11 NETHERHALL GARDENS NW3

TECHNICAL REPORTS SUPPORTING PLANNING APPLICATION OF AUGUST 2009

CONTENTS OF TECHNICAL REPORTS

1	Arboricultural Report	Landmark Trees
2	Structural Report 1/8/08	Watts Group
3	Structural Report 2/1/04	Andrew Firebrace
4	Structural Report 29/8/01	Andrew Firebrace
5	Letter from Network Rail 14/3/08	Network Rail
6	Envirocheck Report – Summary	Price & Myers
7	Daylight Study	Delva Patman

758-310



ARBORICULTURAL CONSTRAINTS REPORT:

11 Netherhall Gardens Hampstead London NW3

REPORT PREPARED FOR:

P K S Architects LLP 10 Deane House Greenwood Place Kentish Town London NW5 1LB

REPORT PREPARED BY

Adam Hollis

MSc ARB MICFor FArbor A

Ref: PKS/NTH/AIA/01

Date: 9th February 2009

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Section	Content	Page N°
1.0	SUMMARY	3
2.0	INTRODUCTION	4
2.1	Terms of Reference	4
2.2	Drawings Supplied	4
2.3	Scope of Survey	4
2.4	Caveats	5
3.0	OBSERVATIONS	7
3.1	Survey Data	7
3.2	Site Descriptions	7
3.3	Subject Trees	8
3.4	Planning Status	10
4.0	DEVELOPMENT CONSTRAINTS	10
4.1	Primary Constraints	10
4.2	Secondary Constraints	11
5.0	ARBORICULTURAL IMPACTS	13
6.0	DISCUSSION	14
6.1	Rating of Primary Impacts	14
6.2	Rating of Secondary Impacts	14
6.3	Mitigation of Impacts	14
7.0	CONCLUSION	14
8.0	RECOMMENDATIONS	15
9.0	REFERENCES	15

APPENDICES

APPENDIX 1	Survey Data	16
APPENDIX 2	Recommended Tree Works	19
APPENDIX 3	Tree Constraints Plan	22
APPENDIX 4	Impact Assessment Plan	24

1. SUMMARY

- 1.1 This report comprises an arboricultural constraints report for the proposed development site at 11 Netherhall Gardens, Hampstead, London NW3.
- 1.2 There are 8 surveyed trees on site (and 2 small apple trees) with a generally mature demographic structure. The neighbouring woodland is over mature /derelict and in need of management, if it is to survive. Of the 8 surveyed trees none are category 'A' (High Quality): there are 4 'B' category (Moderate Quality), 1 'C' category (Low Quality) tree, 2 'R' category (Poor Quality) trees and 1 'C / R' category (undetermined) tree.
- 1.3 The principal primary constraints upon the site are the 2 B-category horse chestnuts (T6 & 7) at the front of the property and the 2 B-category sycamores (T1 & 2) to the rear. Since the existing building frontage is adhered to in the proposals, the chestnuts will not constrain development unduly. The constraints of the two sycamores (and large poplar) allow plenty of room for back garden development (though some minor access facilitation pruning of branch tips, especially for T1 may be required). A young, Norway spruce and other shrubs will be removed from within the back garden without affecting the visual character of the surrounding area. Therefore, there are no significant impacts of development; i.e. the primary tree constraints of Root Protection Area and canopy are preserved intact for the material trees.
- 1.5 The most significant, secondary constraint would be shading on to the site from the western boundaries and branch failure from the derelict poplar. In terms of shading, the main body of the tree belt is set back from the boundary. The threat of structural failure from the poplar needs to be resolved, regardless of development. Therefore, there are no significant secondary impacts of development.
- 1.6 The site has potential for development without impacting significantly on the viable tree population and without disturbing the long-term screening function of the site.

2.0 INTRODUCTION

2.1 Terms of reference

- 2.1.1 LANDMARK TREES were asked by client P K S Architects LLP, 10 Deane House, Greenwood Place, Kentish Town, London NW5 1LB to undertake an arboricultural planning survey of the site: 11 Netherhall Gardens, Hampstead, London NW3. The report is to accompany a planning application.
- 2.1.2 The proposals are for the redevelopment of the land at 11 Netherhall Gardens, which involves the demolition of the existing property, and replacing it with a purpose built block of residential units occupying the same footprint. The lay out has yet to be determined and this constraints plan will inform its evolution.

2.2 Drawings supplied

2.2.1 The drawings supplied by the client and relied upon Landmark Trees in the formulation of our survey plans are: topographical survey – N/a existing ground floor – 1_Netherhall_Gardens_NW3&Planning_App_061207_existing proposed ground floor – 090128_All Plans

2.3 Scope of survey

- 2.3.1 As Landmark Trees' arboricultural consultant, I surveyed the trees on site on 22nd November 2007, recording relevant qualitative data in order to assess both their suitability for retention and their constraints upon the site, in accordance with British Standard 5837:2005 Trees in relation to construction Recommendations [BS5837].
- 2.3.2 I am a Registered Consultant and Fellow of the Arboricultural Association and a Chartered Forester, with a Masters Degree in Arboriculture and 20 years experience of the landscape industry including the Forestry Commission and Agricultural Development and Advisory Service. I am a UK Registered Expert Witness, trained in single joint expert witness duties. I am also Chairman of the UK & I Regional Plant Appraisal Committee, inaugurated to promote international standards of valuation in arboriculture.
- 2.3.3 Our survey of the trees, the soils and any other factors, is of a preliminary nature. The trees were inspected on the basis of the Visual Tree Assessment method expounded by Mattheck and Breloer (The Body Language of Trees, DoE booklet Research for Amenity Trees No. 4, 1994). I have not taken any samples for analysis and the trees were not climbed, but inspected from ground level.
- 2.3.4 The survey does not cover the arrangements that may be required in connection with the laying or removal of underground services. The observations and comments are set out in the body of the report below.

5

2.4 Caveats

- 2.4.1 This report is primarily an arboricultural report. Whilst comments relating to matters involving built structures or soil data may appear, any opinion thus expressed should be viewed as qualified, and confirmation from an appropriately qualified professional sought. Such points are usually clearly identified within the body of the report.
- 2.4.2 It is not a full safety survey or subsidence risk assessment survey. These services can be provided but a further fee would be payable. Where matters of tree condition with a safety implication are noted during an inspection they will of course appear in the report.
- 2.4.3 Inherent in tree inspection is assessment of the risk associated with trees close to people and their property. Most human activities involve a degree of risk, such risks being commonly accepted if the associated benefits are perceived to be commensurate. Risks associated with trees tend to increase with the age of the trees concerned, but so do many of the benefits. It will be appreciated, and deemed to be accepted by the client, that the formulation of recommendations for all management of trees will be guided by the cost-benefit analysis (in terms of amenity), of tree work that would remove all risk of tree related damage.
- 2.4.4 Prior to the commencement of any tree works, an ecological assessment of specific trees may be required to ascertain whether protected species (e.g. bats, badgers and invertebrates etc) may be affected.

3.0 OBSERVATIONS

3.1 Survey data & report layout

- 3.1.1 Detailed records of individual trees are given in the survey schedule in Appendix 1 to this report, with supporting work recommendations in Appendix 2
- 3.1.2 A site plan identifying the surveyed trees, based on the client's drawings / topographical survey is provided in Appendix 3.
- 3.1.3 This plan also serves as the Tree Constraints Plan with the theoretical Recommended Protection Areas (RPA's), tree canopies and shade constraints, (from BS5837: 2005) overlain onto it. These constraints can then be overlain in turn onto the client's future proposals (not supplied) to create an Arboricultural Impact Assessment Plan in Appendix 5.
- 3.1.4 More general observational data and discussion follow in the main body of the report below.

3.2 Site description

- 3.2.1 The site occupies land in residential Hampstead.
- 3.2.2 The site is level within its boundaries, but the adjacent land to the rear slopes away steeply. The land to the rear comprises a derelict woodland / shelterbelt.
- 3.2.3 In terms of the Soil Survey of England and Wales, the soil lies within the unsurveyed area of Greater London where the soils are generally, highly shrinkable clay; e.g. slowly permeable seasonally waterlogged fine loam over clay. Such soils are prone to compaction during development. Damage to soil structure can have a serious impact on tree health. Design of foundations near problematic tree species will also need to take into consideration subsidence risk. A structural engineer may be

able to advise further on the local geology and its implications for development.

3.3 Subject trees

- 3.3.1 There are 8 surveyed trees on site (and 2 small apple trees) with a generally mature demographic structure. The neighbouring woodland is over mature /derelict and in need of management / regeneration, if it is to survive.
- 3.3.2 Of the 8 surveyed trees none are category 'A' (High Quality): there are 4 'B' category (Moderate Quality), 1 'C' category (Low Quality) tree, 2 'R' category (Poor Quality) trees and 1 'C / R' category (undetermined) tree.
- 3.3.3 The B category trees are 2 horse chestnuts (T6 & 7) at the front of the property and the 2 sycamores (T1 7 2) to the rear. The chestnuts appear in robust health, but a full visual inspection of the stem was not possible, because of the density of surrounding vegetation. It is recommended that this shrub cover be cut back to facilitate closer inspection. Similarly, the sycamore stems were covered in dense ivy, but these trees are third party trees, so severance mat not be possible.
- 3.3.4 The C category tree is a young Serbian spruce in good health with potential, future specimen / architectural value, but limited current landscape or environmental value as a small, non-native, internal site tree.
- 3.3.5 The R category trees are a dying, ivy smothered cherry to the rear and a hawthorn of poor form (topped at 3m) with a pronounced lean across the front drive undermined by a weak rootstock and basal wound. Both trees should be felled and replaced with new trees to balance the age demographic.
- 3.3.6 The C/R category tree is an over mature poplar, the nearest of many in the neighbouring derelict woodland. It is a lapsed pollard, bifurcated at 5m with 1 of the 2 forks decayed into a

residual stub of 250mm and the 1 surviving stem growing to 10m. Thereafter, the top has been pollarded with 6m+ regrowth, interspersed with 2m failed stubs in variable states of decay. Large sections of the 6m regrowth are broken but hanging in the canopy.

- 3.3.7 A poplar of this size (c. 1000mm diameter) with such top rot, is likely to have related heart rot in the main stem and decayed roots. Such a level of assessment on a development survey of a neighbour's tree was not possible. Clearly the tree is hazardous. The question arises as to whether repollarding will suffice to make it "safe."
- 3.3.8 Although a final decision rests with the tree owner and could be informed by further diagnostic testing with decay detection equipment, my view is that as a short lived species, the tree has very limited Safe Useful Life Expectancy (SULE) and should be felled rather than wasting resources on further pollarding. Unfortunately, this decision rather begs the question as to what should be done with the rest of the poplars / woodland. Although not closely inspected, they appear to be of a similar age and condition.
- 3.3.9 Clearly, the decision is not the responsibility of the clients. However, as a surrounding land use / landscape from the south west to the north west, its development may have a bearing on the amenity of the client's property, from influencing light / shade levels to adding an air of neglect to the neighbourhood. Because the land slopes away to the north west, any felling of the poplars may have a strong landscape impact on residents of the houses below the bank. Therefore, necessary felling needs to be considered as part of a wider regeneration plan rather than as piecemeal items. It may smooth the path of development to become involved therein.

3.4 Planning Status

- 3.4.1 Trees 6, 7 and 8 are subject to Tree Preservation Order No. 20 placed on them by the former Local Authority, London Borough of Hampstead (14th February 1958). This considerably increases their status, as it is a criminal offence to disturb or damage such trees without permission from the local authority.
- 3.4.2 However, this designation does not mean that as in the case of the problematic hawthorn (T8), they cannot be removed (subject to permission) as they age and deteriorate over the 50 years since its issue.

4.0 DEVELOPMENT CONSTRAINTS

4.1 **Primary constraints**

- 4.1.1 BS5837: 2005 gives Recommended Protection Areas (RPA's) for any given tree size. The individual RPA's are calculated in the Tree Schedule in Appendix 1 to this report, or rather the notional radius of that RPA, based on a circular protection zone. The prescribed radius is generally 12-x stem diameter at 1.5m above ground level except, where basal diameters are used in the case of multi-stemmed trees, and the radius is thence set at 10x the diameter.
- 4.1.2 Circular RPA's are appropriate for individual specimen trees grown freely such as these, but where there is ground disturbance, such as in this case with the client's hard landscaping, the morphology of the RPA can be modified to an alternative polygon, and where appropriate shifted 20% in the direction of undisturbed ground. In less fanciful terms, one needs to remember that RPA's are area-based and not linear.
- 4.1.3 'C category trees should not normally constrain development they may do so in aggregate as a collective feature such as

boundary screening, but will rarely constrain development on an individual tree basis. 'R' category trees are excluded from the planning process.

- 4.1.4 Thus, the principal primary constraints upon the site are the RPA's of the two horse chestnuts to the front and two sycamores to the rear. If the existing building frontage is adhered to, then the chestnuts will not constrain development unduly (though some minor access facilitation pruning of branch tips may be required) The RPA's of the two sycamores allow plenty of room for back garden development.
- 4.1.5 Clearly, the biggest potential constraint on such back garden development comes from the theoretical RPA of the poplar. However, at the very least this tree will have to be pollarded and more than likely removed. If its canopy is removed entirely in a standard pollarding then its RPA should be significantly reduced accordingly.

4.2 Secondary Constraints

- 4.2.1 The second type of constraint produced by trees that are to be retained is that the proximity of the proposed development to the trees should not threaten their future with ever increasing demands for tree surgery or felling to remove nuisance shading, honeydew deposition or perceived risk of harm.
- 4.2.2 The shading constraints are crudely determined from BS5837 by drawing an arc from northwest to east of the stem base at a distance equal to the height of the tree. Shade is less of a constraint on non-residential developments, particularly where rooms are only ever temporarily occupied.
- 4.2.3 This arc represents the effects that a tree will have on layout through shade, based on shadow patterns of 1x tree height for a period May to Sept inclusive 10.00-18.00 hrs daily.

- 4.2.3 The most significant, secondary constraint would be shading on to the site from trees along the western boundaries and branch / stem failure from the poplar. In terms of shading, the many body of the tree belt appears to fairly set back from the boundary. The threat of structural failure from the poplar remains real and would affect potential land use, if it were not managed in any way.
- 4.2.4 Sycamores T1 & 2 may also create some nuisance from their overhanging canopies with general leaf / debris and also honeydew deposition. Although some remedial pruning may be possible (to reduce overhang) land use beneath these trees will have to be tailored accordingly.

5.0 ARBORICULTURAL IMPACTS (TBC)

Table 1: Arboricultural Impact Assessment

*From Matheny & Cark (1995)

BS	Tree	Species	Impact	% Tree /	Tree	Tree	Species	Impact	Impact	Mitigation
Cate-	No.			RPA	Age	Condition	Tolerance*	On Tree	On Site	
gory				Affected				Rating	Rating	
С	5	Norway	Removed to facilitate development	N/a	Young	Good	N/a	N/a	V. Low	None required
		spruce								/ Landscape
										Proposals

Arboricultural Constraints Report: 11 Netherhall Gardens, Hampstead, London NW3 Prepared for: P K S Architects LLP, 10 Deane House, Greenwood PI, Kentish Town, London NW5 1LB Prepared by: Adam Hollis of Landmark Trees, 2 Clifford Gardens, London NW10 5JD

6.0 **DISCUSSION**

6.1 Rating of Primary Impacts

6.1.1 There are no significant impacts: the removal of a young, internal site, conifer tree within mature, broadleaved screening will have negligible impact upon the visual character of the local area; nor will it have any discernible ecological impact.

6.2 Rating of Secondary impacts

6.2.1 There are no significant impacts: both the western shelterbelt and poplar are outside the control of future residents and health and safety considerations will apply to the poplar and its owner, regardless of development.

6.3 Mitigation of Impacts

N/a

7.0 CONCLUSION

- 7.1 There are no significant primary or secondary impacts of development.
- 7.2 The threat of structural failure from the poplar remains real and shading from the western woodland could affect potential land use, if it were not managed in any way. However, these issues relate to third-party ownership, outside the scope of this report.
- 7.3 Therefore, the site has the potential for redevelopment without having any significant impact on either the retained trees or wider landscape.

8.0 **RECOMMENDATIONS**

8.1 Specific Recommendations

- 8.1.1 Tree surgery recommendations are found in Appendix 2 to this report.
- 8.1.2 Cooperation with third-parties in a wider woodland management plan would be beneficial in the long term.

8.2 General Recommendations

8.2.1 TBC

9.0 REFERENCES

- British Standards Institute. 2005. Trees in Relation to Construction BS 5837: 2005 HMSO, London.
- Barlow JF & Harrison G (1999); Shade by Trees, Arboricultural Practice Note 5, AAIS, Farnham, Surrey.
- Lonsdale D 1999. Research for Amenity Trees No.7: Principles of Tree Hazard Assessment and Management, HMSO, London.
- Mattheck C. & Breloer H. 1994. Research for Amenity Trees No.2: The Body Language of Trees, HMSO, London.

APPENDIX 1

TREE SCHEDULE - Notes for Guidance

Dm -	is the diameter of the trunk in millimetres at 1.5m above
	ground level.
Spread -	is in metres at the points of the compass relevant to the
	woodland boundary
Class/Colour -re	efers to the retention classifications in Section 5.2
	BS5837: 2005 and colouring on the site map - Highly
	High Quality (A) (Green) ,
	Moderate Quality (B) (Blue) ,
	Low Quality (C) (Grey) ,
	Poor Quality (R) (Red)

Landmark Trees Tel: 0800 0556912

Tree Survey Schedule

Site: 11 Netherall Gardens Date: 22nd October 2007

Surveyor: Adam Hollis

Ref:

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Age Class	Stem Diameter	Protection Multiplier	Protection Radius	Growth Vitality	Structural Condition	Landscape Contribution	B.S. Cat	Sub Cat	Useful Life	Observations
1	Sycamore	13	5553	5	Mature	510	12	6.1	Moderate	Fair	Medium	В	2	20-40	Ivy smothered
2	Sycamore	14	5535	5	Mature	440	12	5.3	Moderate	Fair	Medium	В	2	20-40	Ivy smothered
3	Cherry, Flowering	5	2552	2	Over-Mature	300	12	3.6	Poor	Poor	Low	R		<10	Deadwood thoughout crown Ivy smothered
4	Poplar, Black	16	7777	10	Over-Mature	950	12	11.4	Moderate	Poor	Medium	C/R	1	<10	Lapsed pollard. Bifurcated at 5m with 1 decayed stub of 250mm + 1 remaining stem to 10m Thereafter, repollarded with 2m stubs in variable levels of decay. Large sections broken but hanging in canopy. Hazardous.
5	Spruce, Siberian	10	1111	1.5	Young	200	12	2.4	Normal	Fair	Low	С	1	>40	A tree with insignificant defects
6	Chestnut, Horse	12	4556	3	Mature	600e	12	7.2	Normal	Fair	Medium	В	2	20-40	Decay in trunk Surrounded by impenetrable scrub

Notes:

- 1. Height describes the approximate height of the tree measured in meters from ground level.
- 2. The Crown Spread refers to the crown radius in meters from the stem centre and is expressed as an average of NSEW aspect if symmetrical.
- 3. Ground Clearance is the height in meters of crown clearance above adjacent ground level.
- Stem Diameter is the diameter of the stem measured in millimeters at 1.5m from ground level for single stemmed trees or at ground level for multi-stemmed trees. Stem Diameter may be estimated where access is restricted.
- 5. Protection Multiplier is 12 for single stemmed and 10 for multi-stemmed trees and is the number used to calculate the tree's protection radius and area.

- 6. Protection Radius is a radial distance measured from the trunk centre.
- 7. Growth Vitality Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree).

8. Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defects present.

- 9. Landscape Contribution High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees).
- 10. B.S. Cat refers to (British Standard 5837:2005 Table 1) and refers to tree/group quality and value; 'A' High, 'B' Moderate, 'C' Low, 'R' Remove.
- 11. Sub Cat refers to the retention criteria values where 1 is Arboricultural, 2 is Landscape and 3 is Cultural including Conservational, Historic and Commemorative.
- 12. Useful Life is the tree's estimated remaining contribution in years.

<u>Tree Survey Schedule</u>

Site: 11 Netherall Gardens

Landmark Trees

Tel: 0800 0556912

Date: 22nd October 2007

Surveyor: Adam Hollis

Ref:

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Age Class	Stem Diameter	Protection Multiplier	Protection Radius	Growth Vitality	Structural Condition	Landscape Contribution	B.S. Cat	Sub Cat	Useful Life	Observations
7	Chestnut, Horse	12	4344	4	Mature	550e	12	6.6	Normal	Fair	Medium	В	2	20-40	Surrounded by impenetrable scrub
															Topped at 10m
8	Hawthorn, Common	6	5353	2	Mature	300b	10	3.0	Moderate	Poor	Low	R		<10	Pronounced lean to south across driveway entrance. Loss of limb at base with decay
															Poor form: topped at 3m. Tree could fail at graft union over driveway entrance.

Notes:

- 1. Height describes the approximate height of the tree measured in meters from ground level.
- 2. The Crown Spread refers to the crown radius in meters from the stem centre and is expressed as an average of NSEW aspect if symmetrical.
- 3. Ground Clearance is the height in meters of crown clearance above adjacent ground level.
- Stem Diameter is the diameter of the stem measured in millimeters at 1.5m from ground level for single stemmed trees or at ground level for multi-stemmed trees. Stem Diameter may be estimated where access is restricted.
- 5. Protection Multiplier is 12 for single stemmed and 10 for multi-stemmed trees and is the number used to calculate the tree's protection radius and area.

- 6. Protection Radius is a radial distance measured from the trunk centre.
- 7. Growth Vitality Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree).
- 8. Structural Condition Good (no or only minor defects), Fair (remediable defects), Poor Major defects present.
- Landscape Contribution High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees).
- 10. B.S. Cat refers to (British Standard 5837:2005 Table 1) and refers to tree/group quality and value; 'A' High, 'B' Moderate, 'C' Low, 'R' Remove.
- 11. Sub Cat refers to the retention criteria values where 1 is Arboricultural, 2 is Landscape and 3 is Cultural including Conservational, Historic and Commemorative.
- 12. Useful Life is the tree's estimated remaining contribution in years.

APPENDIX 2

RECOMMENDED TREE WORKS

Recommended Tree Works

Landmark Trees Tel: 07812 989 928

Surveyor: Adam Hollis

Date: 22nd October 2007

Site: 11 Netherhall Gardens

Ref:

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
1	Sycamore	13	510	5553	Sever ivy (but 3rd party tree)	Ivy smothered Advisable for good arboricultural practice
2	Sycamore	14	440	5535	Sever ivy (but 3rd party tree)	Ivy smothered Advisable for good arboricultural practice
3	Cherry, Flowering	5	300	2552	Fell	Deadwood thoughout crown Ivy smothered Advisable for good arboricultural practice
4	Poplar, Black	16	950	7777	Pol	Lapsed pollard. Bifurcated at 5m with 1 decayed Thereafter repollarded with 2m stubs in variable
					ideally, left (but Sid party fiee)	levels of decay. Large sections broken but hanging Advisable for good arboricultural practice
5	Spruce, Siberian	10	200	1111		A tree with insignificant defects
6	Chestnut, Horse	12	600e	4556	CL4	Decay in trunk
					Prune branches overhanging driveway. Clear back	Topped at 10m
					vegetation to inspect base	Surrounded by impenetrable scrub
						Recommended to permit development
7	Chestnut, Horse	12	550e	4344	Clear back vegetation so base	Surrounded by impenetrable scrub
					can be inspected	Topped at 10m
						Advisable for good arboricultural practice

Notes:

- CB Cut Back to boundary/clear from structure.
- CL# Crown Lift to given height in meters.
- CT#% Crown Thinning by identified %.
- CCL Crown Clean (remove deadwood/crossing and hazardous branches and stubs).
- CR#% Crown Reduce by given %.
- DDD Decay Detection Device recommended.
- Fell Fell to ground level.
- Fell2 Fell and treat stump to prevent re-growth.
- Pol Pollard or re-pollard.
- YM Carry out normal maintenance of a young/newly planted tree.
- RE Remove Epicormic Growth (specific notes may be made).

Recommended Tree Works

Landmark Trees Tel: 07812 989 928

Surveyor: Adam Hollis & James Bell

Date: 22nd October 2007

Site: 11 Netherhall Gardens

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Tree No.	English Name	Height	Stem Diameter	Crown Spread		Recommended Works	Comments/ Reasons
8	Hawthorn, Common	6	300b	5353	Fell	Fell and replace	Pronounced lean to south across driveway Pronounced lean Poor form: topped at 3m. Tree could fail at graft union over driveway entrance. Advisable for good arboricultural practice

Notes:

- CB Cut Back to boundary/clear from structure.
- CL# Crown Lift to given height in meters.
- CT#% Crown Thinning by identified %.
- CCL Crown Clean (remove deadwood/crossing and hazardous branches and stubs).
- CR#% Crown Reduce by given %.
- DDD Decay Detection Device recommended.
- Fell Fell to ground level.
- Fell2 Fell and treat stump to prevent re-growth.
- Pol Pollard or re-pollard.
- YM Carry out normal maintenance of a young/newly planted tree.
- RE Remove Epicormic Growth (specific notes may be made).

APPENDIX 3

TREE CONSTRAINTS PLAN





 \times + 71.7m Belsize Tunnel

 \times

APPENDIX 4

IMPACT ASSESSMENT PLAN



International Enclosity and Construction Consultance

1 August, 2008

Our reference: TGR/JL/AM/107281 Your reference:

Avonhead Investments Ltd c/o Christo & Co 148 Kentish Town Road London NW1 9QB



Watts Group PLC

1 Great Tower Street London EC3R 5AA

T: +44 (0)20 7280 8000 F: +44 (0)20 7280 8001 E: london@watts-int.com

By post and email to mail@christo.co.uk

Dear Sirs

11 NETHERHALL GARDENS, FINCHLEY, LONDON NW3 5RN

In accordance with earlier instructions, we have inspected the above premises in order to assess the recent structural deterioration. We have also undertaken research into its recent history, together with providing possible solutions to restore the integrity of the structure and reduce the risk of further movement.

For the purpose of this report, the front of the building is assumed to face due east.

Introduction

The building comprises two main sections. The main section of the building, constructed around 1880 on comparatively high and level ground, was originally intended to be used as a single occupancy domestic residence. Historical records indicate that the northern section was added later, possibly after the turn of the 20th century.

The construction, typical of that period, is of load-bearing masonry with timber upper floors and concrete ground floor. The pitched roof is of timber construction with clay tiles. A number of the internal walls are substantial masonry loadbearing walls, assumed to have their own foundations, whilst others are partitions built off the floors. There is no basement and the foundations appear to be shallow stepped brickwork, which have previously been underpinned.

There are mature trees in the close vicinity of the property; in particular sycamore, poplar and chestnut, the nearest at about 7 metres.

Andrew Firebrace Partnership, structural consultants, undertook earlier investigations at the property, in connection with cracking to walls, in 2001 and 2004. Recommendations were made for various structural works, including underpinning of the property, as the effects of movement worsened over time.



Watts Group FEC is repistered in England and Wales Repistration number ST28557 - VAT number 205 9605 61 Directors - Tony Williams (Chairman – Non-Executive), Ic Stocks (Chief Executive), Chird Knott, Ian Ford - Nei-Haynes (Company Secretary), Greham Triefus (Non-Executive) International Frequety and Constitution Consultants

Watts.

1 August, 2008 Our reference: TGR/JL/AM/107281 Your reference:

Discussion

Some structural deterioration is occurring due to water ingress, but the significant movement is because the building is founded on soil which has become subject to movement as a result of changes in its moisture content, caused by growth of the nearby trees.

We have commissioned further investigation of the soil at, and below, the level of the existing foundations, and samples of soils removed from boreholes have been laboratory tested to establish pertinent engineering properties. This investigation confirms the findings of earlier investigations by others, that the clay soil is categorised as being of high plasticity. This means that the soil is highly susceptible to change in volume as a result of relatively small variations in its moisture content. The changes in volume can result in either shrinkage or expansion of the soil, depending whether the moisture content is decreasing or increasing. Changes in soil moisture content commonly occur from a range of factors including :-

- Variation in climatic conditions between wet and dry periods.
- Extraction of water caused by the growth of trees and other vegetation.
- Leaking drains.

It is possible that changes in moisture content, and the consequential movement of the foundations causing the ongoing cracking, is due to more than one of the above factors. However tree root growth is occurring in the soil at and below the current foundation level, and given the nature and position of the cracking, this is considered to be the main cause.

The site investigation, undertaken by Site Analytical Services Ltd, comprising trial pits and boreholes on the three exposed elevations of the property, has confirmed the presence of London clay. Results from eleven clay samples revealed a Plasticity Index of above 40%. This is defined by NHBC Standards Chapter 4.2 as clay of 'high susceptibility to shrinkage and swelling movement with changes in moisture content'. Further detail on the soil properties is available by referring to the report.

Trial pit excavation and tree root identification, together with insitu and laboratory testing, has confirmed that the tree roots extend below the level of the current foundations, and are likely to be affecting moisture content of the soil below the level of the building foundations.

The investigation has confirmed that the soils at foundation level are likely to undergo swelling and shrinkage as moisture content changes. For this reason, it is likely that swelling of the soils, with consequent uplift (heave) on the foundations and ground floor will occur if trees are removed from the vicinity of the building. Care should therefore be taken to seek advice in relation to potential ground movement, from a suitably competent arboriculturalist before carrying out work on the trees.

International Property and Construction Consultants

Watts.

1 August, 2008 Our reference: TGR/JL/AM/107281 Your reference:

Long-term prognosis

Due to the shallow foundations of the building, it has suffered from differential movement over many years caused by volumetric changes in the clay sub-soil with changes in moisture. The movement which has occurred has not been uniform throughout the property, probably as a result of the disposition of the trees and their differing water demands. This has resulted in the cracking, visible throughout the property, which is caused by differential movement across the building.

Although it is possible to prevent cracks in load-bearing masonry from leading to significant structural failure by suitable timely intervention, such as stitching and bonding the masonry across the cracked sections, this will not in itself prevent further movement occurring. To prevent ongoing future differential settlement, particularly after periods of prolonged dry weather conditions, foundations should be provided to the structure at a depth at which the soil is not subject to significant movement.

Underpinning

We have considered the possibility of underpinning the property to provide foundations at a depth lower than that affected by the trees. Any such proposals will need careful consideration because of the proximity of the underground rail tunnels. We note from the information issued previously by Railtrack to PKS Architects LLP, that significant conditions are likely to be applicable to construction within the zones of influence above the tunnels.

We have discussed a number of possible underpinning options with Abbey Pynford Foundation Systems Ltd, which is a specialist company with significant experience of design and construction of underpinning works to properties of this age and size.

Abbey Pinford were nearing completion of a similar project at 42 Netherhall Gardens, where a new sub-ground floor has been installed, to underpin the existing building and provide an additional floor of domestic accommodation. We understand the contractor may be able to arrange to show the finished project to interested parties.

Following discussion with them, Abbey Pinford have provided us with approximate budget costings for a number of underpinning options for No 11 Netherhall Gardens, and these are discussed briefly below.

Subject to confirmation by detailed feasibility studies, including consideration of any restrictions due to presence of the tunnels, four possible options were considered:-

1. Demolish the existing building and construct a new building on appropriate foundations, suitably designed for the ground conditions. Feasibility would be subject to obtaining the necessary planning permission.

International Exclusion and Construction Consultants



1 August, 2008 Our reference: TGR/JL/AM/107281 Your reference:

- 2. Retain the existing building and strengthen the foundations with excavated underpinning to a depth of approximately 3.5m, retaining the existing ground floor. Abbey Pynford's preliminary estimate of cost for this option is £250,000 +VAT, although this does not include re-design and re-construction of the ground floor, which would also be necessary.
- 3. Underpin the building using a piled raft system. This option would also provide a new reinforced concrete ground floor throughout and have less risk of cost variations. Abbey Pynford has suggested a preliminary estimate of approximately £325,000 + VAT for this option. The acceptability of piling in the vicinity of the tunnel would need to be checked in detail, but at this stage the use of 10 metre long augered piles in this location is considered unlikely to result in deleterious effects on the tunnel.
- 4. Underpin in the form a structural box to provide a new lower-ground floor or semibasement with light-wells. Abbey Pynford has suggested a preliminary estimate of approximately £575,000 + VAT for this option. This could then be used for habitable purposes, subject to planning approvals, thereby recouping a proportion of the financial outlay in strengthening the foundations.

It should be noted that the cost estimates for the underpinning could be subject to significant increase if there are localised variations in ground conditions, and may be affected by the detailed requirements of the local authority building control department, which may only come to light during inspections of excavation on site.

In addition to the cost of the underpinning, allowance must be made in options 2, 3 and 4 above, for reinstatement works to the building above foundation level, including provision of ties and repairs to the cracked masonry.

Conclusions

If the building is to be retained, without the risk of ongoing movement requiring repetitive repair, underpinning to significant depth is required to all external and internal load-bearing walls. The depth of underpinning required means that specialist design and construction, taking into account the potential for both shrinkage and heave of the soil, is necessary.

Given the high cost of and potential disruption of such work we recommend that all options for the building, including those outlined above, be considered.

International Property and Construction Cara, Bridge

Watts.

1 August, 2008 Our reference: TGR/JL/AM/107281 Your reference:

Yours faithfully

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JIM LAITHWAITE C.Eng. MIStructE.

Consultant Structural Engineer D: +44 (0)20 7280 8145 E: jim.laithwaite@watts-int.com

For and on behalf of WATTS GROUP PLC

ANDREW FIREBRACE PARTNERSHIP STRUCTURAL AND CIVIL ENGINEERING CONSULTANTS

Studio 3, The Warehouse, St Botolphs Lane, Bury St Edmunds IP33 2BE. Tel: 01284 750492 Fax: 01284 705771 Email: afpbury@aol.com

Michael Scott Associates Sheraton House Castle Park Histon Cambridge CB3 0AX

Our Ref: 00/1006/JEH/BES

2nd January 2004

Dear Sirs

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11 Netherhall Gardens, Hampstead

Andrew Firebrace Partnership inspected the above property in 2000, carried out a site investigation, and produced a report on structural damage in August 2001. That report included recommendations for the structural remedial works which would be required to make the property both structurally sound. At the time the building was unmortgageable because insurance cover for subsidence damage could not be obtained. The building had a history of structural movement due to subsidence. Part of the building had been partially underpinned, and even those parts which had been underpinned were still being damaged by foundation movement. Our investigation revealed that the subsidence damage had been caused by seasonal movement of the clay subsoil due to the presence of many large trees on this site and an adjoining site. In addition to the subsidence problem, there were also structural problems with the floors, namely excessive deflection of timber floors due to the later addition of internal partition walls, and excessive deflection of a suspended concrete ground floor due to insufficient floor slab depth and reinforcement.

In our report we produced the outline of a scheme for underpinning those parts of the building that had at that time been damaged by subsidence. I returned to inspect the property again on the 30th October 2003 because cracking had been noticed in areas of the building which had previously not been damaged. This cracking had occurred in Flat 1. I gained access into the rear garden and inspected the outside face of the rear wall where the new cracking had been reported. These cracks had opened above and below the ground and first floor window openings of Flat 1, and other existing cracks to flats 4 and 10 above had increased in width. The maximum width of the new cracks was about 8mm.

Partners: John Freet CEng, MIStructE. Stephen Grange IEng, AMIStructE. John Howlett PhD. MSc. CEng, MIStructE. Peter Stuart BSc. CEng, MICE. Andrew Watson BEng, CEng, MICE, MIStructE. Roger Willcocks BSc. CEng, MICE, MIStructE. Nigel Wilson BSc. CEng, MICE, MIStructE.

Also at:-Stable Barn, Fark End, Swaffham Bulbeck, Cambridge CB5 0NA 31 Queen Street, Whittlesey, Peterborough PE7 1AY 10, Kelvin Drive, Glasgow G20 8QG

Cambridge 01223 811572 Peterborough 01733 205633 Glasgow 0141 9462762 Fax: 01223 812719 Fax: 01733 208961 Fax: 0141 9462762 At the time of my visit, at the end of a prolonged dry summer, the surface of the garden to Flat 1 was cracked due to drying shrinkage of the subsoil, suggesting that the new foundation movement to Flat 1 had also been caused by subsidence of the site caused by drying shrinkage of the subsoil.

In our report of August 2001 we thought it might be possible to stabilise the building by underpinning only about three quarters of the perimeter walls of the building, but this recent cracking indicates that the entire perimeter of the building will need to be underpinned. In order to make the property mortgageable it will be necessary to obtain full subsidence cover. There are few insurance companies prepared to offer subsidence cover for properties with a history of subsidence damage. These companies would also require underpinning for the internal loadbearing walls for this type of property, and would certainly charge high insurance premiums, and stipulate a high policy excess for subsidence claims. We also enclose a copy of our revised drawing No. 00/1006/03A.

I trust this answers your query regarding the recent damage. If you have any other queries please do not hesitate to contact me.

Xours faithfully John Howlett

For and on behalf of the Andrew Firebrace Partnership

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ANDREW FIREBRACE PARTNERSHIP STRUCTURAL AND CIVIL ENGINEERING CONSULTANTS

Stable Barn, Park End, Swaffham Bulbeck, Cambridge CB5 ONA. Tel: 01223 811572 Fax: 01223 812719 E-mail: info@afpconsult.co.uk

JH/SMB/00/1006/1.1

29th August 2001

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Michael Scott Associates Sheraton House Castle Park Cambridge CB3 OAX

Dear Sirs

11 Netherhall Gardens, Hampstead

As instructed we have inspected the above property with respect to structural damage and the proposed refurbishment which might include the re-arrangement of internal partitions and the construction of extra accommodation in the roof space over the second floor, and can report as follows:-

INTRODUCTION

The property comprises a large detached house with accommodation on three floors, and is probably about 90 years old. The top floor is located within the lower part of the roof space. The external walls have been covered with a sand/cement render. Many alterations have been carried out over the years, most notably the construction of a two-storey extension on the north side and the sub-division of the building into self contained flats.

I am informed that some underpinning was carried out at the rear of the property, and a couple of brick buttresses were built against the rear wall of this underpinned part of the building at the same time.

The property is located on a level site on high ground and is reasonably level. The geological drift map indicates that the subsoil comprises London Clay, which is a firm highly plastic clay. This means that it can provide a firm foundation to build on, but can be subject to seasonal movement at normal house foundation depths in the vicinity of trees, large bushes and hedges.

There are some tunnels in the vicinity owned by Midland Railtrack.

There are some large horsechestnut trees on the plot in the front garden, about 8.5m from the front wall of the house. There are some large sycamore trees on an adjoining

John Freer CEng. MIStructE. Stephen Grange IEng. AMIStructE. John Howlett PhD. MSc. CEng. MIStructE. Peter Stuart BSc. CEng. MICE.
 Andrew Watson BEng. CEng. MICE. MIStructE. Roger Willcocks BSc. CEng. MICE. MIStructE. Nigel Wilson BSc. CEng. MICE. MIStructE.

Aiso at:-

Fax: 01733 208961 Fax: 01284 705771 - Fax: 0141 9462762 plot, the closest about 5m from the rear north west corner of the building. There is a large poplar tree about 20m from this corner of the building.

There are numerous cracks in the internal and external walls of the building. These have been recorded by Michael Scott Associates. We therefore do not propose to record again the location of all the individual cracks in this report. Our report is based on the cracks recorded by Michael Scott Associates and our own observations.

The pattern of cracking suggested a number of different causes:-

-] Distortion of external walls due to slight foundation movement.
- Distortion of external wans due to sight foundation into the second secon
- 2] Deterioration of render due to ageing and splasning with sugging of supporting
 3] Distortion and cracking of internal partition walls due to sagging of supporting floors.

The foundation movement could have been caused by both leaking drains and nearby trees, so we had a CCTV survey of the drains carried out and we inspected the foundations and the subsoil by means of trial pits.

We had some of the soil samples tested. These investigations and tests provided us with enough information, so an investigation using a deep mechanically driven borehole was not required for this survey.

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There are cracks in the external walls due to foundation movement. These cracks should be 'stitched' using stainless steel bed joint reinforcement after underpinning works have been completed. We enclose a copy of our sheet number SK01 giving construction details, a method statement and a specification for the materials.

There are cracks in internal partition walls due to floor movement. Many of these walls are too thin to 'stitch' using bed joint reinforcement and are too slender in relation to their height and require demolishing and rebuilding.

Some cracks in the external render are due to soaking with rainwater and frost damage. The render is quite hard, and its removal will damage the face of the brickwork.

Investigation of foundations and subsoil

The location of trial pits and hand augered holes is indicated on drawing number 00/1006/01. The results are shown on drawing number 00/1006/02. The soil test

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results are shown on Table 1. These findings indicate that the north half of the building has been underpinned. Tree roots were found at depths in excess of the depths of the underpins on the front and rear elevations. Not surprisingly the soil test results showed that the clay has been desiccated by the tree roots at depths in excess of the depths of the underpins. The south half of the front elevation has not been damaged by the foundation movement, but could be in the future due to the presence of large horsechestnut trees in the front garden which may not yet have grown to maturity. The south half of the rear elevation has not been damaged by foundation movement and will not be damaged in the future unless trees or large bushes are planted close by.

We are therefore of the opinion that deeper underpinning is required to some of the external walls, as indicated on our drawing number 00/1006/03.

Drains Survey

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The location of the drains is indicated on drawing number 00/1006/04. A CCTV survey was carried out by Rota-Rod. We enclose a copy of their findings. Tree roots have invaded the drains along the front, the north side and along the rear of the property. The drain along the rear of the property has been severely damaged by the roots. The drain along the front of the property is suspected to be cast iron and in a very poor condition. All the external drainage system, with the exception of the manhole at the front south east corner of the site and the manhole in front of the front door should be replaced.

Floors

The trial pit investigation within the building revealed that the floor in the extension on the north side is of suspended reinforced concrete construction. The slab in the area we inspected was 150mm thick and reinforced with mild steel reinforcement bars at 200mm centres with about 50mm bottom cover.

The cracking in the ground floor partitions in this part of the building has been caused by excessive floor slab deflection due to insufficient floor slab depth and reinforcement. We recommend that the existing ground floor slab in the area shown shaded on drawing number 00/1006/05 be removed and replaced with a suspended precast concrete beam and pot floor. This work would necessarily entail the removal of the ground floor internal partitions in the affected area.

The cracking in the internal partitions on the first and second floors has been caused by excessive deflection of these floors. This excessive deflection has been caused by the weight of the blockwork partitions built on the timber floors. We recommend that these walls be demolished and rebuilt. New steel beams will be required, inserted into the floors to support new thicker blockwork partitions. Some of the partitions on the second floor are not unstable and could be retained. If you decide to retain the present partition layout the timber joists directly under each of these cracked partitions could be strengthened by fixing a 178 x 102 rolled steel channel to its side face, as indicated on sheet number SK02. This would entail the removal of part of the ceiling below, and often complications arise due to the presence of plumbing and wiring within the floor. Therefore, although the cost of each steel channel is fairly nominal, the cost of the labour to install the beam and the cost of making good finishes and diverting wiring and plumbing could be significant.

Roof

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The part of the roof structure which could be inspected was in a reasonably good condition, and we could see no areas requiring structural remedial work. However, the conversion of the upper roof space into the flats would entail a substantial amount of strengthening to the roof structure, and may require some strengthening of the second floor also.

General Remarks

The tunnels in the vicinity have not caused any structural problems.

It is not normally possible to obtain a Building Society or Bank Mortgage for a property unless subsidence cover can be obtained.

The fact that the property has been underpinned already, and needs some further underpinning to prevent further cracking will present problems as far as obtaining subsidence insurance is concerned. There are some specialist insurance companies which offer subsidence cover to buildings which have been underpinned. With this property we strongly recommend that such a company be approached <u>before</u> commencing any underpinning in order to establish the conditions under which subsidence cover would be offered. I would expect them to require the work be specified, inspected and approved by a Structural Engineer. There is normally a high policy excess for subsidence claims with these companies.

We have in this report assumed that the intention is to bring the building up to current standards in order to minimise any problems with valuation surveys, and to avoid devaluation due to substandard construction.

Conclusions

1] The external walls on the front north side and part of the rear elevations of the

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property need to be underpinned down to a depth of about 4m, as shown on drawing number 00/1006/03 The ground floor slab in the area shaded on drawing number 00/1006/05 needs 2] to be replaced. The drains need to be replaced with the exception of the deep manhole at the 3] front south east corner of the property. The internal partition walls are too slender in relation to their height and 4] require demolishing and rebuilding. They have cracked due to insufficient support from the timber floor structure. New steelwork will be required to support new partition walls. The upper part of the roof is in a good condition but would need substantial 5] strengthening in order to convert it into living accommodation. 67 The cracks in the external walls should be 'stitched' using stainless steel bed joint reinforcement. The cracks in the internal partition walls which can be retained should be 7] made good using expanded metal lathing. We have not inspected woodwork or other parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect. This engineers report only deals with the above mentioned defects and our liability in respect of this report is limited to yourself as our client. There is no intention to confer any third party rights as described in the Contracts (Rights of Third Parties) Act 1999. If you have any queries, please do not hesitate to contact me. Yours faithfully JOHN HOWLETT For and on behalf of Andrew Firebrace Partnership encls

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HAMPSTEAD : BELSIZE NEW TUNNEL : NETHERHALL GARDENS : PROPOSED REDEVELOPMENT OVER TUNNEL

With reference to your e-mail dated 19th December 2008 concerning the proposal to redevelop the above site; I apologise for the late response to your enquiry.

The site is immediately over Belsize New Tunnel and therefore any works, piling etc would be within the zone of influence of the tunnel. I would be pleased to receive further details of the proposed development for comment.

I enclose a plan showing the approximate line of the tunnel for design feasibility purposes; please note that Network Rail's land ownership on the surface is shown green (both light and dark), the yellow shows the line of the tunnels. I am making enquires as to whether this land ownership issue would have any impact on non engineering approvals / consents for the redevelopment.

From records the cover to the outside of the tunnel lining varies from approximately 14 to 16 metres across the site and therefore Network Rail would have concerns about piling and the construction of basements.

Pending further consultation I enclose, for information, generic engineering requirements for development works in the vicinity of Network Rail tunnels.

Network Rail will require the Proposer to demonstrate that any changes in applied pressure to the outside of the tunnel lining caused by the works will not have a detrimental affect on the tunnel, the increases should not exceed the limits set out in the attached conditions.
 Depending on the out come of the above calculations the Proposer should also expect to have to establish a monitoring regime for movement of the tunnel during the period of the works.

To progress the Network Rail involvement would you please provide the contact details, name, address etc of the proposer of the works (client / sponsor) who can give authority to issue purchase orders to reimburse Network Rail's costs.

Historical drawings are held in our Records Centre and are available for inspection, please contact the Records Assistant at the following address quoting structure details:

Network Rail Records Centre Hudson House Toft Green York YO1 1HP Tel. 01904 524347

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Structure details: Line ref.: SPC1 Site mileage: 3m 0594yds Structure number: SPC1/29

Network Rail's associated costs will be recoverable from the developer under the terms of a Basic Asset Protection Agreement, which must be completed before any of the ancillary works take place. A draft agreement and estimate will be prepared when further details of your proposals are available for consideration.

I trust the above information is of assistance to you, however should you wish to clarify any point please do not hesitate to contact me.

Yours sincerely

Martyn Ward Outside Party Engineer Enc

Tel Direct: +44(0)1904 389799 e-mail: martyn.ward@networkrail.co.uk



http://giportal/cnm/cnm_common_live/print/A4LandscapeNoLegend.jsp?printTitle=HAMPSTEAD%20&printSubTitle=Belsize%20New%20Tunn... 14/03/2008

Network Rail	Network Rail Territory Outside Party Engineer Floor 2A George Stephenson House Toft Green YORK YO1 6JT
Eli Hatleskog PKS Architects LEKS ARCHITECTS LLP 10 Deane house studios E C E I V E D	Tel: +44(0)1904 389800 Fax: +44(0)1904 389802
Greenwood Place 1 7: MAR 2008 London NW5 1LB PARTNER PROJECT FILE REF	Your Ref: Our Ref: TCE.OP/O.3436 14 March 2008
	"Without prejudice

Dear Eli,

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HAMPSTEAD : BELSIZE NEW TUNNEL : NETHERHALL GARDENS : PROPOSED **REDEVELOPMENT OVER TUNNEL**

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From records the cover to the outside of the tunnel lining varies from approximately 14 to 16 metres across the site and therefore Network Rail would have concerns about piling and the construction of basements.

Pending further consultation I enclose, for information, generic engineering requirements for development works in the vicinity of Network Rail tunnels.

Network Rail will require the Proposer to demonstrate that any changes in applied pressure to the outside of the tunnel lining caused by the works will not have a detrimental affect on the tunnel, the increases should not exceed the limits set out in the attached conditions. Depending on the out come of the above calculations the Proposer should also expect to have to establish a monitoring regime for movement of the tunnel during the period of the works.

To progress the Network Rail involvement would you please provide the contact details, name, address etc of the proposer of the works (client / sponsor) who can give authority to issue purchase orders to reimburse Network Rail's costs.

Historical drawings are held in our Records Centre and are available for inspection, please contact the Records Assistant at the following address quoting structure details:

Network Rail Records Centre Hudson House Toft Green York YO1 1HP Tel. 01904 524347

Structure details:

Line ref.: Site mileage: Structure number:

SPC1 3m 0594yds SPC1/29

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I trust the above information is of assistance to you, however should you wish to clarify any point please do not hesitate to contact me.

Yours sincerely

Martyn Ward Outside Party Engineer Enc

Tel Direct: +44(0)1904 389799 e-mail: martyn.ward@networkrail.co.uk



Page 1 of 1



CONDITIONS AND REQUIREMENTS FOR ENGINEERING WORKS IN THE VICINITY OF NETWORK RAIL TUNNELS

ISSUED IN CONNECTION WITH: <u>HAMPSTEAD : BELSIZE NEW TUNNEL : NETHERHALL GARDENS : PROPOSED</u> <u>REDEVELOPMENT OVER TUNNEL</u>

1 INTRODUCTION

In order to carry out any works adjacent to or over Network Rail's structures and operational railway safely the following engineering safety requirements need to be fulfilled. The following is of a general nature and may be subject to additions or deletions when further details of the proposed works are known.

Works are defined as:

- Demolition of any buildings or structures on the site
- Any site investigation works
- Any excavations or earthworks
- Construction of any ground improvement (piling, vibro-compaction, etc)
- Any new construction

2 APPROVALS

2.1 Drawings

Network Rail requires detailed drawings of the works, including temporary works, for acceptance.

2.2 Method Statements

Network Rail requires detailed site specific method statements and risk assessments for the works, including site survey, site investigations, demolition and construction, for acceptance. A minimum of four weeks notice is required for acceptance of each submission. Network Rail reserves the right to extend the acceptance period for complex schemes.

3 REGULATIONS

All the works are to be carried out in accordance with CDM Regulations, HASWA, current legislation, current design standards and best practice. Network Rail must be advised of the identity of the Planning Supervisor and requires confirmation that working in close proximity to Network Rail's operational railway has been addressed in the Safety Plan.

4 DAMAGE

Any damage to Network Rail's property caused by the works is to be made good to Network Rail's satisfaction and at the cost of the proposer of the works. Network Rail may require the proposer to carry out an examination of its tunnel before and / or after

11 SURVEY AND PROTECTION WORKS

Before any works (including site investigations, preliminary works or demolition of existing structures on the site) are carried out on any part of the site the proposer shall, at his own cost, have prepared and submitted to Network Rail for consideration and acceptance:

- a) A topographical survey of the site. This should locate and verify the depth and position of the tunnel or any other part of Network Rail's Infrastructure in relation to the proposed works. Closure of the survey's control stations between the tunnel and surface level should be to an accuracy of +/- 10mm and should relate to ordnance datum. Possessions may be required to undertake this work.
- b) Details of the manner in which Network Rail's property is to be protected during the works.
- c) Such further information as Network Rail may reasonably request.

Excavation of trial holes to locate the crown of the tunnel will not normally be permitted. If excavation is considered necessary, to ensure the protection of the asset, a detailed method statement of how trial holes would be conducted must be supplied together with a detailed description of alternatives considered, why they were rejected and why the excavation is necessary.

No works shall be carried out until such acceptance has been given and for the avoidance of doubt, it is agreed that Network Rail may give its acceptance in respect of part of the site or the whole of the site as appropriate.

12 DESIGN PROCESS

Before the works commence on site the following design approval process shall be followed with Network Rail:

- a) A design statement must be produced. This should include a Designer's Risk Assessment, detail the proposed methods of analysis, detail any software packages to be used and detail the staff proposed to undertake the analysis, including relevant experience on similar projects.
- b) Form A (Approval in Principle) is to be submitted including outline Design Proposals, Methods of Analysis, General Arrangement drawings and an outline feasibility report, which should identify any movements which may occur in the tunnel lining as a result of the proposed works. The proposer must predict what would constitute safe levels of stress, deformation, strain or other relevant criteria above which levels it would constitute a failure of the Network Rail infrastructure and why these levels should be adopted and accepted by Network Rail. Acceptance of this document will take up to eight weeks.
- c) Form B (Design Check Certificate) is required for the works. This is to be checked by an independent organisation. The design should analyse the existing capacity of the tunnel and detail the maximum movement that it can withstand without being overstressed or otherwise affected detrimentally. The design should demonstrate that the proposed works can be maintained within agreed limits and identify any further effect identified through the detailed analysis process and how it will be limited where it may be detrimental. Any previous developments on the site should also be considered when analysing the effect on Network Rail's infrastructure.

The Zone of Influence is defined as an area of land above a tunnel that may be influenced by the existence of the tunnel.

15 SLAB AND RAFT FOUNDATIONS

No part of any foundation raft or slab shall be constructed nearer than 5 metres from the outside of the tunnel lining.

16 CRANE WORKING, PILING, GROUND IMPROVEMENT

Crane Working/Piling Rig Working/Ground Improvements proposed for the site will be subject to the following restrictions, and must demonstrate that ppv, frequency or velocity increases will not cause a detrimental effect on the tunnel lining. Any works generating a ppv greater than 5mm per second at 5m from the extrados of the tunnel must be shown to have no detrimental effect to Network Rail's infrastructure.

Method Statements are required for any crane or piling rig operations on site, they are to indicate technical details of the equipment including load capacity, radii and diagrams showing jib length, position, outriggers position and anticipated load lifts, etc. Drawings are required to show crane and piling rig movements and lifting positions about the site.

Crane working may need to be supervised by Network Rail.

The necessary crane legislative documents and a crane supervisor will be required for cranes of over 50 tonne capacity.

All plant certification is to be checked by Network Rail.

Attention is drawn to the following:

- a) A level and stable platform is to be maintained for cranes or piling rigs.
- b) Placing of pile reinforcement and any casings is to comply with Item 18.

All piling and crane operations to be approved by Network Rail.

17 SERVICE TUNNELS

No service tunnel or pipe shall be constructed nearer to the outside of the tunnel lining than a distance equal to 5 metres plus the outside diameter of such service tunnel or pipe.

18 PILING

No piles are to be driven or bored within a zone bounded by vertical lines drawn at a distance of 5 metres horizontally from the extrados of the tunnel lining at the widest point of the tunnel and a horizontal line drawn at a distance of 5 metres vertically above the extrados of the highest point of the tunnel at the section under consideration.

18.1 Bored Piles

a) Bored piles shall not be under-reamed so that the under-reaming extends vertically below any of Network Rail's tunnels.

- b) Bored piles shall be sleeved to a depth of not less than 2 metres below a line drawn at 45° to the horizontal and tangential to the outer face of the underside of the tunnel lining.
- c) Where a bored pile is sleeved, it shall be so designed that no load is transmitted to the sleeves.
- d) When calculating any distances referred to in this schedule, the sleeve shall be deemed to be part of the pile.

19 TEST BORE HOLES

Any test bore holes drilled on site shall be subject to the same guidelines as above (Clause 18) relating to bored piles. No works to undertake boreholes within 10m of the tunnel will be permitted unless the requirements of clause11 have been complied with.

20 MARKING BOUNDARIES

The proposer shall mark on site the extent of Network Rail's land and shall afford Network Rail and the emergency services at all times full access to all of Network Rail's land.

21 RIGHTS OF VENTILATION

The proposer shall not at any time interfere with Network Rail's existing rights of ventilation on site and if it is subsequently agreed by the proposer and Network Rail to move any of Network Rail's ventilation ducts, the proposer shall provide equivalent size ducting to Network Rail's satisfaction.

22 PROTECTION OF STRUCTURES AND SERVICES

The proposer shall at all times during the works protect Network Rail's structures and services.

23 SERVICES SURVEY

In order for Network Rail to identify the location of its services in this area it may be necessary for it to carry out a services survey. A services survey would take 6 weeks to produce. The proposer would be required to complete the Basic Asset Protection Agreement before a survey could commence.

24 INSPECTION

Network Rail shall have the right to inspect and to stop the proposer's works on the site at any time if it considers that the works could endanger Network Rail's tunnels and the traffic therein.

25 SURFACE WATER

The proposer shall ensure that any surface water on the site drains away from Network Rail's property. Network Rail requires drainage details, including temporary drainage, to be submitted for acceptance.

Where multiple developments are occurring adjacent to Network Rail's infrastructure it may be necessary for the proposer to consider the combined effect of these developments.

In addition, at any stage in the construction process, the change in applied pressure on the outside of the tunnel lining caused by the development shall not exceed 20kN/m² and resultant deformations/displacements of any point within a tunnel should not exceed 3mm. These are indicative values which may be unacceptable to Network Rail due to particular conditions. Any works that exceed these indicative values will require numerical substantiation and will generally not be acceptable.

The design shall include a desk study of the surrounding area, including but not exclusive to:

- BGS Boreholes
- Envirocheck (or similar)
- A study into the history of the site

Analyses submitted must consider all relevant factors which may affect Network Rail infrastructure. This should include but not be limited to the following:

- Amplitude of vibration i.e. peak particle velocity (ppv)
- Frequency
- Acceleration
- Stress changes
- Strain of individual elements of structures and of the structure
- Clearance
- Tension
- Alignment of the rail (vertical and horizontal)
- Cant
- Structural Capacity of elements and structures

Acceptance of this document will take up to eight weeks.

13 MONITORING

Once allowable levels of movement have been established, the proposer is to submit a monitoring regime to measure actual movements against allowable. This regime should include trigger levels and specific actions against these levels (these actions must be analysed and supported by calculations within the Form B) and be agreed by Network Rail.

Possessions/Isolations may be required for monitoring and setting up any monitoring equipment.

14 WORKS WITHIN 10M OF TUNNELS

Where any part of the scheme falls within an annular distance of 10 metres from the outside of the tunnel lining or within the Zone of Influence of the tunnel, the proposer shall submit to the Network Rail for acceptance a detailed programme of such works and details of the construction techniques to be used.

No such works shall take place until such acceptance has been given. A minimum of four weeks notice is required for acceptance.

the construction works or at any time during the works to verify the condition of the tunnel structure. This is to be at the cost of the proposer.

5 COSTS

All Network Rail's costs associated with the works, including acceptance of drawings and method statements, and provision of site safety supervision, protection, possessions and isolations, as necessary, are to be borne by the proposer under the terms of a Basic Asset Protection Agreement.

6 TRAIN DELAY COSTS

Any train delay costs attributable to these works are to be paid for by the proposer. being dependant on the number of trains delayed and the extent of the delay the cost cannot be readily estimated.

7 CLAIMS

Network Rail shall not be liable for any claims against it:

- as a result of any inaccuracies in any of the plans submitted to and accepted by it;
- as a result of noise and vibrations caused by the works (including demolition) carried out by the proposer on the site;
- as a result of noise and vibrations caused by the operation of trains.

Depending on drawings and method statements received, it may be necessary for Network Rail to provide site safety supervision and protection.

8 ACCESS ONTO NETWORK RAIL PROPERTY

There is to be no unauthorised access onto Network Rail property.

9 SAFETY MEETING

Before any works commence on site, a site safety meeting is to be held with the proposer, his contractors and Network Rail's agents for site safety. Emergency procedures regarding Network Rail's infrastructure are to be agreed and displayed on site.

10 WORKS IN TUNNELS

Any works required in Network Rail's operational tunnels, e.g. surveys and inspections, are to be carried out during a possession / isolation period.

A possession is a closure of the operational railway. An isolation is a turning off of the power to the overhead line or third rail electrified equipment.

There is a minimum of 18 weeks notice required for booking of possessions / isolations. The possession / isolation will usually be at night and for a few hours duration only. For operational reasons, Network Rail may need to cancel possessions and isolations at short notice. Network Rail will not be held responsible for any costs incurred as a result of such cancellations, although every effort will be made to make alternative arrangements. If the proposer of the works cancels a booked isolation there will be a minimum charge of 25% of the total cost of the isolation.

PRICE&MYERS

REPORT

11 Netherall Gardens, NW3 5RN

Summary of the Envirocheck Report and Maps

Prepared by: Andrew Stearn July 2009 18511 / 2

🌞 STRUCTURES 🙏 GEOMETRICS 🛛 🔯 SUSTAINABILITY

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1 Historical Maps

- 1850 The site is shown to be undeveloped (possibly farmland or woodland) with the exception of Finchley Road ~100m to the West of the site.
- 1871-1882 The map shows development of the railway and Finchley Road Railway Station approximately 200m West of the site. The edge of the battered slope forming the entrance to the Midland Railway Tunnel (Belsize Tunnel) is shown just within the South West corner of the site. The entrance to the railway tunnel is ~25m South of the site. The alignment of the railway indicates that the tunnel runs East to West approximately 10m South of the site boundary.

The surrounding area within a ~500m radius consists of farmland. Scattered villages and towns are shown to the North and West of the farmland with a dense residential development to the South and East.

1896 The map shows a residential building to the South East of the site (now No. 11 Netherhall Gardens) with Netherhall Gardens itself running North to South immediately to the East of the site. A new tunnel (Belsize New Tunnel) runs parallel with and immediately to the North of the original Belsize Tunnel. The alignment of the new railway indicates that Belsize New Tunnel runs directly under the site from East to West. The area of battered slope immediately to the South West of the site has been adjusted to accommodate the entrance to the new tunnel.

The majority of the surrounding farmland has now been developed and replaced with buildings and roads. Two additional Railway Stations with tunnels are shown; one ~200m North West of site (Unnamed on the map but currently Finchley Rd & Frognal Railway Station) and one ~225m South of site (shown as Finchley Road Met Station but currently LUL Finchley Road Station).

- 1915 The North side of the house is shown extended up to the North Boundary.
- 1920 The majority of the site remains unchanged with the exception of the surrounding area to the North West of the site having been developed further.
- 1934-1935 Both entrances to the Railway tunnels are repositioned to the West of Finchley Road. The battered slopes to the East of Finchley Road have been backfilled with a row of residential housing along Finchley Road and a second row of properties "Frognal Court Mansions" running parallel behind. The area between the site and the Frognal Court Mansions is shown as open area.
- 1946 The aerial photograph does not show any signs of bomb damage to the local area.

The open area between Frognal Court Mansions and site is shown to consist of trees and shrubs.

- 1951 The site remains unchanged, however a new Cocoa factory is shown in the surrounding area ~400m to the West of the site alongside the Midland Railway.
- 1954 The ordnance survey plan shows Belsize New Tunnel running under the site. The Tunnel is shown running from the centre of the West Boundary to the North East corner of the site. The original Finchley Road Station is referred to as "Old Platform" indicating the station is no longer in use.

- 1955-1986 The site remains unchanged with the original Finchley Road Station in the surrounding area now shown as a factory.
- 1967-1968 The site remains unchanged with the Cocoa factory in the surrounding area now shown as a depot.
- 1971-1986 The site and surrounding area remains largely unchanged.
- 1985 The Russian map does not show any significant features that have not been previously shown.
- 1991-1999 The site remains unchanged.
- 2006 The site remains unchanged with the exception of the expansion of the current LUL Finchley Road Station in the surrounding area.
- 2009 The site remains unchanged.

2 Geology

Geological maps show the site on the "London Clay Formation" with the "Claygate Member" sandstone formation stopping ~100m North West of the site.

3 Groundwater Vulnerability

The site is shown situated within a "Non Aquifer (Negligibly Permeable)" with the edge of a "Minor Aquifer (Variably Permeable)" of a "High" soil class ~100m North of the site.

4 Potential for Contamination

Although there is no documented history of contamination on the site itself, the Historical Data Report shows some contamination in the surrounding areas, which is listed below for information but is unlikely to affect the site due to the distance away.

To the West of Finchley Road immediately South of Finchley Road Station is an area of "Historic Landfill". In addition, there was a "Registered Waste Transfer Site" at 269 Finchley Road occupied by "BR Goods Yard". There is a "Potentially Contaminative Industrial Use (Past Land Use)" from the old airshaft over the New Belsize Tunnel adjacent to Maresfield Gardens. There is also "Potentially Infilled Land" that is referred to as an unknown filled ground (pit, quarry, etc.) on the corner of Maresfield Gardens and Nutley Terrace. The historical land use map shows "Potentially Contaminative Land Use" following the railway lines on the West of Finchley Road.

5 Flood Risks

The site is shown to have no risk from flooding.

6 Ground Stability

The ground stability data shows the site is situated in an area of "Low - Potential for Landslide Ground Stability Hazards" with the immediate surrounding area being "Very Low".

The site is in a zone of moderate "Potential for Shrinking or Swelling Clay Ground Stability Hazards" Compressible Ground" with a low to moderate "Potential for Shrinking or Swelling Clay"

7 Further Study Recommendations

Site investigation with trial pits is recommended in order to determine as accurately as possible the ground conditions and party wall conditions across the site.



11 NETHERHALL GARDENS REDEVELOPMENT

LONDON NW3

DAYLIGHT STUDY

Netherball Gardens

Netherhall Gardens

1.1.1.1

Ref: SG/sg/09077 Date: August 2009

Contents	PAGE
INTRODUCTION	2
THE PROPOSAL	2
POLICY / GUIDELINES	2
METHODOLOGY	2
Daylight Standard	
Source Data	
SIGNIFICANCE CRITERIA	2
Daylight	
BASELINE CONDITIONS	3
RESULTS – COMPLETED DEVELOPMENT	3
Vertical Sky Component Results	
Conclusions	3
APPENDIX A – LOCATION DRAWINGS	
09077/SPT/800	
09077/LOC/800 - 801	

APPENDIX B – DAYLIGHT ANALYSIS

09077/DAY/101

1/...

INTRODUCTION

Delva Patman Associates have been instructed by Avonhead Investments Ltd to prepare a daylight study to assess the likely impact of the proposed development at No.11 Netherhall Gardens by PKS Architects on the neighbouring residential amenity adjacent to the site.

This study has been carried out in accordance with the recommendations of the Building Research Establishment Report "Site Layout Planning for Daylight & Sunlight 1991" (BRE_209).

The template drawings, which are attached, illustrate the results for the daylight and sunlight assessments and identify the drawings used in these studies.

THE PROPOSAL

The proposals include the major refurbishment of the existing building with the extension to the roof and rear o the site.

POLICY / GUIDELINES

This study has been carried out in accordance with the recommendations of the Building Research Establishment report "Site Layout Planning for Daylight & Sunlight 1991". This is the standard specifically identified in the London Borough of Camden UDP by which daylight and sunlight should be assessed.

The BRE guide is intended for building designers and their clients, consultants and planning officials. The advice given is not mandatory and the report should not be seen as a part of planning policy. Its aim is to help rather than constrain the designer.

METHODOLOGY

The Daylight assessments have been undertaken in accordance with the Building Research Establishment (BRE) guidelines "Site Layout Planning for Daylight & Sunlight. A Guide to Good Practice".

The BRE Report advises that daylight levels should be assessed for the main habitable rooms of neighbouring residential properties. Habitable rooms in residential properties are defined as kitchens, living rooms and dining rooms. Bedrooms are less important as they are mainly occupied at night time.

Daylight

The BRE Guide states that:

"If, for any part of the new development, the angle from the centre of the lowest affected window to the head of the new development is more than 25°, then a more detailed check is needed to find the loss of skylight to the existing buildings."

The BRE guidelines propose several methods for calculating daylight.

The two main methods predominantly used are those involving the measurement of the total amount of skylight available (the vertical sky component (VSC)) and its distribution within the building (the No-Sky line).

The VSC calculation is a general test of potential for daylight to a building, measuring the light available on the outside plane of windows.

The No-Sky Line divides those areas of the working plane which can receive direct skylight, from those which cannot. It provides an indication of how good the daylight distribution is within a room.

The third recognised method of assessment for daylight is the Average Daylight Factor (ADF) calculation which assesses the quality and distribution of light within a room served by a window and takes into account the VSC value, the size and number of the windows and room and the use to which the room is put. ADF assesses actual light distribution within a defined room area whereas the VSC considers potential light. British Standard 8206, Code of Practice for Daylighting recommends ADF values of 1% in bedrooms, 1.5% in living rooms and 2% in kitchens. For other uses, where it is expected that supplementary electric lighting will be used throughout the daytime, such as in offices, the ADF value should be 2%. There is no general requirement within the BRE guidelines to assess ADF values, other than for neighbouring residential buildings.

This report has considered the primary VSC assessment for daylight purposes.

SOURCE DATA

The studies have been undertaken by calculating the daylight based on the template drawings provided within the BRE guidelines. The study was undertaken with plan drawings derived from:

- PKS Architects:, Dwg No's: 001-001B, 100B 10bB & 110B 113B;
- OS Plan •
- DPA Site photos taken during site visit April2009.

SIGNIFICANCE CRITERIA

In describing the significance criteria as set out below, it should be noted that they have been developed to protect residential properties, which are the most sensitive receptors.

DAYLIGHT, SUNLIGHT AND OVERSHADOWING

The BRE guidance is summarised in Table 1 and this has been used as the basis for the criteria used in the assessment of daylight and sunlight impacts.

TABLE 1:	BRE Daylight Guidance used in the Assessme
Issue	Criteria
Daylight	A window may be affected if the vertical sky component window is less than 27% and less than 0.8 times its f

ent

ent (VSC) measured at the centre of the former value

BASELINE CONDITIONS

An analysis of the impact of the existing buildings (the baseline conditions) against which to compare any potential impact arising from the development has been undertaken based on Drawing 09064/SPT/800 in Appendix A.

It is noted that the Site is in close proximity to neighbouring residential properties to the north and south of the site. The relevant neighbouring windows of No's 9 and 13 Netherhall Gardens generally receive good levels of light over and above the existing and surrounding buildings due relative height and proximity. Such levels are considered very good for a dense, historical urban environment such as this.

This can be seen from the technical results, both in graphical and tabular form in the Technical Appendices A - B.

No.9 Netherhall Gardens has habitable rooms at ground and first floor which face the rear of the property and have been assessed whilst No.13 Netherhall Gardens only has one habitable room at third floor which has a principal aspect of the development site. All other windows on the south elevation of No.13 either serve non habitable rooms or serve rooms which have their principal windows on either the front or rear elevation which will remain unaffected by the proposed development.

An analysis of the existing daylight levels enjoyed by the neighbouring residential properties has been undertaken in order to provide a baseline against which the impacts arising from the proposed development can be assessed.

RESULTS – COMPLETED DEVELOPMENT

DAYLIGHT - VSC

The full results of the daylight analysis are presented in Appendix B in graphical and tabular form. A summary of the results of the Vertical Sky Component (VSC) analysis on the relevant overlooking windows are presented in the Table 2 below. This identifies where habitable rooms are left with adequate light.

TABLE 2:	Number of Windows Experiencing Negligible and Daylight Impacts as a Result of the
Development	/SC Method)

Address	Total Number of Windows Tested	Number of Windows Meeting BRE Guidelines for VSC	Number of Windows Experiencing Impacts	Number of Rooms Experiencing Impacts
9 Netherhall Gardens	4	4	0	0
13 Netherhall Gardens	1	1	0	0
Total	5	5	0	0

Table 2 indicates that all 5 neighbouring windows assessed at No's 9 and 13 Netherhall Gardens will comfortably comply with the BRE guidelines for daylight in VSC terms.

The impact on neighbouring residential amenity is considered negligible when measured against the significance criteria in daylight terms.

CONCLUSIONS

It is noted that the Site is in close proximity to neighbouring residential properties to the north and south of the site. The relevant neighbouring windows of No's 9 and 13 Netherhall Gardens generally receive good levels of light over and above the existing and surrounding buildings due relative height and proximity. Such levels are considered very good for a dense, historical urban environment such as this.

To assess the potential impact of the Development on daylight on neighbouring properties a baseline assessment was undertaken. The main method of assessment used was the primary daylight Vertical Sky Component (VSC) assessment for daylight analysis using the waldram diagram templates.

The London Borough of Camden UDP identifies the Building Research Establishment report "Site Layout Planning for Daylight & Sunlight 1991" by which daylight should be assessed.

The daylight analysis demonstrates that the daylight received by neighbouring residential properties will remain relatively unaffected by the proposed development in daylight terms.

The development proposals by PKS Architects are therefore considered to recognise and observe the intentions of the London Borough of Camden Planning Guidance for daylight and BRE Guidance Note 209 and should therefore be considered to fully comply with the requirements of the London Borough of Camden Unitary Development Plan in daylight terms.

Delva Patman Associates

APPENDIX A

LOCATION DRAWINGS

09077/SPT/800

09077/LOC/800 - 801







APPENDIX B

DAYLIGHT ANALYSIS TABLES

Vertical Sky Component Daylight Report: 11 Netherhall Gardens, London NW3 Testing: 9 and 13 Netherhall Gardens

Existing V's Proposed Analysis

Dwg No	Address	Floor Level	Room Name	Window ID	Existing VSC%	Proposed VSC%	Percentage Difference	Condition
-	9 Netherhall Gardens	Ground	Kitchen	WG/01	23.83	22.50	-5.58%	Pass
-		Ground		WG/02	34.63	33.71	-2.66%	Pass
-		First	Living Room	W01/01	27.63	25.28	-8.51%	Pass
-				W01/02	36.99	36.88	-0.30%	Pass
-	11 Netherhall Gardens	Third	Bedroom	W03/01	38.59	37.82	-2.00%	Pass

29th July 2009