**Dane Moss North Potential Local Wildlife Site (pLWS) – Greenhouse Gas (GHG) Emissions Estimate**

Introduction

Danes Moss North pLWS (also known as the South Macclesfield Development Area / SMDA) is an area of degraded raised bog (UK Habs categories f1b7/f1b6). The site comprises a mosaic of habitats, which have developed in response to modification/reclamation of the original lowland raised bog followed by an extensive period of low intensity farming. Historical peat cutting, drainage and farming have resulted in the site losing its hydrological functionality as an active peat-forming bog, however on large parts of the site the changes are reversible with appropriate management. The peat depths across the site vary from 1 - 6.5m, with the deeper areas remaining waterlogged. Towards the edge of the site the peat is shallower, drier and prone to shrinkage.

In recent years the land has not been farmed or managed and this has resulted in a mosaic of rush pasture, mire, acid grassland, developing woodland and scrub vegetation. The woodland, mire, hedgerows and acid grassland are all UK Priority Habitats and the site as a whole supports a diverse flora and fauna with rare and threatened species such as the willow tit.

Approach

To provide an estimate of baseline and post-intervention GHG emissions at the site, a peat condition category was assigned to different land cover types across the site as described in the 2021 review[[1]](#footnote-1) (National Inventory Report, Brown *et al*. 2021) of the ‘Implementation of an Emissions Inventory for UK Peatlands’ (Evans *et al.* 2017), as reported in ‘Carbon storage and sequestration by habitat: a review of the evidence (second edition)’ Natural England Research Report NERR094 (Gregg *et al.* 2021). The original report by the Centre for Ecology and Hydrology (CEH) provides estimates of GHG emission factors (EF), expressed as tonnes of carbon dioxide equivalent per hectare per year, from a number of peat condition categories that are informed by land cover types on UK peatlands. This report and its subsequent review in 2021 present the most recent and encompassing overview of GHG emissions from UK peatlands that is currently available.

Baseline Habitats and Land Use

Baseline habitats and areas at the site were taken from the WYG ‘Updated extended Phase 1 habitat survey’ (WYG 2017) with additional areas of scrub added based on the latest aerial imagery available in 2022. Table 3 in Appendix A shows the breakdown of habitats recorded across the site and each equivalent peat condition category.

Post-development Habitats and Land Use

Post-development habitats and land use areas were taken from the SMDA Land Use Framework Plan included in the SMDA Design and Access Statement (IDP March 2017) and the ‘Wider Green Infrastructure Areas - Detailed Planting Plan Overall’ (TEP 2018). The TEP detailed planting plan was used to provide a more detailed split of the proposed habitats within the ‘structural landscape (incl. ecology) areas as set out in the SMDA Land Use Framework Plan. Table 4 in Appendix A shows the breakdown of proposed land use and assumed splits across the developed SMDA site and each equivalent peat condition category.

Results

The estimate of GHG emissions across the site at present is approx. **422 – 509 tCO2e yr-1** (Table 1)**.** The estimate of GHG emissions across the site post-development present is approx. **498 – 534 tCO2e yr-1** (Table 2).

Table 1. Baseline GHG emissions estimate

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Peat Condition Category** | **Upper Emissions Factor (tCO2e ha-1 yr-1)**  | **Lower Emissions Factor (tCO2e ha-1 yr-1)**  | **Area (ha)**  | **Upper Annual Emissions (tCO2e yr-1)** | **Lower Annual Emissions (tCO2e yr-1)** |
| Forest | 5.46 | 1.15 | 20.12 | 110 | 23.138 |
| Drained modified Bog (semi-natural heather & grass dominated) | 3.54 | - | 7.58 | 27 | 27 |
| Extensive Grassland (combined bog/fen) | 13.03 | - | 15.76 | 205 | 205 |
| Intensive Grassland | 27.54 | - | 5.84 | 161 | 161 |
| Settlement | 1.61 | - | 3.65 | 6 | 6 |
| Open water[[2]](#footnote-2) | 0 | - | 1.78 | 0 | 0 |
| **Total** | **-** | - | **55** | **509** | **422** |

Table 2. Post-development GHG emissions estimate

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Peat Condition Category** | **Emissions Factor (tCO2e ha-1 yr-1)**  | **Lower Emissions Factor (tCO2e ha-1 yr-1)**  | **Area (ha)**  | **Upper Annual Emissions (tCO2e yr-1)** | **Lower Annual Emissions (tCO2e yr-1)** |
| Forest | 5.46 | 1.15 | 8.25 | 45 | 9.4875 |
| Modified Bog (semi-natural heather & grass dominated) | 3.54 | - | 0.44 | 2 | 2 |
| Extensive Grassland (combined bog/fen) | 13.03 | - | 1.94 | 25 | 25 |
| Intensive Grassland | 27.54 | - | 15.11 | 416 | 416 |
| Settlement | 1.61 | - | 28.49 | 46 | 46 |
| Open water | 0 | - | 0.45 | 0 | 0 |
| **Total** | **-** | - | **55** | **534** | **498** |

Conclusion

As highlighted above, development of the site as proposed will likely result in an increase in GHG emissions arising from the site. We estimate GHG emissions at the SMDA could increase by a maximum of 112 tCO2e yr-1.

Importantly, the above calculations do not account for any GHG emissions associated with the construction impacts on the peat deposits (e.g. extraction, deep soil mixing, exposing the bare peat to the atmosphere etc.). It is highly likely that significant GHG emissions will occur in addition to those calculated above as a result of the construction processes proposed on site. The calculated annual emissions should be considered an ongoing ‘operation’ emissions rate following the completion of construction of the scheme.

It is also unclear what impact development of the site will have on any retained habitat or hydrologically linked sites in the wider area. Again, any changes in GHG emissions as a result of hydrological changes outside the SMDA boundary have not been incorporated into the above calculations. There is the potential that these changes could result in additional significant GHG emissions arising outside of the site.

While the approach to this calculation has been evidenced and justified to ensure accuracy and transparency, it is based on assumptions of the site’s post-development condition and could therefore potentially be subject to change.

**Appendix A**

Table 3. Danes Moss North baseline habitats and equivalent assumed peat condition category

|  |  |  |
| --- | --- | --- |
| **SMDA Phase 1 Habitats**  | **Assumed Peat Condition Category**  | **Approx. Area (ha)** |
| Amenity Grassland | Intensive grassland | 6 |
| Broad-leaved woodland | Forest | 11 |
| Hardstanding/Buildings | Settlement | 4 |
| Hedges | Forest | 0.1 |
| Marshy grassland | Modified bog (drained) | 3 |
| Ponds | Open Water | 0.2 |
| Species-poor Semi-improved grassland | Extensive grassland | 12 |
| Scrub | Forest | 7 |
| Semi-improved Grassland | Modified bog (drained) | 4 |
| Tall ruderal | Extensive grassland | 4 |
| Treelines | 50/50 split open water and forest | 3 |

Table 4. SMDA post-development land use and equivalent assumed peat condition category

|  |  |  |
| --- | --- | --- |
| **D&A Land Use Framework** | **Assumed Peat Condition Category Equivalent**  | **Approx. Area (ha)** |
| Residential | 70% settlement/30% intensive grassland  | 25 |
| Commercial | 80% settlement/20% intensive grassland | 3 |
| Retail | 80% settlement/20% intensive grassland | 2 |
| Primary School | 80% settlement/20% intensive grassland | 1 |
| Potential future use | Forest | 0 |
| Sports area | Intensive grassland | 6 |
| Equipped play areas | Settlement | 1 |
| Infrastructure | Settlement | 5 |
| Structural landscape (incl. ecology) - Detailed split by ‘Wider Green Infrastructure Areas - Detailed Planting Plan Overall’ (TEP 2018) submitted to support planning application 19/1796M | - |
| Area 1 | 50% extensive grassland/20% modified bog (drained)/20% forest/10% intensive grassland  | 2 |
| Area 2 | Forest | 6 |
| Area 3 | Forest | 1 |
| Area 4 | 40% forest/40% extensive grassland/20% open water  | 2 |
| Area 5 | 40% forest/40% extensive grassland/20% open water | 1 |
| Area 6 | 60% intensive grassland/35% forest/5% open water  | 1 |

1. <https://unfccc.int/ghg-inventories-annex-i-parties/2021> [↑](#footnote-ref-1)
2. There is a lack of published research on emissions arising from open water on peatland. Therefore, the area of this condition category has been provided without a GHG emission factor. [↑](#footnote-ref-2)