Air Quality Assessment:

Barrington Close and Fairford Close, Kingswood, South Gloucestershire

December 2023

Experts in air quality management & assessment

Document Control

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1 Introduction

1.1 This report has been prepared in response to pre-application comments received in relation to a proposed 80-unit residential development at Barrington Close and Fairford Close, Kingswood (note the total number of dwellings has increased to 85no. since the pre-application was submitted. South Gloucestershire Council's comments state:

"The application would result in a small increase to the number of dwellings therefore operational impacts on air quality are expected to be low. However as the proposal includes significant demolition in close proximity to residential receptors an air quality assessment is likely to be required in regard to the construction phase of the redevelopment. This should be carried out in line with the EPUK/IAQM guidance; Land-use Planning & Development Control: Planning for Air Quality."

1.2 The development will be constructed in two phases; residential properties within Phase 1 will be constructed first, and residents currently living within the Phase 2 area will be relocated into homes completed in Phase 1 or elsewhere off site, before construction of Phase 2 commences.

1.3 This report sets out a construction dust risk assessment for each Phase, undertaken following the methodology published by the Institute of Air Quality Management (IAQM) (2016), and the recommended mitigation measures based on the level of risk identified. It has been prepared by Air Quality Consultants Ltd (AQC) on behalf of E.G.Carter & Company Ltd/Bromford.

2 Construction Dust Assessment

Construction Dust Risk Assessment Methodology

2.1 The criteria developed by IAQM (2016), divide the activities on construction sites into four types to reflect their different potential impacts. These are:

- demolition;
- earthworks;
- construction; and
- trackout.

2.2 The assessment procedure includes the four steps summarised below:

STEP 1: Screen the Need for a Detailed Assessment

2.3 An assessment is required where there is a human receptor within 350 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), or where there is an ecological receptor within 50 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

2.4 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is *negligible* and that any effects will be 'not significant'. No mitigation measures beyond those required by legislation will be required.

STEP 2: Assess the Risk of Dust Impacts

2.5 A site is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emission magnitude (Step 2A); and
- the sensitivity of the area to dust effects (Step 2B).

2.6 These two factors are combined in Step 2C, which is to determine the risk of dust impacts with no mitigation applied. The risk categories assigned to the site may be different for each of the four potential sources of dust (demolition, earthworks, construction and trackout).

Step 2A – Define the Potential Dust Emission Magnitude

2.7 Dust emission magnitude is defined as either 'Small', 'Medium', or 'Large'. The IAQM guidance explains that this classification should be based on professional judgement, but provides the examples in Table 1.

Table 1: Examples of How the Dust Emission Magnitude Class May be Defined

Class	Examples
Demolition	
Large	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >20 m above ground level
Medium	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level
Small	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months
Earthworks	
Large	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes
Medium	Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes
Small	Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months
Construction	
Large	Total building volume >100,000 m^3, piling, on site concrete batching; sandblasting
Medium	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching
Small	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout [a]	
Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m
Medium	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m
Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

[a] These numbers are for vehicles that leave the site after moving over unpaved ground.

Step 2B – Define the Sensitivity of the Area

2.8 The sensitivity of the area is defined taking account of a number of factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of PM_{10}, the local background concentration; and
- site-specific factors, such as whether there are natural shelters to reduce the risk of wind-blown dust.

2.9 The first requirement is to determine the specific sensitivities of local receptors. The IAQM guidance recommends that this should be based on professional judgment, taking account of the principles in Table 2. These receptor sensitivities are then used in the matrices set out in Table 3, Table 4 and Table 5 to determine the sensitivity of the area. Finally, the sensitivity of the area is considered in relation to any other site-specific factors, such as the presence of natural shelters etc., and any required adjustments to the defined sensitivities are made.

Step 2C – Define the Risk of Impacts

2.10 The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the *risk* of impacts with no mitigation applied. The IAQM guidance provides the matrix in Table 6 as a method of assigning the level of risk for each activity.

STEP 3: Determine Site-specific Mitigation Requirements

2.11 The IAQM guidance provides a suite of recommended and desirable mitigation measures which are organised according to whether the outcome of Step 2 indicates a low, medium, or high risk. The list provided in the IAQM guidance has been used as the basis for the requirements set out in Table 15.

STEP 4: Determine Significant Effects

2.12 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant'.

2.13 The IAQM guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will be 'not significant'.

Table 2: Principles to be Used When Defining Receptor Sensitivities

Class	Principles	Examples
Sensitivities of People to Dust Soiling Effects		
High	users can reasonably expect enjoyment of a high level of amenity; or the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land	dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms
Medium	users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or the appearance, aesthetics or value of their property could be diminished by soiling; or the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land	parks and places of work
Low	the enjoyment of amenity would not reasonably be expected; or there is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land	playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads
Sensitivities of People to the Health Effects of PM_{10}		
High	locations where members of the public may be exposed for eight hours or more in a day	residential properties, hospitals, schools and residential care homes
Medium	locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day.	may include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}
Low	locations where human exposure is transient	public footpaths, playing fields, parks and shopping streets
Sensitivities of Receptors to Ecological Effects		
High	locations with an international or national designation and the designated features may be affected by dust soiling; or locations where there is a community of a particularly dust sensitive species	Special Areas of Conservation with dust sensitive features
Medium	locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or locations with a national designation where the features may be affected by dust deposition	Sites of Special Scientific Interest with dust sensitive features
Low	locations with a local designation where the features may be affected by dust deposition	Local Nature Reserves with dust sensitive features

Table 3: Sensitivity of the Area to Dust Soiling Effects on People and Property [1]

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

[1] For demolition, earthworks and construction, distances are taken either from the dust source or from the boundary of the site. For trackout, distances are measured from the sides of roads used by construction traffic. Without mitigation, trackout may occur from roads up to 500 m from sites with a *large* dust emission magnitude for trackout, 200 m from sites with a *medium* dust emission magnitude and 50 m from sites with a *small* dust emission magnitude, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

Table 4: Sensitivity of the Area to Human Health Effects [1]

Receptor Sensitivity	Annual Mean PM_{10}	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>18 µg/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	16-18 µg/m³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	14-16 µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<14 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>18 µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	16-18 µg/m³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	14-16 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<14 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 5: Sensitivity of the Area to Ecological Effects [1]

Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Table 6: Defining the Risk of Dust Impacts

Sensitivity of the Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Construction Dust Risk Assessment

2.14 Demolition and construction will take place in two phases as shown in Figure 1. During Phase 1, the existing properties within the Phase 2 area will remain occupied. Once Phase 1 is complete, the residents will move from the properties in the Phase 2 area into the new properties constructed during Phase 1 or elsewhere off site. As construction of the two phases will not coincide, they have been considered separately.

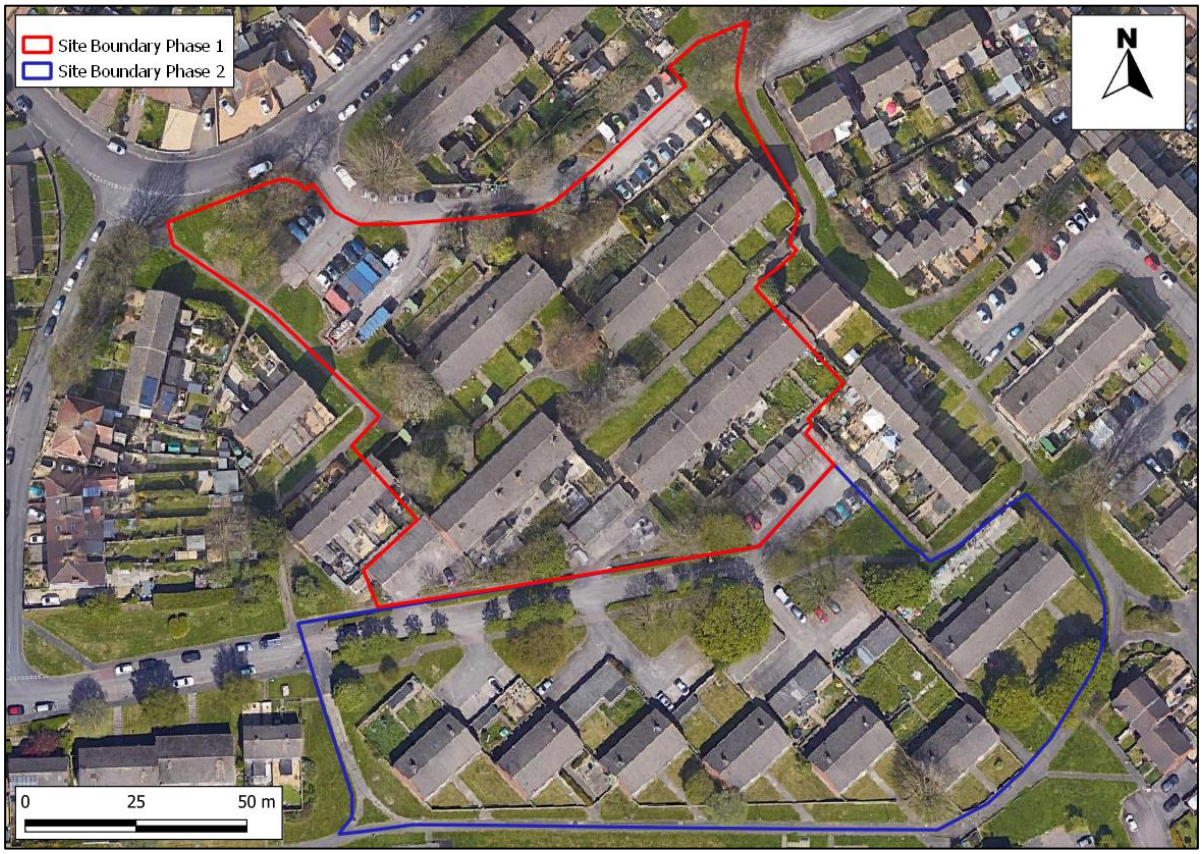

Figure 1: Proposed Phase 1 and Phase 2 Site Boundaries

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Construction Traffic

2.15 It is anticipated that a maximum of 25 heavy vehicles will access the Phase 1 and Phase 2 sites respectively during peak works, thus, taken as an annual average, the additional heavy vehicle movements on local roads will be below the most stringent 25 AADT screening criterion recommended by EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017). It is, therefore, not considered necessary to assess the impacts of traffic emissions during the construction phase and it can be concluded that the proposed development will not have a significant impact on local roadside air quality as a result of construction traffic emissions.

On-Site Exhaust Emissions

2.16 The IAQM guidance (IAQM, 2016) states:

"Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed.

For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur".

2.17 Sensitive receptors are located in close proximity to the Phase 1 and 2 site boundaries. The site layout will take account of the location of sensitive receptors, and the distance between NRMM and sensitive properties will be maximised, as far as possible, and all vehicles and plant will be switched off when not in use. It is judged that there no risk of significant effects at existing receptors as a result of on-site machinery emissions.

Phase 1: Construction Dust and Particulate Matter Emissions

2.18 The Phase 1 construction works will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance, thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

Demolition

2.19 There will be a requirement to demolish multiple brick and concrete buildings with an approximate total volume of approximately 20,500 m^3. The method of demolition has not yet been decided. A mobile crusher is likely to be used on site; such crushing plant may require a valid Environmental Permitting Regulations permit. Based on the example definitions set out in Table 1, the dust emission class for demolition is considered to be *medium.*

Earthworks

2.20 The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2023), as set out in Table 7. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 7: Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Intermediate - Shallow
Soil Parent Material Grain Size	Mixed (Argillaceous [a] – Arenaceous [b])
European Soil Bureau Description	Mudstone and Sandstone
Soil Group	Medium (Silty) to Light (Silty)
Soil Texture	Clayey Loam [c] to Sandy Loam

[a] grain size < 0.06 mm.

[b] grain size 0.06 – 2.0 mm.

[c] a loam is composed mostly of sand and silt.

2.21 The site covers approximately 10,000 m^2 and most of this will be subject to earthworks, involving removal of the foundations of the demolished buildings and breaking up of a paved area. The earthworks will last around 12 weeks for Phase 1 and dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials (such as dry soil). Based on the example definitions set out in Table 1, the dust emission class for earthworks is considered to be *medium*.

Construction

2.22 The proposed development will involve the construction of timber, brick and concrete built residential properties, with a total building volume of around 8,650 m^3. Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials, and from the cutting of concrete. The construction will take place over a 60-week period for Phase 1. Based on the example definitions set out in Table 1, the dust emission class for construction is considered to be *small*.

Trackout

2.23 The maximum number of heavy vehicles accessing the site, which may track out dust and dirt, is 25 outward heavy vehicle movements per day. Based on the example definitions set out in Table 1, the dust emission class for trackout is considered to be *medium*.

2.24 Table 8 summarises the dust emission magnitude for the proposed development.

Table 8: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	Medium
Earthworks	Medium
Construction	Small
Trackout	Medium

Sensitivity of the Area

2.25 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM_{10} concentrations.

2.26 The IAQM guidance, explains that residential properties are 'high' sensitivity receptors to dust soiling and human health effects (Table 2). There are approximately 20 residential properties within 20 m of the site (see Figure 2).

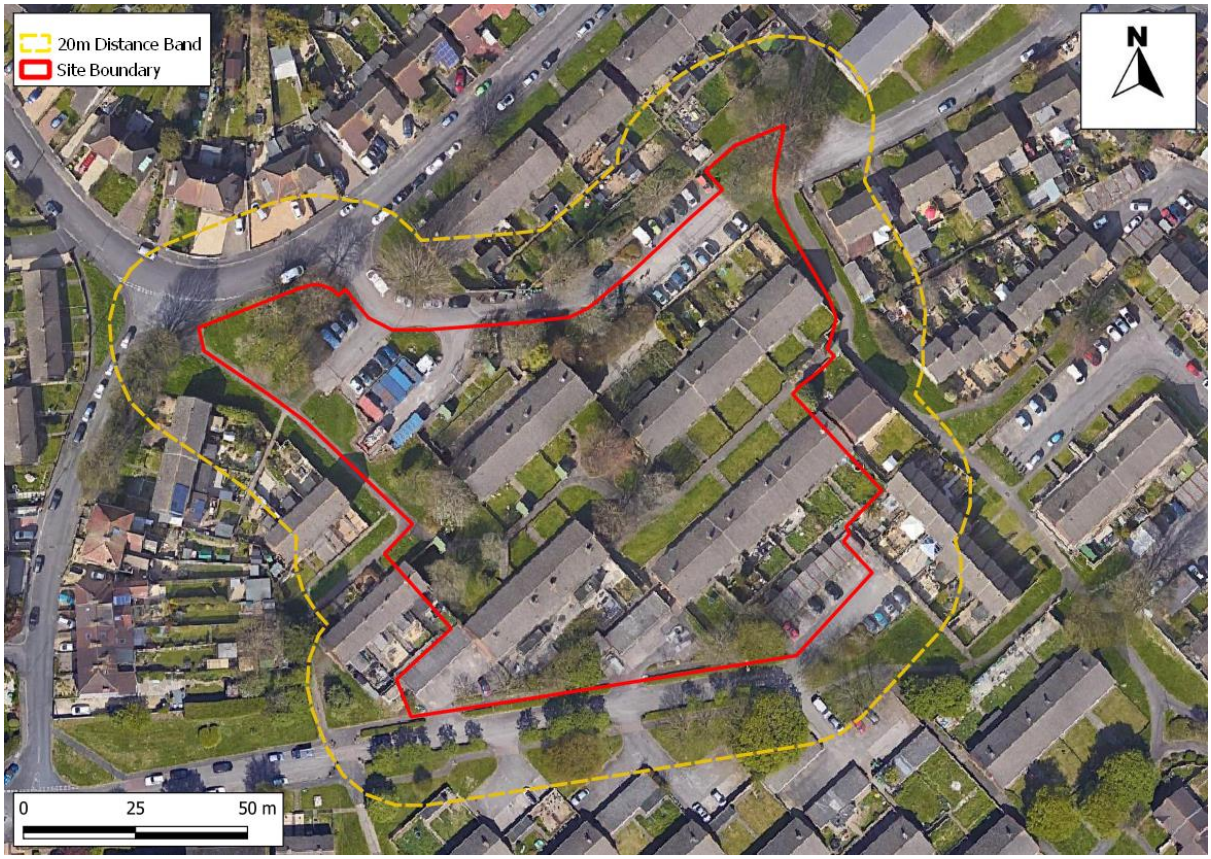

Figure 2: 20 m Distance Band around Phase 1 Site Boundary

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2.27 Table 8 shows that the dust emission magnitude for trackout is *medium* and Table 3 thus explains that there is a risk of material being tracked 200 m from the site exit. Since it is not known which roads construction vehicles will use, it has been assumed that all possible routes could be affected. There are approximately 80 residential properties within 20 m of the roads along which material could be tracked (see Figure 3).

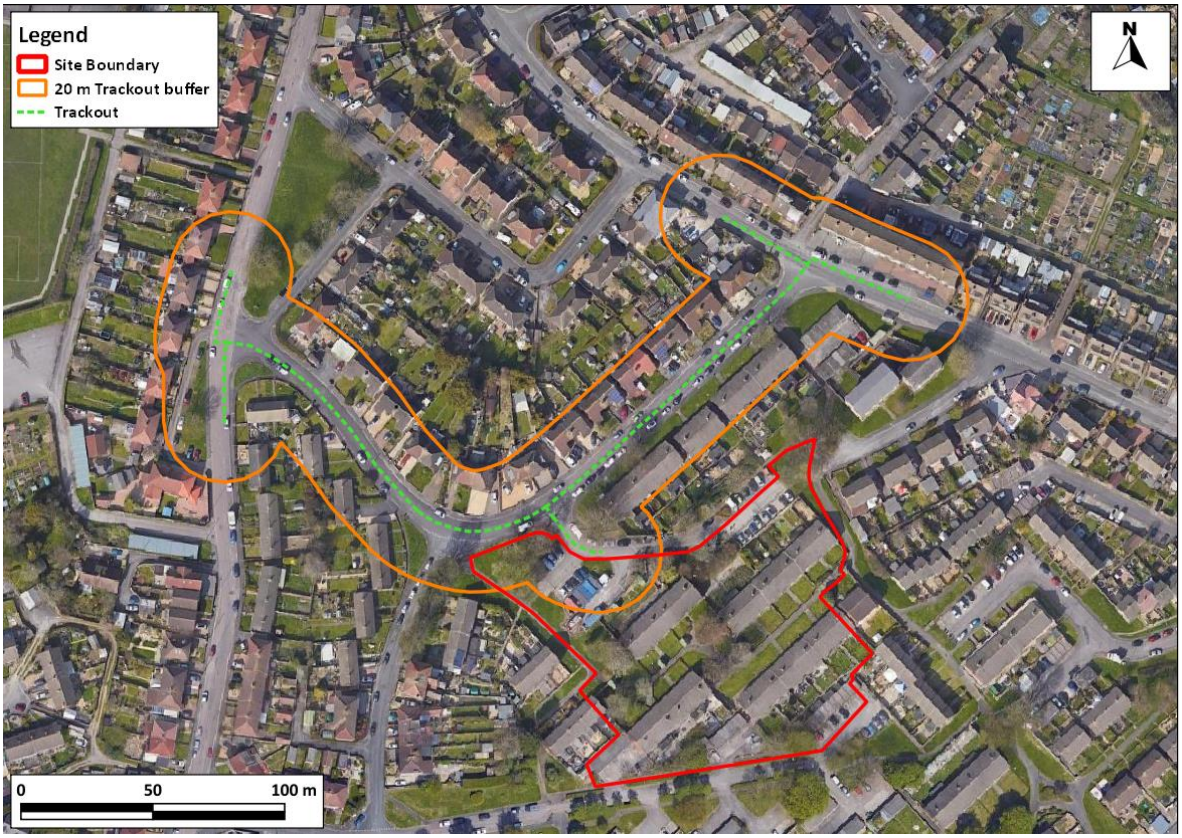

Figure 3: 20 m Distance Band around Roads Used by Construction Traffic Within 200 m of the Phase 1 Site Exit

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Sensitivity of the Area to Effects from Dust Soiling

2.28 Using the information set out in Paragraph 2.26 and Figure 2 alongside the matrix set out in Table 3, the area surrounding the onsite works is of 'high' sensitivity to dust soiling. Using the information set out in Paragraph 2.27 and Figure 3 alongside the same matrix, the area is also of 'high' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

2.29 The matrix in Table 4 requires information on the baseline annual mean PM_{10} concentration in the area. The properties nearest the site are well away from major roads and the existing annual mean PM_{10} concentration is judged to be best described by the background concentration taken from

Defra's 2018-based background maps, which in 2019 is predicted to be 14.8 µg/m^3 (Defra, 2023). Using the information set out in Paragraphs 2.26 and Figure 2 alongside the matrix in Table 4, the area surrounding the onsite works is of 'low' sensitivity to human health effects. Using the information set out in Paragraph 2.27 and Figure 3 alongside the same matrix, the area surrounding roads along which material may be tracked from the site is of 'low' sensitivity.

Sensitivity of the Area to any Ecological Effects

2.30 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. There are no designated ecological sites within 50 m of the site boundary or those roads along which material may be tracked, thus ecological impacts will not be considered further.

Summary of the Area Sensitivity

2.31 Table 9 summarises the sensitivity of the area around the proposed construction works.

Table 9: Summary of the Area Sensitivity

Effects Associated With:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	High Sensitivity	High Sensitivity
Human Health	Low Sensitivity	Low Sensitivity

Risk and Significance

2.32 The dust emission magnitudes in Table 8 have been combined with the sensitivities of the area in Table 9 using the matrix in Table 6, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 10. These risk categories have been used to determine the appropriate level of mitigation as set out in (step 3 of the assessment procedure).

Table 10: Summary of Risk of Impacts Without Mitigation

Source	Dust Soiling	Human Health
Demolition	Medium Risk	Low Risk
Earthworks	Medium Risk	Low Risk
Construction	Low Risk	Negligible
Trackout	Medium Risk	Low Risk

2.33 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant' (IAQM, 2016) Construction Dust and Particulate Matter Emissions.

Phase 2: Construction Dust and Particulate Matter Emissions

2.34 The Phase 2 construction works will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. There are receptors within the distances set out in the guidance, thus a detailed assessment is required.

Potential Dust Emission Magnitude

Demolition

2.35 There will be a requirement to demolish multiple brick and concrete buildings with an approximate total volume of approximately 13,500 m^3. The method of demolition has not yet been decided. A mobile crusher is likely to be used on site; such crushing plant may require a valid Environmental Permitting Regulations permit. Based on the example definitions set out in Table 1, the dust emission class for demolition is considered to be *small.*

Earthworks

2.36 The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2023), as set out in Table 11. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 11: Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Intermediate - Shallow
Soil Parent Material Grain Size	Mixed (Argillaceous [a] – Arenaceous [b])
European Soil Bureau Description	Mudstone and Sandstone
Soil Group	Medium (Silty) to Light (Silty)
Soil Texture	Clayey Loam [c] to Sandy Loam

[a] grain size < 0.06 mm.

[b] grain size 0.06 – 2.0 mm.

[c] a loam is composed mostly of sand and silt.

2.37 The site covers approximately 10,000 m^2 and most of this will be subject to earthworks, involving removal of the foundations of the demolished buildings and breaking up of a paved area. The earthworks will last around 12 weeks for Phase 2 and dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials (such as dry soil). Based on the example definitions set out in Table 1, the dust emission class for earthworks is considered to be *medium*.

Construction

2.38 The proposed development will involve the construction of timber, brick and concrete built residential properties, with a total building volume of around 8,650 m^3. Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials, and from the cutting of concrete. The construction will take place over a 65-week period for Phase 2. Based on the example definitions set out in Table 1, the dust emission class for construction is considered to be *small*.

Trackout

2.39 The maximum number of heavy vehicles accessing the site, which may track out dust and dirt, is 25 outward heavy vehicle movements per day. Based on the example definitions set out in Table 1, the dust emission class for trackout is considered to be *medium*.

2.40 Table 12 summarises the dust emission magnitude for the proposed development.

Table 12: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	Small
Earthworks	Medium
Construction	Small
Trackout	Medium

Sensitivity of the Area

2.41 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM_{10} concentrations.

2.42 The IAQM guidance, explains that residential properties are 'high' sensitivity receptors to dust soiling and human health effects (Table 2). There are approximately 25 residential properties, including those constructed during Phase 1, within 20 m of the site (see Figure 4).

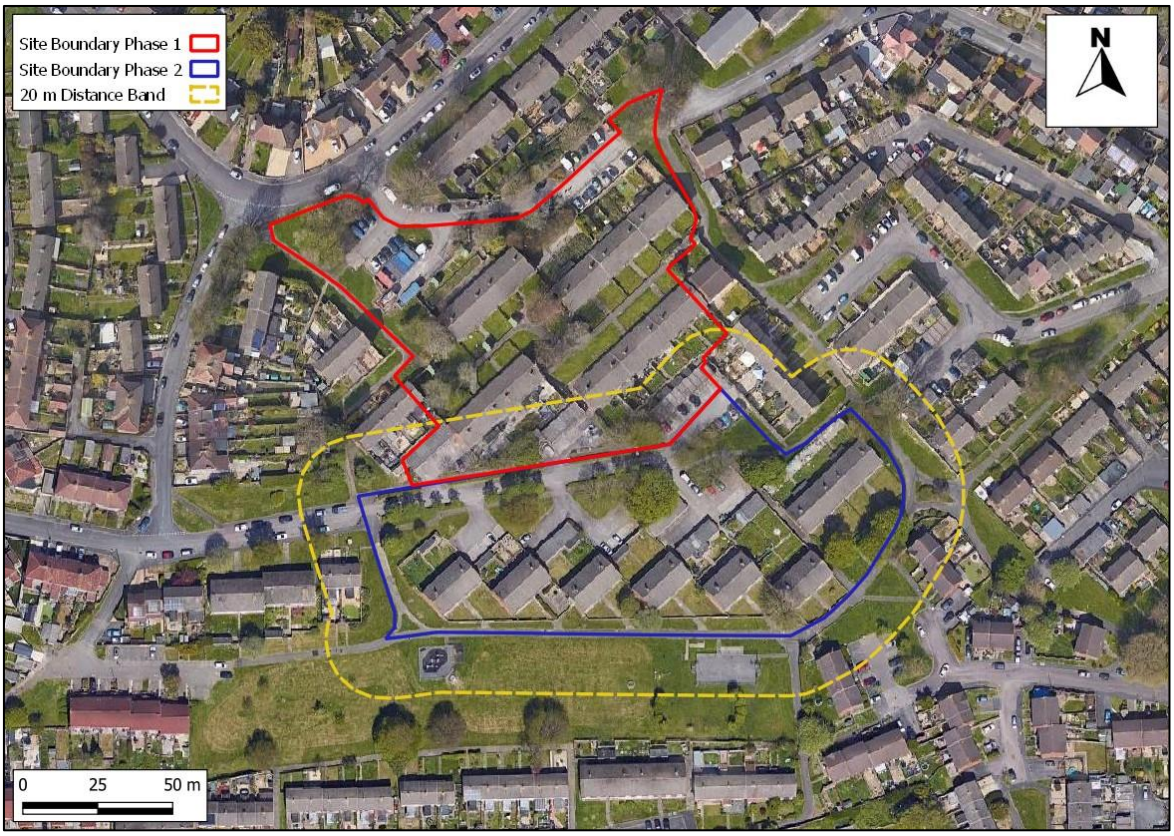

Figure 4: 20 m Distance Band around Phase 2 Site Boundary

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2.43 Table 12 shows that the dust emission magnitude for trackout is *medium* and Table 3 thus explains that there is a risk of material being tracked 200 m from the site exit. Since it is not known which roads construction vehicles will use, it has been assumed that all possible routes could be affected. There are approximately 60 residential properties within 20 m of the roads along which material could be tracked (see Figure 5).

Figure 5: 20 m Distance Band around Roads Used by Construction Traffic Within 200 m of the Phase 2 Site Exit

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Sensitivity of the Area to Effects from Dust Soiling

2.44 Using the information set out in Paragraph 2.42 and Figure 4 alongside the matrix set out in Table 3, the area surrounding the onsite works is of 'high' sensitivity to dust soiling. Using the information set out in Paragraph 2.43 and Figure 5 alongside the same matrix, the area is also of 'high' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

2.45 The matrix in Table 4 requires information on the baseline annual mean PM_{10} concentration in the area. As discussed in paragraph 2.29, the existing annual mean PM_{10} concentration is best described by the background concentration of 14.8 µg/m^3, taken from Defra's 2018-based background maps (Defra, 2023). Using the information set out in Paragraphs 2.42 and Figure 4 alongside the matrix in Table 4, the area surrounding the onsite works is of 'low' sensitivity to human health effects. Using the information set out in Paragraph 2.43 and Figure 5 alongside the same matrix, the area surrounding roads along which material may be tracked from the site is of 'low' sensitivity.

Sensitivity of the Area to any Ecological Effects

2.46 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. There are no designated ecological sites within 50 m of the site boundary or those roads along which material may be tracked, thus ecological impacts will not be considered further.

Summary of the Area Sensitivity

2.47 Table 13 summarises the sensitivity of the area around the proposed construction works.

Table 13: Summary of the Area Sensitivity

Effects Associated With:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	High Sensitivity	High Sensitivity
Human Health	Low Sensitivity	Low Sensitivity

Risk and Significance

2.48 The dust emission magnitudes in Table 12 have been combined with the sensitivities of the area in Table 13 using the matrix in Table 6, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 14. These risk categories have been used to determine the appropriate level of mitigation as set out in (step 3 of the assessment procedure).

Table 14: Summary of Risk of Impacts Without Mitigation

Source	Dust Soiling	Human Health
Demolition	Medium Risk	Negligible
Earthworks	Medium Risk	Low Risk
Construction	Low Risk	Negligible
Trackout	Medium Risk	Low Risk

2.49 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant' (IAQM, 2016) Construction Dust and Particulate Matter Emissions.

Construction Mitigation

2.50 Table 15 sets out a list of best-practice measures from the IAQM guidance (IAQM, 2016) that should be incorporated into the specification for the works. These measures should ideally be written into a Dust Management Plan. Some of the measures may only be necessary during specific phases of

work, or during activities with a high potential to produce dust, and the list should be refined and expanded upon in liaison with the construction contractor when producing the Dust Management Plan. The recommended best-practice measures are the same for both Phases 1 and 2 of the development.

Table 15: Best-Practice Mitigation Measures Recommended for the Works

Measure	Desirable	Highly Recommended
Communications		
Develop and implement a stakeholder communications plan that includes community engagement before and during work on site		✓
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environmental manager/engineer or the site manager		✓
Display the head or regional office contact information		✓
Dust Management Plan		
Develop and implement a Dust Management Plan (DMP) approved by the Local Authority which documents the mitigation measures to be applied, and the procedures for their implementation and management		✓
Site Management		
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken		✓
Make the complaints log available to the local authority when asked		✓
Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book		✓
Monitoring		
Undertake daily on-site and off-site inspections where receptors (including roads) are nearby, to monitor dust. Record inspection results, and make the log available to the Local Authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of the site boundary, with cleaning to be provided if necessary	✓	
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the Local Authority when asked		✓
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions		✓
Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it is a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction (IAQM, 2018)		✓

Preparing and Maintaining the Site		
Plan the site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible		✓
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site		✓
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period		✓
Avoid site runoff of water or mud		✓
Keep site fencing, barriers and scaffolding clean using wet methods		✓
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below		✓
Cover, seed, or fence stockpiles to prevent wind whipping		✓
Operating Vehicle/Machinery and Sustainable Travel		
Ensure all vehicles switch off their engines when stationary – no idling vehicles		✓
Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where practicable		✓
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)	✓	
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials		✓
Implement a Travel Plan that supports and encourages sustainable staff travel (public transport, cycling, walking, and car-sharing)	✓	
Operations		
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems		✓
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate		✓
Use enclosed chutes, conveyors and covered skips		✓
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate		✓
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods		✓
Waste Management		
Avoid bonfires and burning of waste materials		✓

Measures Specific to Demolition		
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust)	✓	
Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground		✓
Avoid explosive blasting, using appropriate manual or mechanical alternatives		✓
Bag and remove any biological debris or damp down such material before demolition		✓
Measures Specific to Earthworks		
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable	✓	
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable	✓	
Only remove the cover from small areas during work, not all at once	✓	
Measures Specific to Construction		
Avoid scabbling (roughening of concrete surfaces), if possible	✓	
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place	✓	
Measures Specific to Trackout		
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use		✓
Avoid dry sweeping of large areas		✓
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport		✓
Access gates should be located at least 10 m from receptors, where possible		✓

2.51 The IAQM guidance, is clear that, with appropriate mitigation in place, the residual effects will normally be ‘not significant’. The mitigation measures set out above and Construction Dust Assessment are based on the IAQM guidance. With these measures in place and effectively implemented the residual effects are judged to be ’not significant’.

2.52 The IAQM guidance does, however, recognise that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. During these events, short-term dust annoyance may occur, however, the scale of this would not normally be considered sufficient to change the conclusion that overall the effects will be ‘not significant’.

3 References

British Geological Survey (2023) *UK Soil Observatory Map Viewer*, Available: http://mapapps2.bgs.ac.uk/ukso/home.html.

Defra (2023) *Local Air Quality Management (LAQM) Support Website*.

IAQM (2016) *Guidance on the Assessment of Dust from Demolition and Construction v1.1*, Available: http://iaqm.co.uk/guidance/.

IAQM (2018) *Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites v1.1*, Available: www.iaqm.co.uk/guidance.html.

Moorcroft and Barrowcliffe et al (2017) *Land-Use Planning & Development Control: Planning For Air Quality v1.2*, IAQM, London, Available: http://iaqm.co.uk/guidance/.

4 Glossary

AADT	Annual Average Daily Traffic
AQC	Air Quality Consultants
Defra	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
EPUK	Environmental Protection UK
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
IAQM	Institute of Air Quality Management
µg/m^3	Microgrammes per cubic metre
NRMM	Non-road Mobile Machinery
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	Small airborne particles less than 2.5 micrometres in aerodynamic diameter

5 Professional Experience

Dr Denise Evans, BSc (Hons) PhD MIEnvSc MIAQM

Dr Evans is an Associate Director with AQC, with more than 23 years' relevant experience. She has prepared air quality review and assessment reports for local authorities, and has appraised local authority air quality assessments on behalf of the UK governments, and provided support to the Review and Assessment helpdesk. She has extensive modelling experience, completing air quality and odour assessments to support applications for a variety of development sectors including residential, mixed use, urban regeneration, energy, commercial, industrial, and road schemes, assessing the effects of a range of pollutants against relevant standards for human and ecological receptors. Denise has acted as an Expert Witness and is a Member of the Institute of Air Quality Management.

Dr Imogen Heard, BSc (Hons) MSc PhD

Dr Heard is an Associate of AQC with over 12 years' experience in the field of air quality. She has been involved in numerous development projects including road schemes, energy from waste facilities, urban extensions and energy centres. These have included the use of ADMS-5 and ADMS-Roads dispersion models to study the impacts of a variety of pollutants, including nitrogen dioxide, PM_{10} and $PM_{2.5}$, and the preparation of air quality assessment reports and air quality chapters for Environmental Statements. She also has experience in undertaking construction dust risk assessments, Air Quality Neutral assessments and human health risk assessments, as well as in preparing local authority reports. Prior to joining AQC she worked as a scientist in the Atmospheric Dispersion and Air Quality area at the UK Met Office for four years, modelling the dispersion of a range of pollutants over varying spatial and temporal scales.

Lina Locatelli, BSc (Hons) MSc

Miss Locatelli is an Assistant Consultant with AQC and joined the company in 2023. Lina's background is in ecological and environmental sciences. During her BSc degree at the University of Edinburgh, she developed an interest around air & environmental pollution and its effects on human health. She completed her master's degree in Earth Future Research at the University of Glasgow, where she expanded her knowledge and passion around climate justice. After graduating, she was involved in delivering a UK-GOV funded net-zero project, where she gained understanding and practical knowledge in carbon accounting and setting science-based emission reduction targets.