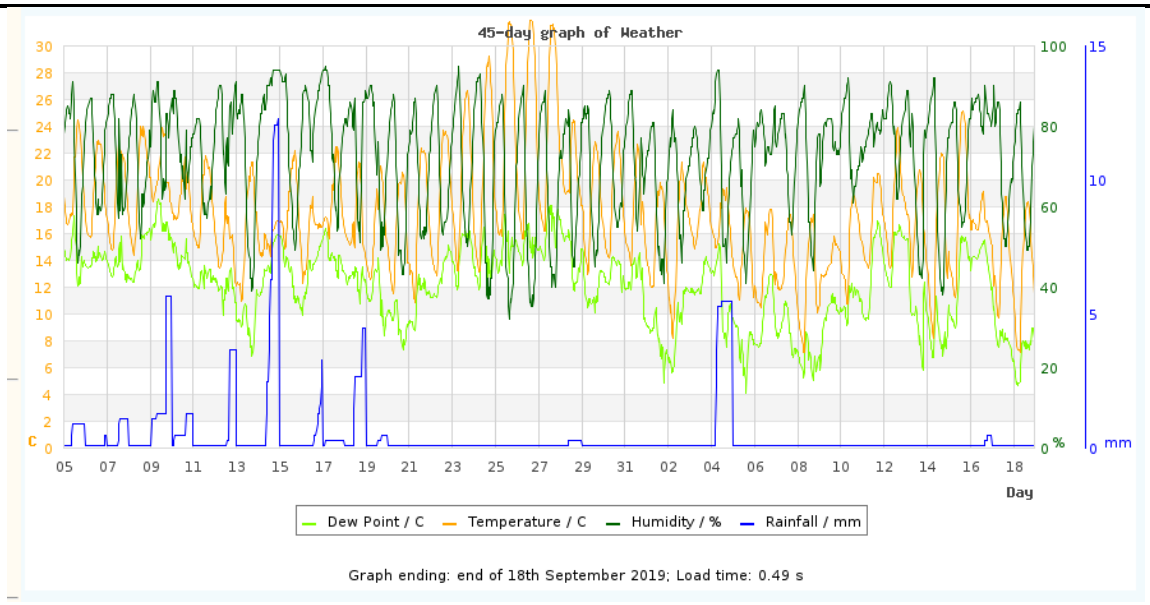
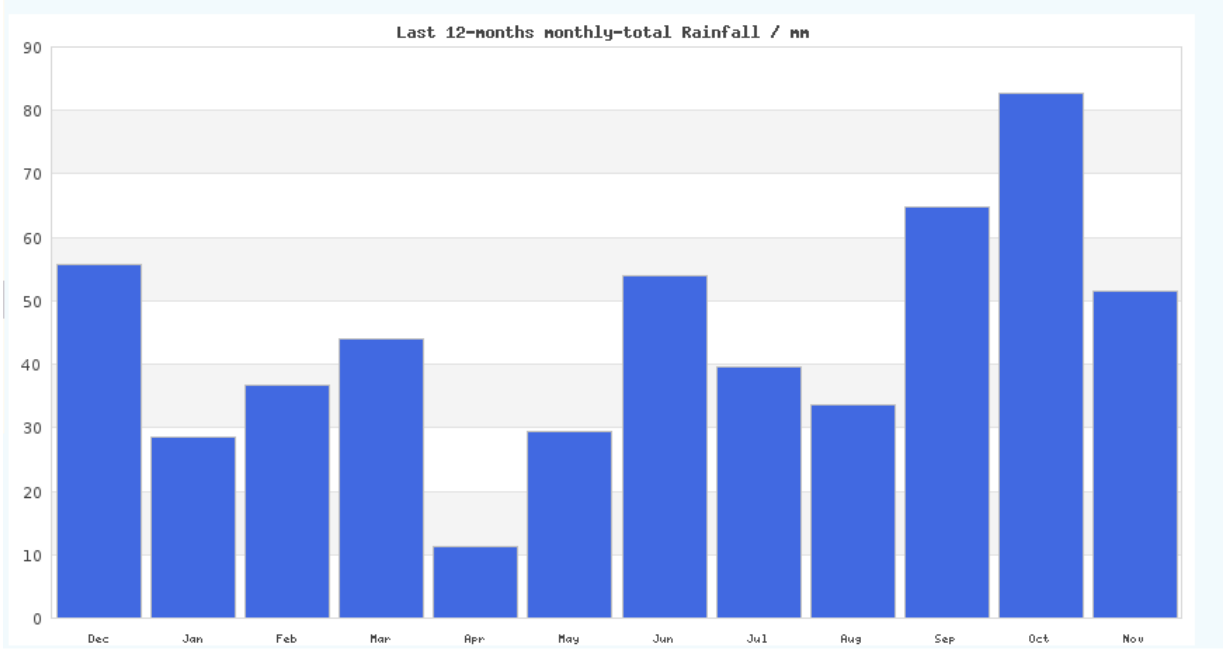


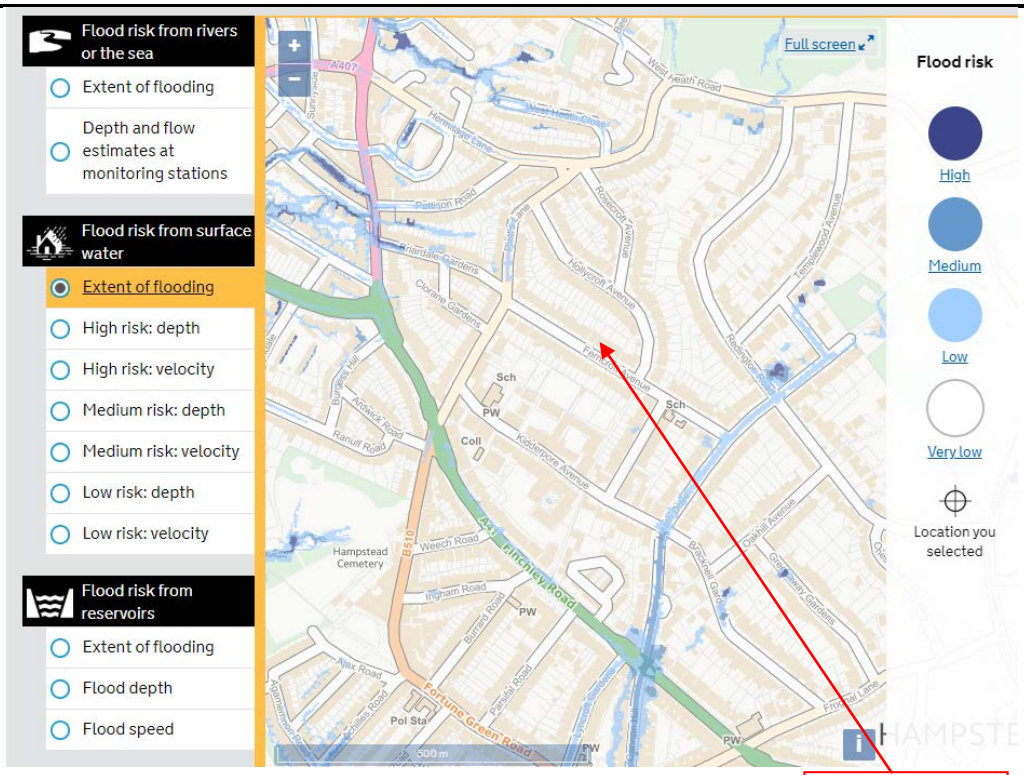
(a)



(b)

	Mr Elliot Graff 20a Ferncroft Avenue	**Figure**
	Rainfall levels a) March to April 2019 b) April 2018 to April 2019	**9**

(a)



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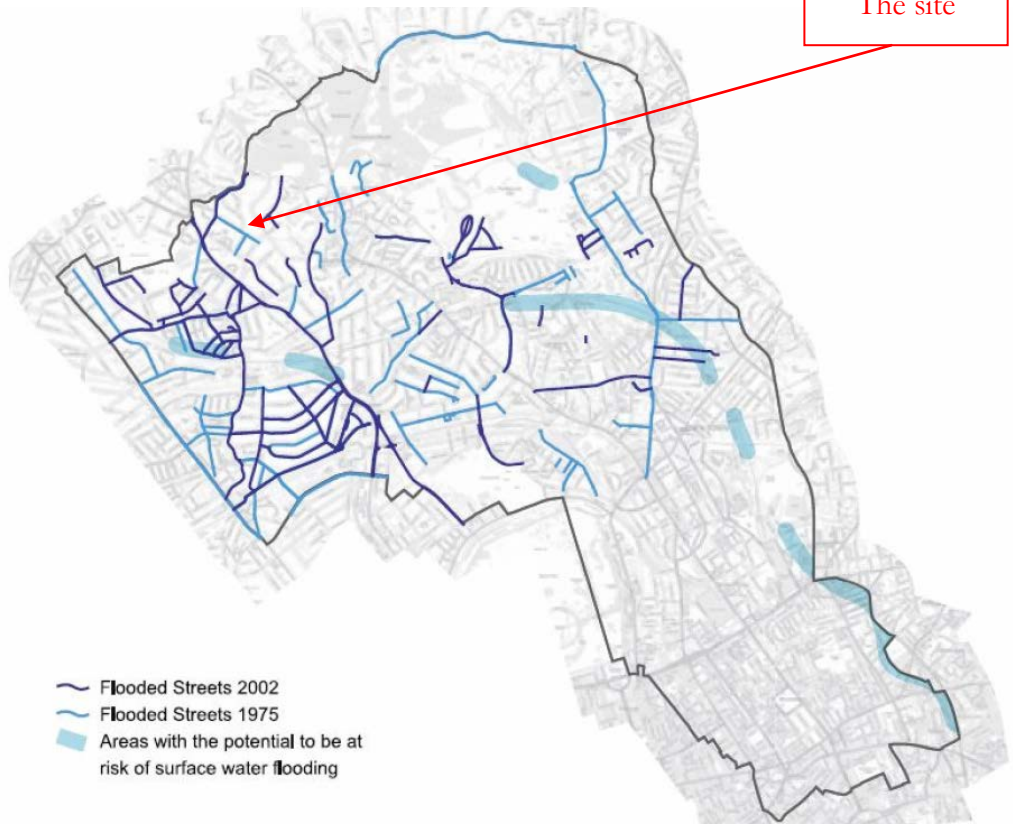


	Mr Elliot Graff 20a Ferncroft Avenue	**Figure** **10**
	Surface flooding risk	

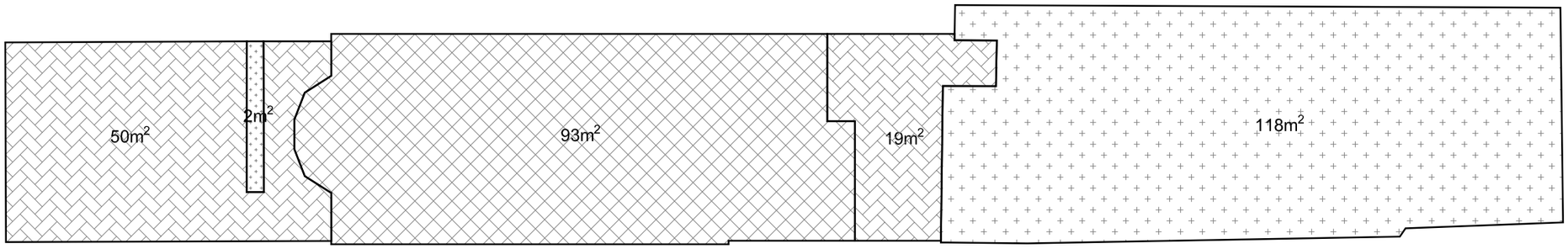
Appendix L

SIMPSON P19_461_SK11_Comparison of existing and proposed hard & soft landscaping Areas

DO NOT SCALE

KEY Total Site Area (282m²)

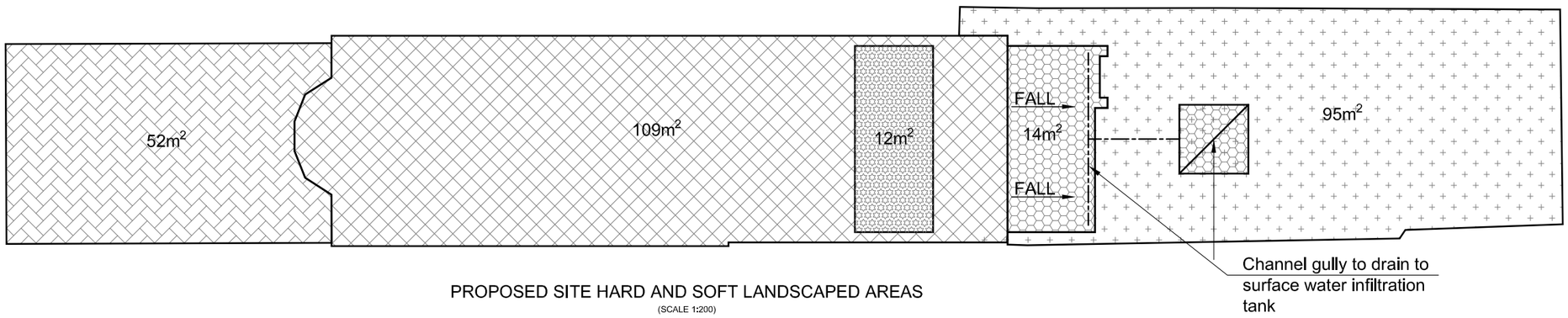
- Landscaped Area (120m²)
- Paved Area (69m²)
- Building (93m²)



EXISTING SITE HARD AND SOFT LANDSCAPED AREAS
(SCALE 1:200)

KEY Total Site Area (282m²)

- Landscaped Area (95m²)
- Paved Area (52m²)
- Building (109m²)
- Permeable paving (14m²)
- Brown roof (12m²)



PROPOSED SITE HARD AND SOFT LANDSCAPED AREAS
(SCALE 1:200)

MK	REVISION	BY	DATE
-	-	-	-

DRAWING STATUS

PLANNING

DRAWING TITLE

COMPARISON OF EXISTING AND PROPOSED HARD & SOFT LANDSCAPING AREAS

PROJECT Project Number - P19-461

20A FERNCROFT AVENUE,
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London, Henley-on Thames, Gloucester and Exeter

Drawn	Ch'kd	Scales	Date
GB	Ch'kd	NTS	29.10.19

Purpose of Issue
BASEMENT IMPACT ASSESSMENT

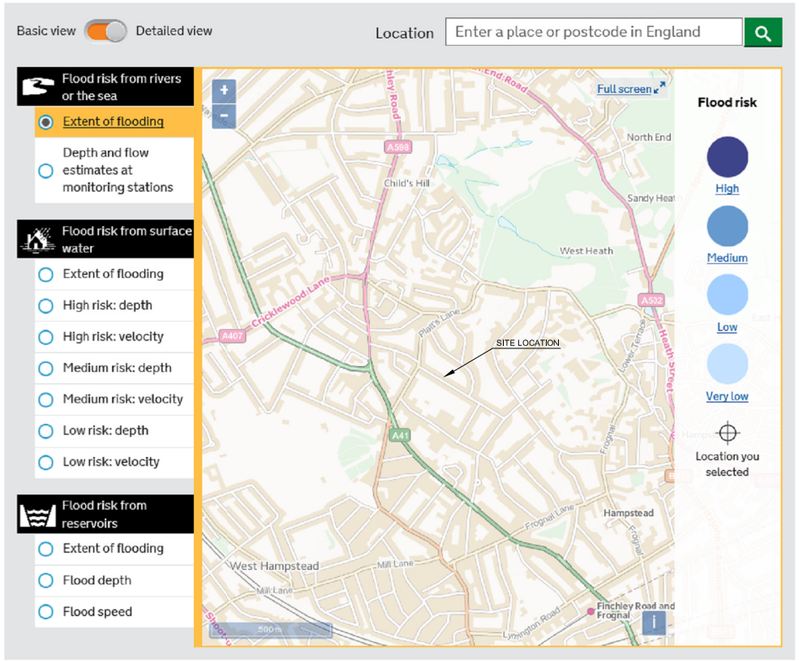
Drawing Number	Revision
P19-461_SK11	-

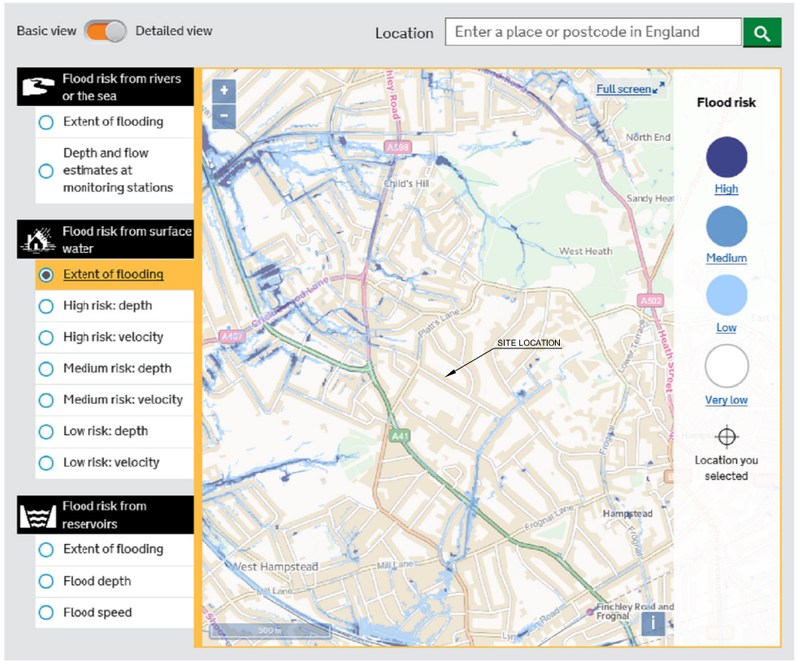
A3

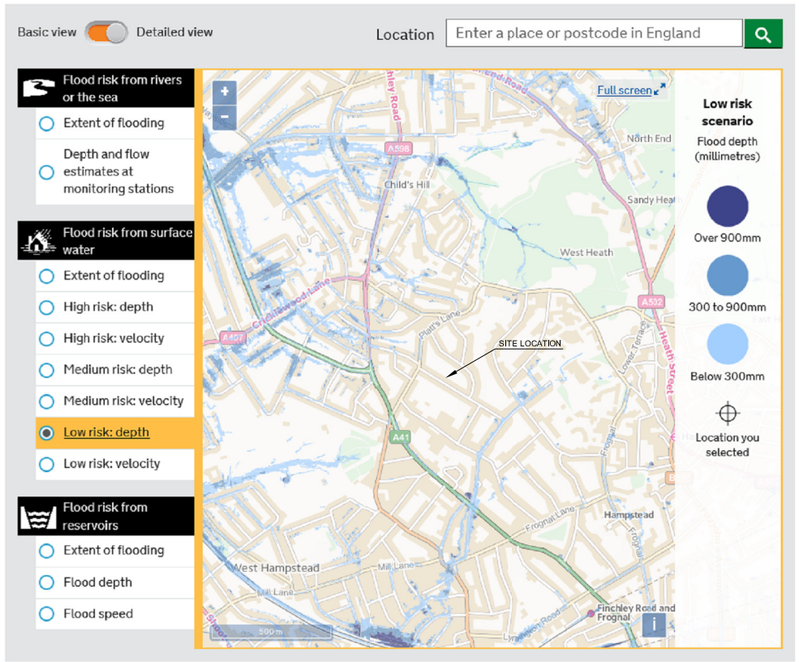
Appendix M

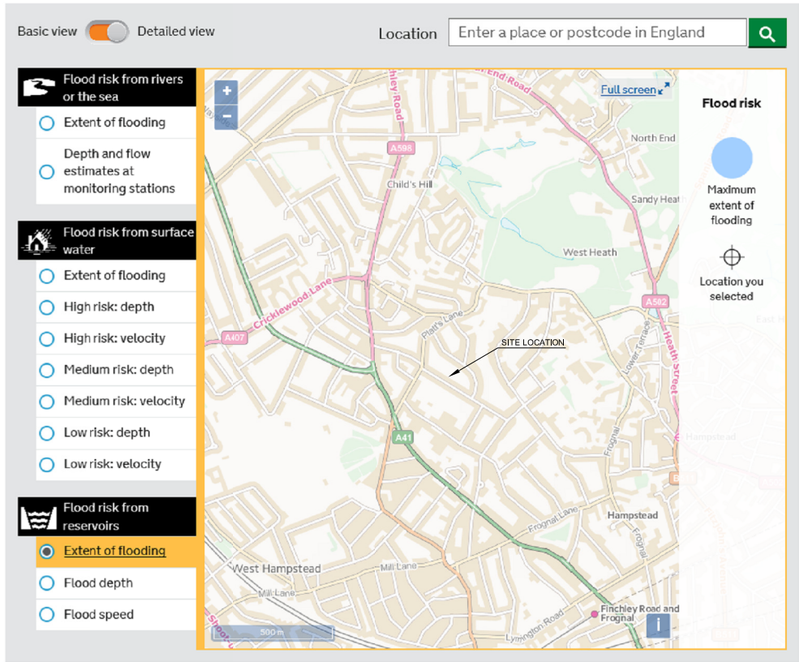
SIMPSON P19_461_SK12_GOV.UK Map for extent of surface water flooding Thames Water Sewer
Thames Water Sewer Flooding History Enquiry dated 21st November 2019

DO NOT SCALE









MK	REVISION	BY	DATE
-	-	-	-

DRAWING STATUS

PLANNING

DRAWING TITLE

GOV.UK MAP FOR EXTENT OF FLOODING

PROJECT — Project Number - P19-461

20A FERNCROFT AVENUE,
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London, Henley-on Thames, Gloucester and Exeter

Drawn	Ch'kd	Scales	Date
GB	Ch'kd	NTS	29.10.19

Purpose of Issue
BASEMENT IMPACT ASSESSMENT

Drawing Number	Revision
P19-461_SK12	-

A3

Sewer Flooding
History Enquiry

Property Searches

Taylor Whalley Spyra Limited

Dufferin Avenue

Search address supplied	20A Ferncroft Avenue London NW3 7PH
Your reference	9652
Our reference	SFH/SFH Standard/2019_4114492
Received date	**21 November 2019**
Search date	**21 November 2019**

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0845 070 9148

Sewer Flooding
History Enquiry

Property Searches

Search address supplied: 20A,Ferncroft Avenue,London,NW3 7PH

This search is recommended to check for any sewer flooding in a specific address or area

TWUL, trading as Property Searches, are responsible in respect of the following:-

(i) any negligent or incorrect entry in the records searched;

(ii) any negligent or incorrect interpretation of the records searched;

(iii) and any negligent or incorrect recording of that interpretation in the search report

(iv) compensation payments

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0845 070 9148

Sewer Flooding
History Enquiry

Thames Water Property Searches

History of Sewer Flooding

Is the requested address or area at risk of flooding due to overloaded public sewers?

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

- A sewer is "overloaded" when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- "Internal flooding" from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- "At Risk" properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company's reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0800 316 9800 or website www.thameswater.co.uk

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

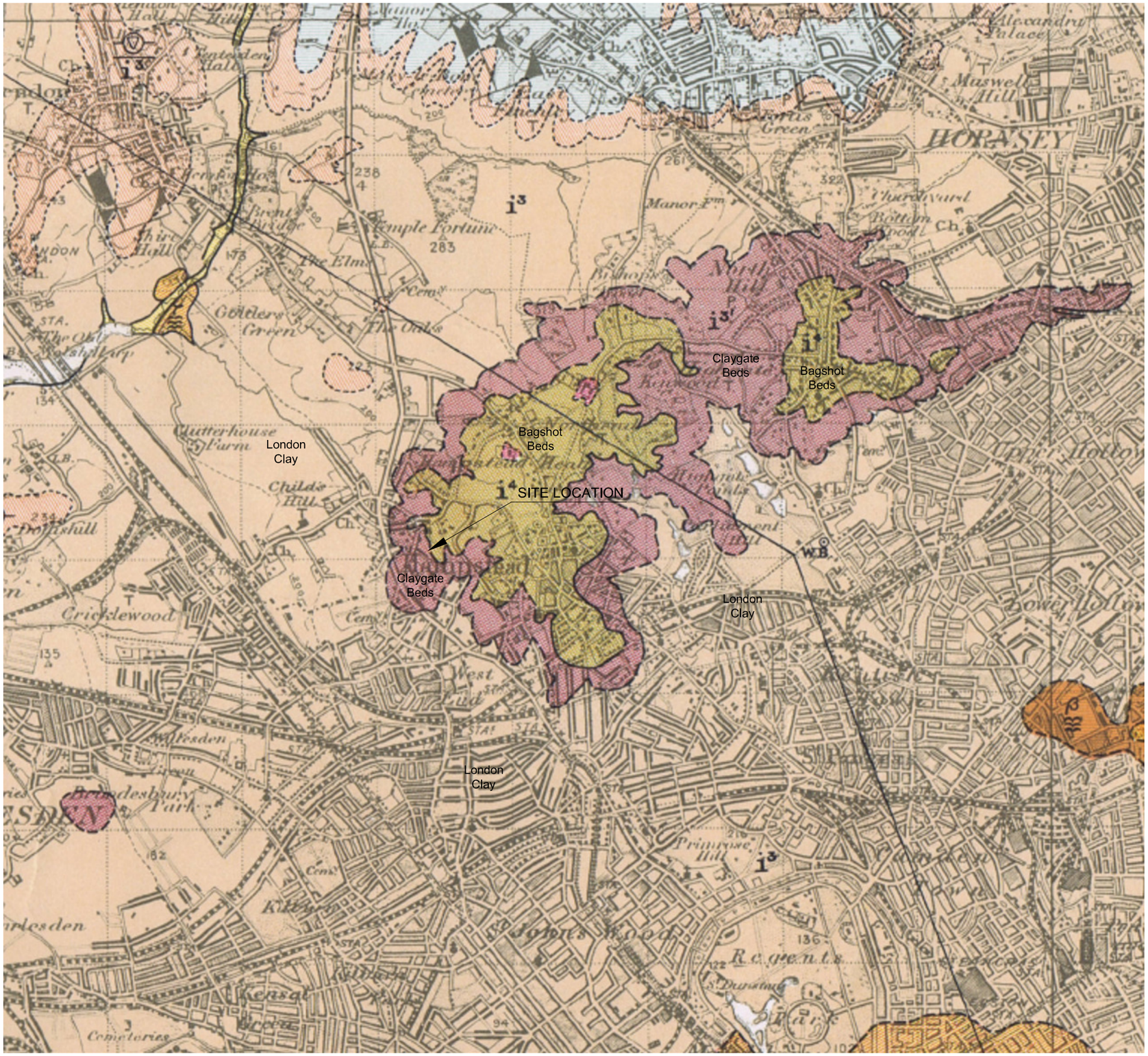
searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0845 070 9148

Appendix N

SIMPSON P19_461_SK13_Geological map.

DO NOT SCALE



MK	REVISION	BY	DATE
-	-	-	-

DRAWING STATUS

PLANNING

DRAWING TITLE

BRITISH GEOLOGICAL MAP OF LOCAL AREA

PROJECT — Project Number - P19-461

20A FERNCROFT AVENUE,
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E: mail@simpsoneng.com
W: www.simpsoneng.com
London, Henley-on Thames, Gloucester and Exeter

Drawn	Ch'kd	Scales	Date
GB	Ch'kd	NTS	29.10.19

Purpose of Issue
BASEMENT IMPACT ASSESSMENT

Drawing Number	Revision
P19-461_SK13	-

A3

Appendix O

SIMPSON Retaining Wall Calculations

Job No	Description	Calc No:	1
P18-461	20a FERNCROFT AVENUE	Date:	02.12.2019
		By:	AT
		Checked:	-

BRIEF

Simpson has been instructed to prepare the structural engineering design for the arrangements for the basement extension of the 20a Ferncroft avenue property in London. The planned extension will require the design of RC walls capable of withstanding the applied earth and surcharge pressures during both the construction phase and the final permanent arrangement.

The purpose of this calculation report is to assess the forces that will be acting on the earth retaining structures during the construction and the final permanent arrangement. Determine the wall sizes and rebar required for the structure to pass both equilibrium and strength checks in accordance to the relevant design standards.

DESIGN PHILOSOPHY

The retaining wall design will be in accordance to the relevant British standards and Eurocodes.

The minimum concrete grade used in the design of the RC walls is C32/40 and the minimum steel grade for the reinforcement is 500N/mm^2.

The soil information used for the structural checks was obtained from the SI report prepared by Risk Management Ltd – Project number RML 7096 "Site Investigation at 20Fercroft Avenue, Hampstead" dated September 2019.

The density of masonry is taken as 21kN/m^3.

There are 5No locations around the property that will be looked at to consider all possible retaining wall scenarios. For each location both the construction and permanent phases will be considered. Refer to the "Retaining Wall Design Outline Mark-up" within this calculation report for information on the retaining wall locations within the site.

1. **Retaining Wall No 1**: Located at the front of the building, the retaining wall is located outside of the existing building footprint.

    a. Temporary – There are no loads from the existing structure which are acting directly on the retaining wall. During the temporary phase the ground water will be drained, therefore the water table is not considered for the design. The retained clay soil is taken as consolidated as the SI report describes it as FIRM, therefore the consolidated depth z_c of the clay will not be acting directly on the wall. The forces acting on the wall considered for this phase are as follows.
        i. Horizontal pressure from the retained soil (reduced because of clay consolidation).
        ii. Horizontal pressure from the surcharge of the construction equipment and vehicles nearby.
        iii. Horizontal pressure from water in fissures (occurs in the event of precipitation).

    The wall will be built in sections and with the clay dug out locally where work is being executed. Construction of the wall will begin next to the existing structure to which it will be tied in. Therefore checking for sliding is unnecessary.

    b. Permanent – The water table is conservatively considered to be at its highest level throughout the site, 910mm of retained water. In its permanent state the wall will be pinned top and bottom. The top soil consolidation is not considered in the permanent state. The forces acting on the wall considered for this stage are as follows:
        i. Horizontal pressure from the retained soil.
        ii. Horizontal pressure from the surcharge of vehicles nearby.
        iii. Horizontal pressure from retained water in soil.
        iv. Vertical reaction from the internal slab acting on the toe of the wall.

    The wall will be tied into the main building structure. Sliding and Overturning will not be considered.

2. **Retaining Wall No 2**: Located at the rear of the building, the retaining wall is part of the new garden extension and external to the footprint of the existing and proposed building.

    a. Temporary – There are no loads from the existing structure which are acting directly on the retaining wall. During the temporary phase the ground water will be drained, therefore the water table is not

considered for the design. The retained soil is made ground as shown in the SI report, while the base soil is clay. No vehicle surcharge will be considered as the rear of the building is not accessible to vehicles. The forces acting on the wall considered for this phase are as follows.

i. Horizontal pressure from the retained soil.

b. Permanent – The base of this retaining wall is above the water table, so no water considered. In its permanent state the wall will be pinned at the bottom. The forces acting on the wall considered for this stage are as follows:

i. Horizontal pressure from the retained soil.
ii. Horizontal pressure from the surcharge garden decorations/furniture.
iii. Vertical reaction on toe from domestic live loads and finishes.

The wall will be tied into the main building structure. Sliding and Overturning will not be considered.

3. **Retaining Wall No.3**: Located on the N-W side of the building bordering the neighboring property, will be supporting the party wall as well as preventing soil from entering the basement.

a. Temporary – The wall will be supporting the foundation loads of the existing structures, only the permanent actions will be considered during this stage. During the temporary phase the ground water will be drained, therefore the water table is not considered for the design. The consolidated clay is conservatively ignored for the design of the retaining walls which are underpinning the existing foundations. The soil above the top level of the RC wall is taken as a dead load surcharge (see engineering sketches in report for more information). There is no live load surcharge acting on the wall. The forces acting on the wall considered for this phase are as follows.

i. Horizontal pressure from the retained soil (consolidation ignored).
ii. Horizontal pressure from the surcharge of ground beyond the top level of the RC wall.
iii. The vertical reaction from the existing foundations (Dead Load only), from walls, floors and roof.

b. Permanent – The water table is conservatively considered to be at its highest level throughout the site, 910mm of retained water. In its permanent state the wall will be pinned top and bottom. The top soil consolidation is not considered in the permanent state. The forces acting on the wall considered for this stage are as follows:

i. Horizontal pressure from the retained soil.
ii. Horizontal pressure from the surcharge of ground beyond the top level of the RC wall..
iii. Horizontal pressure from retained water in soil.
iv. The vertical reaction from the existing foundations (Dead and Live Load), from walls, floors and roof.
v. Vertical reaction from the internal slab acting on the toe of the wall.

The wall will be tied into the main building structure. Sliding and Overturning will not be considered.

4. **Retaining Wall No 4**: Located on the S-E side of the building bordering the garage and the driveway, will be supporting the external cavity wall as well as preventing soil from entering the basement.

a. Temporary – The wall will be supporting the foundation loads of the existing structures, only the permanent actions will be considered during this stage. During the temporary phase the ground water will be drained, therefore the water table is not considered for the design. The consolidated clay is conservatively ignored for the design of the retaining walls which are underpinning the existing foundations. The soil above the top level of the RC wall is taken as a dead load surcharge (see engineering sketches in report for more information). The forces acting on the wall considered for this phase are as follows.

i. Horizontal pressure from the retained soil (consolidation ignored).
ii. Horizontal pressure from the surcharge of ground beyond the top level of the RC wall.
iii. Horizontal pressure from the surcharge of vehicles nearby.
iv. The vertical reaction from the existing foundations (Dead Load only), from walls, floors and roof.

b. Permanent – The water table is conservatively considered to be at its highest level throughout the site, 910mm of retained water. In its permanent state the wall will be pinned top and bottom. The top

soil consolidation is not considered in the permanent state. The forces acting on the wall considered for this stage are as follows:

i. Horizontal pressure from the retained soil.
ii. Horizontal pressure from the surcharge of ground beyond the top level of the RC wall.
iii. Horizontal pressure from retained water in soil.
iv. Horizontal pressure from the surcharge of vehicles nearby.
v. The vertical reaction from the existing foundations (Dead and Live Load), from walls, floors and roof.
vi. Vertical reaction from the internal slab acting on the toe of the wall.

The wall will be tied into the main building structure. Sliding and Overturning will not be considered.

5. **Retaining Wall No 5**: Located to the rear of the building it will become the permanent rear wall of the new basement. The design conditions/parameters are similar to those of retaining wall No 1. The differences with retaining wall No 1 are described below.

   a. Temporary – Same design parameters as R.W. No 1, with the exception of the absence of vehicle access to the rear of the building.
      i. Horizontal pressure from the retained soil (reduced because of clay consolidation).
      ii. Horizontal pressure from water in fissures (occurs in the event of precipitation).

   b. Permanent – Same design parameters as R.W. No 1, with the exception of a single story of the new building extension above causing additional surcharge load. The surcharge from the house is comparable to that used for the vehicles in the design of R.W. No 1.
      i. Horizontal pressure from the retained soil.
      ii. Horizontal pressure from house extension above.
      iii. Horizontal pressure from retained water in soil.
      iv. Vertical reaction from the internal slab acting on the toe of the wall.

   The wall will be tied into the main building structure. Sliding and Overturning will not be considered.

DESIGN INFORMATION

Soil information:

- FIRM/STIFF Silty-CLAY (Most of the site down to 4.0m from the ground level. Refer to the SI report and attached borehole reference drawing).

  Allowable Bearing Pressure = 150 kN/m^2

  Density of saturated soil = 19 kN/m^2

  Wall adhesion = 25 kN/m^2 (conservatively taken the passive wall adhesion – See SI report)

  Internal Angle of Friction = 20^o

- Top Layer MADE GROUND (Crushed road stone or Clinker and Brick Fill first 700mm. Refer to the SI report and attached borehole reference drawing).

  Allowable Bearing Pressure = N/A (new foundations to be taken down to natural soil)

  Density of saturated soil = 19 kN/m^2

  Internal Angle of Friction = 30^o

Loading:

The density of masonry is taken as 21kN/m^3.

Job No	Description	Calc No:	4
P18-461	20a FERNCROFT AVENUE	Date:	02.12.2019
		By:	AT
		Checked:	-

Wind loading is not relevant to this design and has been ignored.

Vehicle and/or equipment surcharge is taken as 10kN/m^2.

Retaining Wall No 1: (These loading are also valid for R.W.5 – The R.W.1 design will also be valid for R.W.5)

Temporary Loading

- Horizontal pressure from the soil is calculated using Tekla TEDDS software. Refer to the calculations in the following section.
- The variable load surcharge (Non heavy-duty vehicle loading) is 5.0 kN/m^2.
- Horizontal pressure caused by water captured in the clay fissures = 0.5 x 1.15^{2}m x 10kN/m^3 = 6.0kN/m (approximately)

Permanent Loading

- Horizontal pressure from the soil is calculated using Tekla TEDDS software. Refer to the calculations in the following section.
- The variable load surcharge (Non heavy-duty vehicle loading) is 5.0 kN/m^2.
- A permanent surcharge of 15 kN/m^2 (R.W. 5 load case)
- Horizontal pressure from the retained water is calculated using Tekla TEDDS software. Refer to the calculations in the following section.
- Loading on toe caused by the new slab and wall. Wall = 24 x 0.2m x 2.3m = 11.04 kN/m and the Slab = 24 x 0.25m x 1.2m = 7.2 kN/m and LL = 1.5 kN/m^2 x 1.2m = 1.8 kN/m

Retaining Wall No 2:

Temporary Loading

- Horizontal pressure from the soil is calculated using Tekla TEDDS software. Refer to the calculations in the following section.

Permanent Loading

- Horizontal pressure from the soil is calculated using Tekla TEDDS software. Refer to the calculations in the following section.
- The variable load surcharge (conservative loading for garden furniture) is 10 kN/m^2.
- Half of the extent of the proposed slab was modeled into the permanent stage TEDDS model to mimic the behavior of the completed structure without the need to add point load reaction on the toe.

Retaining Wall No 3:

Temporary Loading

- Horizontal pressure from the soil is calculated using Tekla TEDDS software. Refer to the calculations in the following section.
- The permanent load surcharge = 0.6m x 19kN/m^3 x Ka= 5.7 kN/m^2 (approximated)
- The vertical load from the existing structure – Wall = 21kN/m^3 x 0.2m x 9.0m = 37.8kN/m – Floors = 0.75kN/m^2 x (6.0 / 2)m x 5 = 11.25kN/m – Roof = 0.8kN/m^2 x 1.41 x (6.0 / 2)m = 3.4kN/m so a total of 52.5kN/m.

Permanent Loading

- Horizontal pressure from the soil is calculated using Tekla TEDDS software. Refer to the calculations in the following section.
- The permanent load surcharge = 0.6m x 19kN/m^3 x Kp= 5.7 kN/m^2 (approximated)
- Horizontal pressure from the retained water is calculated using Tekla TEDDS software. Refer to the calculations in the following section.
- The vertical load from the existing structure – DL of 52.5kN/m and LL = 1.5kN/m^2 x (6.0 / 2)m x 5 = 22.5kN/m.

- Loading on toe caused by the new slabs and wall. Wall = 24 x 0.2 x 2.3 = 11.04 kN/m and the Slabs = (24kN/m^3 x 0.25m x 3m) + (24kN/m^3 x 0.3m x3m) = 39.6 kN/m and LL = 1.5 kN/m^2 x 3.0m x 2 = 9.0kN/m

Retaining Wall No 4:

Temporary Loading

- Horizontal pressure from the soil is calculated using Tekla TEDDS software. Refer to the calculations in the following section.
- The permanent load surcharge = 0.6m x 19kN/m^3 x Ka = 4.75 kN/m^2 (approximated)
- The variable load surcharge (Non heavy-duty vehicle loading) is 5.0 kN/m^2.
- The vertical load from the existing structure – Wall = 21kN/m^3 x 0.2m x 9.0m = 37.8kN/m – Floors = 0.75kN/m^2 x (6.0 / 2)m x 2 = 4.5kN/m – Roof = 0.8kN/m^2 x 1.41 x (6.0 / 2)m = 3.4kN/m so a total of 45.7kN/m.

Permanent Loading

- Horizontal pressure from the soil is calculated using Tekla TEDDS software. Refer to the calculations in the following section.
- The permanent load surcharge = 0.6m x 19kN/m^3 x Kp= 4.75 kN/m^2 (approximated)
- Horizontal pressure from the retained water is calculated using Tekla TEDDS software. Refer to the calculations in the following section.
- The variable load surcharge (Non heavy-duty vehicle loading) is 5.0 kN/m^2.
- The vertical load from the existing structure – DL of 45.7kN/m and LL = 1.5kN/m^2 x (6.0 / 2)m x 2 = 9.0kN/m.
- Loading on toe caused by the new slabs and wall. Wall = 24 x 0.2 x 2.3 = 11.04 kN/m and the Slabs = (24kN/m^3 x 0.25m x 3m) + (24kN/m^3 x 0.3m x3m) = 39.6 kN/m and LL = 1.5 kN/m^2 x 3.0m x 2 = 9.0kN/m

Retaining Wall No 5: Refer to Retaining Wall No 1.

Job No	Description	Calc No:	6
P18-461	20a FERNCROFT AVENUE	Date:	02.12.2019
		By:	AT
		Checked:	-

CALCULATIONS & WALL DIMENSIONS

The calculations and structural/stability cheeks were performed with the aid of the engineering design software "Tekla TEDDS". The results obtained from the analysis and designs are tabulated in the summaries below. All of the design information laid out in the previous chapters was used as inputs for the TEDDS analysis.

Retaining Wall No.1 & No.5
Temporary Phase

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.9.10

Analysis summary

Description	Unit	Capacity	Applied	F o S	Result
Sliding stability	kN/m	37.55	23.6	1.591	PASS
Overturning stability	kNm/m	22	21.6	1.019	PASS
Bearing pressure	kN/m^2	150	84.2	1.781	PASS

Design summary

Description	Unit	Provided	Required	Utilisation	Result
Stem p0 rear face - Flexural reinforcement	mm^2/m	565.5	367.5	0.65	PASS
Stem p0 - Shear resistance	kN/m	123.0	20.1	0.16	PASS
Base bottom face - Flexural reinforcement	mm^2/m	565.5	480.5	0.85	PASS
Base - Shear resistance	kN/m	146.7	30.2	0.21	PASS
Transverse stem reinforcement	mm^2/m	392.7	300.0	0.76	PASS

Retaining Wall No.1 & No.5
Permanent Phase

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.9.10

Analysis summary

Description	Unit	Capacity	Applied	F o S	Result
Bearing pressure	kN/m^2	150	48	3.124	PASS

Design summary

Description	Unit	Provided	Required	Utilisation	Result
Stem max front face - Flexural reinforcement	mm^2/m	565.5	367.5	0.65	PASS
Stem p0 rear face - Flexural reinforcement	mm^2/m	565.5	367.5	0.65	PASS
Stem p0 - Shear resistance	kN/m	123.0	71.6	0.58	PASS
Stem p1 front face - Flexural reinforcement	mm^2/m	565.5	367.5	0.65	PASS
Stem p1 - Shear resistance	kN/m	123.0	29.3	0.24	PASS
Base top face - Flexural reinforcement	mm^2/m	565.5	518.1	0.92	PASS
Base bottom face - Flexural reinforcement	mm^2/m	565.5	480.5	0.85	PASS
Base - Shear resistance	kN/m	146.7	18.1	0.12	PASS
Transverse stem reinforcement	mm^2/m	392.7	300.0	0.76	PASS
Transverse base reinforcement	mm^2/m	392.7	113.1	0.29	PASS

Job No	Description	Calc No:	7
P18-461	20a FERNCROFT AVENUE	Date:	02.12.2019
		By:	AT
		Checked:	-

Retaining Wall No. 2
Temporary Phase

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.9.10

Analysis summary

Description	Unit	Capacity	Applied	F o S	Result
Sliding stability	kN/m	32.2	14.1	2.283	PASS
Overturning stability	kNm/m	15	11.5	1.308	PASS
Bearing pressure	kN/m^2	150	53.9	2.785	PASS

Design summary

Description	Unit	Provided	Required	Utilisation	Result
Stem p0 rear face - Flexural reinforcement	mm^2/m	565.5	367.5	0.65	PASS
Stem p0 - Shear resistance	kN/m	123.0	10.3	0.08	PASS
Base top face - Flexural reinforcement	mm^2/m	565.5	518.1	0.92	PASS
Base bottom face - Flexural reinforcement	mm^2/m	565.5	480.5	0.85	PASS
Base - Shear resistance	kN/m	146.7	20.4	0.14	PASS
Transverse stem reinforcement	mm^2/m	392.7	300.0	0.76	PASS
Transverse base reinforcement	mm^2/m	392.7	113.1	0.29	PASS

Retaining Wall No.2
Permanent Phase

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.9.10

Analysis summary

Description	Unit	Capacity	Applied	F o S	Result
Bearing pressure	kN/m^2	150	27.6	5.434	PASS

Design summary

Description	Unit	Provided	Required	Utilisation	Result
Stem p0 rear face - Flexural reinforcement	mm^2/m	565.5	367.5	0.65	PASS
Stem p0 - Shear resistance	kN/m	123.0	30.5	0.25	PASS
Base top face - Flexural reinforcement	mm^2/m	565.5	367.5	0.65	PASS
Base bottom face - Flexural reinforcement	mm^2/m	754.0	334.9	0.44	PASS
Base - Shear resistance	kN/m	114.8	20.8	0.18	PASS
Transverse stem reinforcement	mm^2/m	392.7	300.0	0.76	PASS
Transverse base reinforcement	mm^2/m	392.7	150.8	0.38	PASS

Job No	Description	Calc No:	8
P18-461	20a FERNCROFT AVENUE	Date:	02.12.2019
		By:	AT
		Checked:	-

Retaining Wall No. 3
Temporary Phase

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.9.10

Analysis summary

Description	Unit	Capacity	Applied	F o S	Result
Sliding stability	kN/m	48.7	40.2	1.211	PASS
Overturning stability	kNm/m	63.2	45	1.402	PASS
Bearing pressure	kN/m^2	150	132.8	1.129	PASS

Design summary

Description	Unit	Provided	Required	Utilisation	Result
Stem p0 rear face - Flexural reinforcement	mm^2/m	565.5	412.7	0.73	PASS
Stem p0 - Shear resistance	kN/m	132.6	34.7	0.26	PASS
Base bottom face - Flexural reinforcement	mm^2/m	754.0	480.5	0.64	PASS
Base - Shear resistance	kN/m	146.7	73.1	0.50	PASS
Transverse stem reinforcement	mm^2/m	392.7	330.0	0.84	PASS
Transverse base reinforcement	mm^2/m	392.7	150.8	0.38	PASS

Retaining Wall No.3
Permanent Phase

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.9.10

Analysis summary

Note: The retaining wall is pinned top and bottom. The base has been expanded with the addition of the ground bearing slab therefore no equilibrium checks are required.

Design summary

Description	Unit	Provided	Required	Utilisation	Result
Stem max front face - Flexural reinforcement	mm^2/m	565.5	412.7	0.73	PASS
Stem p0 rear face - Flexural reinforcement	mm^2/m	565.5	412.7	0.73	PASS
Stem p0 - Shear resistance	kN/m	132.6	48.1	0.36	PASS
Stem p1 front face - Flexural reinforcement	mm^2/m	565.5	412.7	0.73	PASS
Stem p1 - Shear resistance	kN/m	132.6	16.5	0.12	PASS
Base bottom face - Flexural reinforcement	mm^2/m	754.0	480.5	0.64	PASS
Base - Shear resistance	kN/m	146.7	57.2	0.39	PASS
Transverse stem reinforcement	mm^2/m	392.7	330.0	0.84	PASS
Transverse base reinforcement	mm^2/m	392.7	150.8	0.38	PASS

Job No	Description	Calc No:	9
P18-461	20a FERNCROFT AVENUE	Date:	02.12.2019
		By:	AT
		Checked:	-

Retaining Wall No. 4
Temporary Phase

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.9.10

Analysis summary

Description	Unit	Capacity	Applied	F o S	Result
Sliding stability	kN/m	52.5	47.7	1.101	PASS
Overturning stability	kNm/m	67.5	54.7	1.236	PASS
Bearing pressure	kN/m^2	150	135.2	1.109	PASS

Design summary

Description	Unit	Provided	Required	Utilisation	Result
Stem p0 rear face - Flexural reinforcement	mm^2/m	565.5	412.7	0.73	PASS
Stem p0 - Shear resistance	kN/m	132.6	40.8	0.31	PASS
Base bottom face - Flexural reinforcement	mm^2/m	754.0	480.5	0.64	PASS
Base - Shear resistance	kN/m	146.7	83.1	0.57	PASS
Transverse stem reinforcement	mm^2/m	392.7	330.0	0.84	PASS
Transverse base reinforcement	mm^2/m	392.7	150.8	0.38	PASS

Retaining Wall No.4
Permanent Phase

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.9.10

Analysis summary

Note: The retaining wall is pinned top and bottom. The base has been expanded with the addition of the ground bearing slab thereofre no equilibrium checks are required.

Design summary

Description	Unit	Provided	Required	Utilisation	Result
Stem max front face - Flexural reinforcement	mm^2/m	565.5	412.7	0.73	PASS
Stem p0 rear face - Flexural reinforcement	mm^2/m	565.5	412.7	0.73	PASS
Stem p0 - Shear resistance	kN/m	132.6	53.6	0.40	PASS
Stem p1 front face - Flexural reinforcement	mm^2/m	565.5	412.7	0.73	PASS
Stem p1 - Shear resistance	kN/m	132.6	19.8	0.15	PASS
Base top face - Flexural reinforcement	mm^2/m	565.5	518.1	0.92	PASS
Base bottom face - Flexural reinforcement	mm^2/m	565.5	480.5	0.85	PASS
Base - Shear resistance	kN/m	146.7	50.9	0.35	PASS
Transverse stem reinforcement	mm^2/m	392.7	330.0	0.84	PASS
Transverse base reinforcement	mm^2/m	392.7	113.1	0.29	PASS

Job No	Description	Calc No:	10
P18-461	20a FERNCROFT AVENUE	Date:	02.12.2019
		By:	AT
		Checked:	-

APPENDIX

- Retaining wall Designed Sections Locations on Plan
- Preliminary Design Information Work Sheets (RW2 omitted because of design simplicity)

ALL DIMS IN mm U.N.O.

RETAINING WALL TYPE LOCATION PLAN.

R.W. 1 & 5

R.W. 2

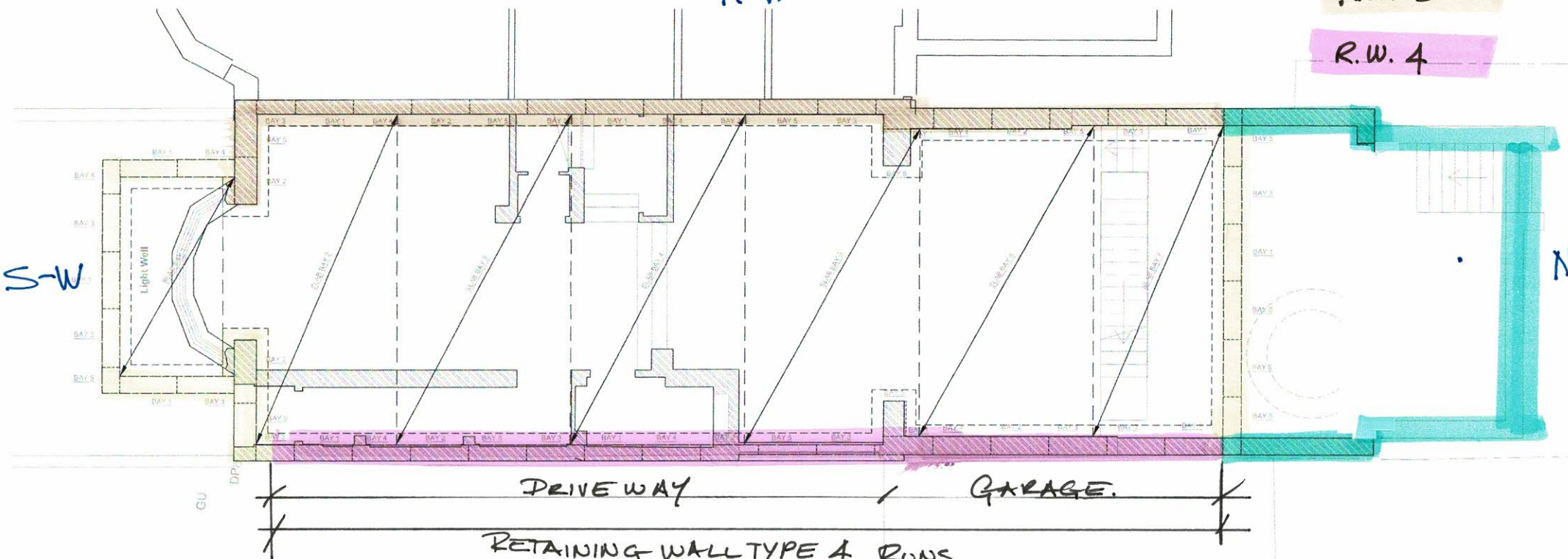
R.W. 3

R.W. 4

N-W

S-W

N-E



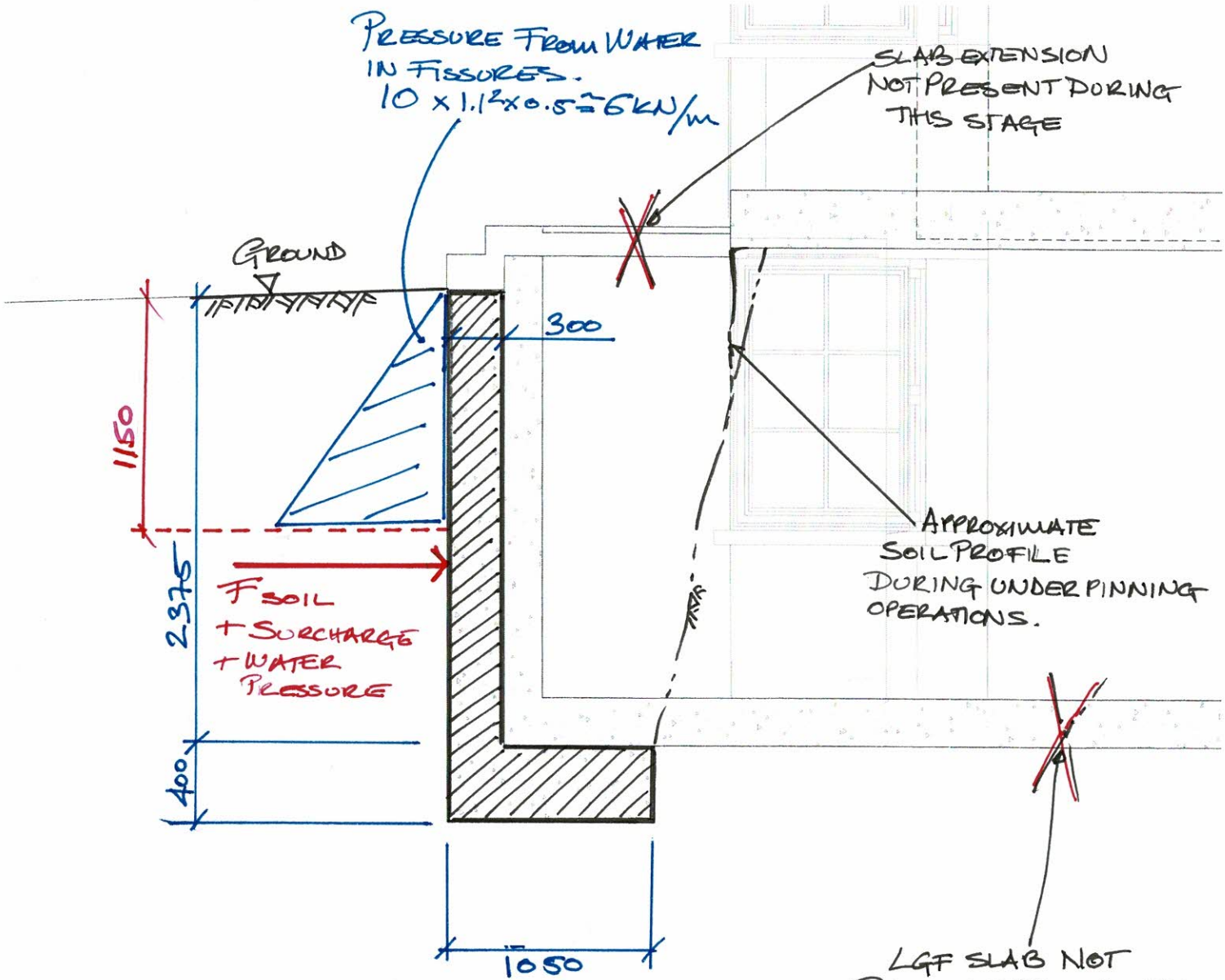
RETAINING WALL TYPE 4 RUNS FOR THE LENGTH OF THE BASEMENT NEIGHBOURING DRIVEWAY & GARAGE.

S-E

ALL DIMS IN mm U.N.O.

TEMPORARY PHASE

NOTE: SOIL WILL BE DRAINED DURING THE TEMPORARY WORKS. SO WATER TABLE TO BE IGNORED.



$$Z_c \text{ (CONSOLIDATION)} = \frac{2c/FOS}{\gamma_{soil}} = \frac{59KN/m^2/2}{18KN/m^3} = 1.64m$$

↳ USE $h/2 \cong 1.15m$ AS Z_c (CONSERVATIVE)

RETAINING WALL SECTIONS 1

NOTE: WALLS NOT TAKEN AS PROPPED DURING TEMP. STAGE. SOIL PROFILE: TAKEN AS "SILTY-CLAY" FULL HEIGHT OF WALL & UNDER THE BASE