



IMPACT OF GREEN GUIDE ON DESIGN

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ABSTRACT

This manuscript will introduce a set of analysis established for the sake of design changes of a customary swimming pool and leisure facility. The classification of design changes are manipulated by The Green Guide for Specifications and BREEAM in terms of materials used in construction

Key words: The Green guide for specifications, BREEAM, classification design, construction, swimming pool, leisure facility, construction materials, environmental effects.

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1. INTRODUCTION

(BACKGROUND: THE GREEN GUIDE AND BREEAM)

BREEAM is considered to be foremost and essential tool in providing environmental assessment methods for building purposes. Newlands (2011) has mentioned that “ The major target of BREEAM is to provide awareness on how to minimize the harmful effects produced by construction on the environment which might results in issues both globally and locally.” BREEAM works by dividing the effects of construction elements into a set of individual impacts, where each impact are weighted and records the average rating of all impacts. Alternatively, *The Green Guide to Specification* provides general information by including all environmental effects of the materials used in construction. It works by arranging elements into a set of categories and applies A+ to E ranking system to each category, where A+ demonstrates most friendly to environment with least environmental effects and E illustrates most unfriendly to environment with high environmental effects Green Guide (2011).

2. TYPICAL MATERIALS USED IN CONSTRUCTION

The building type chosen in green guide ratings website was commercial building and the nature of indoor swimming pool should be free of structural support to allow customers being more comfortable when using different facilities in leisure centre. The upper floor construction consists from screeded in-situ reinforced concrete waffle slab along with huge double glazed window to allow passage of light. The material used in building the swimming pool is general concrete, with imported Chinese granite hard tiles used as floor finishes. Table

1 demonstrates the typical materials (initial design) and table 2 presents ranking of each materials according to Green Guide to Specifications.

Table 1 Typical materials design. (BRE, 2011)

Number	Commercial Category	Solution Adopted
1	Upper Floor Construction	Screeded in situ reinforced concrete waffle slab
2	Internal Wall	Enamelled steel partition, mineral wool core
3	External Wall Construction	Brick faced precast concrete cladding panel, insulation, light steel studwork, plasterboard, paint
4	Insulation	Cellular glass insulation - density 165 kg/m ³
5	Commercial Windows	Aluminium window, (profile mass >1.5 kg/m), double glazed
6	Floor Finishes	Imported Chinese granite floor tiles – Hard Floor Finishes

Table 2 Environmental issue and ranking for each material. (BRE, 2011)

Category of Rating	Material Ranking					
	1	2	3	4	5	6
Summary Rating	E	B	B	B	C	B
Climate Change	E	C	C	C	D	B
Water Extraction	E	E	A	A	A+	A+
Mineral Resource Extraction	E	A+	A	B	B	A
Stratospheric Ozone Depletion	C	A+	B	B	A+	A
Human Toxicity	E	A+	A	A	D	A
Ecotoxicity to Freshwater	E	A	A+	A	D	A+
Nuclear Waste (higher level)	E	E	A+	A+	C	A+
Ecotoxicity to Land	C	A	C	E	A+	A+
Waste Disposal	E	A	C	A+	A+	A+
Fossil Fuel Depletion	D	A	B	C	C	A+
Eutrophication	D	A+	C	A+	A	A+
Photochemical Ozone Creation	C	A+	A	B	A+	A
Acidification	D	A	B	B	C	B
Kg of CO ₂	140.0	64.0	230	26.0	150	59.0

3. DEVELOPMENT ON DESIGN

Since the initial design had low ranking of materials used and high environmental effects some changes has been conducted to improve the design in terms of sustainability, for instance, the external wall was changed to a curtain walling aluminium system. Table 3 illustrates the development made and improvement on initial design and table 4 shows the ranking of changed materials all based on Green Guide to specifications.

Table 3: Changes conducted on materials design. (BRE, 2011)

No.	Category	Solution Adopted
1	Upper Floor Construction	Lattice girder precast concrete floor with polystyrene void formers and in situ concrete topping
2	Internal Wall	Aluminium proprietary glazed partitioning system, double glazed, safety glass
3	External Wall Construction	Curtain walling Aluminium Systems: Extruded aluminium stick type curtain wall: 2 transom per floor, laminated sealed glass unit, glue bonded insulation, medium dense concrete solid block work, plasterboard on dabs, paint
4	Insulation	Stone wool insulation - density 100 kg/m ³
5	Commercial Windows	Aluminium window, (profile mass <1.25kg/m), double glazed
6	Floor Finishes	Ceramic mosaic tiles - Hard Floor Finishes

Table 4: Environmental issue and ranking for each changed design material. (BRE, 2011)

Category of Rating	Material Ranking					
	1	2	3	4	5	6
Summary Rating	A+	A	B	A	B	A+
Climate Change	A+	C	C	B	C	B
Water Extraction	A	C	C	A+	A+	A+
Mineral Resource Extraction	A+	A+	A+	C	A	A+
Stratospheric Ozone Depletion	A	A	C	A+	A+	A+
Human Toxicity	A+	C	A	A	C	A+
Ecotoxicity to Freshwater	A+	C	A	A+	C	A+
Nuclear Waste (higher level)	A+	B	B	A+	B	A+
Ecotoxicity to Land	A+	A	A	E	A+	A+
Waste Disposal	A+	A+	A	A+	A+	A+
Fossil Fuel Depletion	A+	B	C	A	A	A+
Eutrophication	A+	A+	B	A+	A+	A+
Photochemical Ozone Creation	A	A+	A	A	A+	A+
Acidification	A+	B	D	C	B	A+
Kg of CO ₂	68.0	63.0	200	15.0	140	52.0

The changes made on design have improved the materials performance in term of sustainability. As a result to improvement the design at this stage has less environmental impacts with an increase in overall ranking from C rate to an A rate.

4. CONCLUSIONS

The Green Guide to Specifications and BREEAM has aided in achieving better design by dealing with environmental issues arising from materials used in constructing indoor swimming pool and leisure facility near city centre of Dundee. They offer a variety of materials with same performance but different ranking with respect to environmental impact. Also they provided different solutions for maintaining sustainable construction and reduction in CO₂ emissions.

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