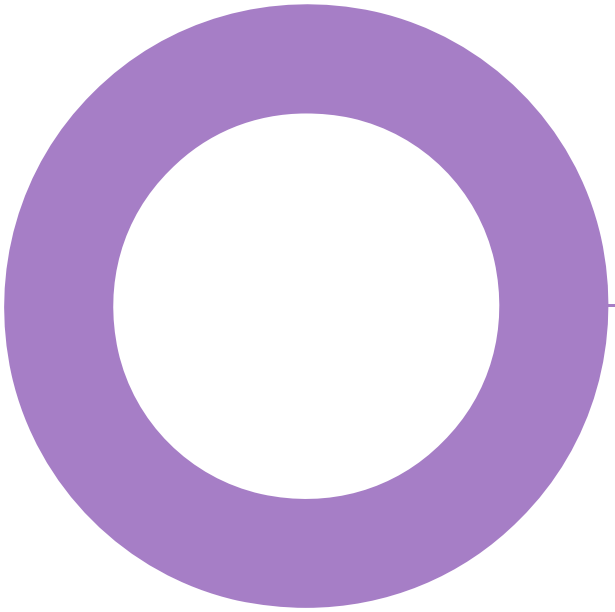
HOARE LEA

Brill Place.
London.
LBS Properties.

MEP ENGINEERING
EMI DESKTOP STUDY

REVISION 2 – 21 OCTOBER 2019



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
0	16/10/2019	First Issue	BE	CPW	CPW
1	18/10/2019	Earthing Arrangement Details Added	BE	CPW	CPW
2	21/10/2019	Earth resistance added	BE	CPW	CPW

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Contents.

Introduction.

An initial desktop study has been undertaken to determine the electromagnetic field emissions that are likely to arise at the northern perimeter wall of the Francis Crick Institute (FCI) from the UKPN sub-station which is to be installed to serve the Brill Place residential development.

For the purpose of the initial appraisal, it has been assumed that UKPN will install a 1000kVA oil filled network transformer within a ground floor sub-station as generally depicted within Figure 1 below.

It is intended that this document is submitted to the local planning authority in order to address queries raised by the FCI in relation to the current S73 planning application, one aspect of which is to introduce a substation to the ground floor of Brill Place residential development. This assessment will also address the requirements of Section C Electromagnetic Interference (EMI) of the Constraints Document appended to the S106 Agreement, insofar as it relates to the installation of a substation.

Proposed UKPN Sub-station.

The proposed UKPN sub-station will be located approximately 25m from the northern boundary of the Francis Crick Institute. We understand from the Constraints Document that all EMI imagery tools within the FCI are located no less than 30m from Brill Place. We can therefore conclude that the closest EMI imagery tools to the proposed substation would be at a distance of approximately 55m.

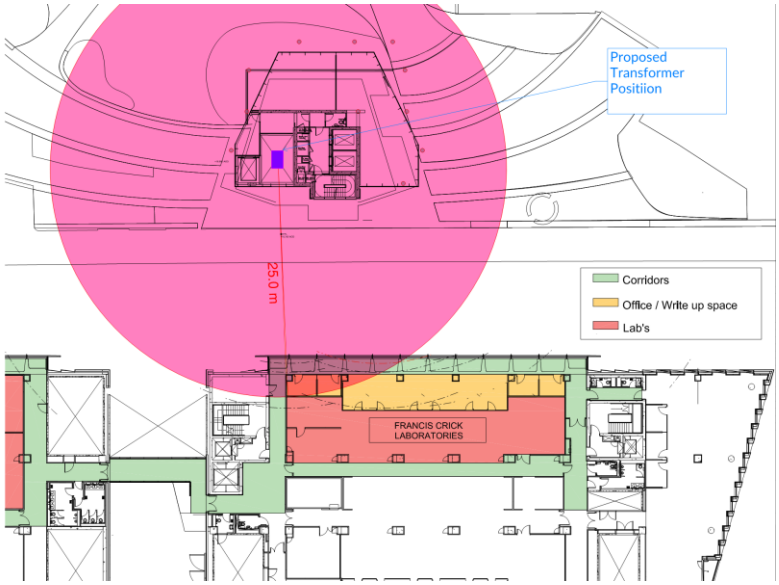

Figure 1 – Location of proposed UKPN Sub-statin at Brill Place

There are many hundreds of thousands of similar substations throughout the UK, each typically supplying up to a few hundred houses. These substations are an essential and integral part of the electricity distribution system and are located close to the homes and businesses that they supply.

All electrical equipment generates both electric and magnetic fields (EMFs). Due to the design of the equipment they contain, this type of substation does not produce a significant external electric field; however, they do generate a magnetic field. Magnetic field values at the boundary of a substation are typically at around 1 or 2 μT (microtesla), but the magnetic field from substations falls very quickly as you move away from the substation. At a distance of around 1-2 m (metres) from the boundary, the magnetic field due to the substation is usually lower than the field normally measured in a house in the UK. The electricity distribution system and electrical equipment and wiring in normal use in houses generates a magnetic field, and typically the magnetic field value in a house in the UK will be in the range 0.01 to 0.2 μT.

This UKPN substation will inherently comply with the requirements of Government exposure guidelines on EMFs as set out in a written Ministerial Statement of October 2009 and with the associated Code of Practice which deals with implementation of the policy. As the substation is inherently compliant with guidelines, routine measurements are not taken, the compliance is assured by the equipment used within the substation.

UKPN Sub-station - Standard Earthing Arrangement.

It is proposed that the sub-station earthing arrangements will be as per the UKPN standard installation.

Earth mesh will be laid across an area of basement slab which has an area equivalent to the whole of the sub-station footprint. The earth mesh is to be linked to marshalling bar in the transformer room and minimum of 2No earthing rods are to be driven into the ground within the basement level of the building, under the sub-station. Refer to figure 2 and 3 for further information.

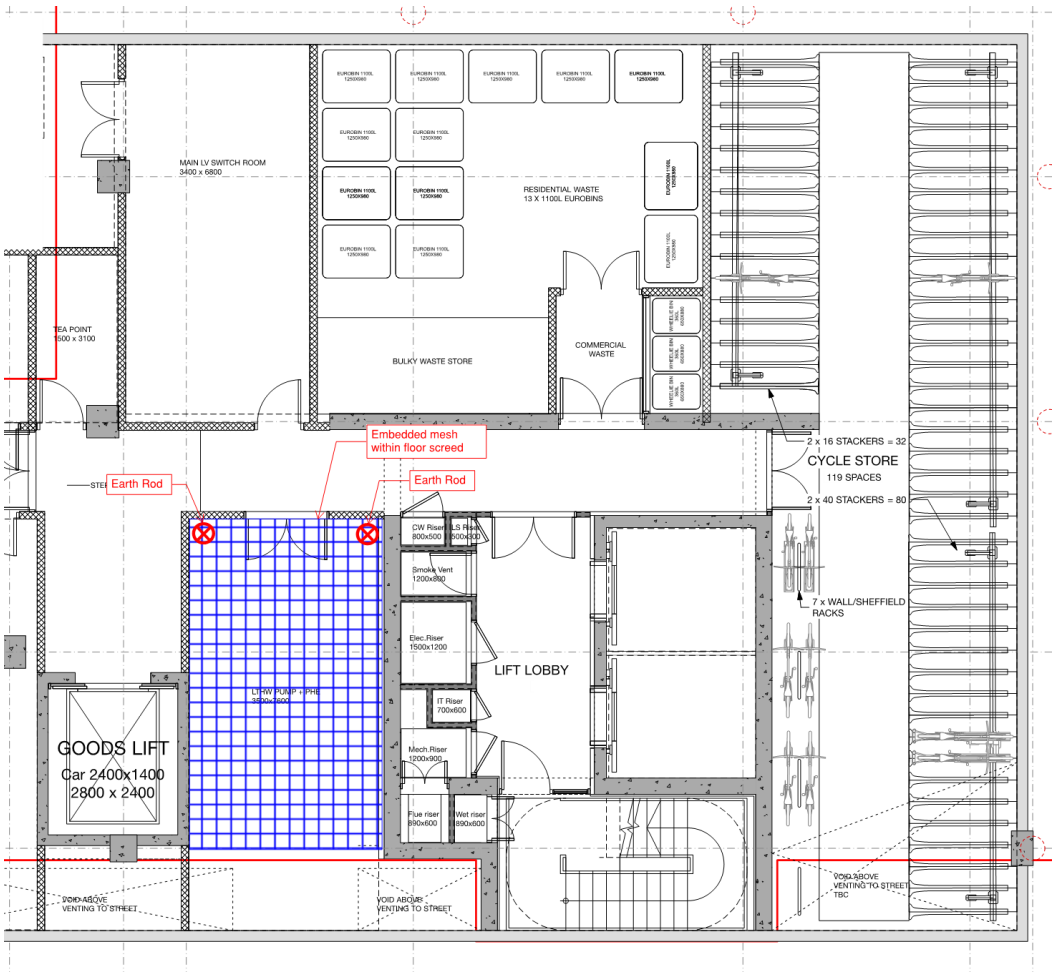

Figure 2: Proposed Earthing Arrangement beneath UKPN Sub-Station

The final number and length of the earth rods will be configured to achieve the following maximum resistances:-

a) A maximum HV electrode earth resistance of 10Ω.
b) A maximum LV earth resistance of 20Ω.

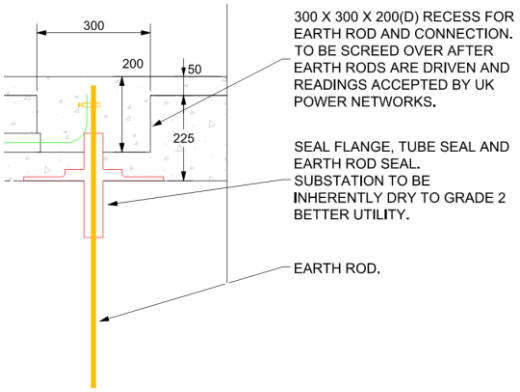

Figure 3: Proposed Typical Earth Road Installation within the floor slab at basement level

EMI Assessment.

The performance requirements established within the construction constraints document for the Brill place residential development are for the Electromagnetic field strength within the Francis Crick institute rooms where the EMI imaging tools are located to not be more than 10nT (nano Tesla).

As the construction details of the Francis Crick Institute are not known to Hoare Lea, the desktop EMI study has been conducted to assess the condition at the northern external boundary wall of FCI. The Electromagnetic Field Strength arising at the boundary of the FCI has been assessed in locations A-I as depicted within figure below and at 1m above each floor level of the Crick Institute.

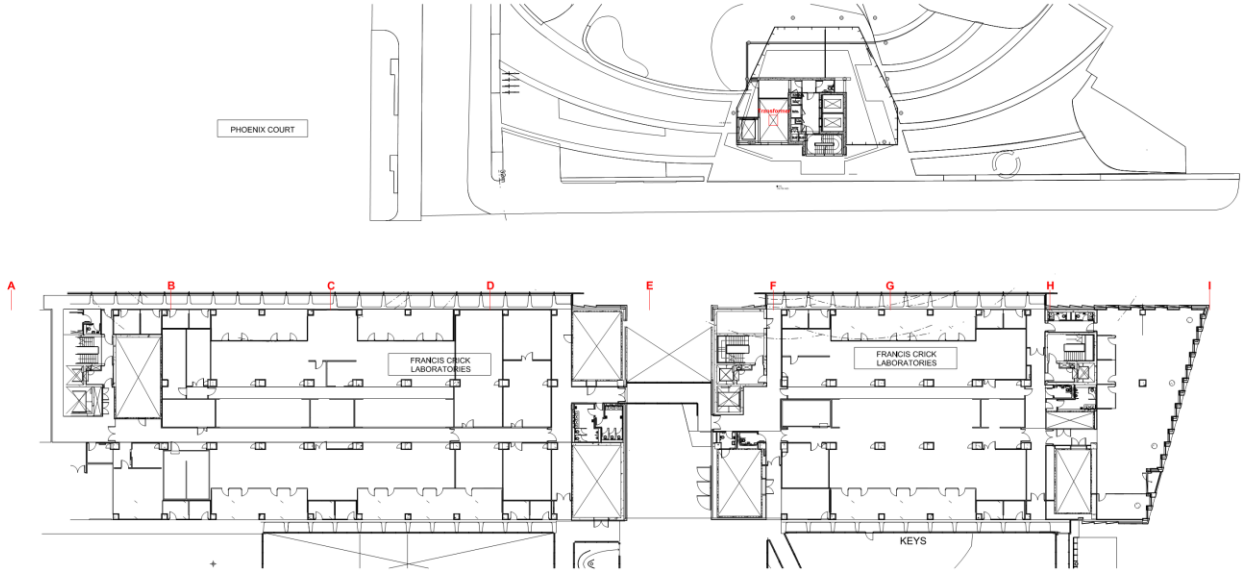

Figure 4 – Spot locations for EMI desktop study at FCI boundary wall

Results.

As field strength diminishes over distance in both the horizontal and vertical plane and the field strength is therefore generally strongest at location F. The graph below illustrates the anticipated peak field strength at level B2 of the FCI at the external boundary wall positions A to I.

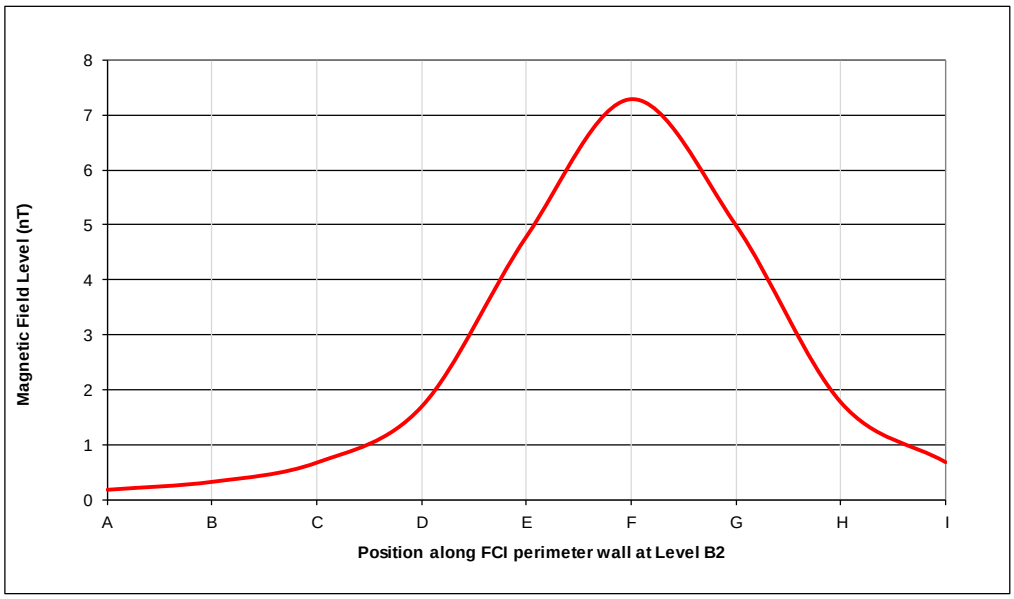

Figure 4 - Calculated Peak Electromagnetic Field Strength in locations A to I – Basement Level 2

The findings from the initial EMI calculations at location F to all levels of the FCI boundary wall condition are summarised within the table below. It is understood that the EMI research and imaging tools which are sensitive to EMI are located within the basement levels at the FCI in the southern part of the building. The field strength will diminish further from the point of our assessment at the external northern boundary wall to those facilities, given the distance and built structures between the two locations. Hence it is not considered that the residual field strength from the sub-station to the Brill Place residential development will exceed 10nT in any laboratory facilities within the FCI, but in particular not in those laboratories to the southern part of the FCI where the EMI tools are located.

FCI Floor level	Magnetic Field Level (nT)
Level B2	7.29
Level B2M	9.10
Level B1	10.73
Level B1M	12.10
Ground Level	12.55
Level 01	12.05
Level 02	10.69
Level 03	8.29

Table 1 – Calculated Peak Electromagnetic Field Strength at location F (FCI external wall location)

Conclusion.

The calculated peak residual field strength to the FCI external boundary wall has been assessed as being between 6.11 and 12.55 nano Tesla.

We expect for further reductions in electromagnetic field strength to occur between the boundary wall of the FCI and the final location of the laboratories which are sensitive to electromagnetic field conditions.

As such, it is not considered that the field strength from the proposed transformer to the Brill Place residential development will exceed 10 nano Tesla's within the laboratories where the EMI imaging tools are located.

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