

FACE Building BREEAM Pollution Evaluation

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1 INTRODUCTION

Environmental impacts of not only construction industry, but human activities in common are big concerns which have significant influence on human society development. In construction industry, answers and possible solutions to these impacts are sustainable assessments such as BREEAM (UK), Passivhaus (DE) and LEAD (USA). These three assessments are the most used in the world. Depending on their adaptability to local conditions, countries use their original versions, or they were modified to suitably corresponds with local environment. Such an example can be foundation of Green Building Councils in various countries.

Reflection of these ideas in construction of new UWTSD campus in SA1 was decision to obtain BREEAM certification for two project starting buildings, the FACE building and Library. BREEAM's assessment can be divided into 9 groups (Management, Health and Wellbeing, Energy, Transport, Water, Materials, Waste, Land Use and Ecology, Pollution) plus one additional, Innovation.

Pollution is one of the important aspects in construction industry, which should be minimised firstly during building process, but also during building's usage. BREEAM assessment is focusing on five elements in Pollution category. POL 01 deals with refrigerants in a way of avoiding their usage and if not, then how to minimise their impact. POL 02 examines NO_x emission levels created by space and water heating systems. POL 03 considers area's predisposition to flooding and how to manage it, also surface water run-off solutions. POL 04 take interest into external lighting systems and their design to use efficient night light distribution in a way to minimise light pollution. Finally, POL 05 deals with noise emission associated with the building itself and how to minimise their impact on building's surroundings.

2 POLLUTION EVALUATION

This report is assessing FACE building of SA1 campus project. According given documentation and evidence, all the subcategories POL 1-5 will be examined and awarded with points accordingly to given criteria. In this category, there are no minimal criteria to be fulfilled.

2.1 POL 01

No evidence obtained. There are two possible causes. First, error can be on my side, because I haven't found any evidence relevant to subcategory of refrigerants, or secondly problem is on client's side as he hasn't delivered needed proofs.

In case of client's fault, he should be informed and be asked to deliver relevant information to be able to obtain credits in this category. If client will not deliver any evidence score in this category is **0 credits**.

2.2 POL 02

According given evidence (**105_-POL_02_NOx_emissions.pdf**), FACE building will be using CHP XRG1 9 by Sav System and boiler QUINTA PRO 115 by REMEHA.

All the calculations stated in the evidence were checked same as technical data used for the calculation were check through subcontractor's technical data sheet if the information is correct and according subcontractor's specification.

See bellow table with average NO_x emissions.

	Gas Boilers	CHP	VRF
Heat related NOx emissions mg/kWh	39	0	123
Space heating energy consumption in kWh/annum	154,180	0	4,906
DHW energy consumption in kWh/annum	0	106,000	0
Total heat energy consumption	154,180	106,000	4,906
Percentage heat demand supplied in %	58	40	2
Average NOx in mg/kWh	25		

According table with average NO_x emissions the result is 25 mg/kWh. Because the result is lower than 40mg/kWh, project can be awarded with **3 credits** in this category.

2.3 POL 03

Flood Resistance

SA1 campus site is rounded by river Tawe, Prince of Wales dock and King's dog and sea access from the south. Such location puts the site into possible flood risk. Most of the site is in Flood Zone 1 and 2, but south end east parts are in Flood Zone 3. To be able to obtain credits for the Flooding part this project must fulfil at least one condition. Either the construction 600mm above or higher the flood area design, or the final design with wider site fulfil the recommendations of appropriate consultant.

According the data obtained from evidence, development is planned 7,13m or higher above OD (**1 - stage 3 report - civil %26 structural.pdf**). 1000-year return period is set to 6,38m above OD (**36 - SA1 Flood Consequence Assessment part 2.pdf**).

$$\Delta h = h(\text{development}) - h(1000 - \text{year}) = 7,13\text{m} - 6,38\text{m} = \mathbf{0,75m}$$

The result shows **0,75m** difference between levels, which means the design fulfilled one of the given conditions and it can obtain **1 credit** in this sub-part (Flood Resistance).

Pre-requisite for sub-part of Surface Water run-off is to appoint appropriate consultant who will confirm developer's intentions and design. (**40 - Drainage Strategy.pdf**)

Surface water run-off

For purposes of this project calculations of surface water run-off in matter of storm events have been made in simulation program MicroDrainage. Results show ability of the project to withstand strong storms and get rid off the surface water quickly and effectively through the designed drainage system. Due to this performance **1 credit** can be awarded.

Minimising Watercourse Pollution

There are intentions to improve quality of surface water flowing into the River Tawe by using a treatment chain where each subsequent system where each subsequent system within the proposed drainage network is treated.

Treatment of surface water prior to soak into ground water has not been considered due to unsuitability of infiltration drainage methods in this project.

Treating the surface water will depend on hazard levels on the site and the receiving water body to pollution. In evidence (**40_- Drainage Strategy.pdf**) are stated two bodies: Roof water with low hazard level and Car park, Roads, Service yard with medium hazard level. Roof water due to its low risk is considered as body without required treatment. Car park, Roads and Service yard water has the risk of light contamination and potential of small spills. Treatment is considered as inclusion of a Class 1 By-pass separator with alarm compliant with NRW/EA PPG3 (April 2006)

Due to the intentions and design to treat possible risks **1 credit** can be awarded.

Sum of all credits awarded in category POL 03 is **3 credits**.

2.4 POL 04

External lighting system should be installed in correspondence with BREEAM assessment. Lighting will not exceed intensity of 10 lux according CIBSE codes for exterior lighting. All the lights will be on during “hours of use”, although security lighting system enhanced about photocells and time switches will be still on. As stated in evidence (**56_- Electrical Scope of Works_%28FACE TECH%29_- Rev_C.pdf**).

Due to set up of this system, project can be rewarded with **1 credit**.

2.5 POL 05

Because Project is in closer range to other facilities than 800m other conditions must be proved to award 1 credit.

As seen in report (**Environmental Noise Assessment.pdf**). There are residential buildings on Kings Road approximately 57m from the FACE building and in future phases of construction there will be new residential block and university building even on closer range. Therefore, survey done by Mach Acoustics was made, to evaluate actual noise levels and evaluate the noise impact of new construction.

In comparison of targeted noise levels with existing ones the differences were in a range of bearable noise levels.

Due to the survey done by specialist and acceptable noise levels, project can obtain **1 credit**.

3 EVIDENCE LIST

Category	Name
POL 01	None available
POL 02	105 - POL 02 NOx emissions.pdf
POL 03	1 - stage 3 report - civil %26 structural.pdf 36 - SA1 Flood Consequence Assessment part 2.pdf 40 - Drainage Strategy.pdf 41 - Drainage Strategy %28Appendix 2 %2B 3%29.pdf
POL 04	27 - Exterior Luminaire Selection WA0168-E-63-SP-001.pdf 56 - Electrical Scope of Works %28FACE TECH%29 - Rev C.pdf
POL 05	Environmental Noise Assessment.pdf

4 CREDIT EVALUATION

Category	CREDITS ACHIEVED
POL 01	0
POL 02	3
POL 03	3
POL 04	1
POL 05	1
TOTAL	8

5 FINAL EVALUATION

In case of obtaining evidence for category POL 01 the amount of credits can be higher. Although according the accessible evidence this project achieved 8/13 credits in Pollution Category.

% Credits achieved = $8 \times 100 / 13 = 61,54\%$

If we apply this result to the total score, where fully fitted POL is 10%, we get result of 6,15% in total scoring.

Depending on other results, this project could be able to obtain desirable result of BREEAM Excellent.