

**TRANSPORT AND WORKS ACT 1992
TOWN AND COUNTRY PLANNING ACT 1990
PLANNING (LISTED BUILDINGS AND CONSERVATION AREAS) ACT 1990**

**PROPOSED LONDON UNDERGROUND
(NORTHERN LINE EXTENSION) ORDER**

TRANSPORT FOR LONDON'S REBUTTAL

OF

**THE EVIDENCE OF THE KENNINGTON AND WALWORTH
NEIGHBOURHOOD ACTION GROUP – SETTLEMENT AND DAMAGE
TO PROPERTY (Alexandra Norrish) AND THE CLAYLANDS GREEN
NLE ACTION GROUP AND NORTHERN LINE COMMUNITY ACTION
(Donald Stark)**

ON

GROUND MOVEMENT

November 2013

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1. INTRODUCTION

- 1.1.1 This rebuttal proof of evidence has been prepared on behalf of Transport for London to address particular aspects of Alexandra Norrish's Proof of Evidence for Kennington and Walworth Neighbourhood Action Group (KWNAG) (OBJ 60) and Donald Stark's Proof of Evidence for Claylands Green NLE Action Group (CGNLEAG) and Northern Line Extension Community Action (NLECA) (OBJ 254/G1 and OBJ 190/G1 respectively).
- 1.1.2 With regard to Ms Norrish, all the issues raised in her evidence are dealt with below. With regard to Mr Stark, only the issues related to ground movement are dealt with here. Other matters raised by Mr Stark will be responded to separately.
- 1.1.3 It is not intended that this rebuttal proof should address further points that witnesses for TfL have previously covered in their evidence; however, cross-references to relevant paragraphs of those witnesses' Proofs of Evidence will be made where appropriate.
- 1.1.4 It is intended that this rebuttal proof should be a composite response to those issues raised by Alexandra Norrish and Donald Stark and set out above. In this respect, for cross-examination purposes the name of the TfL witness who is responsible for each aspect of this rebuttal proof will be given at the beginning of each section below.
- 1.1.5 This rebuttal addresses the points raised by Ms Norris first, followed by Mr Stark. For each of these sections, the points are organised into themes and sub-themes (numbered and shown in bold font) related to the impacts on ground movement and planning conditions related to ground movements.
- 1.1.6 In each of these sections, the objector's point is summarised in plain font, with any quotations shown in italics. This is followed by TfL's response in bold font, preceded by the name of the witness making that part of the rebuttal. Within each sub-theme, there may be several points, each of which is dealt with separately in turn, and with the witness identified as described.

2. GROUND MOVEMENT (MS NORRISH)

2.1 Settlement maps need to be updated

2.1.1 In paragraph 2.2, Ms. Norrish asserts that settlement maps do not reflect the results of recent investigative boring around Kennington Park so are no longer reliable.

TfL witness: Jonathan Gammon

2.1.2 The assessment process, which is undertaken in three phases, is summarised in my Proof of Evidence (TFL2/A) paragraphs 16.12 to 16.35, inclusive.

2.1.3 The phase 1 settlement contour maps produced in the ES Appendix I were produced having had regard to a wide range of sources of geotechnical data. These are referred to in the ES Volume 1 p13-4 paragraph 13.30 and the ES Appendix I2 Buro Happold Report page 12 paragraphs 2.1 and 2.2. The ES Appendix I2 Buro Happold Report describes the ground model utilised at page 14 section 3.

2.1.4 The XDISP model utilised for the production of the phase 1 settlement contours only requires the soil type at tunnel level to be entered e.g. cohesive or granular. Specific soil parameters are not required (see ES Appendix I2 Buro Happold Report page 16 section 3.3). The thickness of Made Ground, Alluvium (where present) and River Terrace Deposits relative to the thickness of London Clay above the tunnel crown means a single cohesive ground model is appropriate for the phase 1 appraisal (see ES Appendix I2 Buro Happold Report page 19 section 4.2).

2.1.5 The ES Appendix I2 Buro Happold Report explains at page 19 section 4.2 that the geological model used assumes a single layer of stiff fissured clay. This is considered appropriate because the tunnels are in general situated within the London Clay. In the zones where the tunnel passes through the Lambeth Group, part of the tunnel is still in the London Clay, or the tunnel is only at the very top of the Lambeth Group.

2.1.6 The ES Appendix I2 Buro Happold concludes at section 3.1 third bullet point: "The ground investigation carried out to date is sufficient for the purposes of the Reference Design."

2.1.7 It follows that the geotechnical studies carried out to date are sufficient to enable TfL to assess the potential impact of ground-based risks of the proposed scheme and possible mitigation. More detailed ground models will be used in the phase 3 assessment once the detailed design has been developed. The ground investigation currently being undertaken is to provide data to be used in later assessment phases.

2.1.8 I should emphasise that the phase 1 assessment is undertaken on the basis of very robust assumptions as I have explained in my Proof of Evidence. It deliberately over-predicts the likely ground movement so that properties can be excluded from further analysis in phases 2 and 3. If a property lies outside of the 10mm contour it can be reliably concluded that that property is unlikely to experience any significant ground movement effects.

2.2 Eligibility for surveys

2.2.1 In paragraphs 2.5-2.10 of her evidence, Ms Norrish states that “Properties shown outside the 10mm line should be able to apply for a defects survey prior to works and TfL should explain how this will work”.

TfL witness: Jonathan Gammon

2.2.2 The draft CoCP to which the project will be tied by a planning condition explains that:

- a) all owners of property within the ‘limits’, which includes those properties predicted to experience 10mm or more of settlement (identified as part of TfL’s Transport & Works Act Order application for the Northern line Extension, April 2013) will receive a building defects survey by a qualified chartered building surveyor or engineer commissioned by TfL at TfL’s cost;
- b) TfL is also willing to enter into a ‘Settlement Deed’ relating to these properties, on the property owner’s request. The Deed would regulate the timescales relating to the survey process and the rectification of any damage, as set out above; and
- c) If the Transport & Works Act Order is made, TfL will then write to all property owners within the ‘limits’ to offer them a Settlement Deed.

2.2.3 Requests from owners of properties outside of the predicted 10mm settlement for defect surveys would be considered on a case-by-case basis.

2.2.4 Given the robustness of the modelling undertaken I repeat that if a property lies outside of the 10mm contour it can be reliably concluded that that property is unlikely to experience any significant ground movement effects. It follows that it is not necessary to require TfL to undertake defect surveys of any property lying outside the limits should the owner request it in every case.

2.2.5 However, there may be special cases where the offer of a settlement deed to a property lying outside the 10mm contour could potentially be

justified. For example, a terraced property where its neighbour lies within the 10mm contour or a building with unusual foundations which might increase the risk to that property. It is thus appropriate to allow for the exercise of discretion in determining whether a property outside of the 10mm contour should be offered a settlement deed to allow for such exceptional cases.

2.3 Full settlement effects are not shown

2.3.1 In paragraph 2.11 of her evidence, Ms Norrish states that TfL's settlement maps do not take account of the potential for damage to be caused to properties associated with vibration from HGV movement and construction work.

TfL witness: Rupert Thornely-Taylor

2.3.2 **The potential for vibration arising from construction activities to cause cosmetic damage is not included in the settlement maps. It is important not to confuse potential impacts that might be caused by ground movement and impacts that might be caused by vibration. They are separate effects; vibration might be caused by an activity that does not cause ground movement and vice versa.**

2.3.3 **The potential for construction activities to cause cosmetic damage to buildings is assessed in the Environmental Statement Volume 1 section 9. This concludes that by reference to criteria set out in BS 7385-2:1993 the expected vibration levels from construction activities are below the thresholds for cosmetic damage to buildings and it is predicted that the likelihood of any cosmetic damage to buildings is negligible.**

2.3.4 **This conclusion bears out my own experience of similar construction work. Adverse impacts from vibration associated with construction work rarely cause cosmetic damage to buildings.**

3. GROUND MOVEMENT (Mr Stark)

3.1 Reporting of ground movement in the Environmental Statement

3.1.1 Mr Stark states in paragraph 4.3 of his evidence that the Environmental Statement deliberately overstates the amount of ground settlement. The objector in paragraph 4.4 asserts that further exploration will be needed into what TfL actually believes might happen from ground settlement for the buildings identified within the predicted 10mm settlement contour.

TfL witness: Jonathan Gammon

- 3.1.2 As I have explained above and in my Proof of Evidence, the phase 1 assessment is deliberately robust and over-predicts the extent of potential ground movement. This enables the conclusion to be reached that if a property lies outside of the 10mm contour it can be reliably concluded that that property is unlikely to experience any significant ground movement effects. This enables the later more detailed phases of assessment to be focussed on a narrower range of properties.
- 3.1.3 This is likely to mean that many properties that are studied in phase 2 are likely to be identified as not experiencing significant impact from ground movement. It is however important to be robust at all stages of the assessment to ensure that potential impacts are identified and mitigated where necessary. TfL wishes to avoid causing any damage to properties and given its commitment to remedy damage caused by the works it is in TfL's interests to do so.
- 3.1.4 Indeed, the phase 2 assessment undertaken by Buro Happold (ES Appendix I2) concludes that only the Kent Building at BDCH has the potential to suffer “moderate” damage. BDCH has withdrawn its objection to the NLE and indeed expresses support for it. It would thus appear that it is content with the project’s approach to the management and mitigation of ground movement.
- 3.1.5 No other building identified as falling within the 10mm contour at phase 1 was identified as being likely to experience more than “slight” damage. Phase 3 of the analysis has not been carried out yet as this requires the detailed design to have been developed, which will not be done until a contractor has been appointed.

3.2 Phase 2 and phase 3 analysis

- 3.2.1 In paragraph 4.8 Mr Stark states that TfL has not confirmed whether all buildings within the limits of deviation have been assessed to at least Phase 2 standard.
- 3.2.2 In paragraph 4.9 Mr Stark states that TfL must share the data behind assessments for various properties which are forecast to experience slight or moderate damage.
- 3.2.3 Mr Stark continues in paragraph 4.11 to argue that TfL has not explained how provisional allowance will be made for mitigating settlement for structures exceeding damage category 2 (slight) before the phase 3 analysis is complete.

TfL witness: Jonathan Gammon

- 3.2.4 At Phase 2 an assessment is made for each building and item of infrastructure that is predicted from the Phase 1 analysis to be subject to settlement of 10mm or more [TFL2/A, paragraph 16.25].
- 3.2.5 In appendix A3 and A5 of the Buro Happold Report in the ES Appendix I2 a series of plans is set out that identify the buildings examined in the phase 2 assessment and their classification in terms of potential impact. The extent of the appraisal of the buildings within the 10mm contour is evident. Again, however, the phase 2 assessment has adopted the same robust volume loss assumptions used for phase 1. As a result the assessment is likely to significantly overstate the level of impact.
- 3.2.6 The “slight” damage category is taken from the work of Burland *et al* (1977). The tensile strains relevant to this category equate in practice to the potential for cracks to be caused that are easily filled. This level of damage would thus be mitigated via the Settlement Deed and the commitments given in the CoCP that TfL will remedy damage caused.

4. PLANNING CONDITIONS (Mr Stark)

4.1 *Proposed additional planning condition on ground settlement*

4.1.1 The objector states in paragraph 5.6 that commitments on ground settlement should be translated into a planning condition so that it would become a reserved matter to be discharged through the relevant local authorities. In paragraph 5.7 the objector goes on to propose a draft planning condition.

TfL witness: John Rhodes

4.1.2 **Commitments relating to Ground Movement are secured by Section 13 of the revised CoCP. A Draft Planning Condition is proposed which requires compliance with the CoCP.**

4.1.3 **A further commitment as proposed by Mr. Stark is not necessary or indeed appropriate given TfL's proposed condition and the content of the CoCP. The local planning authorities have no outstanding concerns regarding ground movement issues and have agreed the proposed planning conditions.**