

Further information on tree protection and working methods close to trees is available in the Landscape Architect's Employer's Requirements document. Reference should also be sought from the Local Borough Tree Protection Officer.

### **Site logistics**

The contractor is required to coordinate the works with other construction projects both within the Royal Free Hospital site and on adjacent sites. To the south of the site, across Rowland Hill Street, the Bartram's Convent and Hostel will be redeveloped. To the north, the RFT A&E departments will be refurbished. Other projects may be planned and reference should be made to the Royal Free Trust for further details of these. The contractor will be required to contact, through agreed channels, the contractors and clients of these projects to agree acceptable working methods on noise, disruption, limit vibration and dust control measures as well as site logistics.

### **Vibration constraints and monitoring**

A series of baseline vibration surveys has been undertaken by Vibration Specialist NVM in areas within the RFT building which house equipment sensitive to vibration. Refer to the NVM Report: RJ222801 issued on the 25<sup>th</sup> of June 2014 and NVM Report Laboratory Floor Vibration Study issued on 1<sup>st</sup> October 2014.

The contractor will arrange for an approved vibration specialist to undertake regular and, if required, continuous measurements of vibration during the demolition, piling and construction activities. Specific locations for vibration monitoring will be agreed with the RFT and the vibration specialist. Typically the locations of these monitoring points will include, as a minimum, the monitoring points in the Vibration Study noted above as well as St Stephen's Church, the School and the LINAC bunker.

'Alarm' threshold levels of vibration for the hospital building are set out in the documents noted above - section 12 of the report - as an advance warning of exceeding acceptable vibration limits. The contractor will work to threshold levels of vibration agreed with the vibration specialist and RFT for other areas which will mitigate any damage to adjacent buildings. In the event that the threshold vibration levels are approached or exceeded, the contractor will immediately halt operations, review the reasons for the excessive vibrations and modify approach to suit. Options to reduce vibration include isolating the structures, employing low vibration working methods and the use of isolation trenches to reduce and remove vibration paths.

### **Noise and dust constraints**

The contractor is required to maintain noise and dust levels within acceptable limits. Again, the contractor will agree noise and dust monitoring locations with the RFT and develop the construction methodology to limit noise and dust within limits set by the RFT. Additional maintenance and cleaning will be required by the contractor to prevent dust build up in filters and equipment. This is particularly critical for the UCL - Institute of Cancer Studies. UCL and the RTF should be consulted regarding the maintenance and cleaning regime to ensure the proposals are adequate and approved.

## 4 Adjacent Structures

### **LINAC Building and replacement of the radiation shielding.**

The radiotherapy block is formed from thick reinforced concrete walls, roof and floors supported by piled foundations. Parts of the surrounding concrete provide health and safety radiation protection from the equipment inside. This building will remain live throughout the build period of the new RFC-Pears Building and afterwards. For health and safety reasons, the shielding of the LINAC will need to remain in place while the LINAC equipment is being operated.

The contractor is required to develop a design and construction methodology for the replacement of the radiation shielding in line with the RFT's requirements and obtain approval of these proposals prior to commencement of any works. The contractor will detail the sequence of car park demolition and shielding replacement to suit the programme and the RFT Radiotherapy teams working hours. The RFT should be engaged to carry out radiation surveys prior to commencement of work and during and after completion of works to verify the effectiveness of the radiation shielding.

Please note that the contractor's vibration specialist must confirm that the remaining demolition works and following construction works can be carried out with no impact on the LINAC operation.

### **Car Park Demolition**

The car park houses a substation (Substation J) which will need to be decommissioned prior to demolition works beginning.

Whilst the car park is generally assumed to be a free standing structure and does not provide support to any adjacent structures, it is structurally connected to the existing LINAC bunker and does take local vertical floor support from the LINAC Radiotherapy building. To facilitate the construction of the new building, there is a requirement to separate the two structures and re-provide the concrete shielding and waterproofing around and above the LINAC bunker. The shielding thickness and extent of the new shielding has been designed by the Radiation Protection Advisor (RPA) at the RFT. All of the contractor's design, drawings, installations, sequence of contraction and the programme for construction require their approval prior to works beginning.

### **Temporary works around the UKPN substation**

The new proposed levels L00 and L01 extend close to the north side of the UKPN substation which needs to remain live throughout the duration of the construction works. Temporary works will be required to be installed prior to the formation and installation of the foundations and retaining walls. Retention methods include the possible use of sheet piling, contiguous piling or precast kingpost elements. Underpinning of the substation would not be advisable due to the unknown locations of entry cables and the makeup of the foundation to the substation. Refer to the site investigation report for notes on the trial pit showing the extent of the building foundation in the area of investigation.

### **St Stephen's Church**

St Stephen's Church is an architecturally and historically important Grade 1 listed building and the design for the Pears Building has been developed to mitigate the impact of the new building on the Church. Works carried out include:

- A geotechnical investigation of the site which provides clear and detailed information about the underlying geology.
- A ground movement assessment of the site extended to include the footprint and surrounding area of St Stephen's Church to allay any concerns about the impact of the sub-structure works on the Church including the Church grounds. Refer to Geotechnical Consulting Group Report 'Notes on Movements associated with Excavation' dated January 2015.
- A baseline vibration survey of the site which has concluded that the Royal Free Hospital itself is not at the sensitive end of the spectrum for susceptibility to vibration despite the sensitive equipment housed in the western end of the hospital adjacent to the proposed works. St Stephens Church lies over 20m away from the development but is clearly of a different construction to the hospital.
- A photographic condition survey, incorporating CCTV drainage survey, of the church is currently being commissioned by the project manager. Refer to the Specification for the Condition Survey: BDP Outline Specification 141202\_BN001. The first survey is to be carried out prior to works commencing. This will allow the contractor to identify any problems attributable by the construction process in the event that they do occur and ensure that the contractor can take steps to prevent them and mitigate them.

Works to be carried out by the contractor and their design team include the following:

- Recover the original structural engineer's details produced by Biscoe Craig Hall for the Church restoration works. These will assist with understanding the ground conditions, the water course that runs centrally down underneath the building and the underpinning works undertaken which did not include the church tower.
- Meet with the owners of the Church, through approved communication channels, to discuss the restoration works undertaken, inspect the Church and review any records available. A schedule of available dates in January and February 2015 has been issued by the Church
- Review a structural report commissioned by the Church and produced by Price and Myers, which the Church will make available.
- Review a report commissioned by the Church and produced by a UCL Geology Professor, which the Church will make available.
- Explore the need for and develop options to support the foundation of the church tower.
- Complete a ground movement analysis to demonstrate acceptable impact of excavation and basement works on the church.
- Detailed piling and construction methodology to minimise vibration to the Church.
- Continue the condition survey of the Church at periods in line with the specification noted above.
- Install vibration monitors within the Church to monitor vibration response against the baseline survey and safe threshold levels of vibration. The contractor's vibration specialist is to establish safe threshold levels of vibration for the Church. Monitor before works commence, at critical points during demolition, during construction works (minimum three monthly) and on completion of the works. Cease construction works if thresholds are approached or exceeded.
- Engage with the St Stephen's Restoration and Preservation Trust to demonstrate that the continuing design and construction methodology will have no impact on the Church building.

### **Structural Condition Surveys**

Along with vibration monitoring, structural condition surveys of selected surrounding buildings will need to be undertaken by the contractor prior to works beginning, during the works and once works have completed. Locations and timings of the surveys are to be agreed with the RTF/RFC and adjacent owners. These will be undertaken at the beginning and end of key construction stages and at least every 12 weeks. As a minimum, this should include the following areas:

1. UCL Institute of Cancer Studies Level L01 in the Theatre Block (RFT)
2. St Stephen's Church - the church has reported that previous damage occurred to the church during the construction of the Royal Free main building in 1970's – see above for details
3. The UKPN substation on Rowland Hill Street.
4. The school buildings of Hampstead Hill Nursery school, Pond Street.
5. The public footpath adjacent to Hampstead Green.
6. Selected residential buildings along Pond Street and Rowland Hill Street. (RFC to agree with the relevant owners)

These survey works would need to be undertaken with the consent of the owners of the properties and the scope agreed.

### **Relocation of the RFT plant and services.**

There are various items of plant that will need to be relocated prior to the works beginning. Refer to the contract documents for details of these elements. These include amongst others the Nitrogen tank, oil tank and the generator and associated works. The works may include fencing and barriers the contractor is required to provide foundations for these items to suit the manufacturer's details and the ground conditions. For technical details of the elements refer to the RFT and their suppliers.