



FLOOD RISK ASSESSMENT

for

Proposed extension and upgrades to
161-162 London Road
Dover
Kent CT17 0TG

on behalf of

Mr J Farrier

Document Control Sheet

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Dover, Kent CT17 0TG

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213-001 Rev / – Site Location & Existing Plans

213-002 Rev / – Existing Floor Plans

213-003 Rev / – Existing Elevations & Sections

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213-007 Rev / – Photo Sheet

213-008 Rev B – Proposed Site Plan & Access

213-009 Rev A – Site Location & Existing Plans
213-010 Rev C – Proposed Site Location A1
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Topographical Survey

Appendix B Environment Agency Details
Product Data 4
Flood Prevention Diagram

1.0 EXECUTIVE SUMMARY

- 1.1 Tridax Ltd has been commissioned by Mr James Farrier to undertake a Flood Risk Assessment for the proposed extensions and upgrade work to 161-162 London Road, Dover.
- 1.2 This Flood Risk Assessment Report (FRA) is prepared in accordance with the Technical Guidance to the National Planning Policy Framework (NPPF) and the Kent County Council Local Flood Risk Management Strategy ~ Guidance on Consultation. The Report takes into consideration the Dover District Council's Strategic Flood Risk Assessment, dated March 2019 together with the Environment Agency advice note and details the observations, calculates the probable flows that may be generated by the development and makes recommendations for the disposal of foul and surface water and identifies any special mitigation measures required to reduce the risks of flooding.
- 1.3 In preparing this Flood Risk Assessment, consultation has been undertaken with the Environment Agency regarding the extent of available information on flood risk at the Site. Flood Mapping and Product Data 4 information has now been provided by the Environment Agency which is derived using the detailed fluvial modelling of the River Dour, completed by JBA Consulting in 2015.
- 1.4 Tridax Ltd consider that with the inclusion of the mitigation measures recommended within this report that the site is sustainable in terms of flood risk and that the proposals do not increase the risk to the neighbouring properties.

2.0 STATUS

- 2.1 This Report is prepared for the sole use of Mr Farrier and his agents in connection with the proposed development. No responsibility can be assumed for the Report if used by others.
- 2.2 For the purposes of the Contracts (Rights of Third Parties) Act 1999, nothing in this Report shall confer on any third party any right to enforce or benefit from any term of this Report

3.0 INTRODUCTION

Background

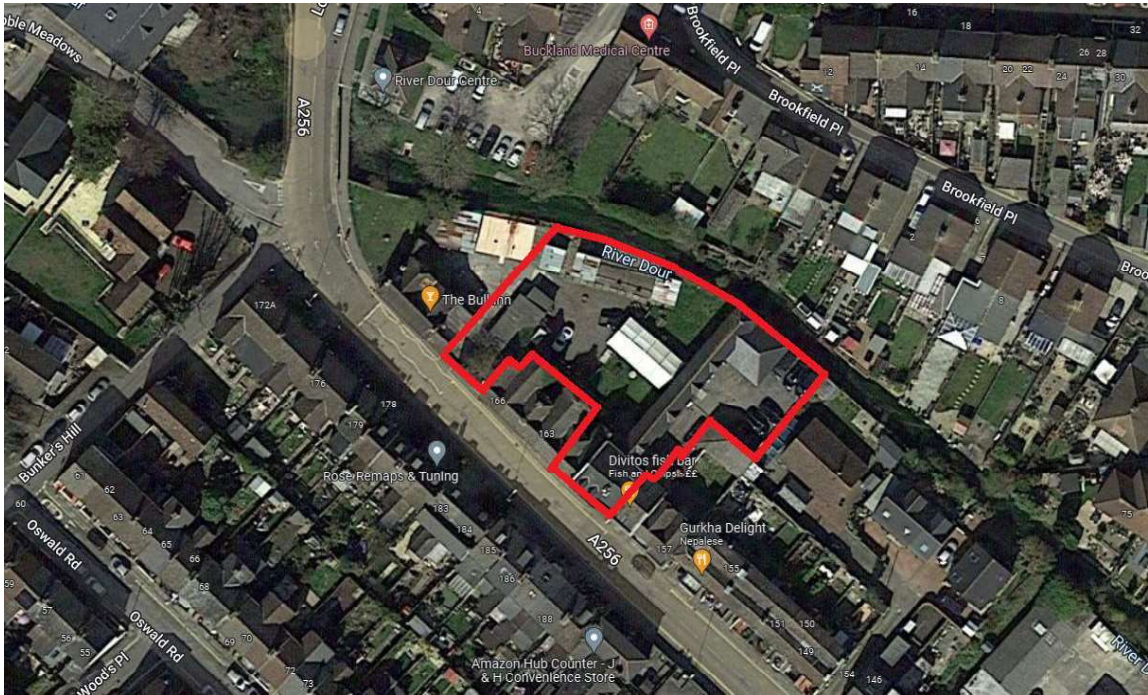
- 3.1 Tridax Ltd has been commissioned by Mr Farrier and requested to undertake a Flood Risk Assessment for the proposed single storey rear extension to the existing commercial premises to provide additional hearse parking, chapels, workshops and cold storage, vehicular access improvements, change of use and conversion of the existing first floor offices to residential maisonette incorporating the existing second floor residential flat.

Site Location

- 3.2 The development site is located at Ordnance Survey reference TR 30680 42694 (630680mE, 142694mN). The northern boundary to the site abuts the River Dour while its southern boundary is adjacent the A256 London Road. The western boundary is formed by the flank wall of 'The Bull Inn' public house and the eastern boundary formed with number 147 London Road. The existing site location, aerial and block plans are extracted in Frames 1, 2 and 3 below and identified on the Architects drawing included in Appendix A of this report.



Frame 1 – Location Plan – Site Edged Red
(Blue edged land is further land owned by client)



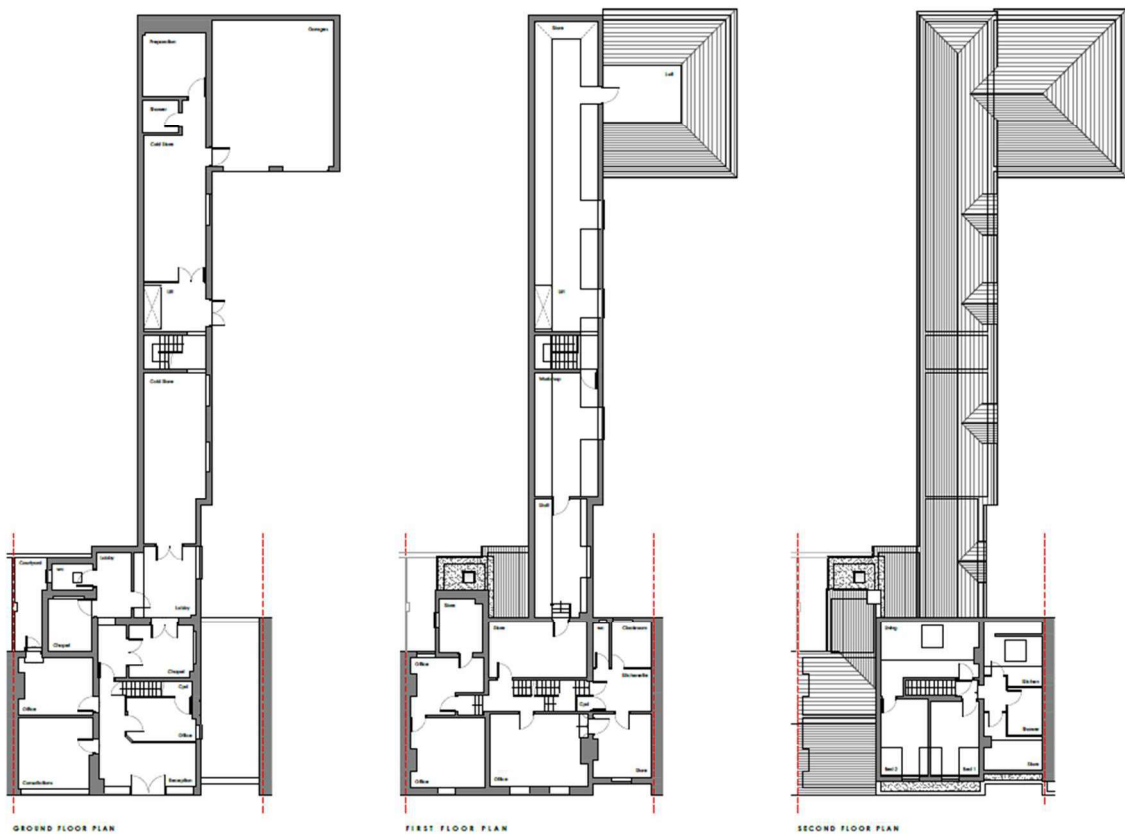
Frame 2 – Aerial Block Plan – Site Edged Red



Frame 3 – Block Plan – Site Edged Red

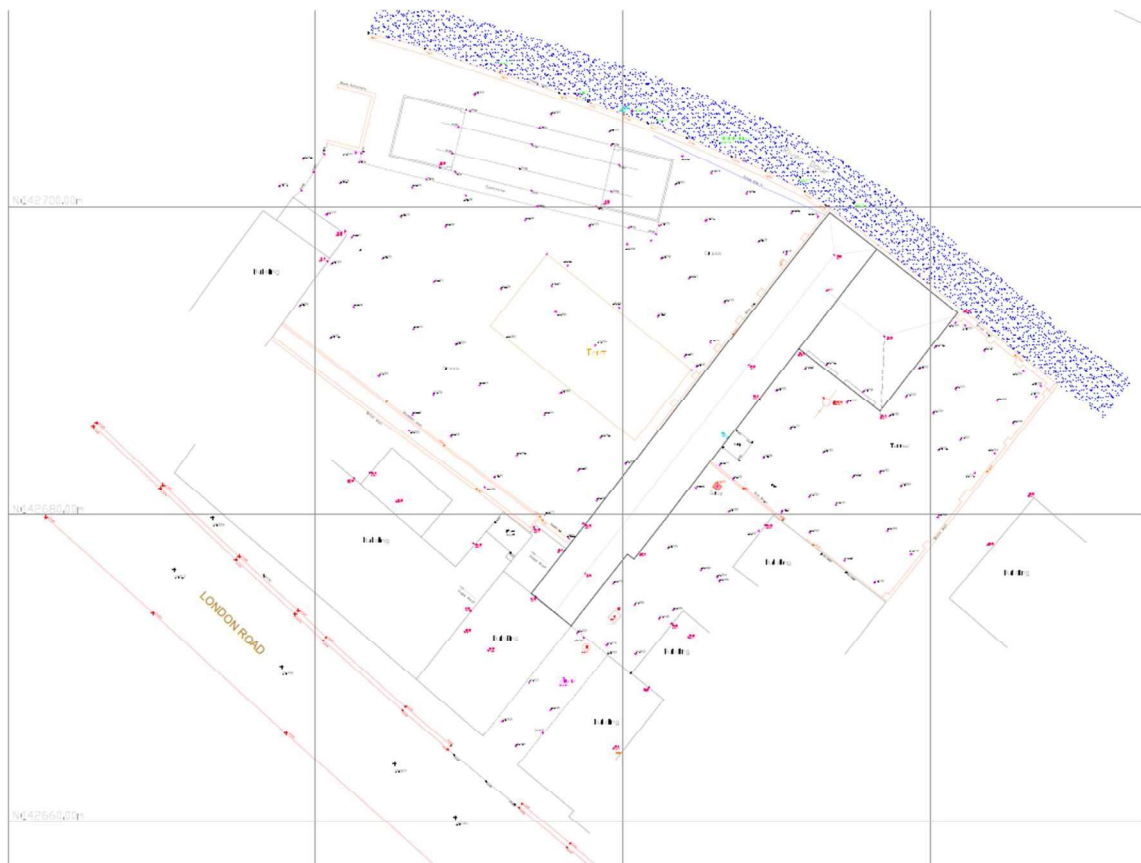
Existing Site

3.3 The existing property (161) is set over three floors adjacent London Road with 162 and the rear additions being set at two storey. Access to the rear areas is via an 'under croft' below 161 with a gated vehicle access point adjacent the Bull Inn. The properties are conventional brick built with pitched roofs front to rear. The total site area is approximately 1460m² (0.146ha). The site has approximately 875m² of impermeable surfaces. Pedestrian access is direct from the public footpath adjoining London Road on the southern boundary. Vehicular access is via the under croft between 161 and 160. The Architects floor layout plan are included in Appendix A but also extracted in Frame 4 below.



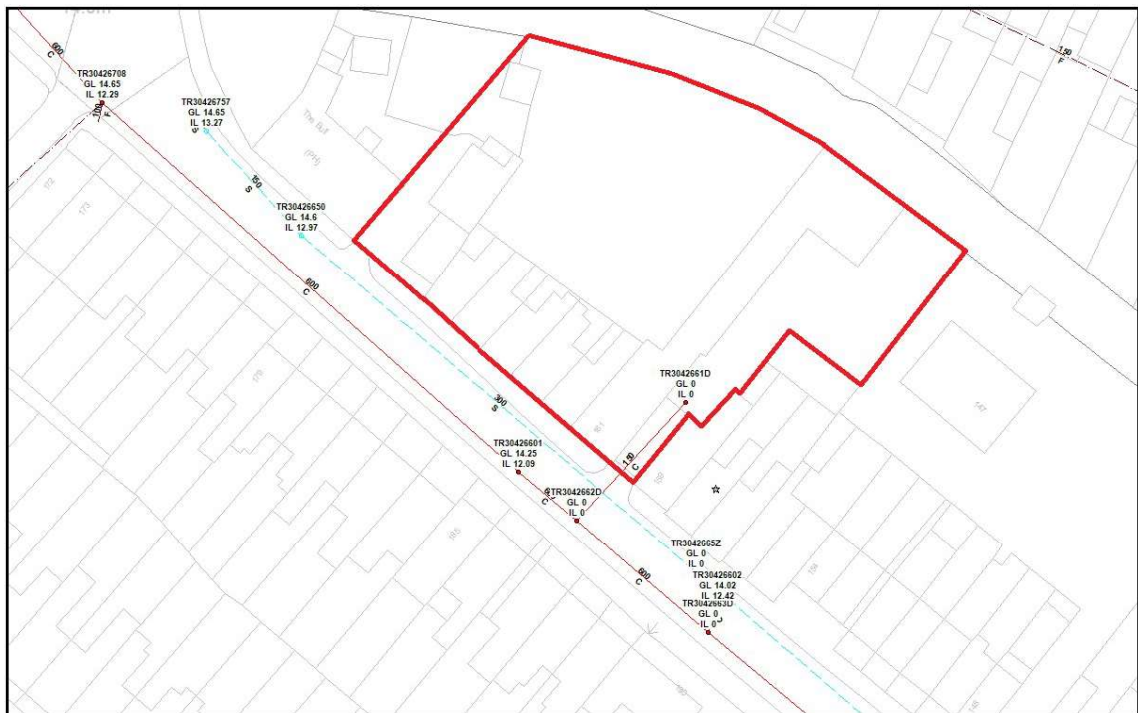
Frame 4 – Existing Ground, First & Second Floor Layout Plans

3.4 A copy of the detailed topographical survey is included in Appendix A and extracted as Frame 5 below. It can be seen that the ground level on the centre of the carriageway to the front of the site is shown to be 14.270mAOD, at the entrance of the undercroft it is 14.30mAOD, at the site entrance adjacent the Bull Inn 14.30mAOD, at the extreme northwest boundary adjacent the River Dour 14.00mAOD and at the extreme northeast boundary adjacent the River Dour it is 14.20mAOD. The local topography is generally flat with only minor variations in levels. The entrance threshold into the property appears to be set 50mm above the footway level. The Ground floor level to the front of the property is 14.375mAOD and at the rear is 14.475mAOD.



Frame 5 – Topographical Survey

3.5 Inspection of the public sewer records indicates that there is a 600mmØ public combined sewer approximately 2.16m deep located in the carriageway (London Road) adjacent the southern boundary. Manhole reference 6601 is in the carriageway directly outside No 162 and shown to have a cover level of 14.25mAOD and an invert level of 12.09mAOD. There is a length of 150mmØ public combined sewer identified beneath the undercroft which connects to the combined sewer in London Road. There is also a 300mmØ public surface water sewer approximately 1.7m deep located in the carriageway (London Road) adjacent the southern boundary. It is assumed that the existing properties discharges foul drainage to the public combined system although this will require confirming. It is further assumed that surface water runoff connects to either the public combined or surface water sewer shown in London Road although this does require confirmation. Extracts of the public sewer records are shown in Frame 6 below.



Frame 6 – Extract of Public Sewer Records

3.6 Inspection of the Geological Map of Great Britain indicates that the site will be underlain with a Bedrock of New Pit Chalk Formation – Chalk with superficial deposits of Head/Alluvium – Clay, Silt, Sand and Gravel. Extracts of the Geological Map of Great Britain are shown in Frame 7 below.



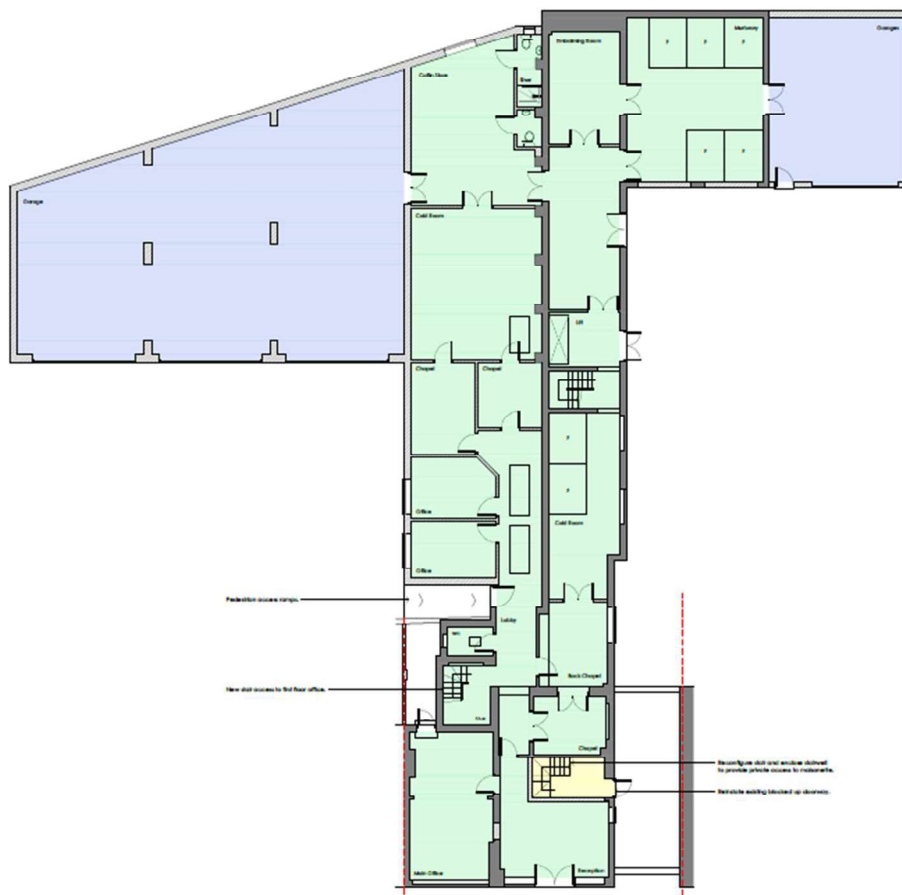
Frame 6 – Extract of the Geological Map of Great Britain



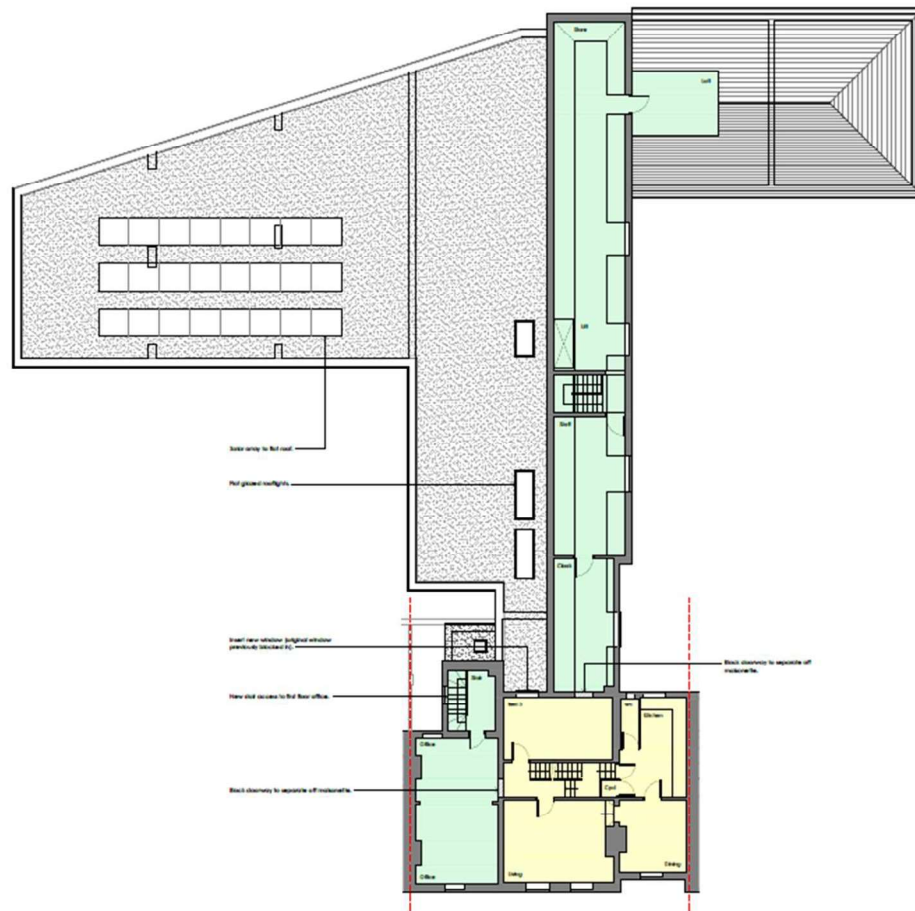
Frame 7 – Front Elevation (Under croft Entrance)

Proposed Development

3.7 The applicant is seeking to build a single storey rear extension to the existing commercial premises which will provide additional hearse parking, chapels, workshops and cold storage, vehicular access improvements, change of use and conversion of the existing first floor offices to residential maisonette incorporating the existing second floor residential flat. The details are identified on the Architects drawings enclosed within Appendix A and as extracted in Frames 8, 9, 10 and 11 shown below. Post-development will increase the impermeable surface finishes from 875m² to 1,375m² although this could be reduced to match the current impermeable area if the new vehicular accesses and parking areas are constructed in permeable finishes. Therefore, there will be an increase in the quantity of surface water runoff generated by this development.

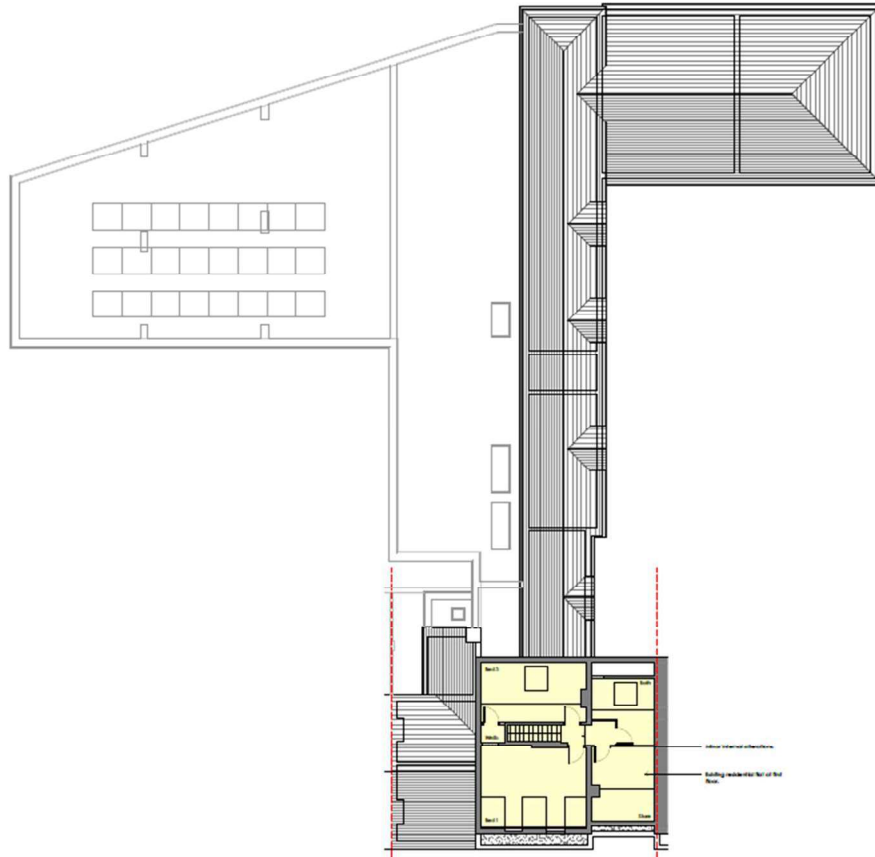


Frame 8 – Proposed Ground Floor Plan

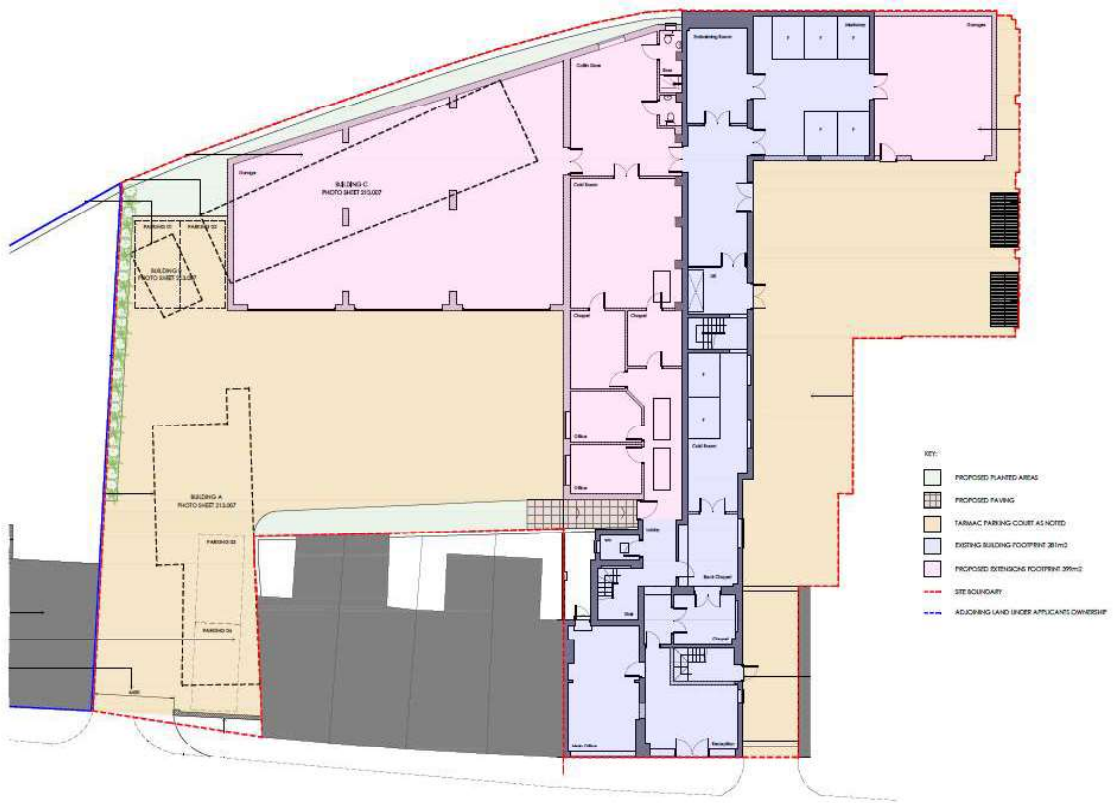


Frame 9 – Proposed First Floor Plan

3.8 The walls are likely to be built as conventional brick/blockwork cavity construction although this has not yet been confirmed. The construction of the new building will utilise flood resilient construction methods. The types of materials used in the construction of the development will be chosen to prevent or reduce the risk of structural damage caused by flood or surface water runoff to prevent the growth of wet rot spores. The access points into the development site will remain as existing. Ground floor will provide commercial and office space. First floor level will be set at 17.292mAOD for commercial and 17.597mAOD/18.047mAOD for residential and provide further commercial and office space together with a residential unit creating living, dining, kitchen, and a single bedroom. Second floor is to be set at 20.763mAOD and 20.913mAOD and arranged with a further two bedrooms and storage. There will be NO sleeping arrangements located at the ground floor level.



Frame 10 – Proposed Second Floor Plan



Frame 11 – Proposed Ground Floor Plan (LH Unit)

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- 3.9 The Environment Agency recommends that finished floor levels (FFL) are set a minimum of 600mm above the design flood level if sleeping arrangements are provided at ground floor level or 300mm above the design flood level for all other habitable accommodation.
- 3.10 Surface water run-off from the existing property will continue to be collected via suitable guttering and rainwater downpipes. It is assumed that surface water discharges to either the public combined or surface water systems. The surface water runoff from the proposed extensions will be collected via suitable guttering and rainwater downpipes and connect to the existing drainage system within the site. There will be an opportunity to attenuate and control surface water runoff so there will be NO increase in surface water runoff generated by this development, therefore, there will not be an impact upon any adjacent properties.
- 3.11 The foul drainage requirements will be designed in accordance with Building Regulations to connect into the public foul drainage system via existing private foul drainage within the development site.

Requirement for Flood Risk Assessment

- 3.12 Flood risk is primarily regulated through planning policy. Key requirements with respect to flooding are outlined in the National Planning Policy Framework (NPPF) which was published in March 2012, revised in July 2018 and updated 19 February 2019.
- 3.13 The NPPF requires that an FRA should be submitted with planning applications for all sites over one hectare in area and all smaller sites within Flood Zones 2 and 3 to determine the risks of flooding at a development site (from all sources including rivers, the sea, sewers, and groundwater). An FRA is therefore an essential element in the overall acceptability of the proposed development in planning terms.
- 3.14 Guidance on the content of FRAs is contained in Technical Guidance to the National Planning Policy Framework which has been used to inform the scope and content of this FRA.

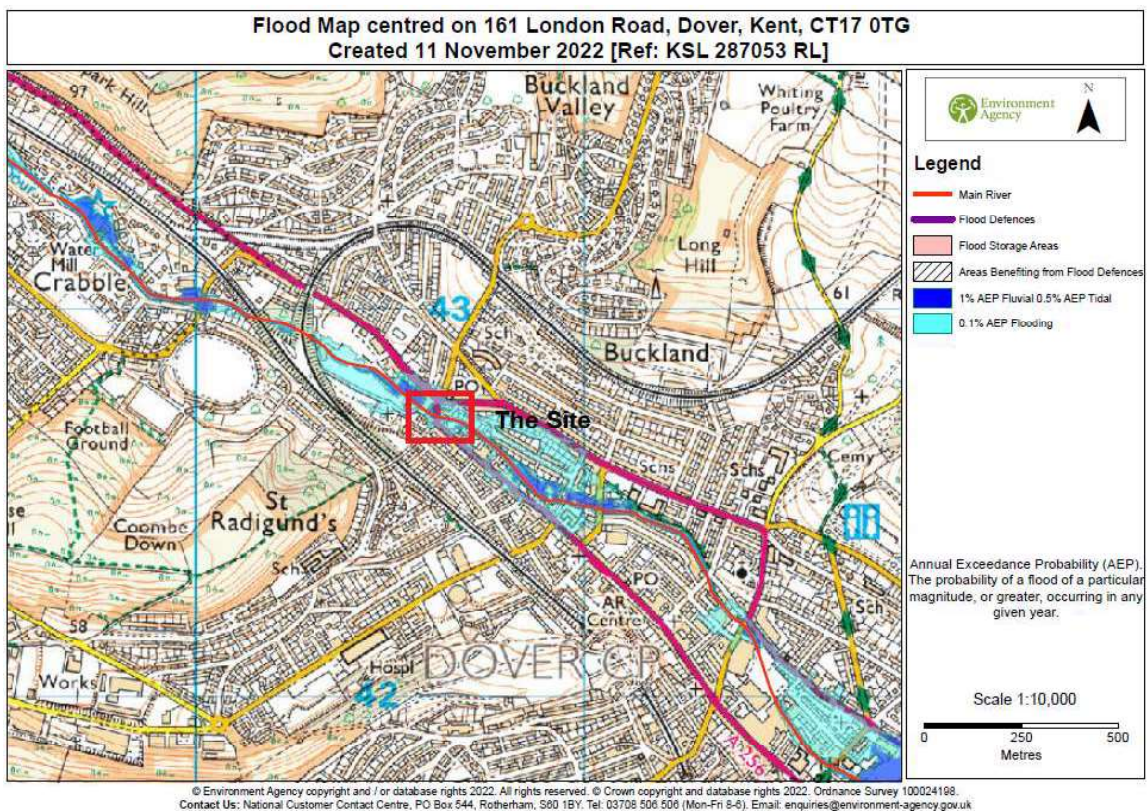
3.15 The primary resource for reviewing fluvial and tidal flood risks is via the Environment Agency (EA) indicative floodplain maps and analysis of their Product Data 4. These classify risks as follows:

- Flood Zone 1 (Low Probability): annual probability of flooding less than 1 in 1,000 (<0.1%);
- Flood Zone 2 (Medium Probability): annual probability of flooding more than 1 in 1,000 (0.1%) but less than 1 in 100 (1%) for fluvial flooding or 1 in 200 (0.5%) for tidal flooding; and
- Flood Zone 3 (High Probability): annual probability of flooding more than 1 in 100 (1%) for fluvial flooding or 1 in 200 (0.5%) for tidal flooding.

3.16 Inspection of the Environment Agency Product Data 4 Information together with discussions with them indicate that part of the site lies within the outline of a Flood Zone 3 (High Probability) with a 1% probability of fluvial flooding, Flood Zone 2 (Medium Probability) with a 0.1% probability of fluvial flooding in any given year and also that part of the site is outside the extreme flood outline known as Flood Zone 1.

Consultation

3.17 In preparing this Flood Risk Assessment, consultation has been undertaken with the Environment Agency both at an initial contact and a further enquiry regarding the extent of available information on flood risk at the site which is extracted as the Flood Map in Frame 12 below. The Environment Agency Product 4 (Detailed Flood Risk) information is included in Appendix B. The information provided is based on the best data currently available.



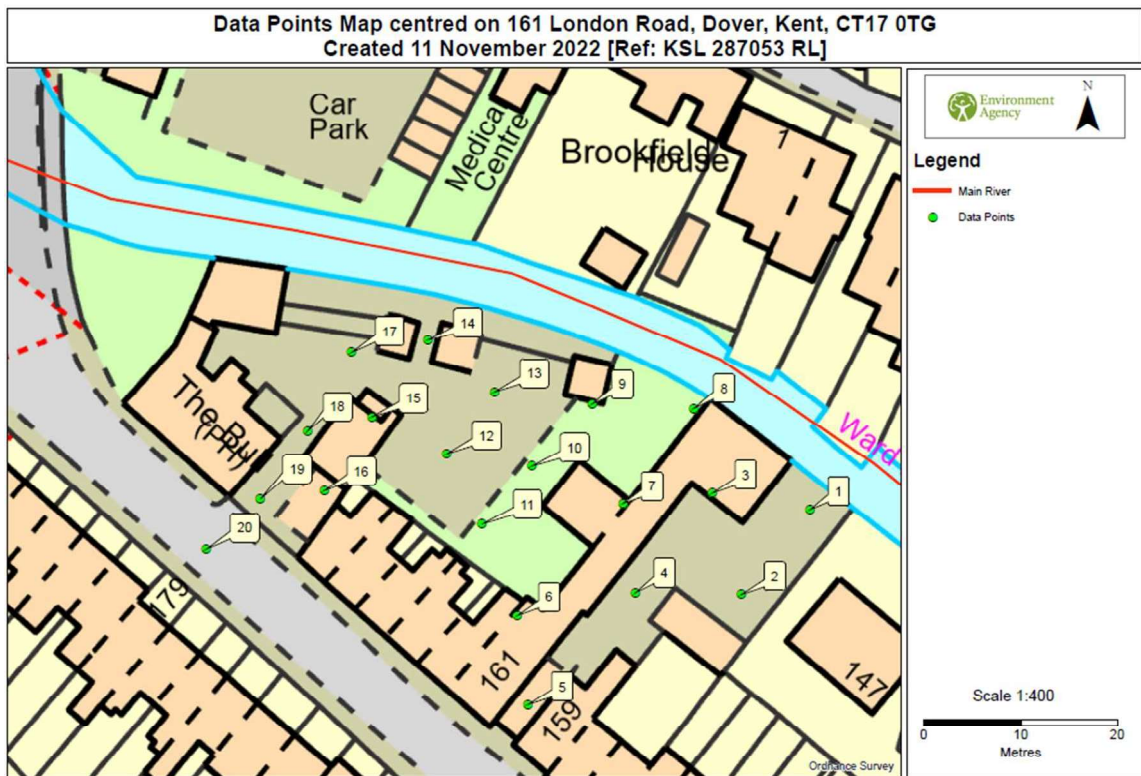
Frame 12 – Extract of Environment Agency Flood Maps

3.18 The Environment Agency Flood Map shows the natural floodplain for areas at risk from river and tidal flooding. The floodplain is specifically mapped ignoring the presence and effect of defences. Although flood defences reduce the risk of flooding they cannot completely remove that risk as they may be over topped or breached during a flood event. The Flood Map at this location has been derived using detailed fluvial modelling of the River Dour, completed by JBA Consulting in 2015.

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- 3.19 The Flood Map indicates the probability of a flood of a particular magnitude, or greater, occurring in any given year. This is known as the Annual Exceedance Probability (AEP). Flood Zone 3 indicates areas of land having a 1 in 100 or greater annual probability (1% AEP) of flooding from rivers, or 1 in 200 or greater annual probability (0.5% AEP) of flooding from the sea. Flood Zone 2 indicates areas of land having up to a 1 in 1000 annual probability (0.1% AEP) of flooding from rivers or the sea. The flood map also shows the location of some flood defences and the areas that benefit from them.
- 3.20 Areas benefiting from flood defences are defined as those areas which benefit from formal flood defences specifically in the event of flooding from rivers with a 1% (1 in 100) chance in any given year or flooding from the sea with a 0.5% (1 in 200) chance in any given year. If the defences were not there these areas would be flooded. An area of land may benefit from the presence of a flood defence even if the defence has overtopped if the presence of the defence means that the flood water does not extend as far as it would if the defence were not there.
- 3.21 The flood map is intended to act as a guide to indicate the potential risk of flooding. When producing it the Environment Agency use the best available data at the time of completion, considering historic flooding and local knowledge. The flood map is updated on a quarterly basis to account for any amendments required.
- 3.22 Ideally all accommodation should be set above the extreme level. However, if it is not practical to raise the ground floor that high then it may be acceptable to use flood resilient construction on the ground floor and provide safe refuge on the first floor. In either case a robust warning and evacuation plan should be specified as the property would be rendered inaccessible by the floodwater.
- 3.23 Information provided by the Environment Agency has been produced using a 2D TuFlow model. The floodplain has been represented as a grid and the flood water levels and/or depths have been calculated for each grid cell. The modelled flood levels/depths presented are for the closest most appropriate model grid cells.

3.24 On 19 Feb 2016, the ‘*Flood Risk Assessments: Climate change allowances*’ were published on gov.uk. which replaced the previous guidance allowances for Planners. The data provided in the Product Data 4 details provided by the Environment Agency includes the new allowances which have now been considered in this FRA and factored in to demonstrate the development will be safe from flooding. The **fluvial climate change** factors are now more complex reflecting the fact that the latest information shows a single uplift percentage across England cannot be justified. The Environment Agency will incorporate these new allowances into future modelling studies.

3.25 A map showing the location of the points from where the data is taken is shown in Frame 13 below. All levels and depths taken are from the River Dour Fluvial Mapping Study’ completed by JBA Consulting in 2015. Climate change (CC) data represents modelled levels with a 20% increase in river flows. A zero (0.00) figure indicates that the data point is outside of the flood extent for a particular return period at that location.



Frame 13– Modelled Data Points

3.26 The modelled undefended fluvial flood levels and depths are shown in Frames 14 and 15 below. The modelled undefended fluvial flood levels and depths including climatic change for the 1% AEP are shown in Frames 16 and 17 below.

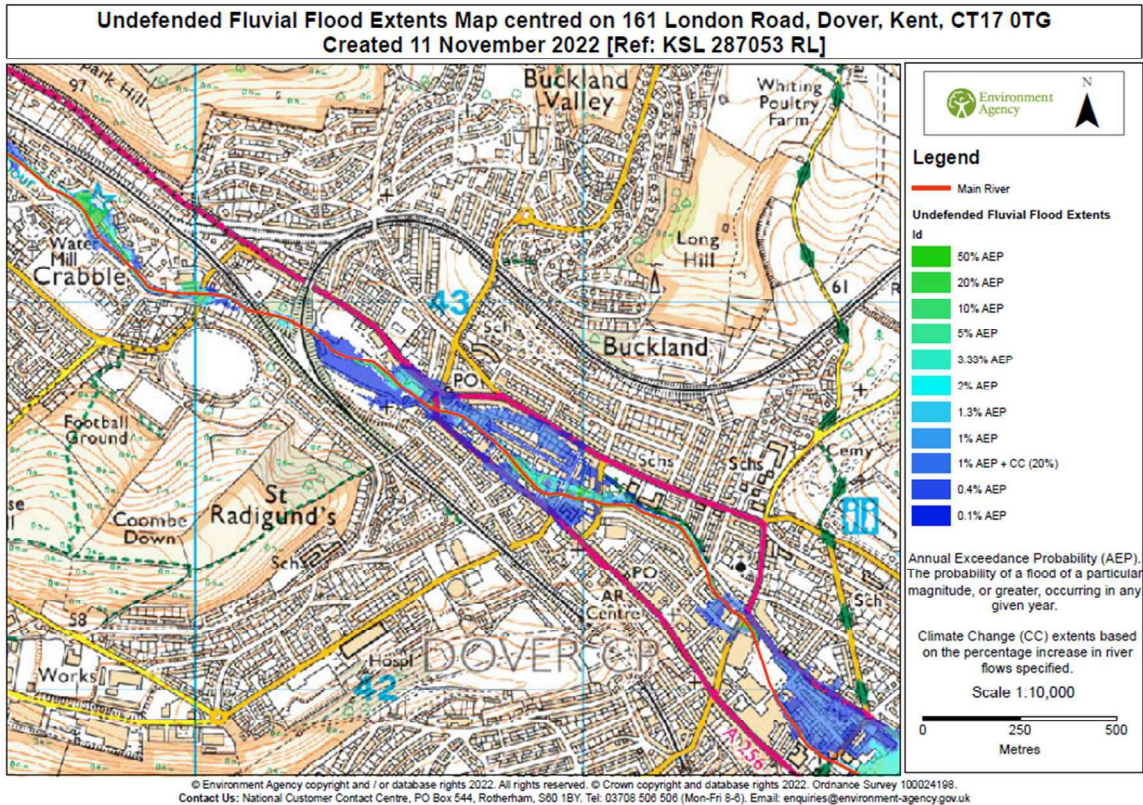
Point ID	National Grid Reference		Modelled Fluvial Flood Levels for Annual Exceedance Probability (AEP) events shown (metres AOD)												
	Easting	Northing	Undefended												
			50% AEP	20% AEP	10% AEP	5% AEP	3.3% AEP	2% AEP	1.3% AEP	1% AEP	1% AEP + CC (20%)	0.4% AEP	0.1% AEP		
1	630704	142688	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	630697	142679	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.26
3	630694	142690	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.26
4	630686	142679	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.27
5	630675	142688	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	630674	142677	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	630684	142689	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.27
8	630682	142699	0.00	0.00	0.00	0.00	0.00	0.00	13.93	13.98	14.02	14.13	14.15	14.15	14.25
9	630681	142699	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.98	14.05	14.12	14.16	14.16	14.28
10	630675	142692	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.05	14.12	14.15	14.15	14.28
11	630670	142686	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.12	14.15	14.15	14.31
12	630686	142694	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.29
13	630671	142700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.05	14.12	14.15	14.15	14.28
14	630684	142706	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.17	14.20	14.20	14.33
15	630659	142698	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.38
16	630654	142690	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.48
17	630656	142704	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.40
18	630652	142696	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.41
19	630647	142689	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.52
20	630641	142684	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.61

Frame 14 – Modelled Fluvial Flood Levels – Undefended (metres AOD)

Point ID	National Grid Reference		Modelled Fluvial Flood Depths for Annual Exceedance Probability (AEP) events shown (metres)												
	Easting	Northing	Undefended												
			50% AEP	20% AEP	10% AEP	5% AEP	3.3% AEP	2% AEP	1.3% AEP	1% AEP	1% AEP + CC (20%)	0.4% AEP	0.1% AEP		
1	630704	142688	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	630697	142679	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
3	630694	142690	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
4	630686	142679	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
5	630675	142688	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	630674	142677	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	630684	142689	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
8	630682	142699	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.04	0.08	0.14	0.14
9	630681	142699	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.08	0.16	0.19	0.32
10	630675	142692	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.19	0.22	0.32
11	630670	142686	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.13	0.13
12	630686	142694	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
13	630671	142700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.03	0.16	0.16
14	630684	142706	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.07	0.19	0.19
15	630659	142698	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10
16	630654	142690	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
17	630656	142704	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08
18	630652	142696	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.16
19	630647	142689	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.13
20	630641	142684	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.17

Frame 15 – Modelled Fluvial Flood Depths – Undefended (metres AOD)

From Frames 14 and 15 above it can be seen that in Undefended scenario the 1% AEP + CC, node points 8, 9, 10, 11, 13 & 14, which are closer to the riverbank, become surcharged by between 30mm – 160mm. The remaining nodes are identified outside of the modelled flood events.



Frame 16 – Undefended Modelled Fluvial Flood Extents Map

Point ID	National Grid Reference		Modelled Fluvial CC Flood Levels for AEP events shown (metres AOD)				
			Undefended				
	Easting	Northing	1% AEP + CC (30%)	1% AEP + CC (35%)	1% AEP + CC (45%)	1% AEP + CC (50%)	1% AEP + CC (105%)
1	630704	142688	0.00	0.00	0.00	0.00	14.26
2	630697	142679	0.00	0.00	0.00	0.00	14.27
3	630694	142690	0.00	0.00	0.00	0.00	14.27
4	630686	142679	0.00	0.00	0.00	0.00	14.28
5	630675	142668	0.00	0.00	0.00	0.00	0.00
6	630674	142677	0.00	0.00	0.00	0.00	0.00
7	630684	142689	0.00	0.00	0.00	0.00	14.28
8	630692	142699	14.15	14.17	14.18	14.19	14.27
9	630681	142699	14.16	14.18	14.19	14.20	14.29
10	630675	142692	14.16	14.17	14.19	14.20	14.30
11	630670	142686	14.16	14.17	14.25	14.26	14.32
12	630666	142694	0.00	0.00	0.00	0.00	14.30
13	630671	142700	14.16	14.17	14.19	14.20	14.30
14	630664	142706	14.21	14.22	14.25	14.25	14.34
15	630659	142698	0.00	14.29	14.34	14.34	14.39
16	630654	142690	0.00	0.00	0.00	0.00	14.49
17	630656	142704	0.00	14.28	14.35	14.35	14.41
18	630652	142696	0.00	14.31	14.35	14.35	14.42
19	630647	142689	0.00	0.00	0.00	0.00	14.53
20	630641	142684	0.00	14.52	14.54	14.54	14.62

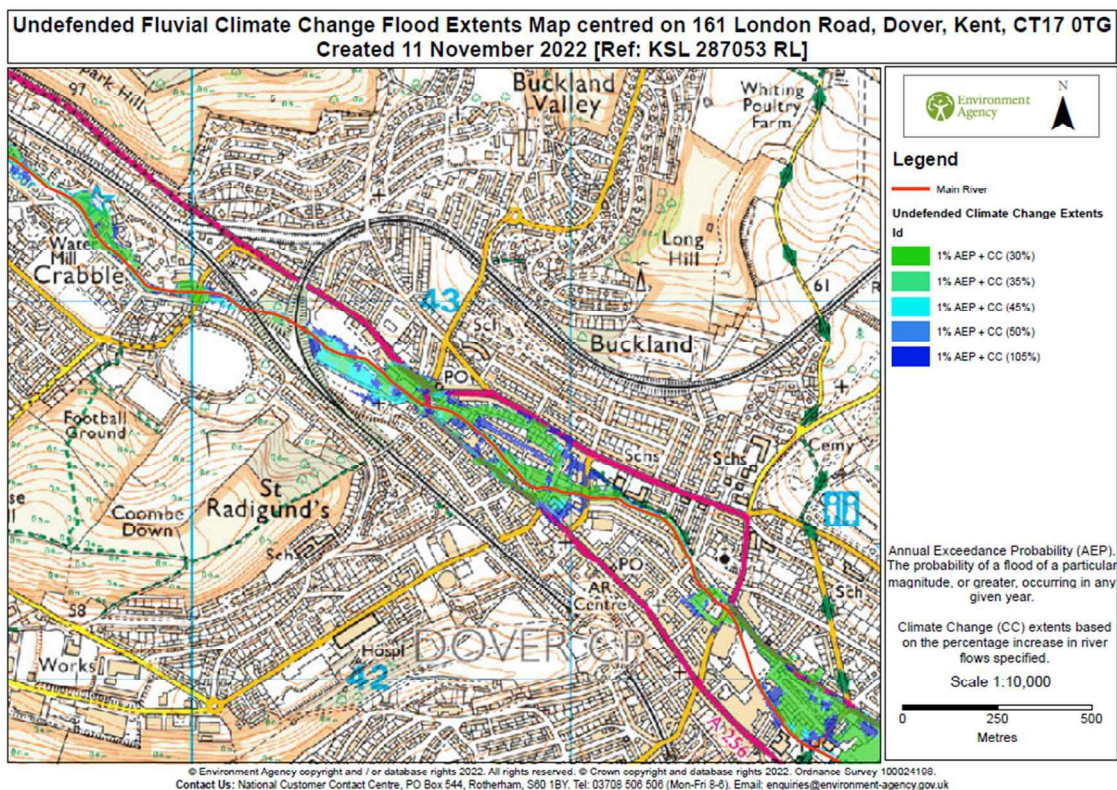
Frame 17 – Modelled Undefended Fluvial Climatic Change Flood Levels for AEP Events as shown (metres AOD)

Data taken from the River Dour Mapping Study, completed by JBA Consulting in 2015 and updated 2016 with additional climate change allowances.

Point ID	National Grid Reference		Modelled Fluvial CC Flood Depths for AEP events shown (metres)				
			Undefended				
	Easting	Northing	1% AEP + CC (30%)	1% AEP + CC (35%)	1% AEP + CC (45%)	1% AEP + CC (50%)	1% AEP + CC (105%)
1	630704	142688	0.00	0.00	0.00	0.00	0.18
2	630697	142679	0.00	0.00	0.00	0.00	0.07
3	630694	142690	0.00	0.00	0.00	0.00	0.08
4	630686	142679	0.00	0.00	0.00	0.00	0.09
5	630675	142668	0.00	0.00	0.00	0.00	0.00
6	630674	142677	0.00	0.00	0.00	0.00	0.00
7	630684	142689	0.00	0.00	0.00	0.00	0.09
8	630692	142699	0.06	0.07	0.08	0.08	0.15
9	630681	142699	0.19	0.21	0.23	0.23	0.33
10	630675	142692	0.19	0.21	0.23	0.23	0.33
11	630670	142686	0.03	0.04	0.07	0.07	0.13
12	630666	142694	0.00	0.00	0.00	0.00	0.13
13	630671	142700	0.04	0.05	0.07	0.08	0.18
14	630664	142706	0.08	0.09	0.11	0.11	0.20
15	630659	142698	0.00	0.01	0.05	0.05	0.11
16	630654	142690	0.00	0.00	0.00	0.00	0.03
17	630656	142704	0.00	0.01	0.03	0.03	0.10
18	630652	142696	0.00	0.07	0.10	0.10	0.17
19	630647	142689	0.00	0.00	0.00	0.00	0.13
20	630641	142684	0.00	0.09	0.10	0.10	0.18

Frame 18 – Modelled Undefended Fluvial Climatic Change Flood Depths for AEP Events as shown (metres AOD)

From Frames 17 & 18 above in the ‘Undefended’ scenario there are minimal Fluvial Flood Depths cross the site. The nodes most impacted are 9 and 10 which appear to be close to the riverbank and a low spot which will be brought up to suit the adjacent finishes.



Frame 19 – Undefended Modelled Fluvial Climate Change Flood Extents Map

- 3.27 This site is not identified to be within an area benefiting from flood defences as shown on the Flood Map extract above. There are no formal flood defences owned or maintained by the Environment Agency around this site. Areas benefiting from flood defences are defined as those areas which benefit from formal flood defences specifically in the event of flooding from Rivers with a 1% (1 in 100) chance in any given year or flooding from the sea with a 0.5% (1 in 200) chance in any given year. If the defences were not there these areas would be flooded. An area of land may benefit from the presence of a flood defence even if the defence has overtopped if the presence of the defence means that the flood water does not extend as far as it would if it were not there.
- 3.28 The Environment Agency do not hold records of historic flood events from rivers and/or the sea affecting the area local to this site. Please be aware that this does not necessarily mean that flooding has not occurred here in the past. Flooding can occur from different sources such as rivers or the sea, surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system), overflowing or backing up of sewer or drainage systems which have been overwhelmed or groundwater rising up from underground aquifers. Currently the Environment Agency can only supply flood risk data relating to the chance of flooding from rivers or the sea.

4.0 NATIONAL PLANNING POLICY FRAMEWORK CONTEXT

- 4.1 Inspection of the Environment Agency Website identifies that parts of this site lie within the outline extent of the Flood Zones 3, an area of land having a 1 in 100 or greater annual probability (1% AEP) of flooding from rivers and a Flood Zone 2 with land having up to a 1 in 1000 annual probability (0.1% AEP) of flooding from rivers or the sea. The mapping does not distinguish between high-risk areas and the functional floodplains, i.e. Flood Zones 3a and 3b.
- 4.2 The functional floodplain is defined by NPPF as land where water has to flow or be stored in times of flood during events that have a probability of occurrence of 1 in 20 (5%) or greater in any one year. The Practice Guide to NPPF goes on to further clarify this by adding the following definitions.
- (a) Areas which would naturally flood with an annual exceedance probability of 1 in 20 (5%) or greater, but which are prevented from doing so by existing infrastructure or solid buildings will not normally be defined as functional floodplain.
 - (b) Developed areas are also not generally considered to comprise functional floodplains, however, areas such as car parks that have been designed to provide flood storage and conveyance function may be.
 - (c) The functional floodplain may also include areas intended to provide transmission and storage of water from other sources of flooding (e.g. surface water).
- 4.3 Based on the information that has been provided by the Environment Agency and reference to the Dover District Council's Strategic Flood Risk Assessment, parts of the site are located within the outline of 1% AEP (Flood Zone 3) chance of flooding from rivers in any given year together with being in the outline of the 0.1% (Flood Zone 2) chance of flooding from rivers or sea in any given year.
- 4.4 Inspection of the Dover District Council Strategic Flood Risk Assessment outlines the following details.

-
- 4.4.1 The SFRA is at the core of the NPPF (PPS25) approach. It provides the essential information on flood risk, taking climate change into account, thereby allowing the LPA to understand risk across its district so that the Sequential Test can be properly applied. The need for LPAs to consider flood risk when preparing Local Development Documents (LDD) and to produce SFRAs is highlighted in paragraphs 12 and 25 of PPS25, now replaced by NPPF paragraphs 93 – 108 *‘Meeting the challenge of climate change, flooding and coastal change’*
- 4.4.2 **Flood Zones 1** – Low probability of flooding – This zone is assessed as having less than a 1 in 1000 annual probability of river or sea flooding in any one year. *If the site is less than 1 hectare then a site-specific FRA will only be required if it lies within an area defined by either the Critical Drainage Zone or the Overtopping Hazard Zone, or if it is identified by the Council as being a site with specific critical drainage problems or is located within 20m of a main river.*
- 4.4.3 **Flood Zone 2** – Medium probability of flooding – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding or between 1 in 200 and 1 in 1000 annual probability of sea flooding in any one year. *A site-specific FRA will be required, and this will need to be prepared in accordance with the requirements set out in PPS25, paragraphs 10 - 13 and annex E.*
- 4.4.4 **Flood Zone 3** – High probability of flooding - This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding or 1 in 200 or greater annual probability of sea flooding in any one year. *A site-specific FRA will be required, and this will need to be prepared in accordance with the requirements set out in PPS25, paragraphs 10 - 13 and annex E.*

Flooding from Surface Water Runoff and Overland Flow

- 4.4.5 Overland flooding typically occurs in natural valley bottoms as normally dry areas become covered in flowing water and in low spots where water may pond. This flooding mechanism can occur almost anywhere but is likely to be of particular concern in any topographical low spot, or where the pathway for runoff is restricted by terrain or man-made obstructions.
- 4.4.6 Parts of the District have very steep topography and are heavily urbanised. In addition, in many places surface water is discharged into the streams that flow through these towns. These streams flow predominantly in culverts through these densely populated urban areas and historically these have become surcharged during extreme rainfall events. This has resulted in surface water flows in streets, which has caused flooding to properties in the past.

Impact of Climate Change on the SFRA Study Area

- 4.4.7 The Environment Agency Flood Zone maps are based on current day sea levels and climate conditions; however, to gain an understanding of the impact of rising sea levels, the Flood Zone maps have been re-produced using the 2115 predicted extremes.
- 4.5 There are generally three significant policies in relation to flood risk which are:-
- 4.5.1 All development will be controlled so as not to give rise to flooding or surface, groundwater, or aquifer pollution. Surface water should be disposed of as close to source as possible or attenuated before discharge to a watercourse or surface water sewer. Surface water should not be allowed to enter the foul system.
- 4.5.2 Areas within Zones 2 and 3 at risk from fluvial flooding are identified on the Environment Agency Flood Map. Planning applications for development on sites of more than 1 hectare within these areas must be accompanied by a flood risk assessment appropriate to the scale of and nature of the development, the level of flood risk, and the protection afforded by the existing defences. Development in undeveloped areas at risk from fluvial flooding will only be permitted in exceptional circumstance. In developed areas at risk from fluvial flooding,

development will only be permitted where appropriate flood defence measures are taken, and it can be demonstrated that there is no increased risk of flooding to other sites.

- 4.5.3 Generally the Local Authority will, in consultation with the Environment Agency, ensure that new developments safeguard existing tidal and fluvial defences. Where works are being carried out in proximity to a tidal or fluvial flood defence the Council will seek to safeguard and where possible extend public access to the waterfront and protect and enhance existing ecological features, the existing flood defences, and access to flood defence facilities for operational maintenance purposes.
- 4.6 Planning permission will be refused for residential development in areas at risk of fluvial or tidal flooding, as identified by the Environment Agency, unless it can be shown that the site is defended to an appropriate standard. Where a site is protected to an appropriate standard the development will be required to show appropriate measures to ensure the safety of the occupiers of the accommodation from flooding.
- 4.7 Generally, development will only be permitted where the District Planning Authority is satisfied that suitable sustainable urban drainage methods, or an alternative method as agreed with the drainage authority designed to mitigate any adverse effects of surface water run-off, are included as an integral part of the development and measures are proposed to ensure the future maintenance of such schemes.
- 4.8 According to Table 2 of the Technical Guidance to NPPF (see Frame 20 below), the site usage is considered to be 'More Vulnerable', (dwelling houses).

Essential infrastructure	<ul style="list-style-type: none"> Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk; and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.
Highly Vulnerable	<ul style="list-style-type: none"> Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding. Emergency dispersal points. Basement dwellings. Caravans, mobile homes and park homes intended for permanent residential use. Installations requiring hazardous substances consent.¹⁹
More Vulnerable	<ul style="list-style-type: none"> Hospitals. Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels. Non-residential uses for health services, nurseries and educational establishments. Landfill and sites used for waste management facilities for hazardous waste.²⁰ Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	<ul style="list-style-type: none"> Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non-residential institutions not included in 'more vulnerable'; and assembly and leisure. Land and buildings used for agriculture and forestry. Waste treatment (except landfill and hazardous waste facilities). Minerals working and processing (except for sand and gravel working). Water treatment plants. Sewage treatment plants (if adequate pollution control measures are in place).

Frame 20- Extract of NPPF Table 2 - Land Use Vulnerability

4.9 Reference to Frame 21 below, Table 3 of the Technical Guidance to NPPF, the 'More vulnerable' land use **does** require the **exception test** performing for Flood Zone 3.

Table D.3²²: Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability classification (see Table D2)		Essential infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (see Table D.1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b 'Functional Floodplain'	Exception Test required	✓	✗	✗	✗

Frame 21 - Extract of NPPF Table 3

Sequential Test

4.10 Local Planning Authorities (LPA) are encouraged to take a risk-based approach to proposals for developments in or affecting flood risk areas through the application of the Sequential Test and the objectives of this test are to steer new development away from high-risk areas towards those at lower risk of flooding.

However, in some areas where developable land is in short supply there can be an overriding need to build in areas that are at risk of flooding. In such circumstances, the application of the Sequential Test is used to ensure that the lower risk sites are developed before the higher risk ones. The Sequential Test can be considered adequately demonstrated if both of the following criteria are met:

- The Sequential Test has already been carried out for the site (for the same development type) at the strategic level (Local Plan)
- The development vulnerability is appropriate to the Flood Zone

4.11 Based on the information that has been provided by the Environment Agency and determined by this assessment, the following functional floodplain test is applied.

Do predicted flood levels show that the site will be affected by an event having a return period of 1 in 20 years or less? **X**

Is the site defended by flood defence infrastructure that prevents flooding for events having a return period of 1 in 20 years or greater? **✓**

Does the site provide a flood storage or floodwater conveyance function? **X**

Does the site contain areas that are 'intended' to provide transmission and storage of water from other sources? **X**

Is site within the functional floodplain (Zone 3b). **No**

This development site is **NOT** located in a functioning floodplain.

4.12 NPPF states that the Local Planning Authority should apply the sequential approach as part of the identification of land for development in areas at risk from flooding. The objective of the sequential test is to ensure that lower risk sites are developed before sites in higher risk areas. When applying the test, it is extremely important to ensure that the subject site is only compared with sites that are available for development and are similar in size. This requires a comprehensive knowledge of development sites within the Dover District and is normally applied as part of the Local Development Framework process.

However, when applying the test to sites that have not been assessed as part of the LDF it is often necessary to apply a site-specific test.

- 4.13 The second level of appraisal is through the application of the more detailed and refined flood risk information contained within the Strategic Flood Risk Assessments (SFRA). Such a document has been prepared for the Dover District and this has been referenced to as part of this site-specific FRA.
- 4.14 The most detailed stage at which the sequential approach can be applied is at site-based level. Careful consideration can then be given to the sites topography and development uses can provide opportunities to locate more vulnerable buildings on higher parts of the site and allow less vulnerable items such as recreation areas or car parking to be placed in higher risk areas.

Exception Test

4.15 By reference to Table 3 of the NPPF (Frame 21) it can be seen that an Exception Test is required. The remainder of this report will assess and recommend appropriate flood mitigation measures and assess the flood risk to and arising from the proposed development in order to ensure the following objectives have been met.

- Ascertain the impact of the proposed development on the flood risk in the surrounding area.
- Recommend appropriate flood mitigation measures in line with the recommendations of current best practice.
- Demonstrate that the development provides wider sustainability benefits to the community that outweigh flood risk.
- The development should be on developable, defined by PPS3 as a site that is in a suitable location for housing, or previously developed land.
- A Flood Risk Assessment must demonstrate that the development will be safe, without increasing flood risk elsewhere and where possible, will reduce flood risk overall.

5.0 ENVIRONMENTAL CONDITIONS

Topography

- 5.1 The site is an existing property with associated land used currently used for access and parking. A topographical survey identifies the following ground levels. On the centre of the carriageway to the front of the site it is shown to be 14.270mAOD, at the entrance of the undercroft it is 14.30mAOD, at the site entrance adjacent the Bull Inn 14.30mAOD, at the extreme northwest boundary adjacent the River Dour 14.00mAOD and at the extreme northeast boundary adjacent the River Dour it is 14.20mAOD. The local topography is generally flat with only minor variations in levels. The entrance threshold into the property appears to be set 50mm above the footway level. The Ground floor level is 14.375mAOD at the front of the site adjacent London Road and 14.475mAOD at the rear.

Flood Defences

- 5.2 The site is identified on the Environment Agency Flood Map as not benefiting from Flood Defences. It should be noted that the flood map (flood zones) at this location have been derived using a generalised computer modelling study completed in 2020 (using JFLOW modelling techniques) and would not necessarily be aware of any localised walls or structures defending the site.

Historical Flooding

- 5.3 The Environment Agency do not keep records of Historic flood events. However, reference to the Dover District Council Strategic Flood Risk Assessment, Section 1.4, notes that fluvial flooding was recorded in 2000 and 2001 as a result of the River Dour exceeding its channel capacity. The historic records have been updated and presented as a map in Appendix A.1 of Dover's SFRA report together with a table that identifies the date of each event and details included in Appendix A.3 of that report.

Flood Hazards

5.4 Technical Guidance to NPPF identifies six potential sources of flooding and requires that all potential sources that could affect the proposed development are considered;

- Flooding from rivers or fluvial flooding
- Flooding from the sea or tidal flooding
- Flooding from land
- Flooding from groundwater
- Flooding from sewers
- Flooding from reservoirs, canals, and other artificial sources

5.5 Flooding from rivers or fluvial flooding

Part of the site is identified to lie within Flood Zone 3 (High Probability): 1 in 100 annual probability of flooding from rivers. Data provided by the Environment Agency indicates that part of this site is at risk of Fluvial flooding as identified in the 'undefended' modelled scenarios.

5.6 Flooding from the sea or tidal flooding

The site is identified to lie within Flood Zone 3 (High Probability): 1 in 200 annual probability of flooding from the sea. Data provided by the Environment Agency does not identify this site to be at risk of tidal flooding.

5.7 Flooding from land

During times of extreme rainfall results in surface water flows along the streets resulting in water collecting in this low-lying area. Under normal conditions this surface water is managed via the highway drains, however, under extreme conditions these may become overwhelmed and consequently water can pond in these areas. Reference to the Strategic Flood Risk Assessment and Dover Surface Water Management Plan identifies the area that the site lies within to be within the modelled predicted pattern of flooding in the Coombe Valley Road.

5.8 Flooding from groundwater

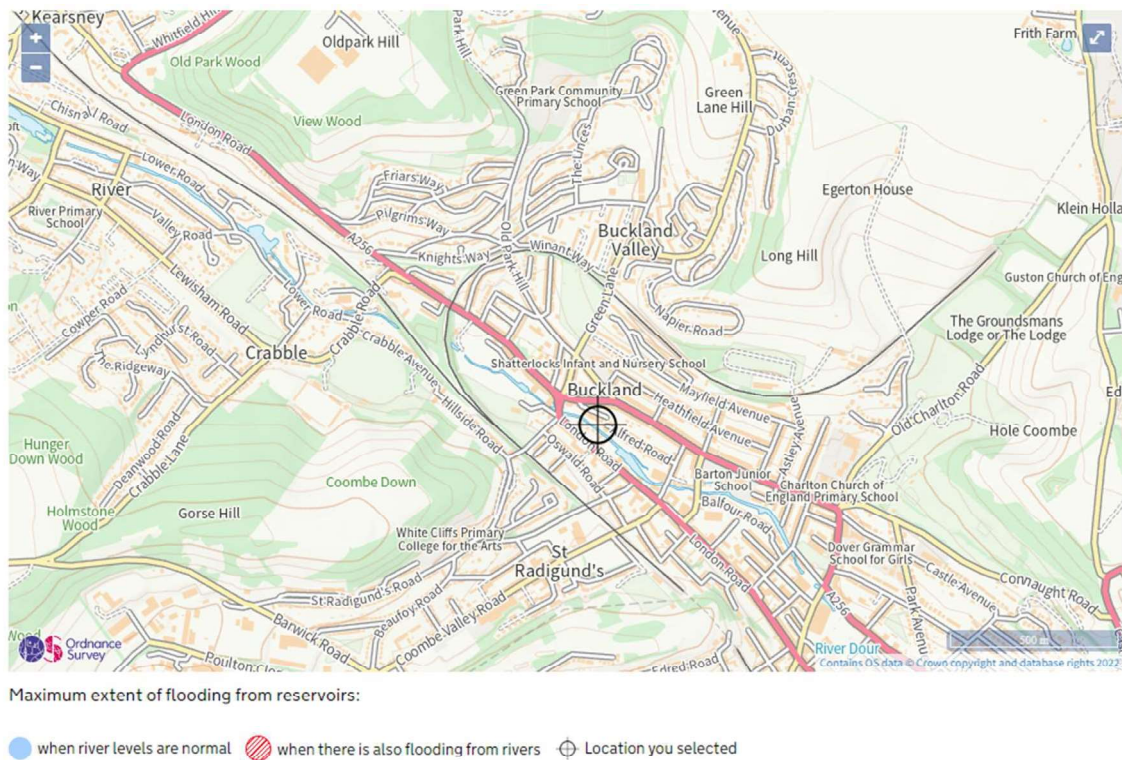
British Geology Surveys website indicates that the site to be underlain by bedrock geology of New Pit Chalk Formation – Chalk, with superficial deposits of Head/Alluvium – Clay, Silt, Sand and Gravel The site is not located within a Groundwater Source Protection. Considering that the floor levels on the site will be set min 150mm higher than the external ground levels the risk from groundwater flooding will be low.

5.9 Flooding from sewers

The public sewer records identify that there are public combined and surface water sewers in close proximity to this site. The risk of flooding from sewers is considered to be moderate.

5.10 Flooding from reservoirs, canals, and other artificial sources

By reference to the Flood Map extract below in Frame 21 the site is not within the maximum extent of flooding from reservoirs.



Frame 22 – Maximum extent of flooding from reservoirs

Risk and Controls

5.11 Considering the hazards identified above at the site, the following requiring consideration and/or mitigation measures;

- Flooding of any new property (Considered)
- Emergency egress through flood water (Considered)
- Displacement of flood water (Considered)
- Health & financial implications of flooding (Considered)
- Loss of mitigation measures during building lifetime (Considered)
- Flood Warning (Considered)

5.12 Flooding of new property

The ground floor levels will be set a minimum 150mm above the finished external ground levels therefore any flood water will be able to flow around the property, so the risk of internal flooding is reduced.

5.13 Emergency egress through flood water

The site is adjacent to land above the 1% AEP level so therefore a dry escape route is available therefore the need for any specialist rescue by the Emergency Services or the need for wading through floodwater can be avoided. The proposed layout of these properties provides a safe means of escape to a high level within the property.

5.14 Displacement of flood water

As the proposed development includes an increased footprint together with extending the existing property at first floor level there will be minor reduction in the potential capacity of the storage zone although this is considered negligible.

5.15 Health & Financial Implications

The construction work will utilise flood resilient construction methods.