 Groundwater flooding is unlikely to exceed the level of fluvial flooding and the risk from other sources is assessed as being low.
- 6.1.7 Assessment from all other sources of flooding has been classified as Low or Negligible risk.
- 6.1.8 The proposal would result in a negligible alteration to the impermeable footprint of the site. It is therefore proposed to retain the same general drainage arrangements for the site. However, in order to ensure the proposal result in betterment in terms of runoff, it is recommended that SuDS planters and/or water butts are attached to downpipes.
- 6.1.9 This FRA shows that the development will be safe for its lifetime, with minor reduction of flooding elsewhere, and therefore meets the requirements of the NPPF.

APPENDICES

APPENDIX A

Site Proposals



Collaborating with:
Carl Bumce

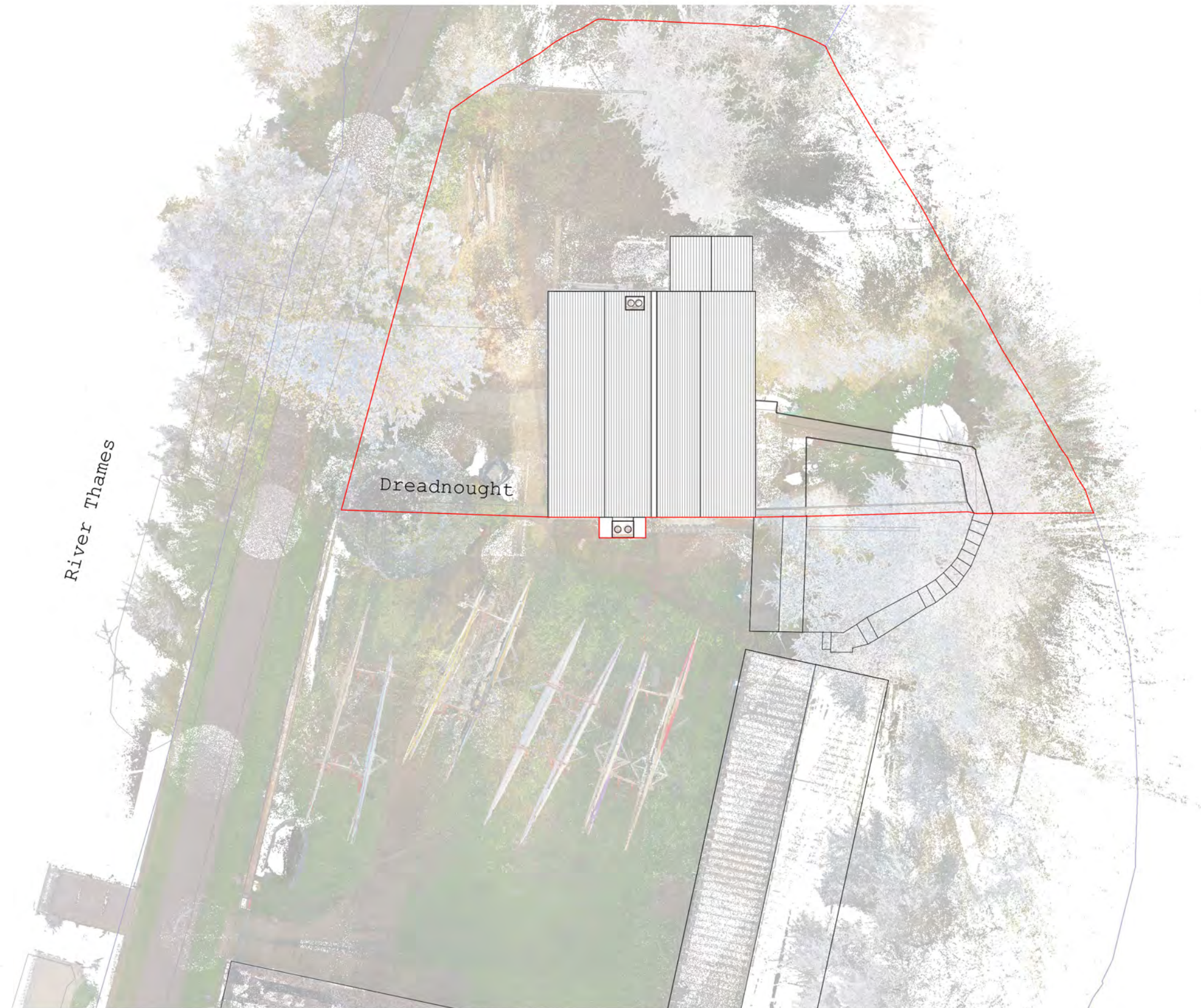
Job: 1144 Drawing: 02-00 Revision:

Project:
The Dreadnought
Kennet Side, RG1 3LU
Drawing:
Site Location Plan

Date: 12.25 Status: **Planning**
Drawn By: AG Checked By: EM



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River Thames

Dreadnought

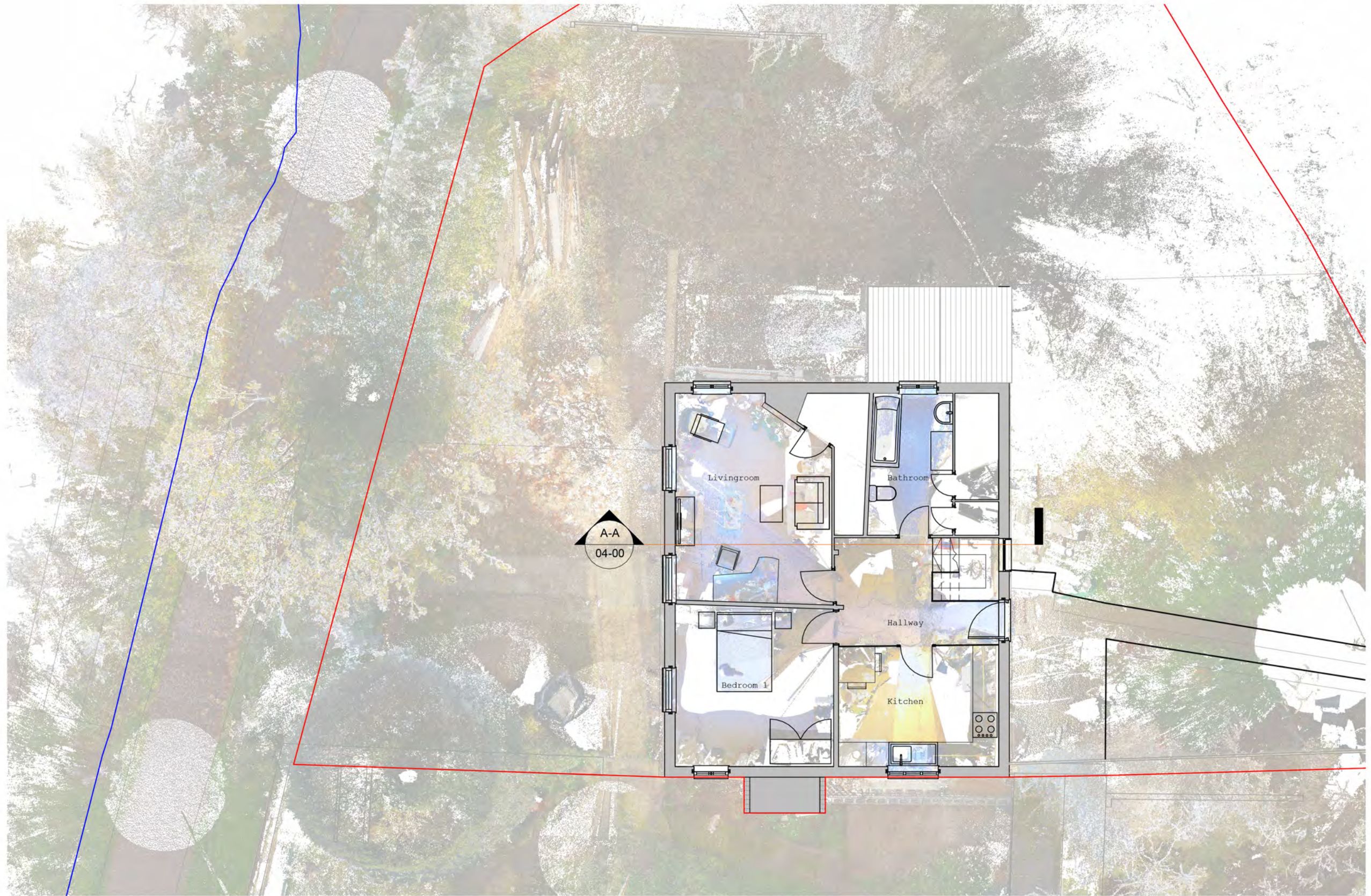


1 : 200 4m 8m 12m 16m 20m 1:200

		Project: The Dreadnought Kennet Side, RG1 3LU		 Chartered Practice
Collaborating with: Carl Bumce		Drawing: Block Plan As Existing		
Date: 12.25	Status: Planning	Drawn By: AG	Checked By: EM	Colony Architects Ltd. The Wine Store, Brewery Court, Theale, Reading, RG7 5AJ +44 (0)118 380 0328 hello@colonyarchitects.com colonyarchitects.com
Job: 1144	Drawing: 02-01	Revision:		



				
Collaborating with: Carl Bumce			Project: The Dreadnought Kennet Side, RG1 3LU	
Job: 1144 Drawing: 03-00 Revision:			Drawing: Ground Floor Plan As Existing	
Date: 12.25			Status: Planning	
Drawn By: AG			Checked By: EM	
Colony Architects Ltd. The Wine Store, Brewery Court, Theale, Reading, RG7 5AJ +44 (0)118 380 0328 hello@colonyarchitects.com colonyarchitects.com				



A-A
04-00

Livingroom

Bathroom

Hallway

Kitchen

Bedroom 1



1 : 100 2m 4m 6m 8m 10m 1:100



Collaborating with:
Carl Bumce

Job: 1144 Drawing: 03-01 Revision:

Project:
The Dreadnought
Kennet Side, RG1 3LU
Drawing:
First Floor Plan As Existing

Date: 12.25 Status: **Planning**
Drawn By: AG Checked By: EM



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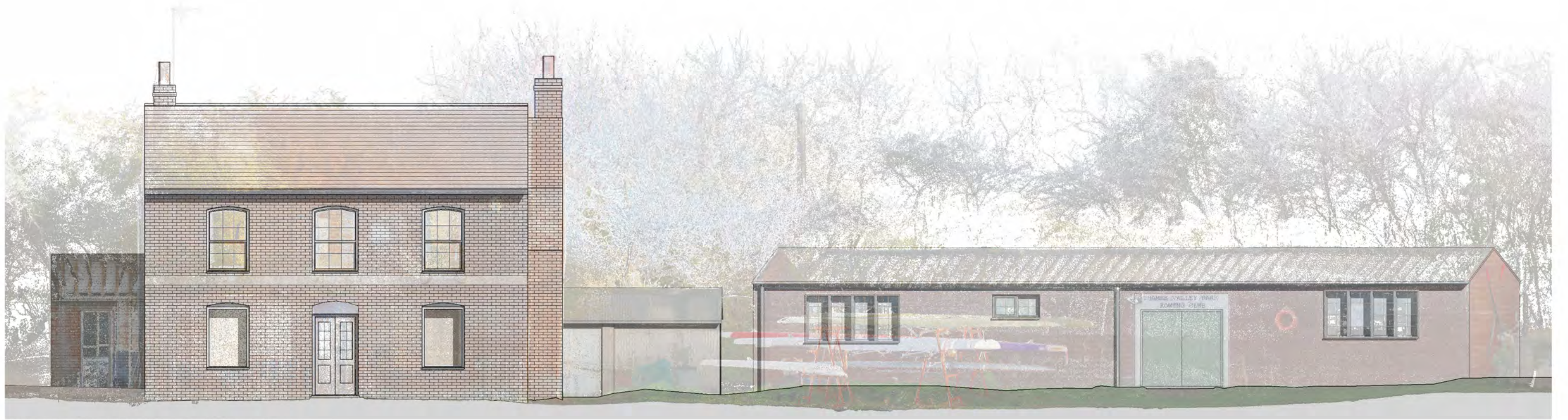
Job: 1144
Drawing: 04-00
Revision:

Project:
The Dreadnought
Kennet Side, RG1 3LU
Drawing:
Section A-A

Date:
251203
Status:
Planning
Drawn By:
AG
Checked By:
EM



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Front (North West) Elevation



Rear (South East) Elevation



Collaborating with:
Carl Bumce

Job: 1144
Drawing: 05-00
Revision:

Project:
The Dreadnought
Kennet Side, RG1 3LU
Drawing:
Front & Rear Elevations As Existing

Date: 12.25
Status: **Planning**
Drawn By: AG
Checked By: EM



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Side (North East) Elevation



Side (South West) Elevation



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