


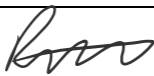
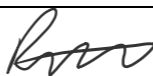

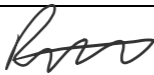
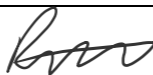


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**Kenley Campus, Victor  
Beamish Way**

Flood Risk Assessment

engineering a better society

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Revision:	P1	Prepared by:	Anthony Horswell MEng	Checked by:	Paul Chance CEng MICE	Approved by:	Paul Chance CEng MICE
Date:	16/06/2023	Signature:		Signature:		Signature:	
Revision:	P2	Prepared by:	Anthony Horswell MEng	Checked by:	Paul Chance CEng MICE	Approved by:	Paul Chance CEng MICE
Date:	27/06/2023	Signature:		Signature:		Signature:	

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- A Topographical Survey
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# One

## Terms of Reference

### 1.1 Introduction

Elliott Wood Partnership Ltd has been commissioned to produce a site-specific Flood Risk Assessment for the proposed development for an 87 home development at Kenley Campus, Victor Beamish Way, Caterham, CR3 5FX.

This report is intended to review all potential sources of flooding to the proposed development, evaluate the sensitivity of the site to flooding and consider the impact to the surrounding area that the development may cause.

This report has been carried out in accordance with the National Planning Policy Framework (NPPF), Tandridge Strategic Flood Risk Assessment, Surrey Preliminary Flood Risk Assessment (PFRA), and Surrey Local Flood Risk Management Strategy.

# Two

## Existing Site

### 2.1 Site Location

The site is located to the north of Caterham in Surrey. Directly adjacent to the north of the site is Kenley Aerodrome and to the east lies undeveloped land forest land. The site is bounded by residential buildings to the south and west. Located within the middle of the site boundary is a school, which is not included as part of this planning application.

The approximate site area of the site is 4.4ha with an OS Grid Reference (approximately at the centre of the site) of 533166, 157341. Refer to Figure 1 for a site location plan.



Figure 1: Site Location (Development site boundary shown in red)

### 2.2 Existing Development

Historically the site was used by the Royal Air Force (RAF) with various buildings and hard standing. Most of the buildings have since been demolished, although much of the northern part of the site is still underlain by concrete surfacing.

Historical imagery from 2003 (found in figure 2) shows the extents of hard surfacing prior to overgrowth which is seen in more recent imagery. The southern part of the site is currently used as a sports field.



Figure 2: Historical mapping of the site.

### 2.3 Existing Site Topography

A Topographical Survey has been undertaken by 360Geomatics in July 2021. The survey indicates ground levels fall to the northeast of the site, with levels varying from approximately 174m AOD falling to 171.5m AOD. Figure 3 below contains an extract of the existing topographical survey with a copy located in Appendix A.

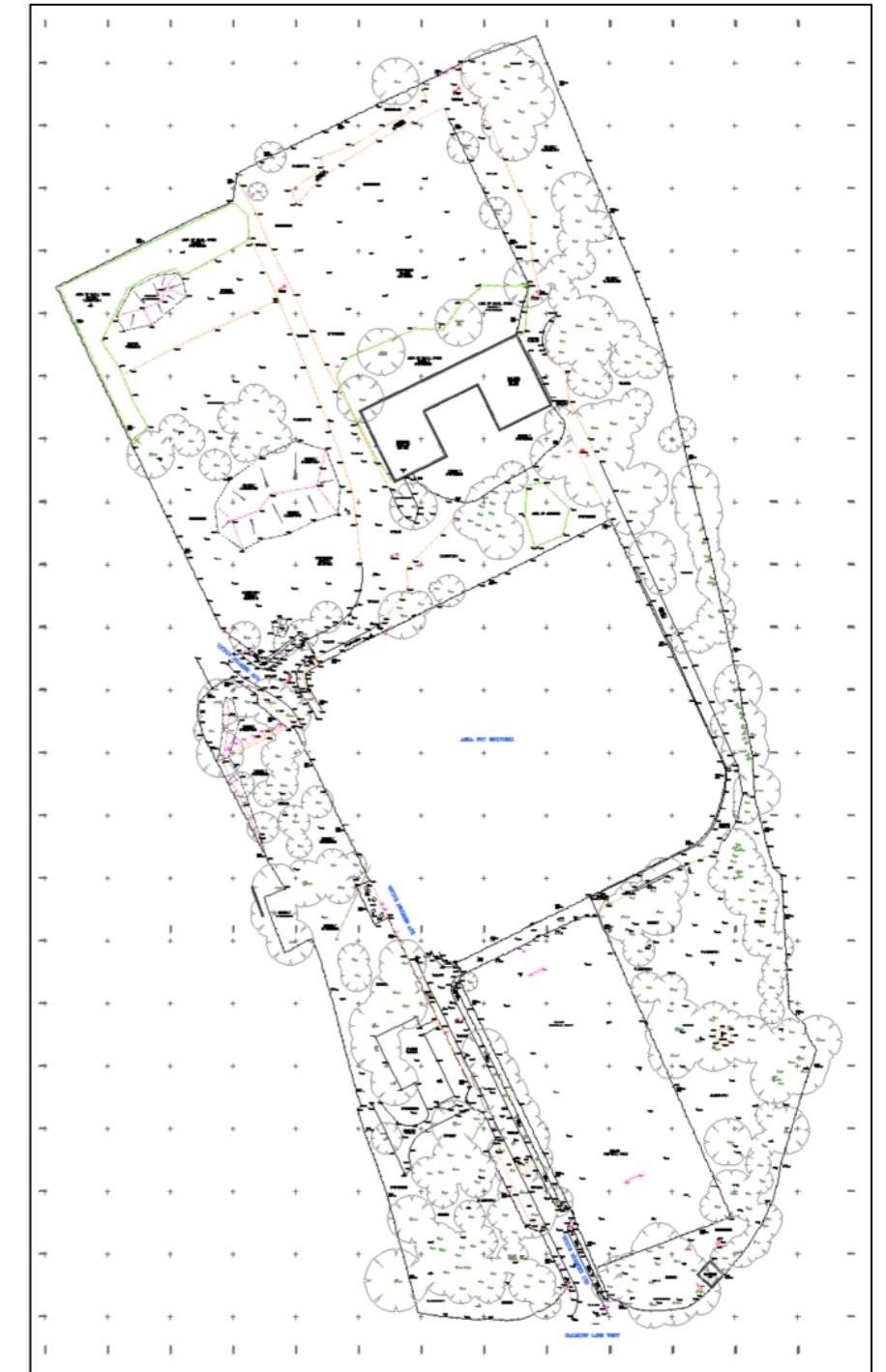


Figure 3: Topographical Survey

## 2.4 Underlying Geology

British Geological Society (BGS) records have been reviewed to understand the likely ground conditions and soil profile on site. The BGS map data indicates that the underlying bedrock is made up of Lewes Nodular Chalk Formation. Superficial deposits of Clay-with-flints Formation, which consist primarily of clay, silt, sand and gravel, are also expected.

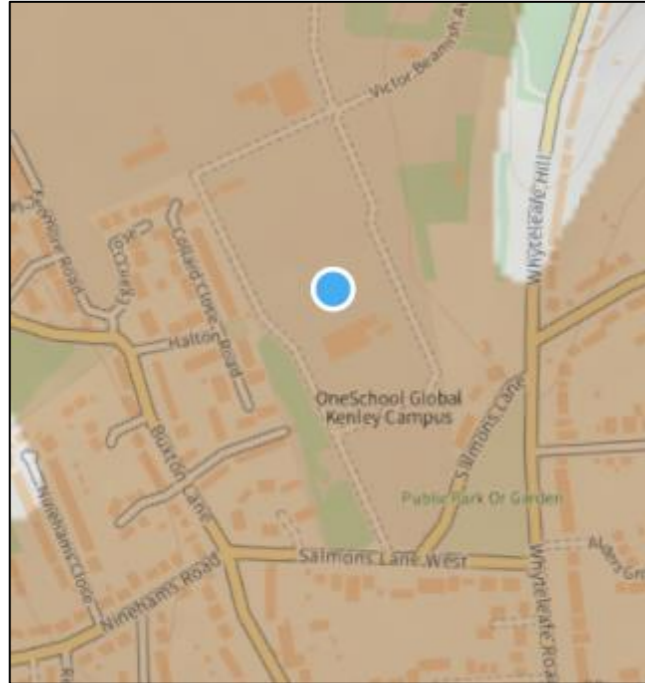


Figure 4: BGS Geology Data (Superficial)

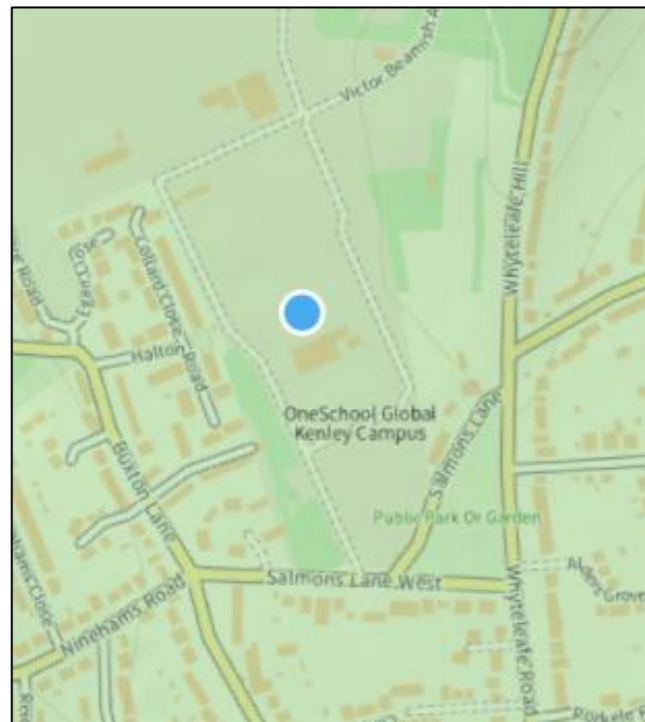


Figure 5: BGS Geology Data (Bedrock)

A site survey was conducted by CGL Ltd. The survey confirms the expected ground conditions and are recorded as clay-with-flints formation over White Chalk Subgroup.

## Three

### Proposed Development

The proposed development will consist of the construction of 87 homes, with associated gardens, roads and driveways and landscaping areas.

An extract of the proposed development can be seen below as Figure 6 with more detailed plans in Appendix B.



Figure 6: Proposed Site Layout

## Four

### Planning and Flood Risk Management Policy

It is important to assess the flood risk posed to the development of this site from all sources of flooding, in accordance with National Planning Policy Framework (NPPF), local and London Plan requirements.

The flood risk sources being considered as part of this FRA are as follows:

- Rivers and Sea
- Groundwater
- Overland Flow
- Infrastructure Failure / Sewer Flooding
- Flooding from Artificial Waterbodies

#### 4.1 Potential Sources of Flooding

Table 1 summarises the potential sources of flooding that could impact the development. These are assessed in detail within the following sections of this report.

Table 1: Potential Sources of Flooding

Flood Source	Mechanism	Site Impact
Tidal/fluvial	This is where extreme flood levels result in overtopping/breach of river defences, thus leading to tidal/fluvial flooding.	This may result in flood waters entering buildings via thresholds and other openings and flooding of external areas.
Groundwater	Rising groundwater within underlying aquifers	Rising groundwater levels could affect buildings or result in flooding of external areas if a pathway is available.
Surface Water Run-off from Heavy Storm Events	Surcharging of existing drainage networks leading to overland flows to the subject site.	This may result in flood water entering the buildings and affecting external areas.
Artificial Water Bodies	Structural failure of banks/structures serving artificial water bodies leading to rapid flood inundation. Overtopping of artificial water bodies.	Rapid flood inundation or flood waters from overtopping will lead to flood waters within external areas and may enter the buildings via low points and level thresholds.
Drainage / Infrastructure Systems	Blockages within site drainage systems or inadequate capacity within surrounding infrastructure to deal with extreme return periods.	Blockages or surcharging of public sewers will lead to surface / foul water flows backing up into site.

## 4.2 Tidal / Fluvial Flooding

National Planning Policy Framework (NPPF) defines the Flood Zone as follows:

- **Zone 1: 'Low Probability'** – This zone comprises of land assessed having a less than a 1 in 1000 annual probability of river or sea flooding (<0.1%) in any year.
- **Zone 2: 'Medium Probability'** – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.
- **Zone 3a: 'High Probability'** – This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- **Zone 3b: 'The Functional Floodplain'** – This zone comprises land where water must flow or be stored in times of flood. SFRA should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the environment Agency, including water conveyance routes).

Based on the EA data the site is located within Flood Zone 1. The closest area indicated at a higher risk of fluvial flooding is 1km to the northeast.

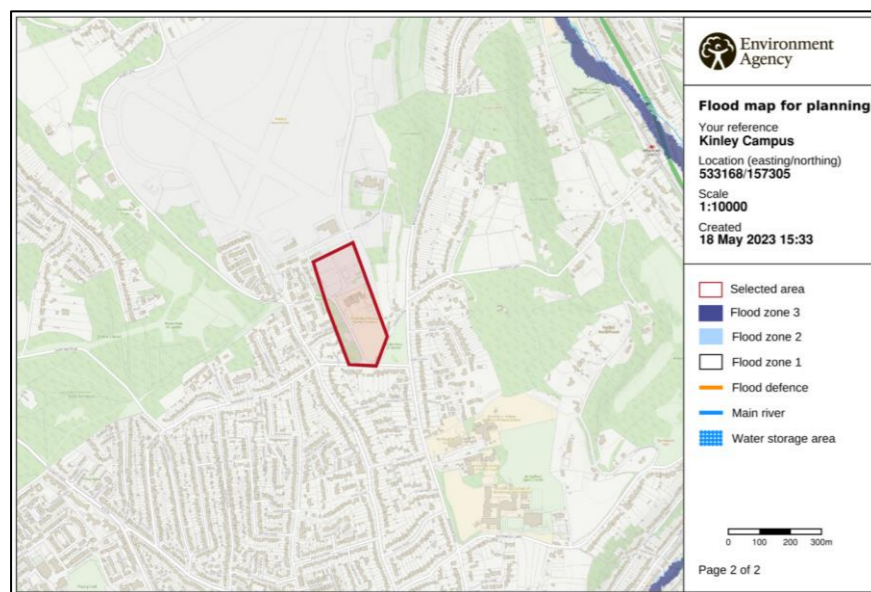


Figure 7: Extract of flood map for planning

## 4.3 Historic Flooding

The Tandridge Strategic Flood Risk Assessment (SFRA) provides mapping highlighting the historic flooding within the district. Their mapping is shown in Figure 8 and this indicates that there have not been any recorded incidents of flooding either in or directly adjacent to the site. However, there has been recorded incidents of flooding in the local area, with internal property flooding occurring on Buxton Road and Ninehams Road located approximately 160m to the west of the site.

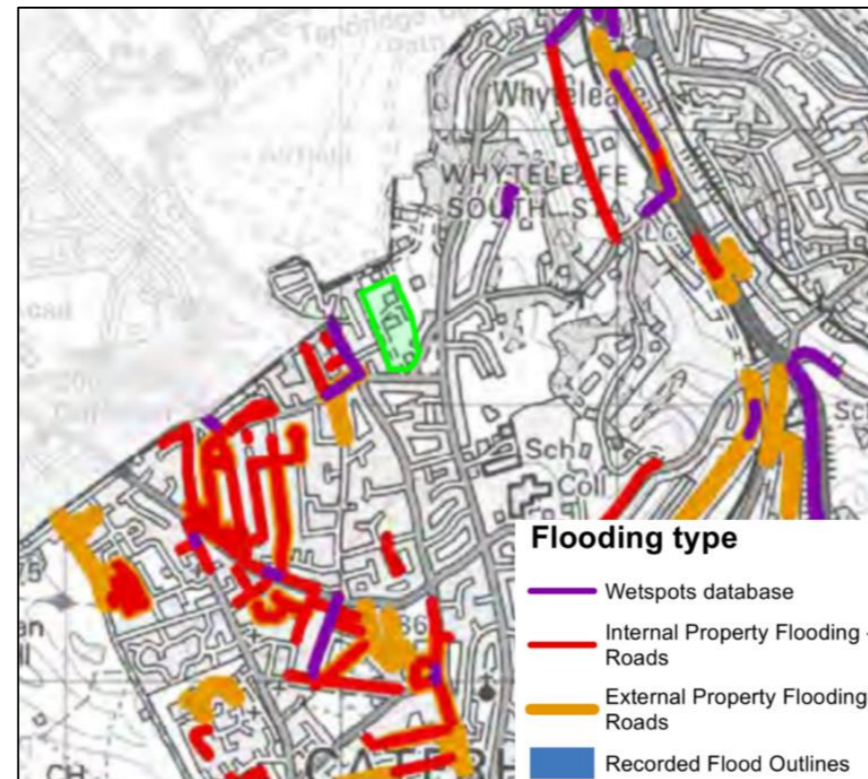


Figure 8: Historic Flooding (site shown in green)

## 4.4 Surface Water Flooding

Surface water flooding may occur during intense or prolonged rainfall events where there is insufficient capacity within the ground or the existing drainage infrastructure which leads to overland flows.

According to the EA Surface Water flood mapping, the majority of the site is at very low risk of flooding. However, there are areas indicated to be at low to medium risk of surface water flooding, although these areas of flooding appear to be confined to areas of existing hard standing, including the road which runs through the site and forms the boundary to the school.

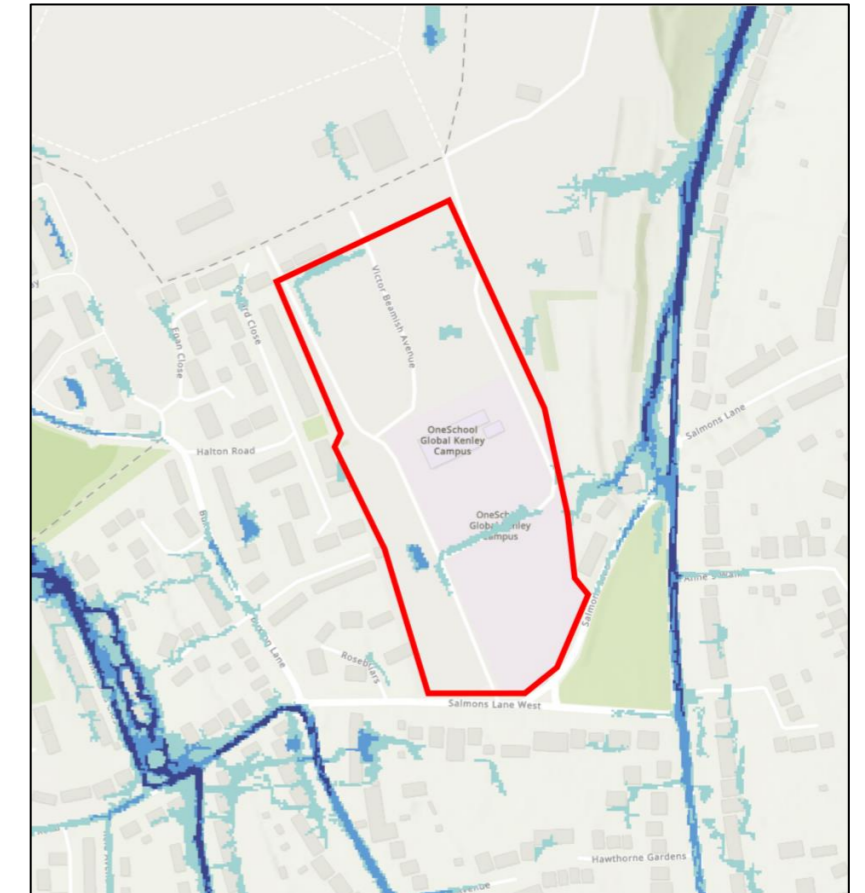


Figure 9: EA Surface Water Flood Map

## 4.5 Ground Water Flooding

Groundwater flooding occurs when water levels in the ground rise above surface levels. It is most likely to occur in areas underlain by permeable ground, called aquifers.

According to the DEFRA magic map, the site is located within a groundwater vulnerability area classed as 'Medium-High', as well as being located with a Zone II source protection zone.

The Tandridge SFRA indicates that the site is on the border between two areas. The west of the site is deemed to have negligible risk from groundwater, whilst the east side is at risk of subsurface flooding although surface flooding is deemed unlikely. This can be found below as Figure 10.

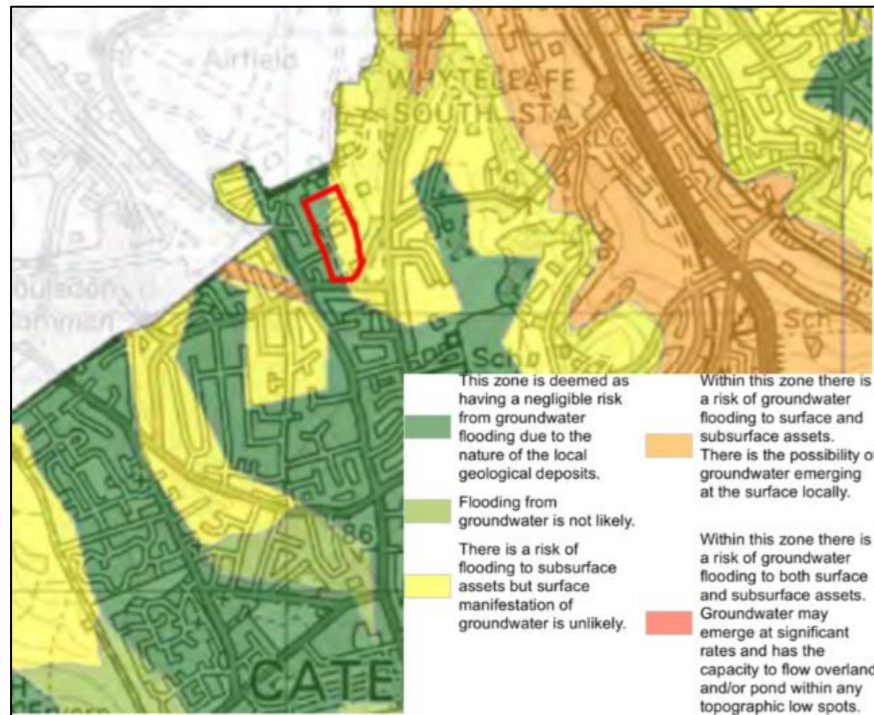


Figure 10: Ground Water Flood Incidents

#### 4.6 Sewer Flooding

Sewer flooding is usually localised and short lived, it can be caused by intense rainfall events overloading the capacity of the sewer, blockages, poor maintenance or structural failure of sewers.

Within the Tandridge SFRA it highlights postcode areas which have been affected by surface water flooding. This can be found below as Figure 11 below.

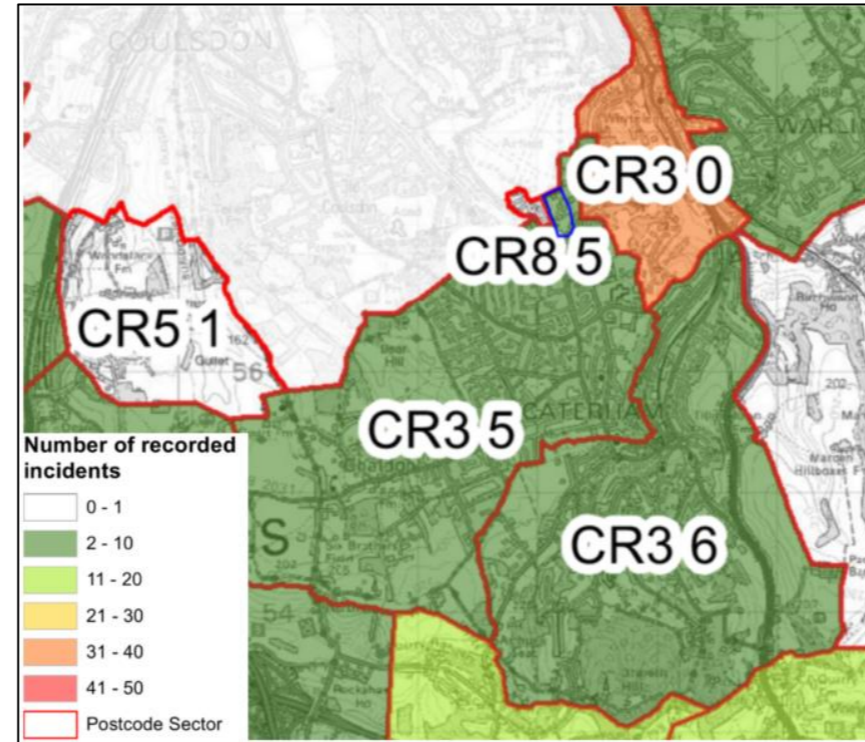


Figure 11: Sewer Flood Events (site shown in blue)

As shown, the CR3 5 post code in which the site is located has experienced a total of 2-10 recorded incidents of sewer flooding. The SFRA goes on to state that there has been a total of 3 incidents for the post code area.

#### 4.7 Reservoir Flooding

Reservoirs are artificially created lakes typically they are formed by building a dam across a river. If one of the dams failed then water could escape from the reservoir, resulting in land or property being flooded.

EA mapping for reservoir flooding is shown in Figure 12 and indicates that the site is not at risk of flooding from reservoirs.

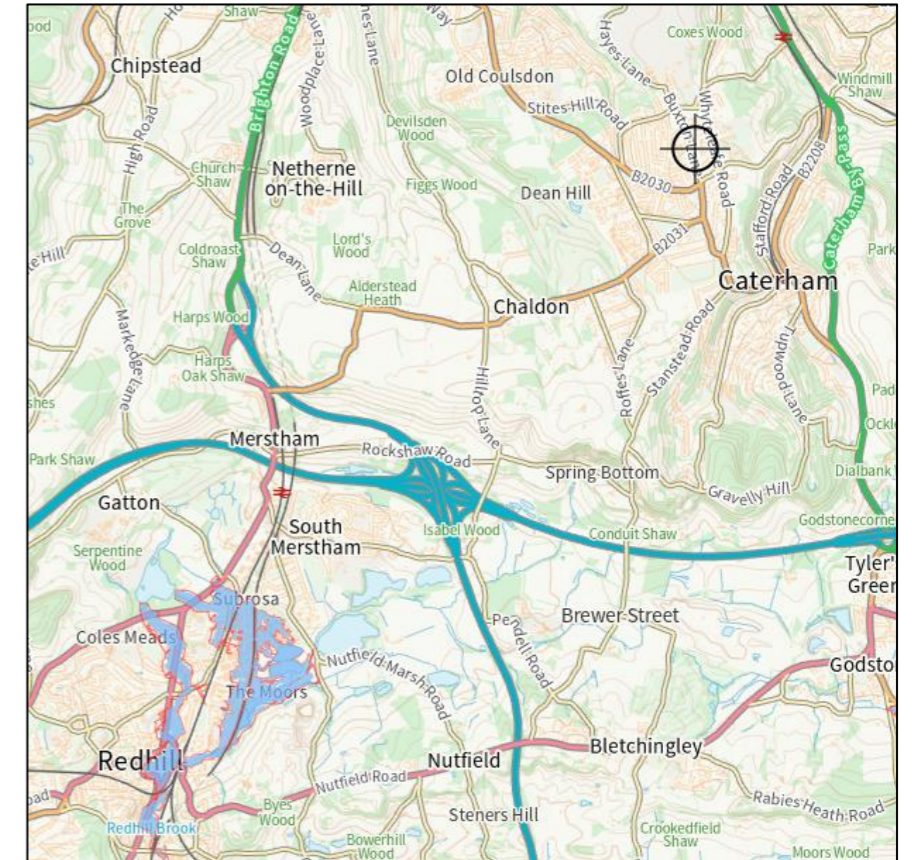


Figure 12: EA Reservoir Flood Mapping

# Five

## Flood Risk Vulnerability

### 5.1 Flood Risk Vulnerability Classification

The proposed development is residential therefore the vulnerability is classed as more vulnerable in line with PPG.

### 5.2 Flood Risk Vulnerability and Flood Zone Compatibility

The site is located within Flood Zone 1 therefore when considering the flood zone compatibility (as shown in Table 2), the development is permitted.

Flood risk vulnerability classification	Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Zone 1	Yes	Yes	Yes	Yes	Yes
Zone 2	Yes	Yes	Exception Test required	Yes	Yes
Zone 3a	Exception Test required	Yes	No	Exception Test required	Yes
Zone 3b functional floodplain	Exception Test required	Yes	No	No	No

Table 2 – Flood Zone Compatibility

# Six

## Mitigation Measures

As is good practice building levels should be set a minimum of 150mm above adjacent ground levels.

# Seven

## Surface Drainage Strategy

Surface water discharge shall be managed to mimic greenfield conditions as closely as possible. Drainage proposals can be found in a separate surface water management report produced by Elliot Wood Partnership Ltd references as 2220481-EWP-ZZ-XX-RP-C-0001-SuDS for the surface water drainage proposals.

# Eight

## Conclusion

The proposed development is located to the north of Caterham, Surrey. The site will comprise of 87 homes across an area of 4.4ha.

The site is located solely in Flood Zone 1, and it is deemed to be at low risk from tidal and fluvial flooding, sewers, and artificial water bodies. The east of the site is noted from the SFRA as being at risk of ground water flooding for subsurface structures and there are areas of low to medium risk of surface water flooding.

Limited mitigation measures are required however ground floor levels for buildings shall be elevated a minimum of 150mm above ground levels and surface water will be managed through the inclusion of SuDS as outlined in a separate report referenced 2230131-EWP-ZZ-XX-RP-C-0002 SuDS Report.



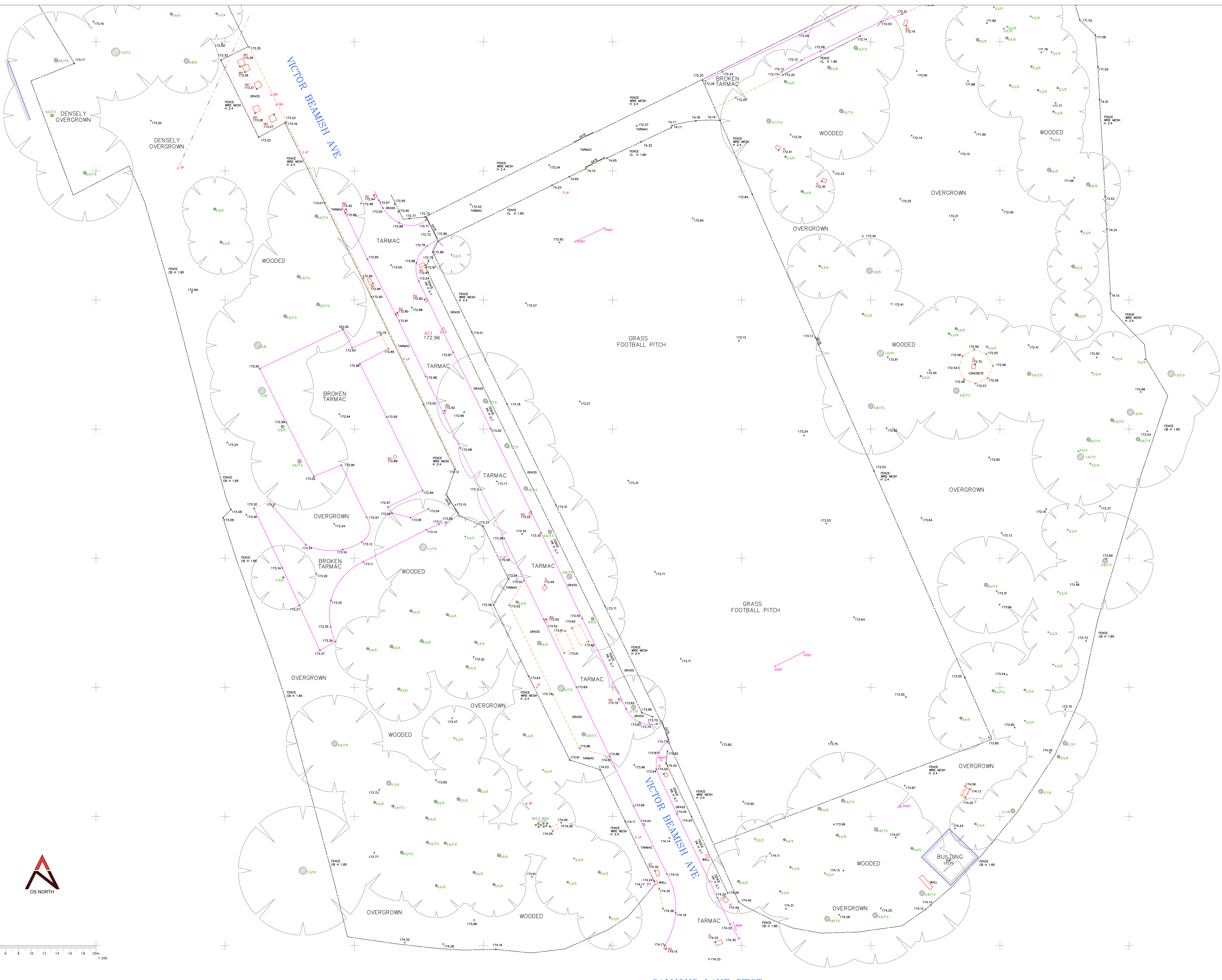
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## **Appendices**

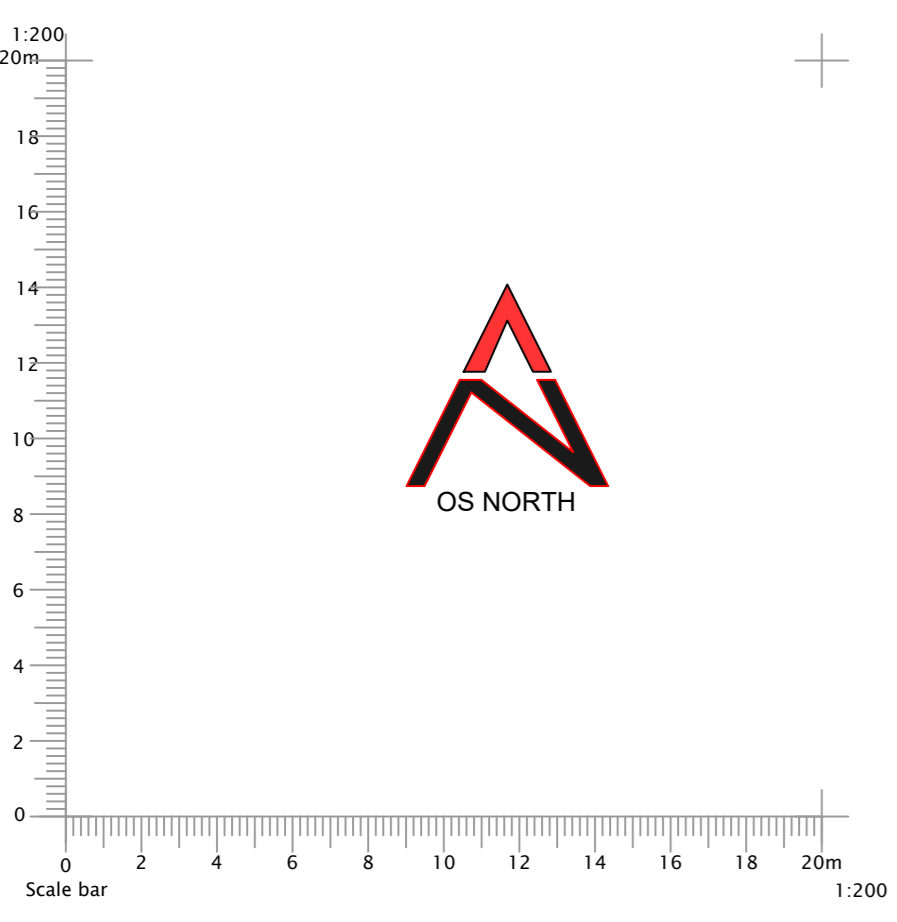
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A Topographical Survey



SALMONS LANE WEST



Station	Eastings	Northings	Level	Description
STN A1	533152.364	157363.261	172.83	Nail
STN A2	533156.367	157448.836	172.12	Nail
STN A3	533171.894	157512.032	171.90	Nail
STN A4	533182.217	157442.111	171.33	Nail
STN A1A	533213.103	157364.859	172.64	Nail
STN A1O	533221.109	157323.651	173.35	Nail
STN A11	533173.817	157219.213	172.96	Nail

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Level datum: Ordnance Datum Mean (ODM).  
All levels on earth lines are channel levels unless noted otherwise.

ARR	Assumed Route	MR	Marker
BR	Broadside	MT	Memory Telecom Cover
BOL	Bolt	OH	Overhead Cable
BT	Belted Telecom Cover	OH	Overhead Pipe
BW	Belted Wire Fence	OSM	Ordnance Survey Bench Mark
BWX	Brickwork	PS	Post Box
CATV	Cable TV Cover	PGM	Permanent Ground Marker
CB	Chain Banded Fence	PI	Post & Rail Fence
CCTV	Closed Circuit TV	PW	Post & Wire Fence
CLK	Chances Fence	PW	Post & Wire Fence
CHFL	Chained Paling Fence	RF	Road Fyke
CL	Chain	R	Road
CM	Cable Marker	RS	Road Sign
CP	Cable Pin	RS	Road Sign
CR	Cable Reel	RS	Road Sign
CR	Calc Pipe	RS	Road Sign
DA	Diameter	RWP	Rain Water Pipe
DA	Down Pipe	SAP	Spigot
DP	Down Pipe	SC	Stop Cock
ESB	Electricity Junction Box	SFB	Spigot
EC	Electricity Cover	STA	Station
EP	Electricity Pipe	SV	Stop Valve
ER	Earthing Rod	SVF	Soil Vent Pipe
EX	Excavation	SV	Stop Valve
FG	Feed into Ground	TB	Telephone Box
FM	Four Meter	TEMP	Temporary Bench Mark
GU	Guillotine	TFR	Taken From Records
GV	Gas Valve	TLS	Temporary Level
H	Height	TJ	Temporary Junction
IC	Inspection Cover	TSS	Tank Filling Station
IR	Iron Rod	TLS	Temporary Level
IR	Iron Rod	TLS	Temporary Level
IS	Iron Stake	UP	Under Pipe
IS	Iron Stake	UP	Under Pipe
LB	Lead Bolt	UP	Under Pipe
LC	Lead Chain	UP	Under Pipe
LP	Lamp Post	WMC	Water Key Hole
LP	Lamp Post	WMC	Water Meter
MH	Manhole	WV	Water Valve
		WV	Water Valve
		WV	Water Valve

Sheet 1	Sheet 2	Sheet 3
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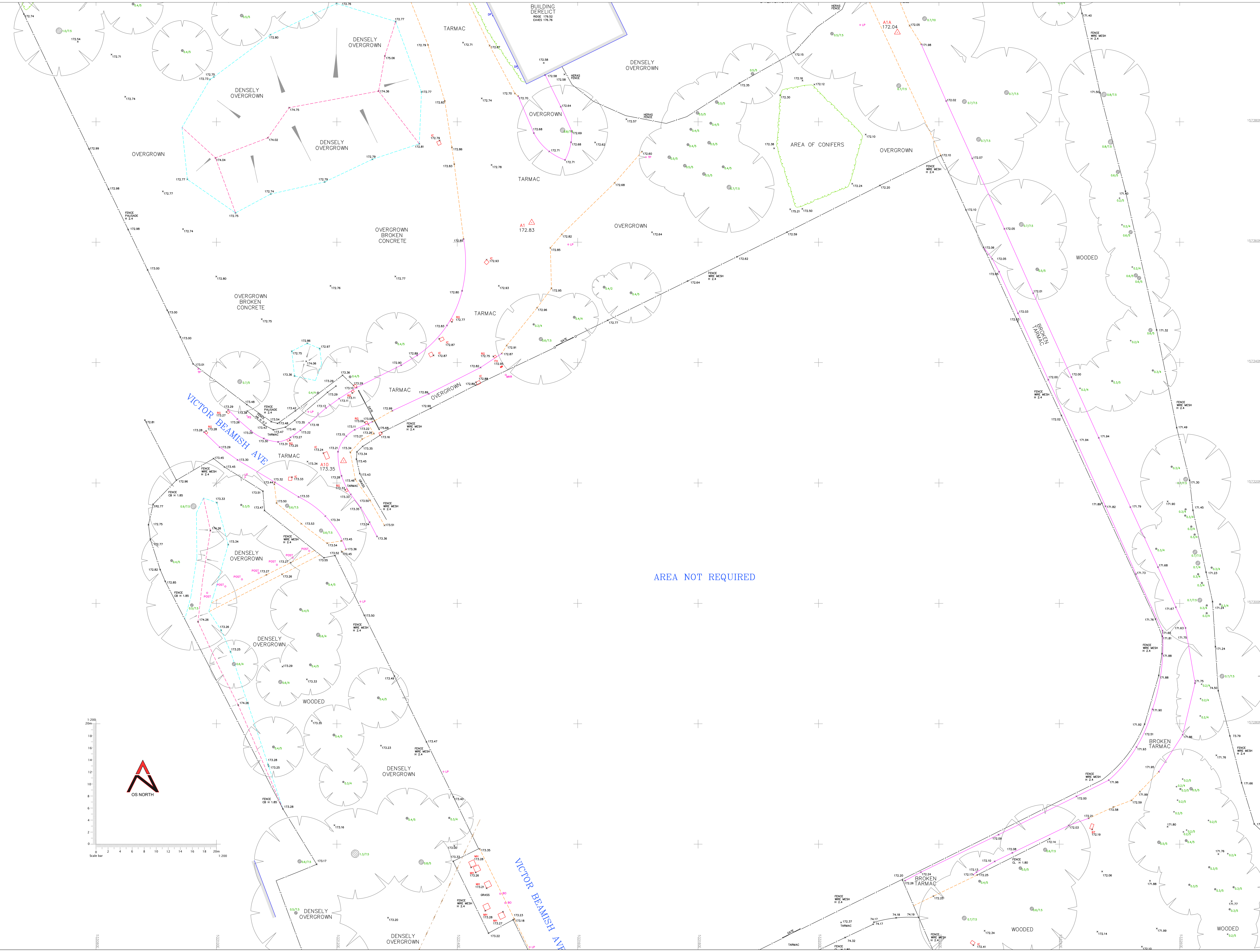
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STN A2	53116.367	157448.836	172.12	Nat
STN A3	53171.984	157512.032	171.90	Nat
STN A4	53162.217	157442.111	171.33	Nat
STN A1A	53123.103	157394.859	172.04	Nat
STN A10	53121.106	157323.651	173.35	Nat
STN A11	53173.817	157215.213	172.96	Nat

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**Abbreviations (where applicable)**

ARR	Assumed Route	MR	Marker
BR	Boulder	MT	Memory Telecom Cover
BOL	Bolton	OHC	Overhead Cable
BT	British Telecom Cover	OH	Overhead Pipe
BWF	Balloon Wire Fence	OSBM	Ordnance Survey Bench Mark
BWSK	Bracon	PS	Post Box
CATV	Cable TV Cover	PGM	Permanent Ground Marker
CB	Chain Branded Fence	PS	Post & Rail Fence
CCTV	Closed Circuit TV	PW	Post & Wire Fence
CK	Chassis Fence	PWM	Post & Metal Fence
CHFL	Chassis Fencing	RE	Road Edge
CL	Cable Marker	RH	Road Header
CP	Cable Post	RS	Road Sign
CR	Cable Marker	RS	Road Sign
CS	Case Studies	RVP	Rain Water Pipe
DA	Diameter	SAP	Step
DK	Drop Stick	SF	Stop Cock
DP	Down Pipe	SFP	Service Pipe
ESB	Electricity Junction Box	SFS	Service Station
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IS	Iron Stake	UTL	Under Line
LB	Level Bolt	UT	Under To Trace
LC	Lamp Column	VP	Vertical Post
LP	Lamp Post	W04	Water Key Hole
M	Manhole	W6	Water Meter
WV	Water Valve	WV	Water Valve
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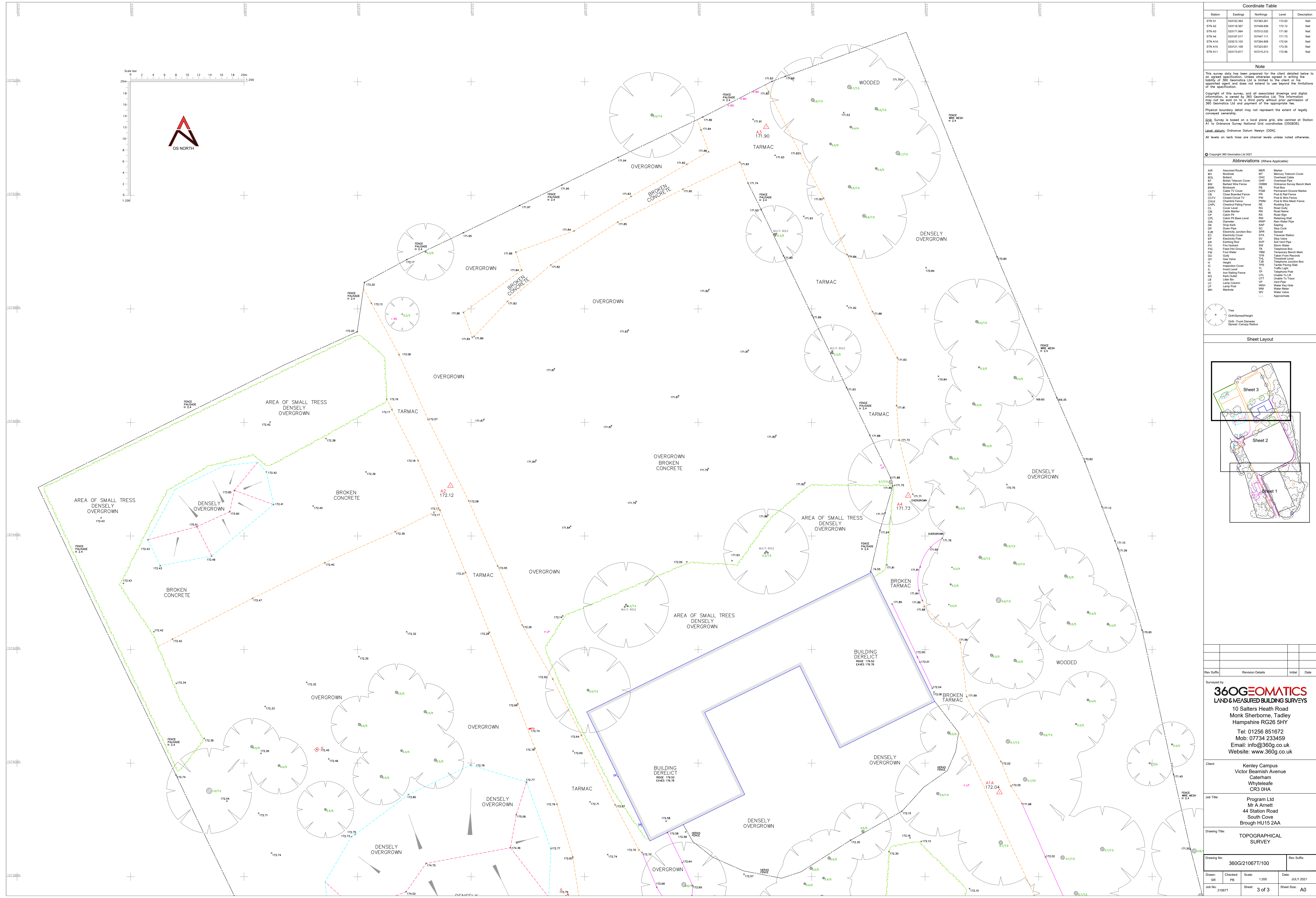
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 10 Salters Heath Road  
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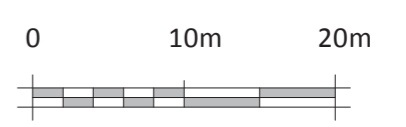
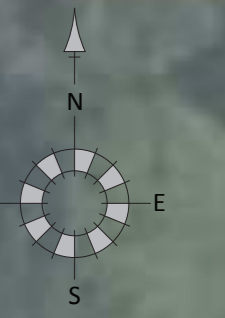
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 SR      PB      Scale: 1:200      Date: JULY 2021

Job No:  
 21067T      Sheet: 3 of 3      Sheet Size: A0

**B** Proposed Site Layout



Colour Site Layout  
Kenley Campus  
**21125 / C104**

Scale 1:500 @ A1 June 2023



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**London**

55 Whitfield Street  
Fitzrovia  
W1T 4AH  
+44 207 499 5888

**Wimbledon**

241 The Broadway  
London  
SW19 1SD  
+44 208 544 0033

**Nottingham**

1 Sampsons Yard  
Halifax Place  
Nottingham  
NG1 1QN  
+44 870 460 0061

[www.elliottwood.co.uk](http://www.elliottwood.co.uk)