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Mr Geoff Green
Green Structural Engineering Ltd
Unit 5
Quayside Lodge
William Morris Way
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8th December 2017

Our Ref: 18630/LR1

Dear Geoff,

**63 Hillfield Road, West Hampstead, NW6 1QB –
Basement Impact Assessment - Report 18630/R3**

As requested by Campbell Reith we have revised the PDISP analyses for the retrofit basement beneath No.63 as follows:

- Reduced the undrained shear strength (cohesion) C_u of the clays at basement formation level from 50kPa to 45kPa;
- Reduced the bearing pressure on Zone 14 (which supports the pier between the windows in the front lightwell) to less than the maximum allowable bearing pressure of 100kPa which was proposed in paragraph 10.4.11 of our BIA (ref: 18630/R3); this was achieved by increasing the width of the Zone 14 from 0.35m to 0.55m, with associated slight reduction to the area of the central basement slab (Zones 12 & 13).

The revised stress changes for Zone 14 were as given in Table 3a; no changes were applicable to Zones 12 and 13 because the floor slab remains subject only to a uniformly distributed pressure change.

Table 3a: Changes in vertical stress for PDISP Zones			
ZONE	Net change in vertical pressure (kPa)		
#	Stage 1	Stage 2	Stages 3 and 4
14	96.44	96.44	96.44

The revised soil parameters are given in Table 4a below, and the revised PDISP figures are presented on the attached Figures G1a and G4a to G7a (Figures G2 and G3 have not changed, but are included here for convenience). The revised summary of predicted displacements is in presented in Table 5a below.

Continued...

Table 4a: Soil parameters for PDISP analyses				
Strata	Level	Undrained Shear Strength, C_u (kPa)	Short-term, undrained Young's Modulus, E_u (MPa)	Long-term, drained Young's Modulus, E' (MPa)
London Clay	3.0 16.0	45.0 143.0	22.5 71.5	13.5 42.9

Where:

Undrained shear strength, C_u assumed as $C_u = 45 + 7.5z$ kPa
 where z = depth below the top of the stratum (3.0m bgl)

Undrained Young's Modulus, $E_u = 500 * C_u$

Drained Young's Modulus, $E' = 0.6 E_u$

Location	Stage 1 (Figure D4)	Stage 2 (Figure D5)	Stage 3 (Figure D6)	Stage 4 (Figure D7)
Front lightwell	0 - 2 mm Settlement	2mm Settlement to 0.5mm Heave	2mm Settlement to 0.5mm Heave	3.5mm Settlement to 1.5mm Heave
Front wall of basement (incl. column)	1 - 5mm Settlement	1 - 4mm Settlement	0.5 - 4mm Settlement	1.5 - 7.5mm Settlement
61/63 party wall	1.5 - 4mm Settlement	0 - 4mm Settlement	1 - 4mm Settlement	1 - 6mm Settlement
Rear lightwell	0.5 - 3mm Settlement	0.5 - 2.5mm Settlement	0.5 - 2.5mm Settlement	1 - 4.5mm Settlement
Rear wall of basement	1 - 5mm Settlement	1 - 4mm Settlement	1 - 5mm Settlement	1 - 7.5mm Settlement
63/65 party wall	2 - 5mm Settlement	1 - 4mm Settlement	1 - 5mm Settlement	2.5 – 7.5mm Settlement
Internal columns	2mm Settlement	1mm Settlement to 1.0mm Heave	0 - 1mm Settlement	2mm Settlement to 0.5mm Heave
Central basement slab	1.5 - 3mm Settlement (No slab present)	2mm Settlement to 1mm Heave (No slab present)	3mm Settlement to 1mm Heave	4mm Settlement to 1mm Heave

The maximum settlement predicted by the PDISP analysis alongside the basement, beneath No.65's rear wall, has remained at 2-2.5mm in Stage 3 and increased to 3.5-4.5mm in Stage 4 (with maximum settlement at the centre of the PDISP zone also increasing by 0.5mm to 7.5mm). The differential between these values (1.5-2mm, also increased by 0.5mm) gives the long-term plastic deformation, which must be combined with the settlement caused by relaxation of the ground alongside the basement in response to excavation of the underpins, which can be estimated using the settlement profile for the worst case (low stiffness) scenario presented in Figure 2.11(b) of CIRIA Report C580. The latter is 0.35% of the excavation depth, which for a 1.0m excavation depth gives a predicted settlement of 3.5mm; that increases to 5.0-5.5mm when combined with the PDISP-predicted 1.5-2mm long-term displacement differential. The maximum predicted deflection, Δ can then be obtained from CIRIA's settlement profiles chart (op cit). For the worst case scenario $\Delta = 17\%$ of the maximum settlement, hence the maximum $\Delta = 5.5 \times 0.17 = 0.94\text{mm}$, which represents a deflection ratio, $\Delta/L = 2.35 \times 10^{-4}$ (0.024%).

Using the graphs for $L/H = 0.5$ as before, these deformations represent a damage category which remains well within the 'negligible' Burland Category 0 ($\epsilon_{\text{lim}} = <0.05\%$) as given in CIRIA SP200, Table 3.1, and illustrated in Figure 12a below.

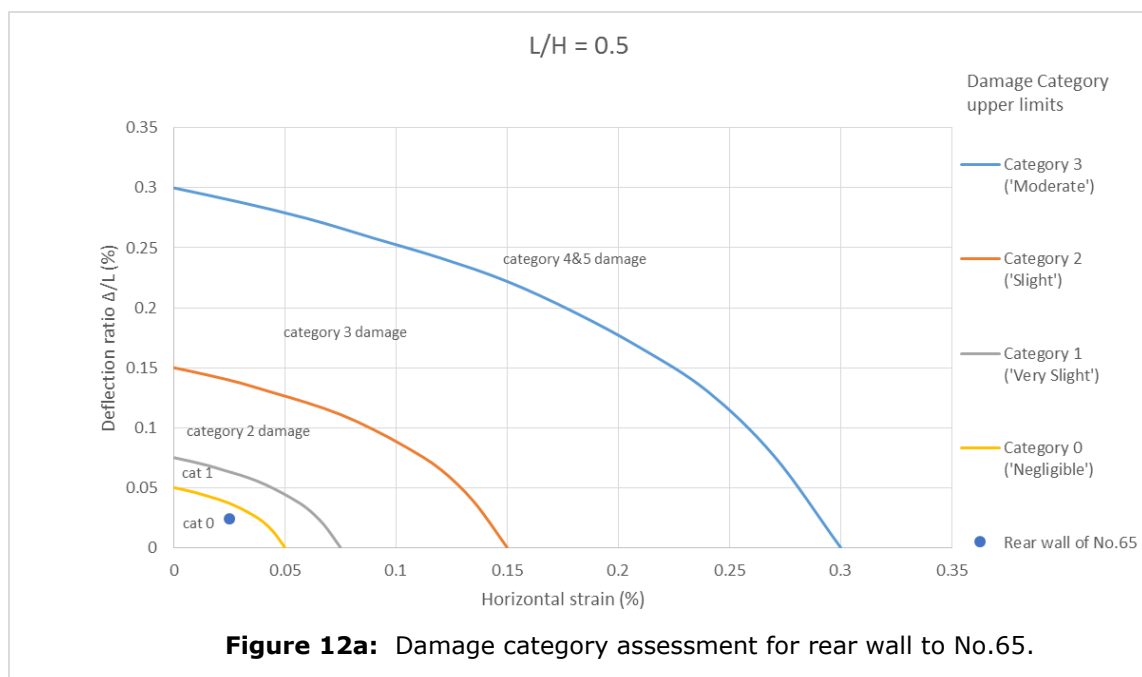


Figure 12a: Damage category assessment for rear wall to No.65.

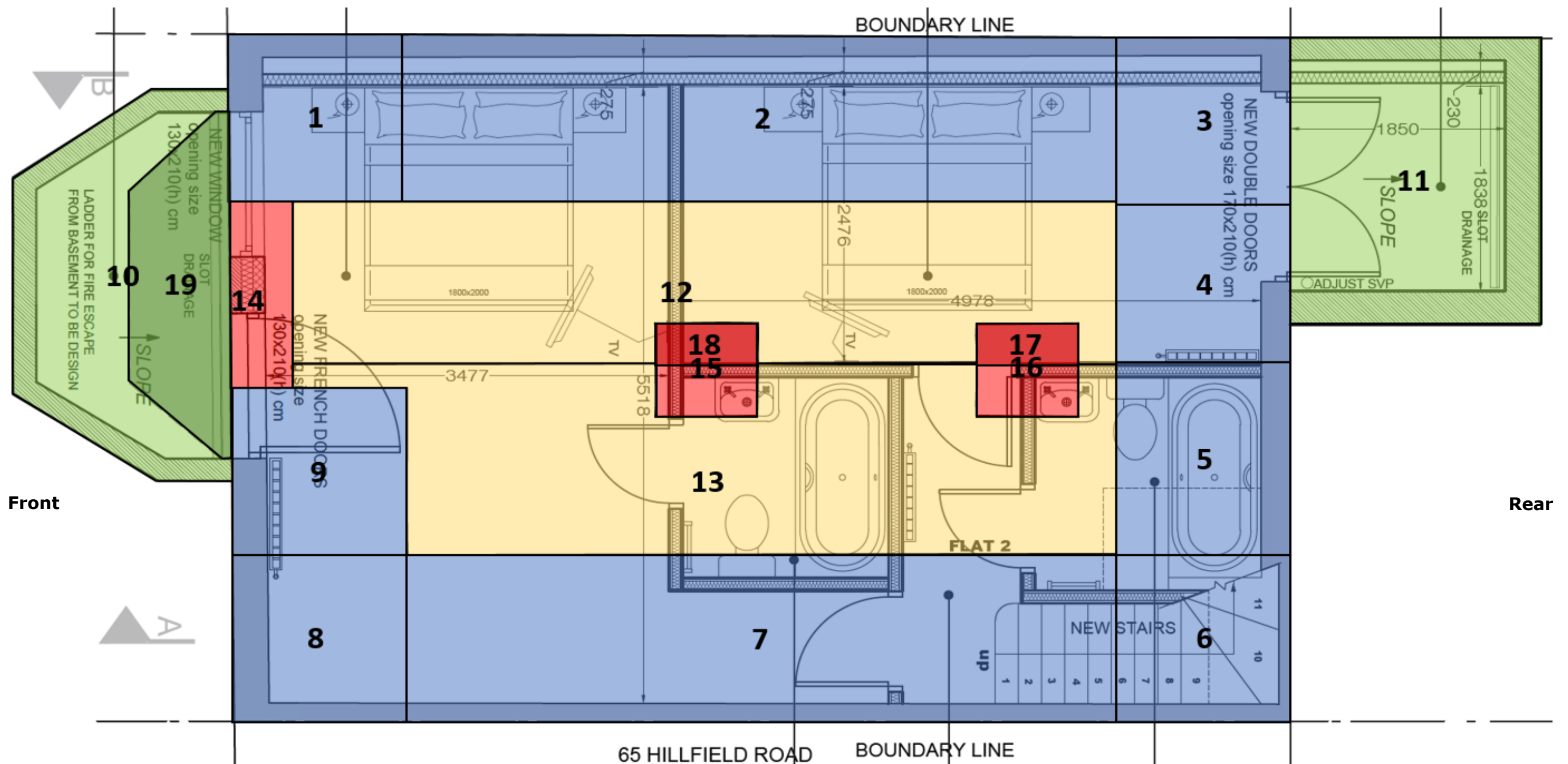
We trust that this will resolve Campbell Reith's first two queries regarding the submitted BIA.

Yours sincerely



Keith Gabriel
UK Registered Ground Engineering Adviser
for and on behalf of **Gabriel GeoConsulting Ltd**
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encs: PDISP Figures



Notes:

1. Zones 1-9 (pale blue) are underpins to the existing party walls and front/rear walls.
2. Zones 10 & 11 (pale green) represent the excavations for the proposed front and rear lightwells, which include the retaining walls and slab.
3. Zones 12 & 13 (pale yellow) represent the excavations for the central basement slab, within the underpin bases.
4. Zones 14-16 (pale red) represent the excavations for the proposed columns.
5. Zones 17 & 18 (dark red) are superimposed zones which allow for the increased excavation depth where the existing ground level steps up.
6. Zone 19 (dark green) is a superimposed zone which allows for the reduced excavation and pre-existing stresses from the existing bay/lightwell.

Plan taken from Vorbild Architecture's 'Proposed Basement Plan' (Drg No. A-(13)-011).

Revision 1: Width of Zone 14 increased from 0.35m to 0.55m.

Project: 63 Hillfield Road, London, NW6 1QB

Title: Layout of Zones used for PDISP Analyses

Figure: G1a

18630

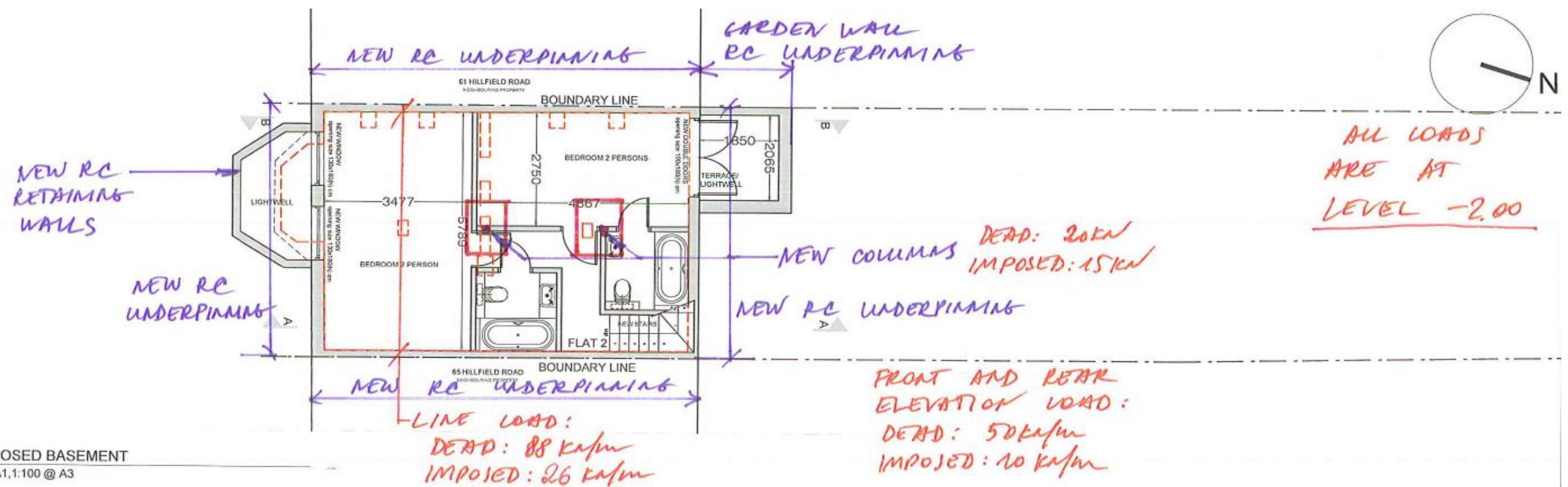
Date: October 2017

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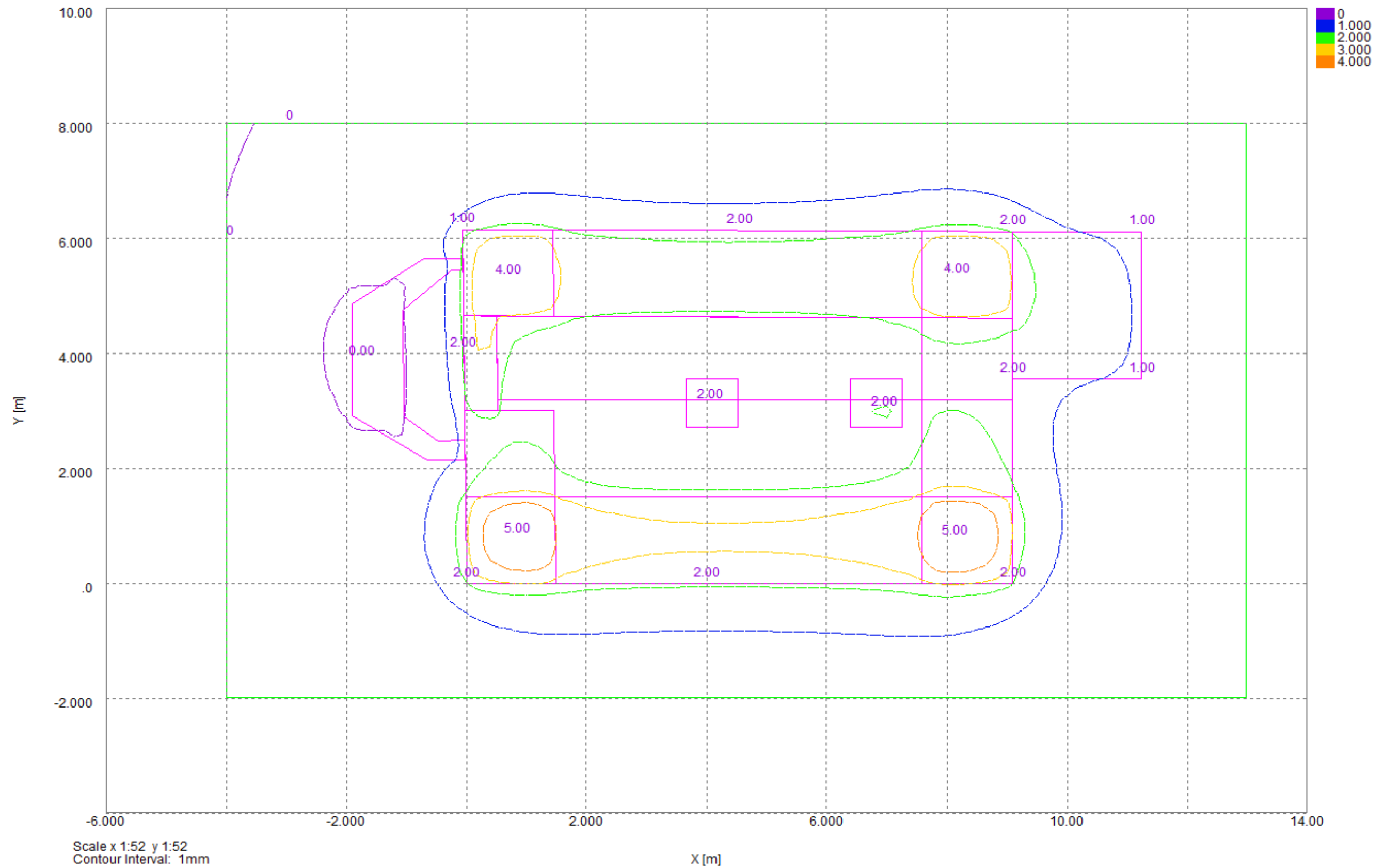
Approved: KRG

Scale: NTS

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Settlement Contours : Grid 1 at -3.3000m



Project: 63 Hillfield Road, London, NW6 1QB

Title: PDISP Output - Contour Plot for Stage 1

Figure: G4a

Date: October 2017

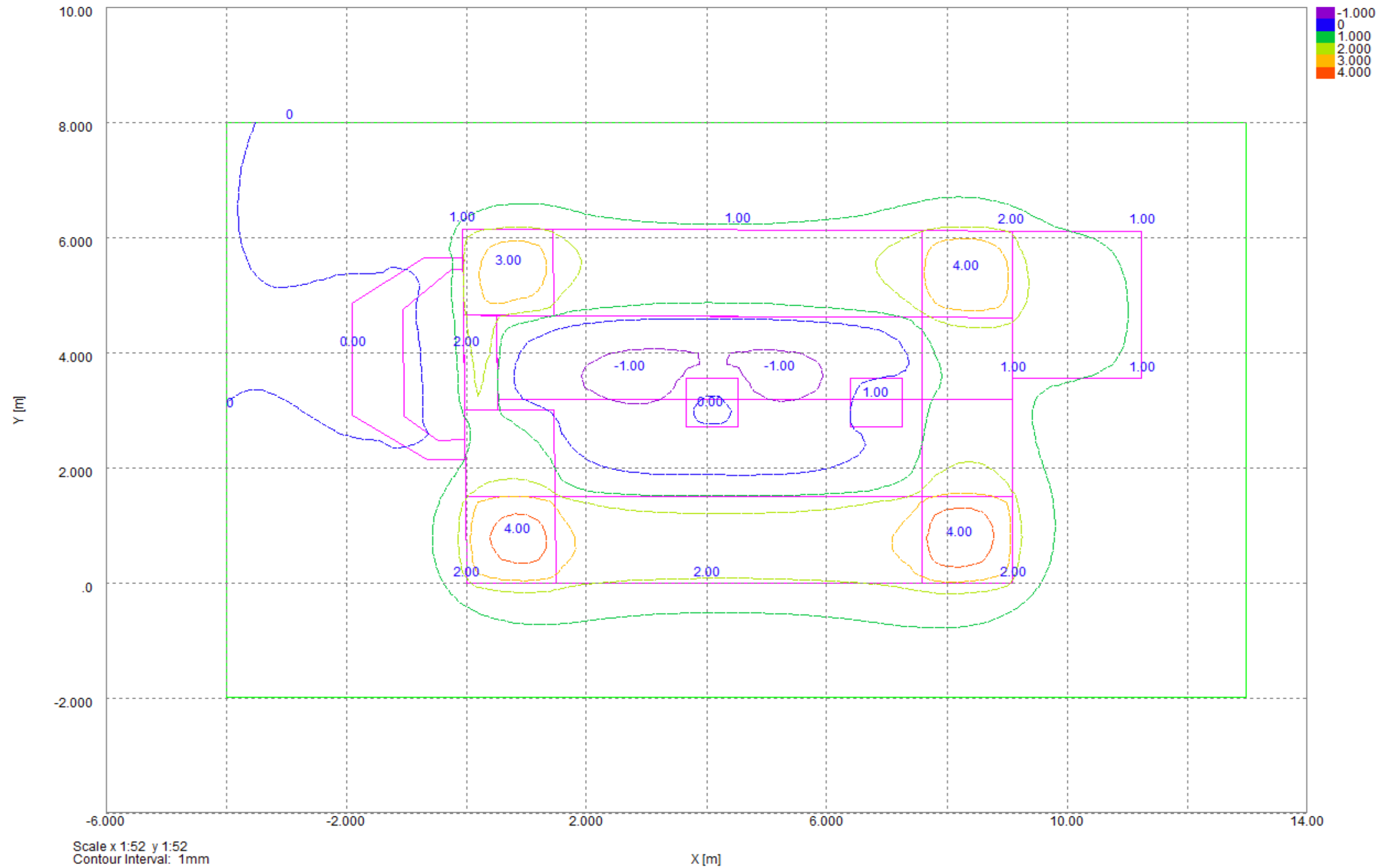
Checked: RM

Approved: KRG

Scale: NTS



Settlement Contours : Grid 1 at -3.3000m



Project: 63 Hillfield Road, London, NW6 1QB

Title: PDISP Output - Contour Plot for Stage 2

Figure: G5a

Date: October 2017

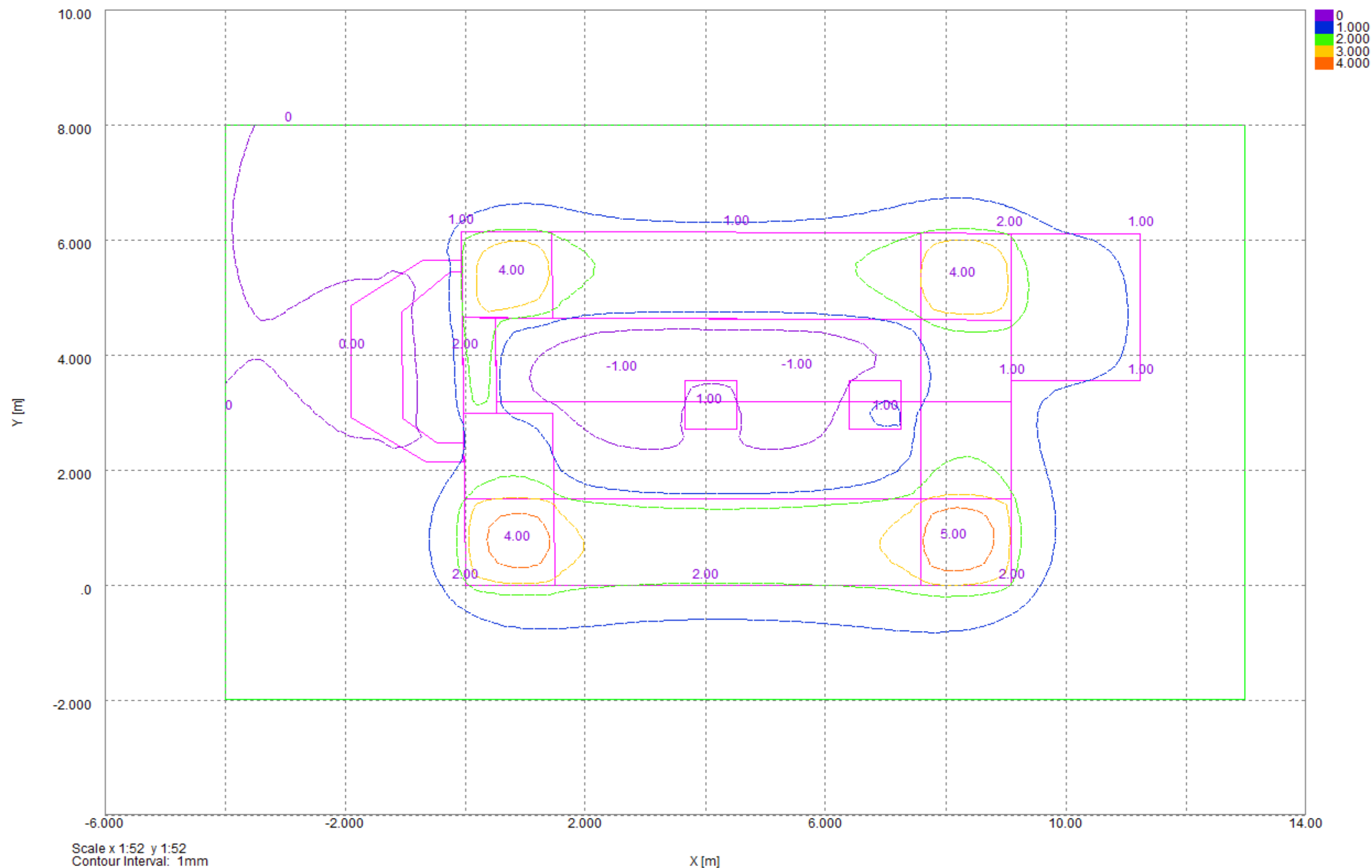
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Approved: KRG

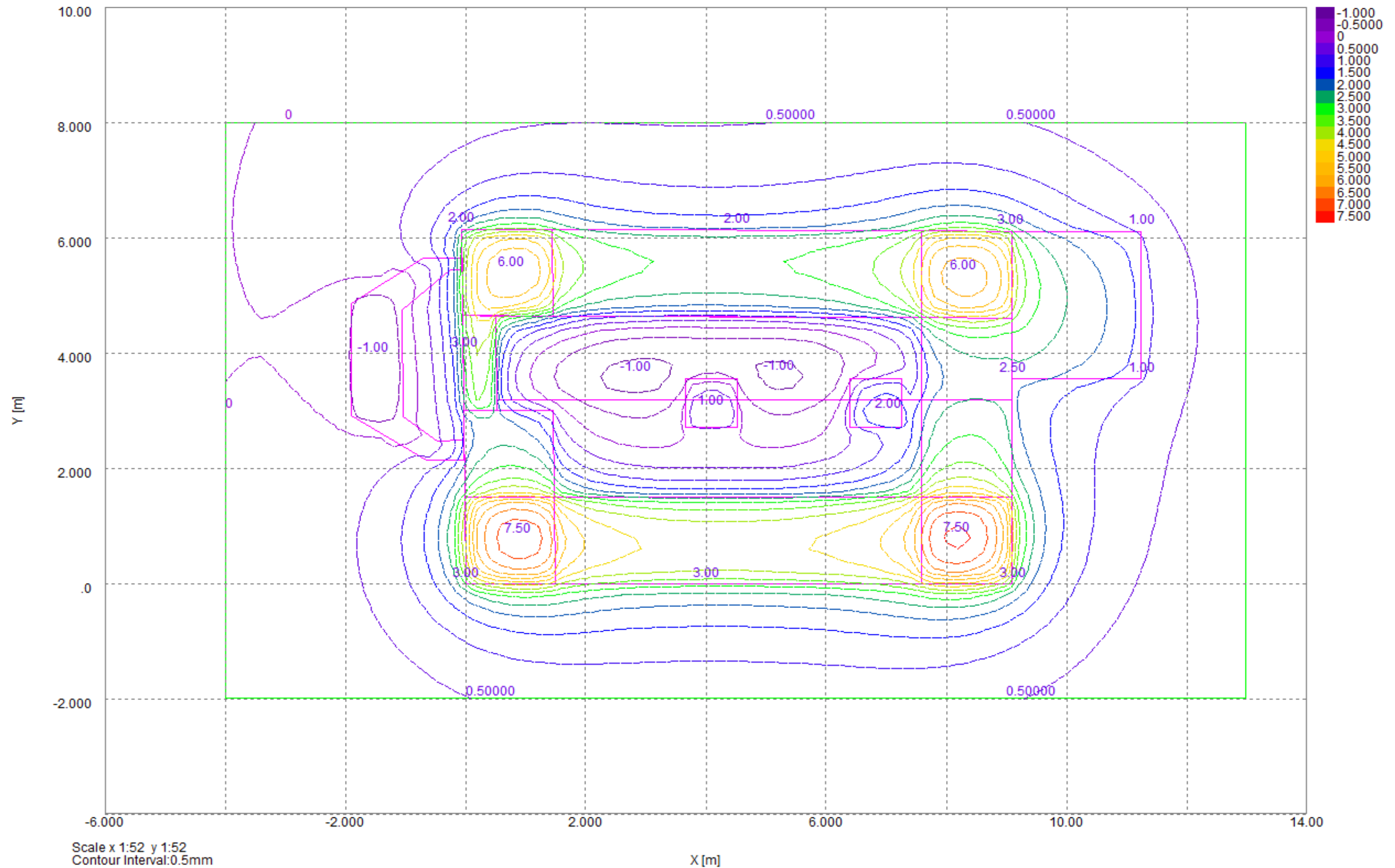
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Settlement Contours : Grid 1 at -3.3000m



Settlement Contours : Grid 1 at -3.3000m



Project: 63 Hillfield Road, London, NW6 1QB

Title: PDISP Output - Contour Plot for Stage 4

Figure: G7a

Date: October 2017

Checked: RM

Approved: KRG

Scale: NTS

