TECHNICAL APPENDIX 13.6: LOUND PFA PROCESSING FACILITY

ENVIRONMENTAL PERMIT APPLICATION

Dust Impact Assessment

Prepared for: **Lound Hive Limited**

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1.0 INTRODUCTION

SLR Consulting Limited (SLR) has been instructed by Lound Hive Ltd to undertake a dust assessment in support of an Environmental Permit (EP) application for the proposed Pulverised Fuel Ash (PFA) extraction operation and processing facility at the site of the former PFA Landfill, located at Lound, north of Retford, hereafter referred to as the 'Site'.

The assessment describes the scope, relevant legislation, assessment methodology and the baseline conditions currently existing in the area. It then considers any potential dust impacts associated with the Site operations, and an evaluation of the significance of effects.

1.1 Proposed Development

Lound Hive Ltd are proposing to extract PFA from the former ash disposal lagoons associated with the former Cottam coal-fired power station. The PFA, which is a waste, will be treated by dewatering, screening/crushing and drying to make it suitable as an end-of-waste material for recovery as a construction product. The Proposed Facility will process approximately 300,000 tonnes per annum (tpa) of PFA.

1.2 Scope and Objective

This report considers the potential for the Proposed Facility to impact upon amenity and local air quality in the vicinity of the Site.

The scope of the assessment comprises the following components:

- Assessment of existing air quality in the local area;
- Assessment of potential dust impacts associated with the operational phase of the Proposed Facility; and
- Recommendation of dust control and mitigation measures, as required.

2.0 RELEVANT LEGISLATION, POLICY & GUIDANCE

2.1 Air Quality Strategy

The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales, and Northern Ireland (AQS) most recently updated in July 2007. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK.

The AQS sets standards and objectives for ten priority pollutants. Standards are the concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. Objectives are policy targets often expressed as maximum concentrations not to be exceeded either without exception or with a limited number of exceedances within a specified timescale.

2.2 Air Quality Regulations

The Air Quality Standards Regulations 2010 (as amended) include Limit Values, Target Values, Objectives, Critical Levels and Exposure Reduction Targets for the protection of human health and the environment (collectively termed Air Quality Assessment Levels (AQAL) throughout this report). Those relevant to this Assessment are presented within **Error! Not a valid bookmark self-reference.**.

2.3 Local Air Quality Management (LAQM)

Section 82 of the Environment Act 1995 (Part IV) requires local authorities to periodically review and assess the quality of air within their administrative area. The reviews have to consider the present and future air quality and whether any AQALs prescribed in regulations are being achieved or are likely to be achieved in the future.

Where any of the prescribed AQALs are not likely to be achieved the authority concerned must designate an Air Quality Management Area (AQMA). For each AQMA the local authority has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the AQAL. As such, Local Authorities (LAs) have formal powers to control air quality through a combination of LAQM and by use of their wider planning policies.

Defra has published technical guidance for use by local authorities in their LAQM work[1]. This guidance, referred to in this report as LAQM.TG(22), has been used where appropriate in the assessment presented here.

2.4 Industrial Pollution Regulations

Atmospheric emissions from industrial processes are controlled in the UK through the Environmental Permitting (England and Wales) Regulations (2016) as amended (the EPR). The EPR seek to prevent or minimise emissions to air, water and soil, as well as waste, from industrial, waste management and agricultural installations with a view to achieving a high level of environmental protection.

Guidance Notes produced by the Department for Environment, Food and Rural Affairs (DEFRA) provide a framework for regulation of installations and additional technical guidance produced by the Environment Agency (EA) is used to provide the basis for permit conditions. The Proposed Facility will be classed as a Part A1 installation under these Regulations, amongst other conditions of operation are emission limits for various pollutants produced by the process.

[1] Department for Environment, Food and Rural Affairs (DEFRA): Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(22), 2022.

The EA has published 'Air emissions risk assessment for your environmental permit'[2] (the 'AERA' guidance) to assist operators for all types of permitted facilities to assess risks to the environment and human health when applying for a permit under the EPR.

2.5 General Nuisance Legislation

Part III of the Environmental Protection Act (EPA) 1990 (as amended) contains the main legislation on Statutory Nuisance and allows local authorities and individuals to take action to prevent a statutory nuisance. Section 79 of the EPA defines, amongst other things, smoke, fumes, dust and smells emitted from industrial, trade or business premises so as to be prejudicial to health or a nuisance, as a potential Statutory Nuisance.

Fractions of dust greater than 10µm (i.e. greater than PM_{10}) in diameter typically relate to nuisance effects as opposed to potential health effects and therefore are not covered within the UK AQS. In legislation, there are currently no numerical limits in terms of what level of dust deposition constitutes a nuisance.

2.6 Applied Air Quality Assessment Levels

The standards applied in this assessment are shown in Table 2-1.

Table 2-1
Applied Air Quality Assessment Levels (µg/m³)

Pollutant	Standard (µg/m³)	Measured As	Equivalent percentile
Particles (PM_{10})	40	Annual Mean	-
	50	24-hour mean	90.41st percentile of 24-hour means (equivalent to 35 24-hour exceedances)
Particles ($PM_{2.5}$)	25	Annual Mean	-

In accordance with the DEFRA technical guidance on Local Air Quality Management (LAQM.TG(22)), the AQALs should be assessed at locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective. A summary of relevant exposure for the objectives presented in The Air Quality Standards Regulations 2010 (as amended) include Limit Values, Target Values, Objectives, Critical Levels and Exposure Reduction Targets for the protection of human health and the environment (collectively termed Air Quality Assessment Levels (AQAL) throughout this report). Those relevant to this Assessment are presented within **Error! Not a valid bookmark self-reference.**.

are shown below in Table 2-2.

Table 2-2
Human Health Relevant Exposure

AQAL Averaging Period	Relevant Locations	AQALs should apply at	AQALs should not apply at
Annual Mean	Where individuals are exposed for a cumulative period of 6-months in a year	Building facades of residential properties, schools, hospitals etc.	Facades of offices Hotels Gardens of residences Kerbside sites

[2] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit.

AQAL Averaging Period	Relevant Locations	AQALs should apply at	AQALs should not apply at
24-hour mean	Where individuals may be exposed for eight hours or more in a day	As above together with hotels and gardens of residential properties	Kerbside sites where public exposure is expected to be short term

2.7 Assessment Guidance

2.7.1 Local Air Quality Management Technical Guidance

Defra Local Air Quality Management Technical Guidance[3] (LAQM.TG(22)) was published for use by local authorities in their LAQM review and assessment work. The document provides key guidance in aspects of air quality assessment, including screening, use of monitoring data, and use of background data that are applicable to all air quality assessments.

2.7.2 Dust Assessment Guidance

The Institute of Air Quality Management (IAQM) published the document '*Guidance on the Assessment of Mineral Dust Impacts for Planning*'[4] in June 2016. The structured methodology outlined in the guidance facilitates the assessment of impacts and consideration of their significance through application of a Source-Pathway-Receptor (S-P-R) conceptual model.

Although this guidance is designed for the planning process of mineral developments, the guidance may be applied independent of the planning process. The guidance is focused around mineral extraction operations, however the majority of the associated processes are applicable for aggregate processing operations (i.e. mineral transportation, handling, stockpiling and processing).

[3] Defra Local Air Quality Management Technical Guidance, dated February 2018.
[4] IAQM, Guidance on the Assessment of Mineral Dust Impacts for Planning, V1.1, May 2016.

3.0 ASSESSMENT METHODOLOGY

The assessment of fugitive dust emissions from the Proposed Facility has been undertaken on the basis of a S-P-R conceptual model as outlined per the IAQM Assessment of Mineral Dust Impacts for Planning. The conceptual model takes into consideration the potential dust sources, surrounding sensitive receptors and the pathway effectiveness between source(s) and receptor(s) in order to assess the magnitude of dust impact risk.

Specifically the following aspects are reviewed:

- the type of activities proposed on Site, including designed-in mitigation measures, in order to determine:
  - the potential magnitude of releases in general terms; and
  - the nature of that release;
- the location of receptors in the surrounding area with specific consideration of the type of receptor and therefore their potential sensitivity to dust; and
- the pathway between source and receptors incorporating the buffer distance between receptors and any mitigating features and the frequency of meteorological conditions likely to result in the dispersion of emissions towards receptors (i.e. dry periods where wind speeds are low).

Following determination of dust impact risk, the guidance provides a framework from which to determine impact significance.

4.0 BASELINE ENVIRONMENT

4.1 Site Setting and Sensitive Receptors

The Site is located approximately 500m south of the village of Lound and 400m south east of the village of Sutton-cum-Lound. Retford is located approximately 1.5km south of the Site. The Site is located at the approximate National Grid Reference (NGR): x468900, y384150. The Site is located within the administrative area of Bassetlaw District Council (BDC) in a relatively isolated location within a predominantly flat, low-lying rural agricultural setting.

The Site is bounded by:

- the Wetlands Fishery immediately to the north of the site among agricultural land; the Idle Valley Nature Reserve is located to the north east as well as a collection of commercial properties;
- the River Idle runs to the east of the site, with a number of large surface water features associated with former minerals workings alongside, as well as the Sutton & Lound Gravel Pits Site of Special Scientific Interest (SSSI);
- south of the site is predominantly bounded by the Sutton & Lound Gravel Pits SSSI as well as agricultural fields; and
- a collection of residential dwellings among agricultural land lies to the west as well as Sutton-Cum-Lound

Primary vehicular access to the Site will be via the south of the Site off from the A638, North Road. The Site setting and receptor locations (as described in the following sections) are presented in Figure 4-1.

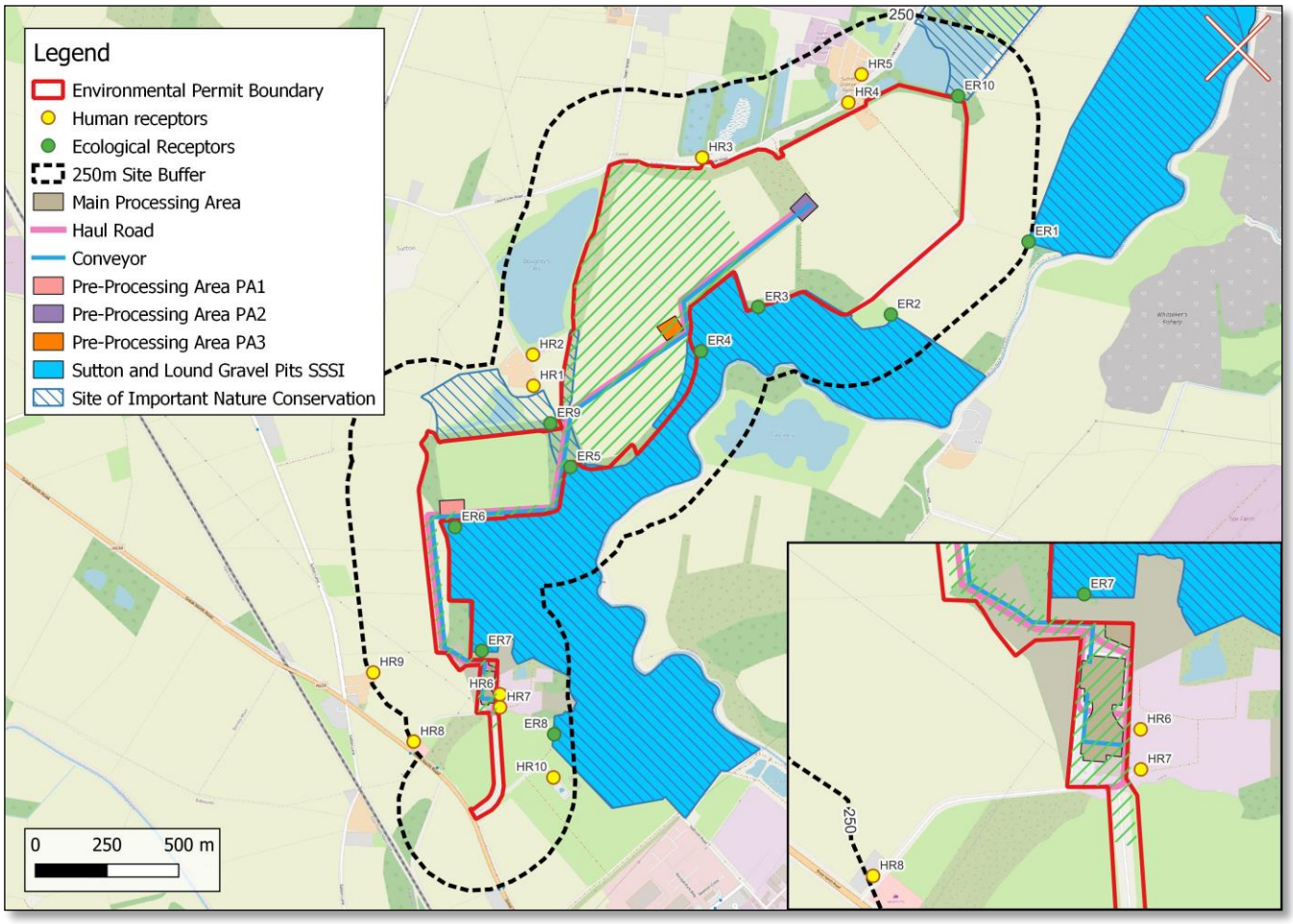

Figure 4-1
Site Setting

4.1.1 Human Receptors

The term 'sensitive receptors' includes any persons, locations or systems that may be susceptible to changes as a consequence of the potential dust emissions from the Site. The most sensitive receptors to dust emissions would be residential properties and amenity areas, with commercial or industrial receptors typically having a lower sensitivity due to the reduced frequency of occupation and amenity expectations.

Receptors in proximity to the Site with a sensitivity to dust have been identified and presented in Table 4-1; these are considered to present the closest receptor locations in each direction and are not considered to be exhaustive. The sensitivity applied to each receptor has been based on the relevant IAQM guidance.

Table 4-1
Human Receptors

Receptor(s)		Receptor Type	Sensitivity to Dust	Direction from the Site Boundary	Distance from Site Boundary (m)
HR1	South Sutton Lake	Residential	High	W	110
HR2	South Sutton Lake	Residential	High	W	130

Receptor(s)		Receptor Type	Sensitivity to Dust	Direction from the Site Boundary	Distance from Site Boundary (m)
HR3	Wetland Visitor Centre Lound Low Road	Residential / Commercial	High	N	40
HR4	Lound Low Road	Residential	High	N	40
HR5	Lound Low Road	Industrial/ Agricultural/ Residential	High	N	90
HR6	North Road, A638	Industrial	Medium	E	At Boundary
HR7	North Road, A683	Industrial	Medium	E	At Boundary
HR8	Northwood Drive	Residential	High	SW	240
HR9	Sutton Lane	Residential	High	W	230
HR10	Idle Valley Nature Reserve Car Park	Recreational	Low	SE	185

4.1.2 Ecological Receptors

In line with relevant guidance, this assessment has considered sensitive ecological designations within 250m of the Site operations. A review was has been undertaken using the Magic web-based mapping service to identify potentially sensitive designated sites of ecological or nature conservation importance within 250m of the Site operations required for consideration within the assessment.

There is a single statutory designated site located within 250m of the Site operations; Sutton and Lound Gravel Pits SSSI, located to the south and east. The SSSI area also contains areas of the Tiln Wood grassland Site of Important Nature Conservation (SINC), which also occupies a smaller area to the northeast of the Site, as presented in Figure 4-1.

A selection of discrete receptors has been identified to represent the area of the SSSI and SINC, as presented in Figure 4-1 and Table 4-2. The sensitivity applied to each receptor has been based on the IAQM guidance.

Table 4-2
Ecological Receptors

Receptor	Name of Designation(s)	Designation	Sensitivity to dust	Distance from boundary (m)	Direction from the site boundary
ER1	Sutton and Lound Gravel Pits	SSSI / SINC	Medium	250	SE
ER2	Sutton and Lound Gravel Pits / Tiln Wood Grassland	SSSI / SINC	Medium	80	SE
ER3	Sutton and Lound Gravel Pits / Tiln Wood Grassland	SSSI / SINC	Medium	<10	S
ER4	Sutton and Lound Gravel Pits / Tiln Wood Grassland	SSSI / SINC	Medium	<10	E
ER5	Sutton and Lound Gravel Pits / Tiln Wood Grassland	SSSI / SINC	Medium	<10	S
ER6	Sutton and Lound Gravel Pits / Tiln Wood Grassland	SSSI / SINC	Medium	<10	S
ER7	Sutton and Lound Gravel Pits / Tiln Wood Grassland	SSSI / SINC	Medium	30	N
ER8	Sutton and Lound Gravel Pits / Tiln Wood Grassland	SSSI / SINC	Medium	190	E
ER9	Tiln Wood Grassland	SINC	Low	<10	N
ER10	Tiln Wood Grassland	SINC	Low	<10	N

4.2 Ambient Air Quality

Monitoring data collected prior to the COVID-19 pandemic (i.e. pre-2020) has been used to characterise the baseline environment, as pollutant concentrations monitored during 2020 and 2021 are expected to be atypical, and not representative of the local environment. This approach is in line with the IAQM position statement, which recommends the following:

> *"If you are carrying out an air quality study that includes validation against monitoring data, use 2019 monitoring data as the last typical year."*

The latest publicly available data for automatic monitoring stations at the time of writing is for 2021. Therefore, the data presented for 2021 and 2020 were potentially impacted by the COVID-19 pandemic. As such, 2020 data have not been presented and has been discounted from further consideration.

4.2.1 Local Air Quality Management

The Site is located within the administrative area of BDC; there are no AQMA declared in BDC, the nearest AQMA is located within Doncaster Council's (DC) administrative boundary, approximately 16.2km north of the Site. The proximity to any AQMA has therefore not been considered further.

4.2.2 Automatic Air Quality Monitoring

A review of national and local air quality monitoring networks has been undertaken to identify relevant monitoring locations within proximity and/or of relevance to the Site.

The nearest automatic monitor to the Site is located approximately 2.1km south east of the site in the centre of Retford. Given the separation distance to the Site and the difference in land designation, air quality monitoring has not been considered further as it is unlikely to be representative of the Site locale.

4.2.3 Modelled Background Pollutant Concentrations

Background pollutant concentration data on a 1km x 1km spatial resolution is provided by Defra through the UK AIR website and is routinely used to support LAQM and Air Quality Assessments. Background pollutant concentrations for PM_{10} and $PM_{2.5}$ are based upon a 2018 base year and projected to future years[5]. The background concentration for the grid square containing the Site and nearby receptors is presented in Table 4-3. These have been calculated for the current year of 2023.

Table 4-3
Annual Mean Background Concentrations (2023)

Grid Square (X,Y)	Annual Mean Concentration (µg/m3)	
	PM_{10}	$PM_{2.5}$
470500, 385500	11.3	6.5
469500, 385500	12.2	6.7
470500, 384500	13.3	7.0
469500, 384500	13.4	7.0
468500, 384500	11.2	6.5
468500, 383500	13.5	7.1
468500, 382500	13.5	7.0

4.3 Meteorological Conditions

The most important climatic parameters governing the release and dispersal of fugitive emissions from the Site are:

- wind direction which determines the broad direction of dispersal;
- wind speed which will affect ground level emissions by increasing the initial dilution of pollutants in the emission; and
- rainfall which naturally supresses dust release (>0.2mm/day considered sufficient to suppress dust).

A windrose from the Doncaster, Sheffield meteorological observation station (located approximately 13.5km north of the Site), providing the frequency of wind speed and direction, is presented in Figure 4-2 below. Winds from the west and south are most frequent, and winds from northeast are least frequent.

[5] Background mapping data for local authorities – http://uk-air.defra.gov.uk/data/laqm-background-home.

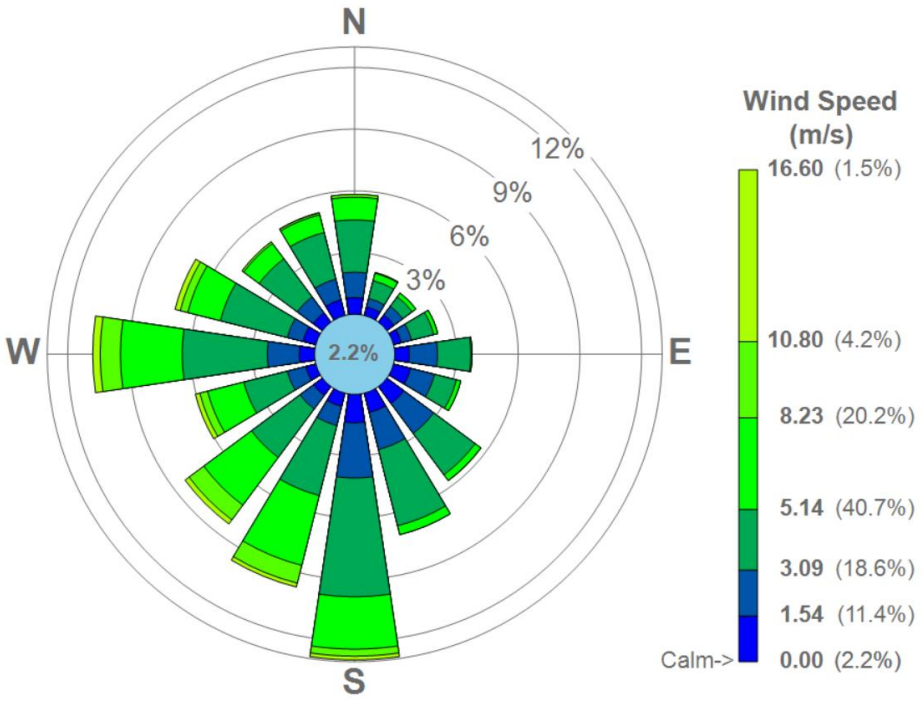

Figure 4-2
Windrose: Doncaster, Sheffield

One of the most important meteorological factors to consider when undertaking assessment of dust is low wind speeds (winds below 5m/s). During periods of low wind speeds, the dispersion of airborne particles/odours is much less effective. Low wind speeds are relatively frequent at approximately 70% of hours, predominantly from the southwestern quadrant. Moderate to high winds (above 5m/s) occur for the remaining hours (approximately 30%), again predominantly form the southwestern quadrant.

Rainfall is also an important climatological parameter supressing the generation of dust. Rainfall greater than 0.2mm per day is considered sufficient to suppress dust emissions.

Relevant rainfall data applicable to the Site has been obtained from the Meteorological Office website[6]. Utilising the map of climate averages from the met office, the number of days with rainfall greater than 0.2mm is between 160 and 170 days per year (~45%).

[6] Meteorological Office, UK Climate Averages https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcjs3tzpf. Accessed December 2022.

5.0 OPERATIONAL PHASE ASSESSMENT

This section presents the potential impacts of dust emissions associated with the proposed operations at the Site.

5.1 Proposed Site Operations

The proposed operations would comprise the extraction, dewatering, processing, storage and transportation of PFA from the former ash disposal lagoons in order to produce a product that meets the 'end-of-waste' criteria required for its use in construction activities. The resultant lagoon voids would be progressively restored using a combination of in-situ overburden and soils and suitable imported inert waste, as required.

The facility would consist of a pre-processing area for initial pre-screening and dewatering of the extracted PFA as well as the main processing area located to the south of the landfill area. The location of the pre-processing area would change as extraction progresses across the Site, referred to as pre-processing sites PA1, PA2 and PA3. Each of the pre-processing sites will cover an area of approximately 3,000 – 6,000m^2 and comprise the following:

- concrete pad or hardstanding;
- storage bays;
- crushing / screening plant; and
- a hopper to transfer the material onto the conveyor and haul road access for transfer to the main processing site.

The main processing site is located on the former Bellmoor Quarry plant site, as shown in Figure 4-1. Extraction of PFA from the lagoons will be carried out in phases at a rate of approximately 300,000 tonnes per annum (tpa). The operations would commence with a site preparation / trial phase (Phase 1) of approximately 6 months (18 months maximum) duration which would consist of the following:

- construction and commissioning of the trial plant at the main processing site;
- construction of haul road and the conveyor (if required) from cell HRP1;
- construction of pre-processing site PA1, with soil and overburden stockpiled to north west of the processing pad; and
- extraction of PFA from HR P1, pre-processing at site PA1 and further processing at the main processing site.

Subsequent phases would see the excavation and processing of PFA from the north-eastern areas of the Site utilising site PA2 (during Phases 2 to 7) and site PA3 (during Phases 8 to 10). The construction of the remaining section of the conveyor / onsite haul road would be undertaken following the completion of the site preparation / trial phase with the decommissioning undertaken on a progressive basis.

PFA would be extracted from the lagoons using mechanical excavators, motor scrapers or similar, and loaded onto articulated dump trucks (ADTs). The ADTs would transport the PFA to the respective pre-processing site for stockpiling, de-watering and initial screening and crushing. Screened PFA is then transferred to the main processing site for further treatment. Oversize material will either be crushed and re-screened where suitable for use, retained in a temporary stockpile in the extraction area for use in progressive restoration works or transferred off site for recovery or disposal at an appropriately permitted facility.

Following the 6 month site preparation and trial phase (Phase 1) it is intended that screened PFA from the pre-processing sites is transferred to the fully enclosed material storage building within the main processing site by an enclosed conveyor. Transfer by vehicle would be used, for example, during conveyor maintenance periods.

PFA would then be fed to the final drying stage which will take place in 10 fully enclosed 'Coomtech' modules to dry the PFA to achieve levels of ca. 0.5% total moisture. Once processed, the dry PFA will be stored in silos before being bulked in containers for transportation to end-users. All HDVs collecting processed material would enter the Site via the A638 to the south along the existing hard paved access road.

In addition to the operations outlined above, the operations would also include the addition of a weighbridge, office space and staff welfare facilities. Parking provision has been included for both on-site staff and collection vehicles.

The fully enclosed materials storage building and drying plant would operate 24 hour per day, with around 1 month of down time for maintenance per year. This would allow for material to be constantly dried and transferred to storage silos, allowing production of up to around 300k tonnes of product per annum.

All other operations, including extraction, export off site and deliveries to site would be limited to between the hours of 09:00 and 19:00 hrs Monday to Friday, 07:00 to 13:00 on Saturdays, with no working on Sundays or bank holidays.

Vehicular movements generated would be in the region of 12 to 18 HDV movements per hour during Phase 1, reducing to around 8 HDV movements per hour across the subsequent Phases.

5.2 Designed-In Mitigation Measures

The extraction, processing, transfer and storage of PFA has the potential to create dust emissions. A range of dust mitigation measures have been incorporated into the scheme design process design, which are as follows:

Table 5-1
Designed In Mitigation Measures

Site Operation / Area	Dust Control Measures
Pre-processing	Pre-processing areas located >250m from any residential receptors Finley Screen supplied with canvas dust covers on mains and fines conveyor Constructed hard standing area of up to ~6k square metres 3-sided bays for storage and turning of PFA No stockpiles of PFA to remain at the end of each working day Hard paved to allow surface to be swept and effectively watered
Main Processing Area	Hard paved to allow surface to be swept and effectively watered Designated collection area Enclosed material storage building, kept under negative pressure with extraction system fitted with filters All processing plant fully enclosed, with the exhaust from the dryers passing through cyclone and fabric filters prior to release to atmosphere PFA transfer fully enclosed via covered conveyors / piping
Material transfer	Transfer of PFA done by fully covered conveyor or covered vehicle when conveyor is not operational
General	Water availability at all times on site with a dust suppression system utilising a tractor and bowser for all internal roads, stockpiles and surfaces, where practicable
Soil and overburden storage	Designated areas on site Graded and vegetated at the earliest opportunity

Site Operation / Area	Dust Control Measures
On-Site transportation	Minimal use of internal unpaved haulage route following the completion of the trial phase (PFA haulage undertaken by covered conveyor and vehicles) Material transfer using articulated dump truck only to be utilised during trial phase and as contingency scenario
Off-Site transportation	All vehicles exiting site to utilise wheel wash located adjacent to weighbridge >400m of hard paved access road between wheel wash and local road network All material transferred off site contained either by powder tankers or sheeted wagons Road sweeper on site for use on local road network, access road and main processing area, as required

5.3 Dust Impact assessment

5.3.1 Dust Soiling Potential

In reference to the proposed operations (as presented in Section 5.1), the following potential sources of dust are identified and their dust potential is presented in Table 5-2.

- on-site vehicle movements;
- material extraction;
- material handling & transfer
- materials processing;
- stockpiles; and
- off-site vehicle movements.

Table 5-2
Potential Sources of Dust

Source	Considerations	Potential
On-Site vehicle movements	Majority of onsite movements restricted the hard paved area of the main processing site, associated with offsite transfers Speed limit of 15mph on site All vehicles exiting site would utilise wheel wash adjacent to weighbridge >500m hard paved access road between main processing site & local road network Onsite material transfers undertaken by enclosed conveyor system 'routine' site operations (i.e. Phases 2 to 10, and when conveyor not operational), ADTs only used from point of extraction to respective pre-processing site. Tractor and Bowser on site to dampen haul roads, as required	Small

Source	Considerations	Potential
Material extraction	Removal of soils and overburden potentially over a large area and considered an intense but short term activity PFA extraction considered to have a low potential for dust generation as the PFA has a moisture content 18% - 47% or average of 31% across the site <5 mobile plant in operation for each extraction location	Soils & Overburden: Medium PFA - Small
Material handling & transfer	PFA transfer from PA2 and PA3 to main processing site during Phases 2 to 10 utilise enclosed conveyor system (ADTs utilised as contingency plan only) Sites PA1, PA2 and PA3 hard paved with low number of plant (<5) required Extracted material has a high moisture content Onsite tractor and bowser to be used, as required Limited onsite movements using ADTs for soil / overburden transfer (Phases 1 to 6 only) Limited onsite movements using ADTs for transfer of PFA from extraction point to designated pre-processing site Once material is either transferred to the conveyor / material storage building, all subsequent transfer and handling operations are fully enclosed Transfer of final product offsite by sealed tankers (processed PFA) or sheeted arctics	Small to Medium
Material Processing	Limited to PA1, PA2 and PA3 (main processing site - all operations fully enclosed) - processing in the region of 1,000 tonnes per day - mobile crushing and screening plant with fitted canvas dust covers - drop heights <5m and 4m for mains and fines conveyor, respectively - hard paved concrete pad with regular sweeping and watering of surface	Pre-Processing Areas: Medium
Material Storage	External storage of PFA primarily limited to PA1, PA2 and PA3: - Hard paved concrete pads with regular sweeping and dampening of surface - Stockpiles cleared at the end of each working day - Designated storage bays with 3 retaining walls - Maximum stockpile of 2,000m^2 (2ha) floorspace Limited, temporary storage of oversize fraction from PFA screening within the lagoon voids External storage of soils and overburden: - During phases 1 to 6 only; - Designated storage areas with surfaces graded and deeded to stabilise surface - After phase 6, it intended that stripped soils would be used directly in restoration;	PFA: Medium Soils & Overburden: Small

Source	Considerations	Potential
Off-Site vehicle movements	Speed limit of 15mph Access road >500m in length and paved (concrete) Restricted access from offsite vehicles beyond the hard paved section of the main processing area All vehicle use onsite wheel wash within main processing area prior to exiting site <125 HDVs per day (as Annual Average Daily Traffic, AADT)) – Phase 1 (6-18 months) <65 HDVs per day (as AADT) for Phases 2 to 10	Negligible

Overall Residual Source Emission & Dust Assessment Scenarios

On the basis of the above, the assessment for each receptor has been based on the maximum residual source magnitude of operations located within the 250m screening distance; as below:

Table 5-3
Activities within 250m of Receptors

Receptor		Activities within 250m	Applied RSE
HR1	South Sutton Lake Residences	Extraction, soil stripping, stockpiling	Medium
HR2	South Sutton Lake Residences	Extraction, soil stripping, stockpiling	Medium
HR3	Residences / Wetland Visitor Centre, Lound Low Road	Extraction, pre-processing site PA2, stockpiling	Medium
HR4	Lound Low Road	Extraction, soil stripping, stockpiling	Medium
HR5	Lound Low Road	Extraction, soil stripping, stockpiling	Medium
HR6	North Road, A638	Main Processing Area	Small
HR7	North Road, A683	Main Processing Area	Small
HR8	Northwood Drive	Main Processing Area	Small
HR9	Sutton Lane	Main Processing Area	Small
HR10	Idle Valley Nature Reserve Car Park	Main Processing Area	Small
ER1	SSSI / SINC	-	-
ER2	SSSI / SINC	Extraction, soil stripping, stockpiling	Medium
ER3	SSSI / SINC	Extraction, soil stripping, stockpiling	Medium
ER4	SSSI / SINC	Extraction, pre-processing site PA3, stockpiling	Medium
ER5	SSSI / SINC	Extraction, soil stripping, stockpiling	Medium
ER6	SSSI / SINC	Extraction, soil stripping, stockpiling, on-site transport	Medium

Receptor		Activities within 250m	Applied RSE
ER7	SSSI / SINC	Main Processing Area, on-site transport	Low - Medium
ER8	SSSI / SINC	Main Processing Area	Low
ER9	SINC	Extraction, soil stripping, stockpiling	Medium
ER10	SINC	Extraction, soil stripping, stockpiling	Medium

To allow the dust assessment to represent the proposed phasing of the proposed facility, three scenarios have been assessed. These are based upon the progressive extraction / restoration phases and the 3 pre-processing site locations. The main processing site would remain operational throughout all scenarios:

- Scenario A: Extraction of PFA with pre-processing at PA1 and transfer by ADTs to main processing site;
- Scenario B: Extraction of PFA with pre-processing at PA2 and transfer by conveyor to main processing site; and
- Scenario C: Extraction of PFA with pre-processing at PA3 and transfer by conveyor to main processing site.

5.3.2 Likely Magnitude of Dust Risk

In reference to the methodology outlined in the IAQM mineral dust guidance, the likely magnitude of dust effects has been determined by consideration of the residual source emission and the pathway effectiveness for each scenario in the following sections.

On Site Operations: Scenario A

Scenario A represents the trial phase of approximately 6 months (up to 18 months) which would also include a degree of site preparation works, including the construction and trial of the main plant, the construction of the of the internal haul roads and conveyor system up to HR P1 and the construction of pre-processing site PA1 with soils and overburden stockpiled to the northwest of the processing pad. Extraction of PFA within cell HRP1 would be undertaken with with pre-processing at PA1 and transfer by ADTs to main processing site.

Figure 5-1 presents the site layout and areas that have the potential to generate dust emissions during Scenario A.

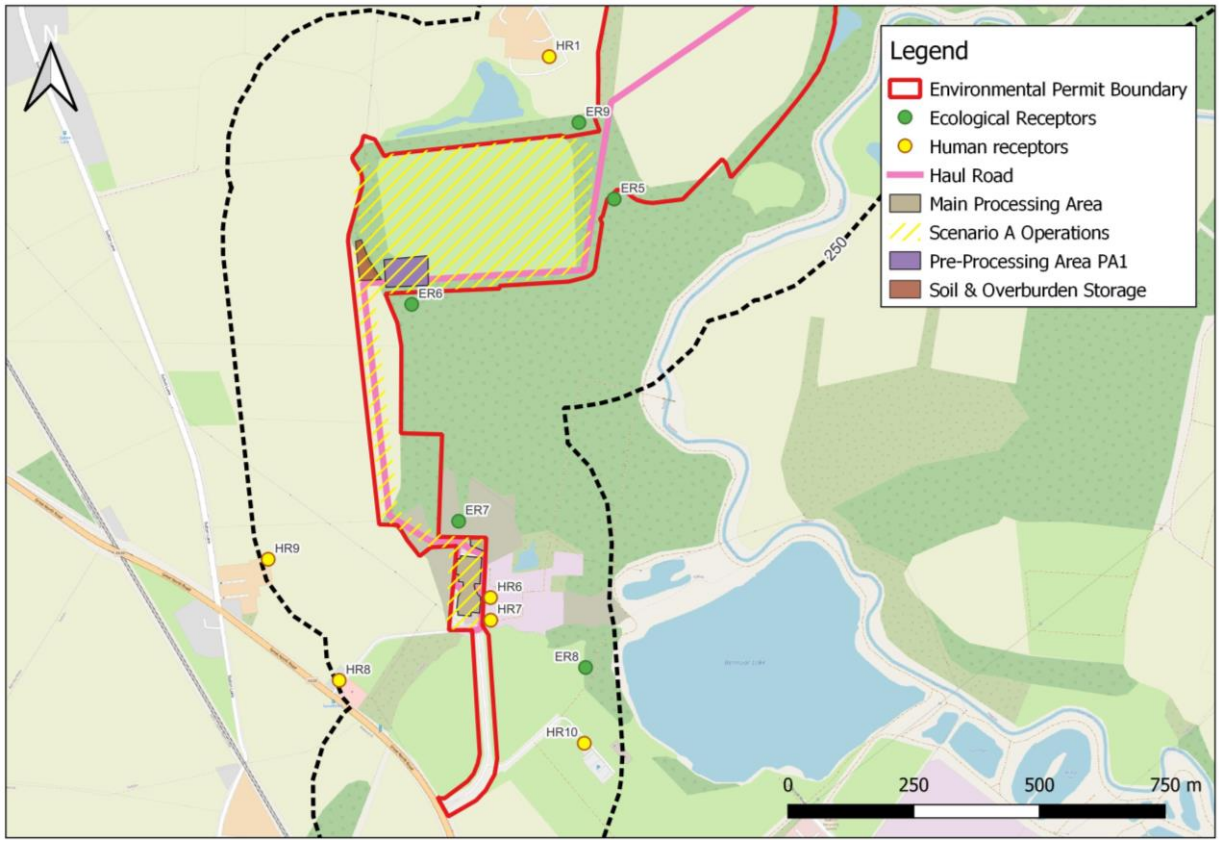

Figure 5-1
Dust Assessment: Scenario A

The pathway effectiveness between sources and receptors and the determined impact risk and magnitude of dust effects in accordance with the IAQM methodology is presented in Tables 5-4 and 5-5.

Table 5-4
Determination of Pathway Effectiveness: On-Site Operations Scenario A

Receptor		Distance to Nearest Source (m)	% Affected Wind Speed >5 m/s	Frequency Category	Pathway Effectiveness
HR1	South Sutton Lake	150	9.1	Moderately Frequent	Moderately Effective
HR6	North Road, A638	<20	15.4	Frequent	Highly Effective
HR7	North Road, A683	<20	9.4	Moderately Frequent	Moderately Effective
HR8	Northwood Drive	240	0.5	Infrequent	Ineffective
HR9	Sutton Lane	230	0.5	Infrequent	Ineffective
HR10	Idle Valley Nature Reserve Car Park	175	6.3	Moderately Frequent	Moderately Effective
ER5	SSSI / SINC	<20	14.8	Frequent	Highly Effective
ER6	SSSI / SINC	<20	17.9	Frequent	Highly Effective
ER7	SSSI / SINC	<20	18.1	Frequent	Highly Effective

Receptor		Distance to Nearest Source (m)	% Affected Wind Speed >5 m/s	Frequency Category	Pathway Effectiveness
ER8	SSSI / SINC	190	3.53	Infrequent	Ineffective
ER9	SINC	<20	11.5	Moderately Frequent	Ineffective

Table 5-5
Determination of Likely Dust Effects: On-Site Operations, Scenario A

Receptor		Residual Source Emissions	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust effects
HR1	South Sutton Lake	Medium	Moderately Effective	Low Risk	High	Slight adverse
HR6	North Road, A638	Small	Highly Effective	Negligible	Medium	Negligible
HR7	North Road, A683	Small	Moderately Effective	Negligible	Medium	Negligible
HR8	Northwood Drive	Small	Ineffective	Negligible	High	Negligible
HR9	Sutton Lane	Small	Ineffective	Negligible	High	Negligible
HR10	Idle Valley Nature Reserve Car Park	Small	Moderately Effective	Negligible	High	Negligible
ER5	SSSI / SINC	Medium	Highly Effective	Medium	Medium	Slight Adverse
ER6	SSSI / SINC	Medium	Highly Effective	Medium	Medium	Slight Adverse
ER7	SSSI / SINC	Small	Highly Effective	Negligible	Medium	Negligible Effect
ER8	SSSI / SINC	Small	Ineffective	Negligible	Medium	Negligible Effect
ER9	SINC	Medium	Ineffective	Negligible	Low	Negligible Effect

From the tables above, it is predicted that the likely dust effects as a result of the proposed operations during Scenario A is predicted to be Negligible to Slight Adverse, in consideration of the designed in mitigation measures. This slight adverse dust effects are principally associated with activities of 'medium' residual source potential within 250m of receptors. For receptors HR1, ER5 and ER6, this potentially comprises the activities of extraction, soil stripping, stockpiling and on-site transport. All other receptors have identified as having a 'negligible' effect.

The likely significance of effects as a result of dust generation during Scenario A of the Proposed Facility is therefore considered 'not significant' at all identified and considered receptor locations in accordance with the IAQM guidance.

On Site Operations: Scenario B

The initial months of Scenario B would comprise the construction of the remaining length of internal haul road and conveyor system up to Cell LR P1 and the construction of PA2. Routine operations in Scenario B would see extraction of PFA from cells LRP1 to LRP5 and HRP2 to HRP3 with pre-processing undertaken at PA2 and material transferred the mains processing site by conveyor.

Figure 5-2 presents the site layout and areas that have the potential to generate dust emissions during Scenario B.

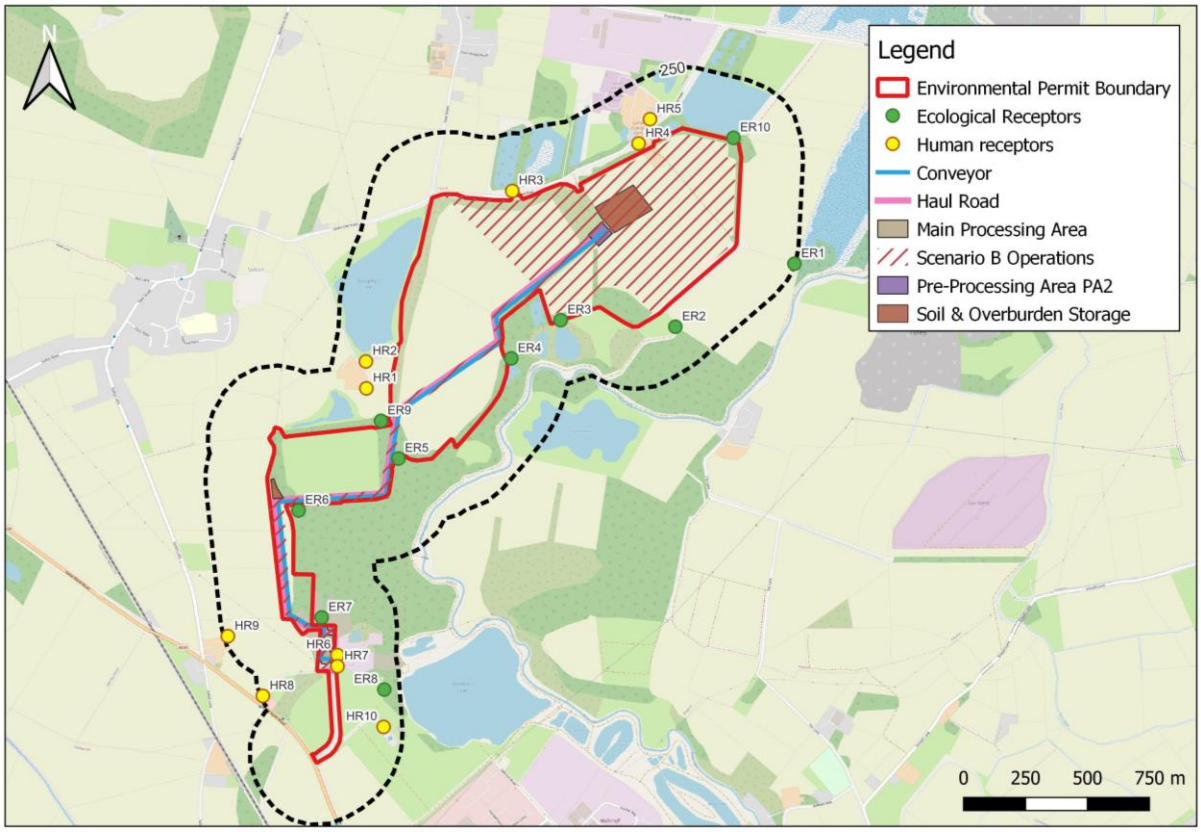

Figure 5-2
Dust Assessment: Scenario B

The pathway effectiveness between sources and receptors and the determined impact risk and magnitude of dust effects in accordance with the IAQM methodology is presented in Tables 5-6 and 5-7.

Table 5-6
Determination of Pathway Effectiveness: On-Site Operations Scenario B

Receptor		Distance to Nearest Source (m)	% Affected Wind Speed >5 m/s	Frequency Category	Pathway Effectiveness
HR1	South Sutton Lake	140	1.7	Infrequent	Ineffective
HR2	South Sutton Lake	225	1.0	Infrequent	Ineffective
HR3	Residences / Wetland Visitor Centre	40	13.9	Frequent	Highly Effective
HR4	Lound Low Road	40	8.6	Moderately Frequent	Moderately Effective
HR5	Lound Low Road	110	6.7	Moderately Frequent	Moderately Effective
HR6	North Road, A638	<20	15.4	Frequent	Highly Effective
HR7	North Road, A683	<20	9.4	Moderately Frequent	Moderately Effective

Receptor		Distance to Nearest Source (m)	% Affected Wind Speed >5 m/s	Frequency Category	Pathway Effectiveness
HR8	Northwood Drive	240	0.5	Infrequent	Ineffective
HR9	Sutton Lane	230	0.5	Infrequent	Ineffective
HR10	Idle Valley Nature Reserve Car Park	175	6.3	Moderately Frequent	Moderately Effective
ER2	SSSI / SINC	110	7.1	Moderately Frequent	Moderately Effective
ER3	SSSI / SINC	<20	3.3	Infrequent	Ineffective
ER7	SSSI / SINC	<20	9.4	Moderately Frequent	Moderately Effective
ER8	SSSI / SINC	190	3.53	Infrequent	Ineffective
ER10	SINC	<20	14.3	Frequent	Highly Effective

Table 5-7
Determination of Likely Dust Effects: On-Site Operations, Scenario B

Receptor		Residual Source Emissions	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust effects
HR1	South Sutton Lake	Medium	Ineffective	Negligible Risk	High	Negligible Effect
HR2	South Sutton Lake	Medium	Ineffective	Negligible Risk	High	Negligible Effect
HR3	Residences / Wetland Visitor Centre	Medium	Highly Effective	Medium Risk	High	Moderate Adverse Effect
HR4	Lound Low Road	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect
HR5	Lound Low Road	Medium	Moderately Effective	Low Risk	High	Slight Adverse Effect
HR6	North Road, A638	Small	Highly Effective	Negligible Risk	Medium	Negligible Effect
HR7	North Road, A683	Small	Moderately Effective	Negligible Risk	Medium	Negligible Effect
HR8	Northwood Drive	Small	Ineffective	Negligible Risk	High	Negligible Effect
HR9	Sutton Lane	Small	Ineffective	Negligible Risk	High	Negligible Effect
HR10	Idle Valley Nature Reserve Car Park	Small	Moderately Effective	Negligible Risk	High	Negligible Effect
ER2	SSSI / SINC	Medium	Moderately Effective	Low Risk	Medium	Negligible Effect

Receptor		Residual Source Emissions	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust effects
ER3	SSSI / SINC	Medium	Ineffective	Negligible Risk	Medium	Negligible Effect
ER7	SSSI / SINC	Small	Moderately Effective	Negligible Risk	Medium	Negligible Effect
ER8	SSSI / SINC	Small	Ineffective	Negligible Risk	Medium	Negligible Effect
ER10	SINC	Medium	Highly Effective	Medium Risk	Low	Negligible Effect

From the tables above, it is predicted that the likely dust effects as a result of the proposed operations during Scenario B (i.e. the extraction of material destined for pre-processing within PR2) is predicted to be Negligible at the majority of receptors, with three receptors showing a Slight Adverse to Moderate Adverse effect, in consideration of the designed in mitigation measures. The single Moderate Adverse and the two Slight Adverse dust effects at the receptors HR3, HR4 and HR5 are principally associated with activities of 'medium' residual source potential, comprising extraction, soil stripping and stockpiling. There are no pre-processing areas within 250m of the identified human receptors.

The likely significance of effects as a result of dust generation during Scenario B of the Proposed Facility is therefore considered 'not significant' at all identified and considered receptor locations in accordance with the IAQM guidance

On Site Operations: Scenario C

The initial months of Scenario C would comprise the construction of PA3 alongside the decommission of the conveyor / haul road between PA2 and PA3 as part of the progressive restoration works. Routine operations in Scenario C would see extraction of PFA from cells HRP3 to HRP6 with pre-processing undertaken at PA3 and material transferred to the main processing site by conveyor.

Figure 5-3 presents the site layout and areas that have the potential to generate dust emissions during Scenario C.

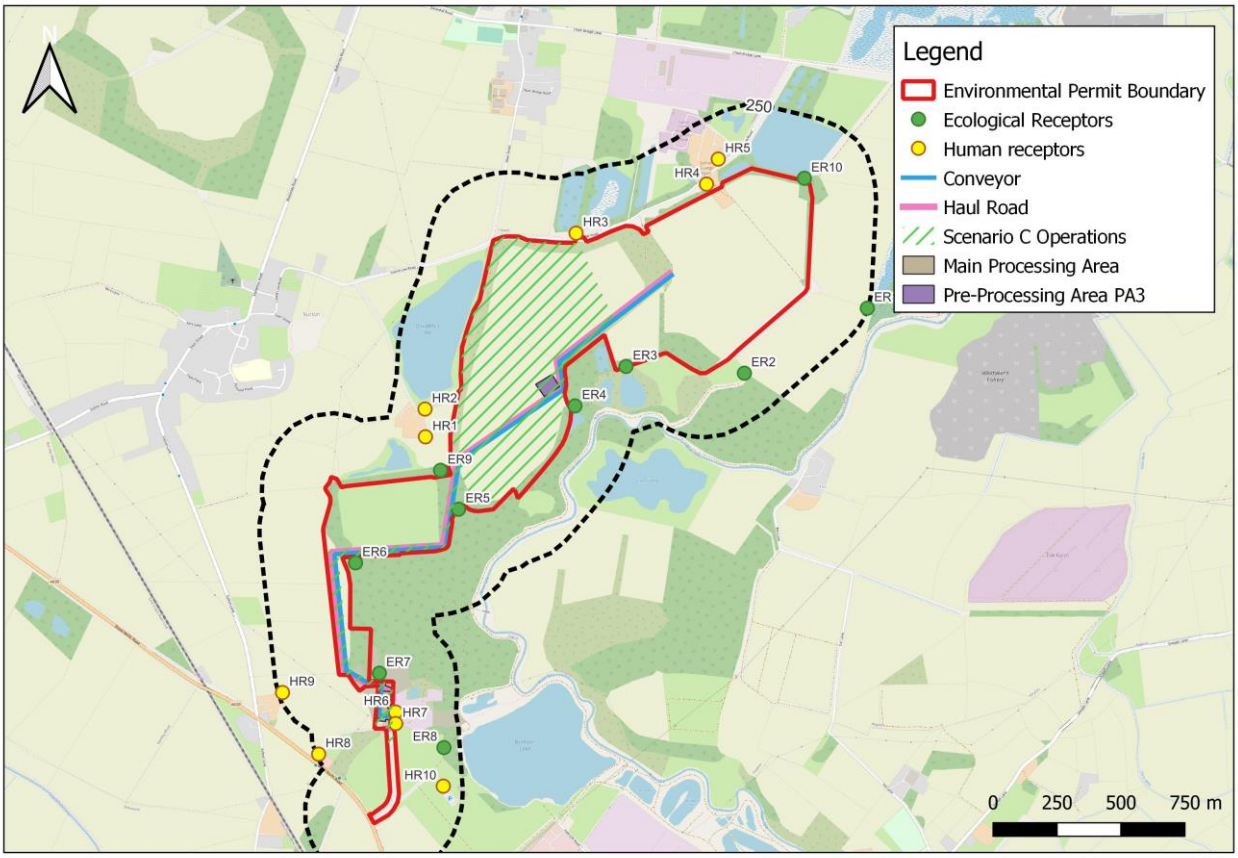

Figure 5-3
Dust Assessment: Scenario C

The pathway effectiveness between sources and receptors and the determined impact risk and magnitude of dust effects in accordance with the IAQM methodology is presented in Tables 5-8 and 5-9.

Table 5-8
Determination of Pathway Effectiveness: On-Site Operations Scenario C

Receptor		Distance to Nearest Source (m)	% Affected Wind Speed >5 m/s	Frequency Category	Pathway Effectiveness
HR1	South Sutton Lake Residences	110	1.9	Infrequent	Ineffective
HR2	South Sutton Lake Residences	130	1.9	Infrequent	Ineffective
HR3	Residences / Wetland Visitor Centre	40	13.3	Frequent	Highly Effective
HR6	North Road, A638	<20	15.4	Frequent	Highly Effective
HR7	North Road, A683	<20	9.4	Moderately Frequent	Moderately Effective
HR8	Northwood Drive	240	0.5	Infrequent	Ineffective

Receptor		Distance to Nearest Source (m)	% Affected Wind Speed >5 m/s	Frequency Category	Pathway Effectiveness
HR9	Sutton Lane	230	0.5	Infrequent	Ineffective
HR10	Idle Valley Nature Reserve Car Park	175	6.3	Moderately Frequent	Moderately Effective
ER3	SSSI / SINC	140	10.0	Moderately Frequent	Moderately Effective
ER4	SSSI / SINC	<20	15.6	Frequent	Highly Effective
ER5	SSSI / SINC	<20	1.8	Infrequent	Ineffective
ER7	SSSI / SINC	<20	9.4	Moderately Frequent	Moderately Effective
ER8	SSSI / SINC	190	3.5	Infrequent	Ineffective
ER9	SINC	<20	1.9	Infrequent	Ineffective

Table 5-9
Determination of Likely Dust Effects: On-Site Operations, Scenario C

Receptor		Residual Source Emissions	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust effects
HR1	South Sutton Lake Residences	Medium	Ineffective	Negligible Risk	High	Negligible Effect
HR2	South Sutton Lake Residences	Medium	Ineffective	Negligible Risk	High	Negligible Effect
HR3	Residences / Wetland Visitor Centre	Medium	Highly Effective	Medium Risk	High	Moderate Adverse
HR6	North Road, A638	Small	Highly Effective	Negligible Risk	Medium	Negligible Effect
HR7	North Road, A683	Small	Moderately Effective	Negligible Risk	Medium	Negligible Effect
HR8	Northwood Drive	Small	Ineffective	Negligible Risk	High	Negligible Effect
HR9	Sutton Lane	Small	Ineffective	Negligible Risk	High	Negligible Effect
HR10	Idle Valley Nature Reserve Car Park	Small	Moderately Effective	Negligible Risk	High	Negligible Effect
ER3	SSSI / SINC	Medium	Moderately Effective	Low Risk	Medium	Negligible Effect
ER4	SSSI / SINC	Medium	Highly Effective	Medium Risk	Medium	Slight Adverse Effect
ER5	SSSI / SINC	Medium	Ineffective	Negligible Risk	Medium	Negligible Effect

Receptor		Residual Source Emissions	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust effects
ER7	SSSI / SINC	Low	Moderately Effective	Negligible Risk	Medium	Negligible Effect
ER8	SSSI / SINC	Low	Ineffective	Negligible Risk	Medium	Negligible Effect
ER9	SINC	Medium	Ineffective	Negligible Risk	Low	Negligible Effect

From the tables above, it is predicted that the likely dust effects as a result of the proposed operations during Scenario C (i.e. the extraction of material destined for pre-processing within PR3) is predicted to be Negligible at the majority of receptors, with two receptors showing a Slight and Moderate Adverse effect, in consideration of the designed in mitigation measures. These adverse dust effects at the receptor of HR3 and ER4, and are associated with activities of 'medium' residual source potential; comprising extraction, soil stripping and stockpiling. The slight adverse effects predicted at ER4 is likely attributable to the proximity of activities within pre-processing area PR3 and extraction activities within the western areas of cells HR P4, P5 and P6. All other receptors have identified as having a 'negligible' effect.

The likely significance of effects as a result of dust generation during Scenario C of the Proposed Facility is therefore considered 'not significant' at all identified and considered receptor locations in accordance with the IAQM guidance

5.3.3 PM_{10} Generation Potential

The assessment of PM_{10} follows the key elements as recommended within the IAQM Minerals guidance, whilst incorporating the AQAL for England. The likelihood of exceedance of the PM_{10} AQAL as a result of the Proposed Facility has been assessed.

The IAQM minerals guidance states that if the PM_{10} background concentration is less than 17µg/m³ it is considered unlikely that any Process Contribution from the Proposed Facility would lead to an exceedance of the annual mean AQAL.

The existing air quality, in terms of annual PM_{10}, has been taken from the Defra background maps in the absence of any background monitoring in proximity to the Site. On the basis of the background concentrations in the local area being consistently below 17µg/m³ it is considered that in the absence of additional mitigation, the impact of the Proposed Facility on human health from emissions of PM_{10} will be negligible.

6.0 MITIGATION MEASURES

Designed in mitigation measures have been taken into account during the assessment process, as detailed in Section 5.2.

6.1 Operational Dust Controls

The level of dust control incorporated into the proposed activities is considered to be satisfactory. Recommendations on additional controls and dust management to further reduce residual effects are presented below.

The overall effects from deposited dust and PM_{10} concentrations associated with the Proposed Facility have been determined as 'not significant' and it is therefore considered that the designed in measures to control dust are sufficient. To ensure residual effects are kept to a minimum, it is recommended that industrial good practice dust control measures are implemented during the Proposed Facility, such as those summarised in Table 6-1.

Table 6-1
Recommended Mitigation Measures

Site Operation	Dust Control Measures
Design and Location of Dust Generating Activities	PFA stockpiles to be located as far from sensitive receptors as possible (i.e. a minimum of 200m from off-site residential receptors
	Haul roads within the lagoons should be designed to minimise distance to the respective Processing Area and to locate routes away from off-site residential receptors where practicable.
Management	Prepare a Dust Management Plan (DMP).
	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.
Training	Provide training to the site personnel on dust mitigation.
Monitoring	Visual monitoring undertaken a spart of routine operations, targeted boundary monitoring in response to incidents or complaints. Methodology to be included within the DMP.
Operation Planning	Activities in close proximity to offsite residential receptors should ideally be planned only during favourable weather conditions. Where possible, particularly dusty activities should be avoided during extended periods of dry and windy conditions.
Soil & Overburden Stripping	Vegetation removal & soil stripping should be undertaken in discrete phases
On-site Transportation	Wetting of unpaved haul roads shall be undertaken in dry conditions using a towed water bowser with a frequency sufficient for the ground conditions
Processing	Drop heights of material shall be minimised and whenever possible loading shall take place at sheltered points around the stockpile

Site Operation	Dust Control Measures
Stockpiles	Long-term stockpiles of oversized PFA in lagoon voids – material shall be covered to prevent any wind whipping, or dampened down until a surface crust has been formed
General	Maintain good standards for all plant and equipment, ensuring all servicing and routine inspections are undertaken as required and recorded in the site log book.

6.2 Residual Effects

Residual effects are those impacts that cannot be reasonably mitigated. As set out in Section 5.0, appropriate dust mitigation and controls are proposed as part of the scheme design. Such measures are generally accepted by regulatory bodies and the mineral industry and providing effective control against the impacts of airborne dust.

Assuming the implementation of the dust controls and recommendations listed, there are considered to be negligible risk of adverse effects during the construction and operation of the Proposed Facility.

7.0 SUMMARY AND CONCLUSIONS

This dust assessment has assessed the potential impacts of dust on air quality and local amenity associated with the proposed PFA extraction and processing facility. The potential impact associated with the dust emissions on human and ecological receptor locations within the Site locale have been assessed used methodologies as outlined within the IAQM minerals dust guidance.

The conclusions of the assessment are that the proposed operations would result in a ‘not significant’ effect with regard to dust at sensitive receptors within the Site locale, in consideration of the designed-in and recommended mitigation measures.