Section 13.0 – Energy & Carbon Management Plan

Guidance Notes:

This section contains details of company policy on energy management and how energy efficiency is incorporated within site operations.

GRAHAM
CONSTRUCTION

Forth Replacement Crossing: Fife ITS

FRC/ITS/GC/ECMP/01

ENERGY AND CARBON MANAGEMENT PLAN

Contents

Appendices:

13.1 Energy and Carbon Policy

Graham are committed to responsible energy management and to practicing energy efficiency throughout our operations. We recognise that climate change is emerging as one of the most serious environmental challenges currently threatening the global community. We understand that there is a need to minimise Greenhouse gas emissions produced as a result of fossil fuel consumption and we acknowledge that we have a role to play in tackling these issues.

This Energy and Carbon Management Plan (ECMP) defines the steps that Graham will take to achieve these outcomes, by specifying and timetabling key actions that are credible and adequately resourced and have clear responsibilities allocated for implementation. These actions are not limited to specific technical interventions leading directly to emissions reduction, but include the full range of management, policy and enabling actions that are required to integrate fully the habit and practice of Energy and Carbon Management in the strategic and operational policies and practices of Graham's. The ECMP is intended to provide a practical and formal basis for implementing carbon emission reduction throughout our project activities.

Graham's are committed to reducing its environmental impacts in each of our projects and ensures that each site adopts a number of sustainable initiatives from procurement of our plant and equipment through to implementing efficient waste management on site and educating our workforce. A Sustainability Manager is appointed whose remit is to establish and evaluate the environmental impact of our activities on a site specific basis and to coordinate solutions aimed at reducing these impacts.

The role of CEEQUAL Assessor will be appointed for the Fife ITS project.

It is Graham's policy to make the protection and enhancement of the environment integral in all of our activities, continually improving our environmental performance wherever practicable.

13.2 Purpose of the Energy and Carbon Management Plan

The scope of the ECMP covers emissions from water usage, waste disposal, site vehicles fuel consumption, business travel.

The objectives of the ECMP process on a site specific basis are to:

- Implement practices on a site by site basis so that, over the short to medium-term, carbon emissions becomes one of the issues that are automatically considered in regular decision making across the full scope of site works.
- To undertake a series of interventions and projects that will lead directly to measurable emissions reductions.

This ECMP defines the steps that Graham's will take to achieve these outcomes, by specifying and timetabling key actions that are credible and adequately resourced and have clear responsibilities allocated for implementation.

The ECMP includes:

- The identification of the key drivers.
- The identification and evaluation of achievable outcomes.
- The use of baseline data for future energy use and CO2 emissions production
- Production of monthly sustainability progress report for monitoring purposes, Appendix T.

Implementing low-carbon initiatives on site is expected to achieve social, economic and environmental benefits.

13.3 Targets and Objectives

Through implementing the ECMP at the Forth Replacement Crossing: Fife ITS the targets are to:

- Reduce carbon emissions.
- Improve energy efficiency in work practices
- Reduce water consumption.
- Reduce waste, increase recycling and reduce the volume of waste sent to landfill.
- Promote and enable environmentally sound transport and travel practices.
- Maximise fuel efficiency and minimise as far as practicable carbon emissions from all plant and ancillary equipment.
- Run an energy efficiency programme.
- Identify opportunities for using energy derived from renewable resources where practicable.
- Identify the energy required to complete the project by developing an operational energy plan.
- Promote energy awareness amongst staff, encouraging and enabling good environmental practice.

Graham shall utilise and maintain the carbon calculator contained within the Transport Scotland Carbon Management System (CMS) to monitor the embodied carbon footprint of the project. The results shall be compared to those previously calculated by the employer which will be used as a baseline for comparison purposes. Graham's objectives are to:

- Set targets to ensure that every effort is afforded to improve upon this baseline.
- And, should any deviations from the estimated carbon footprint be calculated which results in an increased carbon footprint being generated appropriate actions will be taken to generate a corresponding reduction in the footprint.

13.4 Overview of the Forth Replacement Crossing – Fife ITS Project

Project Location: M90 Motorway North of Existing Forth Road Crossing, between Junction 1 (Admiralty) to North of Junction 3 (Halbeath)

Description of work: Supply and installation of 18 Overhead gantries and associated civils works. Install ITS facilities such as lane control/ speed control signals speed compliance cameras, emergency roadside telephones CCTV cameras below ground detection and associated infrastructure including testing and commissioning.

Other works including mine workings consolidation, resurfacing works and landscaping.

13.5 Strategy

In order to achieve the targets and objectives there are a number of key priorities that will require investment, as well as the need for behavioural and structural change throughout the. These include:

- Ensuring that information regarding the ECMP, its aims and successes are regularly communicated to all personnel involved in the project.
- Instilling the idea that carbon and energy management is the responsibility of every individual and not just that of an interested few.
- Educating personnel to ensure that they are fully aware of a how to facilitate the success of the programme, as well as to dispel any energy related myths, including through awareness campaigns and competitions.
- Implementing a Site Waste Management Policy.
- Implementing a:
    - Sustainable Resource Management Framework
    - Materials Register
    - Responsible Sourcing Code of Practice
    - Materials Transportation Strategy
    - Materials Handling and Management Plan
- Creating a Green Travel Plan.
- Clear allocation of responsibilities for energy management, monitoring and control.
- Use energy efficient plant and equipment

13.6 Baseline

In order to begin taking a strategic approach to Energy and Carbon Management, the Forth Replacement Crossing: Fife ITS baseline emissions have been identified and calculated. This will allow the progress in reducing emissions against targets to be measured.

This section describes how the emissions will be calculated and what areas will be analysed and included in the scope. The emissions will be calculated using the Transport Scotland Carbon Management System (CMS) tool.

13.7 Scope

The scope of the ECMP to determine emissions will cover the areas detailed below.

Utility Energy Emissions

Utility data covering electricity, gas, heating oil and water will be collected for the site compound and all on-site mobile units and recorded as per Table 1:

Table 1 – Monitoring of energy usage on site

MONTH_____	FUEL (GENERATOR)	FUEL (PLANT USAGE)	ELECTRICITY (METER READING)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
	Litre quantity to be recorded on the date of each refuel	**Litre** quantity to be recorded on the date of each bowser refuel	To be recorded on the first and last day of the month

Waste Emissions

Waste quantities will be managed via the SWMP and volumes of waste generated will be monitored on a monthly basis via SWMP returns detailing exact quantities of waste streams generated.

The total weight of waste will be calculated by using the total number of all waste skips, waste bins, the type of waste and the service frequency per annum. Waste recycled is included but has a conversion factor of 0 as is assumed to be carbon neutral.

Waste from skips will be calculated, again using a DEFRA conversion factor, for general skip.

Plant and Vehicle Emissions

The volumes of each fuel type will be converted into CO2 from litre consumption by fuel type.

A Record of On-Site Plant will be maintained by the site management team.

Business Travel Emissions

Business mileage in private vehicles will be logged at the site entrance by the gateman and collated on a monthly basis.

Using this data an average monthly business mileage can be calculated to give a yearly total. Assumptions about the vehicle types will be made.

13.7.1 Conversion Factors

Estimating the emissions from each source is carried out by applying the appropriate CO2 emissions factor.

13.7.2 Typical transport emissions by type

The following information provides some indications of carbon efficiencies of differing types of transport. Table 2 represents the lifecycle carbon dioxide emissions (tailpipe and fuel production) for every km used.

Table 2 – Transport emissions by type, kilograms co2 per unit. (To be kept Updated by Site Management Team)

Passenger transport conversion factors

Table 2 ***Petrol and diesel cars***

Car size	Units	$kgCO_2e$ per unit	Car size	Units	$kgCO_2e$ per unit
Small up to 1.4 litre petrol	km	0.1820	Small, up to 1.7 litre diesel	km	0.1528
	miles	0.2929		miles	0.2459
Medium 1.4-2 litre petrol	km	0.2149	Medium, 1.7-2.0 litre diesel	km	0.1894
	miles	0.3459		miles	0.3048
Large, over 2.0 litre petrol	km	0.2976	Large, over 2.0 litre diesel	km	0.2576
	miles	0.4790		miles	0.4146
Average petrol car	km	0.2078	Average diesel car	km	0.1983
	miles	0.3344		miles	0.3192

The table above is taken from the Carbon Trust (Energy and Carbon Conversions 2009 update). The table should be used as a guide to converting the information gathered from monitoring personal travel to site and deliveries to site into total kg CO2.

13.8 Emissions by Source

Based on the projected emissions by source (see Table 3) the carbon footprint of the Forth Replacement Crossing: Fife ITS contract shall be calculated based on volume of emissions by source and presented as indicated in Table 2. Once calculated a comparison can then be made with the baseline carbon footprint calculated by the Employer.

Table 3 – Emissions by source

Projected	Utility Energy Consumption	Water Usage	Waste Disposal	Site Vehicles	Business Travel	**Total tCO2**
CO2 Emissions (Tonnes)						
% CO2						

13.9 Energy Efficient Projects and Practices

The following list of projects or opportunities below have been implemented.

Plant and Equipment

Due consideration should be given to energy efficiency and emissions when plant and vehicles are researched for potential purchase.

All Plant and vehicles should be serviced at designated intervals so they run efficiently, thereby reducing carbon emissions. Where subcontracted or hired plant or vehicles are utilised on our sites, evidence of testing, inspection and regular maintenance should be sought prior to any permitted usage on the site.

In addition ALL plant in use on any Graham site should be subject to a daily inspection which includes an inventory of all required maintenance checks. Where a plant operator identifies a problem with a machine, this must be immediately brought to the attention of the Site Manager. The Site Manager should make arrangements for repair and ensure that the machine is put out of use until necessary repairs are made

Site Operations

The specific energy efficient practices which should be adopted and implemented on site are as follows:

- To encourage energy awareness amongst employees through energy saving posters and training
- To target reductions in energy consumption generated as a result of site accommodation and construction operations
- To monitor energy usage against agreed targets
- To produce energy saving action plans and keep site operatives informed of progress
- To consider use of renewable energy solutions for site accommodation where appropriate
- To encourage subcontractors and suppliers to adopt energy efficient systems of work in their operations
- To set equipment such as photocopiers, and printers which need to remain on during the day, to energy saving mode
- To switch off appliances when not in use

13.10 Communication, Campaigning and Training

In order to ensure the success of the Energy and Carbon Management Programme it is essential that all relevant parties are kept informed as to how they can assist in reaching the emissions reduction targets as well as communicating success stories on what has already been achieved. Due to the nature of the contract it is considered that the best way of communicating with groups and people will vary. Table 4 outlines the proposed communication strategy.

The objective of the Communication Strategy is to promote energy awareness amongst and to encourage a low carbon culture and to disseminate information on the ECMP and performance against emission targets.

Table 4 - Communication Strategy

Method	Description	Target	Involvement
Site Induction	ECMP as part of site induction	Site operatives, site visitors	Site Manager
e-Newsletter	Publication of the ECMP Programme e-newsletter.	Site Operatives, Site Visitors, Employer,	Environmental Advisor, Sustainability Manager
Posters, leaflets	Printed material for distribution on site and displayed on notice boards in site compound and any satellite offices.	Site Operatives, Site Visitors	Site Manager, Environmental Advisor, Sustainability Manager

Campaigning

Posters communicating the following information will be distributed in the site compound and any satellite offices

- Turn off computers and monitors off at the end of the day
- Turn computer monitors off and computers off or in hibernation when away from our desk for more than 15 minutes
- Manage waste, firstly by reducing the amount of waste produced, by re-using where possible and finally recycling where re-use is not possible

- Turn lights off when they are not needed
    - Conserve water wherever possible
    - Use public transport wherever possible for business purpose.

Training

All mangers with specific carbon reduction responsibilities will be trained on carbon reduction initiatives. Training will be provided for all waste management staff. This will be specific to waste and will concentrate on ways to reduce waste and increase reuse / recycling and segregation.

Graham Sustainability Progress Report

Project title/ Number:	Forth Crossing Replacement – Fife ITS		
Project Manager:	Stephen McFaul		
Client Representative:	Tim Barber		
Report Prepared by:	Rory McFadden//Jackie Gibson	Position:	Site Manager/Sustainability Manager

Sustainability Issue	Actions / Progress
Update on Sustainability Objectives	
Sustainable Materials Planning	
Carbon Footprint – Information relating to calculation	
Sustainable Energy management	
Biodiversity Enhancement	
Sustainable Waste Management Measures	

Material use on site and sustainable resource management	
Green Travel Measures Adopted	
Biodiversity Enhancement	
Innovative Solutions / Best Practice Techniques	