5.0 Summary and Conclusion

5.1 Paragraph 14 of the NPPF makes clear that "At the heart of the National Planning Policy Framework is a presumption in favour of sustainable development, which should be seen as a golden thread running through both plan-making and decision-taking". This means that development proposals that accord with the development plan should be approved "without delay", or where the development plan is absent, silent or relevant policies are out-of-date, grant permission unless any adverse impacts of doing so would significantly and demonstrably outweigh the benefits or specific policies in the NPPF indicate development should be restricted.

5.2 Section 2 of this report has explained the full suite of supporting information that is being submitted with this application. The Energy Statement, although not required for a proposal of this scale, has nevertheless been submitted in order to ensure a robust and comprehensive submission. The reports submitted with this application confirm that the proposal has met all the standards required of it.

5.3 Section 3 of this report explains that the delivery of housing is a key challenge faced by the Council and there is clear positive policy support for developing new housing.

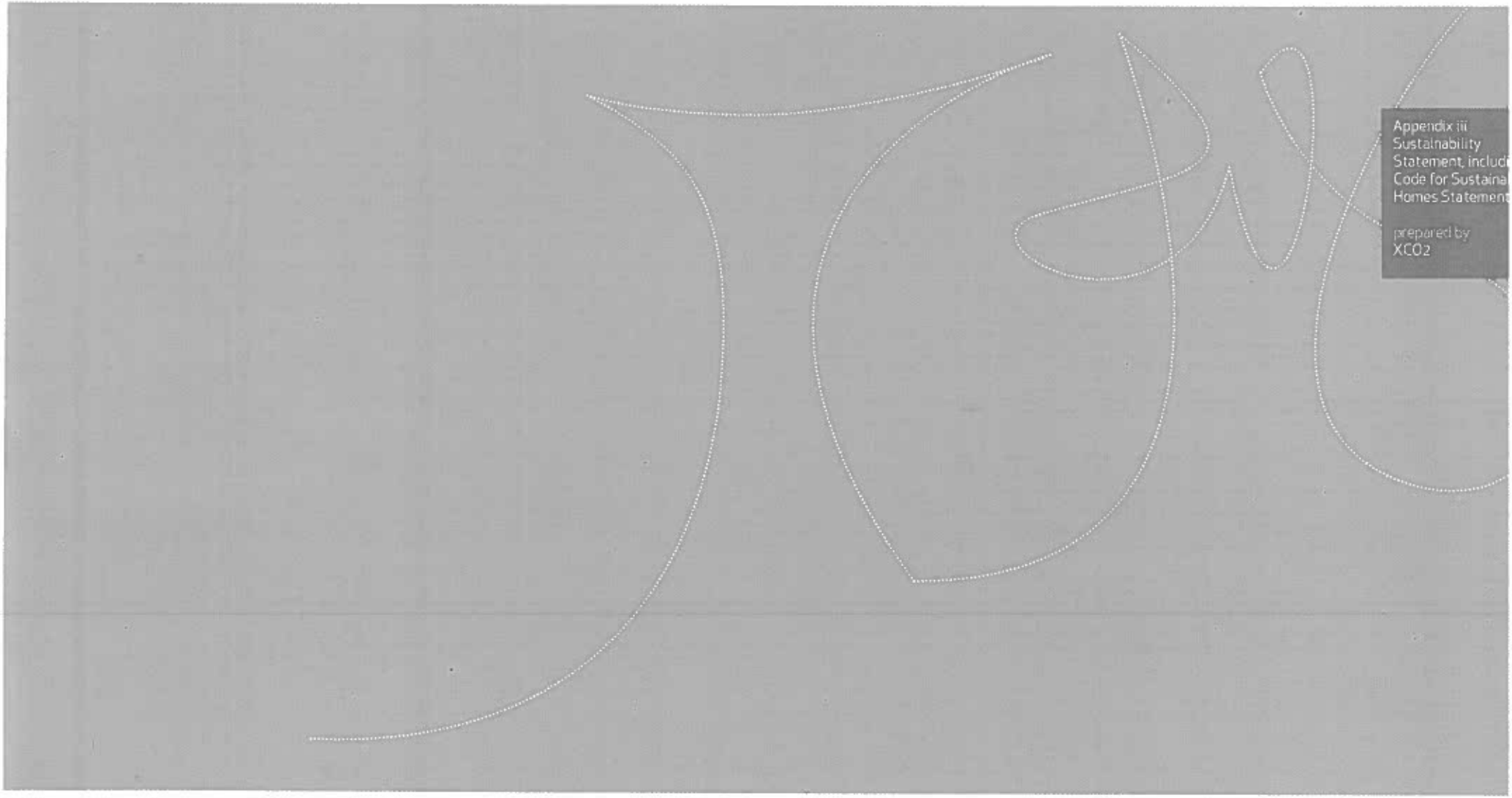
5.4 Section 4 of this report explains that within this positive context that recognises the importance of delivering housing, the Council also want to see ensure quality design. The site falls within the Fitzjohn's/Netherhall Conservation Area. The associated Conservation Area Statement describes the history and evolution of the Conservation Area and identifies its key characteristics which should inform future development proposals. These characteristics have informed the design of the scheme within the context of local and national policies which make clear that design is not prescriptive.

5.5 The Conservation Area Assessment has highlighted that the existing building is of no particular architectural interest and does not merit protection. It was originally a late Victorian house that has been extensively added to and altered so very little remains of the original. It is one of the few buildings that is not identified by the

Conservation Area Statement as a building that "makes a positive contribution" (p29).

5.6 The design of the scheme has borne in mind a number of factors identified by the Conservation Area Assessment, including its hidden location, that good quality design does not mean simply replicating existing design, and the importance of vegetation and trees. All these factors have been borne in mind in designing the application proposals. They have resulted in a scheme which officers have indicated during pre-application discussions that they support.

5.7 The proposal therefore fully accords with the development plan and so should be granted permission without delay.



Appendix iii
Sustainability
Statement, includi
Code for Sustaina
Homes Statement

prepared by
XCO2

Sustainability Statement:
including Code for Sustainable Homes Statement

Sustainability Statement

92 Fitzjohn's Avenue, Hampstead

For MAKE

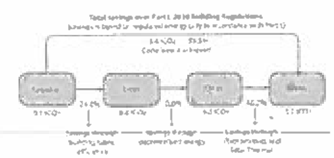
February 2013

XCO2 energy

Contents

	Issue 01	Issue 02	Issue 03	Issue 04	Issue 05
Remarks	Draft	Revised Draft	For Issue	For Issue	For Issue
Prepared by	SP	SP	SP	SP	SP
Checked by	RM	RM	RM	RM	RM
Authorised by	RM	RM	RM	RM	RM
Date	31/05/2012	27/01/2013	[illegible]	14/02/2013	25/02/2013
Project reference	8250	8250	8250	8250	8250

Executive Summary



Sustainability Statement:
including Code for Sustainable Homes Statement

Sustainability Statement

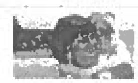
Planning Policies

Local energy generation

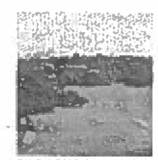
Sustainability Statement

Water and surface water flooding

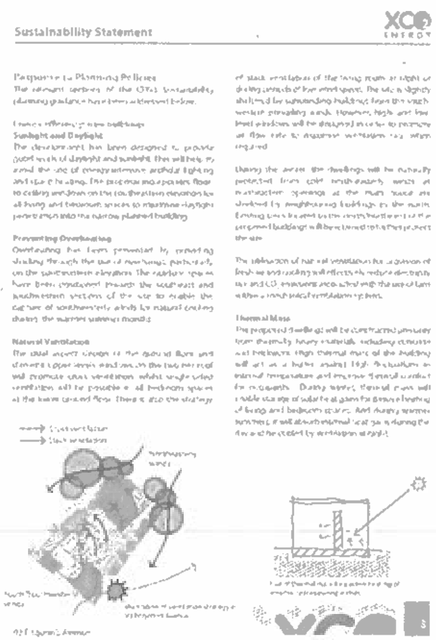
DP22 - Promoting sustainable design and construction

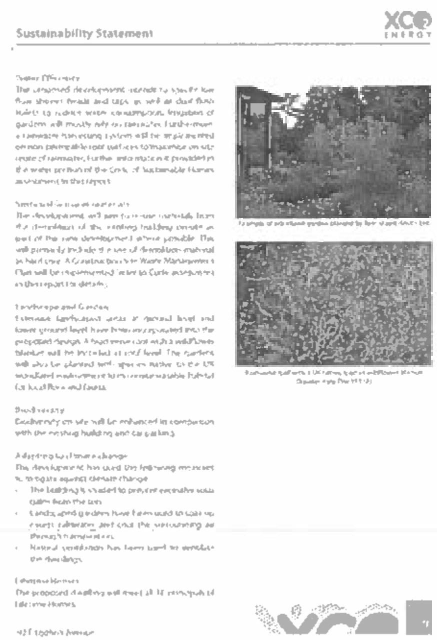


Sustainability Statement



Sustainability Statement:
including Code for Sustainable Homes Statement





Sustainability Statement:
including Code for Sustainable Homes Statement

Compliance with the Code for Sustainable Homes

The Code for Sustainable Homes is the national standard for the design and construction of sustainable homes and was introduced in May 2008. It was established by the government to help industry, professionals and consumers with the challenging task of reducing CO2 emissions from the building sector. The Code measures the overall sustainability of a development against certain categories, rating each dwelling with a Code Level.

Although the Code is currently voluntary, many councils are now setting Code levels as mandatory targets and it is likely to become a material planning consideration.

Each individual category has certain requirements to meet in order to achieve sustainable rating levels and the categories are:

- Energy
- Water
- Materials
- Surface Water Run-off
- Waste
- Pollution
- Health and Wellbeing
- Management
- Ecology

In order to meet Canterbury Borough Policy DP7, Innovative Sustainable Design and Construction the development will need Code Level 4 by implementing the mandatory requirements as detailed in the 2010 Sustainability Planning Guidance Note. Buildings should achieve at least 50% of the available credits in the Energy and Water categories.

To carry out the calculations the dwellings have been modelled using Ecotect and SAP 2009 and the results will be input into Code Tracker to provide the relevant Code Level.

Energy

ENE 1 Dwelling Emission Rate

The Dwelling Emission Rate (DER) is the calculated CO2 emissions rate for the dwelling expressed as kilogrammes of CO2 per square metre per annum (kgCO2/m2/annum). The DER is calculated using approved Government SAP calculations and must show a reduction over the Target Emission Rate (TER) based on Building Regulations Part L1A 2010. The TER is the maximum permitted DER for a dwelling to meet the Building Regulations.

The specification has been set by the Development and Energy and Sustainability (DES) team using the energy hierarchy principle to reduce the CO2 emissions as far as possible through the fabric first approach and then the use of renewable technologies.

A preliminary SAP calculation was carried out to establish the potential CO2 savings achievable through:

- standard efficiency measures
- the efficient supply of energy
- renewable systems

A 25% reduction in regulated CO2 is considered to be the requirement needed to achieve Code Level 4. The preliminary calculations, which are based on the CO2 emissions from Part L Building Regulations 2010, show a reduction of 35%.

Level 1W which is required to achieve TER for the development is set to achieve Code Level 4. The mandatory credits within the Energy category are used to meet Code Level 4 and calculations include:

ENE 2 Fabric Energy Efficiency (FEE)

An assessment of the building's fabric efficiency will ascertain if the building energy demand. This will be achieved through the adoption of high levels of insulation and good levels of airtightness. SAP calculations were carried out on a dwelling type, mid-terrace two and a half storey dwelling, to ensure that the dwelling achieves a fabric energy efficiency of [illegible] kWh/m2/year.

ENE 3 Energy Display Devices

Energy display devices will be required as the dwellings to ensure the occupants are kept aware of their energy consumption and to encourage them to adopt energy saving measures. The display devices will provide information on current, peak and average energy consumption and environmental factors.

ENE 4 Drying Space

Where appropriate developments will include communal facilities such as laundry rooms. Whereby individual dwellings will not have the space to dry clothes internally, a drying space will be provided to allow for this.

ENE 5 Eco-Labelled White Goods

Where white goods are provided as part of the development, they will be A rated for energy efficiency.

ENE 6 External Lighting

Energy efficient light fittings will be installed to the external areas, in addition, natural light will be taken into account to ensure the energy consumption of the dwelling is kept to a minimum.

- external light fittings will include energy efficient fittings
- internal lighting will include daylight cut-off devices, with a minimum efficacy of 45 lumens per circuit watt

ENE 7 Contribution of Low or Zero Carbon Technologies

A feasibility study has been carried out to determine the viability of the use of renewable technologies. The study considered Photovoltaic solar thermal panels and a CHP unit. The study results in the installation of photovoltaic solar panels to the south facing roof slopes. The total energy generation is 1.0kWp which will contribute 10% of the total energy demand.

ENE 8 Cycle Storage

Cycle storage will be provided within the development for the residents to ensure the frequency of their use is maximised. The cycle storage will be conveniently located and accessible by all occupants. The cycle storage will be constructed from timber and will comprise of a lockable shed with rails to secure the cycles.

ENE 9 Home Office

The proposed development will include a home office to encourage:

- sufficient space for a desk or table and bookshelf
- adequate ventilation
- an area with daylight factor of 1.5%
- 2 No. double power sockets
- 2 No. telephone sockets to each habitable room

Water

WAT 1 Indoor Water Use

The water category aims to reduce the consumption of potable water in the home to 105 litres per person per day. Potable water is the term used to describe water that is safe to drink or for food preparation. Non-potable water is water that is not safe to drink but can be used for other purposes such as flushing toilets and irrigation.

The proposed dwellings aim to reduce water consumption through the use of water efficient fittings including dual flush toilets, water efficient showers, taps and baths. The average household water consumption figure used for the water calculations is 105 litres per person per day.

It is understood that the proposed residential development will achieve a water consumption rate of 105 litres/person/day. This meets the mandatory target for Code Level 4.

WAT 2 Outdoor Water Use

A rainwater harvesting and wastewater recycling system will be incorporated to the development to collect rainwater from impermeable hard surfaces for landscape irrigation.

Estimated Water Consumption

Fixture	Capacity / Flow Rate	Consumption (Litres per person per day)
WC (full flush)	6 litres per flush	
WC (part flush)	3 litres per flush	
Kitchen Sink	6 litres per min	17.24
Bathroom Basin	6 litres per min	17
Wash Basin (Low Flow)	4 litres per min	9.6
Bath	180 litre capacity	14.8
Shower	8 litres per min	24
Washing machine	8.17 litres per kg (6 kg)	17.24
Dishwasher	1.25 litres per place setting	4.4
Total internal water		104 litres
Rainwater harvesting		(-)
Total (DER)	105	104.45 litres

Materials

MAT 1 Environmental Impact of Materials

Landscaping encourages the use of materials as far as practicable from sustainably sourced materials.

The development at 52 Edgeways Road must meet the requirements as set out in the Site Waste Management Plans Regulations 2008 which will be the responsibility of the Main Contractor to ensure compliance.

MAT 2 & MAT 3 Responsible Sourcing of Materials

At least 50% of the materials specified must be responsibly sourced. Responsibly sourcing the materials means they will be certified. This includes all basic building materials, components and elements. Basic floors, roof materials, walls, superstructure and internal walls are to be responsibly sourced.

In addition, 100% of all timber used on site will be legally sourced. Generally responsibly the materials will be sourced from local suppliers. This includes all basic building materials, components and elements. Basic floors, roof materials, walls, superstructure and internal walls are to be responsibly sourced.

Where possible, certified materials will be ordered and specified to have independent 3rd party accredited credits. Certain key timber products, materials and components will be specified.

Arrangements must be made for the disposal of any unwanted materials in an environmentally friendly manner. Any unwanted materials must be disposed of in accordance with the Duty of Care Regulations 1991.

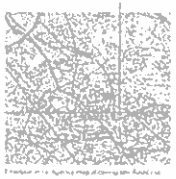
Surface Water Run-off

The aim of the strategy is to ensure the discharge of rainfall does not be increased above the existing greenfield rate.

The development at 52 Edgeways Road must meet the requirements as set out in the Site Waste Management Plans Regulations 2008 which will be the responsibility of the Main Contractor to ensure compliance.

SUR 2 Flood Risk

The Environment Agency flood map identifies the site as not at flooding (as low, a site flood risk assessment will be undertaken to ensure that measures are to be taken to minimise the flooding risk.



Sustainability Statement:
including Code for Sustainable Homes Statement

Waste

WAS 1 Household Waste

- Non-recyclable External waste will be directed to non-recyclable household waste, this will be collected by the Local Authority
- Recyclable. A local Authority collection scheme will be in operation for the collection of recyclable household waste, such as: Dry recyclable items will be provided with a household bag capacity of 30 litres. Each unit will have a capacity of at least 3 litres until be located in the kitchen

WAS 2 Construction Site Waste Management

The development will minimise the impact of construction waste on the environment through a Site Waste Management Plan (SWMP). This plan will include:

- Identification responsible officials
- procedures and responsibilities to ensure hazardous and non-hazardous waste
- monitoring hazardous and non-hazardous waste

Adherence/ credits have been taken into account when apply 85% of non-hazardous waste will be diverted from landfill. Details of the SWMP will be developed at later stage, prior to construction.

WAS 5 Composting

A composting bin will be provided on a waste bin plan in the garden. This will allow the residents to recycle food vegetable and garden waste can be

Internal waste storage bins provided

Composting bin to be placed in garden

Pollution

POL 1 Global Warming Potential (GWP) of Insulation

Global warming potential (GWP) is a measure of how effective a gas is at preventing the passage of infrared radiation (thermal energy, heat) as the predominant of insulation are a common source of gases with high GWPs.

The development will comply with relevant Building Regulations Part L1A: New dwellings 2010 and will have a Global Warming Potential (GWP) of less than 5 to achieve the maximum credits in this category.

POL 2 NOx Emissions

This section aims to reduce the release of nitrogen oxide (NOx) into the atmosphere. Space heating and hot water requirements will be met by natural gas. There are no additional noise issues to the ground floor residents.

HEA 2 Private Space

The proposed dwelling will include generously sized gardens. The inclusion of outdoor space in the development will help improve the health and well-being of occupiers.

HEA 8 Lifetime Homes

The dwelling will be compliant with all 16 principles of Lifetime Homes, ensuring it is easily adaptable for future use.

Materials

MAT 1 Home User Guide

A Home User Guide will be made available to the dwelling, providing occupants with information relating to the energy efficient and the correct use of these items. This non-technical guide will include specific instructions on as well as information on the surrounding area, family amenities, etc. A full credits in this section.

MAT 3 Considerate Constructors Scheme

The tender specification will require works to be carried out by the Considerate Constructors Scheme (CCS). Additional credits have been awarded as it is expected that Considerate will be achieved and that Contractors will operate at high, quality Environmental standards by constantly reducing the impacts of the site will be acheived.

MAT 4 Construction Site Impacts

To minimise the construction impacts on the surrounding area, will be required to maximise recycled materials for the production of CO_2 and the community, issues associated with site activities.

In addition, contractors will be required to adopt best practice policies for air, noise and water pollution and to adopt considerate working practices.

The application is accompanied by a Construction Management Plan which contains more detailed site specific building operations.

MAT 5 Security

The development will meet the requirements of Section 2 of the Design Guide 1 and 2 through consultation with an Architectural Liaison Officer or Crime Prevention Design Advisor.

CONSIDERATE CONSTRUCTORS

Ecology

ECO 1 and 2 Ecological Assessment

The development is located on a developed site likely to be of low ecological value. A ecological survey will be carried out to confirm this.

A landscaped garden will be included in the development, with planting features of ecological value being retained where possible. A brownfield roof with a 10 metre square will have planted and also the installation on part of the roof to promote biodiversity on site.

ECO 7 Ecological enhancement

A suitable qualified ecologist will be appointed by the development. All key recommendations and 30% of additional enhancements to be positively undertake the ecology of the site will be acheived.

ECO 9 Change to Ecological Value of the Site

It is anticipated that planting of native species

a) the landscaped gardens will result in more

Ground floor plan

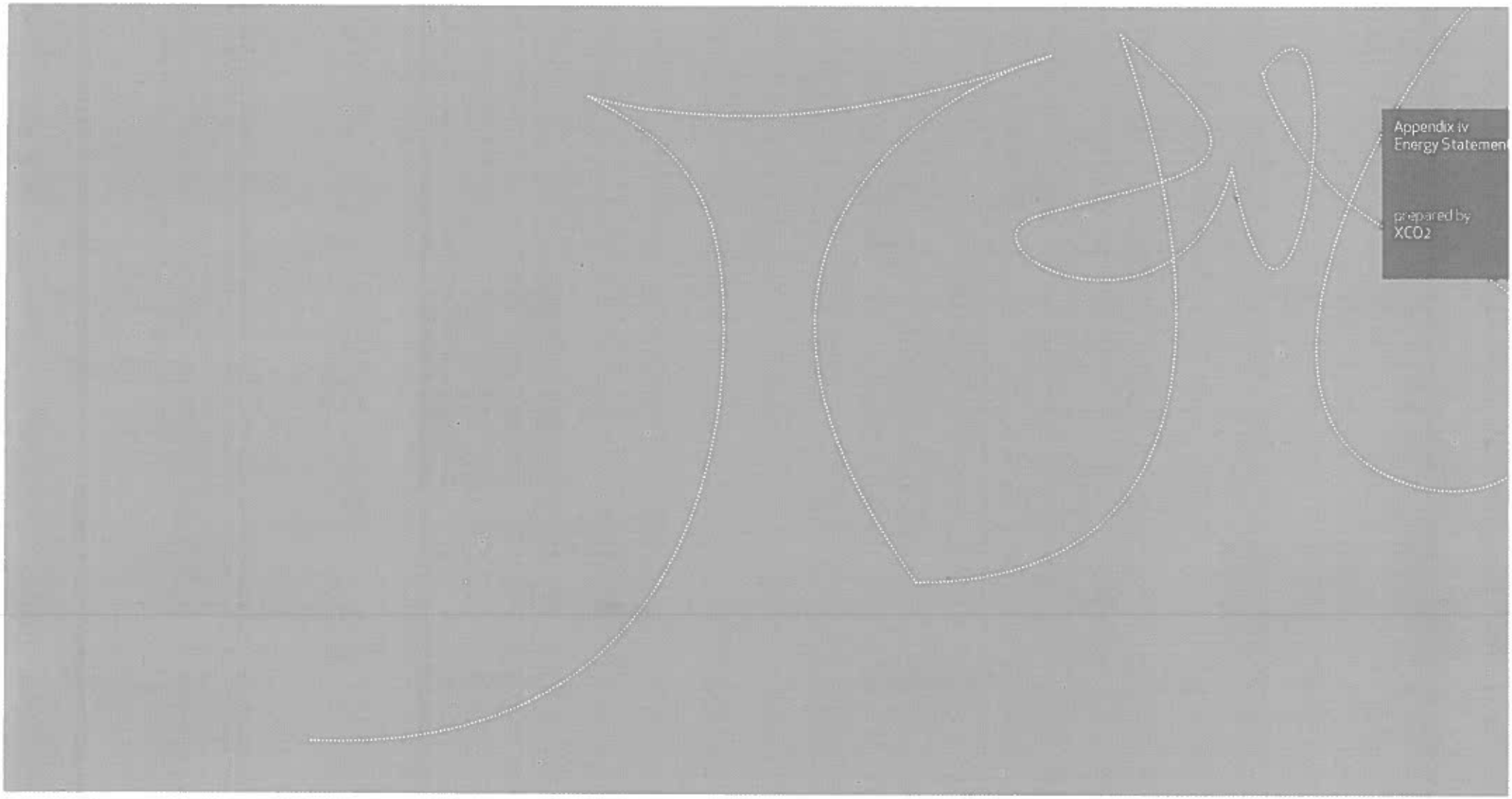
Proposed roof plan

Code for Sustainable Homes Pre-Assessment Results

A Code for Sustainable Homes pre-assessment was carried out by the projected dwelling as 2 Epworth Avenue, using the targets set by the client and project team. This reflects the client's and project team's commitment in adopting a range of sustainable measures over the life cycle of the development.

The following table summarises the credits achieved in each of the Code using the Ecohomes Pre-Assessment Tool. The development achieves a total of 70.24 credits Code Level 4. Over 50% of the Energy and Water categories will be achieved.

Assessment Issue		Credits Target	Code Min. Standards	Weighting Factor
Energy & CO2 Emissions	ENE 1 Dwelling Emission Rate	9.2	1	
	ENE 2 Fabric Energy Efficiency	4.1	1	
	ENE 3 Energy Display Device	1	1	
	ENE 4 Drying Space	1	1	
	ENE 7 Energy Labelled White Goods	2	2	23.1 10.87
	ENE 8 External Lighting	2	2	
	ENE 9 Low or Zero Carbon Technologies	1	1	
	ENE 10 Cycle Storage	1	1	
	ENE 11 Home Office	1	1	
Water	WAT 1 Internal Water Use	5	1	4 9.8%
	WAT 2 External Water Use	1	1	
Materials	MAT 1 Environmental Impact of Materials	5	1	
	Mat 2 Responsible Sourcing of Materials - Building Elements	1	1	1.4 1.4%
	MAT 3 Responsible Sourcing of Materials - Finishing Elements	1	1	
Surface Water Run-off	Wat 1 Measures to Attenuate Surface Water Run-Off Rates	0	1	2 2.7%
	Wat 2 Flood Risk	0	1	
Waste	WAS 1 Household Waste Storage and Recycling Facilities	0	1	
	WAS 2 Construction Site Waste Management	3	1	4 5.4%
	WAS 5 Composting	1	1	
Pollution	POL 1 Global Warming Potential of Insulants	0	1	1 1.4%
	POL 2 NOx Emissions	1	1	
Health & Wellbeing	HEA 1 Daylighting	1	1	
	HEA 2 Sound Insulation	1	1	1.1 1.5%
	HEA 5 Private Space	1	1	
	HEA 8 Lifetime Homes	1	1	
Management	MAN 1 Home User Guide	1	1	
	MAN 2 Considerate Constructors Scheme	1	1	4 5.4%
	MAN 3 Construction Site Impacts	1	1	
	MAN 4 Security	1	1	
Ecology	ECO 1 Ecological Assessment	1	1	
	ECO 2 Ecological Enhancement	1	1	
	ECO 7 Protection of Ecological Features	1	1	4 5.4%
	ECO 9 Change to Ecological Value of Site	2	1	
	ECO 10 Building Footprint	1	1	
Total Credits Available		46		Total Points Tar



Appendix iv
Energy Statement

prepared by
XCO2

Energy Statement

XCO2 ENERGY

Energy Statement

92 Fitzjohn's Avenue, Hampstead

For MAKE

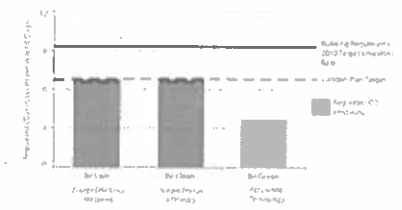
February 2013

Contents

	Issue 01	Issue 02	Issue 03	Issue 04	Issue 05	Issue 06
Remarks	Draft	Draft	Revised Draft	For issue	For issue	For issue
Prepared by	SP	TG	SP	SP	SP	SP
Checked by	RM	RM	RM	RM	RM	RM
Authorised by	RM	RM	RM	RM	RM	RM
Date	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Project reference	8.250	8.250	8.250	8.250	8.250	8.250

Energy Statement

The London Plan Energy Hierarchy



Carbon Dioxide Emissions After Each Stage of the Energy Hierarchy

	Regulated	Unregulated
Building Regulations 2010 Part L TER Target Emission Rate	91	19
After energy demand reduction	82	19
After heat and power	68	19
After renewables	37	19

Regulated Carbon Dioxide Savings from Each Stage of the Energy Hierarchy

	Regulated	Unregulated
Savings from energy demand reduction	11	
Savings from CHP	61	
Savings from renewable energy	31	
Total cumulative savings	59	

Introduction

The proposed energy strategy at 40 Bagot Avenue follows the London Plan energy hierarchy as detailed in Mayor of London's Sustainable Design and Construction SPG and Mayor's Climate Change Mitigation and Energy Strategy.

It should be noted that an Energy Statement and not a Code Pre-assessment has been prepared for this development. However, it is the client's intention to fully comply with sustainability policies in the London Plan and Code for Sustainable Homes.

The hierarchy sets out the following steps to be considered:

- Be Lean: reduce the need for energy through energy efficient design
- Be Clean: supply energy efficiently
- Be Green: use renewable energy

In particular, the report aims to demonstrate that the development will:

- Follow LB Hammersmith Carbon Dioxide Emissions Policy 5.2 Minimising Carbon Dioxide Emissions
- Follow LB Hammersmith Sustainable Design and Construction Policy 5.3 Sustainable Design and Construction
- Follow LB Hammersmith Energy Infrastructure Policy 5.5 Decentralised Energy Networks
- Follow LB Hammersmith Renewable Energy Policy 5.7 Renewable Energy

In particular, the report aims to demonstrate that the development will:

- Achieve a reduction in CO_2 emissions of 35% over Part L 2010 Building Regulations (Policy 5.2)
- Achieve a reduction in CO_2 emissions by renewables (London Plan Policy 5.7) as calculated in paragraph 5.3.11

It should be noted that the London Plan does not require developments of less than 10 dwellings to meet a 20% reduction in CO_2 emissions.

The sustainability objectives in determining the proposed CO_2 savings for the development, as well as all efforts will be made to achieve:

- Be Lean - Reduction the energy efficiency of the building
- Be Clean - Supply as much of the remaining energy requirement with low or zero carbon technologies such as renewables, heat and power (CHP).
- Be Green - Utilise a renewable form of the low zero carbon energy generation to meet remaining energy requirements.

The report refers to how the development will meet the energy hierarchy and aspirations of the London Plan above.

Passive Design Measures

Enhanced Building Fabric

The first line of defence in reducing emissions is the performance of the fabric. The lower the U value, the better the insulation of the element. Although the elements will be designed to achieve values that are better than the minimum Building Regulations requirements, the values have been selected to strike a balance between the cost of the insulation and the payback period.

The dwelling will also be designed to minimise heat losses and gains in order to reduce the demand for space heating and cooling. Accordingly, the following measures will be used to achieve the best practicable specification:

U-Values (W/m²K)

Element	Building Regulations	Proposed	Improvement
Walls	0.35	0.15	57%
Roof	0.25	0.12	52%
Basement Floor	0.25	0.12	52%
Windows	2.0	1.5	25%

Air Tightness

Heat loss may also occur due to air infiltration. Although the current building regulations do not specify an air permeability value, the design will be constructed to achieve a value of 5m³/hr/m² at 50Pa.

Current Part L Building Regulations 2006 state a requirement of 10m³/hr/m² at 50Pa. The above proposed value is 50% more onerous than the current Building Regulations requirement.

Orientation & Site Layout

The development has been designed to benefit from passive solar gains. Floor to ceiling windows have been included to the southern elevations to allow maximum heat gains to the living rooms. Bedrooms and bathrooms have been placed to the north elevations to minimise heat loss.

Thermal Bridging

Particular care will also be taken to minimise thermal bridging. This will be achieved by following Accredited Construction Details or designing junctions to improve the thermal bridging by a value of no less than 0.08 W/mK.

Lighting

Low energy fluorescent lamps will be installed in the kitchens of the dwelling. Also consideration should be given to the use of PIR detectors in the bathrooms and hallways.

Natural Ventilation

Natural ventilation with the possibility of cross ventilation and stack ventilation will reduce the likelihood of overheating in summer months. Please see the Sustainability Statement for further details on the above.

Active Design Measures

High Efficacy Lighting

The design will incorporate low energy lighting throughout the development. This will be light fittings that are specified as low energy lighting, and will accommodate compact fluorescent (CFL), fluorescent tubes or LEDs where appropriate.

Energy Strategy

The table below shows a breakdown of the energy consumption and carbon dioxide emissions associated with the building's proposed energy demand. The figures identify a comparison between the baseline specification and the development proposals.

Breakdown of Energy Consumption and CO_2 Emissions

	Baseline		Lean		
	CO_2 emissions (kg CO_2/m²/yr)	CO_2 savings (%)	Energy (kWh/m²/yr)	CO_2 emissions (kg CO_2/m²/yr)	CO_2 sa
Hot Water	4.8	0.8	24.4	4.1	
Space Heating	9.99	1.7	29.21	9.84	
Cooling	0	0.0	0	0	
Auxiliary	4.1	0.7	11.6	4.1	
Lighting	4.5	0.8	12.5	4.5	
Equipment (not subject to Part L)	39.7	7.1	39.7	39.7	
Total Part L	23.4	4.1	77.71	22.54	
Total Unregulated	42.73	7.5	42.73	42.73	

CO_2 emissions

The table below shows the regulated and unregulated carbon dioxide emissions for the baseline scheme, after energy efficiency measures and before renewables have been applied.

CO_2 emissions breakdown

	Carbon Dioxide Emissions - Regulated (Tonnes CO2 per annum)		Carbon Dioxide Emissions - Unregulated (Tonnes CO2 per annum)
Baseline Emissions	11	1.9	19.0
After energy demand reduction	8.3	1.9	18.7

	Carbon Dioxide Emissions - Regulated (Tonnes CO2 per annum)		Carbon Dioxide Emissions - Unregulated (Tonnes CO2 per annum)
	Part Boiler	Total	Part Boiler
Savings from energy demand reduction		2.7	1.9

Energy Statement

Heating and Cooling Infrastructure (the Clean)

Energy system hierarchy

The energy system for the development has been selected after reviewing the London Plan decentralised energy hierarchy. The hierarchy listed in Policy 5.6 states that energy systems should be specified in the following order of the ones that the Mayor has given within the Camden Planning Guidance:

1. Connection to existing heating and cooling networks
2. Site wide CHP network
3. Communal heating

Local supply of heat and power systems are typically those which, although a viable alternative, most cost-effective systems and thus reducing CO_2 emissions.

As a commercial energy centre, energy at the heart of that, making whilst economically a viable and a central waste and distributed as a means of to maintain long responsiveness and comfort requirements.

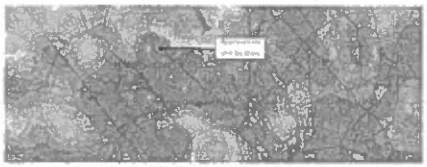
Connection to Existing Low Carbon Heat Distribution Networks

For London, Heat Map identifies existing and potential opportunities for decentralised energy projects in London. It details out the 2025 London Community Heating Development Study.

An extract from the London Heat Map below shows the energy demand for the area surrounding the site. Since there is not a good area where heat demand is high and higher, today where heat demand is low. The map indicates that there are no existing or proposed networks near or the development.

Sustainability of Installing Decentralised Heat and Power

Due to the low energy density on site a communal heat network will not be feasible for the development. The use of the boilers and the energy load may mean that a decentralised energy network, However, there can also a relatively low network are used currently an improvement may of reducing CO_2 emissions. They are to operate and high maintenance solution for the small amount of electricity they generate on return, the overall footprint that a large portion of energy and CO_2 can be saved through the installation of other renewable technologies. A high efficiency gas boiler will be installed to meet the space heating and hot water demands of the dwelling.



London heat map image of area surrounding the development

CO_2 Emissions

The table below shows the regulated and unregulated carbon dioxide emissions for the baseline scheme as well as the reduced emissions once Low energy efficiency and Clean (CHP) emissions have been implemented. The tables below illustrate that regulated CO_2 savings are expected to be in excess of 25% over Part L 2013 requirements as CHP is not to be adopted as part of the energy strategy for the development.

CO_2 Emissions Breakdown

	Regulated	Unregulated	Total
Baseline Building	13	10	23
After energy demand reduction (Be Lean)	10	10	20
After CHP (Be Clean)	10	10	20

	Savings (Tonnes per annum)		Savings (%)	
	Regulated	Total	Regulated	Total
Savings from energy demand reduction	3	3	23.1%	13.0%
Savings from CHP	0.0	0.0	0.0%	0.0%

Renewable energy (Be Green)

Once energy demand reductions have been maximised, methods of generating low and zero carbon energy can be assessed.

The renewable technologies to be considered for the energy statement are:

- Bio-gas
- Photovoltaic panels
- Solar thermal panels
- Ground/water source heat pumps
- Air source heat pumps
- Wind energy

In order to determine the feasibility of the above technologies, their suitability for the site and compatibility with the measures already implemented through the Lean they have been appraised. The technologies deemed viable will be discussed in turn below.

The potential energy and carbon savings achieved by each technology of each of the above renewable energy systems were assessed for the proposed dwelling at 92 Tavistock Avenue using the Camden SAP software.

It should be noted that the total savings from a combination of renewable technologies is unlikely to be identical to the sum of savings from implementing each individual renewables due to the calculations methodology employed by the SAP software.

Where possible, the final systems has been sized to meet a 20% CO_2 reduction, as per both Camden Council's requirements Planning Policy CS13 of the Core Strategy and London Policy 5.2 of the London Plan Strategy.

The following sections contain the potential savings and suitability for the renewable technologies considered.

Photovoltaic Panels Assessment

There is an array of solar cells available at present on the market including mono crystalline, poly crystalline, thin film and hybrid. Although mono crystalline and hybrid cells are the most expensive, they are the most efficient (15-20%). Poly crystalline cells are efficient but they are not efficient (13-16%). Thin film cells are only 5-8% efficient but, have the advantage of being flexible as well as thin and flexible cells.

As the development is not based close to coastline it is considered that photovoltaic panels would be the most suitable renewable energy technology as they have been widespread and do not require a large amount of space. The panels will be installed on the roof of the building. The panels will be inclined at an angle of 30° to maximise available roof space additional self-shading issues.

The feasibility study for 92 Tavistock Avenue includes photovoltaics to be one of the most suitable renewable technologies for the following reasons:

- There is sufficient roof space available to install enough PV modules to have a significant impact on carbon dioxide emissions of the development

Module Efficiency	15	%
Orientation	Horizontal	
Predicted kWh/kWp	863	kWh/kWp/yr
System losses	20	%
System peak power	7.2	kWp
Array area	48	m²
Primary electricity offset by PV panels	5,515	kWh/yr
Total CO_2 savings	2.8	t/yr
Regulated (Gas+CO_2 emissions	0.8	t/yr
Total Clean CO_2 emissions	10.7	t/yr
% Regulated CO_2 reduction	25.9%	% Improvement
% Total CO_2 reduction	22.6	% Improvement

- The installation of photovoltaic samples which could connect to each property.
- Photovoltaics would cover the roof of each property to the flat roof.

A total of 48m² of 15% efficiency (7.2kWp) would provide a total CO_2 saving of 2.8t/yr which is equivalent to 22.6% total CO_2 emissions. Please see Page 12

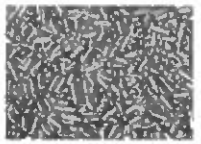
The technology and its implementation The Carbon offset by 92 Tavistock Avenue array can be found on Page 12

A flat PV Panel

Thin Film PV

A bespoke PV Panel

Energy Statement



Energy Statement

Air Source Heat Pumps - Not adopted

An Air Source Heat Pump (ASHP) employs the same technology as ground source heat pump (GSHP) however instead of using the embedded pipework in the ground heat is extracted from the external ambient air.

A benefit of ASHP is that the system produces space heating and hot water through electricity, thereby negating the need for a gas connection to the dwelling.

The efficiency of heat pumps is very much dependent on the temperature difference between the heat source and the space required to be heated. As a result ASHPs tend to have a lower CEP than GSHPs. This is due to the varying levels of air temperature throughout the year when compared to the relatively stable ground temperature. It is known that ultimately between external and internal air temperature is the more efficient of the systems.

The use of ASHP as a low carbon technology to this scheme would result in a negligible CO_2 savings of 3.4%.

As mentioned, the following are some of the reasons:

- ASHP manufacturers usually need to be located externally. Any noise associated with the unit would likely be an issue due to the proximity of the neighbouring buildings.
- Issues of noise may also be of concern at night as the development is mostly residential.

For these reasons, ASHP is not considered to be a feasible renewable technology for the site.

ASHP		
COP No.2	2.5	
Carbon intensity of fuel (kWh)	0.519	kgCO2/kWh
Proportion of space Heating met by ASHP	90	%
Proportion of hot Water met by ASHP	75	%
Energy met by ASHP	24,376	kWh/yr
Energy used by ASHP	9,400	kWh/yr
Total CO_2 savings	0.2	t/yr
Regulated Clean CO_2 emissions	4.5	t/yr
Total Clean CO_2 emissions	10.2	t/yr
% Regulated CO_2 reduction	3.4	%
% Total CO_2 reduction (TER)	2.1	%

ASHP external unit

Wind Turbines - Not adopted

Due to the limited availability of space on site, building mounted turbines would be required for the site as opposed to stand alone turbines.

CO2 savings from wind turbines could also be limited because low mounting height, the relative wind speed and wind data. The calculations assessment from the RIBA website and used in the Carbon Trust Wind Yield Calculation Tool. The average annual wind speed at a mounting height of 10m above the building canopy is understood to be 4.0m/s. It should however, due to local conditions, wind speeds are expected to be slightly lower than that.

Due to the varied orientation between wind turbines, one turbine could be 20m/s on the roof. The two tables below outline the 2.5kW and 6kW turbine respectively.

Due to the visual impact of wind turbines and site considerations which are likely to possibly reduce the calculated outputs, photovoltaics are considered to be a more feasible option for this site and having limited impact on the proposed development.

A building mounted 2.5kW Proven wind turbine

Wind Turbine 2.5kW		
Average wind speed assumed	2.5	m/s
Number of turbines	1	
Electricity offset by turbine	1,584	kWh/yr
Carbon intensity of offset electricity	0.329	kgCO2/kWh
Total CO_2 savings	0.5	t/yr
Regulated Clean CO_2 emissions	4.8	t/yr
Total Clean CO_2 emissions	10.2	t/yr
% Regulated CO_2 reduction	10.3	%
% Total CO_2 reduction (TER)	6.2	%

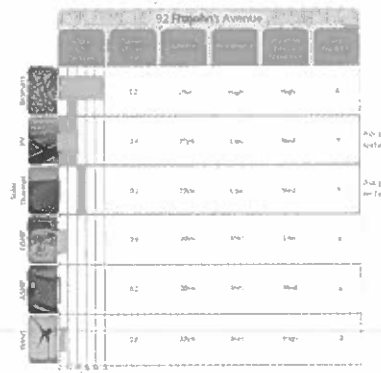
Wind Turbine 6kW		
Average wind speed assumed	2.5	m/s
Number of Turbines	1	
Electricity offset by turbine	3,957	kWh/yr
Carbon intensity of offset electricity	0.329	kgCO2/kWh
Total CO_2 savings	1.3	t/yr
Regulated Clean CO_2 emissions	4.0	t/yr
Total Clean CO_2 emissions	10.2	t/yr
% Regulated CO_2 reduction	24.8	%
% Total CO_2 reduction (TER)	15.2	%

Renewable Energy Summary

The 'solar hierarchy' suggests the hottest roofs are the most appropriate for photovoltaic panels. Therefore, the roof is the most feasible location for the renewable technology for this project. The exclusion of solar thermal panels is due to the high maintenance and limited hot water demand.

Non-viable Energy Technologies

Results from the feasibility study, shows that a combination of PV and solar thermal panels would be the most feasible low or zero carbon energy strategy for the proposed dwellings at 92 Stapleton Avenue. Therefore these two technologies will be implemented at the proposed dwelling as part of the 'Be Green' strategy.



CO_2 Emissions

The table below shows the regulated and unregulated carbon dioxide emissions for the baseline scheme and the emissions after the fabric energy efficiency measures have been implemented.

It can be seen that compared to the Building Regulations baseline, the proposed development achieves the total regulated carbon dioxide emissions of the dwelling

CO_2 Emissions Breakdown

	Carbon Dioxide Emissions (CO_2) for the...		
	Regulated	Unregulated	
Baseline building	0.1	3.9	1
After energy demand reduction	0.8	3.9	1
After energy efficient supply	0.9	3.9	1
After renewables	1.1	3.9	

	Carbon Dioxide Savings		
	Regulated	Total	Percentage
Savings from energy demand reduction	3.7	7.7	34.8%
Savings from energy efficient supply	0.0	0.0	0.0%
Savings from renewable energy	4.1	4.1	46.2%
Total Cumulative Savings	3.4	5.4	19.9%

Energy Statement

Conclusion

The regulated CO_2 emissions for the proposed development at Kingsbury Avenue have been reduced by 39.5% over minor efficiency measures but regard does not taken into account. This far exceeds the 25% target set out in the London Plan 2011, although it is not a requirement for a project of this size.

The table at the bottom of the page shows the carbon emissions at each stage of the energy hierarchy. The reductions made through each stage have been outlined below:

1. Be lean - use less energy

In accordance with the hierarchy, the development will incorporate a range of energy efficiency measures including efficient lighting, high insulation U-values, efficient building envelope, mechanical and the installation of high performance glazing. The regulated carbon emissions savings from this stage are 12.3%, which corresponds to a notional building light Elizabeth Part L Building Regulations 2013.

2. Be clean - supply energy efficiently

The feasibility study showed that no current or future networks currently exist within close proximity of the site. It would not be feasible at this point in time to include a single CHP. As such this energy saving has been will be retained in supply heating and hot water to the dwellings.

3. Be green - use renewable energy

The feasibility study looked at a number of renewable technologies to see suitability to the site. These included biomass heating system, photovoltaic roof panels and ground source heat pumps, photovoltaics, solar thermal and wind turbines.

The analysis demonstrated that a combination of PV and solar thermal panels would be the most suitable renewable technology for this development. The installation of a 49kWp PV array and a 6m² solar thermal array would potentially reduce regulated CO_2 emissions by a further 44.3%.

Including the regulated LO_2 the proposed renewable energy gives a 39% reduction in CO_2 emissions which EXCEEDS London Plans 35% allowable of 20% reduction by the use of PV.

Regulated Carbon Dioxide Savings from Each Stage of the Energy Hierarchy

	Carbon Dioxide Savings		Total CO2 Savings
	Tonnes CO_2 per annum	%	%
Savings from energy demand reduction	2.2	24.6%	12.3%
Savings from CHP	0.0	0.0%	0.0%
Savings from renewable energy	7.1	40.2%	39.3%
Total Cumulative Savings	9.4	48.9%	61.0%

Appendix v
Sunlight, Daylight
Overshadowing
Assessment

prepared by
XCO2

Daylight, Sunlight, Overshadowing Assessment

XCO2 ENERGY

Daylight, Sunlight, Overshadowing Assessment

92 Fitzjohn's Avenue, Hampstead

For MAKE

February 2012

XCO2 energy

XCO2 ENERGY

Contents

About us

XCO2 Energy are a low carbon consultancy working in the built environment. We are a multi disciplinary company consisting of both architects and engineers, with specialists including CIBSE low carbon consultants, Code for Sustainable Homes, Ecohomes and BREEAM assessors and LEED accredited professionals.

	Issue 01	Issue 02	Issue 03	Issue 04	Issue 05	Issue 06
Remarks	Draft	Draft	Draft	For Issue	Draft	For Issue
Prepared by	TG	TG	TG	SP	SP	SP
Checked by	TH	TH	TH	RM	RM	RM
Authorised by	RM	RM	RM	RM	RM	RM
Date	31/08/12	03/09/12	25/09/12	30/01/13	31/02/13	25/02/13
Project reference	8250	8250	8250	8250	8250	8250

XCO2 ENERGY

Executive Summary

A sunlight and daylight analysis was carried out for the proposed development at 92 Fitzjohns Avenue, in the London Borough of Camden. This report outlines the results of the analysis for the detailed planning application, primarily assessing the daylight and sunlight impacts on surrounding buildings.

The methodology set out in this report is in accordance with BRE's "Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice" by PJ Littlefair (2011) which is accepted as good practice by Planning Authorities.

The following assessments were carried out:

Daylight assessments:

- 25 degree line
- Vertical Sky Component
- No Sky Line

Sunlight assessments:

- Annual Probable Sunlight Hours (APSH) and Winter Probable Sunlight Hours (WPSH) analysis
- Overshadowing of open amenity spaces

Specialist software was used to carry out the daylight and sunlight impact assessment. The analysis showed that the proposed development had no significant impact on daylight or sunlight levels to any of the surrounding buildings [...] the site.

All permanent opaque building elements [...] proposed development have been [...] the daylight and sunlight analysis [...] site conditions. The permeable fencing [...] part of site boundary has been designed [...] penetration of daylight and sunlight [...] not required to be included in the assessment [...] recommended by the BRE guidance.

Daylight Assessment

A number of existing windows adjacent to [...] were identified, which may be impacted [...] the proposed development. Twenty-one [...] passed the 25 degree line test and 7 [...] windows were assessed in further detail.

Analysis showed that 5 of the modelled [...] had VSCs greater than 27% and VSC [...] remaining two windows were over 80% [...] existing values.

The proposed development will have no [...] impact on daylight access to the [...] windows. These windows will continue [...] all daylight targets set out in the BRE [...] document.

Daylight Assessment Overview

Building	[illegible]	Window [illegible]	25 Degree Line Pass	VSC > 27%	VSC > 80% of Existing Value
Henderson Ct	6	1 - 6	[illegible]	n/a	n/a
Carmichl	6	7 - 12	[illegible]	n/a	n/a
North Bridge House Senior School	4	13 - 16	0 (0%)	[illegible]	[illegible]
St Anthony's	6	17 - 24	[illegible]	n/a	n/a
Fitzjohns Primary	3	24 - 26	0 (0%)	[illegible]	n/a
TOTAL	24		[illegible]	[illegible]	[illegible]

Daylight, Sunlight, Overshadowing Assessment

XCO2 ENERGY

Sunlight Assessment

The assessment of the surrounding buildings required Annual and Winter Probable Sunlight Hours analysis in order to determine the impact. The proposed development will have no significant impact on the buildings surrounding the site, and all windows will continue to meet all sunlight targets set out in the BRE Guidance document.

Overshadowing of Open Spaces

Amenity spaces in close proximity to the development were assessed for the sunlight they receive on 21 March. All five amenity spaces assessed passed the BRE tests with the development of 92 Fitzjohn's Avenue in place.

Summary

The proposed development at Fitzjohn's Avenue passes the BRE daylight and sunlight tests for the surrounding existing buildings and the sunlight hours test for surrounding open spaces.

Sunlight Assessment Overview

[illegible]	[illegible]	[illegible]	25 Degree Line Pass	Probable Sunlight Hours Test	[illegible]
Henderson Ct	6	[illegible]	[illegible]	n/a	n/a
Greenhill	6	[illegible]	[illegible]	n/a	n/a
TOTAL	[illegible]		[illegible]	n/a	n/a

Overshadowing Overview

[illegible]	Number of Open Spaces	[illegible]	[illegible]
TOTAL	3	[illegible]	n/a

XCO2 ENERGY

Introduction

This report is intended to assess the daylight, sunlight and overshadowing impacts of the proposed development at 92 Fitzjohn's Avenue on the existing buildings surrounding the site.

The approach is based on the BRE's "Site Layout Planning for daylight and sunlight: a Guide to good practice" by PJ Littlefair (2011), which is generally accepted as good practice by Town and Country Planning authorities.

It should be noted that although the numerical values stated in the BRE provide useful guidance to designers, consultants and planning officials, these are purely advisory and may vary depending on context. Dense urban areas, for example, may often experience greater site constraints when compared to low rise suburban areas, and thus a high degree of [illegible] is [illegible] available.

XCO2 ENERGY

Site

The proposed development at 92 Fitzjohn's Avenue is a single dwelling to be located [illegible] Fitzjohn's Avenue adjacent to Henderson Court [illegible] and [illegible] in Hampstead [illegible].

The habitable areas of the proposed dwellings are distributed over two storeys with the main living areas at entrance floor level and bedroom accommodation planned [illegible]. The development will replace an existing residential building and car parking on site.

The approximate site location and boundary is shown in the figure below.

[illegible]

Methodology

Daylight

The following methodology was used to carry out the daylight assessments. The methodology is based on the guidelines set out in the BRE "Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice" (2011).

1. Daylight to surrounding windows

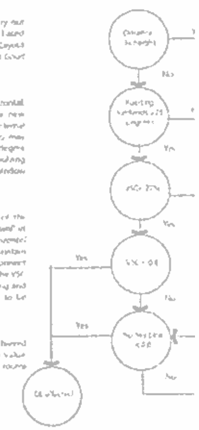
A plane is drawn at 25 degrees from the horizontal at the centre of an existing window. If a new development intersects with the plane, the internal daylight levels of the surrounding windows may be reduced. When an obstruction of the 25 degree plane occurs, a more detailed assessment involving the Vertical Sky Component of the affected window would need to be carried out.

2. Absolute Vertical Sky Component

The Vertical Sky Component is the ratio of the direct sky illuminance falling on the vertical wall at a reference point, to the simultaneous horizontal illuminance under an unobstructed sky. To maintain good levels of daylight, the Vertical Sky Component of a window needs to be 27% or greater. If the VSC is less than 27%, then a comparison of existing and proposed levels of VSC level would need to be calculated.

3. Relative Vertical Sky Component

Good levels of daylighting can still be achieved if VSC levels are within 0.8 of their former value. Otherwise, the No Sky Line of the internal rooms would need to be calculated.



[illegible]

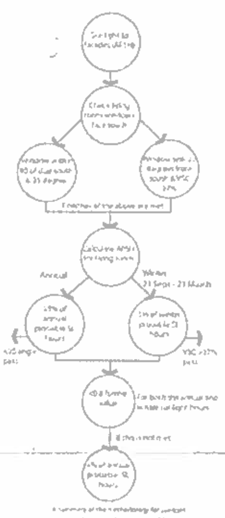
Daylight, Sunlight, Overshadowing Assessment

Sunlight

1. Overshadowing (APSH)

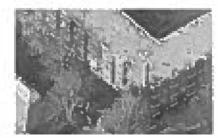
Existing windows

2. Sunlight to Amenity Spaces

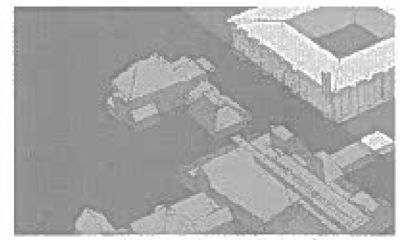


Daylight Assessment

- 25 degree line,
- Vertical Sky Component (VSC) for those windows not passing the 25 degree line,
- Relative VSC for those windows not achieving 27% VSC.



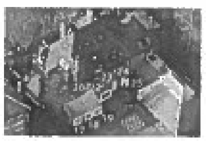
Result Summary



Daylight, Sunlight, Overshadowing Assessment

Daylight, Sunlight, Overshadowing Assessment

St. Anthony's Preparatory School

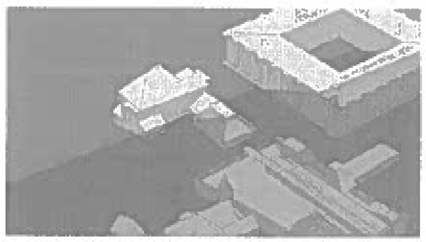


St. Anthony's Preparatory School VSC Results

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	[illegible]			
18	[illegible]			
19	[illegible]			
20	[illegible]			
21	[illegible]			
22	[illegible]			
23	[illegible]			
24	[illegible]			
25	[illegible]			

Result Summary

Number of windows	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	
[illegible]	



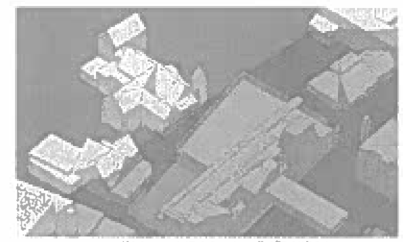
Fitzjohns Primary School

Fitzjohns Primary VSC Results

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26	[illegible]	34.4	[illegible]	
27	[illegible]	34.1	[illegible]	
28	[illegible]	25.4	[illegible]	

Result Summary

Number of windows	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]



Daylight, Sunlight, Overshadowing Assessment

Sunlight Assessment

Existing Buildings

Surrounding windows which were south facing (within 90 degrees of due south) were assessed for the impact of the new development on the sunlight they receive. Therefore, the only buildings covered by this methodology are Henderson Court and Greenhill.

All windows were shown to pass the 25 degree line test and therefore not considered adversely affected by the proposed development at 92 Fitzjohn's Avenue in terms of sunlight access.

Annual and Winter Sunlight Hour Results

Henderson Court and Greenhill APSH and WPSH Results

	Window number	25 Degree Line Pass?	Annual Sunlight Hours (APSH)	Winter Sunlight Hours (WPSH)	Relative Sunlight Hours Result
Henderson Court	1	Yes [illegible]			-
	2	Yes [illegible]			-
	3	Yes [illegible]			-
	4	Yes [illegible]			-
	5	Yes [illegible]			-
	6	Yes [illegible]			-
Greenhill Building	7	Yes [illegible]			-
	8	Yes [illegible]			-
	9	Yes [illegible]			-
	10	Yes [illegible]			-
	11	Yes [illegible]			-
	12	Yes [illegible]			-

Summary of Results

All of the existing south facing windows pass the 25 degree line test. The existing south facing facades will therefore continue to receive an adequate amount of sunlight with the new development in place.

Overshadowing of Open Spaces

An assessment of the sunlight levels of the surrounding amenity spaces was undertaken. Five of these open spaces were identified as being in close proximity to the development at Fitzjohn's Avenue.

BRE Guidance suggests that the test should be run on 21 March which is the midpoint between the summer and winter solstices (equinox). At least half of each of the amenity areas should receive no less than 2 hours on 21 March. Where this is not achieved, a relative test should be carried out to show the are receiving 2 hours of sunlight is no less than 80% of its previous value.

A Solar Access Analysis was undertaken on the two amenity areas for the full 24 hours on 21 March. Two images are provided on the next page showing the the overshadowing of open spaces for the baseline case with existing buildings on site and for the proposed development in place. It can be seen that all spaces pass the BRE test.

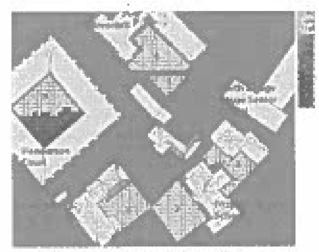
The table below quantifies the results of the sunlight assessment. For the amenity space to the south of the Greenhill Building, sunlight hours received by a very small part of the space [illegible] will be affected by the proposed development which is not considered to be significant.

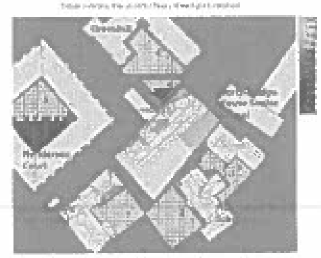
The table below shows that at least half of each of the amenity areas receive more than 2 hours of sunlight. A relative test is therefore not required.

In summary, the development will have no material impact on sunlight to open spaces.

Overshadowing Results

Amenity Space	Area with existing buildings receiving 2 hours sunlight on 21 March	Area with proposed development receiving 2 hours sunlight on 21 March	Relative area test
1. St Anthony's Prep School	100%	100% [illegible]	-
2. Fitzjohn's Primary School	100%	100% [illegible]	-
3. Fitzjohn's Primary School	[illegible]	[illegible]	-
4. Greenhill	100%	[illegible]	-
5. Henderson Court	[illegible]	[illegible]	-





Conclusion

Daylight Assessment

The results from the existing building windows indicate that the provision of daylight will be adequate. This is due to the following findings:

- 21 windows were found to pass the 25 degree line
- 5 of the 7 windows which failed 25 degree line were found to have a VSC of at least 27%
- the remaining 2 of the 7 windows which had a VSC of less than 27%, was shown to achieve a VSC of at least 80% of its former value

The proposed development will have no significant impact on daylight to windows on surrounding properties.

Sunlight Assessment

Twelve windows were assessed [illegible] which passed the 25 degree line test

Overshadowing Assessment

Five amenity spaces were assessed [illegible] the development. An overshadowing [illegible] these spaces showed that the develop[illegible] no material impact on sunlight to ope[illegible]

Summary

The proposed Fitzjohn's Avenue [illegible] passes the BRE daylight and sunligh[illegible] surrounding existing buildings and [illegible] hours test for surrounding open spaces

Daylight Assessment Overview

Building	Number of Windows	Window numbers	25 Degree line Pass	VSC > 27%	VSC > 80% of Former Value
Henderson Ct	5	1 - 5	[illegible]	n/a	n/a
Greenhill	6	7 - 12	[illegible]	n/a	n/a
North Bridge House Senior School	4	13 - 16	[illegible]	[illegible]	[illegible]
St. Anthony's	[illegible]	17 - 25	[illegible]	n/a	n/a
Fitzjohn's Primary	3	26 - 28	[illegible]	[illegible]	n/a
TOTAL	28		[illegible]	[illegible]	[illegible]

Sunlight Assessment Overview

Building Group	Number of Windows	Window Numbers	25 Degree Line Pass	Probable Sunlight Hours Test	Sunlight [illegible]
Henderson Ct	6	1 - 6	[illegible]	n/a	
Greenhill	6	7 - 12	[illegible]	n/a	
TOTAL	12		[illegible]	n/a	

Overshadowing Overview

Open Spaces	Number of Open Spaces	Area Receiving 2 Hours of Sunshine on 21 March is Greater than 50%?	Area Receiving 2 Hours 21 March, 80% of [illegible]
TOTAL	5	[illegible]	n/a

Appendix vi
Tree survey,
Aboricultural Impa
Assessment and
Arboricultural Me
Statement

prepared by
Landmark Trees

Arboricultural impact assessment report

Landmark Trees

ARBORICULTURAL IMPACT ASSESSMENT REPORT

92 Fitzjohns Avenue
London
NW3 5NP

REPORT PREPARED FOR:

Ms Rachel Lord and Mr John Weston
92 Fitzjohn's Avenue
London
NW3 5NP

REPORT PREPARED BY

Adam Hollis
MSc ARB MICFor FArbor A MRICS C Env

Ref: TSS/92FJA/AIA/01c

Date: 29th February 2013

Web: www.landmarktrees.co.uk
e-mail: info@landmarktrees.co.uk
Tel: 0207 851 4544

Section	Content	Page Nº
1.0	SUMMARY	5
2.0	INTRODUCTION	7
2.1	Terms of Reference	7
2.2	Drawings Supplied	7
2.3	Scope of Survey	8
2.4	Survey Data	8
3.0	OBSERVATIONS	9
3.1	Site Description	9
3.2	Subject Trees	10
3.3	Planning Status	11
4.0	DEVELOPMENT CONSTRAINTS	12
4.1	Primary Constraints	12
4.2	Secondary Constraints	14
5.0	ARBORICULTURAL IMPACTS	19
6.0	DISCUSSION	21
6.1	Rating of Primary Impacts	21
6.2	Rating of Secondary Impacts	22
6.3	Mitigation of Impacts	23
7.0	CONCLUSION	25
8.0	RECOMMENDATIONS	26
9.0	REFERENCES	27

APPENDICES

APPENDIX 1	Survey Data	28
APPENDIX 2	Recommended Tree Works (existing trees)	30
APPENDIX 3	Recommended Tree Works to Facilitate Development	37
APPENDIX 4	Tree Constraints Plan	41
APPENDIX 5	Impact Assessment / Tree Protection Plan	43

Caveats

This report is primarily an arboricultural report. Whilst comments relating to matters involving structures or soil data may appear, any opinion thus expressed should be viewed as qualified, confirmation from an appropriately qualified professional sought. Such points are usually identified within the body of the report.

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.

Inherent in tree inspection is assessment of the risk associated with trees close to people and property. Most human activities involve a degree of risk, such risks being commonly accepted, provided the benefits are perceived to be commensurate.

Risks associated with trees tend to increase with the age of the trees concerned, but so do 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.

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.

Arboricultural impact assessment report

Tree Constraints & Protection Overview

Client:	Ms Rachel Lord and Mr John Weston	Case Ref:	18340A JAR 07 12
Local Authority:	LB Camden	Date:	20 February 2013

Site Address: 62 Fitzjohn Avenue, London NW3 6NP

Proposal: New basement dwelling with associated landscaping strategy

Report Checklist	Y/N		Y/N
Arboricultural constraints on site	Y	Trees removal proposed	Y
Tree Survey	Y	Topographical Survey	Y
Method Report	Y	Conservation Area	Y
Tree Preservation Orders	NA		
Tree Protection Plan	N	(Details to be full a matter of Comment)	
Tree Constraints Plan	Y		
Arboricultural Impact Assessment	Y		

Site Layout

Site Visit	Y	Date: 07/02/13	Access	Y/N or Limitations	Y
Trees on Site		Y	Off site Trees		Y
Trees affected by development		Y	Off Trees affected by development		Y
Tree replacement proposed		Y	Off site trees indirectly affected by development		Y

Trees with the potential to be affected

Trees listed on site to facilitate development: T 25, 26, 30, 42, 43, 44
Trees to be retained: as per all landscape/tree quality improvement scheme T1 to T9
On-site Low RPA impacts to T12 & T37
Crown lift to T12 for access
Off site RPA impacts to T25 (category B) and T30 (category C)
Pruning operations to T3, T15, T31 & T36

Comments

T37 recommended felling for good arboricultural practice

Recommendations

1	Prepare a soil, Health Plan Plan of Implantation Trees (TPP/ICA)	Y
2	Propose Arb Officer supervision for tree felling	Y
3	Propose tree protection plan to be implemented	Y
4	Specialist excavation / construction techniques required	Y
5	The Proposal will result in significant new / changes to retained trees	N
6	Further investigation of tree condition recommended	N

RPA - Root Protection Area
TPP- Tree Protection Plan
ISA- Arboricultural Impact Assessment
AIA = Arboricultural Implication Assessment
BS3837 2012 Trees in relation to design, demolition and construction - Recommendations

1. SUMMARY

1.1 This report comprises an arboricultural impact assessment of the proposals for 62 Fitzjohn's Avenue, London NW3 6NP, reviewing any conflicts between the proposals and trees(s) identified in our survey.

1.2 There are 45 trees and vegetation groups on the site, of which 5 are 'B' category, 36 are 'C' category and 2 are 'U' category. Additionally, 2 are 'B' category trees and 2 are 'C' category trees on the adjacent highway (Fitzjohn's Avenue). Of 'B' category trees, 2 are City Councils and 3 are Private. One 'U' category tree is recommended for removal due to poor quality and the remainder are hedges and shrubs of low quality and value.

1.3 The principal property impacts of the current proposals are the removal of 7 trees/parts of the existing/planted hedge to the frontage, including shrubs and conifers. Tree removal will have little arboricultural impact to the broader area (T13 - T22) will be felled and replaced with good quality trees appropriate for the existing low quality (all 'C' Category), the underlying soil conditions and those trees will be provided as per Design and Access Statement.

1.4 The impacts on retained arboricultural quality have been carefully considered during the development of the scheme. Of the 7 trees (T30 and T37's by 30% (2.1% and 17% each respectively. Further consultation and discussions have the development are situated within the RPA's by 13.9%. The impacts to T29 and T30 occur within existing hard standing. Thus, the primary RPA impacts are likely to be non-given sufficient to investigations and mitigation. Similarly, potential above ground impacts of buildings upon canopies of T29 & 37 have been reduced through design and functionality. The roots to be made inroads along the existing route shared with St Antony's school could also require some further pruning, crown lifting of T3, T15 and T12. A few smaller ones, T31, which overhangs the site by 1.7m would also need to be cut back to the boundary to facilitate construction.

1.5 In terms of mitigation, the LOF boundaries, which are those most adjacent to T29 (the only tree proposed at this level) to avoid further pollarding through the RPA / crown to the tree. Tower piling methodology could be pre-excavated and root-pruned by hand to 750mm depth under arboricultural supervision. The CP measurements noted employ low-structural designs, with cantilevered foundations for the underground within T29's RPA and the open patio T37's RPA. Removing CP encroachments to all the 3 hardstanding areas with shallow beams at flexible locations determined by both consultants. The proposed canopy impacts to 29 & 37 are above ground construction will be carried by design with ongoing verbal input from the crown, and with a total impact of at <10% (by 3 bay) to T37. The impact of the encroachment on T12 can be mitigated by using various pruning / re-leg construction techniques. Careful demolition of existing structures (buildings and surfaces) and replacement with soft landscape at less elevation design will also reduce root impacts. Further detailed considerations to making allowance can be made in the detailed stages during the landscaping phase.

1.6 Secondary impacts of post-development landscaping between the new structures and tree canopies are generally assessed through development the current gardens levels should it require treatments T29 & 37. The build does move marginally closer to off-site tree T28, however, the tree has a high ground-clearance (7m) stands to the north of the building and the outside canopy encroachment already present.

1.7 The proposals have also been specifically designed by Tapp to have a/way from the trees and provide high levels of light through gardens. In addition to basic design features, the basement with T37 will be allowable through several landscape planning, such a 2.5m above FL about 2.0 m dwelling up top to 5m ground clearance. The construction equipment will require the potential for pruning of the courtyard below.

1.8 The principal RPA encroachment is established within BS5837 2012 and supported by the source document, National Joint Utilities Guidance 10 / the 4 tiers / 30% NJUG reduced the 12 distance Precautionary Zone for supervised working and Prohibited Zone at a universal 1m from the base of the tree. RPA's are frequently confused with the NJUG Prohibited Zone, where they don't correlate with the NJUG Precautionary Zone.

1.9 An RPA encroachment of <20% of RPA area to be considered as low impact, given the permissive tolerance to 20% RPA intrusion and supportive bearing under BS5837 2012 and other published references to nearby trees (average up to 35-60% root tolerance, Coder, Fraser and Whitmore in CEH 2008).

1.10 The trees in question are deeply rooted, of limited and good resistance to encampment impacts, and quite capable of tolerating these two encroachments.

1.11 To minimise 80% of roots and connections be removed with little problem provided these are required roots observed. Inevitably the degree of root loss will temporarily slow / canopy growth and even lead to some dieback (Thomas 2000). ILT do not / particularly encourage such high proportions of the root system, rather that as the extent of the pollarded crowns, planning should not be unduly concerned by one-off loss that are well below the tolerated in general – the result is not of note.

1.12 The potential impacts of development are all relatively low in terms of both quality of trees removed and the RPA encroachments (by many of trees retained. The species selected are generally tolerant of root disturbance / crown reduction and the retained trees are generally in good health and capable of sustaining these reduced impacts. The full potential of the impacts can be largely mitigated through design and precautionary measures. These measures can be implemented / limited statements in the discharge of planning conditions.

1.13 The trees that are recommended for felling are of little individual significance, such that their loss will not affect the wider character of the area. The replacement planting will be decided in a landscape strategy for the garden and the rest of the site pending.

1.14 The proposed design has been developed in detail with the architects to mitigate potential impacts. Mitigation has evolved as a result of these discussions and the proposal is supported by this report.

* In this Standard, Trees are defined as those with an above-ground stem with a diameter of 75 mm or more, measured at 1.5 m above ground level (or immediately below the lowest branch if this is lower than 1.5 m).

2 INTRODUCTION

2.1 Terms of reference

2.1.1 LANDMARK TREES were asked by Ms Rachel Lord and Mr John Weston to provide a survey and an arboricultural impact assessment of proposals for the site / tree property 62 Fitzjohn's Avenue, London NW3 6NP. The report is to accompany a planning application.

2.1.2 The proposals are for the demolition of the small eg dwelling followed by the construction of a replacement dwelling with a related landscaping strategy. The design proposes a predominantly single storey structure which spans across the rear creating the ground level garden. This report will assess the impact on the trees and shrub vegetation classified in our survey. Although the proposals were known at the time of the survey, Landmark Trees endeavour to survey each site being worked from a topographical survey whenever possible, with the overall aims plan influencing their evolution.

2.1.3 I am a Registered Consultant and Fellow of the Arboricultural Association and a Chartered Forester with a Master's Degree in Arboriculture and 25 years experience of the landscape industry - initially for the Forestry Commission and Agricultural Development and Advisory Service. I am a LV Registered Expert Witness, trained in single joint expert witness duties. I am also Chairman of the UK & I Regional Plant Assessor Committee, being tasked to promote international standards of valuation in arboriculture.

2.2 Drawings supplied

2.2.1 The drawings supplied by the client and relied upon by Landmark Trees as the formation of our survey plans are

Existing site survey 4170 (1)005
Proposals A/P 20 10

Arboricultural impact assessment report

2.3 Scope of survey

2.3.1 An Arboricultural Tree (LT) arboriculture consultant, James Hall surveyed the trees on site on 7th August 2017, recording relevant qualitative data in order to classify their suitability for retention and their contribution to the site in accordance with British Standard 5837:2012 Trees in relation to design, demolition and construction – Recommendations (BS5837:2012).

2.3.2 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 propounded by Mattheck and Breloer (The Body Language of Trees DoE booklet Research for Amenity Trees No. 4 1994). LT have not taken any samples for analysis and the trees were not climbed but inspected from ground level.

2.3.3 The survey does not cover the arrangements that may be required in connection with the laying or removal of underground services.

2.4 Survey data & report layout

2.4.1 Detailed records of individual trees are given in the survey schedule at Appendix 1 to this report.

2.4.2 A site plan identifying the surveyed trees based on the client's drawings / topographical survey is provided at Appendix 4.

2.4.3 This plan also serves as the Tree Constraints Plan with the theoretical Recommended Protection Areas (RPA's), tree canopies and trunk coordinates (from BS5837: 2012) overlaid onto it. These constraints are then overlain on the client's proposals to create an Arboricultural Impact Assessment Plan at Appendix 5. General observations and conclusions follow below.

3.0 OBSERVATIONS

3.1 Site description

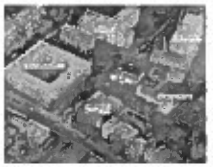


Fig 2 page 1 Aerial view of the site

3.1.1 The site reformed from two previously separate, though adjacent, pieces of land that have been brought under the same ownership by the client. The land plot comprises the existing house and garden at 92 Fitzjohn's Avenue, which forms a detached two-storey brick built property, which was extensively remodelled post-war, radically altering and extending the late Victorian house to restore all traces of the original. It is arranged over a split-level ground and first floor with extensive patio areas. It has a good sized level lawn area to the garden.

3.1.2 The second plot is a car park and service area to the north Bridge House Senior School whether was purpose built requirements. It is currently located to the existing plot by a high wall the combined plot is situated within the Hampstead Hills district of the London Borough of Camden Metropolitan Open Field.

3.1.3 Access is normally provided by means of a gentle roadway running from Fitzjohn's Avenue to the site, under part shared with St Anthony's School.

3.1.4 In terms of the British Geological Survey, the site overlies the Claygate Formation (see inset detail location on Fig 1 plan extract below). As the youngest part of the London Clay they form a transition between the clay and the London Reynhet Park above (between 0 metres). Under the Regent Road, the associated soils are generally highly shrinkable clay to a slowly permeable seasonally waterlogged and base over clay. Such highly plastic soils are prone to movement: subsidence and heave.

3.1.5 Obviously, the actual soils of soil types are not as clearly defined on the ground as on plan and there may be variances between them. Further advice from the relevant experts on the specific soil properties can be sought as necessary.

3.1.6 Clay soils are prone to connection during development with damage to tree structure potentially having a resultant impact on tree health. The design of foundations near problematic tree species will also need to take into consideration subsidence risk. Further advice from the relevant experts on the specific soil properties can be sought as necessary.

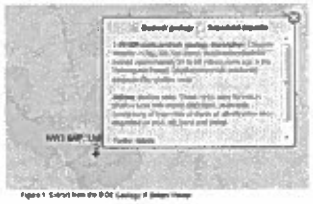


Figure 1 Extract from the OS Landranger 1:50000 Survey Map

3.2 Subject trees

3.2.1 There are 45 trees surveyed on or around the site, of which 9 are 'B' category (Moderate Quality), 2 are C4 category (Moderate/Low Quality), 24 'C' category (Low Quality), 6 are C2s (Low/Unsuitable for Retention) and 2 'U' category (Unsuitable for Retention).

3.2.2 In terms of age demographics there is a wide spread from young to mature, with the majority of the trees being semi or early mature.

3.2.3 Surveyed trees T 11 & 27-33 are beside (north of) the driveway and primarily within the grounds of Hazelmere Court. In these trees, a remote survey only, was undertaken. They comprise a screen of mixed broadleaves, predominantly native, with sycamore, beech and holly present. Trees 32-33 stand as an edge the eastern boundary of the site, prominent among this row, is tree 32, a moderate quality, mature sycamore with a rounded crown of c 17m average. The remaining trees on the flank of the site are under broadleaved and unmanaged

3.2.4 Tree 34 is a prominent Yew tall mature specimen to the rear (east) of the dwelling. T 37-45 stand to the east of the garage beyond a high wall. This is a mixed quality group of trees and cover of mixed native species, e.g. T 43, 41, 42, 44, 45 & 46. Trees 6, 35 stand offsite to the north, within an adjoining property. Trees 37 is more or less within the group, being a short tall, very mature non-domiciled specimen.

3.2.5 The surveyed trees and considerable amenity to the developed urban area. Trees T 27-33 provide a valuable screening to Hampstead Court to the north and trees T 1, 2, 3, 34 & 37 (as capable) follow the elements of Fitzjohn's Avenue.

3.2.6 See Appendix 1 for detail of surveyed trees.

3.3 Planning Status

3.3.1 We are not aware of the existence of any Tree Preservation Orders (TPO's) that encompass the site. However, the Fitzjohn's/Netherhall Conservation Area (Sub-area 1 Fitzjohn) which will affect the subject trees. It is a criminal offence to prune, damage or fell trees without permission from the local authority.

3.3.2 Further investigations can be made on request as time allows, for dialogue with the Local Authority (LA Camden).

Arboricultural impact assessment report

4.0 DEVELOPMENT CONSTRAINTS

4.1 Primary constraints

4.1.1 BS5837: 2012 gives the perceived Protection Areas (RPA's) for any given tree size. The individual RPA's are tabulated in the Tree Schedule in Appendix 1 to this report, or rather the notional radius of the RPA, based on a circular protection zone. The prescribed radius is 12 x stem diameter at 1.5m above ground level.

4.1.2 Circular RPA's are appropriate for undeveloped open ground trees, but where there is ground disturbance, the morphology of the RPA can be modified to an alternative polygon as shown in the diagram below (Figure 2). Alternatively, one need only remember that RPA's are circular and not linear – Pythonic rather than Euclidean. No modifications have been made in this instance (please see overleaf).

Figure 2 – BS5837 RPA Adjustments

4.1.3 In BS5837, paragraph 4.6.2 states that RPA's should reflect the morphology and disposition of the root zone considering site conditions or other factors indicate that rooting has occurred asymmetrically a diagram of adjusted area should be produced. Modifications to the shape of the RPA should reflect a soundly based arboricultural assessment of likely root distribution. Root pathogens, if are recognised by EPA. Trees. Others to modify the RPA's to reflect their assumptions that e.g. a road will have stationary limited root growth

4.1.4 Such assumptions cannot be proved without pre-site investigations / trial pits. Where it is not physically possible to conduct site investigations (e.g. below fully rooted), we can assume that in the outermost extends. There is little support for the popular myth that roads and pavements halt root growth. Research by the International Society of Arboriculture (Kuhns J.J (Jul 1994), found that "a constant high moisture content of the soil directly underneath the pavement surface can be considered as a major soil factor in affecting the tree's roots to develop there." By contrast grass in lawns only suffers drought-related root mortality and rarely penetrates the sub-base. Conversely roots are a "known unknown." Roots rarely die as a result of the

4.1.5 A way into understanding root zone morphology is that we consider the RPA and the actual root system RPA's are prone to a notion / construction / traffic and general arboricultural theoretical but rarely calculable. Conversely roots are a "known unknown." Roots rarely die as a result of the

4.1.6 Lastly the reliability of a circular RPA becomes in a difference of opinion. We have given officer will always have the prerogative to dictate the final modification of these RPA the best will in the world, the best allowance of modifications will tend to lead to negotiated outcomes, prejudicing the applicant and the practice is in our view, best avoided. The result of undue discussion with the weight

4.1.7 Ultimately the point of the circular RPA is to illustrate areas of concern. The purpose of this report is to consider areas of concern (not to simply them to suit our argument or brevity). Therefore, no modifications are made here to the RPA's, regardless of roads etc

4.1.8 The quality of trees will also be a consideration. U Category trees are discounted as the planning process in view of their limited span of life. A/B/A Category C trees would not normally constrain development adequately, whilst they provide some external screening function. As discrete wooded trees their removal will not affect the wooded amenity that occupies much of the site

4.1.9 At paragraph 4.11.1 BS5837: 2012 notes that "Care should be exercised over retrofitted tree preservation measures to retain too many or unsuitable trees on a site are taken to result in excessive pressure on the trees during construction or construction work, or post-completion demands on their removal."

4.1.10 In theory only moderate quality trees are those are significant material constraints on development. However, the low quality trees will comprise a constraint in aggregate in terms of air, wind, replacement planting

4.1.11 In this instance, the significant primary benefits arise from development will be provided by the 4 category 'B' trees within the proposed development area (T12, 28, 34 & 37). Further consideration should also be given to the tree along the existing access road, which may require crown lifting to facilitate access by construction machinery. In particular, category 'B' trees T3, 10 and 12. Further comments are likely to be provided in aggregate by the significant number of category 'C&U' and 'C' trees on site.

4.2 Seasonality 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 places the trees at greater risk of damage as trees increasing elements for tree owners or failing to receive adequate shading (Figure 3), removing deciduous or perceived risk of harm

Figure 3 – Shading Considerations

4.2.2 The shading constraints are crudely superimposed from BS5837 by drawing an arc from northeast to east of the tree base at a distance equal to the height of the tree as shown in the diagram opposite. Shade is cast at a tangent to non-deciduous evergreens, particularly where noted, are only approximately accurate

Figure 4 – Shading Arc

4.2.3 The arc (see Figure 4) represents the effects that a tree will have on light through shade based on shadow cast of its own height for a period May to Sept inclusive 15.00-18.00 hrs GMT

4.2.4 Assuming that they will be retained, the orientation of the sun was taken 4/6/15 minute that shading constraints will prevail, with the exception of T34 (on-site). There will also be potential nuisance associated with leaf deposits and honey dew likely

4.2.5 Tree TP are those also have the potential to provide a variety of secondary constraints including shading, organic deposition and the potential need to maintain crown clearance over the future. The significance of these constraints will vary depending on the location and proximity to the proposed re-development

4.2.6 The close juxtaposition of numerous category T12, 29, 34 & 37 and building elevations with its associated nuisance already present on site. The RPA for development will be not to add to new potential conflicts, but rather to reinforce them (will through design.

Note Section 5 & 6 and now assess the impacts upon constraints identified in Section 4. Table 1 in Section 5 assesses the impacts in detail for planning upon survey data, and as per in Appendices 1 & 2). Impacts are presented in terms of arising from removal and the effect on the landscape or zone environment (% of RPA) and its effect on immediate tree health. Section 6 subsequently sets data, chronologically upon the impacts significance and mitigation.

5.0 Table 1: Arboricultural Impact Assessment

(Impacts assessed prior to mitigation and rated with reference to From Matheny & Cark (1998))

Ref: T&S/92FJA/AIA/01c

B.S. Cat.	Tree No.	Species	Impact	Tree / RPA Affected	Age	Growth Vitality	Species Tolerance	Impact on Tree Rating	Impact on Site Rating	Mitigation
B	3	Maple Norway	Pruning/crown lifts to facilitate access	m² N/A %	Mature	Normal	Moderate	Low	N/A	Remedial tree surgery (see Rec. Works)
B	10	Yew, Common	Pruning/crown lifts to facilitate access	m² N/A %	Early Mature	Normal	Good	Low	N/A	Remedial tree surgery (see Rec. Works)
B	12	Sycamore	Drive Construction within RPA Boundary fence in RPA Parking within honeydew	16.5 m² 10.48 %	Mature	Normal	Moderate	Low	N/A	No-dig construction Crown-lift for access Boundary wall secured with mini-piles
C	13	Holly	Felled to Facilitate Landscaping Scheme	m² N/A %	Early Mature	Normal	N/A	N/A	Low	New planting accordance with a landscape strategy
C	14	Cherry, Wild (Gean)	Felled to Facilitate Landscaping Scheme	m² N/A %	Young	Normal	N/A	N/A	Low	New planting accordance with a landscape strategy
C	15	Rowan, variety	Felled to Facilitate Landscaping Scheme	m² N/A %	Young	Normal	N/A	N/A	Low	New planting accordance with a landscape strategy

5.0 Table 1: Arboricultural Impact Assessment

(Impacts assessed prior to mitigation and rated with reference to From Matheny & Cark (1998))

Ref: T&S/92FJ

B.S. Cat.	Tree No.	Species	Impact	Tree / RPA Affected	Age	Growth Vitality	Species Tolerance	Impact on Tree Rating	Impact on Site Rating	Mitigat
C	16	Amelanchier spp	Felled to Facilitate Landscaping Scheme	m² N/A %	Young	Normal	N/A	N/A	Low	New planting ac with a landscap
C	17	Ceanothus	Felled to Facilitate Landscaping Scheme	m² N/A %	Mature	Moderate	N/A	N/A	Low	New planting a with a landscap
C	18	Loquat	Felled to Facilitate Landscaping Scheme	m² N/A %	Semi-mature	Normal	N/A	N/A	Low	New planting a with a landscap
C	19/20	Privet	Felled to Facilitate Landscaping Scheme	m² N/A %	Early Mature	Normal	N/A	N/A	Low	New planting a with a landscap
C	21	Cotoneaster	Felled to Facilitate Landscaping Scheme	m² N/A %	Early Mature	Normal	N/A	N/A	Low	New planting a with a landscap
C	22	Magnolia (M grandiflora)	Felled to Facilitate Landscaping Scheme	m² N/A %	Semi-mature	Normal	N/A	N/A	Low	New planting a with a landscap

5.0 Table 1: Arboricultural Impact Assessment

(Impacts assessed prior to miligation and rated with reference to From Matheny & Cark (1998))

Ref: TSS/92FJA/AIA/01c

B.S. Cat	Tree No.	Species	Impact	Tree / RPA Affected	Age	Growth Vitality	Species Tolerance	Impact on Tree Rating	Impact on Site Rating	Mitigation
C	25	Clive	Felled to Facilitate Landscaping Scheme	m² N/A %	Semi-mature	Normal	N/A	N/A	Low	New planting accordance with a landscape strategy
C	26	Cherry, Autumn Flowering	Felled to Facilitate Development	m² N/A %	Young	Normal	N/A	N/A	Low	New planting accordance with a landscape strategy
B	29	Sycamore	50m2 GF (loss existing 11m2) 20.4% Building Construction within Canopy	30 m² 20.4 %	Mature	Normal	Moderate	Medium	N/A	Low-invasive foundation design Low-invasive roof design
C	30	Holly variegated	Ground floor building: 7m2	7 m² 10.49 %	Mature	Normal	Good	Low	N/A	Low-invasive foundation design
C/u	31	Willow, Sallow	Pruning/crown lifts to facilitate access.	m² N/A %	Semi-mature	Normal	Moderate/good	Low	N/A	Remedial tree surgery (see Rec Works)
B	34	Sycamore	Demolition of existing house	m² N/A %	Mature	Normal	Moderate	Positive	N/A	Positive impact on RPA where built development removed with care

5.0 Table 1: Arboricultural Impact Assessment

(Impacts assessed prior to miligation and rated with reference to From Matheny & Cark (1998))

Ref: TSS/92FJA/A

B.S. Cat	Tree No.	Species	Impact	Tree / RPA Affected	Age	Growth Vitality	Species Tolerance	Impact on Tree Rating	Impact on Site Rating	Miligation
C	35	Cypress, Lawson variety	Felled to Facilitate Development	m² N/A %	Early Mature	Normal	N/A	N/A	Low	New planting acc with a landscape s
C	36	Cypress, Lawson variety	Felled to Facilitate Development	m² N/A %	Early Mature	Normal	N/A	N/A	Low	New planting acc with a landscape s
B	37	Sycamore	LGF/steps 16m2 additional RPA impact (15%) GF construction 14m2, but ex. garage demo<18m2	16 m² 15.16 %	Early Mature	Normal	Moderate	Low	N/A	Pre-emptive root p of limbs of LGF thr Gym to be canteen All roofs swept bo
C/u	40	Elder	Felled to Facilitate Development	m² N/A %	Mature	Poor	N/A	N/A	Low	New planting acc with a landscape s
U	41	Cherry	Felled for good arboricultural practice	m² N/A %	Semi-mature	Dead	N/A	N/A	N/A	New planting acc with a landscape s
C	42	Cedar (C deodara)	Felled to Facilitate Development	m² N/A %	Young	Normal	N/A	N/A	Low	New planting acc with a landscape s

Arboricultural impact assessment report

5.0 Table 1: Arboricultural Impact Assessment

(Impacts assessed prior to mitigation and rated with reference to From Matheny & Clark (1998))

Ref: TSS/92FJA/AIA/01c

B.S. Cat.	Tree No.	Species	Impact	Tree / RPA Affected	Age	Growth Vitality	Species Tolerance	Impact on Tree Rating	Impact on Site Rating	Mitigation
C/u	43	Elder	Felled to Facilitate Development	m N/A %	Mature	Moderate	N/A	N/A	Low	New planting accordance with a landscape strategy
C/u	44	Cherry, Wild (Gean)	Felled to Facilitate Development	m^2 N/A %	Semi-mature	Moderate	N/A	N/A	Low	New planting accordance with a landscape strategy

[illegible]

Arboricultural impact assessment report

5.3.4 Driveway/pavement resurfacing around trees e.g. T12 will need to retain or improve upon the existing soil gas exchange (i.e. surface water infiltration). New paving needs to be less permeable than existing and therefore a permeable surface if not option is to be employed. A particular paving option would be built up using the RPA over-dig construction techniques such as a cellular confinement system with an inert aggregate for the sub-base. The finished vector is likely to be 150mm above grade, depending on final specification, which will need to be factored into the overall finished site levels. The cellular confinement system with a porous hard surface (e.g. resin bound stone) can be used by the access, being demarcation and the surface material required for completion of construction.

5.3.5 The construction exclusion enclosures will be avoided with minor breaches of the existing RPA of lower value, over the drive, specially a 3-4m ground clearance and 'through design' whereby the ground level is at the level of the bottom tier below T29 and 37. A minor encroachment of <22% (c.25m) is further recommended for T32.

5.3.6 Nuisance deposition can be mitigated with regular broom sweeping and vacuum traps on the guttering (see Figure 5 below). The shading impacts have been further mitigated in building design, with the provision of multiple aspect windows and orientation of room layout.

5.3.7 The landscape impact of tree losses will be offset by the landscape proposals. Levels are negligible will be provided in the Design and Access Statement which will ensure that the Category C trees retained for landscape enhancement (T42 – 54) will be replaced with higher quality trees

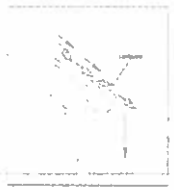


Figure 4: Retained trees as shown above should be fitted on the gutters which may easily be maintained at 2.5m above ground

7.0 CONCLUSION

7.1 The potential impacts of development are all relatively low in terms of both quality of trees removed and also RPA encroachments. Only a total of three trees will be removed.

7.2 The full potential of the impacts can be mitigated through design and precautionary measures. These measures have been elaborated in our Method Statement (TBS_30PJA_AMS_01A) in further support of the planning application.

7.3 The species affected are generally tolerant of root disturbance / crown reduction and the retained trees are generally in good health and capable of withstanding these reduced impacts.

7.4 The trees that are recommended for felling are of little individual significance, such that their loss will not affect the visual character of the area. The replacement planting is detailed in the Design & Access Statement for the garden and the roof of the new dwelling.

7.5 Therefore, the proposals will not have any significant impact on either the retained trees or wider landscape.

8.0 RECOMMENDATIONS

8.1 Specific Recommendations

8.1.1 Tree works recommendations are found in Appendices 2 & 3 to this report. Any tree removals or pollarding recommended within this report should only be carried out with local authority consent / permission as applicable.

8.1.2 Excavation and construction activity within the RPA's of trees identified as T29 to T32 inclusive, will need to be carefully monitored by a qualified arboriculturist to ensure adherence to paragraph 5.3 above and by subsequent supervision as necessary. Tree protection specifications have been provided in our Method Statement (TBS_30PJA_AMS_01A) in further support of the planning application.

8.1.3 Replace the felled trees with suitable ornamental nursery stock under current best practice (i.e. conforming to and planted in accordance with the following):

- BS 3936 1980 Nursery Stock
- bb 4043 1966 Transplanting Semi Mature Trees; and
- bb 5236 1975 Cultivation and Planting of Trees in the Amenity Tree Category
- All replacement stock should be planted and maintained as detailed in BS 4428 1989 (Section 7) Recommendations for General Landscape Operations

9.0 REFERENCES

- Barrow JF & Harrison C. 1988. Stands By Trees. A Horticultural Heritage Vol 5, 344-9 Further Survey
- Brief Statistics Update 2017 Trees & Timber in London, Centre for Economics and Business Consultancy - Recommendations BS 5837: 2012 HMSO London
- Centre for Ecology & Hydrology 2006 Tree Roots in the Built Environment HMSO London
- Hellmuth R 1980 Poetson for New Trees Landscape Design July Budget issue
- International Society of Arboriculture (ISA). 1994 The Landscape Below Ground. ISA Champaign Illinois USA
- Lonsdale D 1999 Research for Amenity Trees No.7 Principles of Tree Hazard Assessment and Management. HMSO London
- Matheny, N. Clark, J. R. 1998 Trees and Development. A Technical Guide to Preservation of Trees during Land Development. ISA. Champaign Illinois, USA
- Mattheck C. & Breloer H. 1994 Research for Amenity Trees No.2 The body Language of Trees. HMSO London
- Thomas P. 2000. Trees: Their Natural History. Cambridge University Press. Cambridge
- Proceedings J. & Jacobs N. (2004) Trees in the Urban Landscape. Site Assessment, Design and Installation. J Wiley & Sons Inc. NJ, USA

Appendix 1. Tree schedule

APPENDIX 1

TREE SCHEDULE - [illegible]

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 -	refers to the retention classifications in Section 4.5 BS5837 2012 and colouring on the site map
	: High Quality (A) (Green)
	: Moderate Quality (B) (Blue)
	: Low Quality (C) (Grey)
	: Unsuitable for Retention (U) (Red)

Landmark Trees Ltd
Tel: 020 7851 4544

BS5837 Tree Constraints Survey Schedule

Page

Site: 92 FitzJohn's Avenue, London NW3 6NP

Date: 7th August 2012

Surveyor(s): James Bell

Ref: TSS/92FJA/AIA/01a

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	Holly	13	2223	4	Mature	420e	12	5.0	Moderate	Fair?	Medium	C/b	1	20-40	Offsite
2	Sycamore	16	7377	7	Mature	530e	12	6.4	Moderate	Fair?	Medium	B	1	20-40	Offsite
3	Maple, Norway	17	6684	2	Mature	650e	12	7.8	Normal	Fair?	Medium	B	1	20-40	
4	Holly	4	3	3	Early Mature	250e	12	3.0	Normal	Fair?	Low	C	1	20-40	Offsite
5	Birch, Silver	16	4455	5	Early Mature	300e	12	3.6	Moderate	Fair?	Medium	C	1	20-40	Offsite
6	Birch, Silver	16	5	5	Early Mature	350e	12	4.2	Moderate	Fair?	Medium	C	1	20-40	Offsite
7	Birch, Silver	16	5332	5	Early Mature	320e	12	3.8	Moderate	Fair?	Medium	C	1	20-40	Multiple pruning wounds on stem Offsite

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
4. Stem Diameter is the diameter of the stem measured in millimeters at 1.5m from ground level for single stemmed trees. See section 4.6 for detail of treatment for multistems
5. Protection Radius is a radial distance measured from the trunk centre
6. Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or c trees).
7. Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major d present
8. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees)
9. B.S. Cat refers to (British Standard 5837 2012 Table 1) and refers to tree/group quality and value High, 'B' - Moderate, 'C' - Low, 'U' - Unsuitable for Retention
11. Sub Cat refers to the retention criteria values where 1 is mainly arboricultural qualities, 2 is main landscape qualities and 3 is mainly cultural values including conservation.
12. Useful Life is the tree's estimated remaining contribution in years

Appendix 1. Tree schedule

Landmark Trees Ltd
Tel: 020 7851 4544

BS5837 Tree Constraints Survey Schedule

Page

Site: 92 FitzJohn's Avenue, London NW3 6NP

Surveyor(s): James Bell

Date: 7th August 2012

Ref: TSS/92FJA/AIA/01a

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
8	Sycamore	17	7	6	Mature	520e	12	6.2	Normal	Fair?	Medium	B	1	20-40	Offsite; low quality elder & hazel at base
9	Walnut, Common	8	4244	2.5	Early Mature	280e	12	3.4	Normal	Fair?	Low	C	1	20-40	Offsite
10	Yew, Common	3	3	1.5	Early Mature	480	12	5.8	Normal	Fair?	Low	B	1	>40	Offsite
11	Cherry, Wild (Gean)	11	4244	4	Semi-mature	170e	12	2.0	Moderate	Fair	Low	CAu	1	10-20	Poor form Offsite
12	Sycamore	17	6666	2	Mature	560	12	7.1	Normal	Good	Medium	B	1	>40	Forks at 1.5m,4.5m clearance over garden
13	Holly	4.5	1.5	1.5	Early Mature	184	12	2.0	Normal	Good	Low	C	1	20-40	Twin stem SD=100 & 130
14	Cherry, Wild (Gean)	4.5	1.5/2.5/2.5/1	1.5	Young	90	12	1.1	Normal	Good	Low	C	1	20-40	

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
4. Stem Diameter is the diameter of the stem measured in millimeters at 1.5m from ground level for single stemmed trees. See section 4.6 for detail of treatment for multistems
5. Protection Radius is a radial distance measured from the trunk centre
6. Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree)
7. Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defects present
8. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees)
9. B.S. Cat refers to (British Standard 5837 2012 Table 1) and refers to tree/group quality and value: 'A'- High, 'B' - Moderate, 'C' - Low, 'U' - Unsuitable for Retention
11. Sub Cat refers to the retention criteria values where 1 is mainly arboricultural quality, 2 primarily landscape qualities and 3 is mainly cultural values including conservation
12. Useful Life is the tree's estimated remaining contribution in years

Landmark Trees Ltd
Tel: 020 7851 4544

BS5837 Tree Constraints Survey Schedule

Page

Site: 92 FitzJohn's Avenue, London NW3 6NP

Surveyor(s): James Bell

Date: 7th August 2012

Ref: TSS/92FJA/AIA/01a

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
15	Rowan, variety	4	1	2	Young	60	12	0.7	Normal	Good	Low	C	1	20-40	
16	Amelanchier spp	4	1.5	1	Young	60	12	0.7	Normal	Good	Low	C	1	20-40	
17	Ceanothus	3	2	1.3	Mature	114	12	1.4	Moderate	Fair	Low	C	1	10-20	Multi stem 3 30-90,70 & 40, shrub
18	Locust	2.5	1.5	1	Semi-mature	80	12	1.0	Normal	Good	Low	C	1	10-20	Garden ornamental
19/20	Privet	4	1.5	0	Early Mature	178	12	2.1	Normal	Fair	Low	C	1	10-20	Multi stem - 5 SD av = 40, shrubs
21	Cotoneaster	3	1	1	Early Mature	70	12	0.8	Normal	Good	Low	C	1	10-20	
22	Magnolia (M. grandiflora)	3	1	1	Semi-mature	80	12	1.0	Normal	Fair	Low	C	1	20-40	

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
4. Stem Diameter is the diameter of the stem measured in millimeters at 1.5m from ground level for single stemmed trees. See section 4.6 for detail of treatment for multistems
5. Protection Radius is a radial distance measured from the trunk centre
6. Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree)
7. Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defect present
8. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees)
9. B.S. Cat refers to (British Standard 5837 2012 Table 1) and refers to tree/group quality and value: 'A'- High, 'B' - Moderate, 'C' - Low, 'U' - Unsuitable for Retention
11. Sub Cat refers to the retention criteria values where 1 is mainly arboricultural quality, 2 primarily landscape qualities and 3 is mainly cultural values including conservation
12. Useful Life is the tree's estimated remaining contribution in years

Appendix 1. Tree schedule

Landmark Trees Ltd
Tel: 020 7851 4544

BS5837 Tree Constraints Survey Schedule

Page

Site: 92 FitzJohn's Avenue, London NW3 6NP
Date: 7th August 2012

Surveyor(s): James Bell
Ref: TSS/92FJA/AIA/01a

Tree No.[1]	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
23	Olive	3	1.5	1	Semi-mature	160	12	1.9	Normal	Good	Low	C	1	20-40	Shaped
24	Gingko (Maidenhair Tree)	10	2	2	Semi-mature	150e	12	1.8	Normal	Fair?	Low	C	1	>40	Offsite
25	Maple, Norway	10	4	3	Early Mature	[illegible]	12	4.2	Normal	Good	Medium	B	1	20-40	Offsite; crimson cv
26	Cherry, Autumn Flowering	4	2.5	1	Young	60	12	0.7	Normal	Good	Low	C	1	20-40	Sapling
G27	Hazel & Elder	7	2.5	2	Early Mature	179	12	2.1	Normal	Fair	Low	C	2	10-20	Multi stem 20+ Av SD = 40
29	Sycamore	18	7477	7	Mature	650e	12	7.8	Normal	Fair?	Medium	B	1	20-40	4 trunks from 3m Fork obscured 2m clearance off ridgeline offsite
30	Holly, variegated	12	3	2	Mature	364	12	4.4	Normal	Fair?	Medium	C	1	10-20	Multi stem - 3 Ivy smothered SD= 300e,170e & 170e dieback in upper crown

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
4. Stem Diameter is the diameter of the stem measured in millimeters at 1.5m from ground level for single stemmed trees. See section 4.6 for detail of treatment for multistems.
5. Protection Radius is a radial distance measured from the trunk centre.
6. Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree).
7. Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defects present
8. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees)
9. B.S. Cat refers to (British Standard 5837:2012 Table 1) and refers to tree/group quality and value: 'A' - High, 'B' - Moderate, 'C' - Low, 'U' - Unsuitable for Retention
11. Sub Cat refers to the retention criteria values where 1 is mainly arboricultural qualities, 2 mainly landscape qualities and 3 is mainly cultural values including conservation
12. Useful Life is the tree's estimated remaining contribution in years.

Landmark Trees Ltd
Tel: 020 7851 4544

BS5837 Tree Constraints Survey Schedule

Page

Site: 92 FitzJohn's Avenue, London NW3 6NP
Date: 7th August 2012

Surveyor(s): James Bell
Ref: TSS/92FJA/AIA/01a

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
33	Willow, Sallow	6	1323	2	Semi-mature	113	12	1.4	Normal	Fair?	Low	C/U		10-20	Twin stem Offsite, SD=80 x 2
34	Sycamore	15	6	2	Mature	670	12	8.0	Normal	Fair?	Medium	B	1	20-40	Ivy smothered Forks at 1.7m Offsite, crown growing onto flank of build over roof, base invisible so SD estimate notional
35	Cypress, Lawson variety	8	2.5	1.8	Early Mature	300	12	3.6	Normal	Good	Low	C	1	20-40	Garden ornamental
36	Cypress, Lawson variety	7	2.5	1.8	Early Mature	240	12	2.9	Normal	Good	Low	C	1	20-40	Garden ornamental
37	Sycamore	15	5546	2.5	Early Mature	483	12	5.8	Normal	Fair?	Medium	B	1	>40	Twin stem SD=400 & 270
[illegible]	Hawthorn, Common	4	1.5	2	Young	40	12	0.5	Normal	Fair	Low	C	1	20-40	

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.
4. Stem Diameter is the diameter of the stem measured in millimeters at 1.5m from ground level for single stemmed trees. See section 4.6 for detail of treatment for multistems
5. Protection Radius is a radial distance measured from the trunk centre.
6. Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree).
7. Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defects present
8. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees)
9. B.S. Cat refers to (British Standard 5837:2012 Table 1) and refers to tree/group quality and value: 'A' - High, 'B' - Moderate, 'C' - Low, 'U' - Unsuitable for Retention
11. Sub Cat refers to the retention criteria values where 1 is mainly arboricultural qualities, 2 mainly landscape qualities and 3 is mainly cultural values including conservation
12. Useful Life is the tree's estimated remaining contribution in years.

Appendix 1. Tree schedule

Landmark Trees Ltd
Tel: 020 7851 4544

BS5837 Tree Constraints Survey Schedule

Page

Site: 92 Fitzjohn's Avenue, London NW3 6NF

Surveyor(s): James Bell
Ref: TSS/92FJA/AIA/01a

Date: 7th August 2012

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
33	Hawthorn Common	2.5	1.5	2	Young	30	12	0.4	Normal	Fair	Low	C	1	20-40	
35	Holly	12	4	3	Mature	350e	12	4.2	Normal	Fair?	Medium	C/b	1	20-40	
36	Yew Common	7	2.5	1.5	Semi-mature	240	12	2.6	Normal	Good	Low	C	1	>40	Twin stem SD=160e & 150e
38	Yew Common	5	2221	1.7	Semi-mature	130e	12	1.6	Normal	Good	Low	C	1	>40	
40	Elder	7	2422	3	Mature	240	12	2.9	Poor	Fair	Low	C/u		10-20	A sparser than normal canopy Twin stem SD=180 & 160
41	Cherry	4	0322	2	Semi-mature	140		0.0	Dead	Poor	Low	U			Dead
42	Cedar of deodaran	4.5	1.5	0	Young	100	12	1.2	Normal	Good	Low	C	1	>40	

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
4 Stem Diameter is the diameter of the stem measured in millimeters at 1.5m from ground level for single stemmed trees See section 4.6 for detail of treatment for multistems
5 Protection Radius is a radial distance measured from the trunk centre
6 Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree)
7 Structural Condition - Good (no or only minor defects), Fair (remediable defects) Poor - Major defects present
8 Landscape Contribution - High (prominent landscape feature) Medium (visible in landscape) Low (secluded/among other trees)
9 B.S. Cat refers to (British Standard 5837:2012 Table 1) and refers to tree/group quality and value "A" - High, "B" - Moderate, "C" - Low, "U" - Unsuitable for Retention
11 Sub Cat refers to the retention criteria values where 1 is mainly arboricultural qualities, 2 is mainly landscape qualities and 3 is mainly cultural values including conservation
12 Useful Life is the tree's estimated remaining contribution in years

Landmark Trees Ltd
Tel: 020 7851 4544

BS5837 Tree Constraints Survey Schedule

Page

Site: 92 Fitzjohn's Avenue, London NW3 6NF

Surveyor(s): James Bell
Ref: TSS/92FJA/AIA/01a

Date: 7th August 2012

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
43	Elder	4	2	1.5	Mature	200	12	2.4	Moderate	Fair	Low	C/u	2	10-20	Ivy smothered
44	Cherry Wild (Geen)	4.5	2322	2	Semi-mature	220	12	2.6	Moderate	Fair	Low	C/u	2	10-20	Ivy smothered Bacterial canker
45	Cherry Wild (Geen)	9	1.5/2/2	2.5	Early Mature	390	12	4.7	Normal	Poor	Low	U		<10	Leans to SE Decay in exposed roots
46	Cherry Wild (Geen)	8	0321	3.5	Early Mature	320e	12	3.8	Moderate	Fair	Low	C/u		10-20	Leans to SE Ivy smothered

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
4 Stem Diameter is the diameter of the stem measured in millimeters at 1.5m from ground level for single stemmed trees See section 4.6 for detail of treatment for multistems
5 Protection Radius is a radial distance measured from the trunk centre
6 Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree)
7 Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defects present
8 Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees)
9 B.S. Cat refers to (British Standard 5837:2012 Table 1) and refers to tree/group quality and value "A" - High, "B" - Moderate, "C" - Low, "U" - Unsuitable for Retention
11 Sub Cat refers to the retention criteria values where 1 is mainly arboricultural qualities, 2 is mainly landscape qualities and 3 is mainly cultural values including conservation
12 Useful Life is the tree's estimated remaining contribution in years

Appendix 1. Tree schedule

Landmark Trees Ltd
Tel: 0207 851 4544

Recommended Tree Works To Facilitate Development

Page

Site: 92 FitzJohn's Avenue, London NW3 6NP
Surveyor(s): James Bell
Date: 7th August 2012
Ref: TSS/92FJA/AIA/01c

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
41	Cherry	4	140	0322	Fell	Dead Advisable for good arboricultural practice
45	Cherry Wild (Gean)	9	390	1.5/5/2/2	FInv (or apply to fell)	Leans to SE Decay in exposed roots Advisable for good arboricultural practice
46	Cherry Wild (Gean)	8	320e	0321	Monitor	Leans to SE Ivy smothered 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 maximum % (of outermost branch & twig length)
DWD - Remove deadwood.
Fell - Fell to ground level
FInv - Further investigation (generally with decay detection equipment)
Pol - Pollard or re-pollard
Mon - Monitor ongoing condition (annually by staff / owners & every 2-3 yrs by consultants.
Svr Ivy / Clr Bs - Sever ivy / clear base and re-inspect base / stem for concealed defects

Appendix 2. Recommended tree works to facilitate development

Landmark Trees Ltd
Tel: 0207 851 4544

Recommended Tree Works To Facilitate Development

Hide irrelevant | Show All Trees

Page

Site: 92 FitzJohn's Avenue, London NW3 6NP
Surveyor(s): James Bell
Date: 7th August 2012
Ref: TSS/92FJA/AMS/01a

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
3	Maple, Norway	17	650e	8644	CL 4m	Crown lift to facilitate access Recommended to permit development
10	Yew, Common	9	450	3	CL 4m	Crown lift to facilitate access Offsite Recommended to permit development
12	Sycamore	17	580	8686	CL4m	Crown lift to facilitate access Ground protection with allowance for piling Forks at 1.5m 4/5m clearance over garden Recommended to permit development
13	Holly	4.5	164	1.5	Fell	Twin stem SD=100 & 130 Part of landscape improvement scheme
14	Cherry Wild (Gean)	4.5	90	1.5/2.5/2.5/	Fell	Part of landscape improvement scheme
15	Rowan variety	4	60	1	Fell	Part of landscape improvement scheme
16	Amelanchier spp	4	60	1.5	Fell	Part of landscape improvement scheme
17	Ceanothus	3	114	2	Fell	Multi stem 3 SD=80,70 & 40. shrub Part of landscape improvement scheme
18	Loquat	2.5	60	1.5	Fell	Garden ornamental Part of landscape improvement scheme

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 maximum % (of outermost branch & twig length)
DWD - Remove deadwood
Fell - Fell to ground level.
FInv - Further investigation (generally with decay detection equipment).
Pol - Pollard or re-pollard
Mon - Monitor ongoing condition (annually by staff / owners & every 2-3 yrs by consultant)
Svr Ivy / Clr Bs - Sever ivy / clear base and re-inspect base / stem for concealed defects

Appendix 2. Recommended tree works to facilitate development

Landmark Trees Ltd
Tel. 0207 851 4544

Recommended Tree Works To Facilitate Development

Page

Site: 92 FitzJohn's Avenue, London NW3 6NP — Surveyor(s): James Bell

Date: 7th August 2012 — Ref: TSS/92FJA/AMS/01a

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
19/20	Privet	4	175	1.5	Fell	Multi stem - 5 SD av = 60 shaped Part of landscape improvement scheme
21	Cotoneaster	3	70	1	Fell	Part of landscape improvement scheme
22	Magnolia (M. grandiflora)	3	80	1	Fell	Part of landscape improvement scheme
23	Olive	3	180	1.5	Fell	Shaped Part of landscape improvement scheme
26	Cherry, Autumn Flowering	4	60	2.5	Fell	Gapen g Recommended to permit development
31	Willow, Sallow	6	110	1323	CB1 -2	Cut back 1-2 metres to facilitate access Recommended to permit development
35	Cypress, Lawson variety	8	300	2.5	Fell	Garden ornamental Recommended to permit development
36	Cypress, Lawson variety	7	240	2.5	Fell	Garden ornamental Recommended to permit development
37	Sycamore	15	480	3546	CL5m	Ground protection with allowance for piling CL for working clearances/Reduction in shading Recommended to permit development
40	Elder	7	241	2422	Fell	A sparser base formal canopy Recommended to permit development
42	Cedar (C. deodara)	4.5	100	1.5	Fell	Recommended to permit development

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 maximum % (of outermost branch & twig length)
DWD - Remove deadwood
Fell - Fell to ground level
Finv - Further investigation (generally with decay detection equipment)
Pol - Pollard or re-pollard.
Mon - Monitor ongoing condition (annually by staff / owners & every 2-3 yrs by consultant)
Svr Ivy / Clr Bs - Sever Ivy / clear base and re-inspect base / stem for concealed defects

Landmark Trees Ltd
Tel. 0207 851 4544

Recommended Tree Works To Facilitate Development

Page

Site: 92 FitzJohn's Avenue, London NW3 6NP — Surveyor(s): James Bell

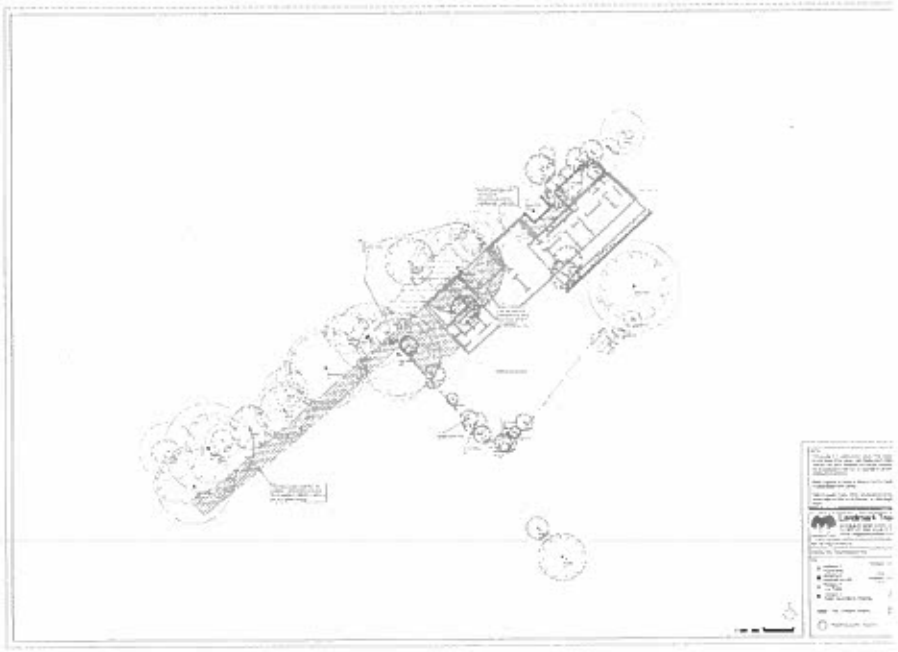
Date: 7th August 2012 — Ref: TSS/92FJA/AMS/01a

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
43	Elder	4	200	2	Fell	Ivy smothered Recommended to permit development
44	Cherry Wild (Green)	4.5	220	2322	Fell	Ivy smothered Bacterial canker Recommended to permit development

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 maximum % (of outermost branch & twig length)
DWD - Remove deadwood
Fell - Fell to ground level
Finv - Further investigation (generally with decay detection equipment).
Pol - Pollard or re-pollard
Mon - Monitor ongoing condition (annually by staff / owners & every 2-3 yrs by consultant)
Svr Ivy / Clr Bs - Sever Ivy / clear base and re-inspect base / stem for concealed defects

Appendix 4. Tree constraints plan

Appendix 5. Arboricultural impact assessment plan



Arboricultural Method Statement

Landmark Trees

ARBORICULTURAL METHOD STATEMENT

92 Fitzjohn's Avenue
London
NW3 6NP

REPORT PREPARED FOR

Ms Rachel Lord and Mr John Weston
92 Fitzjohn's Avenue
London
NW3 6NP

REPORT PREPARED BY:

Adam Hollis
MSc ARB MICFor FArbor A MRICS C Env

Ref: TBS/92F/AMS/01a
Date: 22nd February 2013

Web: www.landmarktrees.co.uk
e-mail: info@landmarktrees.co.uk
Tel: 0207 851 4544

CONTENTS

Tree survey & arboricultural assessment

1.3.3 The impacts on retained, moderate quality trees comprise building/path/fencing encroachments of the theoretical RPA's of T29, T30 and T37's by 27%, 19.5% and 15% area respectively. Further resurfacing encroachments from the driveway/parking are assumed within T12 RPA's by 19.5%.

1.3.4 In terms of mitigation, the LGF foundations will be sheet piled adjacent to T37 (the only tree impacted at this level) to avoid further battering through the RPA / closer to the tree. These piling encroachments will be pre-excavated and root-pruned by hand to 750mm depth under arboricultural supervision. The GF encroachments will employ low-invasive designs with cantilevered foundations for the [illegible] within T29's RPA and the [illegible] within T37's RPA. Remaining GF encroachments will use discontinuous pads with shallow beams at flexible locations determined by trial excavations. The potential canopy impacts to 29 & 37 from above ground construction [illegible] will be reduced by design with sloping roof designs away from the branches, though minor crown lifts of <20% (c. 2.5m) are still recommended. The impact of the proposed fencing will be mitigated by using a low-invasive foundation design. The impact of the driveway/path on T12 will be mitigated by using porous paving / no-dig construction techniques. Careful demolition of existing structures (buildings and surfaces) and replacement with soft landscape or less invasive design will also reduce net impacts. Further cultural improvements to rooting conditions can be made in the protected zones during the landscape phase.

1.4 Sequence of Works

1.4.1 The sequence of works will be as follows:

- initial tree works – felling, stump grinding and pruning for working clearances
- installation of Tree Protection Barrier (TPB) & ground protection
- demolition of existing building & landscaping
- installation of supplementary ground protection
- installation of underground services
- main construction
- removal of TPB
- soft landscaping

These works and their arboricultural implications are outlined in sequence below.

1.5 Site Supervision

1) Site supervision – an individual e.g. the Site Agent, must be nominated to be responsible for all arboricultural matters on site. An agent must be nominated for each phase of work if demolition and construction contracts are to be awarded separately. The agent(s) must:

- be present on site for the majority of the time
- be aware of the arboricultural responsibilities – to this end, a site briefing / meeting between the agent and arboricultural consultant must be held before the commencement of each phase of works
- have the authority to stop any work that is causing, or has the potential to cause harm to any tree
- be responsible for ensuring that all site operatives are aware of their responsibilities toward trees on site and the consequences of the failure to observe these responsibilities
- Make immediate contact with the local authority and/or a retained arboriculturalist in the event of any tree related problems occurring, whether actual or potential
- Contact details for Landmark Trees are provided on the cover to this report
- Contact details for the Local Authority Tree Officer are as follows:

  Alex Hutson
  Tree and Landscape Officer
  London Borough of Camden Council
  5th Floor Town Hall Extension
  Argyle Street
  London WC1H 8ND

  E-mail: alex.hutson@camden.gov.uk

  Telephone: 020 7974 5979

1.6 Site Monitoring

1.6.1 Landmark Trees are to be retained as Arboricultural Consultants responsible for site monitoring for the duration of the development. Key personnel are in the main Adam Hollis MSc (Arb) and occasionally James Bell Tech Cert, subject to any new staff intake. Site monitoring will be undertaken by a qualified and experienced arboriculturalist at pre-determined and agreed time intervals.

1.6.2 The arboriculturalist will arrive at the site, check in at the site office and be either escorted around the site by the site agent, checking the maintenance of tree protection measures. Access visits will generally be unannounced. However, the arboriculturalist will also visit subject to advance notification and agreement to supervise any agreed works within the RPA.

1.6.3 General site monitoring will take the form of regular inspections (of e.g. protection measures), ongoing liaison with all personnel involved in the site development and with the LA. Any defects

requiring rectifying must be notified to the Site Agent and the Client and copied to the LA by email. Emergencies will be notified to the LA by phone. Appropriate records will be kept and be made available to the LA if required to show evidence of site monitoring (Appendix 3).

1.6.4 Task specific site supervision will require the arboriculturalist to be present during the key operations to ensure detailed tasks are carried out as per the approved methodology and during any other unplanned incursions into the protection areas (subject to LPA agreement) for whatever reasons. This supervision will require the arboriculturalist to be present during the task to ensure the arboricultural objectives are met. However, where the tasks are ongoing, provided the arboriculturalist is satisfied, and after an appropriate briefing, the supervision may be reduced to telephone and email contact between the site foreman/contractor and arboriculturalist. Site supervision should include the landscape works (reconstruction of boundary wall, resurfacing and construction of cycle store within the RPA).

1.6.5 The recommended frequency of visits is fortnightly for the first three months and monthly thereafter. In addition, a site logbook will be kept by the Site Agent to record all stages of the development from the installation of the fence protection to daily checks of the fencing through to the completion of the project. This should be made available to the LA if required to show evidence of site monitoring. Site monitoring should include:

- Pre Development Site Inspection (S.2.3)
- Construction Site Agent Briefing (S.1.5)
- Installation of site facilities (S.2.3)
- Demolition of hard surfaces / structures within RPA's (3.5)
- Construction of new of hard surfaces / structures within RPA's (3.7)
- Site completion meeting (3.5)

1.6.6 The LPA's Arboricultural Officer will have free access to the site and report on any problems arising directly to the developer's Project Arboriculturalist, who will then visit the site and make recommendations to the developer on how best to rectify the situation and ensure implementation. A final sign-off visit will be carried out at the end of the development and a formal letter sent to both the client and LPA indicating an end to the monitoring period.

1.6.7 N.B. Landmark Trees will only be responsible for providing monitoring in so far as they are instructed to do so and regularly paid for such services by the client. In the absence of before payment (as per our business terms), routine monitoring will cease (temporarily or permanently) and the LPA will be informed of the cessation of monitoring. The client will also reserve the right to dismiss Landmark Trees and replace with another arborist, but must inform the LPA.

1.7 Statement Adoption

1.7.1 It is recommended that, in due course, acceptance of the recommendations in this re[port be] demonstrated by: for example, the architect specifying in writing to the building contractor th[at these] conditions apply in execution of the contract; and by an adequate [illegible] written undertaking [from] the contractor to the architect demonstrating that the practical methods of observation o[f these] recommendations have been proposed. If conflicts between any part of a tree and the bui[lding] arise in the course of development these can often be resolved quickly and at little c[ost if a] qualified arboriculturalist is consulted promptly. Lack of such care is often apparent [in the] decline and death of such trees, can spoil design aims and can of course affect saleabi[lity] reflect poorly on the construction and design personnel involved. Trees that have be[nefited from] treatments of careful handling during construction add considerably to the appeal and value [of the] finished development.

Tree survey & arboricultural assessment

2.0 Pre-Development Site Preparation

2.1 Arboricultural Works

2.1.1 All works must be carried out by a competent arborist in accordance with BS 3998: 2010 and any other prevailing good professional practice.

2.1.2 Specific works recommended to facilitate development are the removal of trees/shrubs T1, [illegible] 23, 26, 35, 36, 40, 42, 43, 44. Crown lifting of T3, T10 and T12 is likely to be required to facilitate access, with T7 crown-lifted to provide sufficient working clearance. A low quality willow T31 which overhangs the site by 1.2m would also need to be cut back to the boundary to facilitate construction. These specific works to facilitate development and any other husbandry works are listed in Appendix 1.

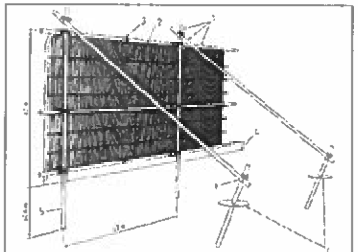
2.2 Installation of Tree Protection Barriers

2.2.1 A Tree Protection Barrier (TPB) comprising steel mesh panels of 2.4m in height ('Heras') should be erected to protect trees near buildings to be constructed on site. These panels will be mounted on a scaffolding frame as shown in Figure 1 below (this is also Figure 2 of BS5837 'Trees in Relation to Design, Demolition and Construction' in paragraph 6.2.2.2).

2.2.2 The TPB is to be erected before any work commences on site, is to remain in situ undamaged for the duration of all work on each phase, and only to be removed once all work is completed. If any work is required [illegible] prior to the erection of fencing a Landmark Trees representative should be informed to enable their presence to oversee the work being carried out.

2.2.3 The only other exception is the completion of soft landscaping but if any excavations, however minor, are to be carried out as part of soft landscaping within RPAs, an arboricultural assessment must be carried out beforehand and any arboricultural protection measures incorporated. The TPB should only be removed [illegible] during access within the RPA.

2.2.4 The Tree Protection Plan in Appendix 5 illustrates where the protective fencing will be located to form the boundary of the Tree Protection Zone (TPZ). The TPZ is an exclusion zone and suitable steps will be taken to prevent access by pedestrians and vehicles and the storage of any works materials and equipment will be located outside of the TPZ.



Key
1 Standard scaffold poles
2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels
3 Panels secured to uprights and cross-members with wire ties
4 Ground level
5 Uprights driven into the ground until secure (minimum depth 0.6 m)
6 Standard scaffold clamps

Fig 1 Tree Protection Barrier Specification (Source: Figure 2 from BS5837 - Default specification for protective barrier)

2.3 Pre-Development Site Inspection

2.3.1 Upon completion of the tree works the LT representative will meet the relevant local authority member on site to check the standards of the work. If there are any amendments to either the tree works or additional protection measures, they will be agreed at this meeting and confirmed in writing.

3.0 Development Phase

3.1 The following general precautions will apply:

- No fires shall be made on any part of the site or within 20m of any tree to be retained.
- No spilling of pouring of fuels, oils, solvents, etc. shall be made on any part of the site.
- No chemicals that are likely to have an adverse effect on tree health such as oil, bitumen or cement will be stored or discharged within 10 metres of the trunk of a tree that is to be retained.
- No spillage or discharge of wet mortar or concrete shall be made on any part of the site.
- No storage of materials shall be made within the protective fences.
- No breaching or moving of the protective fences without the approval of an arboriculturist.
- Alterations in levels within the tree protection fence areas shall be avoided.

3.2 Root Protection Areas (RPA)

3.2.1 The Root Protection Area (RPA) is a desirable zone of protection around the trees' rooting system and these have been marked on the plan in Appendix 5. As much as possible, the RPA's will be within the TPZ and therefore be fully fenced off. However, this degree of protection is not entirely possible on the site. It is necessary to perform some works (in part) within the RPA i.e. demolition of existing building and hard landscaping, installation of services and construction of new building (including discontinuous piling), and the access.

3.2.2 All involved parties will need to be made aware of the deficiencies. In these instances, careful and supervised working, as described in sections 3.3.4 (routing of services) and 3.3.8 (demolition of surfaces) and 3.3.7 (crush action) will be required.

3.2.3 Ground outside the TPZ must be protected from site traffic and not left exposed during construction. As far as practical, existing hard surfaces should be retained as initial ground protection (where fit for purpose for anticipated loading) until the landscaping phase and / or substituted / supplemented with appropriate materials (e.g. Cellweb, Ground Guards etc.), capable of withstanding anticipated loads. Existing surface will not be adequate ground protection for heavy plant use. To this end, a concrete overlay and intensive ground protection will be supplemented where necessary (see TPP in Appendix 5). Crossovers for HGV's should have 150mm concrete slabs temporarily installed to protect services and tree roots.

3.3 Site Access, Accommodation & Storage

3.3.1 Site access and accommodation will be as per the layout within our Tree Protection Plan (Appendix 5), making use of the existing access road with supplemented ground protection where necessary. Site accommodation and storage will be located in the garden area, away from the TPZ's.

3.3.2 Pedestrian access will run parallel but separate to vehicular access.

3.3.3 Delivery lorries will be excluded from RPA's by tree protection fencing and ground protection. Adequate allowance has been made for vehicle heights and ground clearance, with proposed crown lifts where tree canopies overhang access routes (T3, T10 and T12). Construction clearance will be provided by lightly cutting back T31 and crown lifting T37 (as per Appendix 1). Any further pruning for working clearances must be discussed first with the arboriculturalist. Materials can be unloaded on protected ground within RPA's, then stored in the designated area and throughout the interior of the site away from protected trees.

3.3.4 Many site activities are potentially damaging to trees e.g. materials storage, parking, soil compaction and the use of plant machinery. In this latter example particular care is required to ensure that the operational arcs of excavation and lifting machinery, including their loads, do not physically contact trees in situ.

3.4 Routing & Installation of Services

3.4.1 Final service routes and provision are to be determined. In general, where any underground services routes should enter an RPA, then the provisions of BS5837 and NJUG VOLUME 4 will be employed (e.g. radial trenching and/or hand trenching) under arboricultural supervision.

3.5 Changes in Grade

3.5.1 The upper layer of top soil contains the majority of a tree's roots and if this is disturbed by reduction in ground level, serious damage can be caused. If such soil is to be disturbed within the TPZ / RPA, it will be done only with hand tools and the supervising arborist will be informed if roots are exposed.

3.5.2 If the ground level requires raising, this will be achieved using coarse granular material such as pebbles.

3.5.3 If ground levels need to be marginally altered within the RPA of any tree, prior agreement must be sought and given by either a local authority tree officer or a LT Consultant.

3.6 Demolition Measures

3.6.1 Access facilitation pruning will be undertaken to prevent injurious contact between demolition plant and the tree(s). Any such pruning will be undertaken in accordance with British Standard 3998 Recommendations for tree works (See Section 2.1 / Appendix 1).

3.6.2 Demolition of structures within what would otherwise be an RPA will proceed with due caution to avoid unnecessary damage to roots. Such measures apply in particular to T29, 30, 34 and 37.

3.6.3 All plant and vehicles engaged in demolition works (removers only) will either operate outside the RPA, or work from within the existing built structure and hard standing, near trees. Where trees stand adjacent to structures scheduled for demolition, it will be necessary to undertake demolition inwards within the footprint of the existing building (often referred to as 'top down, pull back').

Tree survey & arboricultural assessment

3.6.4 Specifically, the demolition of the main structure will be carried out by using a 360 excavator fitted with a grab/pulverisor and, where necessary, a hydraulic impact hammer.

3.6.5 The roof timbers will be lifted from the house using the grab/s and lowered to the ground where they will be further processed, prior to being loaded into roll on/off containers and removed from site to a suitable tip/ facility.

3.6.6 Having completed the removal of all overhead the main structure to first floor level, the remainder of the house will be demolished using a 360 excavator. The walls will be pulled over in small increments and allowed to free fall in to the confines of the building, where they will be gathered into a stockpile to await loading away from site to a suitable landfill facility.

3.6.7 Having taken the structure down and removed it to the ground floor slab, hydraulic rotations will be brought in (if a 360 excavator equipped with, if necessary, the hydraulic impact hammer, but, if the concrete is not too difficult to break, it will be done with the excavator bucket), the current action being performed the concrete will be broken into manageable size pieces. Where the foundations are shallow trees the trees will be carved out in small sections and the wood taken away and compacted prior to the next section being broken out.

3.6.8 Throughout all mechanical operations a banksman will be present at all times. Dust generated by the works will be suppressed using water sprays.

3.6.9 If the weather is 'dry' the site will be watered down to reduce dust travelling to adjacent properties, where levels of dust build-up are seen good. It may be necessary to lock the above at Lambeth Trees on remedial measures e.g. hose down the event, immediately following any significant accumulation of dust.

3.6.10 All waste is to be stored internally and taken away by skip.

3.6.11 Heavy plant used to remove engrained materials and grade the surface will be the lightest in the specification. This will be achieved by using machinery much less than of the existing grade level and working systematically away from adjacent trees. The aim is to ensure that spoil is removed away from RPAs but it is very important that their original soil levels are only lowered under consultant supervision as roots will be close to the surface and can be easily damaged.

3.6.12 The hard standing within the tree's RPA's will be first broken up with manual power tools and then carefully removed with plant by a skilled machine operator. Soil beneath the structure will not be stripped away but protected in situ and protected with replacement ground protection (as per para 3.2.11) for post-development treatment (as per para 3.8.1).

3.6.13 Where replacement or supplementary ground protection is required following the removal of hard standing, it will be installed prior to the commencement of operations.

3.7 Construction Methods

Detailed method statements and risk assessments will be obtained from all specialist contractors involved in the new build and these will be scrutinised by the site agent to ensure the RAPS requirements have been considered therein.

3.7.1 The building contractors will require the use of specialised foundation techniques, the CFA foundations will be sheet piled through the RPA of T37 before the retained canopy. Piling should not breach the ground retained previously by the tree canopy (post tree surgery), where a piling rig will be required. The trials of the CFA piles/cages into the RPA will be pre-excavated and root pruned by hand to 75mm depth under arboricultural supervision.

3.7.2 Roots greater than 25mm diameter may be cut cleanly with a sharp saw or secateurs back to a junction. Roots larger than 25mm diameter may only be cut in consultation with an arboricultural.

3.7.3 JCB to excavate to required depth. All spoil to be loaded into trucks outside the RPA's until ground protection is removed and reinforced. Construction materials will generally be delivered as normal with restrictions on load and unloaded outside RPA's.

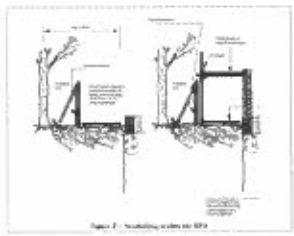
3.7.4 Concrete will be delivered to site pre-mixed in SPT lorries and distributed by a static concrete pump located outside RPA's where possible.

3.7.5 The CF foundations will be similarly pre-excavated within the RPA. Feasibility of trial pile borehole and beam depth has been built into the foundation design.

3.7.6 The ground protection at T29's RPA will also allow excavation of the pile and shallow beam's under arboricultural supervision. The purpose of T29's ground protection is both to designate a precautionary area and to protect ground that is not affected by these excavation works. The piling mat for T29's RPA encroachment will be extended over the ground protection not excavated.

3.7.7 During the construction phase and throughout dry periods on the capital, heavy dust will be damped down to control dust pollution. In the event of dust build up on trees during a borehead advice will be sought and if necessary removed measures such as hosing down the trees will be taken.

3.7.8 Where scaffolding needs to be installed within the RPA the following ground protection should be followed / adapted to site needs.



3.7.13 The following is a sample specification for cavity wall construction in Area B12

a. The Construction should ideally be undertaken between May and October as it is preferably dry to prevent contractor rutting. The purchaser should ensure that no toxic or harmful materials should be used to bring up to surrounding levels.

b. Install 6 No Geotextile Separation Fabric over levelled ground surface.

c. The geotextile should be laid out and not installed as you go along.

d. The Cell (Plastic cellular confinement system (e.g. 1 x 100 mm 'Cellweb' Tree Protection System or equivalent as used on site) and Pegs for protection are only on the exterior and side adjacent panels are stapled together. Place staking material. Cellweb cells open. The panels should be laid out and worked in such as the contractor progresses across the length of the area. The panels are laid flat with the no fines aggregate each serving as a platform for the next section.

e. There is no need at any time for the ground to be crossed by heavy traffic as panels are transported from the delivery bay over the top of the confinement system BY WHEELBARROW and installed BY HAND. There will be no access onto the RPA beyond the installation of the confinement system itself.

f. Panels are backfilled with no finer 20-40mm single size stone (clean granular material) and then be rolled to compact the panels and create a tight interlock and bond.

g. The finished surface can then be laid on top. Again no fines material to be used. Stone dry set block paving or porous tarmac is preferable for a gravel finish (e.g. Breedon Golden Gravel). Install a non woven filter fabric separation layer over Cellweb as a minimum of 50 mm of decorative gravel surfacing retained with plastic Duotrac edging as necessary.

h. Install hard surface edging (kerbs as detailed here to other pages as appropriate).

3.7.14 See cross-sectional diagram, Figure A1 below for further explanation. For technical data on the Cellweb membrane and the Cellweb cellular confinement system, always refer to the manufacturers guidance and implementation. Further technical advice can be gained from the manufacturer:

Cellweb and Duotrac in a trade name of Geosynthetics Ltd

Fleming Road
Leominster Industrial Estate
Herefordshire
HR6 0PH
Tel 01568 611733
www.geosynthetics.co.uk

Tree survey & arboricultural assessment

3.8 Removal of Ground Protection & Post Construction Landscaping & Treatment

3.8.1 The tree protection may be removed upon completion of the construction phase and when all drainage and service runs have been installed and any site machinery has been removed from the RPA.

3.8.2 Following the development phase, impacted trees within the site boundary, identified for such treatment, will receive remedial and remediation treatment: deep root [illegible] injection and surface mulching.

3.8.3 Any further landscaping works should avoid the changing of ground levels or deep digging. Mechanised cultivation such as tractor-mounted rotovators must not be used within the RPAs of existing trees.

3.8.3 Heavy machinery should not be used in the vicinity of any retained trees.

3.8.4 If herbicides are to be used they should be appropriate to their purpose and not in such a way as to damage any retained trees or vegetation.

3.8.5 Ideally, retained trees should be within a shrub area as this reduces the chances of compaction and disturbance of root systems.

3.8.6 Any new planting schemes adopted should consider aspects of the site such as current design, layout and future use. Consideration should also be given to the soil type, climate and overall character of the landscape.

4.0 Summary of Proposed Methods

4.1 Table of Impacts and Mitigation

4.1.1 The table below summarises the main areas where trees could become damaged by the proposed development and the methods that need to be adopted in order to prevent such damage.

Impact	Mitigation	Reference	Trees Affected
General site access, material storage etc	Ground protection to acceptable standards	Paras 2.2.1 & 2.3.3 Tree Protection Plan in Appendix 6	All retained trees
Demolition & construction within existing canopy	Tree surgery	Section 2.1	T2, T6, T12, 31 & 32
Demolition of existing build within RPA	Pull down / back technique within RPA	Section 3.6	T29, 30, 34 and 37
Damage to roots caused by building / retaining wall foundation excavation within RPA	CF pile and beam and CF pile and raft specification for building	Section 3.7 & 6	T29, 30 and 37

5.0 Completion

5.1 Completion Meeting

5.1.1 Following completion of the works listed above, a Landmark Trees consultant will meet with a local authority representative and agree upon any remedial works deemed necessary.

5.1.2 A separate LT post-development tree inspection (with specific reference to trees identified in the Appendix 1 schedules) is recommended to facilitate a constructive meeting and to monitor the health of some of the more 'sensitive' trees on site.

5.1.3 Any works agreed at the above meeting will be confirmed in writing and will be performed to BS 3998: 2010 Tree Works.

5.1.4 Landmark Trees recommend that any work proposed post development is checked to avoid penalty for performing illegal work on a protected tree.

5.1.5 If conflicts between any part of a tree and the building(s) arise in the course of development these can often be resolved quickly and at little cost if a qualified arboriculturist is consulted promptly. Lack of such care is often apparent quickly and decline and death of such trees can spoil design aims and will of course affect saleability and reflect poorly on the construction and design personnel involved. Trees that have been the recipients of careful handling during construction add considerably to the appeal and value of the finished development.

Signed

Adam Hollis MSc ARB MICFor FArbor A

22nd February 2013

For and on behalf of Landmark Trees

Web: www.landmarktrees.co.uk
e-mail: info@landmarktrees.co.uk
Tel: 0207 851 4544

Appendix 1. Arboricultural Works

landmark Trees Ltd
Tel: 0207 851 4544

Recommended Tree Works To Facilitate Development

Page

Site: 92 FitzJohn's Avenue, London NW3 6NP

Surveyor(s): James Bell

Date: 7th August 2012

Ref: TSS/92FJA/AMS/01a

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
3	Maple, Norway	17	850e	6884	CL4m	Crown lift to facilitate access Recommended to permit development
10	Yew, Common	9	480	5	CL4m	Crown lift to facilitate access Offsite Recommended to permit development
12	Sycamore	17	590	6868	CL4m	Crown lift to facilitate access Ground protection with allowance for piling Forks at 1.5m 4/5m clearance over garden Recommended to permit development
13	Holly	4.5	164	1.5	Fell	Twin stem SD=100 & 130 Part of landscape improvement scheme
14	Cherry, Wild (Gean)	4.5	90	1.5/2 5/2.5/	Fell	Part of landscape improvement scheme
15	Rowan variety	4	80	1	Fell	Part of landscape improvement scheme
16	Amelanchier spp	4	60	1.5	Fell	Part of landscape improvement scheme
17	Ceanothus	3	114	2	Fell	Multi stem 3 SD=60,70 & 40, shrub Part of landscape improvement scheme
18	Loquat	2.5	60	1.5	Fell	Garden ornamental Part of landscape improvement scheme

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 maximum % (of outermost branch & twig length)
DWD - Remove deadwood.
Fell - Fell to ground level.
FInv - Further Investigation (generally with decay detection equipment)
Pol - Pollard or re-pollard.
Mon - Monitor ongoing condition (annually by staff / owners & every 2-3 yrs by consultant).
Svr Ivy / Clr Bs - Sever ivy / clear base and re-inspect base / stem for concealed defects

landmark Trees Ltd
Tel: 0207 851 4544

Recommended Tree Works To Facilitate Development

Page

Site: 92 FitzJohn's Avenue, London NW3 6NP

Surveyor(s): James Bell

Date: 7th August 2012

Ref: TSS/92FJA/AMS/01a

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
19/20	Privet	4	179	1.5	Fell	Multi stem - 5 SD av = 80, shaped Part of landscape improvement scheme
21	Cotoneaster	3	70	1	Fell	Part of landscape improvement scheme
22	Magnolia (M. grandiflora)	3	80	1	Fell	Part of landscape improvement scheme
23	Olive	3	160	1.5	Fell	Shaped Part of landscape improvement scheme
28	Cherry, Autumn Flowering	4	60	2.5	Fell	Sapling Recommended to permit development
31	Willow, Sallow	6	113	1323	CB1-2	Cut back 1-2 metres to facilitate access Recommended to permit development
35	Cypress, Lawson variety	6	300	2.5	Fell	Garden ornamental Recommended to permit development
36	Cypress, Lawson variety	7	240	2.5	Fell	Garden ornamental Recommended to permit development
37	Sycamore	15	463	5648	CL5m	Ground protection with allowance for piling CL for working clearance/reduction in shading Recommended to permit development
40	Elder	7	241	2422	Fell	A sparser than normal canopy Recommended to permit development
42	Cedar (C. deodara)	4.5	100	1.5	Fell	Recommended to permit development

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 maximum % (of outermost branch & twig length)
DWD - Remove deadwood
Fell - Fell to ground level
FInv - Further Investigation (generally with decay detection equipment)
Pol - Pollard or re-pollard.
Mon - Monitor ongoing condition (annually by staff / owners & every 2-3 yrs by consultant).
Svr Ivy / Clr Bs - Sever ivy / clear base and re-inspect base / stem for concealed defects

Appendix 1. Arboricultural Works

Landmark Trees Ltd
Tel: 0207 851 4544

Recommended Tree Works To Facilitate Development

Hide Irrelevant | Show All Trees

Page

Site: 92 FitzJohn's Avenue, London NW3 6NP
Surveyor(s): James Bell
Date: 7th August 2012
Ref: TSS/92FJA/AMS/01a

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
43	Elder	4	200	2	Fell	Ivy smothered Recommended to permit development
44	Cherry Wild (Gean)	4.5	220	2322	Fell	Ivy smothered Bacterial canker Recommended to permit development

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 maximum % (of outermost branch & twig length)
DWD - Remove deadwood
Fell - Fell to ground level.
FInv - Further investigation (generally with decay detection equipment).
Pol - Pollard or re-pollard
Mon - Monitor ongoing condition (annually by staff / owners & every 2-3 yrs by consultant).
Sv Ivy / Clr Bs - Sever ivy / clear base and re-inspect base / stem for concealed defects

Appendix 2: General Guidelines

3.1 All work must be to BS 3998:2010 - *Recommendations for tree work*.

3.2 Staff carrying out the work must be qualified, experienced and ideally be Arboricultural Association approved contractors, and will be covered by adequate public liability insurance.

3.3 Any defects seen by a contractor or the client that were not apparent to the consultant must be brought to the consultant's attention immediately.

3.4 No liability can be accepted by the consultant in respect of the trees unless the recommendations of this method statement are carried out under the supervision of a Landmark Trees consultant.

3.5 It is advisable to have trees inspected by a Landmark Trees consultant regularly. On this site it is recommended that these inspections are made every year

Appendix 4. Indicative pruning guidelines

Landmark Trees

Site Monitoring Report Sheet

Client:		**Planning Ref:**	
Local Authority:		**Date:**	
Site Address:			
Proposal:			

Visit Checklist	**Y/N**		**Y/N**
Tree protection barrier (TPB) in place		TPB as per approved	
Ground protection (GP) in place		GP as per approved	
TPB / GP breached		Trees damaged	
Site Agent briefed by LT			
LT briefed by Site Agent			
LPA informed			
Remedial action required			

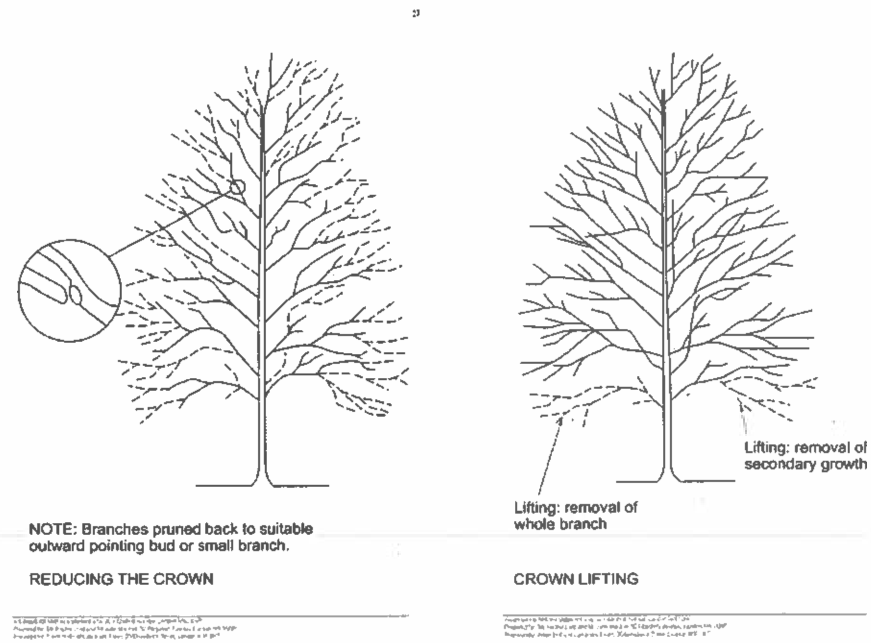
Comments:

Recommendations:

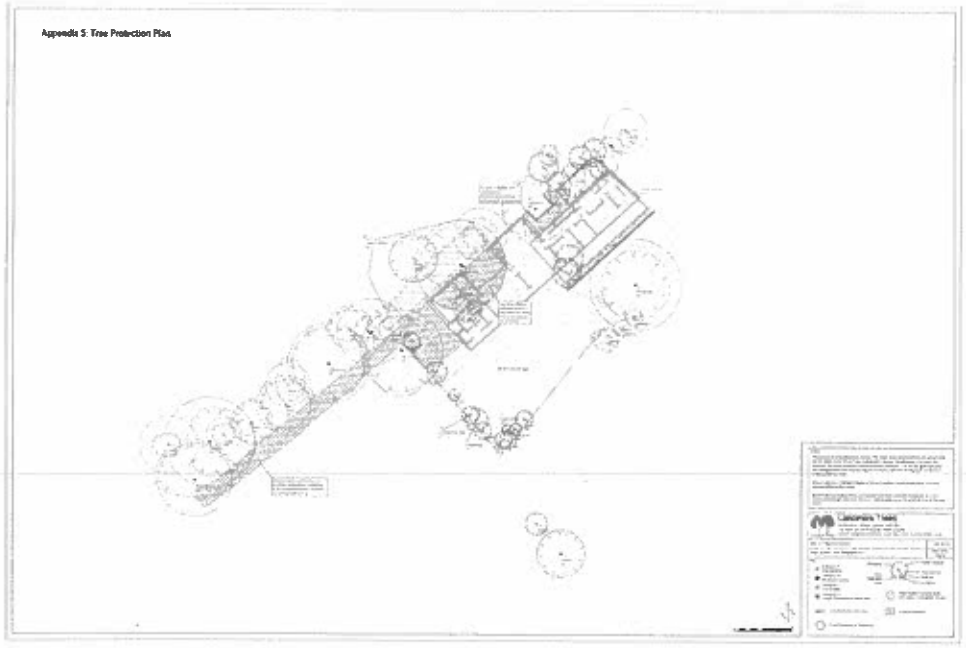
Outcome:

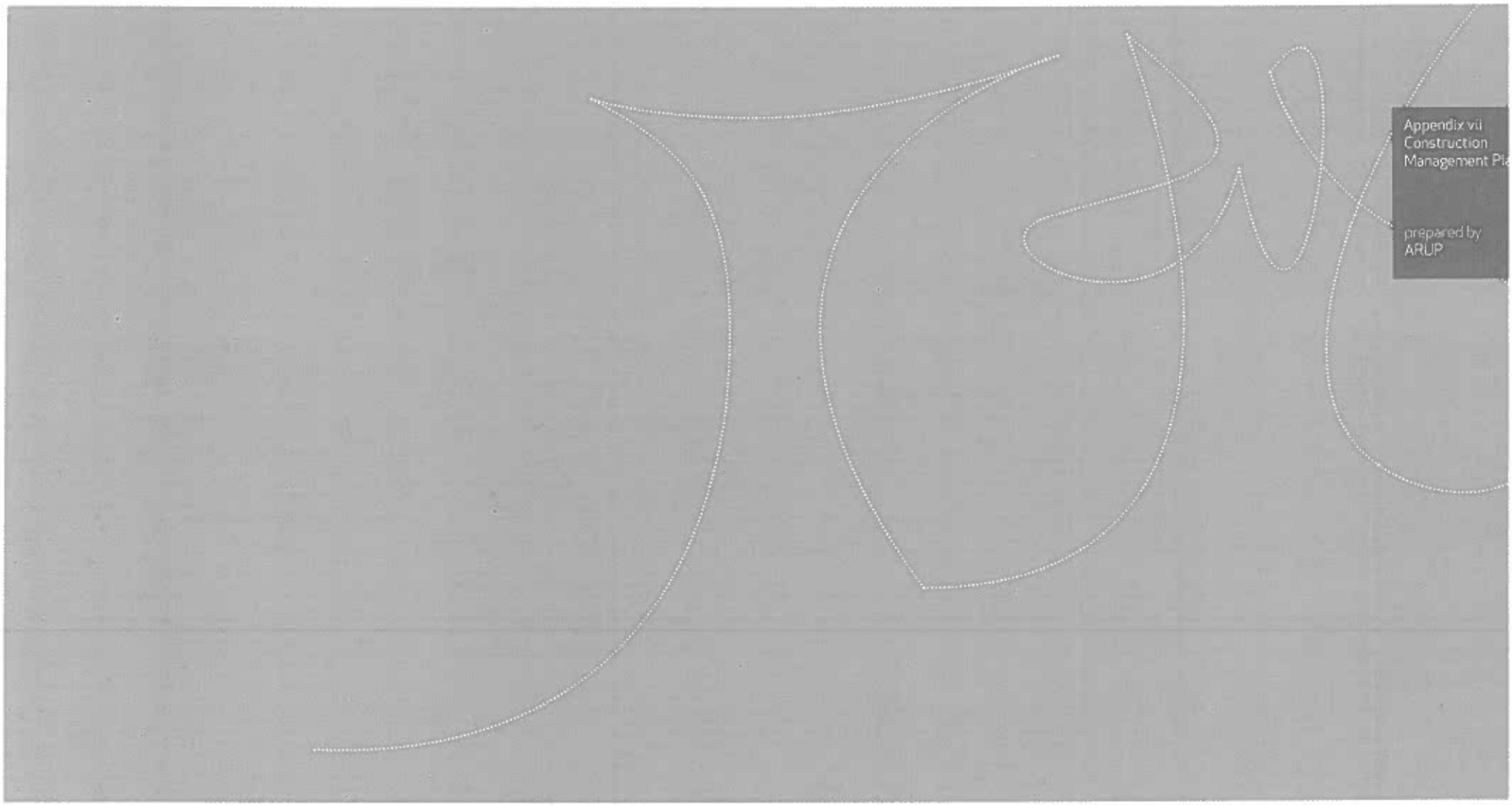
1		
2		
3		
4		

Web: www.landmarktrees.co.uk
e-mail: info@landmarktrees.co.uk
Tel: 0207 851 4544



Appendix 5. Tree protection plan





Appendix vii
Construction
Management Pla

prepared by
ARUP

Construction Management Plan

Make Architects

92 Fitzjohn's Avenue

Construction Management Plan

Report Ref 225590-REP-CMP-001

26th February 2013

Job number 225590-00

Ove Arup & Partners Ltd
13 Fitzroy Street
London
W1T 4BQ
United Kingdom
www.arup.com

ARUP

Document Verification

ARUP

Job title		92 Fitzjohn's Avenue		Job number 225590-00	
Document title		Construction Management Plan		File reference	
Document ref		Report Ref 225590-REP-CMP-001			
Revision	Date	Filename	Document1		
Draft 1	20 Sep 2012	Description	First draft		
			Prepared by	Checked by	Approved by
		Name	Paul Baldwin	Tom Honeywill	
		Signature			
Draft 2	11 Jan 2013	Filename	92 Fitzjohns Ave draft CMP[rev01]		
		Description	CMP revised following redesign		
			Prepared by	Checked by	Approved by
		Name	Paul Baldwin	Tom Honeywill	
		Signature			
Rev 2	23 Jan 2013	Filename	92 Fitzjohns Ave draft CMP[rev02]		
		Description	CMP revised following comments		
			Prepared by	Checked by	Approved by
		Name	Paul Baldwin	Tom Honeywill	
		Signature			
Rev 3	26 Feb 2013	Filename	92 Fitzjohns Ave CMP[rev03]		
		Description	CMP revised following change to layout and levels		
			Prepared by	Checked by	Approved by
		Name	Paul Baldwin	Tom Honeywill	
		Signature			

Issue Document Verification with Document ✓

Contents

Construction Management Plan

1 Introduction

The purpose of this document is to provide a Construction Management Plan (CMP) for the development at 92 Fitzjohn's Avenue, London NW3 6NP. It is intended this CMP will outline how, based on the current design, the construction phase of the development can be managed in order to mitigate the potential impacts of the works on both neighbours and surrounding road network. The CMP must be complied with unless otherwise agreed with the Council. The project manager overseeing the works shall work proactively with the Council and relevant parties to ensure, where possible, problems relating to construction do not arise. During the course of the works the project manager shall review and if necessary make amendments to this CMP to address any issues that may arise. Any future revised plan must be approved in writing by the Council and complied with thereafter.

London Borough of Camden require Construction Management Plans where developments are on constrained sites, in close proximity to schools or care homes when the construction process will take place over a number of months and where there is very narrow or restricted site access. All of the above conditions apply to the development at 92 Fitzjohn's Avenue which in broad terms includes the demolition of an existing building and construction of a new residential property with new landscaping.

This Construction Management Plan has been produced in accordance with Camden Planning Guidance CPG6: Amenity (in particular Section F), along with Camden's Core Strategy Policy CS5 '*Managing the impact of growth and development*' and in particular development policies DP20 and DP26 '*Movement of goods and materials*' and '*Managing the impact of development on occupiers and neighbours*' respectively.

The CMP is split into two elements. The first is focused on controlling environmental impacts, e.g. air quality, dust and other emissions. The second element is traffic control with a view to minimising traffic disruption and avoiding dangerous situations for pedestrians and other road users.

2 Controlling Environmental Impacts

2.1 Significant Scheme Environmental Aspects

Location
The development at 92 Fitzjohn's Avenue is within a site bounded to the north by Greenhill apartment block, to the east by the Royal School Hampstead, to the south by Fitzjohn's Primary School, to the southwest by St Anthony's Preparatory School and to the west by Henderson Court Age UK Camden Resource Centre (see figure 1).

It is noted the Royal School Hampstead has been renamed North Bridge House Senior School. For the purpose of continuity with drawings and other reports the original name will be used in this document.

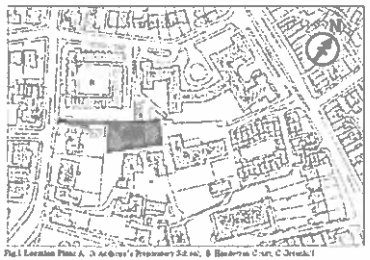


Fig 1 London Plane A. St Anthony's Preparatory School, B Henderson Court, C Greenhill apartment flats, D North Bridge House Senior School Hampstead, E Fitzjohn's Primary School

Access
The site is currently accessed by an existing private road from Fitzjohn's Avenue, close to its junction with Arkwright Road, and this will continue during the construction period.
There will also be the opportunity to access the site from the Royal School site via Vane Close. The extent of this access and details of the types of vehicles involved will be confirmed in the final CMP.

Demolition
The existing structure on the site comprises an L shaped two storey residential property and out houses. The development requires the removal of all structures along with hard and soft landscaping.

Perimeter Walls
To Henderson Court: The existing fence mounted on a low masonry wall will be retained and supported temporarily during construction of adjacent foundations.
To Greenhill: The existing masonry wall will be retained and supported temporarily during construction of adjacent structure.
To The Royal School: A new boundary will be created by construction of a reinforced concrete and masonry wall.
To Fitzjohn's Primary School: The current temporary retaining wall will be replaced with a new reinforced concrete and masonry wall incorporate bricks salvaged from the original wall following its collapse in Summer 2012 where necessary this supply of brick will be supported with salvaged bricks of a similar type (see Design and Access Statement for full details)
To St Anthony's School: The existing boundary will be replaced with a new masonry wall.

Excavation
The lower level ground floor accommodation will be formed by installing a perimeter wall founded on steel bored piles to two of its four sides. Generally the sides of the excavation will be which the retaining wall is constructed will be battered back although may also be supported by shoring as when close to retained trees
Superstructure
It is anticipated that, subject to final design, the above ground structures will comprise a steel frame with pre-cast concrete roof slab.

2.2 Significant Scheme Environmental Impacts

The aim of the contractor responsible for the works must be to minimise the environmental impact of the development on surrounding properties, neighbours and the local road network. To this end, and in addition to the measures outlined below, it is recommended they are part of the 'Considerate Constructors Scheme' and works within London Borough of Camden's 'Guide to Contractors Working in Camden'.

2.3 Significant Scheme Environmental Controls

This Construction Management Plan is intended to provide a framework upon which detail can be added, mainly due to there being aspects of the works that can only be confirmed by detailed design and appointment of main contractor and specialist sub-contractors who may employ specialist techniques/equipment).

Given there are details concerning the development that are to be considered, the control measures listed below should be seen as minimum requirements.

2.3.1 Hours of Operation

To be agreed with LBC but generally seen as being in line with industry standards, namely,

8.00am-6.00pm Monday to Friday, and
8.00am-1.00pm Saturday.

Exceptional operations (such as crane erection/ dismantle and delivery of key plant such as excavators) can take place outside of these hours and will be notified by the contractor's project manager. It is not expected that there will be any works on Sundays or Bank Holidays although it is noted that, as long as no planning conditions apply restricting normal working hours, Camden's Environmental Health Team would not object to the presence of workers on site outside these hours as long as they are only involved in quiet work (LBC Guide to Contractors Working in Camden part 4.1).

2.3.2 Demolition

Particular attention will be paid to minimising noise and dust. Noise will be limited, where possible, by dismantling rather than breaking (which also prevents salvaging materials such as roof tiles, timber and bricks). The use of hydraulic crushers rather than pneumatic breakers will also minimise noise along with instructing plant operators not to drop loads from height. Dumping down will be required during demolition of the existing structure to maximise dust.

2.3.3 Asbestos

There is the potential that asbestos will be present on the current property given its age and the fact it was extensively redeveloped in the post war period. Asbestos may be present in features such as chimney flues, central heating systems, floor ceiling tiles and some types of thermal plastics (this is not an exhaustive list). The property and out buildings will therefore require a full asbestos survey prior to demolition, carried out in accordance with the Control of Asbestos Regulations 2012. Any asbestos removal that is necessary must also be carried out in accordance with current Legislation.

2.3.4 Noise

The close proximity of the Henderson Court (Age UK Camden Resource Centre) means that noise will be a sensitive issue during the construction period. While the Council accepts that "*all construction and demolition work will cause at least some noise and disturbance*" (CPG6: Amenity, paragraph 8.21) the contractor is expected to use best practicable means and work within the requirements of British

Standard BS 5228, Parts 1, 2 and 4 to minimise noise. This will include, although not limited to, using well maintained plant, using noise baffles especially to plant such as generators.
The contractor is expected to work with the adjoining schools to establish controls that significantly reduce any nuisance arising from noise during exam periods. This particularly applies to the Royal School Hampstead.

2.3.5 Contaminated Land Management

The area occupied by the development plot was given over to farming prior to construction of the late current Victorian villa. Therefore significant contaminants are not expected on the site although this will need to be confirmed by investigation and or inspection of excavated material as the works proceed.

2.3.6 Dust

As well as during the demolition phase dust will need to be controlled during general construction and in particular during landscaping. Dust is best controlled by good housekeeping within the site and minimising the area of exposed soil, especially during dry, windy weather.

2.3.7 Smoke

There will not be any burning on the site as smoke is not considered to be an issue.

2.3.8 Odour Control

Bitumen is not considered to be an issue. A certain types of waterproofing membranes that may be used to seal the low level ground slab may give rise to a requirement for odour control but this will need to be assessed as the design is developed.

2.3.9 Stability of Adjacent Properties

Foundation and Lower Ground designs are to include provision for temporary supports to the boundary walls during construction of the permanent structure. The current property within the development site has a garage built against the wall to Greenhill to the north and an elevation against the boundary to Fitzjohn's Primary School to the south. The contractor is expected to carry out an assessment of these adjacent structures prior to demolition.

The southern Fitzjohn's School boundary is currently supported by a temporary retaining wall following the collapse of the original wall in summer 2012. This temporary structure will be replaced with a new retaining wall incorporating bricks salvaged from the original wall.

The constrained nature of the site means the contractor must ensure that any stockpiled material is not allowed to surcharge adjacent structures or boundary walls.

2.3.10 Vibration

It is not considered there will be any construction techniques employed that will result in excessive or prolonged vibration. The contractor will need to ensure vibration is kept to a minimum by avoiding dropping loads and ideally maintaining flat access ways for tracked vehicles the movement of which can set up vibration.

2.3.11 Protection of Listed Buildings

Fitzjohn's Primary School is a Grade 2 listed building and approximately 3m from the boundary to the new development. The contractor would be advised to undertake a photographic survey of this and all other adjacent structures prior to start of work.

2.3.12 Protection of Biodiversity and Trees

Refer to the arboricultural impact assessment report prepared by Mayes Landmark Trees

2.3.13 Air Quality and Climate Change Considerations

The contractor will employ best practise to control dust emissions (see 2.3.6 above)
The contractor will also employ best practise to control PM10 and NOx emissions from vehicles and plant. This will include measures such as ensuring diesel operatives have appropriate training, using well maintained plant switching off equipment when not in use, using mains electricity (with appropriate safety measures) for the site power supply rather than diesel generators.
These techniques will also assist in reducing CO_2 emissions from construction vehicles.

3 Programme

Appendices 1 and 2 contain indicative information relating to the key construction phases required by the development and an outline construction programme, showing works starting in April 2014 and completed September 2014 as contained in Appendix 1
I should be noted the final phasing and programme will be dependent on design, procurement and any constraints relating to start end dates. Furthermore, some aspects of the works may need to be gained to coincide with school holidays. For information the adjacent schools have passed the following regarding Easter and Summer holidays:-

Holiday	School	Start	Finish
Easter 2015	Royal School	22 Mar	06 Apr
	Fitzjohn's Primary	29 Mar	05 Apr
	St Anthony's School	27 Mar	21 Apr
Summer 2015	Royal School	11 Jul	4 Sept
	Fitzjohn's Primary	19 Jul	4 Sept
	St Anthony's School	10 Jul	5 Sep
Easter 2014	Royal School	2 Apr	24 Apr
	Fitzjohn's Primary	4 Apr	22 Apr
	St Anthony's School	28 Mar	24 Apr
Summer 2014	Royal School	10 Jul	
	Fitzjohn's Primary	23 Jul	
	St Anthony's School	11 Jul	

4 Controlling Highways Impacts

The development site is currently accessed from Fitzjohn's Avenue by a private road on the Hendersons Court side of St Anthony's School and this will continue to be the point of access for the new property. For a period during the construction there may be the opportunity for construction vehicles to access the site via Vane Close and the Royal School to the east.

4.1 Access to the Development Site and Construction Vehicle Routing

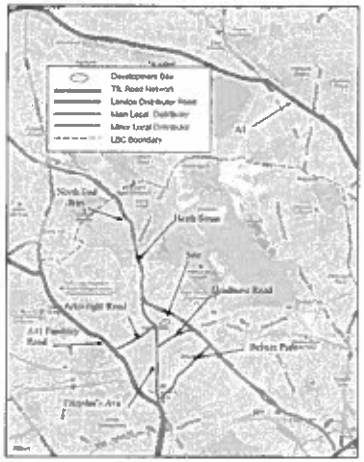
Figure 4 shows the proximity of the development site to Transport for London's (TfL) road network along with key London and local distributor roads. From this it can be seen that, at approximately 600m, the A41 Finchley Road is the closest TfL road if accessed using Arkwright Road (designated a Minor Local Distributor road by TfL). As an alternative to Arkwright Road and at a distance of 1.2km, construction traffic could access the site from the A41 at Swiss Cottage using the wider Fitzjohn's Avenue (designated a Major Local Distributor road by TfL).

The ability for larger delivery vehicles, such as articulated lorries/ tracks, to turn around within the site will not be available during the later stages of construction. From this point larger vehicles will need to reverse into the site, under the control of a banksman. It is anticipated that vehicles entering the site in such a manner will need to approach from the north (Heath Street), turn right as if proceeding into Arkwright Road and then reverse into the site entrance.

The shortest route using Major Local Distributor roads between the A41 and Rosslyn Hill Vane Close site access is a distance of 1.8km travelling via Arkwright Road, Fitzjohn's Avenue and Lyndhurst Road. This compares with a slightly longer distance of 1.9km from Swiss Cottage to Vane Close using the Main Local Distributor roads Belsize Avenue and Belsize Park.

The A1 represents the other TfL road within the borough which can be accessed at Archway (5.1km) or more likely to the north of the development at Hendon (4.3km). The latter route would see construction traffic using North End Way and Heath Street which would see vehicles that need to reverse into the site.

It is believed there are no low bridges or weight restrictions on any of the routes described above.



4.2 Example Vehicles for Each Construction Phase

See Appendix 1

4.3 Access within the Development Site

The development site is approximately 90m x 25m in size. Construction will cover around 35% of this area with the remainder being high quality landscaping. The new structure forms a strip along the northern edge of the site and the gardens are laid out in two distinct levels (as opposed to the general slope currently across the site). This difference in level will influence construction phasing which in turn will impact on access and opportunities for site set up and material storage. As is often essential the contractor will plan works to minimise the need for on-site storage i.e. use just in time deliveries.

Vehicles exiting the site onto Fitzjohn's Avenue are expected to be controlled by banksmen as will all movements along the private road to the side of St Anthony's School. When there is no longer space within the development site to turn vehicles, it will be necessary to reverse deliveries along the private road. In such circumstances the banksman and driver should be in radio contact to mitigate the problem of restricted rear vision. Larger vehicles returning to re-enter the site will need to approach from the north (Heath Street).

All deliveries are expected to be off-loaded within the development site with the exception of large items of plant which may be delivered by low loader. These can include specialist piling rigs, mobile tower cranes and excavators. In such cases it is anticipated the plant will be delivered during off peak periods to either Fitzjohn's Avenue or Arkwright road and trucked to the site under the control of a banksman.

4.4 Other Transport Considerations

With the site located well away from Fitzjohn's Avenue it is not anticipated there will be hoardings, scaffolds or site accommodation storage adjacent to public highways. Similarly the development is not expected to require any highway works or the suspension of parking bays.

The interface with the public highway will be restricted to vehicles entering and exiting the site which will be under the control of a banksman.

Good housekeeping within the site and the length of access to Fitzjohn's Avenue mean there is not expected to be a problem with mud or dirt being deposited on the public highway. While the cleanliness of this access will be the responsibility of the contractor they is not expected to require much, if any, wheel washing.

The contractor is expected to coordinate deliveries with the start and end of the school day so as to minimise disruption to the immediate road network during these very busy periods.

5 Conclusion

Within this Construction Management Plan we have outlined a sequence of constructing for the development at 95 Fitzjohn's Avenue. We have endeavoured to identify the potential impacts of the construction works, along with the means to mitigate their effect on the immediate surroundings. In addition, routes have been identified between the development site and Transport for London's road network.

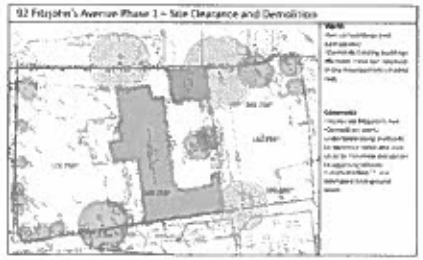
In order for this document to form a working reference through to project completion it will need to be updated, where appropriate, prior to start of the works.

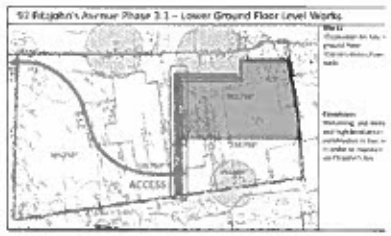
Construction Management Plan
Appendix 1. Phasing information

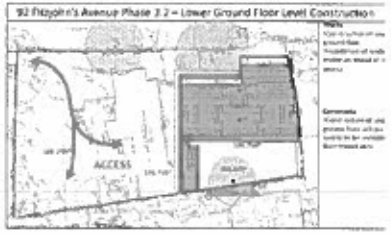
Appendix 1: Phasing Information

Phase	Works	Dates	Vehicles + Routes	Comments
1	Demolition and site clearance		7.5 tonne flat bed trucks width 2.4m (scaffold lorries) Roll on roll off skips (similar size to 7.5t trucks) or 15 tonne tipper lorries (2.6m wide) Access via Fitzjohn's Ave with ability to turn vehicles within the site	Potential opportunity to use some or all of the demolition arisings as temporary hard standings for deliveries and piling equipment
2	Piling for perimeter walls and wall construction		Excavators and specialist equipment delivered on low loaders located on Fitzjohn's Ave or Arkwright Road. Concrete wagons (2.6m wide) and 15 tonne tipper lorries will access via Fitzjohn's Ave and possibly Vane Close (tbc)	
3	Lower ground floor construction		Combination of Phase 1 and 2 type vehicles with possible use of small tower crane. Access via Fitzjohn's Ave with ability to turn vehicles within the site Possible access via Vane Close for works to eastern elevation	Any mobile tower crane used in this stage of construction will need to depart prior to start of Phase 4
4	Retaining wall between upper and lower gardens		Excavator with lifting capacity, concrete wagons Access via Fitzjohn's Ave. Area required for wall construction will reduce opportunities to turn vehicles within site	
5	Upper ground floor		As Phase 4 Ability to turn vehicles within site limited to transit van size. Any larger delivery vehicles will need to access the site by reversing in from Fitzjohn's Ave	
6	Superstructure		Telescopic forklift truck, articulated dumper, mini digger for landscaping Concrete can be placed using the forklift although there may be a requirement for use of a static concrete pump located in the entrance to the site. During such an operation access to site will be completely blocked by pump and concrete delivery trucks.	Confirmation required whether the structure is concrete or stack built. Use of pre-fabricated modules/panels unlikely due to access issues and lack of space for a crane
7	Landscaping		Bulk movements of excavated materials out and new materials in (topsoil tree soil) will best be completed before loss of access brought about by Phases 4 and 5. Vehicle access to the gardens will cease towards the end of Phase 6 with completion of the roof terrace.	
8	Fit out		Transit van deliveries with some specialist equipment, such as structural glazing, delivered by 7.5t truck. Access from Fitzjohn's Ave	

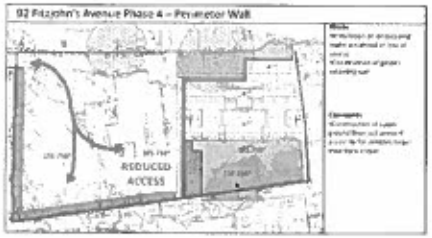
Construction Management Plan
Appendix 2. Construction sequence

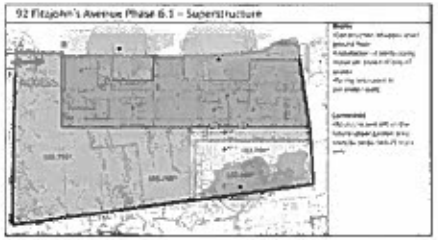


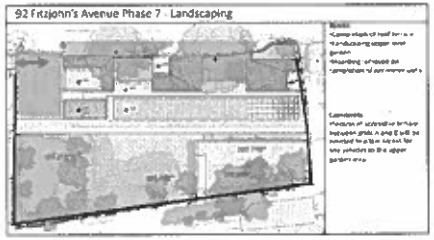


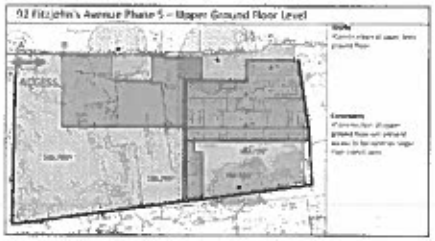


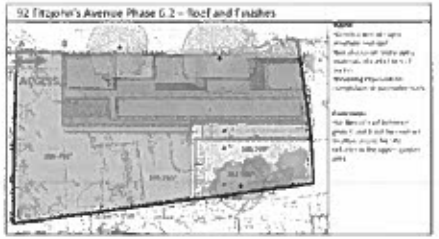
Construction Management Plan
Appendix 2. Construction sequence



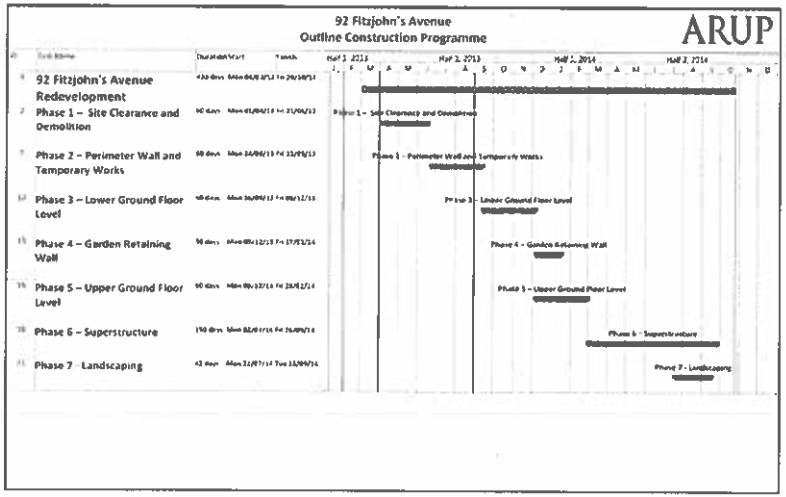








Appendix 3: Outline Programme



FITZJOHN'S AVENUE
NW3
make