Flood Risk Assessment

Proposed Retirement Living
76-78 High Street, Tonbridge, Kent
AMA823 Rev 0
May 2021

Prepared for:
McCarthy and Stone Retirement Lifestyles Limited

amazi

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Prepared by Leigh Parratt
BEng(Hons) CEng MICE CWEM MCIWEM PCHEP FHEA

Revision 0 17 May 2021

1 Introduction

1.1 Amazi Consulting Ltd has been instructed by McCarthy and Stone Retirement Lifestyles Limited to prepare this Flood Risk Assessment (FRA) associated with the proposed retirement living development at 79-78 High Street, Tonbridge, Surrey TN9 1EE.

1.2 This FRA has been prepared in accordance with National Planning Policy Framework (NPPF), June 2019, and its accompanying gov.uk Planning Practice Guidance (PPG): *Flood Risk and Coastal Change* (2016). It is expected that this report will be reviewed by the relevant authorities as part of the documentation submitted for full planning permission, and the reader will have some understanding of the technical issues relating to development and flood risk.

1.3 This FRA report has been prepared for the sole use of McCarthy and Stone Retirement Lifestyles Limited and its contents cannot be copied or relied upon by others, other than as noted above, without the written authority of Amazi Consulting Ltd.

1.4 This FRA focuses upon the flood risks to the site. It has been undertaken as a desk study and refers to flood data from other sources. The site surface water drainage has been assessed separately by Infrastructure Design Ltd. This report does not attempt to comment upon the Sequential Test, insurance or for flood events other than as stipulated by planning policy.

2 Site Description

2.1 Existing

2.1.1 The 0.201 hectare (ha) development site is centred at approximate Ordnance Survey (OS) national grid reference 558930 mE, 146400mN. The site location is shown on the plan in Appendix A and in Figure 2.1. The River Medway is routed near to the west and north site boundaries. A short distance south of the site is Botany Stream.

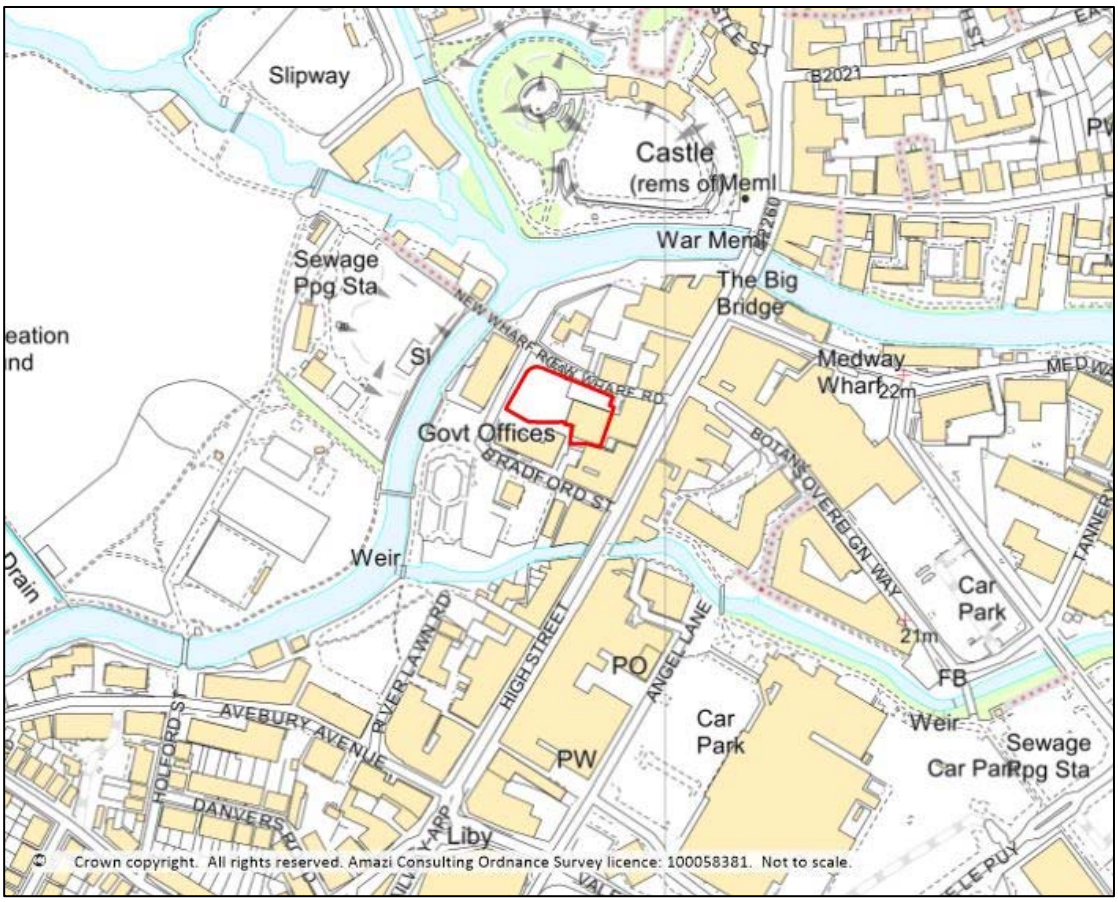


Figure 2.1 - Site location

2.1.2 The site is within the jurisdiction of Tonbridge and Malling Borough Council and Kent County Council.

2.1.3 The existing site levels are given on the site topographical survey in Appendix B. The levels shown on the survey relate to OS GPS datum (mAOD). The existing site levels vary from 22.03 to 22.63 mAOD, but generally the majority of the site is relatively level. Figure 2.2 shows the local topography.

2.1.4 The existing site comprises hard surfacing at the west end and a retail unit to the east. The retail unit goes beyond the extent of the planning application boundary.

2.1.5 The existing land use is classified as *less vulnerable* in accordance with Table 2 of the NPPF Planning Practice Guidance (Reference ID: 7-066-20140306).

*Refer to NPPF Table in Appendix D

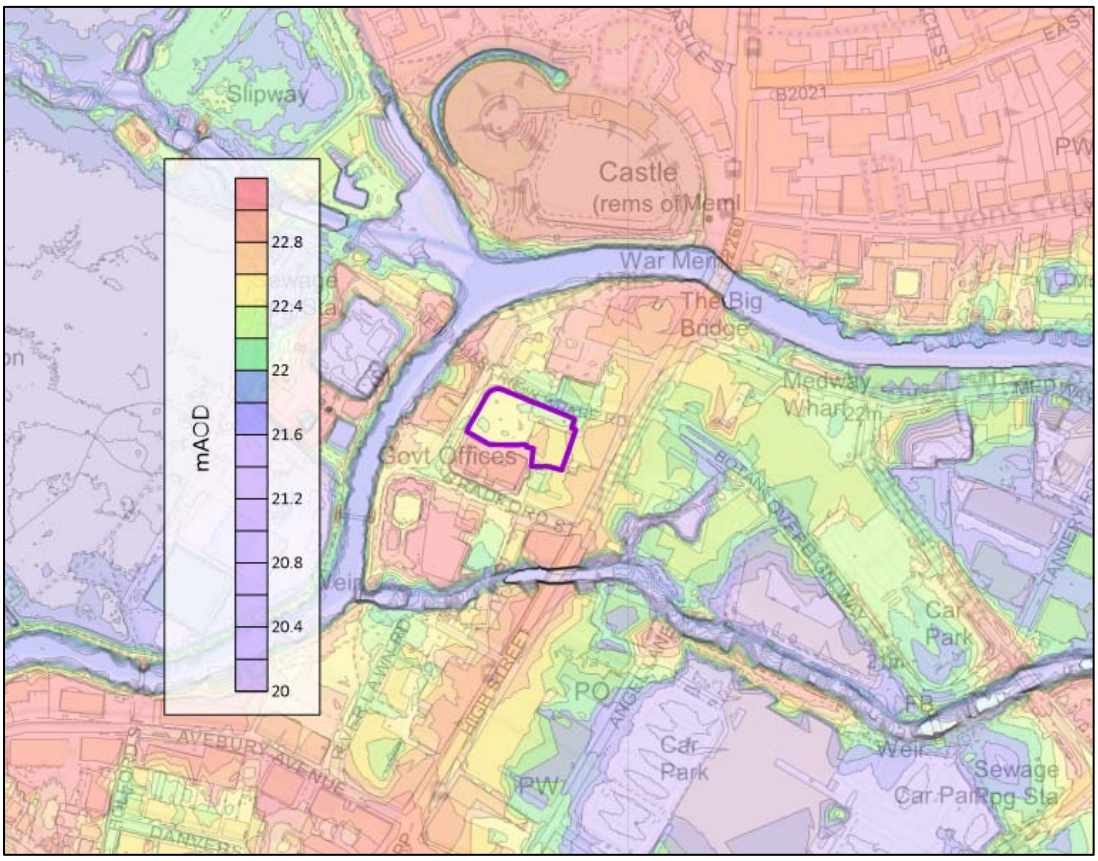


Figure 2.2 - Local contours
(Source: TQ54ne_DTM_1m.tif)

2.2 Proposed

2.2.1 The proposed development is shown on the drawings in Appendix C and comprises the construction of 36 living apartments (20 x 1bed, 16 x 2bed) with associated car parking provision.

2.2.2 Proposed levels are shown on Infrastructure Design Ltd drawing in Appendix E. The proposed floor levels are:
Ground floor west (reception, office, amenity space) = 22.475 mAOD
Ground floor east (Stairwell) = 22.175 mAOD
First floor = c25.5 mAOD

2.2.3 Current best practice indicates that the design life of a residential development should be 100 years. The year 2121 is therefore considered appropriate in assessing the possible impacts of climate change upon flood risk.

2.2.4 The proposed site use is classified as *more vulnerable* in accordance with Table 2 of the Planning Practice Guidance (Reference ID: 7-066-20140306). The proposed retirement living development site is fully within flood zone 1*. An extract from Table 3 of the Planning Practice Guidance (Reference ID: 7-067-20140306) given below indicates in red the appropriate nature of the site's development's classification.

*See Appendix D

(For flood zone information, refer to section 3.1.)

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓*

Key:

✓ Development is appropriate

X Development should not be permitted.

3 Fluvial Flooding

3.1 Flood Zones

3.1.1 As shown in Figure 3.1, the site lies fully within flood zone 3*.

*Refer to Appendix D.

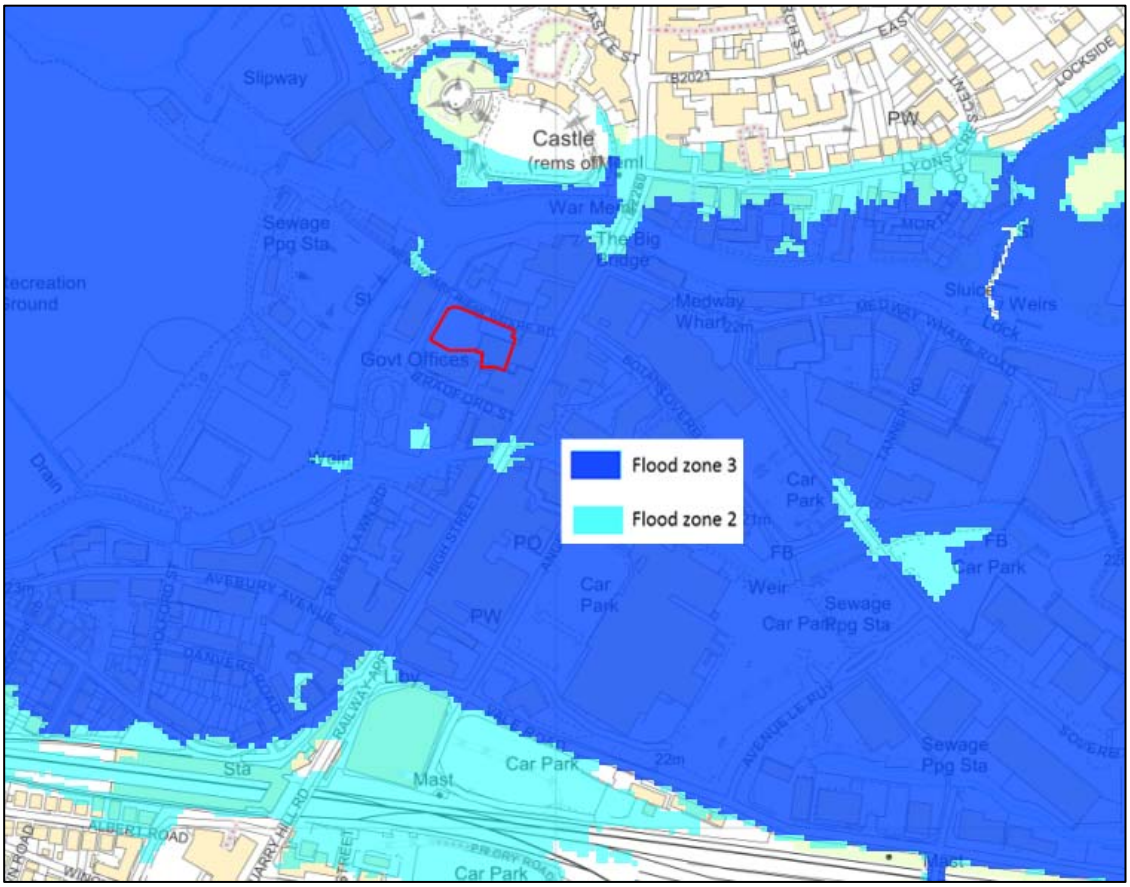


Figure 3.1 - Flood Zones

(Source: Flood_Map_for_Planning_Rivers_and_Sea_Flood_Zone_2.shp & Flood_Map_for_Planning_Rivers_and_Sea_Flood_Zone_3.shp, downloaded 05 May 2021)

3.2 Flood Defences

3.2.1 Figure 3.2 shows the Environment Agency flood defence data. There are defences around the east/south bank of the River Medway west of the site, but no raised defences to the north or east of the site. The lowest being a wall with a crest level of 21.5 mAOD. The Botany Stream has high ground at its north bank.

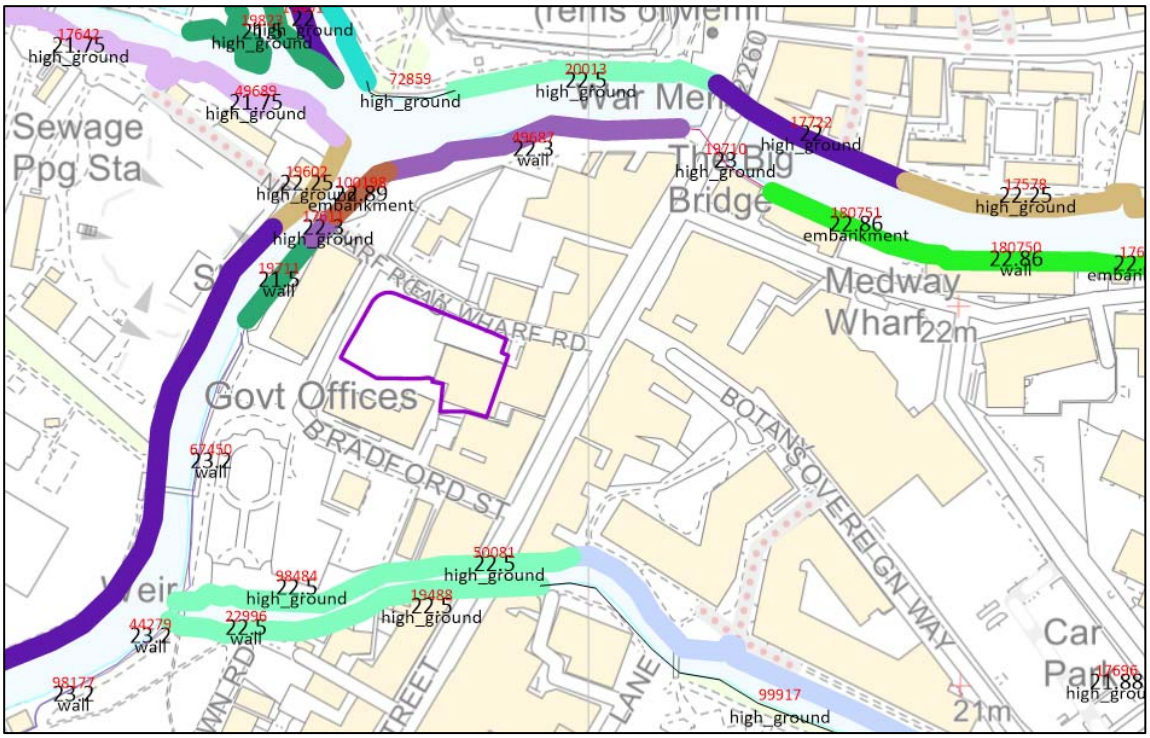


Figure 3.2 - Flood defences (reference, crest heigh and type)

(Source: Spatial_Flood_Defences_Including_Standardised_Attributes.shp, 05 May 2021)

3.3 Flood Levels

3.3.1 The Environment Agency has provided results from its hydraulic modelling of the River Medway (Ref: KSL 215277 AC). We have used this flood model output data within GIS software to create Figures 3.3 to 3.10. A summary of the resulting peak flood levels is given in Table 3.1.

3.3.2 The climate change allowances included in the Environment Agency modelling as compatible with the current Gov.uk *Flood risk assessments: climate change allowances*, July 2020.

Table 3.1 - Predicted peak flood levels at site (mAOD)*

	Defended	Undefended
1:20	22.4 (in river channel, site remains dry)	-
1:100	22.62	23.28
1:100 + 35% CC	23.43	23.60
1:100 + 70% CC	23.84	-
1:1,000	24.03	24.33

CC = climate change

*Exact flood levels taken from electronic .asc file along site's west boundary, i.e. peak flood level at site. Predicted flood levels at the east of the site are lower, but for the purpose of this assessment, the peak levels only have been used as a precautionary approach.

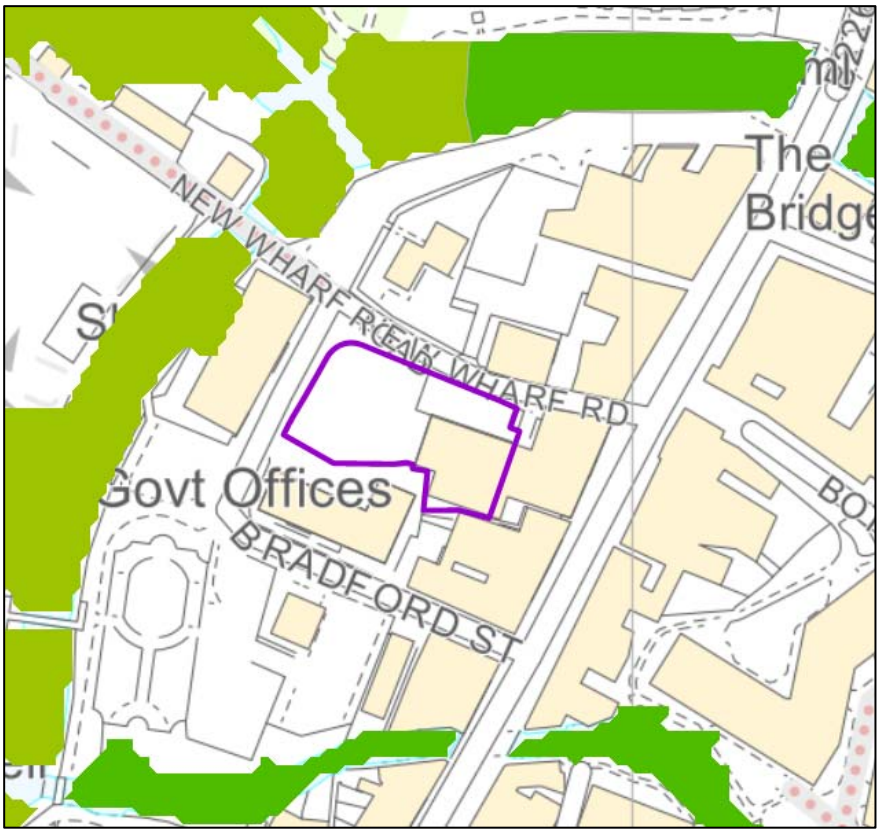


Figure 3.3 - Floodplain & 1:20 year flood extent – defended (mAOD)
(Source: Medway_Model2_101_Def_0020_26FEB34932000_hMax.asc)

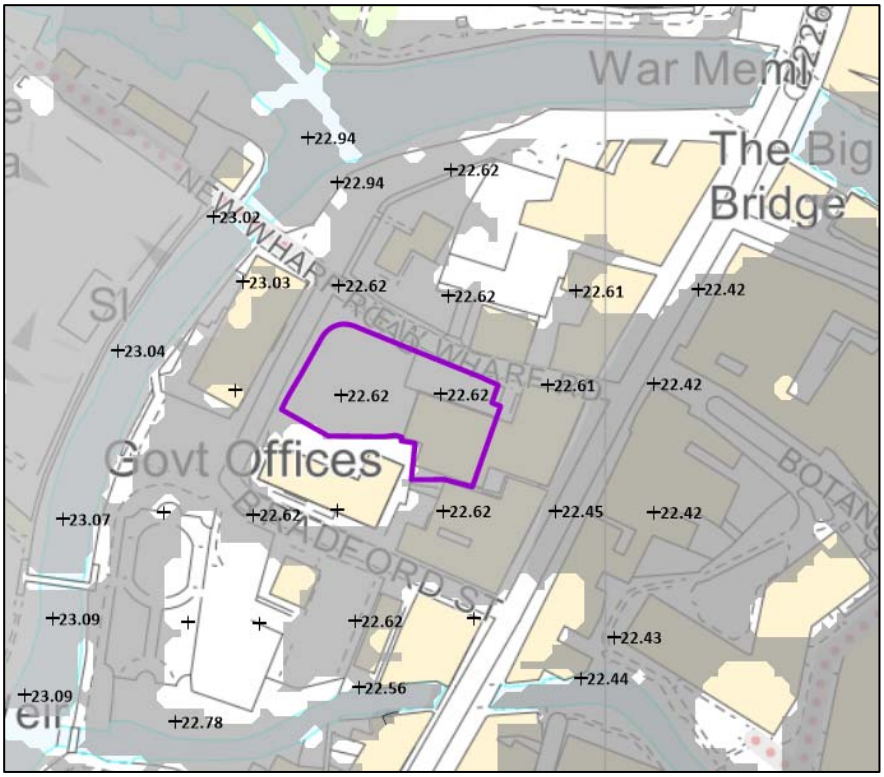


Figure 3.4 - 1:100 year defended flood extent and peak flood levels (mAOD)
(Source: Medway_Model2_101_Def_0100_27NOV43551900_hMax.asc)

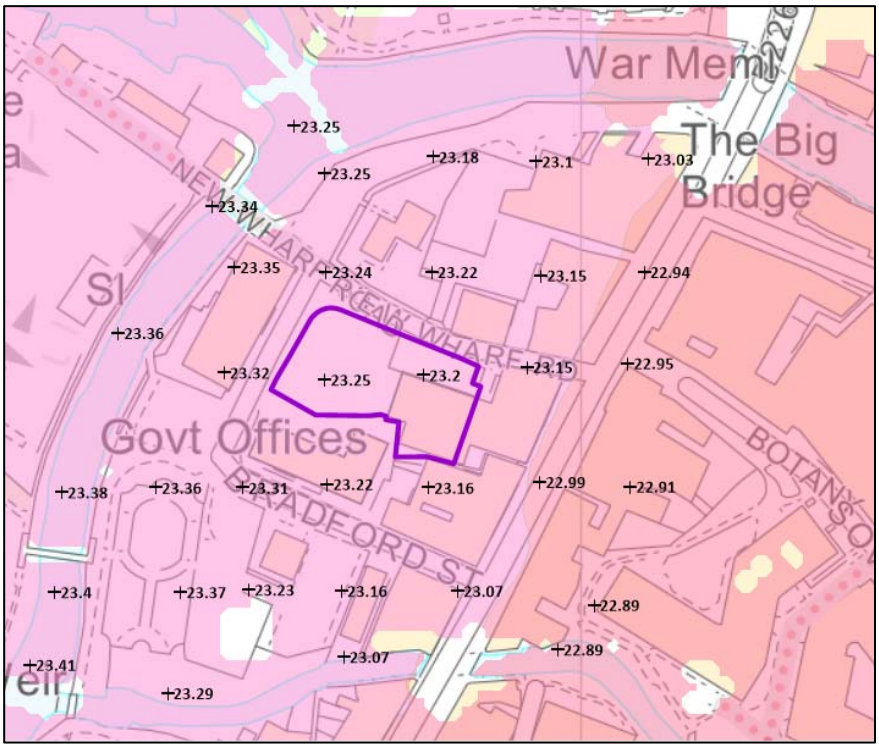


Figure 3.5 - 1:100 year undefended flood extent and peak flood levels (mAOD)
(Source: Medway_Model2_101_Und_0100_18FEB54602100_hMax.asc)

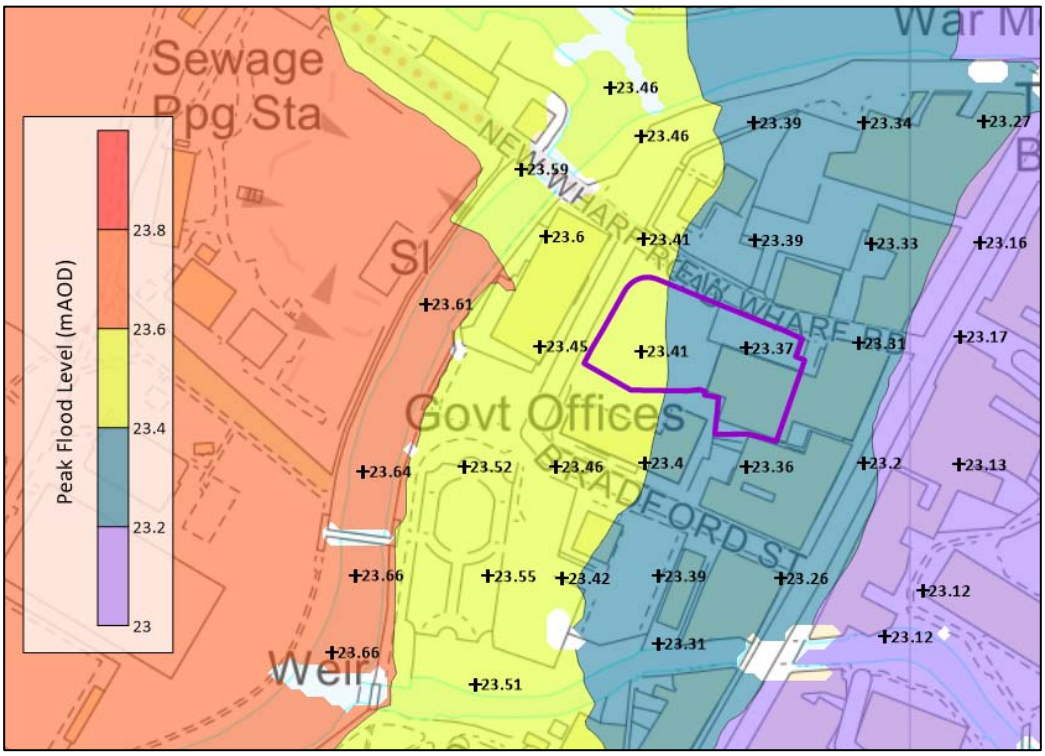


Figure 3.6 - 1:100 + 35% CC defended flood extent and peak flood levels (mAOD)
(Source: Medway_Model2_101d_Def_0100PLUS35PC_17JAN58611100_hMax.asc)

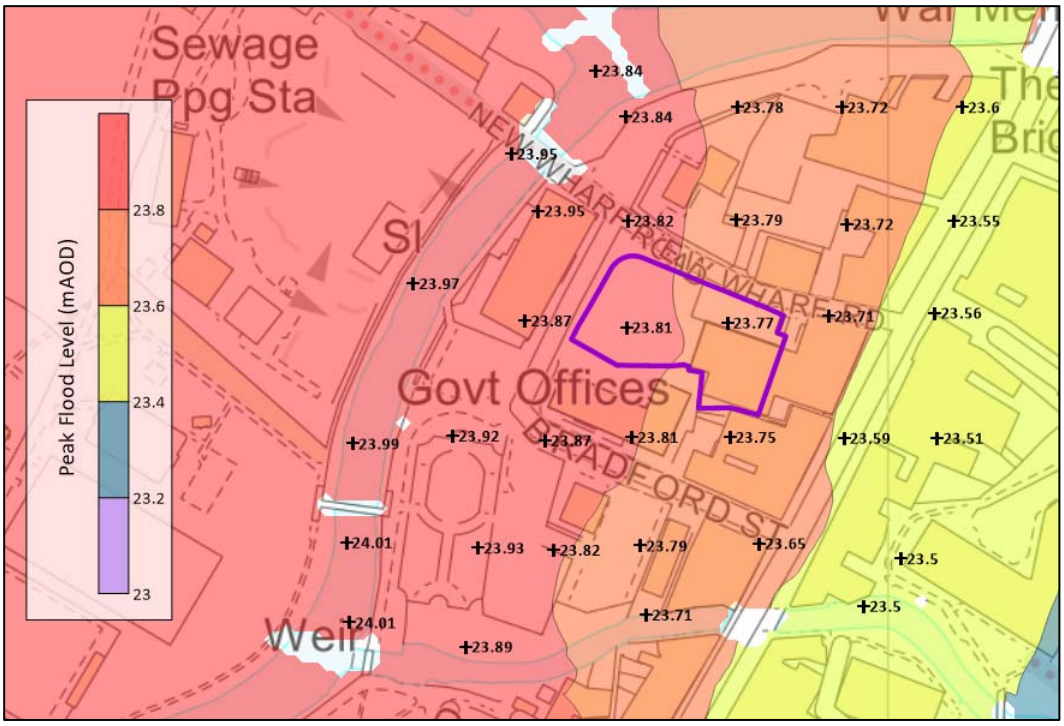


Figure 3.7 - 1:100 + 70% CC defended flood extent and peak flood levels (mAOD)
(Source: Medway_Model2_101d_Def_0100PLUS70PC_17JAN58611100_hMax.asc)

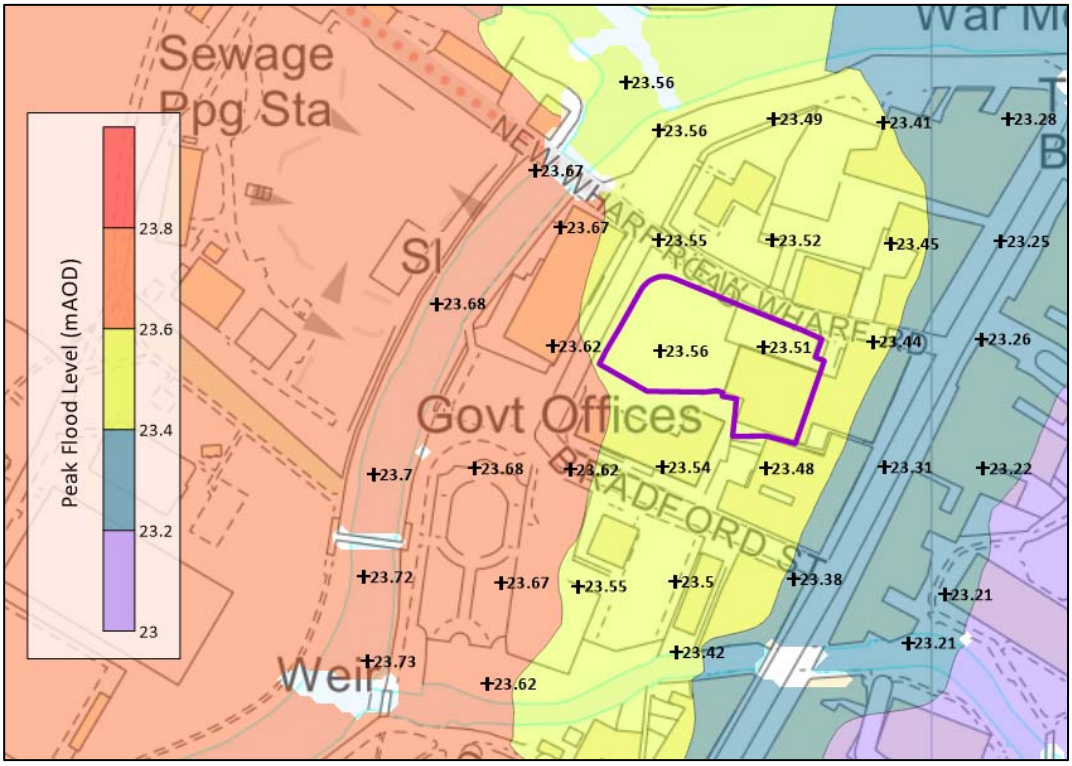


Figure 3.8 - 1:100 + 35% CC undefended flood extent and peak flood levels (mAOD)
(Source: Medway_Model2_101d_Und_0100PLUS35PC_14DEC58021600_hMax.asc)

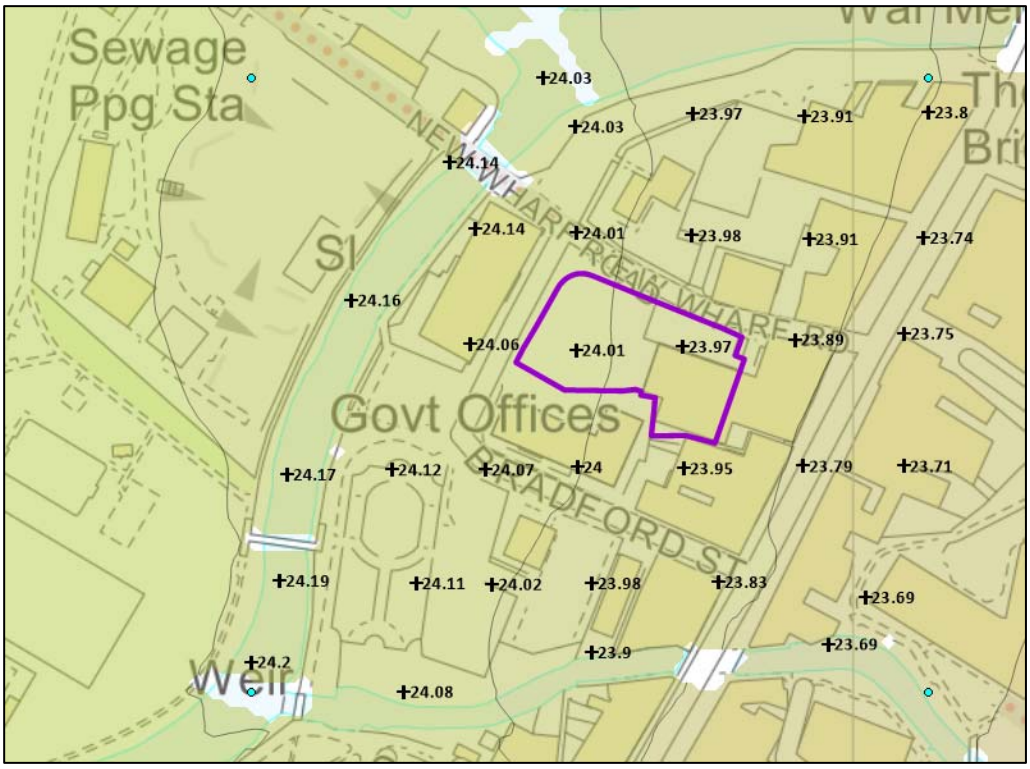


Figure 3.9 - 1:1,000 defended flood extent and peak flood levels (mAOD)
(Source: Medway_Model2_101d_Def_1000_01JAN31620200_hMax.asc)

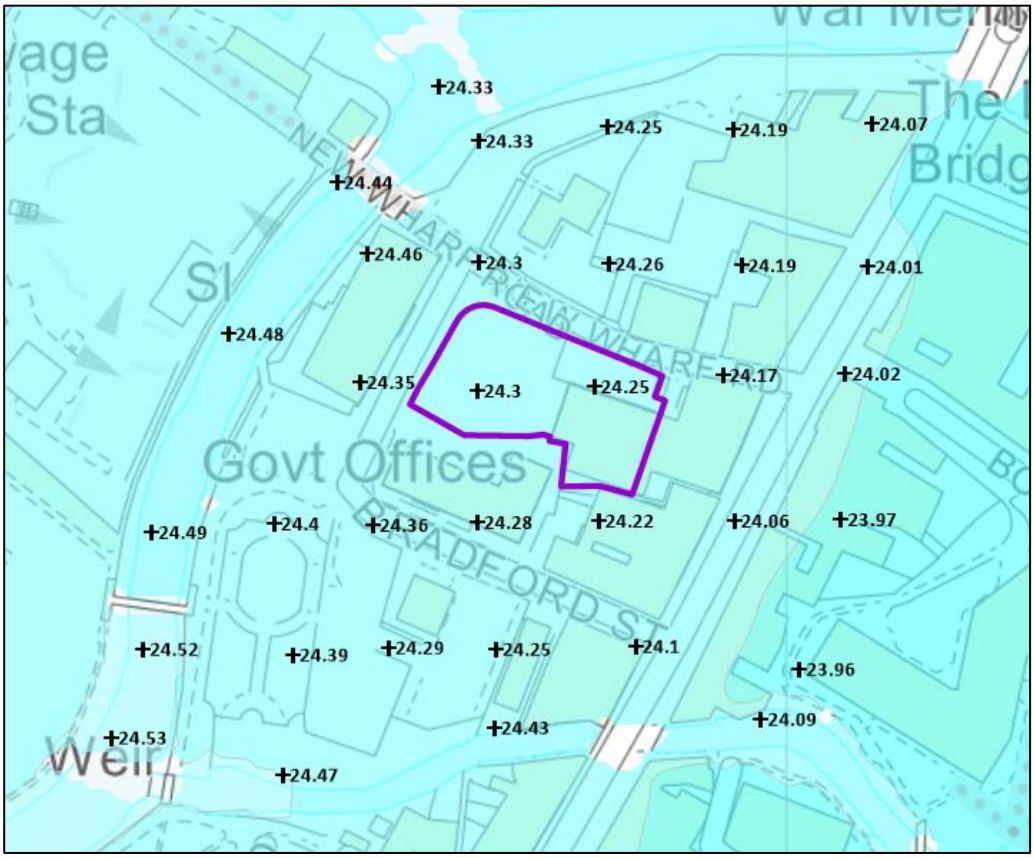


Figure 3.10 - 1:1,000 undefended flood extent and peak flood levels (mAOD)
(Source: Medway_Model2_101d_Und_1000_02JAN32620000_hMax.asc)

3.3.3 Comparing the proposed site floor levels with the predicted flood levels (defended situation):

- Ground floor west (reception, office, amenity space) = 22.475 mAOD:
  The 1:100 year flood level is 22.62 mAOD. So these proposed ground floor areas are 0.145 m below this flood level.
  The 1:100 year plus climate change peak flood levelis 23.43 mAOD. So these proposed ground floor areas are 0.955 m below this flood level.
  The 1:1,000 year flood level is 24.03 mAOD. So these proposed ground floor areas are 1.555 m below this flood level.

- Ground floor east (Stairwell) = 22.175 mAOD
  The 1:100 year flood level is 22.62 mAOD. So these proposed ground floor areas are 0.445 m below this flood level.
  The 1:100 year plus climate change peak flood levelis 23.43 mAOD. So these proposed ground floor areas are 1.255 m below this flood level.
  The 1:1,000 year flood level is 24.03 mAOD. So these proposed ground floor areas are 1.855 m below this flood level.

- First floor (sleeping and main residential accommodation) ≥25.5 mAOD
  The 1:100 year flood level is 22.62 mAOD. There is at least 2.88 m freeboard above the flood level to first floor and above.
  The 1:100 year plus climate change peak flood levelis 23.43 mAOD. There is at least 2.07 m freeboard above the flood level to first floor and above.
  The 1:1,000 year flood level is 24.03 mAOD. There is at least 1.47 m freeboard above the flood level to first floor and above.

3.3.4 The flood levels in section 3.3.3 are the fully defended situation. It is necessary to also consider the 'residual' event, i.e. if defences were to fail. We do not have modelled flood levels for a defence failure event, but we can refer to the fully undefended flood levels in Table 3.1. For this site the fully undefended flood levels are all higher than the defended flood levels. The residential floor levels are well above these flood levels.

3.3.5 Apart from where there are internal areas at the ground floor, the facades of the site will be permeable, comprising hit and miss brickwork. This will enable flood water to flow through the site.

3.3.6 This report has been undertaken as a desk study and relies upon flood data supplied by the Environment Agency. The hydraulic modelling this is based upon includes assumptions in modelling parameters and inaccuracies in input data and the modelling methodologies. This flood data is currently the best available data for assessing flood risks at the site. We have assessed the design events currently stipulated by national planning policy and Environment Agency guidelines. There is always the risk, however small, that flooding could be different to the design events assessed.

3.4 Flood Storage

3.4.1 The drawing in Appendix F summarises the existing verses proposed site flood storage volumes. The proposed development results in a net increase in site flood storage of 131.2 m^3.

3.5 Flood Management

3.5.1 Generally the site is defended from flooding by defences. However there are events where the site is considered to be at risk of flooding and to significant depth. The residential floors will remain well above the flood levels, but access to the site may be hindered since the access route to the site would also be inundated in such events. Figure 3.11 shows the peak predicted flood hazards during the future 1:100 year event. This illustrates that the site and its surroundings have a hazard rating in the category of danger for most (assuming defences remain as existing). So there are various measures that need to be taken in order to manage these risks.

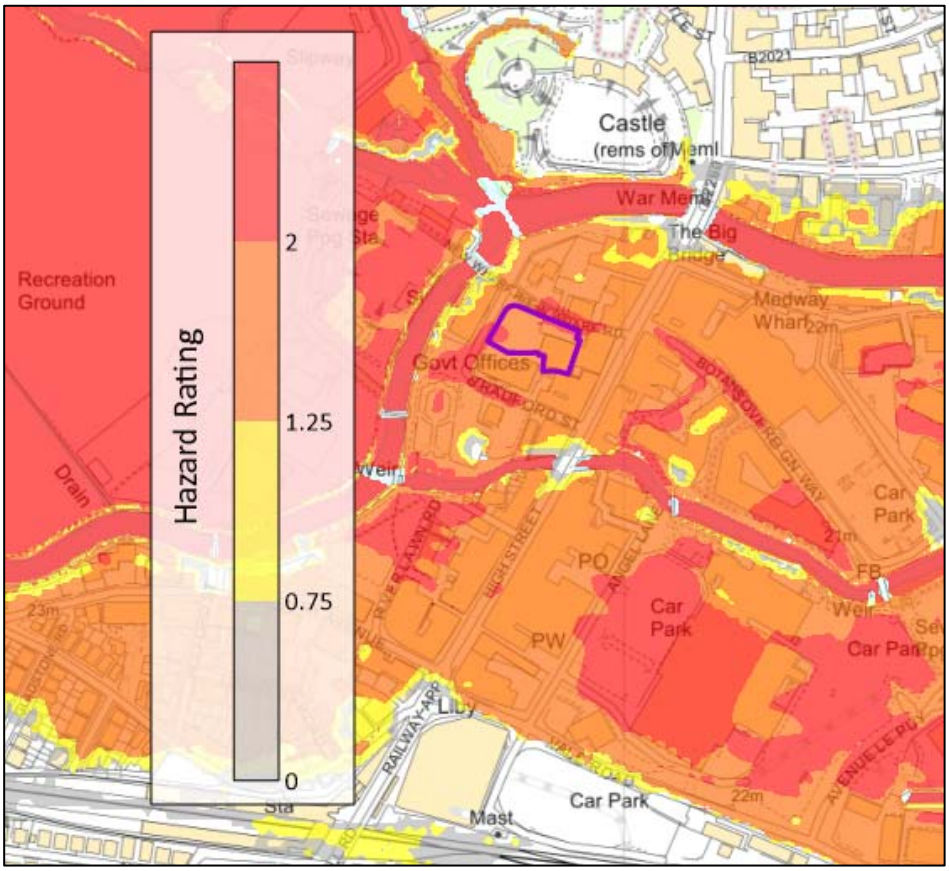


Figure 3.11 - 1:100 + 35% CC defended peak flood hazards

(Source: Medway_Model2_101d_Def_0100PLUS35PC_17JAN58611100_zuk0Max.asc)

Unshaded ⇨ very low hazard - caution

Yellow ⇨ Danger for some, including the elderly

Orange ⇨ Danger for most

Red ⇨ Danger for all

In accordance with Flood Risk to People.

3.5.2 All site management should be aware of the possible flood risks. It will be necessary for the management to prepare a site flood management plan. This will need to clearly stipulate how to communicate flood risks to staff, what actions to take in advance of flooding and when flooding nearby is imminent. Further advice on suitable preparation measures are given at:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/410606/LIT_5284.pdf

3.5.3 The site management and owners should sign up to receive flood warnings. Evacuation from the site should be prior to flooding occurring using the usual vehicular access routes onto the site. If for some reason evacuation has not occurred prior to flooding occurring at the site and on its access route, then it is likely to be sensible to adopt a stay put policy. There should, therefore, be resources kept on site to enable residents to safely stay insitu for a suitable period of time. For example by keeping stores of bottled water and other essential supplies.

3.5.4 Other advice and information on preparing for flooding is available from the following websites:
Environment Agency Floodline: 0345 988 1188 and
https://www.gov.uk/prepare-for-a-flood
National Flood Forum booklet:
https://nationalfloodforum.org.uk/about-flooding/preparing/checklist-action-plan/
Kent County Council:
https://www.kent.gov.uk/environment-waste-and-planning/flooding-and-drainage/flood-preparation-and-help-after-a-flood

3.5.5 It is not safe to walk, swim, cycle or drive through flood water. It may be fast flowing, contain debris, be contaminated or hide unseen dangers. Flood evacuation should be undertaken in advance of flood water reaching the vicinity of the site and always in accordance with the instructions of the emergency authorities.

3.6 Flood Resilience

3.6.1 It will be prudent for the building sub and super structure design to take into account the possibility of flooding to, say 0.5 m above the design flood levels due to wind action and uncertainties in the flood modelling. Where possible, include flood resilience measures outlined in CLG, *Improving the Flood Performance of New Buildings* (2007) and CIRIA *Code of practice for property flood resilience* (C790), *Flood Resilient Building* BS85500:2015, Flood resistant and resilient construction and CIRIA improving flood resilience advice Sheets 1-8. Flood resilience measures extend the duration over which the building can withstand a head of water. A water tight structure is not proposed. Recommended measures include:

- All plant in the **plant room** to be above the flood levels in Table 3.1, or made waterproof.

- All **doors and glazing** shall have frame to brickwork joints fully sealed
- Any **new plaster boarding** at ground floor level will be laid horizontally.
- **Electrical services** to run at ceiling level and drop down to service points where ever possible given the specialist nature of the building. Electricity meter placed at high level.
- Proposed extension: Low absorbency **brickwork** where applicable, i.e. clay engineering or DPC brick with less than 7% moisture content by absorption.
- **Closed cell type insulation** that is well fixed.
- Use of good quality **mortar**, ideally cement:lime:sand (1:1:5-6) plus air entrained where practicable to better accommodate shrinkage cracking, or sand:cement (1:3).
- Detailed **structural design** should take into account the remote possibility of flooding on site to a level of 24.33 mAOD.

4 Surface Water Flood Risks

4.1 Figure 4.1 shows that the site is not identified at high or medium risk of surface water flooding. There may be surface water flooding in the local area as indicated. The drawing in Appendix E indicates how the proposed ground floor levels at the west of the site is to be slightly raised about surrounding ground levels. The need for level thresholds has limited the raising of floor level.

Figure 4.1 – Risk of flooding from surface water

(Source: https://flood-warning-information.service.gov.uk/long-term-flood-risk/postcode)

5 Summary

5.1 The proposed development comprises construction of a construction of 36 living apartments (20 x 1bed, 16 x 2bed) with associated car parking provision.

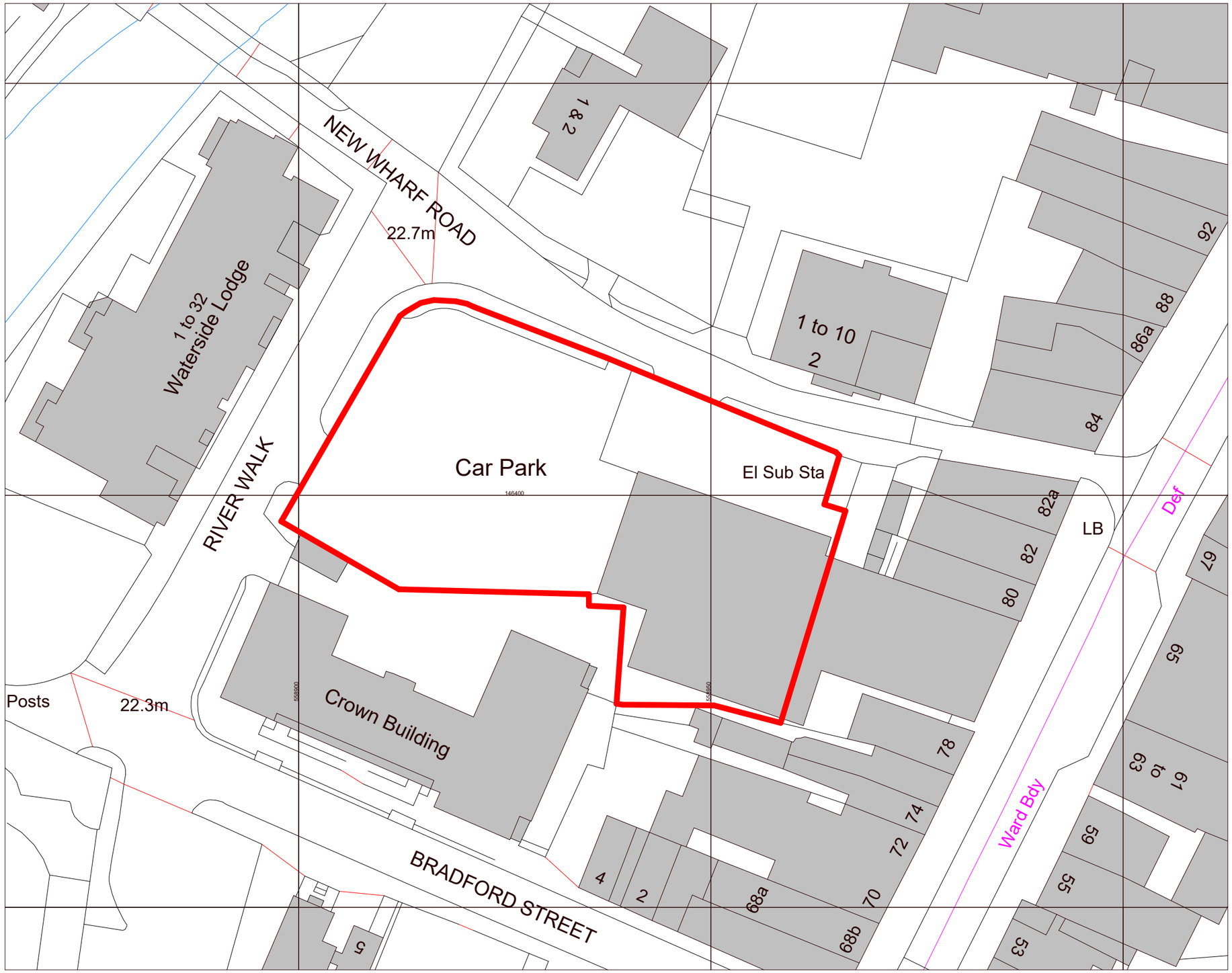
5.2 The site lies within flood zone 3 associated with the River Medway, located a short distance west and north of the site. The predicted peak 1:100 year plus 35% climate change flood level at the site is 23.43 mAOD.

5.3 The building has been designed to ensure that the residential accommodation is situated at first floor and above, with a minimum floor level of 25.5 mAOD.

5.4 It will be important for the site management to have a clear flood management measures in place to receive flood warnings and act appropriately to keep site occupants safe.

A

Site Location



0 5 10 15 20 30m
1:500

REVISIONS:
A 12/05/21: FIRST ISSUE

0 10 20 30 40 50mm
FULL SIZE @ A3

ROSEMARY WHITE DESIGN
rosemary@rawhite-design.co.uk 07988 404168

Tonbridge RL
New Wharf Road

STAGE 03 Planning

Location plan

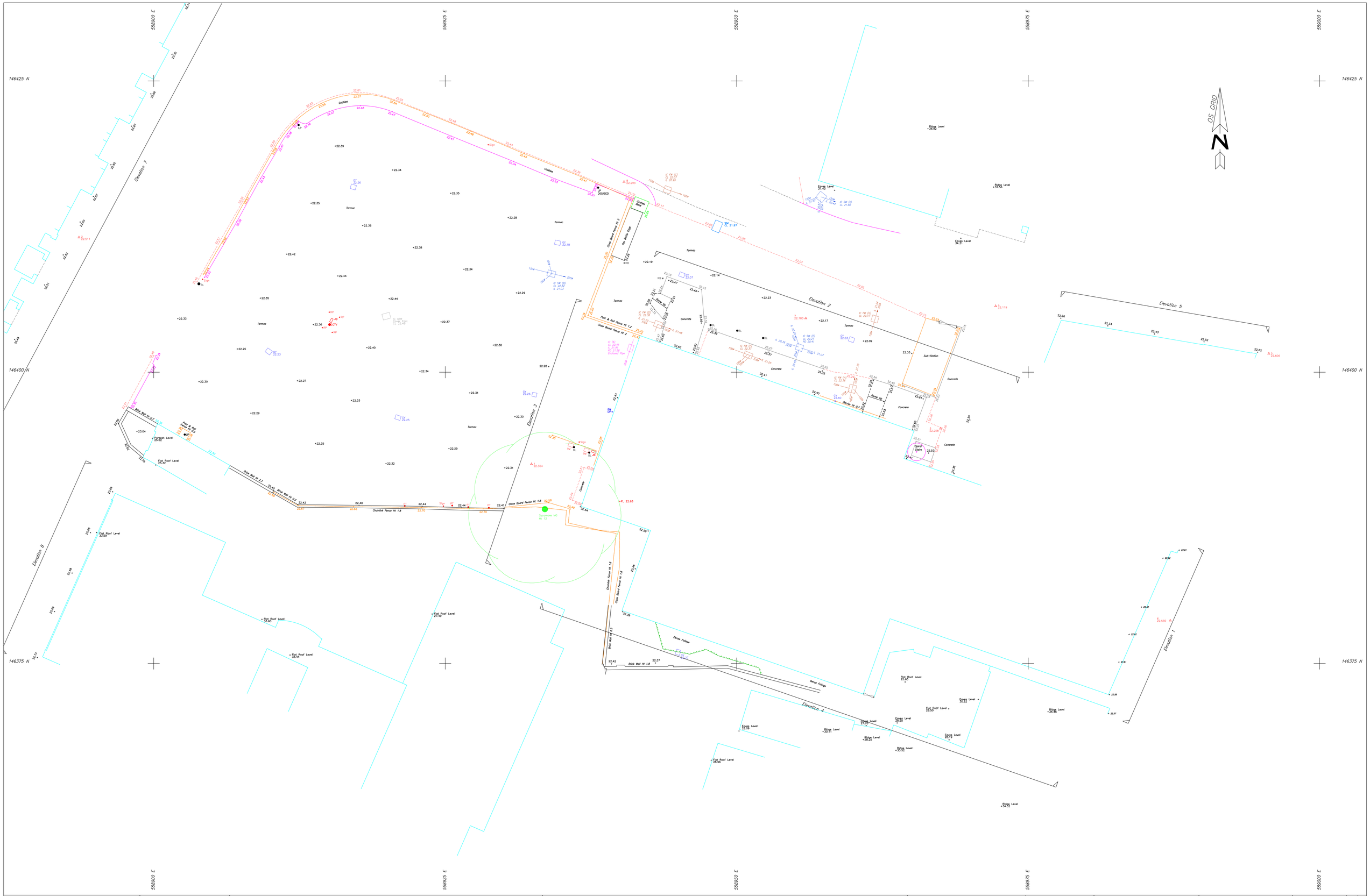
1 : 500 @ A3

SE-2739-02-AC- 101 A

RWD REF: 9147-MR22-210510

B

Survey



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DATUM NOTES

CO-ORDINATES USED ARE BASED ON O/S NATIONAL GRID, OBTAINED USING THE ACTIVE GPS NETWORK AND ADJUSTED TO A LOCAL GRID WITH A SCALE FACTOR OF 1.0000

LEVELS ARE RELATED TO :- O/S ACTIVE GPS NETWORK.

SURVEY CONTROL STATIONS SHOWN △

ABBREVIATIONS (where applicable)

AV	Air Valve	DC	Drainage Channel	IC	Inspection Cover	OH	Overhead	SK	Soakaway	VP	Vent Pipe
BK	Brick	DP	Drain Pipe	IL	Invert Level	PAV	Paving	SPT	Septic Tank	WL	Water Level
BL	Bollard	EP	Electricity Pole	IN	Interceptor	PB	Post Box	ST	Silt Trap	WM	Water Meter
BS	Bus Stop	ER	Earthing Rod	I/R	Iron Railings	PE	Pipe	SV	Stop Valve	WO	Wash Out
BT	British Telecom	FB	Flower Bed	JB	Junction Box	PM	Parking Meter	SVC	Security Video Camera		
C/B	Close Boarded	FE	Fence	KO	Kerb Outlet	P/R	Post and Rail	TCB	Telephone Call Box		
CL	Cover Level	FH	Fire Hydrant	LB	Litter Bin	PT	Post	THL	Threshold Level		
CLK	Chainlink	FL	Floor Level	LP	Lamp Post	P/W	Post and Wire	TL	Traffic Light		
CO	Column	FP	Flag Pole	MH	Manhole Cover	RE	Rodding Eye	TK	Tank		
Conc	Concrete	GP	Gate Post	MK	Marker	RET	Retaining	TP	Telegraph Pole		
CP	Catch Pit	GV	Gas Valve	MS	Milestone	RS	Road Sign	UG	Underground		
CPS	Concrete Paving Slabs	Gy,G	Gully	MT	Meter	RSJ	Rolled Steel Joist	UTF	Unable To Trace Further		
CTV	Cable Television	HT	Height	MY	Mercury	SC	Stop Cock	UTR	Unable To Raise		

POUNDLAND STORE
76–78 HIGH STREET, TONBRIDGE, TN9 1EE

TOPOGRAPHICAL SURVEY

NOTES

- Drainage pipe sizes (where shown) have been gauged from the surface for safety reasons and should be regarded as approximate only.
- Tree species (where shown) should be treated with caution and expert identification is advised.
- Although this is a digital survey the accuracy and amount of detail shown is only commensurate with the graphical scale of mapping as specified. Care should be exercised when working to larger scales.
- Values shown in the vicinity of the boundaries as shown above, may not represent the extent of legally conveyed ownership.
- Whilst every effort has been made to achieve accuracy on this plan, CRUCIAL clearance dimensions, levels and invert levels should be checked prior to design and construction.
- Kerb levels have been taken in the bottom of the channel.

SHEET LAYOUT
NOT TO SCALE

2
1

SURVEYED FOR McCARTHY & STONE, PROSPECT PLACE, 85 GREAT NORTH ROAD, HATFIELD, AL9 5DA.

SURVEYOR R WARR DATE DEC 2020

NO	DATE	REVISION

DRAWING NO	G 9941/1	REV 0
DRAWING TITLE	TOPOGRAPHICAL	
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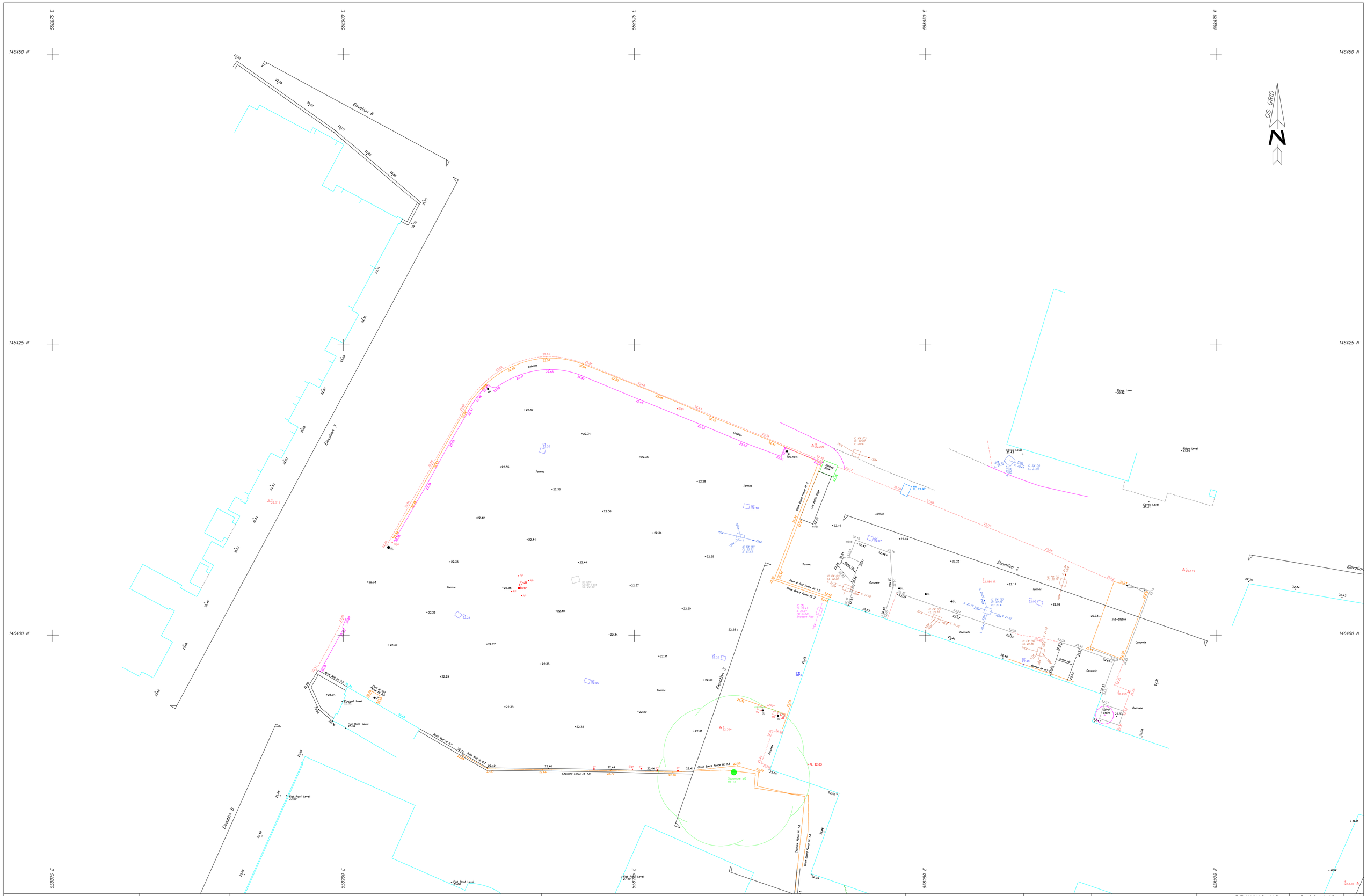
SHEET	1 of 3	
REF NO	G 9941	



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LEVELS ARE RELATED TO :- O/S ACTIVE GPS NETWORK.

SURVEY CONTROL STATIONS SHOWN △

ABBREVIATIONS (where applicable)

AV	Air Valve
BK	Brick
BL	Bollard
BS	Bus Stop
BT	British Telecom
C/B	Close Boarded
CL	Cover Level
CLK	Chainlink
CO	Column
Conc	Concrete
CP	Catch Pit
CPS	Concrete Paving Slabs
CTV	Cable Television
DC	Drainage Channel
DP	Drain Pipe
EP	Electricity Pole
ER	Earthing Rod
FB	Flower Bed
FE	Fence
FH	Fire Hydrant
FL	Floor Level
FP	Flag Pole
GP	Gate Post
GV	Gas Valve
Gy,G	Gully
HT	Height
IC	Inspection Cover
IL	Invert Level
IN	Interceptor
I/R	Iron Railings
JB	Junction Box
KO	Kerb Outlet
LB	Litter Bin
LP	Lamp Post
MH	Manhole Cover
MK	Marker
MS	Milestone
MT	Meter
MY	Mercury
OH	Overhead
PAV	Paving
PB	Post Box
PE	Pipe
PM	Parking Meter
P/R	Post and Rail
PT	Post
P/W	Post and Wire
RE	Rodding Eye
RET	Retaining
RS	Road Sign
RSJ	Rolled Steel Joist
SC	Stop Cock
SK	Soakaway
SPT	Septic Tank
ST	Silt Trap
SV	Stop Valve
SVC	Security Video Camera
TCB	Telephone Call Box
THL	Threshold Level
TL	Traffic Light
TK	Tank
TP	Telegraph Pole
UG	Underground
UTF	Unable To Trace Further
UTR	Unable To Raise
VP	Vent Pipe
WL	Water Level
WM	Water Meter
WO	Wash Out

POUNDLAND STORE
76-78 HIGH STREET, TONBRIDGE, TN9 1EE
TOPOGRAPHICAL SURVEY

NOTES
- * Drainage pipe sizes (where shown) have been gauged from the surface for safety reasons and should be regarded as approximate only.
- * Tree species (where shown) should be treated with caution and expert identification is advised.
- * Although this is a digital survey the accuracy and amount of detail shown is only commensurate with the graphical scale of mapping as specified. Care should be exercised when working to larger scales.
- * Visible features in the vicinity of the boundaries as shown above, may not represent the extent of legally conveyed ownership.
- * Whilst every effort has been made to achieve accuracy on this plan, CRUCIAL clearance dimensions, levels and invert levels should be checked prior to design and construction.
- * Kerb levels have been taken in the bottom of the channel.

SHEET LAYOUT
NOT TO SCALE
2
1

SURVEYED FOR
McCARTHY & STONE,
PROSPECT PLACE,
85 GREAT NORTH ROAD,
HATFIELD,
AL9 5DA.

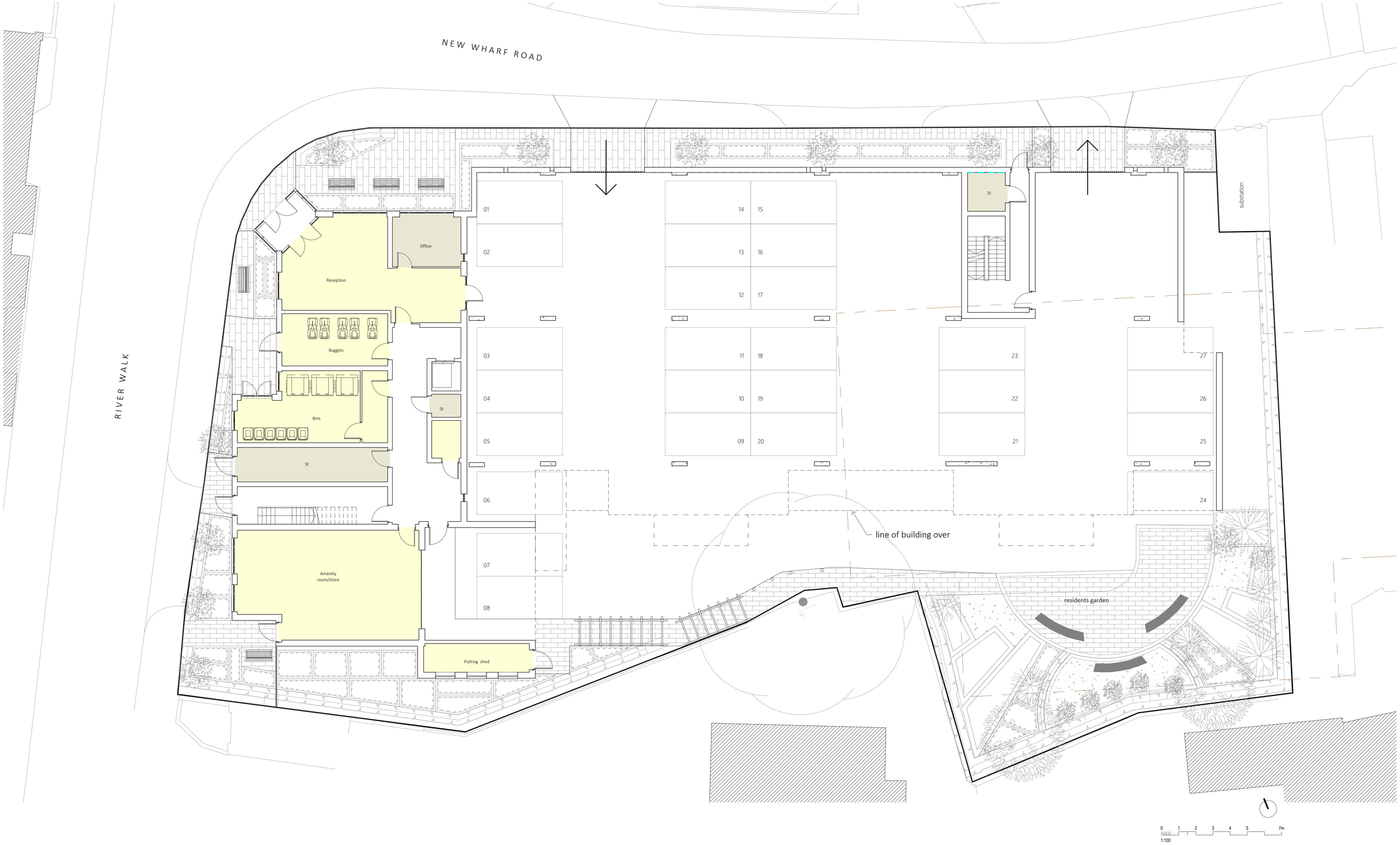
SURVEYOR R WARR DATE DEC 2020

NO	DATE	REVISION

DRAWING NO	G 9941/2	REV	0
DRAWING TITLE	TOPOGRAPHICAL		
SCALE	1 : 100 (A0)		
SEE ALSO DWG NOS	G 9370/1 - 6		
SHEET	2 of 3		
REF NO	G 9941		

C

Proposed Site



Read in conjunction with site plan drawing 102

REVISIONS:
A 12/05/21: STAGE 3 FIRST ISSUE
B 19/05/21: MINOR DIMENSIONAL CHANGES
C 25/05/21: SITE & LANDSCAPE DETAILS ADDED
D 25/05/21: AMENITY ROOM/STORE NAME UPDATED

ROSEMARY WHITE
DESIGN
rosemary@rawhite-design.co.uk 07988 404168

0 10 20 30 40 50 100mm
FULL SIZE @ A1

Tonbridge RL
New Wharf Road

Plan L0

STAGE 03 Planning
1 : 100 @ A1

SE-2739-03-AC- 103 D

RWD REF: 9147-MR22-210517x

D

NPPF Planning Practice Guidance Flood Risk and Coastal Change, Table 1

Table 1: Flood Zones

These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's web site, as indicated in the table below.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.(Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

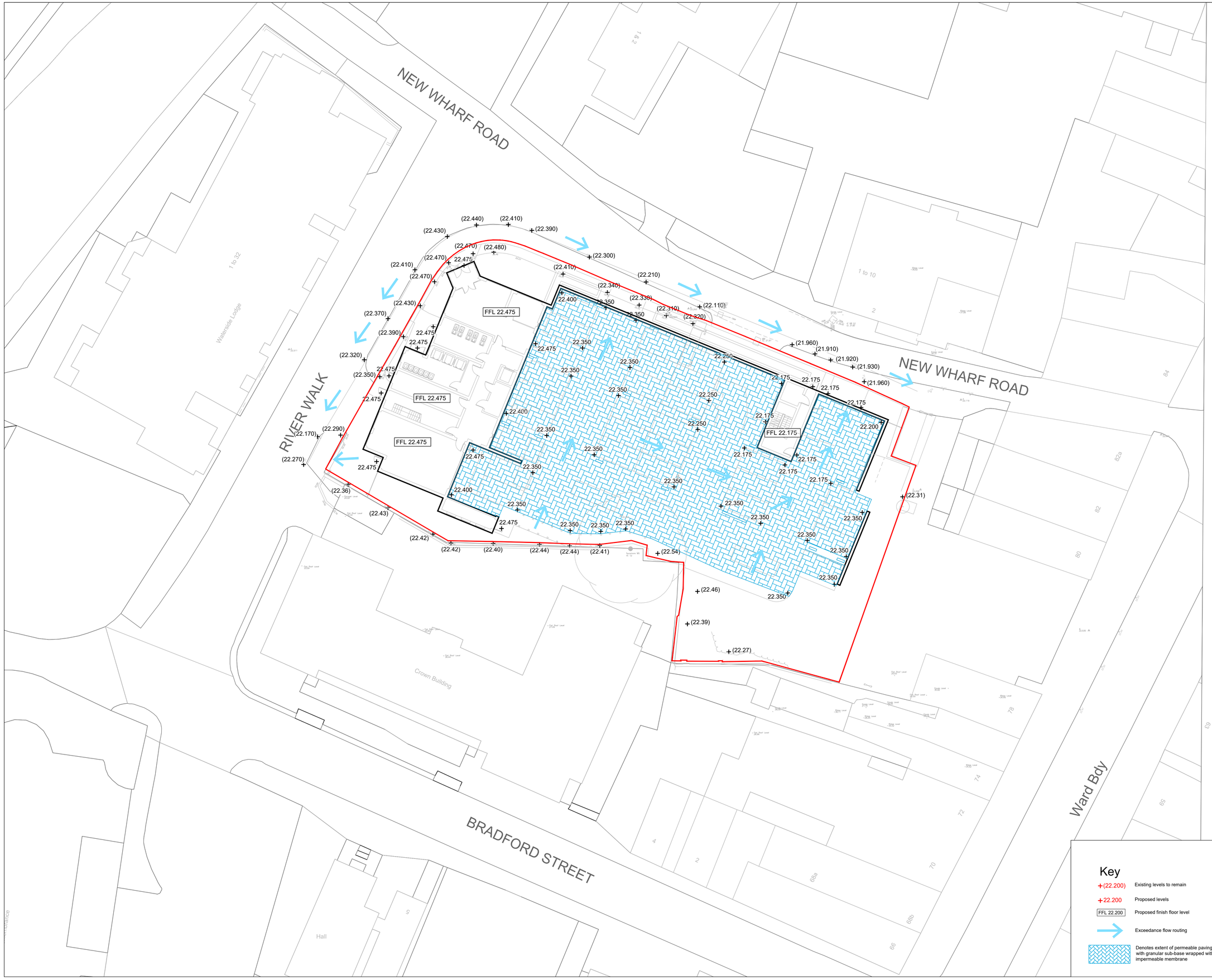
Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the Strategic Flood Risk Assessment when considering location and potential future flood risks to developments and land uses.

Paragraph: 065 Reference ID: 7-065-20140306

Revision date: 06 03 2014

E

Proposed Levels



PRELIMINARY

Notes

Rev	Description	Date
-	First Issue	14.04.21

Status:

Stage 3

Scale :	1:200@A1		
Date :	April 21	Checked:	Approved:
Drawn :	IDL	BM	PT

Title :

Proposed Levels

Project :

76-78 High Street, Tonbridge, Surrey

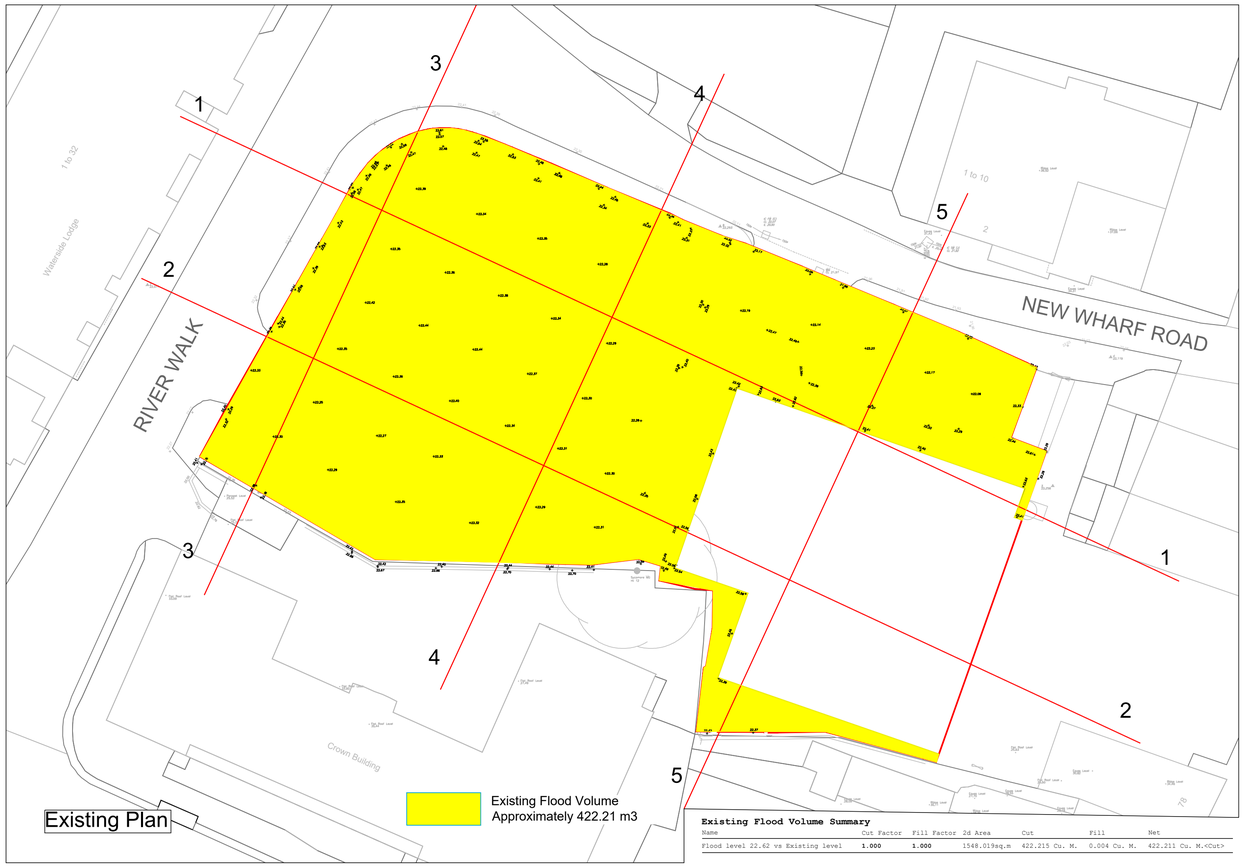
Drg. No:	Rev:	File Ref:	1070-05-110.dwg
SE-2739-03-DE-110	-	Plot Ref:	SE-2739-03-DE-110

33 The Point
Rockingham Road
Market Harborough
Leicestershire LE16 7QU
Tel: 01858 411570 Fax: 01858 411571
Email: info@infrades.co.uk URL: www.infrades.co.uk

INFRASTRUCTURE DESIGN LIMITED
working for
McCARTHY STONE
Life, well lived

F

Flood Storage



Existing Plan

Existing Flood Volume Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Flood level 22.62 vs Existing level	1.000	1.000	1548.019sq.m	422.215 Cu. M.	0.004 Cu. M.	422.211 Cu. M.<Cut>

Proposed Plan

Proposed Flood Volume Summary

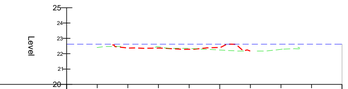
Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Flood level 22.62 vs Proposed level	1.000	1.000	1943.750sq.m	553.392 Cu. M.	0.000 Cu. M.	553.392 Cu. M.<Cut>

Note: 131.181 m3 of Flood volume will be gained overall

Key

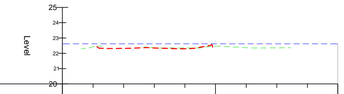
+ 22.70	Existing levels
+(22.200)	Existing levels to remain
+22.200	Proposed levels
FFL 22.475	Proposed finish floor level

Flood level
Existing level
Proposed level



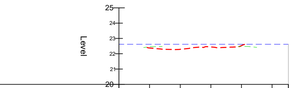
Chainage	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	89.922
Existing Levels			22.373	22.387	22.290	22.189				
Proposed Levels		22.408		22.451	22.341	22.241		22.287		
Flood Levels- 1 in 100	22.620	22.620	22.620	22.620	22.620	22.620	22.620	22.620	22.620	

Section 1-1



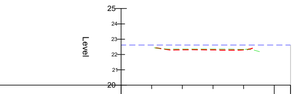
Chainage	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	89.922
Existing Levels			22.324	22.344	22.297					
Proposed Levels		22.426		22.389	22.350	22.485	22.389	22.360		
Flood Levels- 1 in 100	22.620	22.620	22.620	22.620	22.620	22.620	22.620	22.620	22.620	

Section 2-2



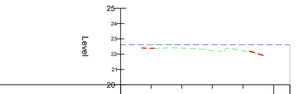
Chainage	0.000	10.000	20.000	30.000	40.000	50.000	58.324
Existing Levels		22.375	22.291	22.441	22.529		
Proposed Levels		22.432			22.476		
Flood Levels- 1 in 100	22.620	22.620	22.620	22.620	22.620	22.620	

Section 3-3



Chainage	0.000	10.000	20.000	30.000	40.000	50.000	58.324
Existing Levels			22.397	22.302	22.300		
Proposed Levels			22.540	22.350	22.525		
Flood Levels- 1 in 100	22.620	22.620	22.620	22.620	22.620	22.620	

Section 4-4



Chainage	0.000	10.000	20.000	30.000	40.000	50.000	58.324
Existing Levels		22.384			22.223		
Proposed Levels			22.383	22.225			
Flood Levels- 1 in 100	22.620	22.620	22.620	22.620	22.620	22.620	

Section 5-5

PRELIMINARY

Notes

Rev	Description	Date
-	First Issue	14.05.21

Status:

Stage 3

Scale : NTS

Date : May 21 | Checked: | Approved:

Drawn : IDL | BM | PT

Title :

Flood Volume

Project :

76-78 High Street, Tonbridge, Surrey

Drg. No:	Rev:	File Ref:	1070-00-115.dwg
SE-2739-03-DE-115	-	Plot Ref:	SE-2739-03-DE-115

33 The Point
Rockingham Road
Market Harborough
Leicestershire LE16 7QU
Tel: 01858 411570 Fax: 01858 411571
Email: info@infrades.co.uk URL: www.infrades.co.uk

INFRASTRUCTURE DESIGN LIMITED
working for
McCarthy & Sto

G

Environment Agency checklist

Environment Agency

Flood Risk Assessment (FRA) Checklist	
This document should be attached to the front of the Floor Risk Assessment (FRA) issued to Local Planning Authorities (LPA) in support of a development proposal which may be at risk of flooding. This document is not a substitute for a FRA. Please note, under our responsibilities as a statutory consultee we will review any submitted FRA only in respect to fluvial and tidal risk. Your FRA should also consider other sources of flooding such as surface water, drainage, and ground water flooding.	
1.Development Proposal	
Site name	76-78 High Street, Tonbridge, Kent
National Grid Reference (NGR)	558930 mE, 146400mN
Flood Risk Assessment	Reference/Title: Flood Risk Assessment Date: May 2021
Existing site use & vulnerability classification	Car park and retail unit
Proposed site use & vulnerability classification	Residential care home
2. Flood Risk	
Flood Zone(s) affecting the site/property	FZ 3
Sources of flooding affecting the site	River Medway
Have you considered flood storage compensation?	Yes/~~No~~ **
3. Please provide a node map and accompanying table in the Flood Risk Assessment similar to the example given (see Appendix A). You should clearly demonstrate the highest and most representative flood levels for your proposed development. For example, if it is a small extension (< 250 square metres) then approximately 5-10 nodes would be sufficient. For larger sites, approximately 10 to 20 nodes would be appropriate.	
4. Mitigation	
Finished floor levels (in mAOD) for each proposed floor. Have you considered a freeboard for these Finished Floor Levels?***	Refer to 2.2.2 of the FRA: Ground floor west (reception, office, fitness room) = 22.475 mAOD Ground floor east (Stairwell) = 22.175 mAOD First floor = c25.5 mAOD
Drawing reference showing Finished Floor Levels for proposed development	Appendix E of FRA
Have you considered suitable internal and external access for safe refuge above the flood level?	Yes/~~No~~ For sleeping accomodation
5.Proximity to the watercourse/ flood defence/ culvert	
Are the proposed developments on, over, under or within 8 metres of a fluvial main river or 16 metres of a tidal main river or flood defence?	~~Yes~~/No If yes, please provide a cross section drawing in your planning application showing the distance of the proposed development in relation to the watercourse/flood defence/culvert. The measurement should be taken from the closest point of the proposed development to the top of bank/ landward face of a flood defence or culvert. If yes, this may require a Flood Risk Activity Permit. https://www.gov.uk/guidance/flood-risk-activities-environmental-permits
Map Many of our flood datasets are available online: Flood Map For Planning (Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences, , Risk of Flooding from Rivers and Sea, Historic Flood Map, Current Flood Warnings	

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cover photography: Lindsey Wakelin