Flood Protection Schemes: Carbon Footprint and Climate Change Considerations

Introduction

Dumfries and Galloway Council has set a target of achieving a regional net zero carbon status by the year 2025. The Council's Route Map for Carbon Neutral in Dumfries and Galloway highlights that considerations on reducing or eliminating carbon emissions will be embedded into all activities and decisions across the Council.

The development of the Council's Flood Protection Schemes will include carbon emission risks and assessments as they progress, with particular emphasis on this as they go through the detailed design stage. It should be remembered that Flood Events themselves have a carbon cost and this is predicted to rise in future. The following information outlines the potential for carbon emissions from both Flood Events and the construction of Flood Defences (and how this can be mitigated to reduce the impact).

Carbon Emissions from Flood Events

During and after a flood event, greenhouse gases (GHG) emissions will result from factors including:

- power shortages and use of diesel generators to provide electricity to properties.
- emergency responses & evacuation.
- road closures, leading to potential large-scale diversions, increasing petrol use.
- repairs to properties.
- replacement of household equipment and goods.
- drying processes (e.g., use of air blowers and dehumidifiers).
- potential rebuild or replacement buildings.
- waste generation and management.
- repair of infrastructure (e.g., construction of replacement bridges).

Carbon Friendly Schemes

Some flood management options have a potential for carbon sequestration, which means the long-term capture and storage of carbon. These options include different Natural Flood Management (NFM) measures, such as planting of woodlands and creation of wetlands, however NFM alone is often proven to be insufficient to manage the flood risk. For larger schemes on major watercourses, as are being developed by Dumfries and Galloway Council at Langholm, Dumfries (Whitesands) and Newton Stewart, these techniques are not effective in reducing flood risk, and thus hard defences are required.

Hard Defences

Defence construction and maintenance give rise to GHG emissions directly or indirectly, due to activities including:

- Use of materials with high GHG emissions/energy consumption due to its production processes, such as concrete, mortars & cement; metals; plastic.
- Material transport.
- Quarried material.
- Personnel travel (e.g., for survey, inspection, maintenance, construction, etc.).
- Plant emissions.
- Waste removal.

Mitigations

It is accepted that the construction industry contributes significantly to GHG emissions. However, there are options that could be implemented to reduce emissions. Examples are: The use of low carbon/alternative building materials whenever possible i.e., 'low carbon' concrete, which can be produced using blended cements. Considerable research has been undertaken on the production of more sustainable concrete and it is predicted that emissions from the cement/concrete/ industry will reduce drastically by 2030. The use of

steel and aluminium rather than concrete also has the potential to reduce carbon impacts and options for using materials with lower levels of embedded carbon will be a consideration during later stages of design.

Other measures to reduce the carbon footprint of construction include the use of recycled materials or reusing waste materials; use of natural materials; and use of renewable energy sources.

The use of local labour and supplies can also contribute as this will reduce GHG emissions during transportation.

More specifically, the carbon footprint of Flood Protection Schemes can be reduced by implementing measures such as planting schemes and the use of embankments instead of concrete walls whenever feasible.

Summary

Providing Flood Protection Schemes can increase carbon and other GHG emissions during the construction phase, however consideration will be given on how to offset these emissions through best practice during all stages of development. As outlined above however this needs to be considered in relation to the cost of 'doing nothing' and the carbon emissions from flood events being allowed to continue.

A study by the Department of Environment, Food and Rural Affairs (DEFRA) on the impact of Flood and Coastal Erosion Risk Management (FCERM) activities on the causes of climate change has found that although FCERM activities are a contributor to GHG emissions, these activities largely represent a net reduction in emissions when compared to the lack of flood risk management measures, due to the flood alleviation that they provide, which reduce damages from flooding and consequential GHG emissions associated with those damages.