Network Rail

King's Cross Concourse

King's Cross Concourse and Station Enhancements

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King's Cross Concourse

King's Cross Concourse and Station Enhancements

Part L Energy Appraisal

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Executive Summary

This document considers the application of the Part L energy efficiency requirements of the Building Regulations to the proposed building work of the Kings Cross Station Enhancements, comprising the refurbished Western Range, new Western Concourse and internal retail space. As described by Regulation 9 of the Building Regulations, both the Western Range, owing to its protected Grade 1 status, and the Western Concourse, as it does not use energy to condition its internal environment, should be exempt from the energy efficiency requirements of the Regulations. As a heated and cooled space the internal retail space will, however, have to comply with the requirements by meeting a carbon emissions target.

As it is not required to implement energy efficient measures in the Western Range and Western Concourse, it would be possible to make emissions reductions in these areas, beyond what is required by regulation, and reduce the total carbon emission level of the development below that required by Part L. Through improvements to the thermal performance of the glazing and roof of the Western Range, and increased lighting efficiency in both the Western Range and Concourse, it is estimated that a 21.5% reduction in carbon emissions, below that required by Part L, could be achieved by such measures.

1 Kings Cross Station Enhancements and Part L Compliance

The King's Cross Station Enhancement Works can be sub-divided into three distinct areas when considering the development with regard to Part L of Schedule 1 to the Building Regulations. These are:

- 1) The refurbishment of the Western Range building on the western side of the main train shed.
- 2) The construction of a new concourse space on the western side of the Western Range.
- 3) The construction of retail space at ground and first floor level within the new concourse.

Regulation 9 of the Building Regulations determines under which circumstances a building may be exempt from the building regulations:

- (3) The energy efficiency requirements of these Regulations apply to:
 - a) the erection of any building of a kind falling within this paragraph;
 - b) the extension of any such building, other than an extension falling within class VII in Schedule 2; and
 - c) the carrying out of any work to or in connection with any such building or extension.
- (4) A building falls within paragraph (3) if it:
 - a) is a roofed construction having walls;
 - b) uses energy to condition the indoor climate; and
 - c) does not fall within the categories listed in paragraph (5).
- (5) The categories referred to in paragraph (4)(c) are:
 - a) buildings which are:
 - *i. listed in accordance with section 1 of the Planning (Listed Buildings and Conservation Areas) Act 1990*

(Regulation 9, Approved Document L2B; SI 2006/652)

As the Western Range is a Grade 1 listed building under the Planning (Listed Buildings and Conservation Areas) Act 1990, it is exempt from the energy efficiency requirements under Regulation 9 part (5)a. As the concourse space does not use energy to condition the indoor climate, it too, according to Regulation 9 part (4)b., is exempt from the energy efficiency requirements of the Building Regulations.

Regarding the retail space, as a roofed construction having walls which uses energy to condition the indoor climate (despite it being located within the envelope of the concourse structure), the construction will have to comply with the energy efficiency requirements of the Regulations. These requirements will include the need to meet an annual carbon emissions target, as outlined by Approved Document L2A (new buildings other than dwellings). However, whilst the internal retail spaces will need to meet minimum Part L emissions requirements, it will be possible to further reduce its emissions below minimum Part L standards by taking further energy efficient measures (beyond those required by Part L), in the refurbished Western Range and new concourse (i.e. any reductions of carbon emissions resulting from energy efficient measures in the Western Range and concourse are not required by Part L and can therefore be seen as a reduction below minimum Part L standards with regard to the retail space, which has the only Part L carbon emissions requirement).

2 Thermal Modelling

Two Integrated Environmental Solutions models have been constructed, of the Western Range and retail space, in order to predict the carbon emission levels from both. As the Western Range is being re-developed, the emissions for this building were calculated both before and after the expected changes were made. Images of these models are shown here:



Fig 1: Existing Western Range model.



Fig 2: Proposed Western Range model.



Fig. 3: Proposed Retail Space model.

Annual carbon emissions savings were calculated for both the Western Range and retail space using these models. An estimation was also made of carbon emissions savings

resulting from energy efficient lighting in the concourse. These carbon savings were then used to produce a carbon saving below minimum Part L standards for the retail space.

3 Energy Saving Proposals and Assumptions

Assumptions used to produce these energy/carbon savings are outlined here:

- The glazing of the Western Range was changed from (assumed) existing single glazing (U-value 4.8W/m².K) to secondary double-glazed (U-value 1.5W/m².K).
- The insulation of the roof was improved to reduce the assumed existing U-value from 1.2W/m².K to the minimum Part L standard of 0.25W/m².K.
- The lighting energy consumption was reduced by 33% from current energy benchmarks in both the Western Range and the new concourse (King's Cross Station Enhancements, Arup Energy Report, Dec. 2006)

4 Carbon Emissions Levels and Savings

The carbon emissions calculated from the Western Range, the Western Concourse and the retail space, both before and after the potential energy saving measures have been implemented, are shown in the below table.

	Carbon emissions before energy efficient measures introduced (tonnes per annum)	Carbon emissions after energy efficient measures introduced (tonnes per annum)	
Western Range ¹	918	739	
Western Concourse ²	513	344	
Retail Space ³	182	182	
Total:	1613	1265	
	(acceptable Part L emissions)	(reduction below Part L)	
	Total Carbon Savings:	348	
	Total Carbon Savings (%):	21.5%	

Table 1: Carbon emissions and savings from energy efficiency measures in the station enhancement work.

¹The figures for the Western Concourse obtained from IES outputs.

²The figures for the Western Concourse are based on lighting energy consumption based on 'Kings Cross Station Enhancements, Arup Energy Report', Dec. 2006.

³As the retail space must meet minimum Part L emission levels, no further energy saving measures have been assumed in the retail space.

As can be seen from the above table, the proposed energy saving measures, described in section 3, may result in a carbon emission saving of 21.5%.

5 Appendix A: Assumptions Data Sheet

The below table provides information on data sources used for certain figures.

Assumption	Value Used	Source	
U-Values			
Single-glazing	4.81W/m².K	IES	
Double-glazing	1.95W/m².K	IES	
Secondary double glazing	1.51W/m².K	IES	
Western Range external wall	1.22W/m².K	IES	
Existing Western Range roof	1.21W/m².K	Engineering estimation	
Improved Western Range roof	0.25W/m².K	Engineering estimation	
Grid electricity carbon emissions factor	0.422kgCO2/kWh	Approved Document L2A	

Table 2: Assum	otions and sour	ces used in calc	ulations
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