Appendix 11.12

DAMAGE COST CALCULATIONS

11.12 Appendix 11.12 Damage cost calculations

Introduction

11.12.1 Damage costs are a set of impact values defined per tonne of emission. These values estimate the external costs associated with a marginal change in pollutant emissions. They can be combined with forecasts of emission changes to provide an approximate valuation of the aggregate external impacts of a project. The total damage cost of the proposed development indicates the minimum figure that should be spent on practical mitigation measures to improve air quality.

Methodology

11.12.2 Damage costs have been calculated using Defra's damage cost appraisal toolkit[1], which has involved the following steps:

- Quantify in tonnes per annum, the pollutant emissions (NOx and $PM_{2.5}$) associated with the proposed development (i.e. emissions from operational traffic generated, from the increase in annual average daily traffic (AADT) flows) using the Defra Emission Factor Toolkit (See Figure 1 and Figure 2);
- Multiply total emissions generated by the development by the central value damage costs (£per tonne) to calculate annual offset costs for 1 year;
- Apply damage cost factors to calculate the damage costs associated with the first 5 years of development operation; and
- Present damage costs to compare with proposed mitigation costs and determine whether the proposed level of mitigation is appropriate.

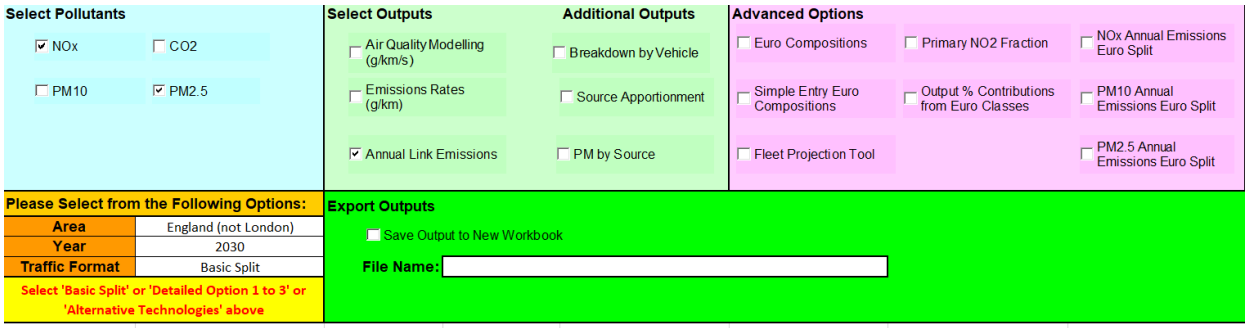

Figure 1 Emission Factor Toolkit input

Source Name	Pollutant Name	All Vehicles (Annual Emissions (kg/yr except CO2 tonnes/yr))
Begbroke 2030	NOx	4,071.22732
Begbroke 2030	PM2.5	509.39543

Figure 2 Emission Factor Toolkit output

[1] Defra (2023) Air quality appraisal: damage costs toolkit available at: Assess the impact of air quality - GOV.UK (www.gov.uk)

Results

11.12.3 Damage cost calculations are presented in Table 1.

Table 1 Damage cost calculations

NOx	**PM2.5**	**Total**
Development emissions: 4071kg/yr /1000 = 4.071tonnes/yr Damage cost per tonne: £8,148* Offset cost for one year: £33,171 Offset cost for five years: £165,855	Development emissions: 509kg/yr /1000 = 0.509tonnes/yr Damage cost per tonne: £74,769* Offset cost for one year: £38,057 Offset cost for five years: £190,285	**£356,140**

* Figures derived from Table 1.1 of Air quality appraisal: damage cost guidance March 2023 (DEFRA)

11.12.4 The total damage cost value identified is £356,140. This value should be compared with proposed mitigation costs to ensure the level of mitigation for the development is appropriate in offsetting the emissions generated by the development. It is anticipated that mitigation costs will be detailed following detailed design of the proposed development and therefore it is recommended that a review of the proposed mitigation in relation to the damage cost calculations is carried out at the detailed design/reserved matters stage.

11.12.5 Proposed mitigation may include, but is not limited to the following:

- Residential and Workplace Travel Plans;
- Electric Vehicle (EV) infrastructure;
- On-site walking and cycling improvements;
- Offsite walking and cycling improvements;
- Public transport contributions and improvements;
- Cycle spaces, dedicated external and internal cycle stores and a dedicated cycle lift;
- Support for local walking and cycling initiatives;
- Car club provision;
- Designation of parking spaces for low emission vehicles and car club vehicles; and
- Green infrastructure including trees, shrubs and green walls, which may provide an air quality benefit.