

FLOOD RISK ASSESSMENT
of a site at
LAND TO REAR OF WINFRED ROAD, ERITH
for
SCHEUCH DEVELOPMENTS LTD



**Contaminated
Land
Solutions**

t 020 8291 1354 e ask@gosolve.co.uk

4 De Frene Road, London, SE26 4AB

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Revision:

- 1 EXECUTIVE SUMMARY**
- 2 BRIEF**
- 3 REFERENCE INFORMATION**
- 4 LOCATION**
- 5 SITE DESCRIPTION**
- 6 GROUND CONDITIONS**
 - 6.1 Geology**
 - 6.2 Hydrogeology**
 - 6.3 Hydrology**
- 7 PROPOSED DEVELOPMENT**
- 8 PLANNING POLICY**
- 9 SEQUENTIAL AND EXCEPTION TEST**
 - 9.1 Sequential Test**
 - 9.2 Exception Test**
- 10 STRATEGIC FLOOD RISK**
 - 10.1 L.B. Bexley Strategic Flood Risk Assessment**
- 11 LOCAL FLOOD RISK**
 - 11.1 Bexley Preliminary Flood Risk Assessment**
 - 11.2 Environment Agency Information**
 - 11.3 Planned Works**
- 12 FLOOD SOURCES**
 - 12.1 Rivers**
 - 12.2 Seas**
 - 12.3 Surface Water**
 - 12.4 Groundwater**
 - 12.5 Sewers**
 - 12.6 Reservoirs, Canals and other Artificial Sources**
- 13 RISK ASSESSMENT**

13.1 Category Definitions

13.2 Risk Matrix

13.3 Risk Assessment

14 MITIGATION AND MANAGEMENT PROPOSALS

14.1 Principles

14.2 Building Layout

14.3 Resilient and resistant construction

14.4 Protection from Flooding

14.5 Maintenance Regime

14.6 Drainage

14.7 Flood Warning

14.8 Emergency Plan

14.9 Emergency Access and Escape

14.10 Climate Change

15 RESIDUAL RISK

16 FLOODPLAIN AND FLOW ROUTES

16.1 Floodplain

16.2 Flow Routes

17 CONCLUSIONS

Appendix A – Site Location Plan

Appendix B – Proposed Plan

Appendix C – Sequential and Exceptional Test

Appendix D – Extracts from Strategic Flood Risk Assessment

Appendix E – Extracts from Preliminary Flood Risk Assessment

Appendix F – Environment Agency Information

Appendix G – Magic Defra Information

Appendix H – Contacts

1 EXECUTIVE SUMMARY

The proposed development comprises a single storey ground floor dwelling, soft landscaping, cycle, bin storage and parking area. Access to the residential property is via a common access driveway that links to Maximfeldt Road.

The site is currently vacant with an outbuilding and areas of landscaping.

The northeast part of the site lies just within an area at risk from river flooding that has a 1.0% (1 in 100), or greater chance of occurring each year and is therefore in an area designated as Flood Zone 3, while the southwest end is shown to have less than 0.1% (1 in 1000) chance of flooding in any year from rivers. The site benefits from flood defences however the residual risk from a breach in the defences remains.

The risk assessment has determined that there is a negligible level of flood risk to the site from groundwater, rivers and artificial sources. The other significant sources; seas, surface water and sewers also present a negligible level of risk.

The Environment Agency Product 4 & 8 shows part of the site to be in an area at residual risk of flooding, due to a breach of the River Thames defences, to a depth of 5.78mAODN in the northeastern third of the site.

The site is located on the extreme edge of the calculated extent of the breach inundation event. With reference to nodes 9 and 10, which cover the southwestern two thirds of the site, a nil return is shown. It would therefore seem reasonable to assume that the return values given for node 5 and 7 which are located within the building outline are unreasonably high.

As a precautionary measure, it is recommended that floor levels are raised by 450mm above existing ground level, and the doors located on the northeast end of the property are watertight.

The use of appropriate water resilient and resistant construction will protect the development in the event of flooding.

In case of flooding due to a breach in the River Thames defences, there are areas in the southwest part of the site that are unaffected by any source of flooding. This area will provide safe haven until emergency services arrive.

The use of water resilient and resistant construction will protect the development in the event of flooding and ensure that the site is safe without increasing flood risk elsewhere.

The proposed development is in line with the core principle of the national planning policy, satisfies the detailed planning policies CS10 and CS04 and is therefore assumed to provide the wider sustainability benefits to the community that outweigh flood risk.

Therefore, the proposed development will satisfy the requirements of the National Planning Policy Framework and is considered suitable for the proposed residential use.

2 BRIEF

Mr Dwindia Tamna of Scheuch Developments requested a flood risk assessment, for a site at Land to Rear of Winfred Road, Erith DA8 1AJ.

The FRA is prepared generally in accordance with the requirements of the National Planning Policy Framework in particular Section 14: Meeting the Challenge of Climate Change Flooding and Coastal Change and the Supporting Technical Guidance; and the Environment Agency Flood Risk Assessment (FRA) Guidance Note 3 for all development in Flood Zones 2 and 3 where standing advice does not apply.

The FRA is required to assess the risk to the site from all significant forms of flooding identified in Annex C of PPS25, including climate change considerations; and to demonstrate that the proposed development will be safe for its lifetime without increasing flood risk elsewhere and where possible will reduce the flood risk overall.

This report is based upon factual data for the site obtained from the sources described in the text, a site visit, preliminary discussions with the local authority and product 4 data obtained from the Environment Agency. The information obtained is not necessarily exhaustive and additional information may be available from other sources.

3 REFERENCE INFORMATION

Reference has been made to the following sources of information during the preparation of this report:

- National Planning Policy Framework - December 2023.
- Technical Guidance to the National Planning Policy - March 2012.
- The Environment Agency – Flood Map For Planning

**2633-FRA-1: Land to rear of Winfred Road, Erith
Scheuch Developments**

- The Defra- Magic Map
- L.B. of Bexley Strategic Flood Risk Assessment – November 2020
- L.B. of Bexley Preliminary Flood Risk Assessment Report - July 2011.

4 LOCATION

The site is situated towards the north of Erith in Southeast London. The site lies in a vacant plot of land between Winifred Road and Maximfeld Road.

5 SITE DESCRIPTION

The site is approximately rectangular shaped in plan.

The site is currently vacant and overgrown with vegetation.

An outbuilding and a concrete slab are present on the site with areas of soft landscaping.

6 GROUND CONDITIONS

6.1 Geology

Reference to the geological survey of Great Britain indicates that beneath made ground, the area generally is underlain by bedrock deposits comprising Sand described as Thanet Formation.

No superficial deposits are shown to underlie the site.

6.2 Hydrogeology

The Environment Agency maps show the site to be located over a Secondary A Aquifer in the Bedrock.

Secondary A Aquifers comprise permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

The Environment Agency maps show the site is not located near to or within a source protection zone.

6.3 Hydrology

The main water course of significance to the site would appear to be the River Thames which is approximately 160 metres to the northeast at the nearest point.

7 PROPOSED DEVELOPMENT

The proposed development comprises a single storey ground floor dwelling, soft landscaping, cycle, bin storage and parking area. Access to the residential property is via a common access driveway that links to Maximfeldt Road.

8 PLANNING POLICY

The National Planning Policy Framework (NPPF) promotes sustainable development and as a core principle encourages the effective use of land by reusing land that has been previously developed (brownfield land) provided that it is not of high environmental value. In addition, the following sets out advice from the NPPF that is of relevance to the proposed works.

- Section 5: Delivering a sufficient supply of homes advises that:

To support the Government's objective of significantly boosting the supply of homes, it is important that a sufficient amount and variety of land can come forward where it is needed, that the needs of groups with specific housing requirements are addressed and that land with permission is developed without unnecessary delay.

- Section 14: Meeting the challenge of climate change, flooding and coastal change advises that:

The application of the exception test should be informed by a strategic or site specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. For the exception test to be passed it should be demonstrated that:

- a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and*
- b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.*

When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

- a) 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;*
- b) the development is appropriately flood resistant and resilient;*
- c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*
- d) any residual risk can be safely managed; and*
- e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.*

9 SEQUENTIAL AND EXCEPTION TEST

9.1 Sequential Test

From reference to the Environment Agency Flood Maps, the proposed development lies within an area likely to be affected by a major flood from fluvial sources with up to a 1 in 100 (0.5%) chance of occurring each year and 1 in 200 year event of sea flooding. Therefore, in accordance with Table 1 of the technical guidance to the NPPF (TGNPPF), the site is defined as being in Flood Zone 3, which means it can be developed for water-compatible, less vulnerable, more vulnerable and essential infrastructure land uses as classified in Table 2 of the TGNPPF.

The proposed development will provide a dwelling house (residential accommodation) and therefore in accordance with Table 2 of the TGNPPF, would fall within the more vulnerable classification.

As shown by Table 3 of the TGNPPF, the vulnerability classification is compatible with Flood Zone 3a and an exception test is required.

9.2 Exception Test

In order for the proposed development to pass the exception test it must be demonstrated that:

- The proposed development provides wider sustainability benefits to the community that outweigh flood risk.
- The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and where possible will reduce flood risk overall.

The proposed development is in line with the core principle of the national planning policy and satisfies the detailed planning policies:

- **CS10.** Housing Need: It is the Council's aspiration to achieve 50% affordable housing as a proportion of all provision, over the plan period as a whole. Housing provision will include a mix of dwelling types, size and tenure to meet the needs of Bexley's current and future population.
- **CS04.** Erith geographic area: The vision for this region will be achieved by: a contributing to housing and employment growth by focusing growth in and around Erith town centre.

This FRA will satisfy the second part of the exception test by demonstrating that the proposed development will be safe from all sources of flooding and where possible will reduce flood risk overall.

10 STRATEGIC FLOOD RISK

10.1 L.B. Bexley Strategic Flood Risk Assessment

The L.B of Bexley SFRA (SFRA) was produced in 2020 in order to provide the information required to apply the sequential and exception tests and identify the level of detail required for a site-specific FRA. In addition, the SFRA informs on the extent and severity of flood risk from all sources to the area both at present and in the future.

This SFRA is a planning tool that enables the Council to identify sites for development away from vulnerable flood risk areas. The assessment focuses on the existing site allocations within the Borough but also sets out the procedure to be followed when identifying future sites for development. The SFRA will assist the Council to make the spatial planning decisions required to inform the Local Development Framework (LDF).

The site is located in area where the Environment Agency flood map indicates that there is a continual flood risk zone associated with the River Thames.

The SFRA describes the flood zones to the northeast of the sustainable growth area as being attributed by the Environment Agency as fluvial/tidal, which indicates that there is a flood risk to the north east of the area, associated with the tide. As with all other parts of the tidal floodplain in Bexley, this is a defended floodplain, indeed it is a continuation of the Crayford Marsh embayment. As such, the tidal flood risk in the Crayford sustainable growth area is classified as residual risk, as tidal flooding will only occur if the tidal defences fail or are overtopped.

11 LOCAL FLOOD RISK

11.1 Bexley Preliminary Flood Risk Assessment

The Bexley Council Preliminary Flood Risk Assessment (PFRA) was prepared by Halcrow Group Limited as part of the Drain London Project and was published in June 2011.

The PFRA is a high-level screening exercise to locate areas in which risk of local flooding is of significance and warrants further examination through the production of flood risk maps and flood risk management plans. Local flood risk is defined as the risk originating from surface water runoff, groundwater, ordinary watercourses and lakes and ponds, but not sewers unless the flooding is caused by rainwater affecting the system or flooding originating from the water

**2633-FRA-1: Land to rear of Winifred Road, Erith
Scheuch Developments**

supply system. The PRFA also informs the local risk management strategy and any updates to the strategic flood risk assessment.

Based upon the following definition of harmful consequences: ‘Memorable past floods or otherwise registered on a national scale (such as the summer 2007 event) even if only occurring over a relatively small area’, the PFRA has not identified any past floods that are considered to have had any significant harmful consequences. However, future flood risk is estimated to be high in the borough and based upon surface water modelling outputs 10,600 properties are at risk of flooding should a 1 in 200 year event occur, particularly in the locations where past flooding has occurred as no alleviation schemes have yet been undertaken.

The following table of the PFRA provides a summary of past flood incidents and shows two incidents that were considered sufficiently important to be distinguished from other flood events. Neither of the highlighted flood events took place in close proximity to the site.

Table 4.1 – Summary of Past Floods

Location	Source of flooding (? Indicates uncertainty)	Description: Source, Pathway and Receptor information and Interactions with Other Flooding Sources	Consequence
Thamesmead	Surface water Ground water?	The drainage system can't cope as the area is very flat. The river system is working fine. There is no major flooding from the rivers. The problem is mainly standing water. No flooding to properties. The perched water table is very high here - ground water interaction. Redirecting to the pumping station at the east of the catchment would be costly.	Mostly disruption to transport routes rather than property damage.
Belvedere, north of rail track	Surface water Sewers?	Conveyance route of water is too flat. Re-grading would allow for water to be drained towards a common direction to be pumped out to Thames. This area has environmental issues in that it is a habitat/is an optimum habitat for water voles. Legal requirement to protect such sites so agreement for work would be a lengthy process.	Transport and properties affected/potentially affected.
Side of hill near Belvedere Woods	Surface water	This area delivers water to the system downhill in Thamesmead. There is high velocity flow coming down the escarpment. An integrated study into Marsh Dykes and the sewer system serving this catchment has been undertaken, and this can be used to identify possible solutions.	Transport and properties affected/potentially affected.
Riverdale Rd, Church Rd, Pembroke Rd, Battle Rd	Surface water (Bedon Stream)	Basement flooding occurring in this area.	Transport and properties affected/potentially affected.
Fraser Rd	Surface water	Industrial estate with a possible pumping station - evidence for this location is anecdotal. High frequency flooding in this area. Land is a natural dip.	Commercial/industrial properties affected
Danson Park (north of)	Surface water	Very flat area - Dumbwells. (Soakaways in poor soakage soils) Problem compounded by paving over of front gardens, lack of surface water sewers or where sewers exist, possible lack of capacity. Main impacts on transport. Some property flooding including internal.	Main impacts on transport. Some property flooding including internal.

Location	Source of flooding (? Indicates uncertainty)	Description: Source, Pathway and Receptor information and Interactions with Other Flooding Sources	Consequence
Heversham Rd/Swanbridge Rd	Surface water	Steep road (Swanbridge) leading to natural trough, however flooding has been experienced at the top end of the catchment as well (Heversham and surrounding area) so scope for offline storage soakage complicated and or expensive as valley to the East was filled in - contaminated land. TWUL are looking at options for increasing capacity in sewers whilst Bexley as Highway Authority are looking at SUDS options to reduce demand. TWUL developing modelling already completed by both Bexley and TWUL.	Properties, School and transport affected
Penn Lane, A2 East Rochester Way, Pengarth Rd	Surface water and overland flow	Penn Lane has deep flooding. Culvert under the road shown in SFRA modelling. Drain London modelling assumes culvert is at capacity. Culvert closed so no entry for overland flows, which then can neither drain into the culvert nor pass under the A2 embankment. Flooding is predicted by modelling. Recorded flooding occurs downstream in Venture Close area.	
Crayford	Surface water (fluvial)	Photos available for this site. Flooding is both SW and fluvial, joint solutions are needed.	Private domestic and commercial property affected/potentially affected. Also disruption to transport.
Hazel Drive	Surface water	System is backing up. There is a later model of this area (Jacobs) showing the Darent and Crayford Marsh system	Mostly domestic properties at risk.
Darent Industrial Estate, Ray Lamb Way	Surface water	Previous flooding on the marsh. Planners have now confirmed that the estate has lawful consents. Environment Agency holds further details of plans to reduce flooding in the area as part of the development proposals.	Commercial/industrial properties affected
Bexley Village	Surface water	Previous flooding in Bexley Village in high intensity rain storms.	Domestic and commercial properties at risk as well as transport/transport links
High Street, Bexley Station	Surface water	High level car park causes a dam to flood waters coming from back gardens of properties. High run off.	Domestic and commercial properties at risk as well as transport/transport links
Apperfield Rd/Reddy Road	Surface water	Floods 3-4 times a year. The SW sewer is not taking the drainage. Frequent problems in this area.	Mainly private domestic properties affected. Roads impassable.

Location	Source of flooding (? Indicates uncertainty)	Description: Source, Pathway and Receptor information and Interactions with Other Flooding Sources	Consequence
Welling/Bexley Heath line		Flooding along embankment	
Halfway Street/ Woodlands Ave, Sidcup			Private domestic properties and transport affected
Wickham Street Welling	Surface water/ Sewers?	Seems to be a problem during heavy rain. Highway drainage normally copes. Surface water or Sewers or combination.	Private domestic properties and transport affected

Maps contained within appendix D indicate that the site does not lie in area affect by surface water or fluvial flooding. The site is in an area where between 6 and 10 sewer flood events have occurred.

11.2 Environment Agency Information

Environment Agency Interactive mapping

The interactive mapping available from the Environment Agency provides the following information:

The southwestern half of site lies within an area at risk from tidal flooding that has 0.5% (1 in 200), or greater chance of occurring each year, or from fluvial flooding that has a 1.0% (1 in 100), or greater chance of occurring each year and is therefore in an area designated as Flood Zone 3. It also benefits from flood defences.

The Environment Agency categorise the probability or likelihood of flooding as very low if the chance of flooding is less than 1 in 1000 (0.1%) in any given year.

The surface water mapping shows that the site itself is not at risk from surface water flooding.

The Interactive mapping also indicates that the site is not at risk from reservoir flooding.

Product 4 Data

The data provides the following information:

- The flood map that shows the northeastern half of the site within the outline of flood zone 3. The southwestern half of the site is not located within a flood zone. Flood zone 3 represents land assessed as having between a 0.5% (1 in 200), or greater probability of tidal flooding. The site lies in an area benefiting from flood defences but the flood map ignores the effect of these on the basis that they cannot completely remove the risk of flooding as they may be overtopped or breached.
- Model output data from the Thames Estuary 2100 study 2008 levels, which provides in-channel flood levels for the tidal river Thames. The closest modelled node to the site is 3.12. Flood defences in this area are built to a minimum level of 7.00m.
- Table 1 shows that in the defended situation for a 0.5% AEP no flooding will occur at node points 3 through 10. At Node point 1 and 2 flooding will occur to a level of 5.00m AODN. This approximately 1m above ground level on site.
- For a 0.1 % AEP no flooding will occur at node points 4 through 10. At node points 1, 2 and 3 flooding will occur to a level of 5.28mAODN.
- For a defended situation in the year 2115 with allowance for climate change for a 0.5% AEP event no flooding will occur at Node points 8,9 and 10. Flooding will occur at all other Node points to depths ranging between 5.46m AODN at Node point 7, 5.56m at Node points 5 and 6, and 5.57m AODN at Node points 1, 2 and 3.
- For a defended situation in the year 2115 with climate change allowance for a 0.1% AEP no flooding will occur at Node points 9 and 10. Flooding will occur at all other Node points to depths ranging between 5.73m AODN at Node point 8, 5.77m at Node point 5 and 5.78m AODN at Node points 1,2,3,4,6 and 7.
- Historic flood data which advises that the Environment Agency have a record of flooding from the January 1953 flood event. This flood event did not affect the site or any of the nearby surrounding area. The site is located approximately 850m southeast of the outline of the 1953 flood.

Environment Agency Information is contained in Appendix F.

11.3 Planned Works

Any planned or ongoing maintenance or upgrade works can be viewed at the one.network website.

No relevant planned or current works are shown.

Planned flood alleviation and river engineering works can be checked at Flood List .com <https://floodlist.com/protection/uk-floods-list-flood-defence-projects-announced>

No flood alleviation or river projects are planned in the vicinity of the site. A map of planned projects is included in F.

12 FLOOD SOURCES

Annex C of PPS25 identifies significant forms of flooding that should be considered by a flood risk assessment and these are addressed hereunder.

12.1 Rivers

Flooding from river (fluvial) sources occurs when the volume of water flow exceeds the capacity of the river channel. Most rivers have a flood plain, which is a natural area that water will occupy in the event of a flood. Flooding in these areas can occur very rapidly where there are steep gradients, or very gradually in large relatively flat areas. The local land use and forms of development together with topography are the main influences on the velocity and volume of water and the direction of flow in the event of a flood. The 1 in 100 year flood event is normally taken into consideration with respect to fluvial flooding.

The EA interactive mapping indicates that site has a medium risk of flooding from rivers or the sea.

12.2 Seas

Flooding to low-lying land from the sea and tidal estuaries is caused by storm surges and high tides. The severity of tidal flooding is dependent upon several factors including tide heights, weather systems, wind and wave conditions and the effectiveness of defence systems. Tidal defences can be overtopped or breached during severe weather conditions and deep fast flowing flood waters can occur with very little warning, because of this the 1 in 200 year flood event is considered in respect of tidal flooding.

12.3 Surface Water

Flooding from surface water generally occurs when rainwater is unable to soak into the ground or enter into the drainage system and therefore runs off the land in an uncontrolled manner. This run off occurs mainly during periods of intense rainfall and is often the cause of localised flooding.

The SFRA shows the results of modelling undertaken to provide an indication of surface water flooding should a 0.1% AEP event occur and also when climate change is taken into consideration.

The Environment Agency mapping indicates the site has a very low chance of flooding from surface water.

No flood depths are shown for flooding from surface water on site in the EA interactive mapping.

No flooding is shown on site for surface water flood extents for a 3.33%, 1.0% or 0.1% AEP event in the SFRA (Figure A10).

The available information generally confirms that the site is at very low risk should the 1 in 1000 year event occur and indicates that there is no increased risk when climate change is taken into consideration.

12.4 Groundwater

Flooding from groundwater occurs when water levels in the ground rise above the surface. This occurs most commonly in low-lying areas, which are underlain by permeable rocks (aquifer). These can be extensive regional aquifers such as chalk or sandstone, or sands and gravels such as occur in valley bottoms and underlain by less permeable rock.

Given the superficial geology of the area around the site, together with the potential for groundwater to interact with the ground surface there is considered to be some potential for groundwater flooding to occur in extreme circumstances.

12.5 Sewers

Rainwater generally drains into the local sewer system and flooding can occur in extreme events, such as periods of intense or prolonged rainfall, if the volume of run off due to insufficient capacity overwhelms the system, or if the sewer is blocked.

The PFRA has identified that there has been between 6 and 10 sewer flooding incidents in the DA8 1 postcode area.

12.6 Reservoirs, Canals and other Artificial Sources

Flooding from artificial sources such as reservoirs and canals is generally a risk when the artificial source retains water above ground level and can occur if there is a breach or failure of the retaining structure. Artificial sources can also include mining, quarrying and mineral extraction as well as some industrial processes and flooding is often the result of operational difficulties such as pump failure.

The Environment Agency interactive mapping shows that the site is not at risk from reservoir flooding.

13 RISK ASSESSMENT

A risk matrix is used to combine the assessment of probability and consequence into an indicative risk level for each of the identified flood sources. The definitions for qualitative flooding probability and consequence used in the DTSFRA have been adopted for this FRA and these definitions are presented below.

13.1 Category Definitions

Qualitative Probability	Definition
Likely	Events of common occurrence that an individual may experience a few times in their lifetime. This corresponds approximately to an annual probability of 10% - 4% (i.e. return periods of between 10 and 25 years)
Infrequent	Events that an individual may experience once in a lifetime, approximately equivalent to the 1% annual probability event (i.e. return period of 1 in 100 years)
Possible	Events that may be seen once in every few lifetimes. These correspond to approximately a 0.1% annual probability (1 in 1000 year event). This category may also include the combination of an infrequent event (1% annual probability) in combination with a failure of flood defences designed to protect against such an event.
Remote	Events that are of a low order of likelihood (approximately 0.1% annual probability), but combined with a failure of flood defences designed to protect against such an event.
Very remote	Extreme flood events with an annual probability of less than 0.1%.

Qualitative Consequence	Definition
High	Serious damage to property and high risk of injury and loss of life. High depths of floodwater (>1m) and high flood flow velocities.
Medium	Moderate damage to property, moderate flood depths (<1m) and flow velocities. Some risk of injury.
Low	Minor damage to property, low depths of floodwater (<0.5m) and low flow velocities. Minor risk of injury.
Negligible	No damage to property or risk of injury.

13.2 Risk Matrix

Consequence	Probability				
	Likely	Infrequent	Possible	Remote	Very remote
High	Very High	Very High	High	High	High
Medium	High	High	Medium	Medium	Medium
Low	Medium	Medium	Low	Low	Negligible
Negligible	Low	Negligible	Negligible	Negligible	Negligible

13.3 Risk Assessment

Based upon the qualitative probability and consequence definitions, the risk assessment provides the site with a level of risk determined by the risk matrix, for each of the identified flood sources.

Flood Source	Probability	Consequence	Risk level
Rivers	Very remote	Low	Negligible
Seas	Very remote	Low	Negligible
Land (surface water)	Very remote	Low	Negligible
Sewers	Very remote	Low	Negligible
Groundwater	Remote	Low	Low
Reservoirs, Canals and other artificial sources	Very remote	Low	Negligible

14 MITIGATION AND MANAGEMENT PROPOSALS

14.1 Principles

It is important that new developments, particularly in the higher flood risk zones, are proofed against future uncertainty for their lifespan, which is assumed to be 75 years for commercial and industrial developments and 100 years for residential developments. Therefore it is advised that proposed flood mitigation measures associated with developments are reviewed at the detailed FRA stage, paying attention to the potential implications of future changes in climate and land use. The impact of climate change on drainage networks should also be

considered as existing drainage systems and flood barriers will not provide the same level of protection in years to come as now. The application of the precautionary principle and the provision of freeboard and flood resistance and resilience in buildings at design stage can mitigate the impact of future increases in flood risk at relatively low cost at the construction stage.

The risk assessment has identified a negligible risk of flooding from all flood risk sources.

14.2 Building Layout

The proposed development consists of a single storey dwelling.

The SFRA recommends the following considerations for building design within the borough;

- Using 'less vulnerable' land use types, and residential uses that are not bedrooms, or living spaces that can become bedrooms, or bedrooms partitioned from communal living spaces, such as open plan living/kitchen/dining spaces, below the predicted peak flood water level;
- Providing safe escape from all units in the event of a flood. Where possible safe escape should be achieved, alternatively, it might be considered acceptable for escape routes to be exposed to a 'caution' flood hazard rating (less than 0.75 during the 1 in 100 year plus climate change event).
- Applying flood resilient and resistant design (see Section 6 of the Level 1 SFRA);

14.3 Resilient and resistant construction

In order to provide mitigation against floodwater damage in any event, it is recommended that where appropriate, the following design initiatives be incorporated into the new building works:

- Water resilient material in structural elements;
- Cracks and joints to be sealed with a suitable material;
- Floor surfaces to have tiled finish;
- Electrical appliances and fittings, service panels, boilers and supplies should be installed at high level;
- Plastic, metal and other easily replaceable alternatives to chipboard or MDF;
- Lime plaster or cement render rather than gypsum plaster;
- Installation of positive pumped devices to foul and surface water drain systems
- Inclusion of emergency Sump and Pump equipment.

Retrofitting properties in this way after flooding is common practice. These measures are not necessarily more expensive than conventional techniques, but will significantly reduce the damage, cost and time to repair should a property be flooded. Reference should be made to BS 85500:2015 Flood resistant and resilient construction, this guide to improving the flood performance of buildings sets out guidance for improving the flood performance, resistance and resilience of buildings.

14.4 Protection from Flooding

The risk assessment has identified that the site could be affected by flooding from groundwater.

To prevent ingress of groundwater should water table levels increase directly beneath the site, the floors of all new buildings should be made of solid construction materials or the ground beneath suspended floors should be sealed.

The Environment Agency Product 4 data shows that in the event of a breach of the river Thames the maximum height AODN of water on site would be 5.78m with an allowance for climate change. The estimated level of the site is 4.2mAOD based on the kerb height of 4.1mAOD on West Street approximately 25m northeast.

There is a residual risk, however the site is located on the extreme edge of the calculated extent of the breach inundation event. With reference to nodes 9 and 10, which cover the southwestern two thirds of the site, a nil return is shown. It would therefore seem reasonable to assume that the return values given for node 5 and 7 which are located within the building outline are unreasonably high. However, taking a precautionary approach it is recommended that the floor levels are raised by 450mm above existing ground level, and the doors located on the northeast end of the property are watertight.

14.5 Maintenance Regime

A robust maintenance regime should be instigated to support any mitigation and management proposals. The regime should include routine servicing and inspection.

The regime should include routine servicing and inspection and responsibility for maintenance and emergency repairs should be clearly identified and contact details included in the emergency plan.

14.6 Drainage

Although the form of development proposed will increase the number of washing and WC facilities from the previous usage, the maximum discharge from the building will still be less than 1l/sec which is still a negligible flow and therefore it is considered unlikely that the new flow will have any adverse impact on the existing sewer network. However, it is recommended that Thames Water are contacted at the earliest opportunity to discuss the matter.

14.7 Flood Warning

The risk from all forms and sources of flooding has been assessed as low or negligible and therefore it is not considered necessary for the development to have a flood warning system or an emergency plan. However, consideration could be given to developing a simple emergency plan.

14.8 Emergency Plan

It is recommended that an Emergency Plan is prepared for the development, which takes cognisance of existing local flood incident management strategies and compliment any major incident plans already in place.

The Emergency Plan should be available to all occupants of the site with information displayed in communal areas. It should include the following information and generally accord with the Environment Agency Flood Plan Advice and the Flood warning and Evacuation Plan Requirements in the RBG Developers Guide for Flood Risk.

- Roles and responsibilities of organisations involved in local flood risk management
- Detail of flood sources and expected flood water depths and hazard rating
- Flood risk management measures
- Evacuation Routes
- Contact details
- Individual flood plan pro-forma

14.9 Emergency Access and Escape

This report has not identified any significant sources of flooding.

The potential depth of groundwater is not quantified by any of the reference sources. However, both of these forms of flooding are the result of surface water run- off and infiltration and

therefore the surface water Environment Agency mapping is considered to be a worst case scenario.

The Environment Agency mapping indicates the site has a very low chance of flooding from surface water with no flood extents or depths shown on site.

Any flood risk on site is considered to be localised and therefore there is considered to be a safe means of escape. It is not anticipated that emergency access and escape routes will be significantly restricted and the raised floor level within the property will allow exit from the property.

In case of flooding due to a breach in the River Thames defences, there are areas in the southwest part of the site that are unaffected by any source of flooding. This area will provide safe haven until emergency services arrive.

14.10 Climate Change

In order to ensure the safest possible outcome a worst-case scenario has been considered throughout this report using the 2115 figures adjusted for climate change.

Based on the available information the proposed mitigation and management proposals are considered sufficient to address climate change for the likely lifespan of the development.

15 RESIDUAL RISK

Residual risk is the risk remaining after implementation of all risk management and mitigation measures. It can arise due to the failure of flood management infrastructure, such as breach, or blockage; or severe flood events that exceed the design standard of flood defences, such as overtopping.

According to the SFRA the site is in tidal Flood Zone 3, this is described as a defended flood plain as such the SFRA states that this should be considered residual; risk as tidal flooding will only occur if the tidal defences are overtopped or fail. The site is defended from all tidal risk and is at low residual risk.

There is a residual risk, however the site is located on the extreme edge of the calculated extent of the breach inundation event. With reference to nodes 9 and 10, which cover the southwestern two thirds of the site, a nil return is shown. It would therefore seem reasonable to assume that

the return values given for node 5 and 7 which are located within the building outline are unreasonably high. However, taking a precautionary approach it is recommended that the floor levels are raised by 450mm above existing ground level and the doors located on the northeast end of the property are watertight.

Provided that the appropriate mitigation and management proposals recommended in Section 14.0 have been incorporated into the design there is not considered to be any significant residual risk.

16 FLOODPLAIN AND FLOW ROUTES

16.1 Floodplain

Floodplain is the area that would naturally be affected by flooding if a river rises above its banks, or high tides and stormy seas cause flooding in coastal areas.

The SFRA advises that The London Borough of Bexley is defended against tidal flooding from, however the risk from river flooding from the River Cray in an extreme flood event.

The proposed development does not increase the size of the existing building footprint and therefore there is no loss of flood plain storage.

16.2 Flow Routes

In extreme flood events flood flow routes can form on roads, pathways and in passages between buildings.

The proposed development will include the construction of a new dwelling building, however it is not considered that any existing flow route will be adversely affected.

17 CONCLUSIONS

The east part of the site lies just within an area at risk from river flooding that has a 1.0% (1 in 100), or greater chance of occurring each year and is therefore in an area designated as Flood Zone 3, while the west end is shown to have less than 0.1% (1 in 1000) chance of flooding in

any year from rivers. The site benefits from flood defences however the residual risk from a breach in the defences remains.

The risk assessment has determined that there is a negligible level of flood risk to the site from groundwater, rivers and artificial sources. The other significant sources; seas, surface water and sewers present a negligible level of risk.

The Environment Agency Product 4 & 8 shows the site to be in an area at residual risk of flooding, due to a breach of the River Thames defences, to a depth of 5.78mAODN in the northeastern third of the site.

The site is located on the extreme edge of the calculated extent of the breach inundation event. With reference to nodes 9 and 10, which cover the southwestern two thirds of the site, a nil return is shown. It would therefore seem reasonable to assume that the return values given for node 5 and 7 which are located within the building outline are unreasonably high.

As a precautionary measure, it is recommended that floor levels are raised by 450mm above existing ground level, and the doors located on the northeast end of the property are watertight.

In case of flooding due to a breach in the River Thames defences, there are areas in the southwest part of the site that are unaffected by any source of flooding. This area will provide safe haven until emergency services arrive.

The use of appropriate water resilient and resistant construction will protect the development in the event of flooding.

Therefore, the proposed development will satisfy the requirements of the National Planning Policy Framework and is considered suitable for the proposed residential use.

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Appendix A – Site Location Plan



Promap
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Plotted Scale - 1:500. Paper Size - A4
 0 5 10 15 30M
 SCALE = 1:500

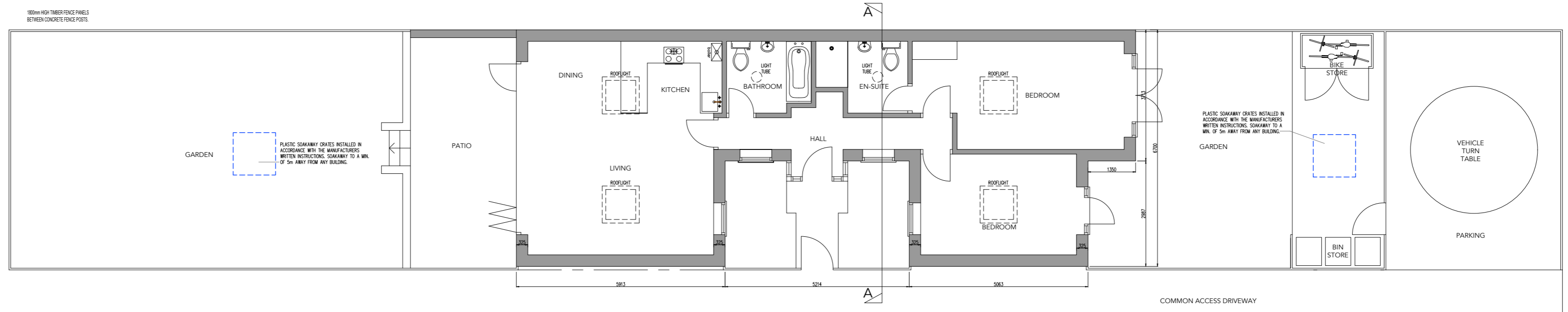
SITE LOCATION PLAN
 LAND BETWEEN MAXIMFELDT ROAD
 & WINIFRED ROAD, ERITH D.A.S.

SK/01



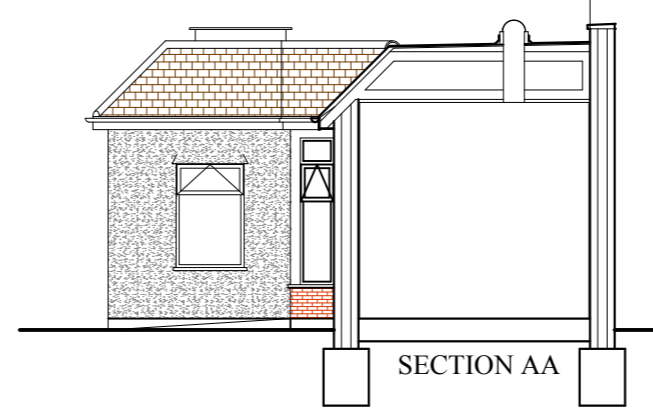
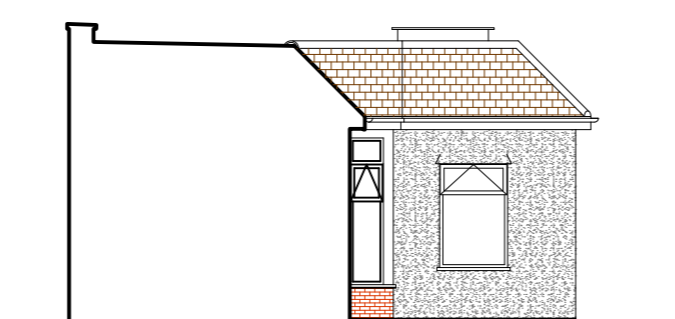
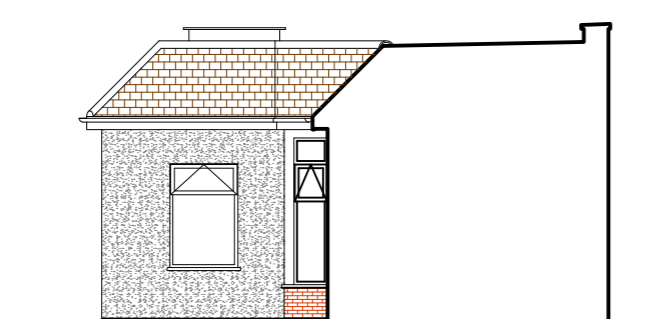
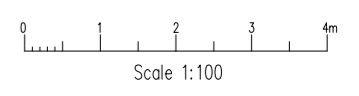
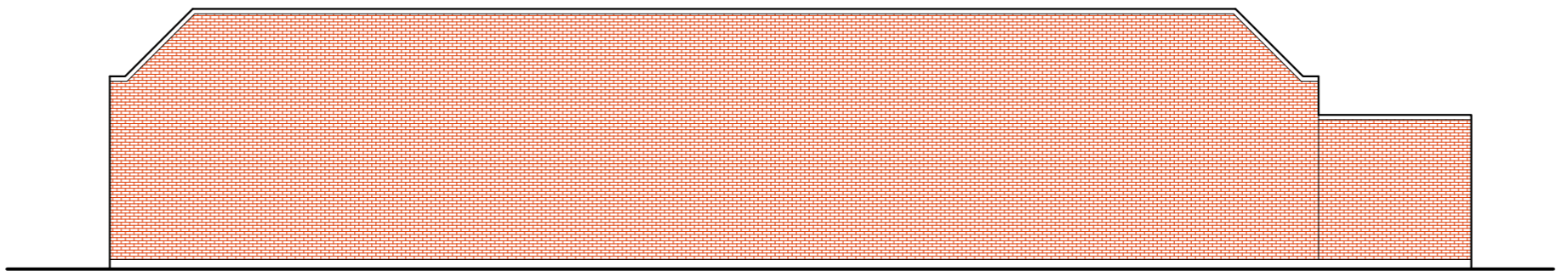
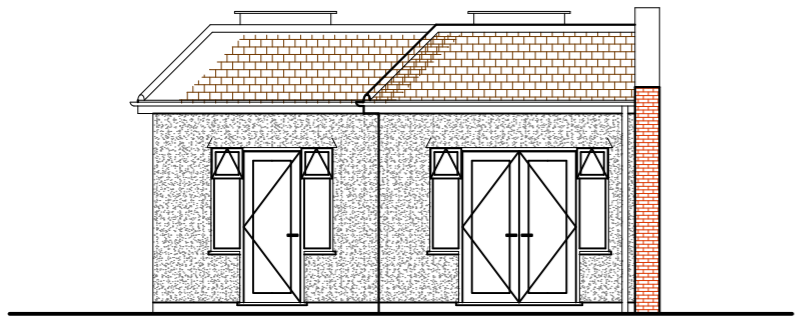
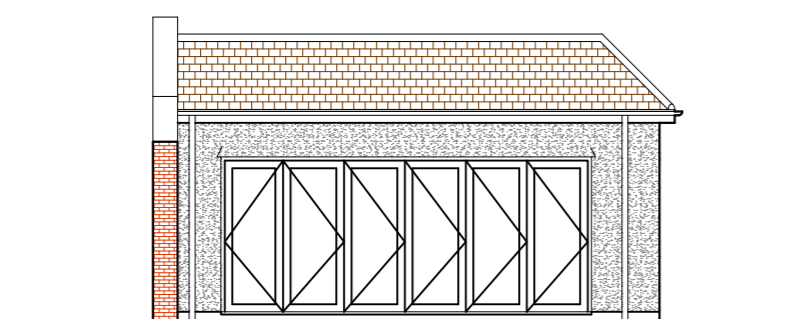
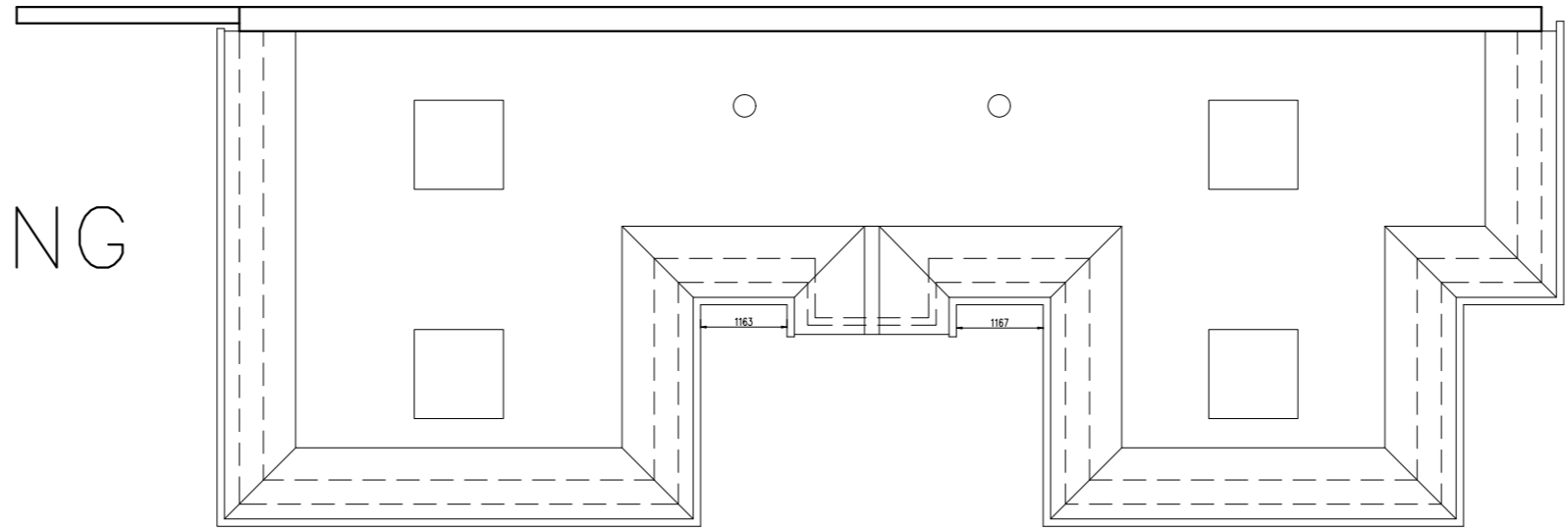
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Appendix B – Proposed Plan



PROPOSED GROUND FLOOR PLAN
83m²

PRELIMINARY DRAWING



PRACTICE NAME JAMES DOLAN ARCHITECT		
TEL: 07505 996340 Email: jamesdolan57@cloud.com		
PROJECT MAXIMFELDT ROAD		
TITLE NEW DETACHED SINGLE STOREY DWELLING ON SITE BETWEEN MAXIMFELDT ROAD AND		
PROPOSED PLANS, ELEVATIONS & SECTION		
SCALE 1:100	DATE SEPT 2023	DRAWN BY: JD
DWG No. MR/2023/01		REVISION



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Appendix C – Sequential and Exceptional Test

PPS 25 states that when applying the Sequential Test for individual planning applications the following should be considered:

- 4.20 Planning applications should be determined in accordance with development plan policies. Where plans and policies have been sequentially tested using evidence from SFRA's the application should be relatively straight forward. The site-specific FRA will show how the proposal meets the requirements of PPS25 and the plan policies.
- 4.21 Where applications are brought forward on sites not allocated in the plan, LPAs should consider the flood risk implications of the proposal, including applying the Sequential Test.
- 4.22 Where a site has not yet been sequentially tested in the LDD, the Sequential Test will need to be applied at the individual site level. In these cases the developer will need to provide evidence to the LPA that there are no other reasonably available sites where the development could be located. The LPA applies the Sequential Test to the application. If the proposed development is needed for wider sustainable development reasons in flood risk areas it must then satisfy the three criteria of the Exception Test, set out in PPS25 (annex D, paragraph D9), to ensure that the development would be safe for its occupants, and would not increase flood risk.
- 4.23 Another instance when the Sequential Test will need to be applied to individual planning applications is where the use of the site being proposed is not in accordance with LDD allocations and policies. For example, if housing is proposed on a site allocated for less vulnerable industrial uses.
- 4.24 It is the responsibility of the developer to assemble the evidence for their application to allow the LPA's planning officer to carry out the Sequential Test. This is likely to include evidence:
- on the flood risk to the site. (The starting point for this will be the Environment Agency's Flood Map. It should be borne in mind that this map does not cover all sources of flooding such as surface water flooding or groundwater flooding. If a SFRA has been produced this should build on the Environment Agency Flood Map and include flooding from all sources. Site-specific FRAs may also be available from previous applications made);
 - on the availability of 'reasonably available' (suitable developable and deliverable) sites in the relevant area with a lower flood risk that could be used for the development;
 - the vulnerability classification of the development, bearing in mind that a mixed use development could contain various vulnerabilities (table D.2. of PPS25);

- if it is likely that the Exception Test will need to be applied, evidence to show that wider sustainability benefits to the community outweighs the flood risk; and
- that the development is safe and residual flood risk can be overcome to the satisfaction of the Environment Agency and other stakeholders.

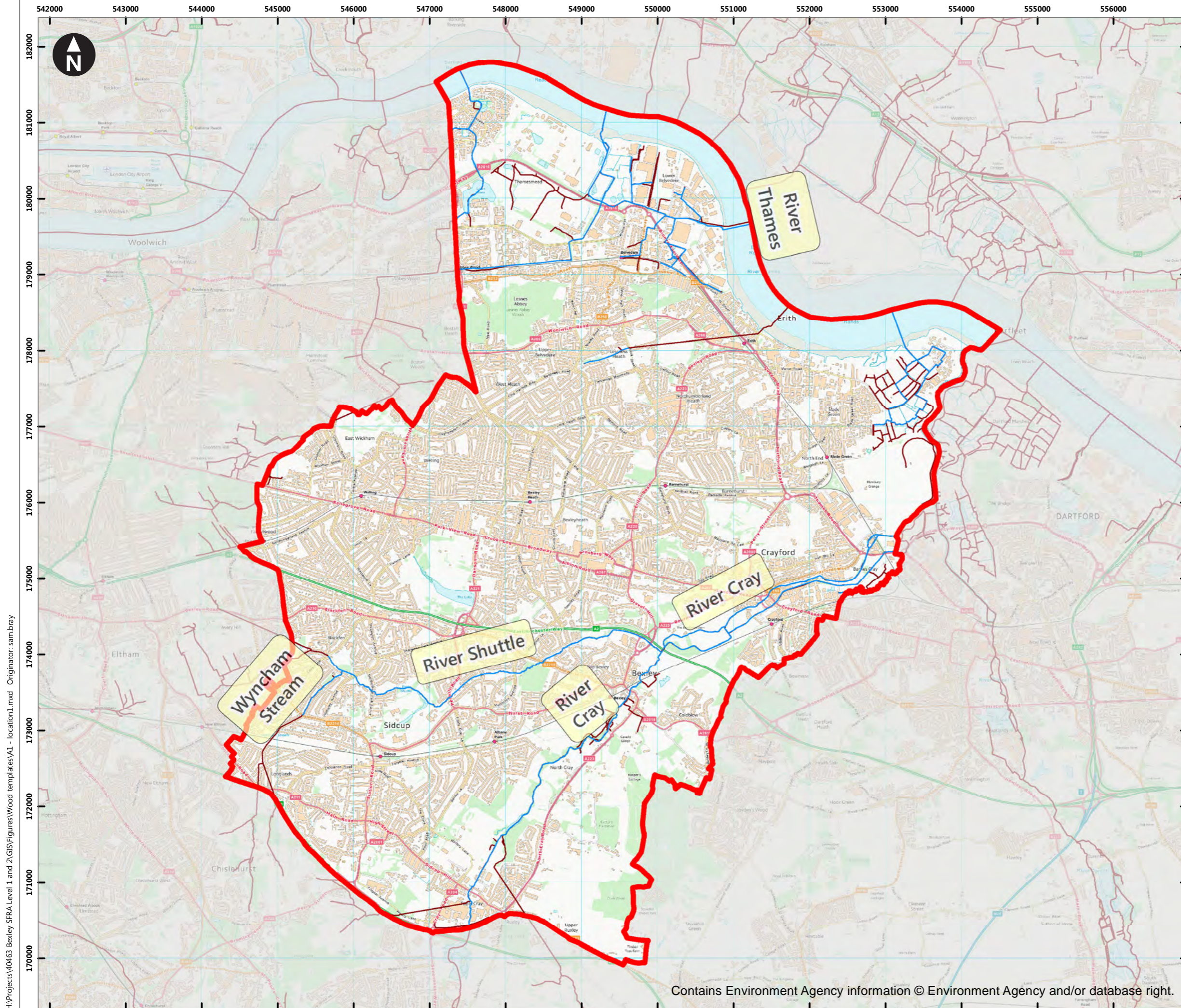
PLANNING POLICY STATEMENT 25 PRACTICE GUIDE | The Sequential and Exception Tests 75

- 4.25 Developers seeking to develop in flood risk areas should undertake pre-application discussions with the LPA, Environment Agency and other relevant stakeholders to scope out the availability of other sites that would meet the functional requirements of the application, and what evidence will be needed to show that consideration has been given to alternative locations in lower risk areas, so that the LPA can apply the Sequential Test.
- 4.26 The Sequential Test will show whether there are any reasonably available sites for the type and scale of proposed development in a lower flood risk zone or at a lower flood risk than the application site.
- 4.27 'Reasonably available' alternative sites can be identified from evidence based documents which feed into the development of the LDDs e.g. Strategic Housing Land Availability Assessments required by PPS3.
- 4.28 As the process of RFRAs/SFRAs is completed and LDDs are reviewed applying the Sequential Test, the need to apply the Sequential Test at the planning application level will reduce. However, there will still be instances where the Sequential Test will need to be applied at the planning application stage e.g. where windfall sites are not in accordance with LDD plans and policies.
- 4.29 The EA and stakeholders will work together on the application of the Sequential Test.



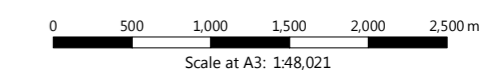
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Appendix D – Extracts from Strategic Flood Risk Assessment



Key

- London Borough of Bexley Boundary
- Main Rivers
- Ordinary Watercourses



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London Borough of Bexley
Level 1 SFRA

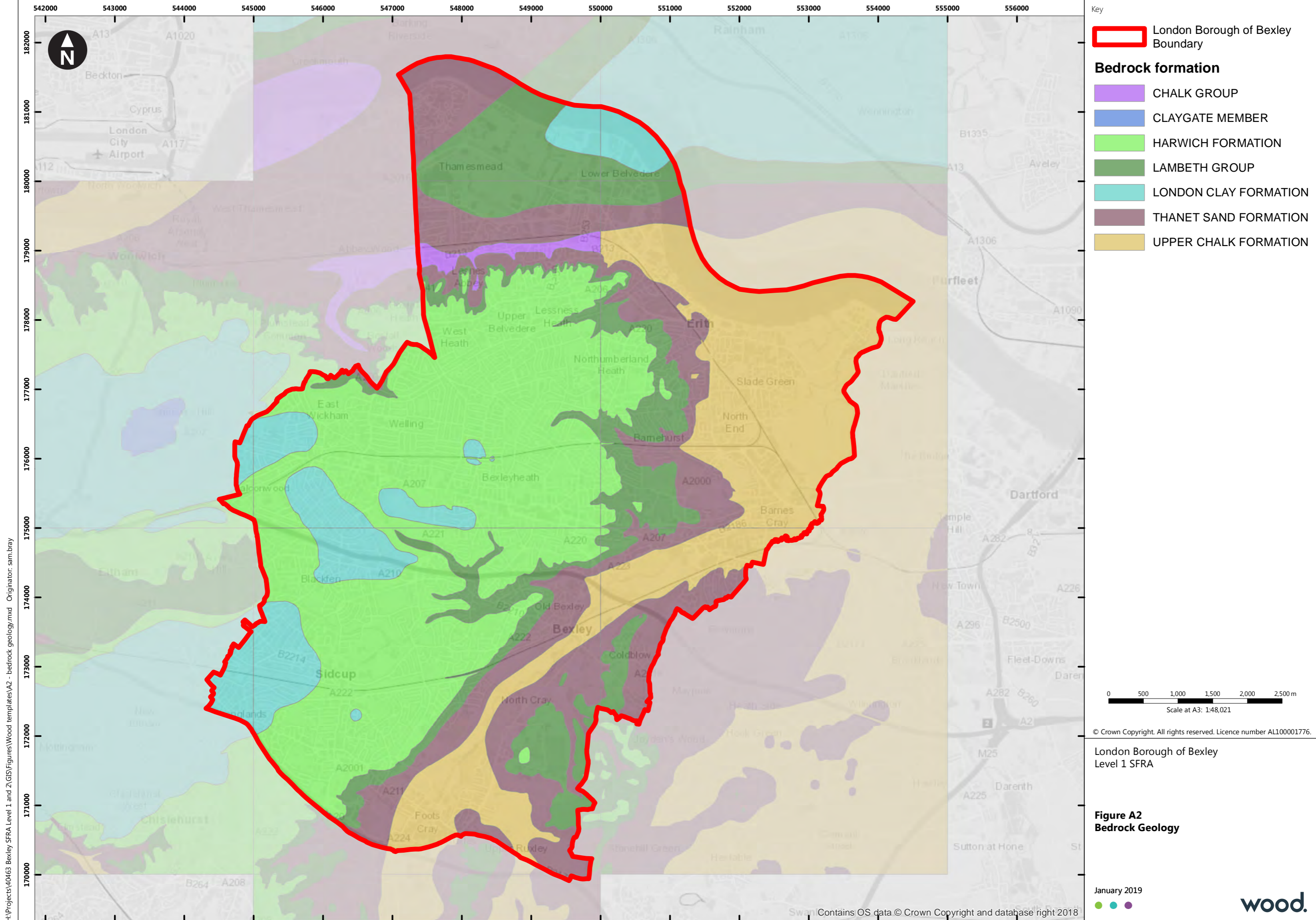
Figure A1
London Borough of Bexley Boundary and Main Rivers

January 2019



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Key

- London Borough of Bexley Boundary

Bedrock formation

- CHALK GROUP
- CLAYGATE MEMBER
- HARWICH FORMATION
- LAMBETH GROUP
- LONDON CLAY FORMATION
- THANET SAND FORMATION
- UPPER CHALK FORMATION

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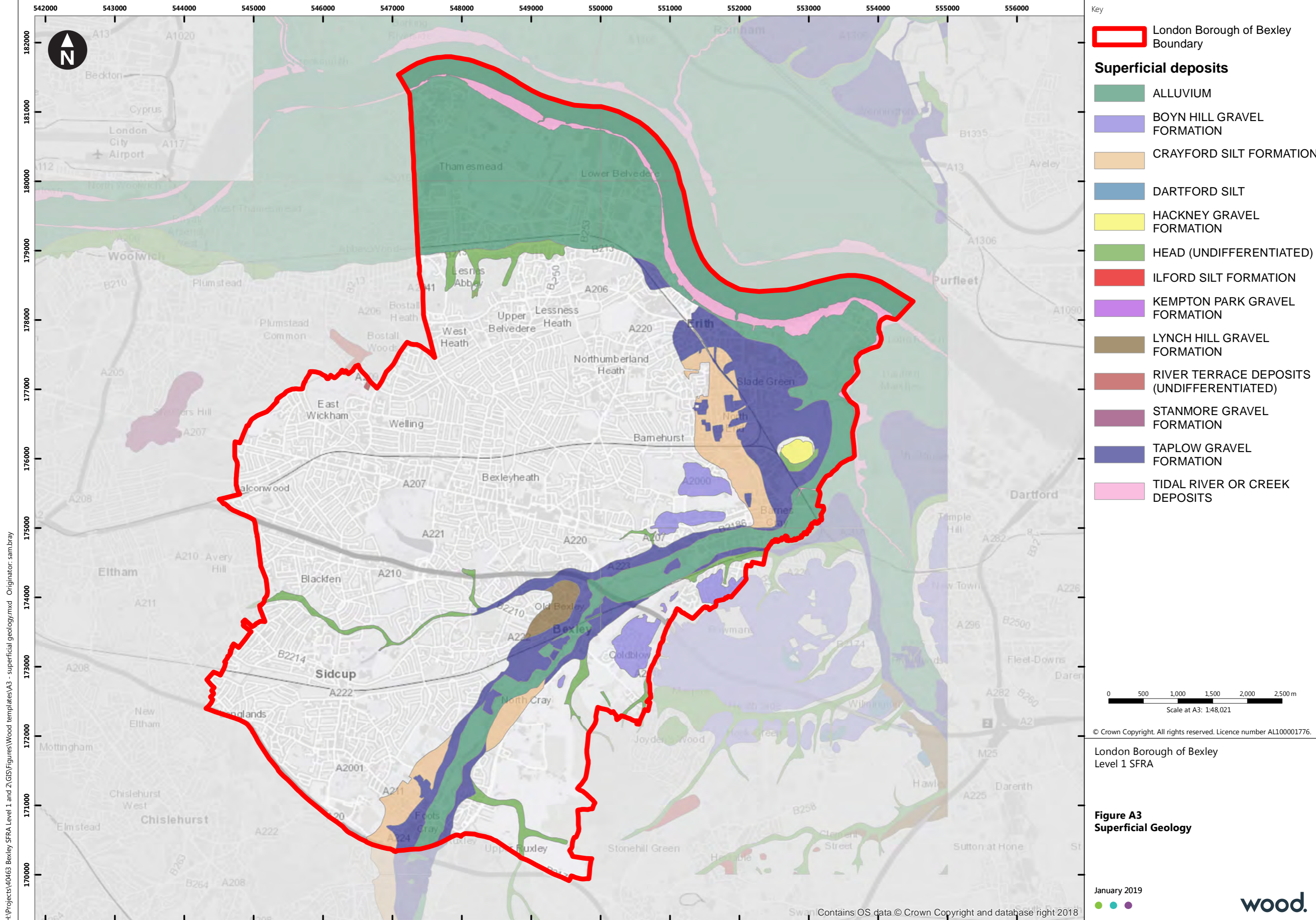
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London Borough of Bexley
Level 1 SFRA

Figure A2
Bedrock Geology

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- Key
- London Borough of Bexley Boundary
- Superficial deposits**
- ALLUVIUM
 - BOYN HILL GRAVEL FORMATION
 - CRAYFORD SILT FORMATION
 - DARTFORD SILT
 - HACKNEY GRAVEL FORMATION
 - HEAD (UNDIFFERENTIATED)
 - ILFORD SILT FORMATION
 - KEMPTON PARK GRAVEL FORMATION
 - LYNCH HILL GRAVEL FORMATION
 - RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)
 - STANMORE GRAVEL FORMATION
 - TAPLOW GRAVEL FORMATION
 - TIDAL RIVER OR CREEK DEPOSITS

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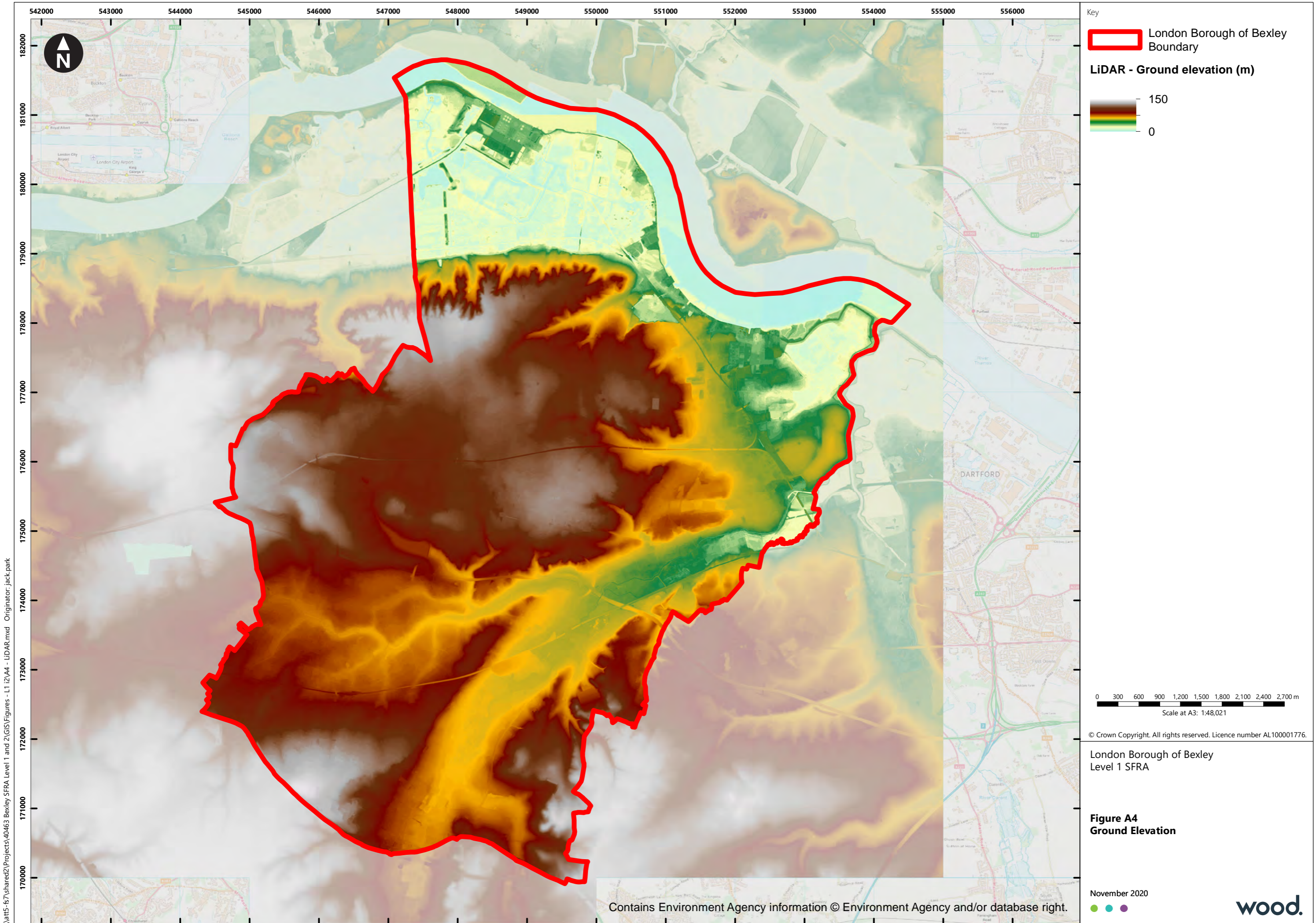
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London Borough of Bexley
Level 1 SFRA

Figure A3
Superficial Geology

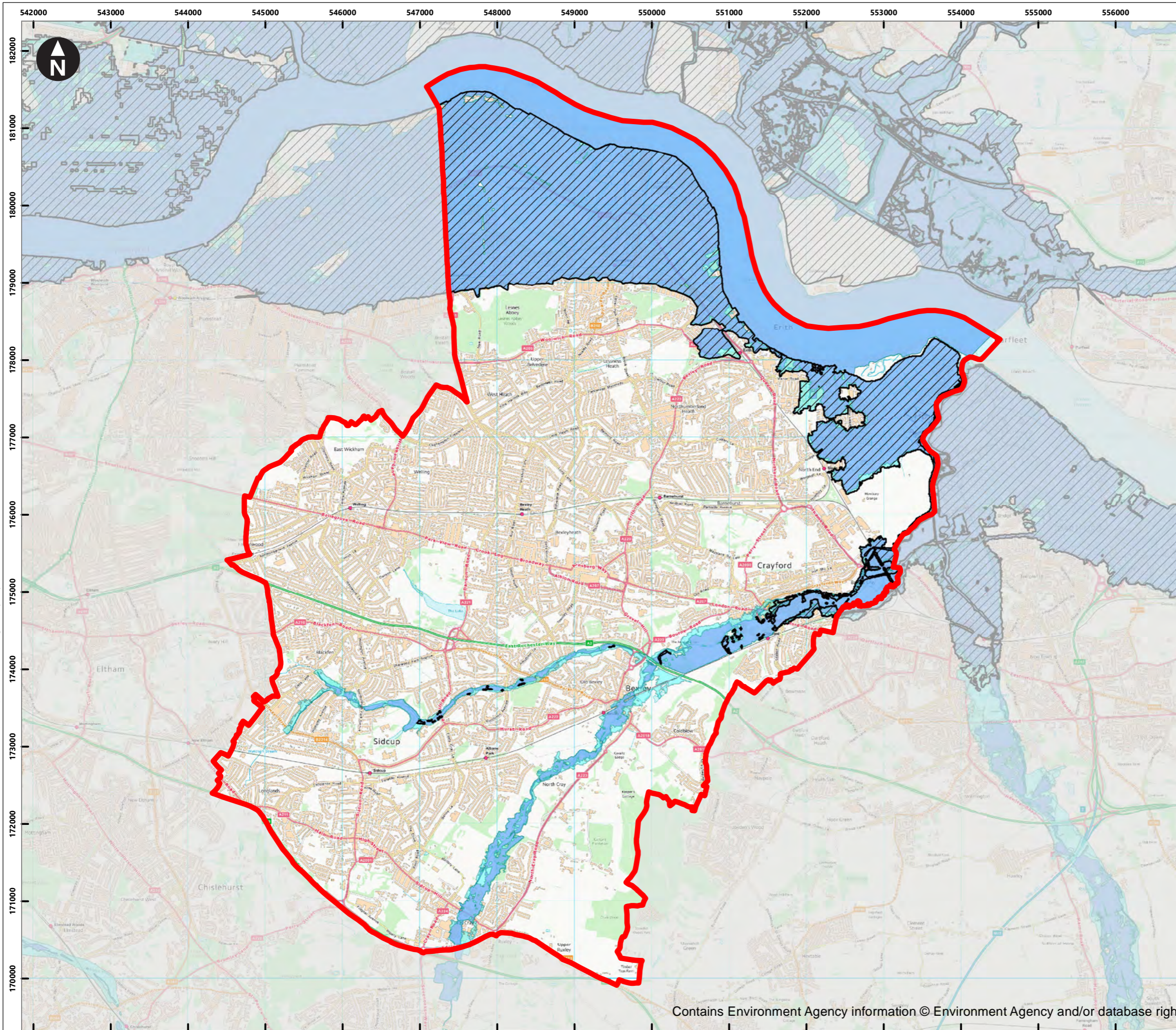
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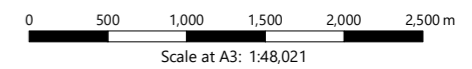
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Key

-  London Borough of Bexley Boundary
- Flood Map for Planning**
-  Areas Benefiting from Flood Defences
-  Flood Zone 3
-  Flood Zone 2



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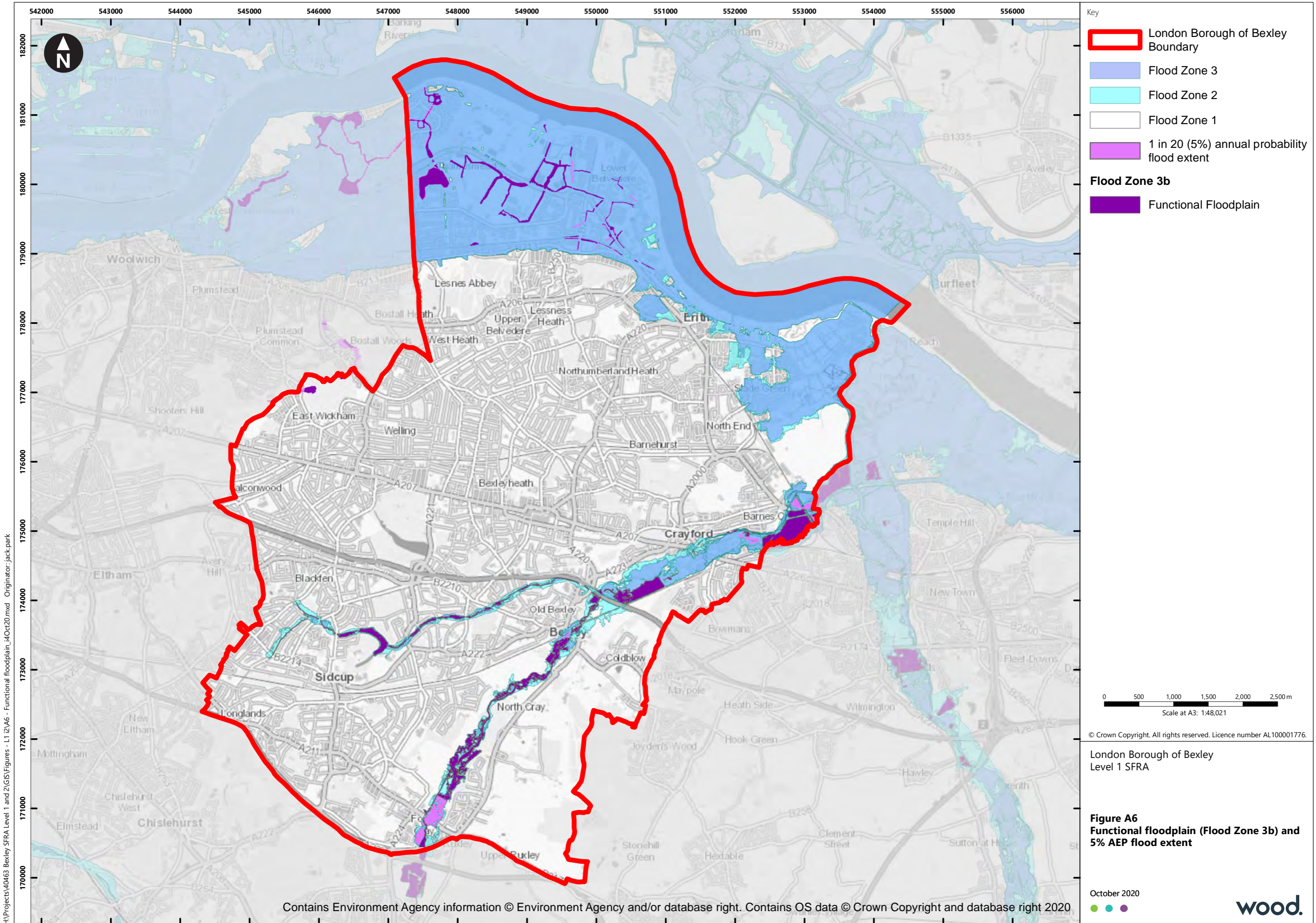
London Borough of Bexley
Level 1 SFRA

Figure A5
Flood Map for Planning

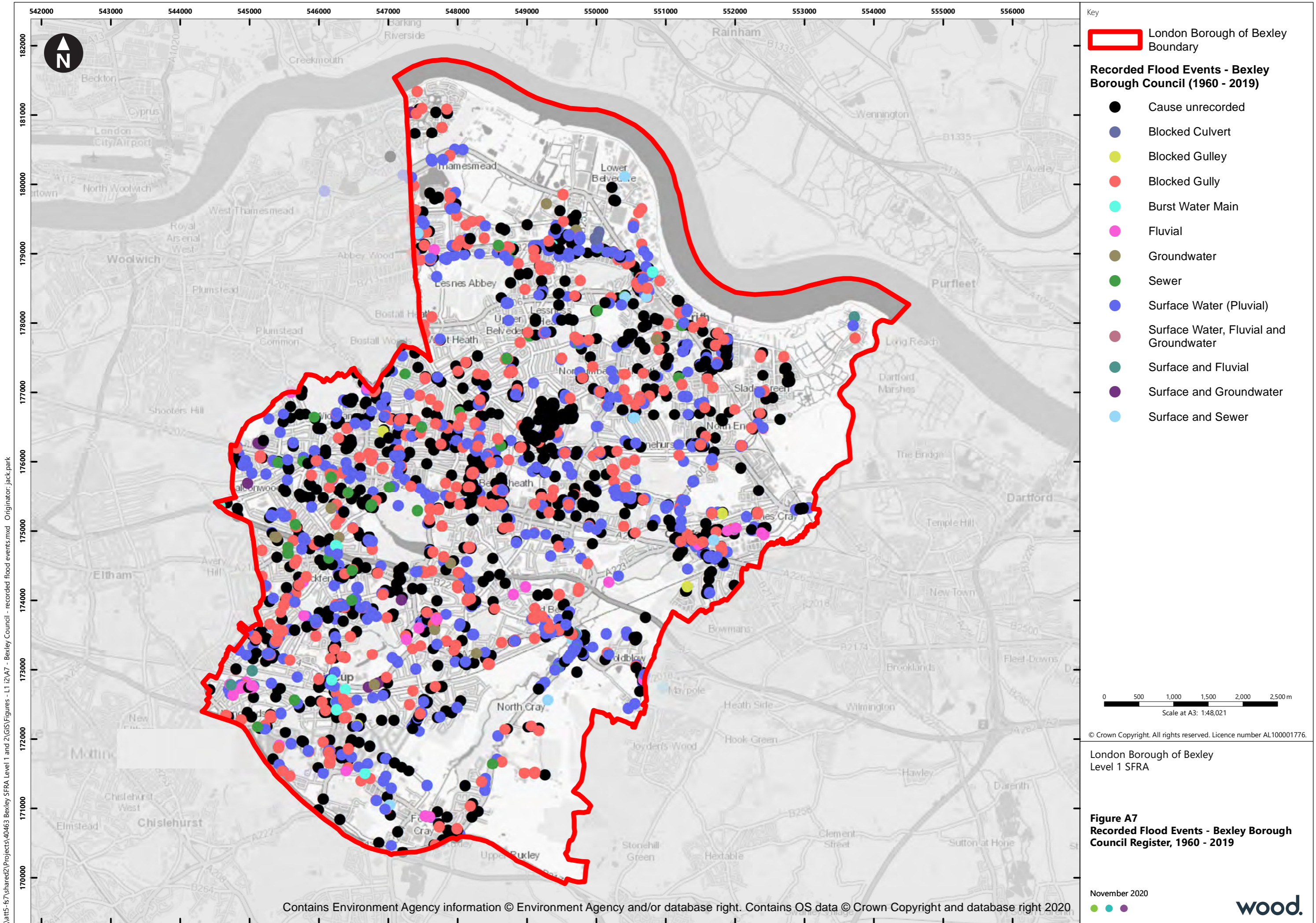
August 2020



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- Key
- London Borough of Bexley Boundary
- Recorded Flood Events - Bexley Borough Council (1960 - 2019)**
- Cause unrecorded
 - Blocked Culvert
 - Blocked Gully
 - Blocked Gully
 - Burst Water Main
 - Fluvial
 - Groundwater
 - Sewer
 - Surface Water (Pluvial)
 - Surface Water, Fluvial and Groundwater
 - Surface and Fluvial
 - Surface and Groundwater
 - Surface and Sewer

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Scale at A3: 1:48,021

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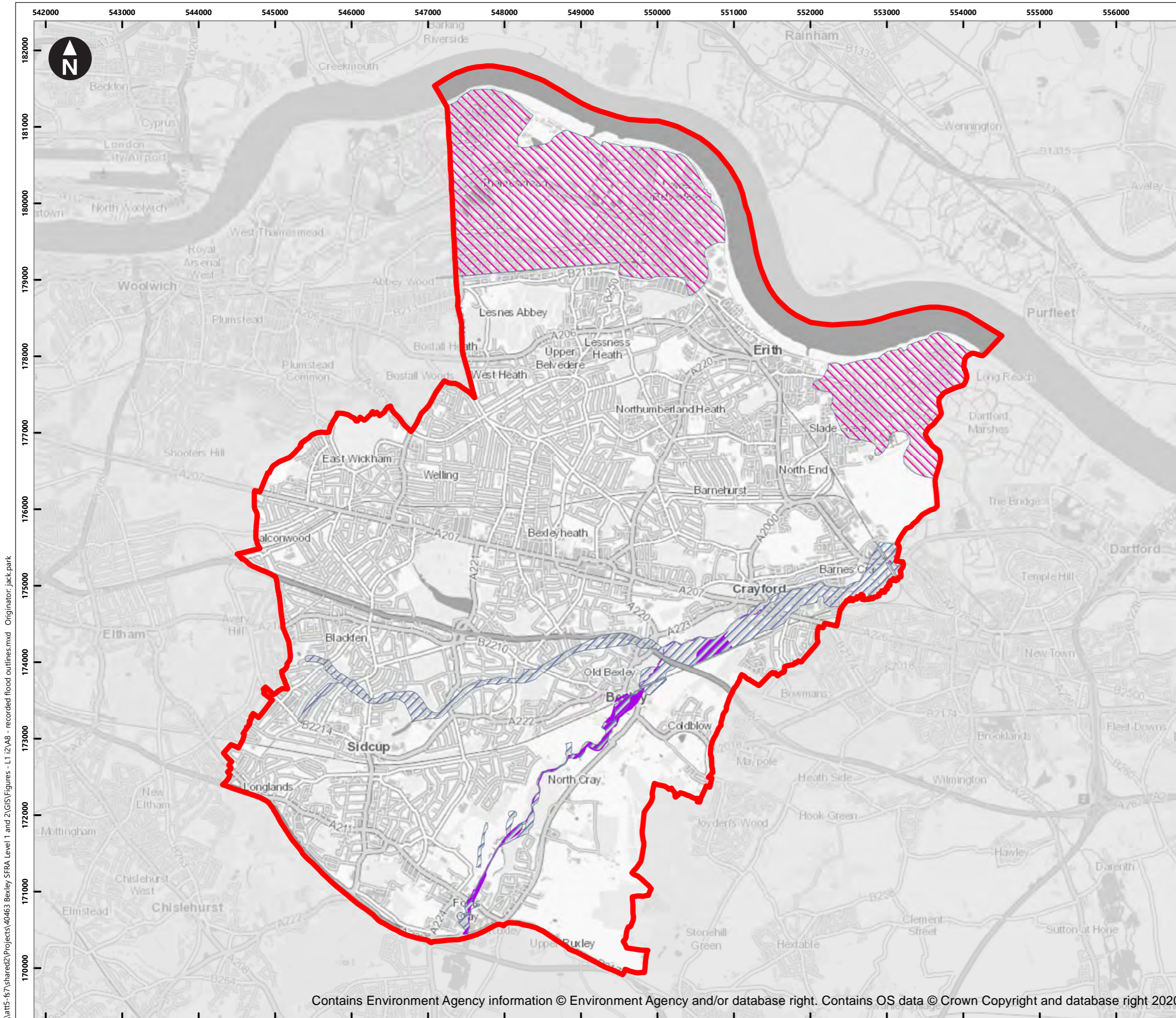
London Borough of Bexley
Level 1 SFRA

Figure A7
Recorded Flood Events - Bexley Borough Council Register, 1960 - 2019

November 2020



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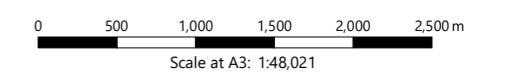


Key

- London Borough of Bexley Boundary

Recorded flood outlines

- 1953 Event
- 1968 Event
- 1977 Event



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London Borough of Bexley
Level 1 SFRA

Figure A8
Recorded Flood Outlines

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