

# MoorLIFE 2020 Project:

D5 Carbon Audit Update Report 2018

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(LIFE14 NAT/UK/000070)



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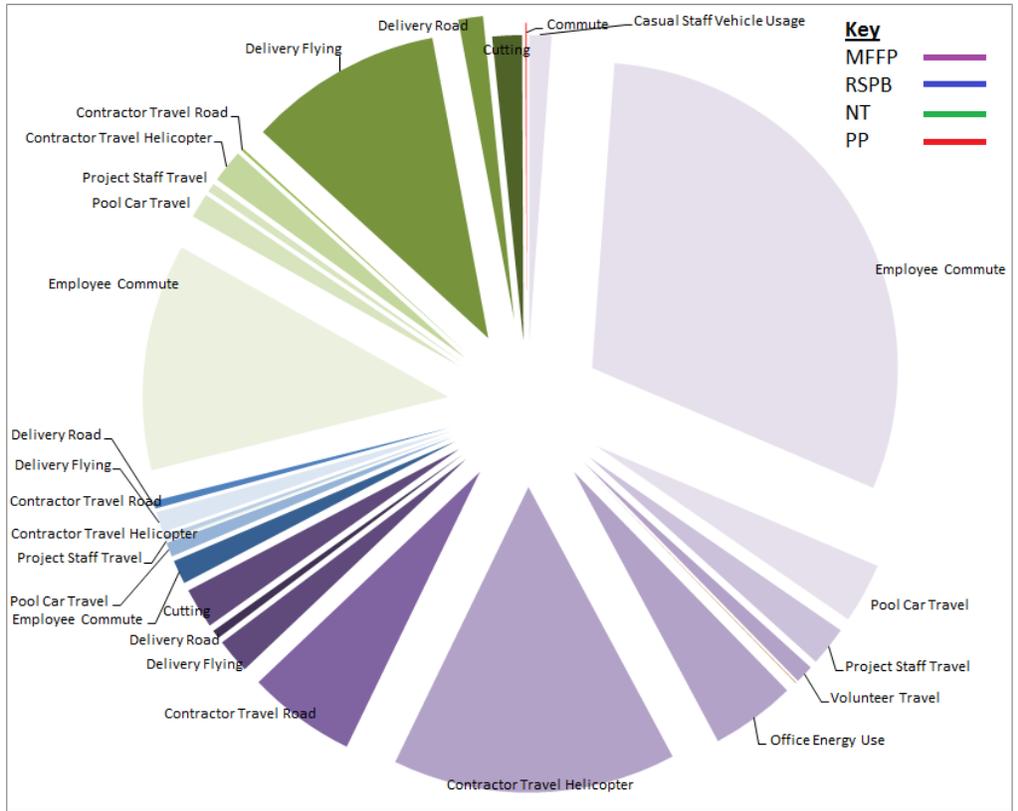
Suggested citation: Titterton, P., Benson, J., & Thorpe, K. (2018) Carbon Audit Update Report 2018. Moors for the Future Partnership, Edale.

## Highlights

- As part of the MoorLIFE 2020 project, action D5, Moors for the Future Partnership will monitor the carbon footprint of the project, with the aim of monitoring our carbon expenditure to identify where carbon savings can be made by Moors for the Future Partnership and our associated beneficiaries.
- The carbon audit builds upon the original MoorLIFE carbon audit, by including additional activities (e.g. office energy use) that are both directly controlled by Moors for the Future Partnership (scope 1 and 2 activities), and indirectly controlled (scope 3), i.e. those outside the control of Moors for the Future the Partnership.
- Including the travel figures for our associated beneficiaries (National Trust, Pennine Prospects, RSPB), total Carbon Dioxide Equivalents (CO<sub>2</sub>e) produced in year 1 of the project was 12,435 kg
- 107,737 kg of CO<sub>2</sub>e was emitted during year 2 of the MoorLIFE 2020 project.
- 166,213 kg of CO<sub>2</sub>e was emitted during year 3 of the MoorLIFE 2020 project.
- The activities that contributed the most kg of CO<sub>2</sub>e in year 3 were deliveries by road and employee commute.

## Graphical representation

**A graph showing total kg of CO<sub>2</sub>e emitted by delivering year 3 of ML2020 split by partner and activity**



## Executive summary

Moors for the Future Partnership and our associated beneficiaries are undertaking a carbon audit of all actions (A1 – E7) associated with the MoorLIFE 2020 project. The carbon audit for MoorLIFE 2020 aims to expand on the carbon audit undertaken by Maskill et al (2015) in the original MoorLIFE project by expanding the number of activities included. The activities are split into scope 1 and 2 activities, which are defined as any activities controlled directly by Moors for the Future Partnership, whereas scope 3 activities are those activities not directly controlled by Moors for the Future Partnership.

Office energy use was only calculated for Moors for the Future Partnership primary office base (Moorland Centre). The reason for not including additional offices (e.g. Aldern House), was because it was deemed too difficult and time consuming for this project to work out the split. Calculating office energy usage for Moors for the Future Partnership involved splitting out the electrical and water consumption used by Moors for the Future Partnership at the Moorland Centre, as the building is also used by the following accountable services: Fieldhead Campsite, Peak District National Park Authority Ranger Service and Visitor Centre. Usage was calculated using a series of percentage splits for different variables including electrical consumption, floor space and staff working hours.

The activities associated with scope 1, 2 and 3 were calculated using the methodology set out in D5 Carbon audit guide (2016) produced by Benson, Crouch, Thorpe and Walker. Greenhouse gas emission data for our partner organisations (National Trust, RSPB and Pennine Prospects) was not included in the D5 update report 2016, because the data was unavailable at the time. With the additional year 1 data included, it is possible to determine that 12,435 kg of CO<sub>2</sub>e was used to deliver year 1 of the ML2020 project. Whereas this increased to 166,213 kg of CO<sub>2</sub>e (carbon dioxide equivalents) emitted during year 3 of the MoorLIFE2020 project.

The primary activities that contribute to total greenhouse gas emissions in year 3 of the project are:

- Employee commute – 72,343 kg of CO<sub>2</sub>e
- Contractor Travel (Helicopter) – 27,867 kg of CO<sub>2</sub>e
- Deliveries (Road) – 21,944 kg of CO<sub>2</sub>e

The reason for this is primarily because in the 2017/18 works season the amount of conservation works significantly increased, and therefore the number and scale of operations also increased, which in turn increased the amount of CO<sub>2</sub>e emitted.

As part of the MoorLIFE 2020 project, Moors for the Future Partnership, and our associated beneficiaries are committed to reducing our carbon footprint through the following:

- Siting lift points as close to the working area as possible
- Specifying local helicopter take-off sites and the right helicopters for the job
- Accurately specifying areas using desk-based GIS and helicopter-mounted GPS
- Car sharing / use of public transport when and where logistically possible
- Purchase or lease of vehicles with the lowest CO<sub>2</sub>/ km emissions (e.g. hybrid vehicles)

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## 1. Introduction

As part of the MoorLIFE 2020 (ML2020) project action D5, a carbon audit will be undertaken for all greenhouse gas (GHG) emissions (e.g. methane (CH<sub>4</sub>)) used in delivering the project. As specified by Defra (2017) the different GHG emissions are then converted into carbon dioxide equivalents (CO<sub>2</sub>e), allowing comparison between the different types of GHG emissions and a total emissions figure can be calculated (OECD Statistics, 2013).

The aim of this document is to report the full kg of CO<sub>2</sub>e figures used to deliver year 1 (1st October 2015 – 31st March 2016) and the annual carbon expenditure figures for the subsequent years of the project including year 2 (1st April 2016 – 31st March 2017) and year 3 figures (1<sup>st</sup> April 2017 – 31<sup>st</sup> March 2018).

This report does not include carbon intensity figures by activity or site, as further activities (e.g. cutting) will be undertaken on the ML2020 project sites in future years. It was therefore decided that these figures will be included in the final report when all conservation activities on all sites have been completed.

ML2020 is being delivered in partnership with a number of organisations, therefore emissions for our associated beneficiaries: National Trust (NT), RSPB and Pennine Prospects are also reported on, along with any contractor travel associated with delivering the conservation works.

The different activities included within the carbon audit are identified in Table 1, along with the group or 'scope' of emission the activities relate to. Scope 1 and 2 activities relate to those actions which are controlled directly by Moors for the Future Partnership (MFFP) (e.g. driving a works vehicles), whereas scope 3 activities are activities which are indirectly controlled by MFFP (contractors and partners' travel) (Carbon Trust, 2017).

**Table 1 – Activity and scope reported on in the MoorLIFE 2020 Carbon Audit**

<b>Activity</b>	<b>Scope</b>
Works vehicles use	1 and 3
Project staff commute	1 and 3
Contractor travel	3
Volunteer travel	3
Flying	3
Deliveries	3
Office energy use (Moorland Centre only)	2

Adapted from Benson, Crouch, Thorpe, Walker 2016

Since the original MoorLIFE carbon audit, the number of activities covered within the carbon audit has been expanded to produce a more comprehensive audit. The original audit can however still be used as

a guide for expected outcomes associated with the ML2020 carbon audit. Maskill et al (2015) identified that those activities involving helicopters and the delivery of materials produced the most carbon emissions.

Where data is presented for our associated beneficiaries, the information is presented alphabetically and is not intended for direct comparison, due to the different work areas and requirements of the sites our associated beneficiaries work on. The information has been presented by partner to allow each organisation to easily identify which actions contribute the most to their total kg of CO2e emitted and therefore our partners are able to put subsequent measures in place to reduce their carbon footprint, where applicable.

## 2. Methodology

### 2.1. Conservation work and travel

The methodology used to calculate the carbon emission figures for all actions (office energy usage, travel and conservation work activities (e.g. brash spreading) is set out in the D5 update report 2016, produced by Benson, Crouch, Thorpe and Walker. As the methodology for these activities has not changed in the intervening period it will not be covered in this report.

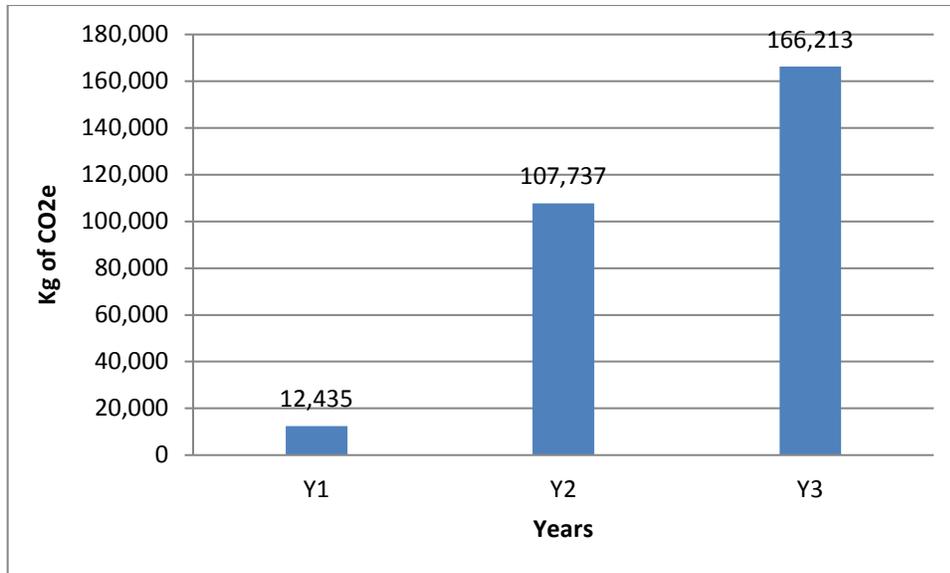
### 2.2. Assumptions

A number of assumptions were made when calculating the GHG emissions figure. A full list of the assumptions made is presented in Appendix 1 of this report. Any further assumptions can be added to the master document found here - [N:\Projects\MoorLIFE\\_2020\Science\Data\D5\\_Carbon audit\Data\Carbon Audit Assumptions made.docx](N:\Projects\MoorLIFE_2020\Science\Data\D5_Carbon_audit\Data\Carbon Audit Assumptions made.docx)

### 3. Results

#### 3.1. MoorLIFE 2020

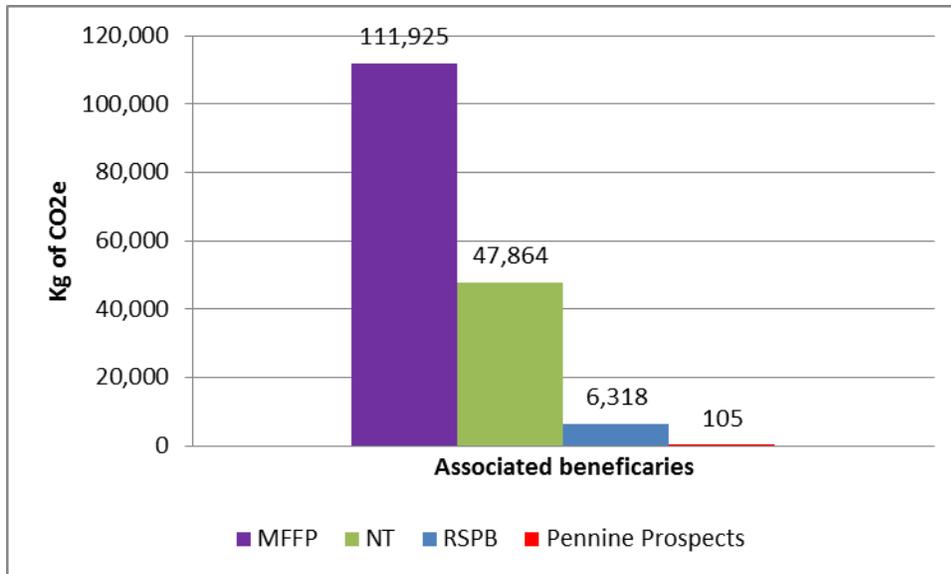
In total ML2020 emitted 166,213 kg of CO<sub>2</sub>e during year 3 of the project. This represents a 60% increase in the amount of CO<sub>2</sub>e emitted between years 2 and 3. The primary reason for this increase is the number of live deliverables increased (e.g. MFFP started delivering on site works in year 3).



**Figure 1 - Total CO<sub>2</sub>e expenditure per annum by the MoorLIFE2020 project**

Figure 2 below identifies that, MFFP emitted 111,925 kg of CO<sub>2</sub>e in year 3. This is because MFFP has the highest employee commute figures, and there has been a significant increase in our conservation works programme. The National Trust emitted 47,864 kg of CO<sub>2</sub>e in year 3 (Figure 2). The primary reason for this is down to the amount of deliveries received by the NT and a high employee commute figure of 19,954 kg of CO<sub>2</sub>e (Table 5) Pennine prospects were responsible for emitting 105 Kg of CO<sub>2</sub>e during year three of the project (Figure 2). This relatively low contribution is because only 1 employee works on the project for this organisation and they generally cycle to work (Table 6).

The RSPB emitted 6,318 KG of CO<sub>2</sub>e in year 3 of the project (Figure 2), this is because their work programme this year did not involve a significant amount of helicopters being used for their ML2020 conservation related activities.



**Figure 2 – Total CO2e contributions by partner for year 3 of the ML2020 project**

In year 3, the single biggest contributor to total kg of CO2e was Employee commute which accounted for 72,343 kg of CO2e, see Table 2 below, there was then a big drop to the next closest action was contractor travel – helicopter (27,867 Kg CO2e). The lowest contributing factor is the generator usage by the Bogtastic van, 53 kg of CO2e, and is due to the generator only being used twice rather than it being a low emitter.

**Table 2 - Total CO2e for all partners by activity per annum**

Activity	Scope	Year 1	Year 2	Year 3
		kg of CO2e	kg of CO2e	kg of CO2e
Casual Staff Vehicle Usage	1 + 3	129	980	1,938
Employee Commute	1 + 3	7,890	56,843	72,343
Pool Car Travel	1 + 3	222	2,591	8,708
Project Staff Travel	1 + 3	998	4,487	4,384
Volunteer Travel	3	0	715	1,613
Generator usage (Bogtastic van)	2	0	0	53
Office Energy Use	2	3,106	7,809	7,451
Contractor Travel Helicopter	3	0	3,379	27,867
Contractor Travel Road	3	0	1,414	10,151
Delivery Flying	3	0	18,483	21,944
Delivery Road	3	0	10,303	3,600
Cutting	3	0	733	6,163
<b>Total CO2e</b>		<b>12,435</b>	<b>107,737</b>	<b>166,213</b>

### 3.2. Moor for the Future Partnership contributions

Office energy use increased from 3,106 Kg of CO2e in year 1 to 7,451 kg of CO2e in year 3 (See Table 3 below). This increase can be attributed to the fact that year 3 covered a 12 month period whereas year 1 only covered a 6 month period and both staff numbers and office floor space increased in this time period. Office energy usage is however down on year 2 of the project by 358 kg of CO2e, however we are not able to comment on whether this reduction is significant. This could be due to a change in way the electricity is metered at the moorland centre, meaning a change in methodology. Prior to February 2017 the campsite was on a separate electricity meter, whereas from Feb 2017 onwards both the campsite and the moorland centre was on the same meter, meaning that the campsite data had to be split off based upon calculations provided by the campsite before being included in the carbon audit.

**Table 3 - Total CO2e for office energy use for all years of ML2020**

Activity	Scope	Year 1	Year 2	Year 3
		kg of CO2e	kg of CO2e	kg of CO2e
Office Energy Use	2	3,106	7,809	7,451

Table 4 below identifies that 7,227 kg of CO2e emitted by MFFP in year 1 of the ML2020 project, with employee commute being the largest contributor with just 3,279 Kg of CO2e emitted. The reason that the figures is not higher in line with the future year figures is because year 1 was a preparatory year with no conservation activities undertaken, additionally not all staff worked on the project.

Employee commute is the highest contribution of kg of CO2e in year 2 at 33,970 (see Table 4 below). This is to be expected with 32 staff members working on the ML2020 project, an increase of 14 full and part-time staff members from year 1. This activity continues to be the largest contributing factor in year 3 as the amount of staff increased again to 33 staff members working on the project.

The total amount of CO2e emitted by MFFP in year 3 is 111,925 kg CO2e, see Table 4 below, which is higher than the year 2 figure of 48,731 Kg of CO2e and is due to a greater amount of conservation work being delivered in year 3. As MFFP started to deliver their own concrete conservation works (actions C1 – C6).

Additionally, year 3 saw the generator on the Bogtastic van used for the first time which contributed an additional 53 kg of CO2e to the total figure and an outside scope figure of 1.65kg of CO2e. The outside scope figure represents emissions that fall out of Scope 1, 2 and 3, and in line with the guidance provided by DEFRA, this should be reported but not included within the total CO2e figure (Defra, 2017).

**Table 4 - Total CO2e for MFFP by activity for all years**

Activity	Scope	Year 1	Year 2	Year 3
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		Kg of CO2e	Kg of CO2e	Kg of CO2e
Pool Car Travel	1 + 3	222	1,969	5,294
Staff Travel	1 + 3	491	3,289	3,474
Employee Commute	1 + 3	3,279	33,970	50,288
Casual Staff Vehicle Usage	1 + 3	129	980	1,938
Volunteer Travel	3	0	715	1,613
Office Energy Use	2	3,106	7,809	7,451
Generator Usage (Bogtastic van)	2	0	0	53
Contractor Travel Helicopter	3	0	0	24,934
Contractor Travel Road	3	0	0	9,519
Delivery Flying	3	0	0	3,050
Delivery Road	3	0	0	753
Cutting	3	0	0	3,559
<b>Total</b>		<b>7,227</b>	<b>48,731</b>	<b>111,925</b>

### 3.3. National Trust contributions

The relatively small contribution (4,529 kg of CO2e) from the NT in year 1 (see Table 5 below) when compared to year 3 (47,864 kg of CO2e) (see

Table 5) is primarily down to the fact that the first year of ML2020 was a preparatory year, with no on site conservation activities happening. Furthermore it was MFFP who led on delivering the preparatory actions, reducing the NT involvement at this stage of the project.

In year 2 and 3 employee commute and deliveries - flying are the two highest contributions to the NT total kg of CO2e. This is slightly unexpected, as the original MoorLIFE report found that helicopter work was the highest contributor to overall kg of CO2e. This is because employee commute was not considered in the original MoorLIFE project, so there is not a record of employee commute emissions data to compare the data against. In year 3 Employee Commute (19,954 Kg of CO2e) is again the activity that contributed the most to the amount of carbon produced by the NT despite a small decrease from year 2, which is down to staff members changing to a lower powered vehicle. The overall increase in kg of CO2e is due to NT starting cutting work in year 3 and a slight increase in the amount of deliveries – flying that has taken place.

**Table 5 - Total CO2e for National Trust by activity for all years of ML2020**

Activity	Scope	Year 1	Year 2	Year 3
		kg of CO2e	kg of CO2e	kg of CO2e
Delivery Flying	3	0	11,722	17,072
Delivery Road	3	0	2,015	2,171

Employee Commute	1 + 3	4,063	22,236	19,954
Pool Car Travel	1 + 3	0	521	2,165
Project Staff Travel	1 + 3	466	911	790
Contractor Travel Helicopter	3	0	2,558	2,898
Contractor Travel Road	3	0	225	210
Cutting	3	0	0	2,604
<b>Total CO2e</b>		<b>4,529</b>	<b>40,189</b>	<b>47,864</b>

### 3.4. Pennine Prospects contributions

For year 1, 2 and 3 (Table 6) Pennine Prospects contributes the least kg of CO2e of all the project partners. The reason for this is because only 1 employee from the organisation works on the ML2020 project, there are no conservation works deliverables undertaken by Pennine Prospects, and under project staff travel, the staff member generally commute to work by bike reducing the kg of CO2e emitted.

**Table 6 - Total CO2e for Pennine Prospects by activity for all years of ML2020**

Activity	Scope	Year 1	Year 2	Year 3
		kg of CO2e	kg of CO2e	kg of CO2e
Project Staff Travel	1 + 3	41	139	105
<b>Total CO2e</b>		<b>41</b>	<b>139</b>	<b>105</b>

### 3.5. RSPB contributions

The RSPB emitted 638 kg of CO2e in year 1 of the project (Table 7). The reason for the relatively low amount of kg of CO2e emitted as a proportion of the total CO2e is because year 1 was a preparatory year, where no conservation activities took place and the majority of preparatory work was being led by MFFP.

In year 2 of the ML2020 project the kg of CO2e deliveries by road was the highest contributor (8,288 kg of CO2e) and deliveries by helicopter was the second highest contributor of kg of CO2e (6,761). This is again slightly different to what was seen in the original MoorLIFE project, and could be due to the type of conservation work being undertaken (e.g. Sphagnum planting) by the RSPB did not require a significant amount of helicopter usage to transport materials onto site(s).

For year 3 there was a significant reduction (12,359) in the amount of Kg of CO2e produced by the RSPB, this is primarily down to a reduction in Deliveries – Flying, and Deliveries by Road due to how they have scheduled their conservation works throughout the project.

**Table 7 - Total CO2e for RSPB by activities by year**

Activity	Scope	Year 1	Year 2	Year 3
		kg of CO2e	kg of CO2e	kg of CO2e
Delivery Flying	3	0	6,761	1,822

Delivery Road	3	0	8,288	676
Cutting	3	0	733	0
Employee Commute	1 + 3	638	638	2,101
Pool Car Travel	1 + 3	0	100	1,249
Project Staff Travel	1 + 3	0	148	15
Contractor Travel Helicopter	3	0	821	35
Contractor Travel Road	3	0	1,189	421
<b>Total CO2e</b>		<b>638</b>	<b>18,679</b>	<b>6,318</b>

## 5. Impacts

Research undertaken by Worrell et al. (2011) identifies that restoration of state 2 (bare peat) (MFFP, 2012) active blanket bog sites produces a significant overall positive carbon benefit; it is therefore expected that the ML2020 work will be carbon neutral. Despite this, MFFP and our partners are committed to reducing the carbon footprint associated with the project through a number of key areas.

Applying the outcome of the carbon audit data indicates that the greatest saving could be achieved in areas relating to staff travel / employee commute, as this contributes the most to total GHG emissions in 2 out of the 3 years, and includes actions such as:

- Car sharing / use of public transport when and where logistically possible,
- Purchase or lease of vehicles with the lowest CO2/ km emissions (e.g. hybrid vehicles),
- Optimise/ reduce number of meetings - use of remote meeting facilities / telephone and video conferences.

Additionally the greatest individual carbon emissions are in relation to helicopter journeys, therefore undertaking actions such as those identified below will also help reduce our carbon footprint.

- Specifying local helicopter take-off sites and the right helicopters for the job,
- Accurately specifying areas using desk-based GIS and helicopter-mounted GPS,
- Siting lift points as close to the working area as possible.

## 6. Conclusion

This report utilises the methodology presented by Benson, Crouch, Thorpe and Walker (2016) to calculate the kg of CO<sub>2</sub>e used in all years of the project for MFFP, NT, RSPB Pennine Prospects travel actions. With the additional year 1 figures included, it is possible to determine that **12,435 kg of CO<sub>2</sub>e** was used to deliver year 1 of the ML2020 project. This, as expected, increased to **166,213 kg of CO<sub>2</sub>e** in year 3 due to a number of factors including:

- Start of the on-site conservation works.
- Longer timescales being monitored in subsequent years, as year 1 was not a full year.
- Additional staff resource required to deliver the ML2020 project.

Analysis of the data indicates that the 3 largest contributors to total kg CO<sub>2</sub>e emitted to deliver the project are:

- Employee commute – **72,343 kg of CO<sub>2</sub>e**
- Contractor Travel Helicopters – **27,867 kg of CO<sub>2</sub>e**
- Delivery (Flying) – **21,944 kg of CO<sub>2</sub>e**

Whilst operations involving flying was expected to contribute a significant amount of kg of CO<sub>2</sub>e based upon the findings of the original MoorLIFE carbon audit, employee commute was not expected to be a significant contribution. This could be due to a number of factors including, a significant increase in the number of staff delivering the project especially compared to the original MoorLIFE project.

With employee commute contributing the most to total kg of CO<sub>2</sub>e emitted for each year of the project, it suggests that implementing / encouraging staff to undertake the following measures, see below, would have the greatest impact in reducing the carbon footprint of ML2020:

- Car sharing / use of public transport when and where logistically possible,
- Optimise/ reduce number of meetings - use of remote meeting facilities/telephone and video conferences,
- Purchase or lease of vehicles with the lowest CO<sub>2</sub>/ km emissions (e.g. hybrid vehicles)

Whilst the largest individual GHG emissions are produced from helicopter use, other ways to reduce the emissions would be to:

- Specify local helicopter take-off sites and the right helicopters for the job,
- Accurately specify areas using desk-based GIS and helicopter-mounted GPS.
- Siting lift points as close to the working area as possible

## 7. References

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## Appendix 1 – Assumptions made

### Conservation works

1. For helicopter flights from base to site it is assumed that a straight line is flown. Fuel consumption multiplied by km flown.
2. Stone wagons are 100 % laden if delivering 20 tonnes.
3. Tractor and trailer uses 0.24 litres of diesel per km.
4. Heather Cutting – Cutting tractor travels 12.5 m per bag / bale and collecting vehicles travel 50 m per bag on average. Assume one cutting tractor and one collecting tractor per job.

### Helicopter works

1. Helicopter base to site flights – Assumed that a straight line is flown from base to site. Fuel consumption multiplied by km flown.
2. Helicopter Fuel is calculated as Aviation Turbine Fuel – Scope 1 as there is no option on Scope 3
3. MoorLIFE carbon audit did not include flights from base to site eg. AH flying from Devon to Glossop. ML2020 audit includes these journeys and also the ground crew journeys.

### Travel

1. All notes for individual entries are noted on the relevant spreadsheet using the comments function.

### Commute

1. A commute is defined either as a person's journey from home to base or home to a meeting point (where there may be an onward journey to site).
2. The estimation does not take account of holidays.
3. If an employee walks / cycles / car shares to work then the total number of days worked on ML2020 is reduced to take account of this change.
4. If an employee only undertakes, on average 0.25 days or less than this on ML2020 then the figure is rounded down to 0 and they are excluded from the calculation.
5. The number of weeks worked on ML2020 is dependent on when the employee started, and only includes full weeks, if an employee started mid-week, this week is discounted, to take account of any inductions they would be required to take.
6. Only full weeks are taken account of, therefore if a person started part-way through a week, this is not included within the calculation.

7. If an employee commutes to two bases regularly, the commute to the second base (e.g. Aldern house) is included as a separate entry.

### **Pool Cars**

1. We are only interested in number of miles, not the number of people within the car.

### **Working from home**

1. It is better to use an accurate figure is included within the calculations, but if this isn't possible then an estimate is fine, because days spent working from home can be ad-hoc.

### **Volunteer Travel**

1. Only those volunteers that submit a travel claims are captured within the data, if they do not submit a travel claim we cannot prove the journey for audit purposes.

### **Office Energy Use**

1. We are not expecting co-beneficiaries to report on office energy use.
2. As it is difficult to calculate the weekly energy usage for ML2020, the campsite electricity figure for February 2017 has not been separated out from total energy usage.