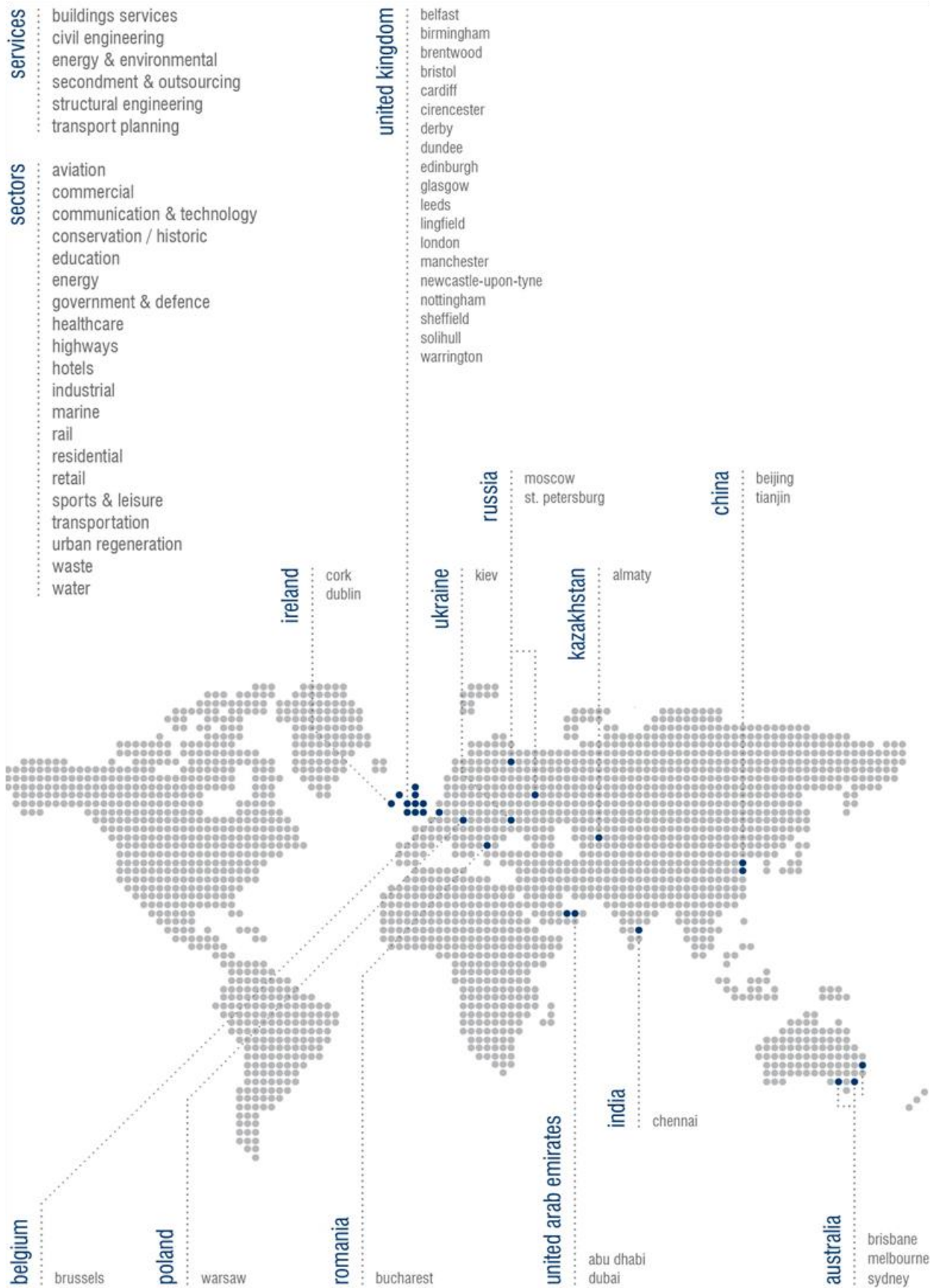




Appendix 13.1

Flood Risk Assessment (July 2015)



Station Hill, Reading

Flood Risk Assessment

July 2015

Waterman Infrastructure & Environment Limited

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Client Name: Sackville Developments (Reading) Limited
Document Reference: CIV13174 ES 004
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Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
 Waterman Group's IMS (BS EN ISO 9001: 2008, BS EN ISO 14001: 2004 and BS OHSAS 18001:2007)

Issue	Date	Prepared by	Checked by	Approved by
A01	01/08/14	Donal O'Donovan	Sophie McCabe	Brendan McCarthy

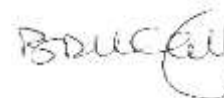
Comments Preliminary

A02	25/09/14	Donal O'Donovan	Sophie McCabe	Brendan McCarthy
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Comments Preliminary

A03	14/07/15	Donal O'Donovan	Sophie McCabe	Brendan McCarthy
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Comments Preliminary



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- D. Thames Water Correspondence
- E. Hoare Lea Below Ground Drainage Design Note
- F. Reading Council's Strategic Flood Risk Assessment Map
- G. Hoare Lea Stormwater Drainage Strategy

Executive Summary

Waterman was commissioned by Sackville Developments (Reading) Limited to undertake a Flood Risk Assessment in relation to the proposed development at Station Hill, located within central Reading.

The Development proposals comprise demolition of the existing buildings on Site with the exception of the Multi Storey Car Park (which will be reconfigured and refurbished) and redevelopment to include offices, shops, restaurants and cafes, leisure uses and residential units.

Environment Agency mapping shows that the Site is located within Flood Zone 1, and is therefore classified as having a low probability of tidal and fluvial flooding.

The Environment Agency have confirmed that the peak 1 in 1000 year fluvial flood level closest to the Site is 38.45m AOD. Minimum ground levels at the Site are 38.5m AOD, confirming the Site lies within Flood Zone 1.

The risk of flooding from groundwater and artificial sources has been assessed and found to be low.

The Environment Agency's surface water flood maps show that there is a potential for surface water flooding within some of the highways in and around the Site. However, neither Thames Water nor the Strategic Flood Risk Assessment have records of surface water flooding in the vicinity.

Taking a precautionary approach, in order to ensure that the potential risk of surface water flooding is managed, it is recommended that finished floor levels of the proposed Development are reviewed against those of the surrounding highway network, to ensure that no new low points are created. If potential surface water flow/ponding cannot be ruled out, the drainage strategy should be designed to ensure that this water can be appropriately accommodated, and internal finished floor levels should be set nominally above the level of any adjacent highways. This could be achieved by gently ramping up from the external areas/highways to the building entrances.

Hoare Lea has confirmed that surface water runoff from the proposed development would discharge to the surrounding sewer network at the lesser of either the 1 year 30 minute runoff rate, or the capacity of the existing drainage connections into the Thames Water Sewers. Attenuation would be provided up to the 1 in 100 year rainfall event, including for 30% climate change.

This report demonstrates that the proposed Development is at a low risk of flooding. It also confirms that surface water runoff from the Site can be managed sustainably to ensure that flood risk is reduced elsewhere. It is considered that the information provided within this report satisfies the requirements of the National Planning Policy Framework.

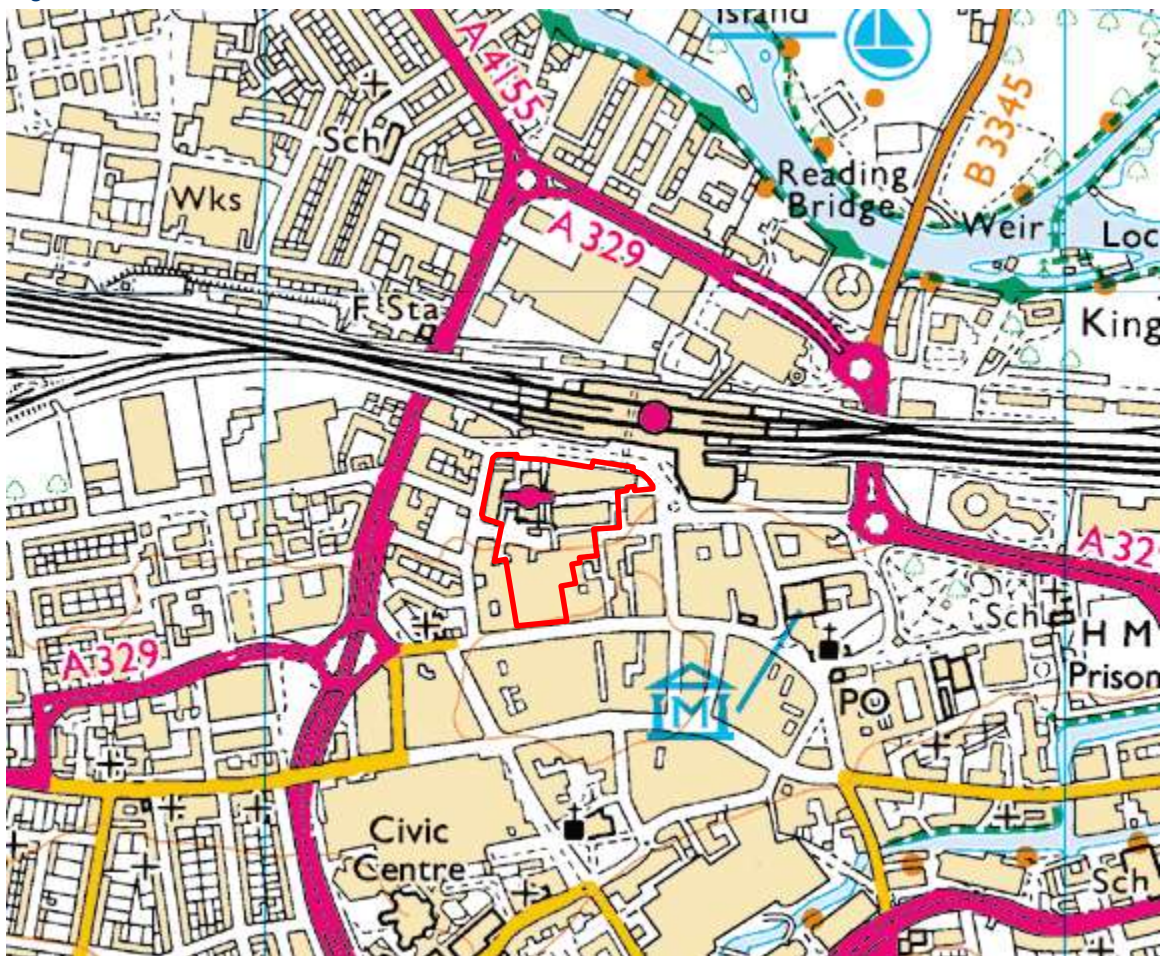
1. Introduction

- 1.1. Waterman was commissioned by Sackville Developments (Reading) Limited to undertake a Flood Risk Assessment (FRA) in relation to the proposed development at Station Hill (hereafter referred to as 'the Site'), located within central Reading.

Site Description

- 1.2. The existing Site is approximately 2.47 hectares (ha) in size and comprises of a number of existing buildings located to the south of Reading railway station. The Site is centred at National Grid Reference 471370, 173710 as shown in Figure 1.

Figure 1: Site Location Plan



Key

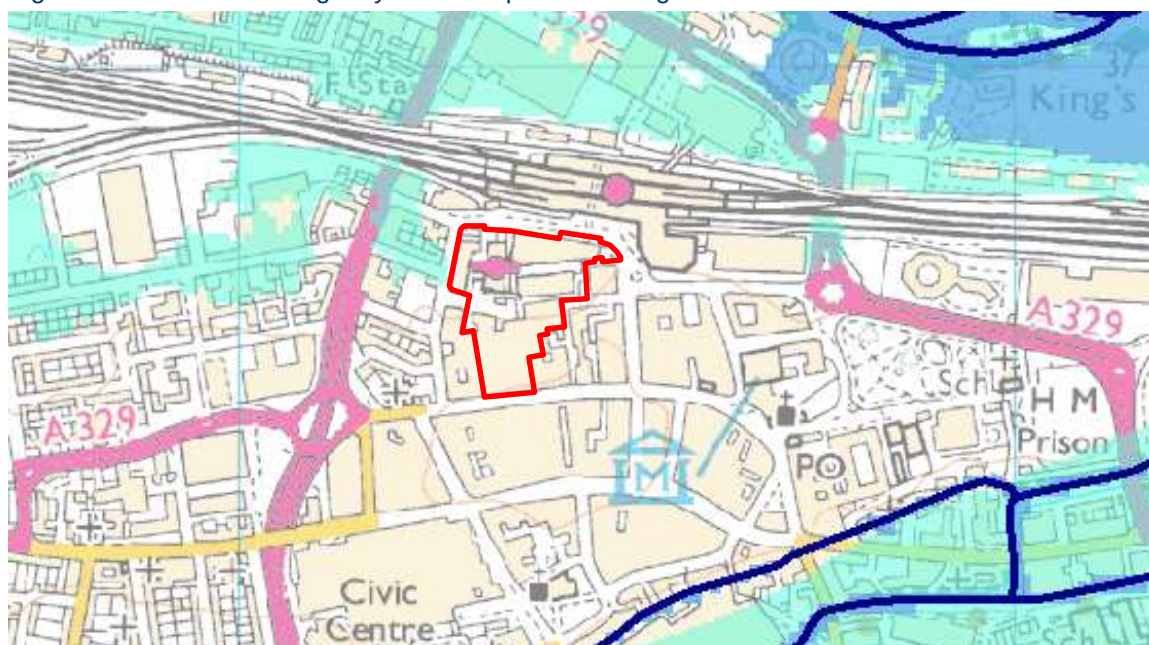


Site Location

- 1.3. The Site is bounded by Reading Station and Station Hill to the north, Greyfriars Road to the west, Friar Street to the south, and Thames Tower and various commercial buildings to the east. Garrard Street runs east-west through the centre of the Site.

- 1.4. The Site consists of a number of existing buildings including the former Reading bus station, Telecom House, NCP multi-storey car park, Western Tower, Friars Walk Shopping Centre and Xafinity House.
- 1.5. The topographic surveys of the Site (see Appendix A) carried out in 2003 and 2008 indicate that the Site falls to the northwest from approximately 45.8m AOD along Friar Street to 38.3m AOD at the junction of Greyfriars Road and Stanshawe Road. Garrard Street and Station Hill fall in a westerly direction from 44.0m to 38.7m AOD and 43.7m to 39.3m AOD respectively.
- 1.6. As seen in Figure 2, the Site is located within Flood Zone 1 according to the Environment Agency's (EA) Flood Map for Planning, indicating a low probability of flooding from fluvial or tidal sources.

Figure 2: Environment Agency Flood Map for Planning



Key



Site Location



Flood Zone 3, High Probability of flooding from rivers or the sea, without the presence of defences



Flood Zone 2, Medium Probability of flooding from rivers or the sea, without the presence of defences



Flood Zone 1, Low Probability of flooding from rivers or the sea



Flood defences



Areas benefiting from flood defences



Main River

Source: <http://maps.environment-agency.gov.uk>

Development Proposals

- 1.7. The Development proposals (included in Appendix B) comprise demolition of the existing buildings on Site with the exception of the Multi Storey Car Park (which will be reconfigured and refurbished) and redevelopment to include offices, shops, restaurants and cafes, leisure uses and residential units.
- 1.8. Office units would be provided on the ground floor in Plot A with retail units provided on the ground floor of Plots B to F. The upper levels would comprise a mixture of office units in Plots A to D to the north of the Site, with residential accommodation in Plots E and F to the south of Garrard Street. Car parking and some retail units would both be provided at ground level within Plot G with additional car parking provided in the upper levels.

Planning Policy and Guidance

National Planning Policy Framework

- 1.9. The National Planning Policy Frameworkⁱ (NPPF) states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. Where development is necessary, it must be made safe without increasing flood risk elsewhere.
- 1.10. The NPPF clarifies that the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. In addition, development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. If, following application of the Sequential Test, it is not possible (consistent with wider sustainability objectives) for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied if appropriate. For the Exception Test to be passed:
 - A site-specific FRA must demonstrate that the development would be safe for its lifetime, taking account of the vulnerability of its users without increasing flood risk elsewhere, and, where possible would reduce flood risk overall; and
 - It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared.
- 1.11. As the Site lies within Flood Zone 1 the Sequential Test would be passed and the Exception Test is not required.
- 1.12. The NPPF states that when determining planning applications, Local Planning Authorities (LPA) should ensure that flood risk is not increased elsewhere and only consider development in areas at risk of flooding where it can be demonstrated that:
 - Within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location; and
 - Development is appropriately flood resilient and resistant, includes safe access and escape routes where required, any residual risk can be safely managed (including emergency planning), and priority is given to the use of Sustainable Drainage Systems (SuDS).
- 1.13. The Planning Practice Guidance (PPG)ⁱⁱ provides additional guidance to LPAs to ensure effective implementation of the planning policies set out within the NPPF regarding development in areas at risk of flooding. The guidance retains key elements of superseded NPPF Technical Guidanceⁱⁱⁱ and

Planning Policy Statement 25 Development and Flood Risk Practice Guide^{iv} (PPS25) and is accessed via a web-based portal.

- 1.14. The PPG states that developers and LPAs should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of SuDS. Referencing information provided by the EA, the PPG provides advice on taking climate change into account, setting out recommended contingency allowances for net sea level rise and peak rainfall intensities, which should be increased by between 5% and 30% from now until the year 2115. It also advises on flood resilience and resistance measures when dealing with the residual risks remaining after applying the sequential approach and mitigating actions.
- 1.15. The PPG also includes advice on flood risk vulnerability and flood zone compatibility. The following flood zones refer to the probability of river and sea flooding, without the presence of defences:
- Zone 1 - low probability: less than 1 in 1000 annual probability of river or sea flooding (<0.1%) in any year;
 - Zone 2 - medium probability: between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% to 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% to 0.1%) in any year;
 - Zone 3a - high probability: 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability flooding from the sea (>0.5%) in any year; and
 - Zone 3b - the functional floodplain: where water has to flow or be stored in times of flood; identification should take account of local circumstances but would typically flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme 1 in 1000 (0.1%) flood.

Reading Borough Council's Strategic Flood Risk Assessment

- 1.16. Reading Borough Council's Strategic Flood Risk Assessment (SFRA)^v was published in March 2009. The report was primarily produced to determine how flood risk varied throughout the Borough. Its key aims are to:
- Collate all known sources of flooding that may affect development;
 - Identify areas of high, medium and low probability of flooding;
 - Recommend appropriate land uses within flood affected areas; and
 - Recommend possible mitigation measures.
- 1.17. In addition, it is used to support the local development framework, providing information on flood risk to be incorporated into local policies, and helped provide information to the Council when choosing their preferred options for site allocation. The SFRA also aids in the development of emergency planning procedures.
- 1.18. Relevant flood risk information from the SFRA is included within Section 2 of this report.

Reading Borough Council Core Strategy

- 1.19. The Core Strategy Document^{vi} was adopted in January 2008, and sets out the main strategy for development across the borough to 2026 and beyond.
- 1.20. Policy CS1 regarding Sustainable Construction and Design states that all developments should incorporate SuDS techniques as appropriate. Advice should be sought from the EA and the design

should aim to minimise the size of impermeable areas in order to reduce the peak runoff rates from the development. On no account should the peak runoff rate increase from the existing situation. In addition, particular care should be taken in areas where there is a flood risk.

- 1.21. Policy CS35 regarding flooding states that no development will be allowed within an area at high risk of flooding if it will reduce the capacity of the floodplain to store water, prevent the flow of floodwater or cause an increased risk to life and property. However, the policy states that appropriate weight will be given to the redevelopment of land at risk of flooding that provides significant regeneration benefits on previously developed land. Such developments will be required to pass the Sequential Test and where appropriate the Exception Test. As the Site lies within Flood Zone 1 the Sequential Test would be passed.

Reading Borough Council, Sites and Detailed Policies Document

- 1.22. The Sites and Detailed Policies Document^{vii} was adopted in October 2012 and forms part of the development plan used when determining planning applications. It contains detailed policies which should be followed when deciding planning applications, and identifies specific sites for development and protection.
- 1.23. Policy DM1 regarding Adaption to Climate Change states that all developments must demonstrate how their design incorporates measures to adapt to climate change. With regard to flood risk and surface water, the policy states that all developments should minimise the impact of surface water runoff from the development through the design of the drainage system.
- 1.24. Supplementary documentation regarding the Station Hill area of Reading^{viii} provides further guidance on development within the area. As part of this guidance, Principle 8 regarding Incorporating High Standards of Sustainable Design states that all developments should aim to include a specific water management scheme which addresses flood risk and water usage. The two key criteria regarding this aspect of the principle are:
- A water management scheme will need to address the management of rainfall to avoid flooding and the minimisation of water usage to reasonable levels; and
 - Applicants should investigate and incorporate SuDS where appropriate.

Reading Borough Council, Reading Station Area Framework

- 1.25. The Reading Station Area Framework Document^{ix} was adopted in December 2010 and sets out principles and guidelines for how development should take place around Reading Station.
- 1.26. Chapter 10 regarding sustainability indicates that all developments around the station should address the principles of sustainability and account for associated guidance. The chapter identifies a range of sustainability measures which could be incorporated into developments to help improve their sustainability, including green and brown roofs. There are also a number of measures highlighted which should be taken into consideration within all developments including:
- Residential uses should not be located on the ground floor within Flood Zone 3a.
 - Buildings, landscaping and infrastructure should be oriented within the site to avoid blocking overland flow routes. Where this cannot be achieved, appropriate management of these flow routes should be provided to ensure there will be no increase in flood risk to the surrounding area, aiming to improve flood risk where possible.
 - Ground floor levels for residential developments should be set at a minimum of 300mm above the 1 in 100 annual probability flood level, including an allowance for climate change.

Scope of Report

- 1.27. This report assesses the potential effects of tidal, fluvial, groundwater, pluvial and artificial sources of flooding upon the Development. In line with current policy, the management of surface water is also assessed, and a strategy to effectively manage runoff whilst working within the Site specific constraints is proposed, so as not to increase, and if possible decrease flood risk elsewhere.

2. Sources of Potential Flooding

Tidal and Fluvial

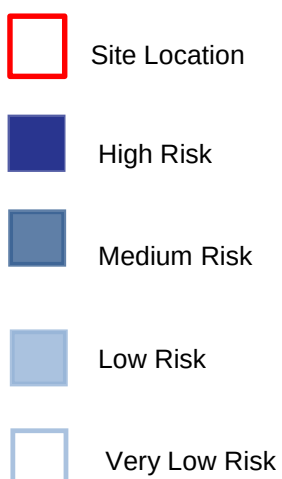
- 2.1. The EA has confirmed (Appendix C) that the Site is located within Flood Zone 1 and is therefore classified as having a low probability of tidal and fluvial flooding. An extract from the EA's Flood Map for Planning is shown in Figure 2.
- 2.2. The nearest watercourse to the Site is the River Thames which is located approximately 400m to the northeast. The EA has confirmed (Appendix C) that the peak 1 in 1000 year fluvial flood level nearest to the Site is 38.45m AOD. Minimum ground levels at the Site are 38.5m AOD, confirming the Site lies within Flood Zone 1.
- 2.3. The EA has provided maps (Appendix C) confirming that there have been no historic incidents of tidal or fluvial flooding at the Site. The Development is therefore considered to be at a low risk of flooding from both sources.

Pluvial

- 2.4. Pluvial flooding occurs when natural and engineered drainage systems have insufficient capacity to deal with the volume of rainfall. Pluvial flooding can sometimes occur in urban areas during an extreme, high intensity, short duration summer rainfall event which overwhelms the local surface water drainage systems, or in rural areas during medium intensity, long duration events where saturated ground conditions prevent infiltration into the subsoil. This flood water would then be conveyed via overland flow routes dictated by the local topography.
- 2.5. The EA's Risk of Flooding from Surface Water map (Figure 3 overleaf and Appendix C) indicates that the Site is generally at a very low risk of surface water flooding. However, there are some potential areas of surface water flooding indicated within the highways in and around the Site.
- 2.6. Post development it is likely that this potential flooding would remain within the highways, however it is recommended that the finished floor levels of the proposed Development are reviewed against those of the surrounding highway network, to ensure that no new low points are created. If potential surface water flow/ponding cannot be ruled out, the drainage strategy should be designed to ensure that this can be appropriately accommodated, and in line with best practice internal finished floor levels should be set nominally above the level of any adjacent highways. This could be achieved by gently ramping up from the external areas/highways to the building entrances.
- 2.7. The Thames Water Sewer records (Appendix D) show that there are a number of foul sewers that currently cross the Site. It is proposed to build over the primary sewer and divert others which are in poor condition. These will be relocated with a 3m easement provided either side to facilitate future maintenance access. A build over agreement is being sought from Thames Water for the primary sewer. Alternatively, this sewer could be diverted to Garrard Street. Please refer to Hoare Lea's Design Note on below ground drainage design (Appendix E) for further details. It is understood that any diversion or relocation would be undertaken on a like for like basis, and therefore these alterations would not change the risk of pluvial flooding at the Site.
- 2.8. Figure 3 of the SFRA (Appendix F) indicates that there have been six recorded incidents of sewer flooding within the city centre area. Of these, three incidents are located within 1km of the Site, the closest of which is located approximately 500m to the south.
- 2.9. Correspondence received from Thames Water (Appendix D) confirms that they have no records of sewer flooding occurring at the Site. It is therefore considered that although some highways in the vicinity of the Site may be at risk of surface water ponding, the risk of flooding to the Development

itself from overland surface water runoff or surcharged sewers is low.

Figure 3: Environment Agency Risk of Flooding from Surface Water



Source: <http://watermaps.environment-agency.gov.uk>

Groundwater

- 2.10. The natural geological sequence beneath the Site has been established from the Station Hill Geo-Environmental and Geotechnical Assessment^x produced by Waterman Energy, Environment & Design in 2014. In addition, review of the British Geological Survey's (BGS) online historic borehole

records further confirms the results of the above assessment. A summary of the predicted geology is provided in Table 1 below.

Table 1: Existing Site Geology

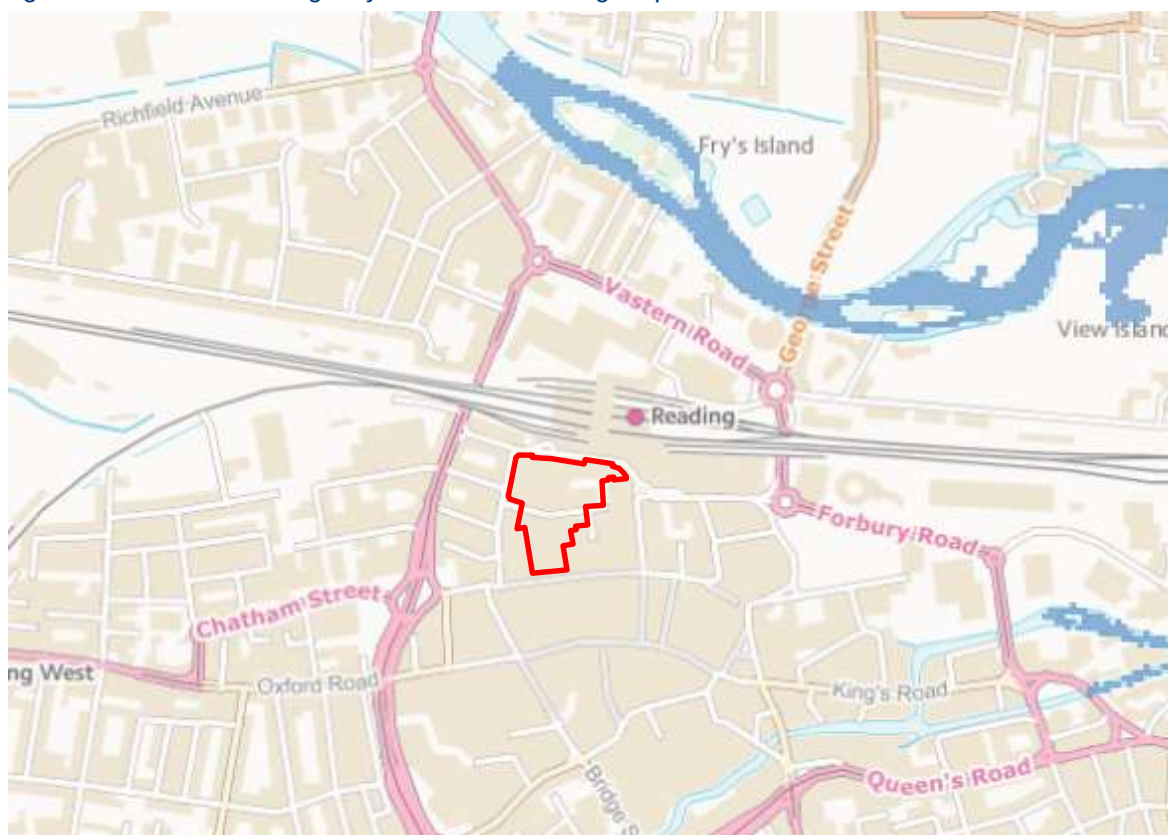
Stratum	Area Covered	Estimated Thickness of stratum	Hydrological Significance
Made Ground	Whole Site	0.5m to 2m	Unproductive Strata
Alluvium	Whole Site	1m to 2m	Secondary A Aquifer
Taplow Gravel Formation	Whole Site	8m to 10m	Secondary A Aquifer
Seaford Chalk Formation	Whole Site	Unknown (over 10m)	Principal Aquifer

- 2.11. The Made Ground at the Site is classified as an unproductive stratum, and the Alluvium and Gravels below as Secondary A Aquifers. The Chalk is classified as a Principal Aquifer.
- 2.12. Historic BGS boreholes at the Site indicate that groundwater has been recorded at between 6.1m and 12.2m below ground level (bgl).
- 2.13. As part of the Geo-Environmental and Geotechnical Assessment groundwater monitoring was undertaken in May and June 2014, which identified groundwater levels ranging between 2.15m and 2.75m bgl.
- 2.14. The SFRA (Figure 3, Appendix F) indicates that no groundwater flooding has been recorded within the Site boundary. However, three incidents have occurred within a 1km radius, the closest of which is located approximately 420m to the southeast.
- 2.15. As groundwater has been recorded at a minimum of 2.15m bgl, and there have been no historic incidents of groundwater flooding at the Site, it is assumed that the risk of flooding from this source is low. In addition, since the proposals do not include the construction of a basement there would be no impact on the flow of groundwater beneath the Site, or any increase in flood risk elsewhere.

Artificial Sources

- 2.16. Mapping shown on the EA website indicates the largest area that may be affected by flooding if a reservoir were to fail. The EA note that this is a worst case prediction and any flood event is unlikely to be this large. EA mapping (Figure 4) shows that the Site would not be subject to flooding due to failure of the reservoirs in the area. There are no other artificial water bodies in the vicinity of the Site, and the risk of flooding from this source is therefore considered to be low.

Figure 4: Environment Agency Reservoir Flooding Maps



Key



Site Location



Maximum extent of reservoir flooding

Source: <http://watermaps.environment-agency.gov.uk>

Summary

- 2.17. The Site is considered to be at a low risk of flooding from tidal, fluvial, pluvial, groundwater and artificial sources of flooding. It is also important to assess the potential for the Development to increase flood risk to others through increasing surface water runoff from the Site. This is discussed in Chapter 3.

3. Surface Water Drainage Strategy

Methods of Surface Water Disposal

- 3.1. In line with Building Regulations^{xi} and good practice the following hierarchy of surface water disposal should be adhered to, in decreasing order of preference.
- i. Discharge to ground
 - ii. Discharge to a surface water body
 - iii. Discharge to a surface water sewer
 - iv. Discharge to a combined sewer

Discharge to Ground

- 3.2. The most effective way to reduce surface water runoff is through infiltration into the subsoil which reduces the total volume of runoff, rather than simply reducing peak flows. This can include techniques such as infiltration trenches, soakaways, permeable paving and infiltration basins.
- 3.3. Hoare Lea have indicated within their Stormwater Drainage Strategy (Appendix G) that the use of soakaways is not feasible since there is a potential risk of contamination at the Site. They also highlight that there may be risk that any soakaways would adversely affected the ground bearing slabs and footings across the Site.

Discharge to a Surface Water Body

- 3.4. The River Thames is located approximately 400m to the north of the Site with dense development between the Site and the river. Discharge to a surface water body is therefore not possible without draining through third party land, which is not considered feasible.

Discharge to a Sewer

- 3.5. According to the Thames Water sewer records (Appendix D) there are foul and surface water sewers in the vicinity of the Site. It is therefore proposed to discharge surface water runoff into the surface water sewers, as per the existing situation.
- 3.6. The rate of runoff into these sewers would be controlled through the provision of attenuation.

Sustainable Drainage

- 3.7. Hoare Lea has considered the use of SuDS to provide sufficient attenuation in the most sustainable manner, whilst working within the Site-specific constraints. Please refer to their Stormwater Drainage Strategy for further details, included in Appendix G.

4. Conclusions

- 4.1. EA mapping shows that the Site is located within Flood Zone 1, and is therefore classified as having a low probability of tidal and fluvial flooding.
- 4.2. The EA has confirmed that the peak 1 in 1000 year fluvial flood level closest to the Site is 38.45m AOD. Minimum ground levels at the Site are 38.5m AOD, confirming the Site lies within Flood Zone 1.
- 4.3. The risk of flooding from groundwater and artificial sources has been assessed and found to be low.
- 4.4. The EA's surface water flood maps show that there is a potential for surface water flooding within some of the highways in and around the Site. However, neither Thames Water nor the SFRA have records of surface water flooding in the vicinity.
- 4.5. Taking a precautionary approach, in order to ensure that the potential risk of surface water flooding is managed, it is recommended that finished floor levels of the proposed Development are reviewed against those of the surrounding highway network, to ensure that no new low points are created. If potential surface water flow/ponding cannot be ruled out, the drainage strategy should be designed to ensure that this water can be appropriately accommodated, and internal finished floor levels should be set nominally above the level of any adjacent highways. This could be achieved by gently ramping up from the external areas/highways to the building entrances.
- 4.6. Hoare Lea have confirmed that surface water runoff from the proposed development would discharge to the surrounding sewer network at the lesser of either the 1 year 30 minute runoff rate, or the capacity of the existing drainage connections into the Thames Water Sewers. Attenuation would be provided up to the 1 in 100 year rainfall event, including for 30% climate change.
- 4.7. This report demonstrates that the proposed Development is at a low risk of flooding. It also confirms that surface water runoff from the Site can be managed sustainably to ensure that flood risk is reduced elsewhere. It is considered that the information provided within this report satisfies the requirements of the NPPF.

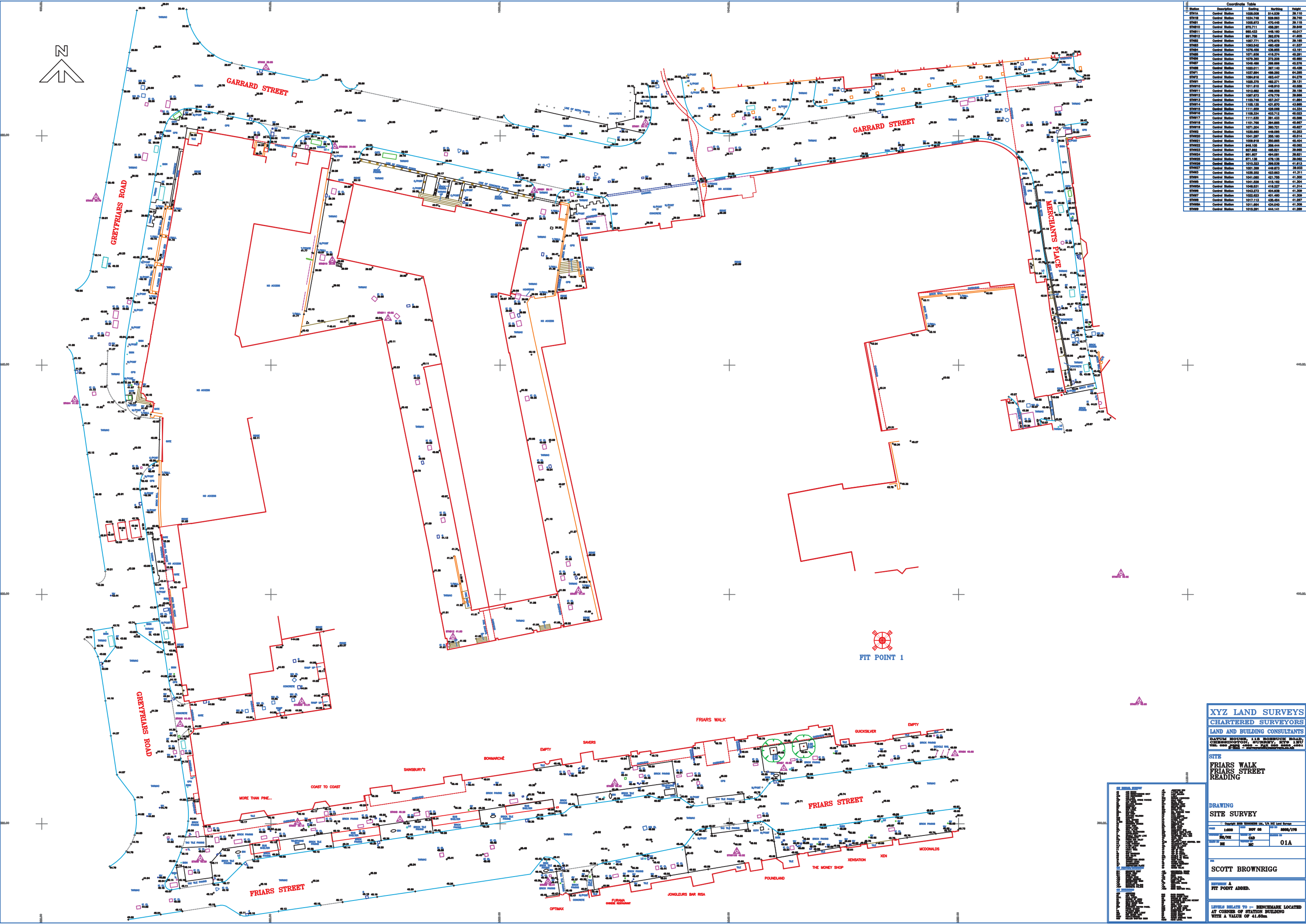
5. References

- ⁱ Department for Communities and Local Government, March 2012. *National Planning Policy Framework*
- ⁱⁱ Department for Communities and Local Government, March 2014. *Planning Practice Guidance*
- ⁱⁱⁱ Department for Communities and Local Government, March 2012. *National Planning Policy Framework Technical Guidance*
- ^{iv} Communities and Local Government, 2009. *Planning Policy Statement 25: Development and Flood Risk Practice Guide*
- ^v Jacobs on behalf of Reading Borough Council, March 2009. *Level 1 Strategic Flood Risk Assessment*
- ^{vi} Reading Borough Council, January 2008. *Local Development Framework Core Strategy*
- ^{vii} Reading Borough Council, October 2012. *Local Development Framework Sites and Detailed Policies Document*
- ^{viii} Entec on behalf of Reading Borough Council, 2007. *Station Hill South Planning and Urban Design Brief*
- ^{ix} Reading Borough Council, December 2010. *Reading Station Area Framework Document*
- ^x Waterman Energy, Environment and Design Limited, 2014. *Station Hill Geo-Environmental and Geotechnical Assessment (EED12350-110-R-3.1.1-RM)*
- ^{xi} HM Government, 2010. *The Building Regulations 2010: H, Drainage and Waste Disposal*



APPENDICES

A. Topographical Survey



Coordinate Table				
Station	Description	Easting	Northing	Height
STW16	Control Station	1008.008	814.838	38.110
STW18	Control Station	1004.748	808.883	38.740
STW1	Control Station	1005.873	870.445	38.118
STW10	Control Station	870.711	458.281	38.648
STW11	Control Station	885.433	448.180	40.017
STW12	Control Station	891.788	382.676	41.005
STW13	Control Station	1007.771	478.879	38.48
STW15	Control Station	1003.542	460.439	41.637
STW14	Control Station	1078.498	438.885	43.181
STW19	Control Station	1077.538	418.274	45.281
STW6	Control Station	1079.380	372.808	45.880
STW7	Control Station	1040.486	389.686	45.076
STW8	Control Station	1003.011	387.140	45.038
STW17	Control Station	1037.894	488.286	44.285
STW2	Control Station	1084.816	453.437	45.378
STW3	Control Station	1005.378	482.271	38.331
STW10	Control Station	1011.810	448.810	40.088
STW11	Control Station	1013.688	448.888	38.158
STW12	Control Station	1007.873	479.779	38.888
STW13	Control Station	1100.748	487.247	41.884
STW14	Control Station	1105.135	431.870	43.885
STW15	Control Station	1111.889	438.088	44.334
STW16	Control Station	1109.334	453.712	45.023
STW17	Control Station	1111.830	381.433	45.888
STW18	Control Station	1101.786	384.888	45.887
STW19	Control Station	1077.204	385.721	45.827
STW20	Control Station	1030.880	448.088	40.083
STW21	Control Station	1041.297	385.180	45.814
STW22	Control Station	1008.818	380.888	45.814
STW23	Control Station	948.105	388.444	45.082
STW24	Control Station	897.888	448.881	38.888
STW25	Control Station	891.887	384.881	38.881
STW26	Control Station	871.138	478.135	38.882
STW27	Control Station	1010.333	389.338	41.813
STW28	Control Station	1021.389	448.873	38.823
STW29	Control Station	1035.582	433.883	41.311
STW30	Control Station	1041.880	431.785	41.300
STW31	Control Station	1041.888	418.182	41.304
STW32	Control Station	1048.831	418.287	41.314
STW33	Control Station	1043.273	404.888	41.309
STW34	Control Station	1002.633	401.480	41.309
STW35	Control Station	1017.113	438.484	41.897
STW36	Control Station	1011.844	434.880	41.308
STW37	Control Station	1018.281	444.141	41.289

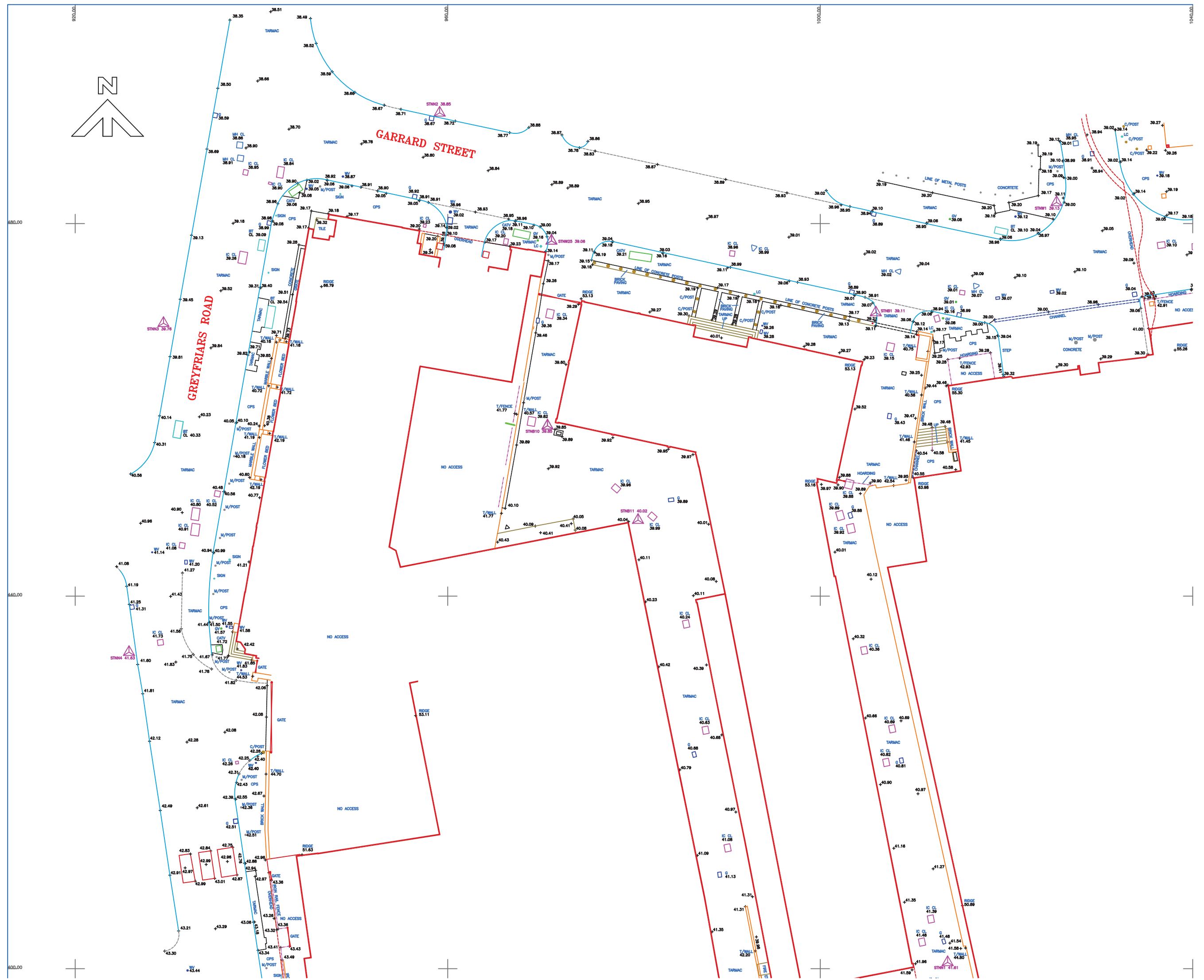
XYZ LAND SURVEYS
CHARTERED SURVEYORS
LAND AND BUILDING CONSULTANTS
DARTMOUTH, 116 ROXBURGH ROAD,
CHERRINGTON, SURREY, KT8 1SU
TEL: 0181 606 0000 - FAX: 0181 606 0001
WWW.XYZSURVEYS.CO.UK

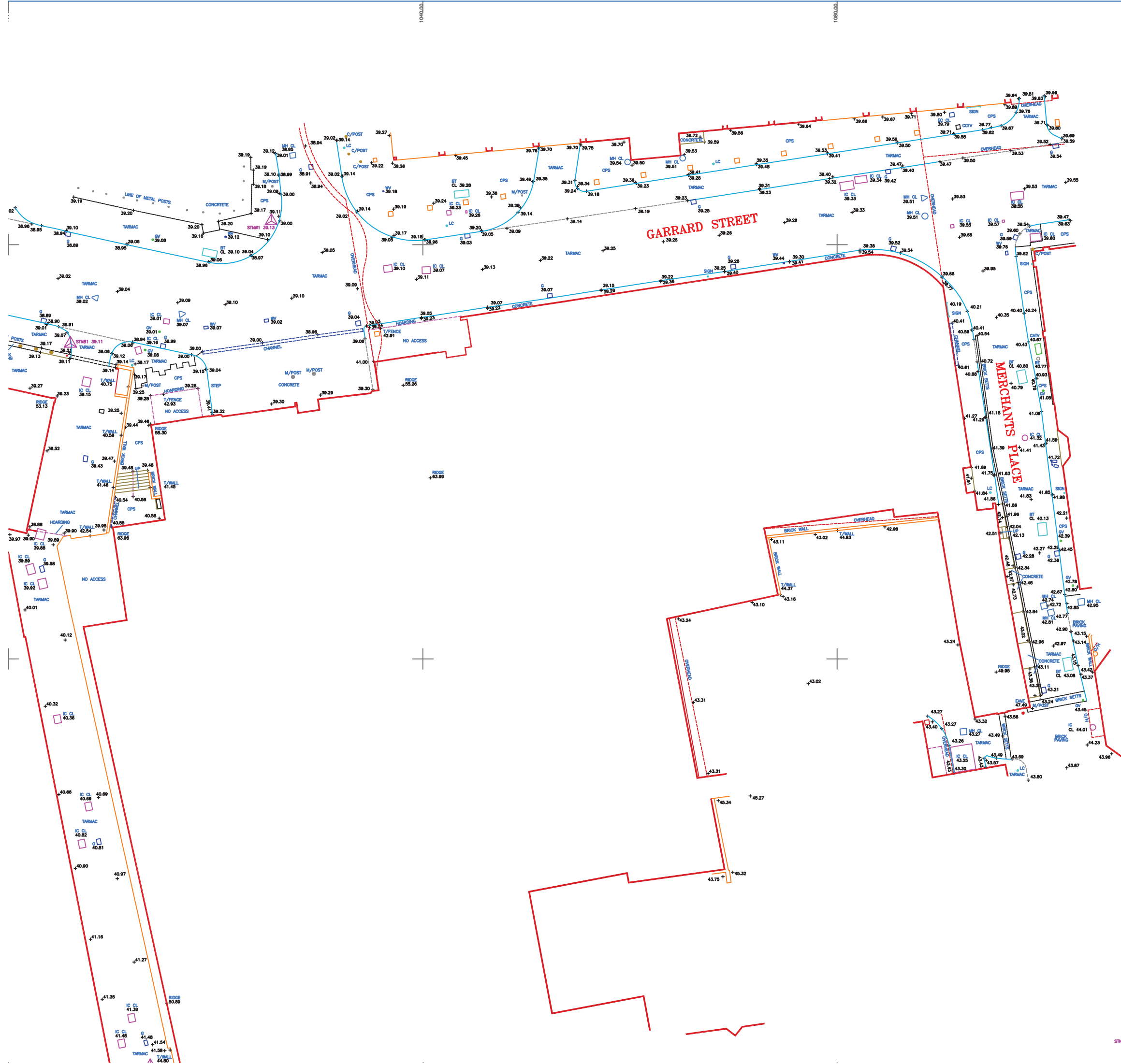
SITE
PRIARS WALK
PRIARS STREET
READING

DRAWING
SITE SURVEY
Copyright © XYZ Land Surveys
1:500 NOV 08 2008/170
REV 01
01A

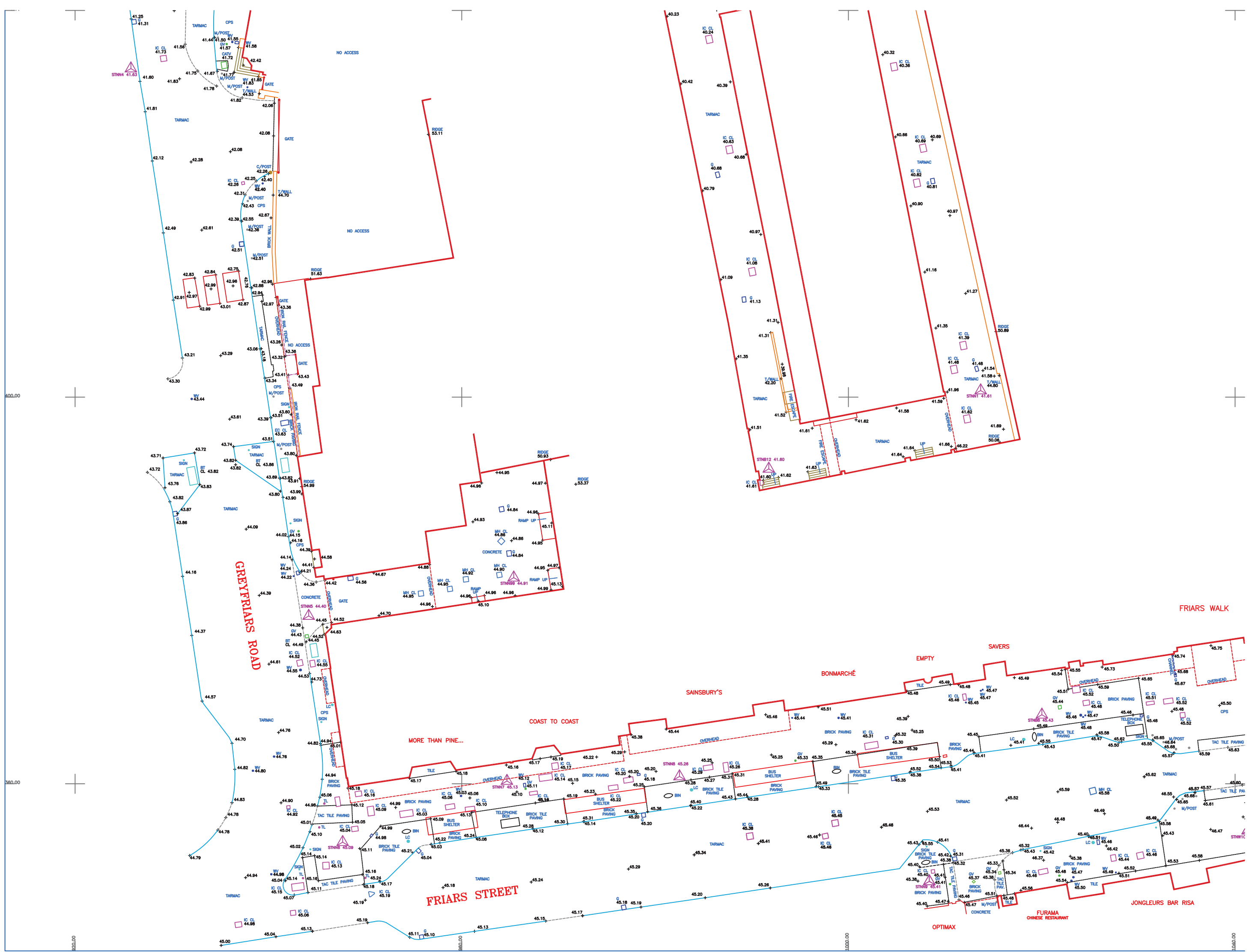
SCOTT BROWNRIGG
SURVEYOR & FIT POINT ADDED.

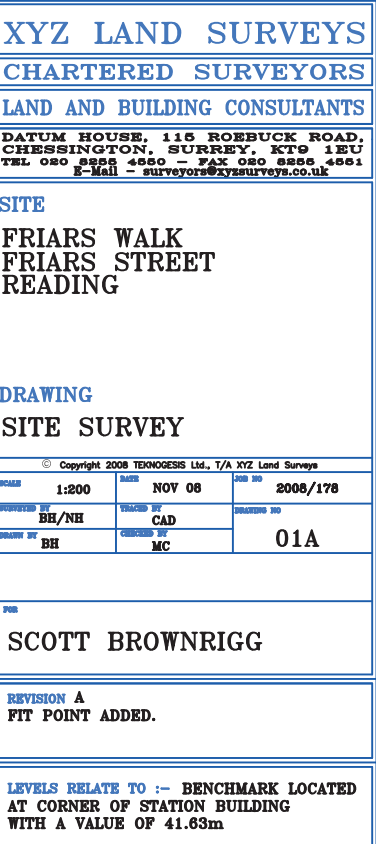
LEVELS RELATE TO 2m BENCHMARK LOCATED
AT CORNER OF STATION BUILDING
WITH A VALUE OF 41.82m

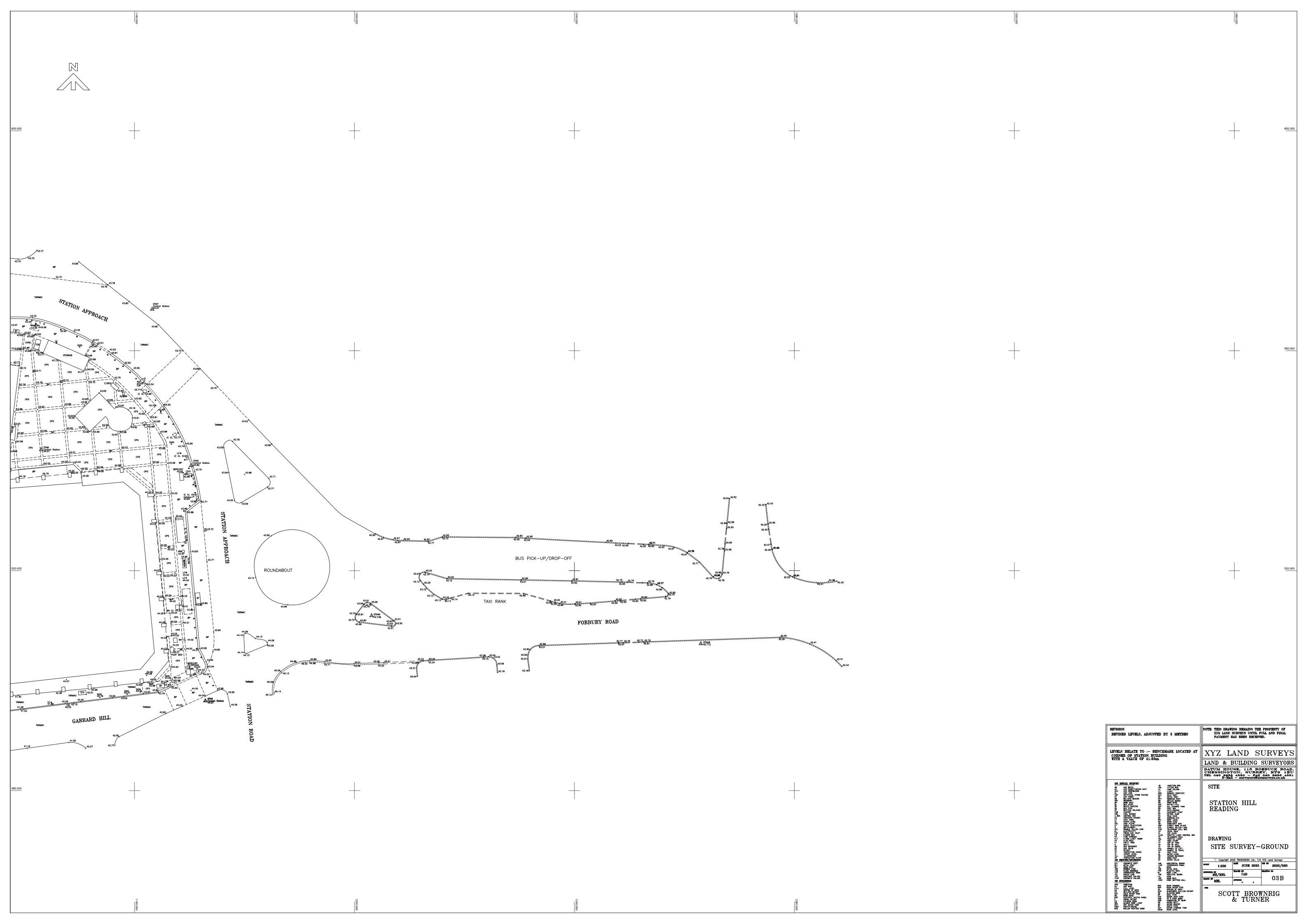




Coordinate Table				
Station	Description	Easting	Northing	Height
STN1A	Control Station	1028.008	514.539	39.110
STN1B	Control Station	1034.748	529.563	38.740
STN1	Control Station	1005.973	470.445	39.115
STN10	Control Station	970.711	458.291	39.849
STN11	Control Station	980.433	448.160	40.017
STN12	Control Station	991.798	392.576	41.605
STN2	Control Station	1057.771	475.975	39.165
STN3	Control Station	1093.542	460.429	41.537
STN4	Control Station	1076.456	436.955	43.191
STN5	Control Station	1071.936	416.374	45.291
STN6	Control Station	1079.360	372.208	45.680
STN7	Control Station	1049.486	369.666	45.576
STN8	Control Station	1020.011	367.140	45.428
STN1	Control Station	1037.894	489.292	64.295
STN2	Control Station	1084.916	493.447	64.279
STN1	Control Station	1025.375	482.271	39.131
STN10	Control Station	1011.610	448.910	40.558
STN11	Control Station	1012.682	468.558	39.156
STN12	Control Station	1097.673	479.779	39.866
STN13	Control Station	1100.746	457.347	41.884
STN14	Control Station	1105.135	431.870	43.665
STN15	Control Station	1111.859	428.088	44.334
STN16	Control Station	1108.334	403.712	45.023
STN17	Control Station	1111.530	381.433	45.598
STN18	Control Station	1101.766	364.865	45.667
STN19	Control Station	1071.204	360.721	45.627
STN2	Control Station	1030.660	449.095	40.253
STN20	Control Station	1041.297	355.160	45.514
STN21	Control Station	1009.918	350.865	45.404
STN22	Control Station	946.105	359.444	45.092
STN23	Control Station	927.862	465.521	39.985
STN24	Control Station	951.607	494.081	38.821
STN25	Control Station	971.138	478.135	39.062
STN26	Control Station	1010.323	399.538	41.613
STN27	Control Station	1001.399	449.873	39.933
STN3	Control Station	1035.252	423.863	41.311
STN4	Control Station	1041.080	421.755	41.300
STN5	Control Station	1041.526	415.162	41.304
STN5A	Control Station	1048.531	416.227	41.314
STN6	Control Station	1043.273	404.938	41.309
STN7	Control Station	1022.623	401.460	41.309
STN8	Control Station	1017.113	435.454	41.297
STN8A	Control Station	1011.664	434.040	41.308
STN9	Control Station	1015.291	444.141	41.289





[illegible]

NOTE: THIS DRAWING REMAINS THE PROPERTY OF XYZ LAND SURVEYS UNLESS FULL AND FINAL PAYMENT HAS BEEN RECEIVED.

XYZ LAND SURVEYS

LAND & BUILDING SURVEYORS

DATUM: HOUSE, 110 BOREBUCKE ROAD, CHERRINGTON, SURREY, KT9 1ST
T.M. CON. 44500 = TRUE CON. 44500
E-Mail - survey@xyzland.co.uk

SITE

STATION HILL
READING

DRAWING
SITE SURVEY -
LOWER GROUND

DATE: 1-2009

DATE: JUNE 2003

DATE: 2003/065

PROJECT NO: 01B

PROJECT NO: 01B

PROJECT NO: 01B

SCOTT BROWNRIG
& TURNER

REVISION

REVISED LEVELS, ADJUSTED BY 3 METRES

LEVELS RELATE TO - BENCHMARK LOCATED AT CORNER OF STATION BUILDING WITH A VALUE OF 41.63m

BY: [Signature]

DATE: 1-2009

DATE: JUNE 2003

DATE: 2003/065

PROJECT NO: 01B

PROJECT NO: 01B

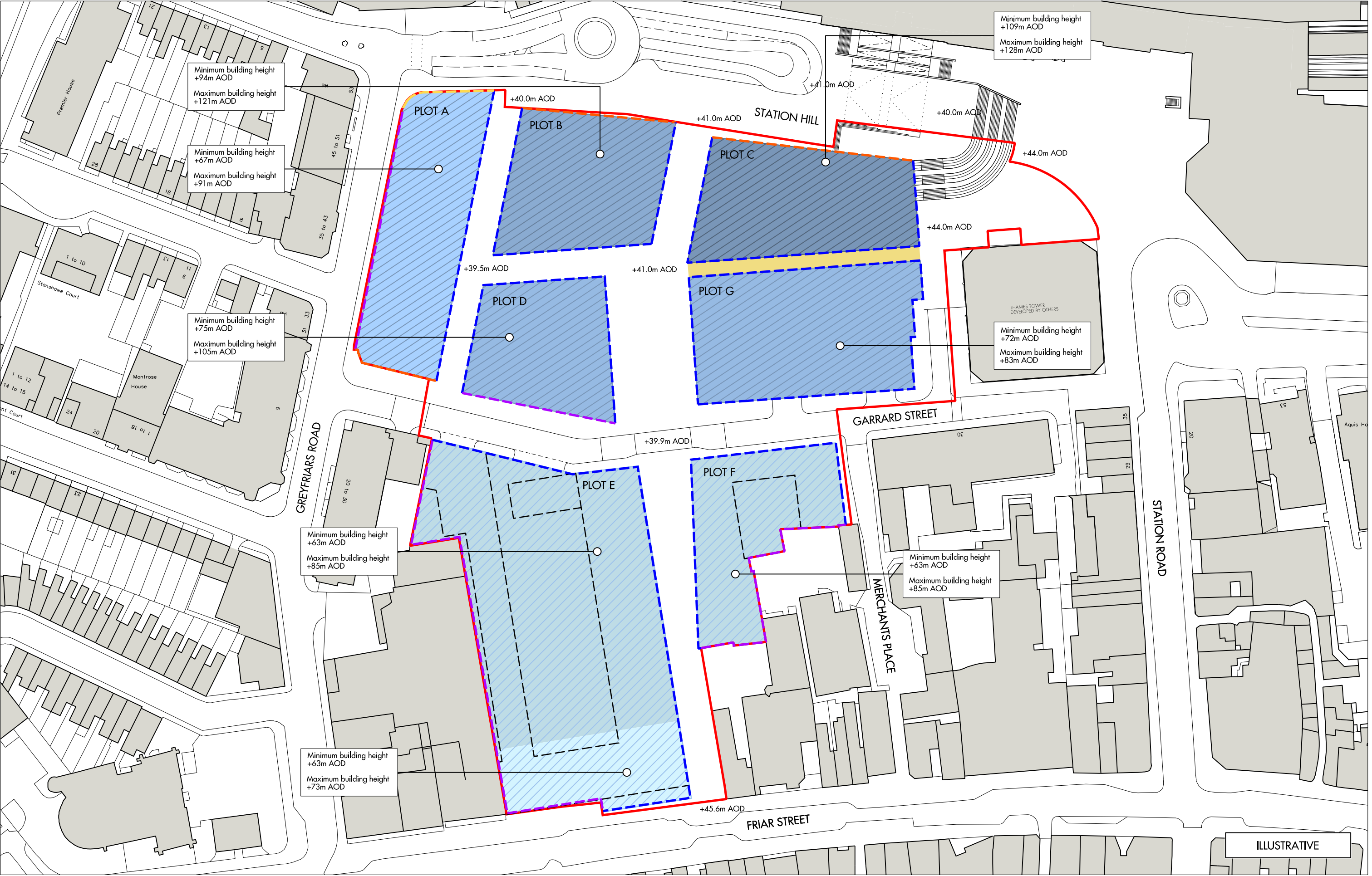
PROJECT NO: 01B

SCOTT BROWNRIG
& TURNER

The site plan illustrates the layout of Station Hill, featuring several key areas: a central 'BLDG' (Building), an 'UNDERGROUND CAR PARK' to the right, and a 'MULTI-STOREY CAR PARK' further right. The plan also shows 'GARRARD HILL' at the bottom and 'STATION HILL' at the top. A 'FIT POINT' is marked with a crosshair. The drawing includes numerous level points (e.g., 38.00, 38.01, 38.02) and boundary lines. A north arrow is located in the top left corner. The plan is oriented with Station Hill at the top and Garrard Hill at the bottom.



B. Development Proposals



0

10

20

0m10m20m

00

07.07.15

ISSUED FOR INFORMATION (ILLUSTRATIVE ONLY)

SB

COMBINED APPLICATION BOUNDARY

DEVELOPMENT PLOTS
NOTE: DARKER SHADING REFLECTS TALLER PERMISSIBLE HEIGHTS

ZONE FOR ARCADE
[MIN. HEIGHT +48.5m AOD, MAX HEIGHT +54m AOD]

LIMIT OF DEVIATION +/- 2.5M

LIMIT OF DEVIATION - 2.5M

LIMIT OF DEVIATION - 5M

LIMIT OF DEVIATION - 10M (PLOT A ONLY)

ZONE FOR COURTYARDS [MIN. HEIGHT +50m AOD]

ZONE FOR CHP FLUE
[MIN. HEIGHT +63m AOD, MAX. HEIGHT +85m AOD]

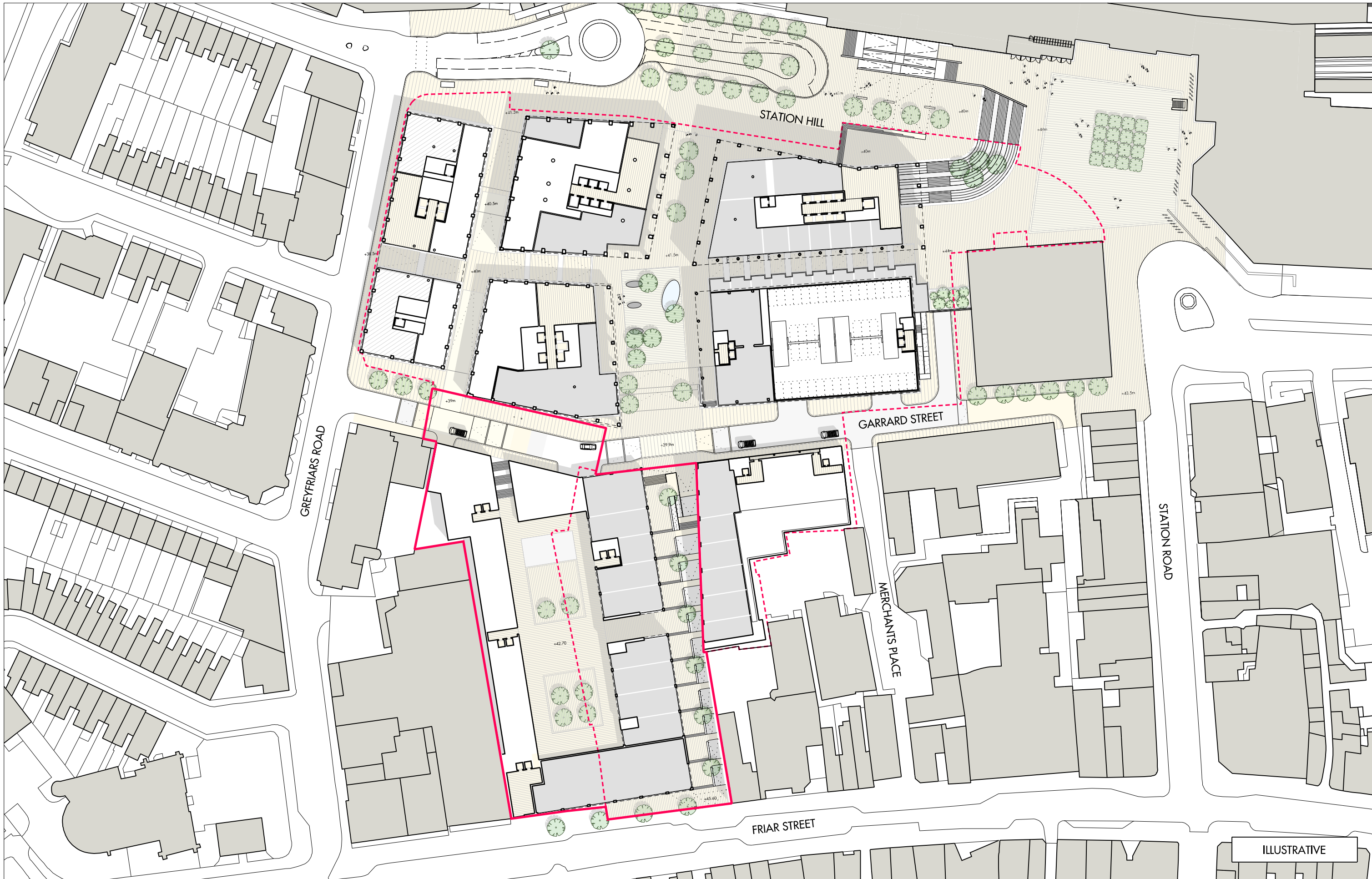
NOTE: SEE DESIGN CODES FOR RULES GOVERNING SETBACKS TO UPPER LEVELS

Allies and Morrison
85 Southwark Street
London SE1 0HX
020 7921 0100
020 7921 0101
info@alliesandmorrison.com
A&M JOB NO: 698

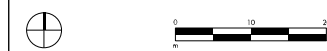
STATION HILL: READING
ILLUSTRATIVE PLAN: SH3 AND ENLARGED PLOT E
BUILDING PLOT(including heights)
698_04_212

00
Revision

SCALE 1:500 @A1 1:1000@A3



REV	DATE	DESCRIPTION	CHKD
P1	28.04.15	INFORMATION FOR FIRST PRE-APPLICATION MEETING	JCH
P2	July 2015	OUTLINE PLANNING APPLICATION - FOR ILLUSTRATION ONLY	JCH



— PLOT E/TELECOM HOUSE APPLICATION BOUNDARY

- - - SH3 APPROVED BOUNDARY

Allies and Morrison
85 Southwark Street
London SE1 0HX
020 7921 0100
020 7921 0101
info@alliesandmorrison.com
A&M JOB NO: 698

STATION HILL: READING
ILLUSTRATIVE PLAN
ILLUSTRATIVE MASTERPLAN
698_E_07_101
SCALE: 1:500 @A1 1:1000 @A3

ILLUSTRATIVE



C. Environment Agency Correspondence

O'Donovan, Donal

From: WT Enquiries <WTenquiries@environment-agency.gov.uk>
Sent: 02 July 2014 12:58
To: O'Donovan, Donal
Subject: WT16308: CIV13174 140612 DODEA Station Hill - Flood Risk Enquiry
Attachments: WT16308 Product 4.pdf; Standard Notice.pdf; WT16308 Surface Water Map.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Donal

Thank you for your request for flood risk data.

I have attached our Product 4 flood level data to assist you with your flood risk assessment although the site of interest does not lie in a flood plain and the maps confirm that it lies in flood zone 1.

The site is not governed by any bylaws and the nearest water course is approximately 0.4 km from the site.

I have also attached surface water maps although the lead local authority for ground water, surface water and drainage is Reading Borough Council.

I hope that we have correctly interpreted your request. Please see the attached Standard Notice or license for the details of the permitted use.

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

If you are not satisfied with our response to your request for information, you can contact us within 2 calendar months to ask for our decision to be reviewed.

Kind regards

Julia Hewitt
Customers and Engagement Officer

Customers and Engagement
Environment Planning and Engagement
Environment Agency
West Thames Area
Red Kite House, Howbery Park, Wallingford, OX10 8BD

Telephone: 01491 828426

We would be really grateful if you could spare five minutes to help us improve our service. Please click on the link below and fill in our survey – we use every piece of feedback we receive:

<http://feedback1.environmentagency.uk.com/s3/2be3681a283f>

Product 4 (Detailed Flood Risk) for Station Hill, Reading, RG1 1NR

Our Ref: OX_0795_01

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

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

Product 4 includes the following information:

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

A table showing:

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

Please note:

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

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

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

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

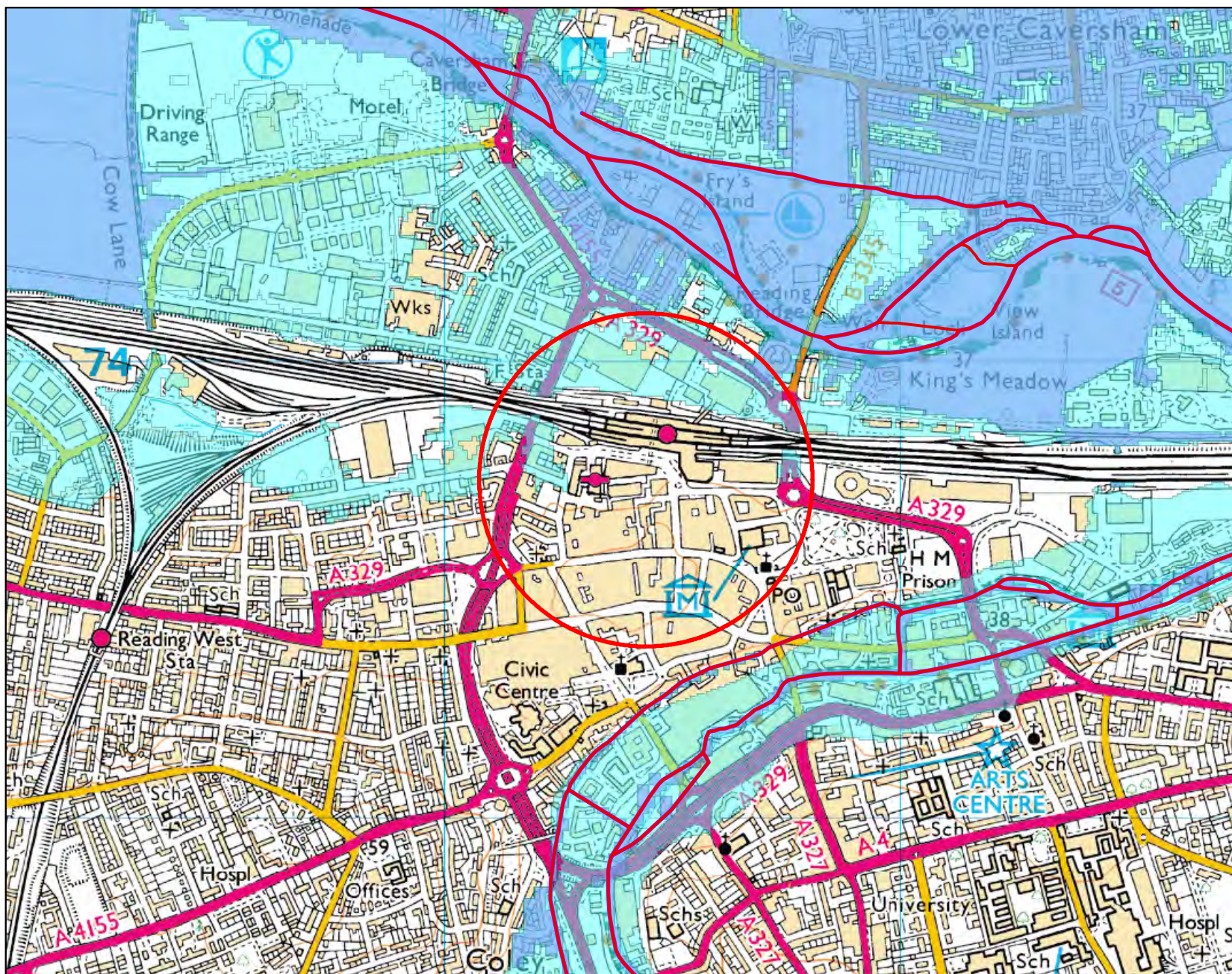
<http://www.environment-agency.gov.uk/research/planning/82584.aspx>

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

<http://www.environment-agency.gov.uk/research/planning/33580.aspx>

Flood Map centred on Station Hill, Reading, RG1 1NR

Created on 30/06/2014 REF: OX_0795_01



Kilometres

0 0.15 0.3

Legend

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

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

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

Defence information

Defence Location: No defences on Main River

Description: This location is not currently protected by any formal defences and we do not currently have any flood alleviation works planned for the area. However we continue to maintain certain watercourses and the schedule of these can be found on our internet pages.

Model information

OX_0795_01

Model: Thames (Mapledurham to Sonning) 2011

Description: The information provided is taken from the Thames (Reading Complex Change) Flood Alleviation Study completed in June 2011. The study was carried out using 2D modelling software (ISIS-Tuflow).

Model design runs:

1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 50 / 2% AEP; 1 in 100 / 1% AEP; 1 in 1000 / 0.1% AEP and 1 in 100+20% / 1% AEP with climate change

Mapped Outputs:

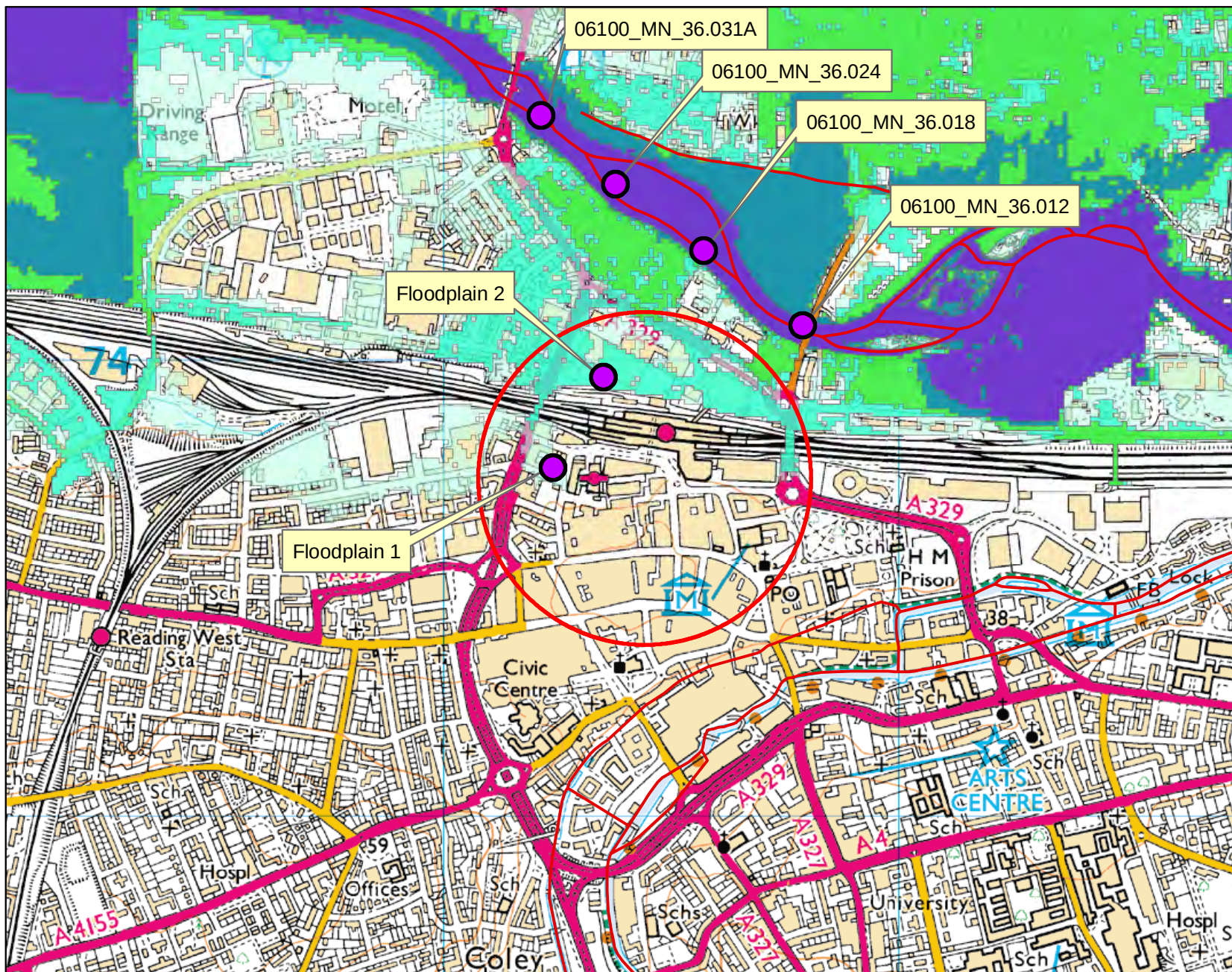
1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 50 / 2% AEP; 1 in 100 / 1% AEP; 1 in 1000 / 0.1% AEP and 1 in 100+20% / 1% AEP with climate change

Model accuracy:

Levels $\pm$ 250mm

Created on 30/06/2014 REF: OX_0795_01

Created on 30/06/2014 REF: OX_0795_01



Kilometres

0	0.15	0.3
---	------	-----

Legend

- Main River
 20% AEP
 5% AEP
 1% AEP
 1%CC
 0.1% AEP

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

1%CC = 1% Climate Change extent
This is the 1% AEP event with an allowance
for climate change (+20% on river flows)

Modelled in-channel flood flows and levels

OX_0795_01

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

Node label	Model	Easting	Northing	Flood Levels (mAOD)				
				20% AEP	5% AEP	1% AEP	1% AEP with climate change allowance (+20% on river flows)	0.1% AEP
06100_MN_36.031A	Thames (Mapledurham to Sonning) 2011	471220	174537	37.20	37.59	38.06	38.26	38.51
06100_MN_36.024	Thames (Mapledurham to Sonning) 2011	471380	174382	37.15	37.55	38.02	38.23	38.47
06100_MN_36.018	Thames (Mapledurham to Sonning) 2011	471579	174240	37.07	37.48	37.98	38.18	38.43
06100_MN_36.012	Thames (Mapledurham to Sonning) 2011	471796	174061	36.98	37.35	37.82	38.00	38.23

Node label	Model	Easting	Northing	Flood Flows (m3/s)				
				20% AEP	5% AEP	1% AEP	1% AEP with climate change allowance (+20% on river flows)	0.1% AEP
06100_MN_36.031A	Thames (Mapledurham to Sonning) 2011	471220	174537	223.10	284.45	374.33	450.03	571.71
06100_MN_36.024	Thames (Mapledurham to Sonning) 2011	471380	174382	223.09	283.73	369.35	440.90	555.83
06100_MN_36.018	Thames (Mapledurham to Sonning) 2011	471579	174240	223.09	268.80	324.55	377.28	456.53
06100_MN_36.012	Thames (Mapledurham to Sonning) 2011	471796	174061	223.08	281.34	353.30	405.25	476.08

Modelled floodplain flood levels

OX_0795_01

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

2D grid cell reference	Model	Easting	Northing	flood levels (mAOD)				
				20% AEP	5% AEP	1% AEP	1% AEP with climate change allowance (+20% on river flows)	0.1% AEP
Floodplain 1	Thames (Mapledurham to Sonning) 2011	471,245	173,764					38.45
Floodplain 2	Thames (Mapledurham to Sonning) 2011	471,346	173,960				38.18	38.44

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