UMBRELLA ENVIRONMENTAL

PROTECTING YOUR BUSINESS

Emissions Management Plan

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CIWM

Affiliated Organisation 2022

Together, we stand for a world beyond waste

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Application Reference:
EPR/HP3444QP
Document Reference:
016.1_05_005
Issue Date:
20/07/2023

Document Control

Document Title	Reference	Client	Status
Emissions Management Plan	016.1_05_005	Rock Solid Processing Limited	FINAL

Document History

Version	Issue date	Author	Checked	Description
D1	18/11/2022	AIL	AIL	Drafted for bespoke installation application pack, Client review.
V1	30/11/2022	AIL	AIL	Approved by client for submission to Environment Agency (EA).
V2	20/07/2023	AIL	AIL	Following further enhanced pre app advice from the EA further amendments to the activities table to be more reflective of the application.

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1 INTRODUCTION

This Emissions Management Plan (EMP) accompanies the application for a bespoke waste installation by Umbrella Environmental Limited on behalf of Rock Solid Processing Limited EPR/HP3444QP at Bromborough South Dock CH62 4RY. The site location is shown in Figure 1 Site Location.

Rock Solid are contracted to reprocess the IBA arising from the Energy from Waste (EFW) plant at Protos, Grinsome Road, Chester CH2 4RB, Ince and Dublin Waste to Energy Facility, Pigeon House Road, Dublin 4. Eircode: DO4 N2 P2 . Rock Solid already hold a number of contracts of this type across the UK for the reprocessing of Incinerator Bottom Ash (IBA) to produce IBA aggregate (IBAA) and the recovery of ferrous and non-ferrous metals. The resultant products are suitable for use as recycled aggregates in place of virgin materials in unbound and bound applications. Rock Solid Processing Limited's parent company Rock Solid B.V. also have many years' extensive experience of reprocessing IBA and the production of resultant IBA aggregates in the Netherlands.

This will enable the site to divert waste from landfill, the avoidance of virgin material when a waste/secondary aggregate can be used.

Waste that arrives via site from Ireland to dock side is unloaded via bucket loader deposited in to a trailer and is subsequently transported to the site (approx.. 200 m) for sorting and blending meaning the offload/handling of the IBA from the cargo ship onto the trailer is apart of the overall transportation of the ship and the transfer of waste (change of legal ownership) does not happen until it is tipped in the permitted area, All activities waste activities will occur within the permit boundary.

1.1 Site Location

The site is approximately 40174 m^2 and is located at Bromborough South Dock CH62 4RY.

The National Grid Reference (NGR) is SJ 34947 84720, Eastings and Northings 334947 , 384720 and What Three Words location, ladder.values.thick.

The wider industrial area is accessed by the A 41 and New Chester road located to the west of the site, with the site itself accessed by Dock road. The site is bounded to the north west by the Dibbinsdale Brook and Port Sunlight River Park, while to the north east by Mersey Wharf and the River Mersey. The south east boundary is bounded by warehouses operated by Mersey Wharf. The south west boundary is formed by Dock Road South.

Figure 1 Site Location

1.2 Sensitive Receptors

Table 1 Sensitive receptors up to 1 km shows all the sensitive receptors around the site. Most at risk receptors are those located within 300 m and east north east of the site.

Table 1 Sensitive receptors up to 1 km

ID #	DESCRIPTION	DISTANCE FROM BOUNDARY (M) APPROX	DIRECTION
	Site workers	On site	-
	Site visitors	On site	-
	Commercial		
1	Mixed commercial light industrial, shipping etc…..	Adjacent	S
2	Mixed commercial light industrial including shops and supermarkets	383-2000	S
3	Mixed commercial including uni lever site	838	Sw
7	Commercial	591	Nw
8	Commercial	135	W
	Residential		
1	Pool lane, ashton way, boniface close, york street, south view, the green, manor place	185	S
2	Bryce drive, bryce close, hesketh way	1000	Sw

3	Church road, birch road, trafalgar drives andrews road, woodfield road, stanton road, quarry avenue, frairacrres road, high croft avenue	1000	Sw
5	New chester road, shore drive, marine drive, woodhead road, lewisham road, wirral circular trail, portbury way, bolton road, portbury way. Corniche road, lodges lane, dock road, eccleshill road, embankment road, greylands road, lodge lane. Lower road, primrose hill, brook street, windy bank, greendale road, queen marys drive and causeway close.	351	W
	Roads & railways		
	A41 new chester road	721	W
	New ferry by pass	725	W
	RECREATIONAL (Public Use)		
1	Port sunlight river park	20	N
2	Playing field	742	Nnw
3	Shorefields nature park	948	N
8	Playing field	945	Wnw
13	Playing field	433	S
17	Maritime cricket club	128	S
1	Christ church port sunlight	854	W
2	Church drive primary school	917	W
12	Hotel	956	W
18	Rainbow Corner Park	237	SW
	Surface water		
	River mersey	54	N,e
	Dibbinsdale brook	10	Nw
	Inland river not influenced by normal tidal action.	59	Nw
	Inland river not influenced by normal tidal action.	83	Nw
	Inland river not influenced by normal tidal action.	94	Nw
	Inland river not influenced by normal tidal action.	128	Nw
	Inland river not influenced by normal tidal action.	131	Sw
	Inland river not influenced by normal tidal action.	167	Nw
	Inland river not influenced by normal tidal action.	236	Nw
	Designated sites (european) sssi, ramsar spa etc…		
1	New ferry	26	Ne
2	Mersey estuary	695	Se
3	New ferry	83.5	Ne
	Non designated sites (but of impact to permitting)		

2	Deciduous wood land (priority habitat)	476	Ssw
6	Deciduous wood land (priority habitat)	879	W
7	Deciduous wood land (priority habitat)	805	Nw
8	Deciduous wood land (priority habitat)	388	Sse
	Listed buildings and parks		
1	Unichema office building	382	Sw
2	10-16, york street	286	Ssw
3	18-24, york street	289	Ssw
4	26-32, york street	296	Ssw
5	Giles shirley hall	324	S
6	Church of st matthew	348	S
7	The enterprise centre	373	S
8	1 and 2, the green	329	Sse
9	17-23, manor place	338	Ssw
10	25-31, manor place	345	Ssw
11	33-37, manor place	347	Ssw
12	39-45, manor place	355	Ssw
13	47-53, manor place	363	S
14	46-52, manor place	385	S
15	38-44, manor place	376	Ssw
16	22-28, manor place	363	Ssw
17	14-20, manor place	360	Ssw
18	324 and 326, new chester road	725	W
19	320 and 322, new chester road	727	W
20	314-318, new chester road	731	W
21	310 and 312, new chester road	731	W
22	306 and 308, new chester road	738	W
23	302 and 304, new chester road	742	W
24	298 and 300, new chester road	744	W
25	294-296, new chester road	748	W
26	288-292, new chester road	755	W
27	284 and 286, new chester road	758	W
28	276-282, new chester road	764	W
29	64-78, bolton road	805	W
30	1-7, water street	802	W
31	9-21, water street	792	W
32	60 and 62, bolton road, 2 and 4, water street, and 1, 3, and 5, the ginnel	852	W
33	7-23, the ginnel	872	W
34	25-35, the ginnel	895	W

35	71-75, bolton road	788	W
36	268-274, new chester road	787	W
37	262-266, new chester road	796	W
38	256-260, new chester road	807	W
39	250-254, new chester road	815	W
40	244-248, new chester road	822	W
41	240 and 242, new chester road	834	W
42	234-238, new chester road	849	W
43	230 and 232, new chester road	856	W
44	224-228, new chester road	862	W
45	218-222, new chester road	877	W
46	1-5, corniche road	896	W
47	7-15, corniche road	913	W
48	17-23, corniche road	920	W
49	25-29, corniche road	909	W
50	31-35, corniche road	903	W
51	37-41, corniche road	890	W
52	43-47, corniche road	880	W
53	49-53, corniche road	873	W
54	55-59, corniche road	865	W
55	61-67, corniche road	862	W
56	61-69, bolton road (see details for further address information)	851	W
57	The bridge inn	994	W
58	69-75, pool bank (see details for further address information)	990	W
59	12-20, lodge lane	975	W
60	2-10, lodge lane	939	W
61	212-216, new chester road	930	W
62	200-210, new chester road	942	W
63	192-198, new chester road	972	W
64	178-190, new chester road	997	Wnw

2 OPERATIONS

Waste is brought in to site either by road or by boat. If by boat it is loaded in to dumpers on the wharf and driven the final few 100 metres to site.

Waste is tipped in designated areas and stored externally and internally. All processing of waste IBA occurs inside a building with processed IBA being stored externally post processing.

Site is designed to reduce double handling as much as possible with a clear in and out flow of material. There will be a minimum of 1 mobile dust cannons to tackle localised issues. As well as a site wide misting system.

2.1 Waste Delivery's

All vehicles will be sheeted or containerised to contain the load. Whether it arrives by road or boat. Sheeting is required for both loaded and empty vehicles. Dumper trucks will transport the material from boat to site across the wharf. The potential source of dust emissions will be the movement of wheeled plant and vehicle movement during delivery and tipping. Vehicle speeds onsite will be restricted to 10 mph. Tipping will be supervised and if required dampening down of material will occur, however, all waste arrives damp (15 – 30 % moisture content).

All incoming loads will be pre-booked. Visual inspections of the load and Duty of Care documentation shall be reviewed for accuracy in accordance with the Waste Acceptance Procedure (See below) and retained for a minimum of 2 years.

2.2 Waste Acceptance Procedure

Waste is accepted from only pre-approved sites via an agreed contract and waste description. No ad-hoc waste deliveries are accepted to site.

Individual waste deliveries are inspected on arrival on site and during the tipping process. If waste is deemed to be non-compliant the Technically Competent Manager (TCM) or appropriately trained employee can reject the waste and send it back to the producer.

An annual Waste Transfer Note will be used for IBA that arrives from the pre-approved suppliers which will record amounts, day of transfer and type of waste, including EWC code.

Site layout is shown in the Site Layout Plan 100104167-MMD-00-00-DR-A-1101 - Proposed Site Block Plan). The site will benefit from a natural land raise to the northern and southern boundary, due to the old use as a quarry. There are also large bunds to the south and northern boundaries This will act as a wind break to prevent transmission of Dust-off site. However, when damp IBA is stored on site it forms a cementitious crust that prevents dust from whipping up.

Operating machinery will be located in the centre of the site and is up wind of the bunds and IBA storage piles.

Further handling requirements can be seen in Table 5 Measures to Control Dust/Particules (PM10) and other Emissions.

2.3 Waste Storage

Wastes are stored internally and externally and stockpiled prior to further treatment. The unprocessed IBA is imported to the site and stored outside .

2.4 Storage Areas

IBA and IBAA are stored in the designated storage area, where the materials are deposited on the impermeable concrete surface.

2.5 Waste Handling

Wastes are stored externally prior to further treatment. The unprocessed IBA is imported to the site and stored outside.

IBA and IBAA are stored in the designated storage area, where the materials are deposited on the impermeable concrete surface.

To enable appropriate management of material within the storage area, once a day the IBA is formed into stockpiles using either a 360-swing shovel or bucket loader.

IBA and IBAA will be stored to a maximum height of approximately 8 m and a storage capacity of 261,882 tonnes.

2.6 Overview of Waste Processing Dust and Other Emission Controls

IBA arrives either by road or by boat. All vehicles are either containorised or sheeted. Material is tipped externally with local mitigation such as an misting cannon if required. However IBA arrives damp and within hours forms a crust to prevent particles being agitated.

All processing activities occur inside as per site plan 100104167-MMD-00-00-DR-A-1101 - Proposed Site Block Plan. Once processed material is stored externally again. Where required misting cannons are deployed.

Table 2 Typical Waste Accepted

European Waste Code(EWC)	Product Description	Tonnes/week	Destination within facility (maximum storage amount)				Processing per day (tonnes)
			IBA (Storage Area 1,2,3 & 4) Internal	IBAA (Storage area 5&6) External	IBAA (Storage area 7) External	External Bays	
19 01 12	Bottom ash and slag other than those mentioned in 19 01 11 (not containing hazardous substances)	2,308	19, 643	5,264	100,770	63	1350
19 12 12	Other wastes(including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 191211 Incinerator Bottom Ash Aggregate only	2,308		5,264			
	Total	**4,615**	**19,643[1]**	**10,528[2]**	**100,770[3]**	**63**	1350

[1] Up to 19,643 stored across the 4 bays.
[2] Up to depending on requirement.
[3] Up to depending on requirement

2.7 Mobile Plant and Equipment

Mobile plant will be purchase specifically for this site and maintained in a manner complaint with manufacturers guidelines.

Table 3 Mobile Plant

Machine	Brand	Type/ Variant Code
Swing Shovel Tracked 360	Leibherr	R934C
Swing Shovel Tracked 360	Leibherr	R944C
Load Shovel	Leibherr	L586
Load Shovel	Leibherr	L580
Mobile Screening Unit	Keestrack	Giant e8
Portable Generator	SDMO	R220
Hand Sorting Cabin	Phairon	Genus
Windsifter	Phairon	Ventum
Mobile Crusher	Kleemann	MR122Z
Mobile Metal Seperator	Phairon	Ultra
Mobile Metal Seperator	Phairon	Forta
Mobile Metal Seperator	Phairon	Optima

Rock Solid Processing Limited have lease contracts in place with local suppliers if plant breaks down. A small local supply of parts will be kept on site for maintenance and minor repairs. Machines are purchased to be compliant with current emission standards. Machines will be replaced at the end of any lease contracts or when machinery is no longer fit for purpose.

Emissions from mobile plant will be controlled via speed limits and anti idling campaigns on site as best practise.

3 DUST AND PARTICULATE (PM_{10}) MANAGEMENT

3.1 Responsibility for Implementation of EMP

The TCM shall be responsible for the implementation onsite, training of relevant persons and the annual review of the EMP. The site's Environment Management System will be updated to incorporate these changes.

Refresher training and additional support may be provided by external competent persons as required.

All records of training and document reviews will be retained by the operator.

Site supervisor will be the designated person of responsibility after the TCM. Training of the EMP will take the form of tool box talks covering the person individual job role and the relation to the EMP.

Training will be provided as a part of the induction programme for a new employee and a refresher training session provided once every two yeas.

3.2 Sources and Control of Fugitive Dust/Particulate Emissions

Table 4 Source-Pathway-Receptor-Routes and Table 5 Measures to Control Dust/Particules (PM10) and other Emissions identify the Source-Pathway-Receptor routes of the dust and particulates from the process and describes the proposed dust abatement/control measures to be employed at site.

Table 4 Source-Pathway-Receptor-Routes

Source	Pathway	Receptor	Type of impact	Where relationship can be interrupted
Mud	Tracking dust on wheels and vehicles, then mud dropping off wheels/vehicles when dry	Humans and Property	Visual soiling, also consequent resuspension as airborne particulates	Remove mud/debris before vehicles before they leave site. If required hire a road sweeper to clear haul/access road as and when required.
Debris	Falling off lorries	Humans and Property	Visual soiling, also consequent resuspension as airborne particulates	Remove mud/debris before vehicles before they leave site. If required hire a road sweeper to clear haul/access road as and when required. Self contained wheel was installed.
Tipping, storage and sorting of wastes in the open	Atmospheric dispersion	Humans and Property	Visual soiling and airborne particulates	Minimise tipping/drop heights of waste material, IBA Cementitious when wet and will develop a crust preventing dust, positioning sources away from receptors. Localised dust suppression e.g. on processing equipment or during tipping.
Vehicle exhaust emissions Non-road going machinery exhaust emissions	Atmospheric dispersion	Humans and Property	Airborne particulates	Plant and delivery vehicles maintained in accordance with manufacturers guidance all with upward facing exhausts.

Table 5 Measures to Control Dust/Particules (PM10) and other Emissions

Abatement Measure	Description / Effect	Overall consideration and implementation	Trigger for implementation
Preventative Measures			
Site / process layout in relation to receptors	All processing done in centre of site away from boundary. Bund around North and eastern boundaries. Cementitious crust forms during storage.	Day to day minimum whilst operational.	• Standard operational practice • Site wide misting system
Site speed limit, 'no idling' policy and minimisation of vehicle movements on site	Speed limit enforced on site No idling of vehicles or mobile plant. Mobile Plant and delivery vehicles maintained in accordance with manufacturers guidelines.	Easy to implement as part of good practice.	• Will be used all the time that the site is operational and applied as 'best practice'
Minimising drop heights for waste. Use of enclosed chutes for waste drops/end of conveyor transfers and covered skips	Minimising the height at which waste is handled, control drop and tipping heights. Should reduce the distance over which debris, dust and particulates could be blown and dispersed by winds.	All drivers and operational staff trained in tipping heights and controlled handling. Implemented day to day as best practice.	• Site and site operatives will implement this as part of normal working practices and is being used as best practice.

Abatement Measure	Description / Effect	Overall consideration and implementation	Trigger for implementation
Preventative Measures			
Good house- keeping	Regular house keeping Removal of dust and particulate build up on mobile and static plant as well as clearing site surface of debris.	Daily site inspections at start and end of the day to inspect housekeeping of the site, targets where cleaning is required. Including site surface, haul/access road, weigh bridge and site perimeter. End of day clean down of equipment. Deeper cleans e.g. filters and cabs in accordance with manufacturers guidelines.	• Site will carry out these inspections/ cleaning processes daily.
Sheeting of vehicles/ Containerised vehicles	Prevents the escape of debris, dust and particulates from vehicles as they travel.	Waste carriers and producer sites notified of this requirement as best practice and as part of contractual obligations.	• Waste will always arrive sheeted/containerised, empty vehicles will also be sheeted. If not the driver will be informed of the requirement and a note made in the site diary. Persistent non-compliance and either the haulier • will be contacted or the producer of the waste will be notified.

Abatement Measure	Description / Effect	Overall consideration and implementation	Trigger for implementation
Preventative Measures			
Hosing of vehicles on exit	Vehicle washed down using a hose to remove dust, dirt and other particular matter as required.	Vehicle washed down as and when required. Extra focus in winter months for debris.	• Inspections will be carried out on every vehicle as part of day to day operations as best practice. Self contained wheel was installed.
Ceasing operation during high winds and/or prevailing wind direction	During extreme wind weather conditions operations to cease to prevent dust being whipped up to reduce pollution events and or lower peak of pollution events.	Likely to reduce dust and particulate emissions, however, not a long-term solution.	• Cessation of operation instructed when 'Gale' or 8 on the Beaufort scale is reached see appendix A.

Abatement Measure	Description / Effect	Overall consideration and implementation	Trigger for implementation
Preventative Measures			
Easy to clean concrete impermeable surfaces	Site surface made of impermeable concrete pad with sealed drainage system. Regular housekeeping prevents build-up of loose debris/dusty material.	Dust and particulate reduction due to site surface and regular housekeeping Regular maintenance for site surface as other permit requirements require an impermeable site surface.	• Infrastructure installed during construction of site and maintained as part of critical infrastructure for permit compliance.
Minimisation of waste storage heights and volumes on site	Height of waste controlled by natural gradient of material when stored cementitious crust forms to prevent whipping up of dust	Cementitious crust will minimise dust being whipped up. Regular house keeping	• Site will carry out these inspections/ cleaning processes daily.
Localise netting/ covers	Erecting netting/covers around high risk parts of the processing, localised solution.	Reduces wind whipping dust away whilst processing of material is occurring.	• Used during processing as best available practise.
On-site sweeping	On site housekeeping, sweeping of site surface and cleaning of equipment, Road sweeper as required.	Part of daily and weekly checks recorded in site diary.	• A part of normal daily and weekly operations.

Abatement Measure	Description / Effect	Overall consideration and implementation	Trigger for implementation
Preventative Measures			
Water suppression with hoses, water jets and misting cannons	Damping down of site areas using hoses/ dust cannon, reduce dust and particulate re-suspension and assist in the cleaning of the site if combined with sweeping. Dust suppression system (boundary).	Adds to cementation of crust on storage piles, keeps site surface clear reduce potential of dust whipping up also reduces risk of mud and debris being tracked out of site.	• Applied to higher risk activities such as waste processing and tipping. • Particular attention to weather conditions as contributing factors, more likely in summer months/dry periods. • Site wide misting system

3.3 Other Considerations

Water usage/ availability:

Site benefits from a mains water connection and leachate storage will potentially provide water to mitigate dust generation on site. If water is not available, then management will review the situation and amend operations in a way that reduces dust generation.

3.3.1 Water usage/ availability:

Water usage/ availability:

Site benefits from a mains water connection and leachate storage will potentially provide water to mitigate dust generation on site. If water is not available, then management will review the situation and amend operations in a way that reduces dust generation.

3.3.2 In the event of a drought:

Material arrives damp and dry to create a cementitious crust which prevents dust generation levels of water use as dust suppression will not impact dust mitigation.

3.4 Enclosure of Waste Processing and Storage Areas

All processing activities are carried out internally within the on site building see site plan 100104167-MMD-00-00-DR-A-1101 - Proposed Site Block Plan. Storage or pre processed and processed material is stored externally apart from material from Dublin which is stored internally. Waste forms a crust as it drives to prevent particles from being agitated and suspended in the air. Waste arrives damp.

3.5 Visual Dust Monitoring

Visual inspections will be undertaken by trained site staff for dust, particularly along the downwind site boundary on a daily basis. Observations will be recorded in the Site Diary. This will occur after a dry period of 3 working days and or if the wind speed is in excess of beaufort 5.

Monitoring points shown in Visual Dust Monitoring Locations 016.1_09_005.

If dust is identified then mobile dust suppression cannons will be deployed to prevent dust escaping site.

4 PARTICULATE MATTER MONITORING

Site management and staff will monitor dust on an informal basis throughout the day. Any adverse observations and details of the action taken will be recorded and retained in the Site Diary/Site Event Log.

All plant will be inspected daily and be regularly cleaned to prevent the build-up of dust on machinery parts.

No dust monitoring will occur when site is non-operational as none should be generated.

All dust monitoring results will be recorded and retained in the site office along with dates, times, weather conditions, wind direction and the name of the individual carrying out the monitoring event.

Where dust emissions are continually identified as an issue at the site boundary and complaints are received as a result, the TCM will review the mitigation measures (Table 5) and monitoring techniques detailed in this EMP in order to improve detection and prevent emissions being discharged from the site.

The TCM shall be responsible for the implementation onsite, training of relevant persons and the annual review of the EMP. The site's EMS will be updated to incorporate these changes.

Refresher training and additional support may be provided by external competent persons as required.

All records of training and document reviews will be retained by the operator.

4.1 Monitoring Location

Dust will be monitored onsite by all operatives during the working day. As part of daily checks, the north and southern boundary will be visually monitored as part of daily checks and during operations see Visual Dust Monitoring Locations 016.1_09_005. Locations 4 and 2 are chosen as they are up wind and down wind of the prevailing wind direction see fig. 1

4.2 PM10 Monitoring

Data will be collected on a 5 minute averaging period and that levels should be below 75µg/m3 for this period at the site boundary.

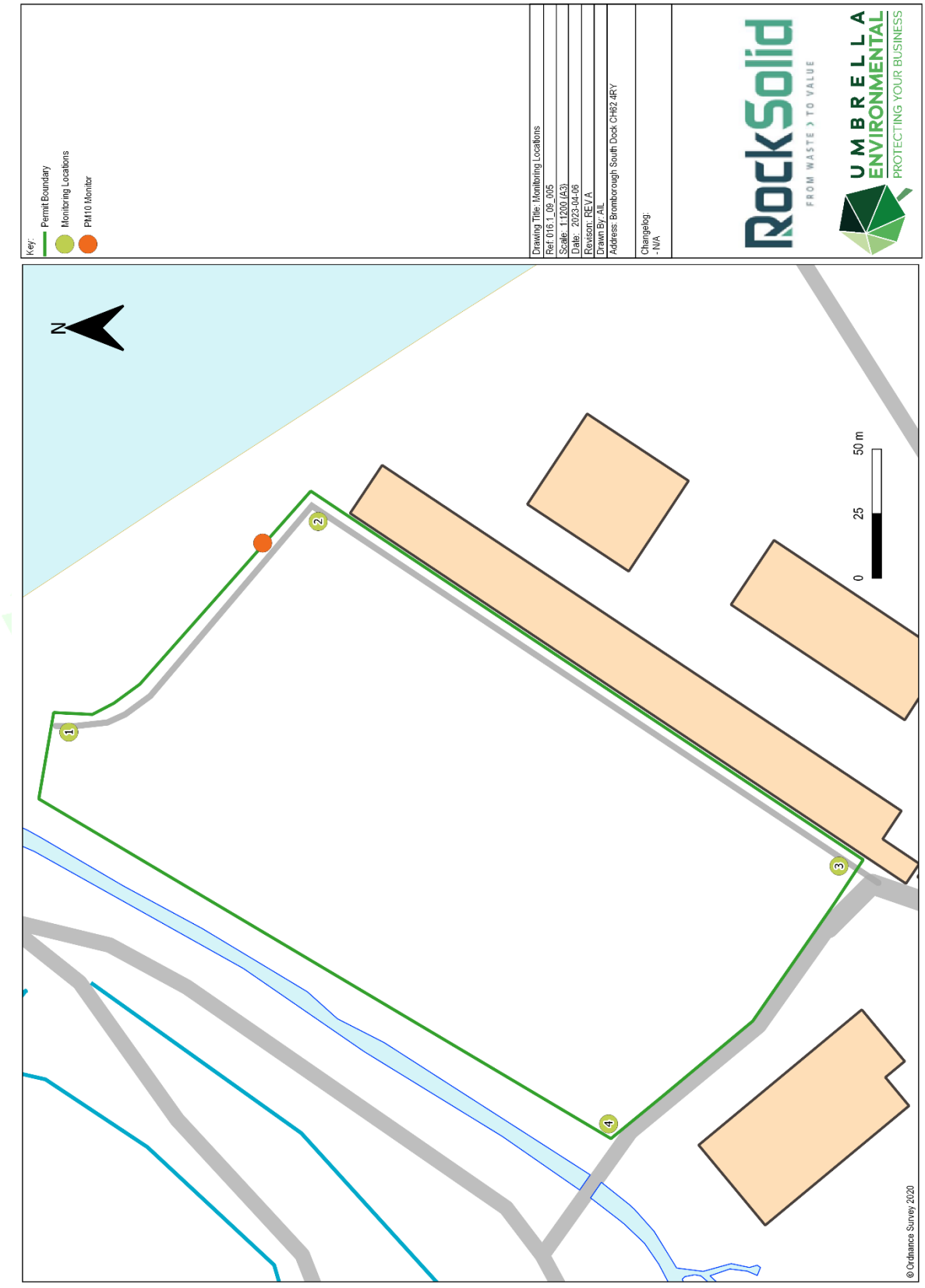
Monitoring equipment will be calibrated a minimum once per year.

4.2.1 PM10 Monitoring Location

The monitors location will be north east of the site on the boundary as the prevailing wind is from the south east. The inlet of the monitor will be sited at least 2 m above the ground and the inlet will not be obstructed/shielded by buildings and or other obstructions.

Location of the monitor is shown below in Figure 2 Location of Monitor

Figure 2 Location of Monitor



4.3 Operation of the PM Monitoring Equipment

The TCM is responsible for the management and operation of the system. The data is reviewed monthly and trends identified however this may need to occur quarterly to identify trends as monthly may only reflect stand alone issues.

At present there is no point source emission held within the pemrit so no submission of data to the EA is required.

If 75µg/m3 over a 5 minute period is exceeded action will be taken. A light a top the monitor will flash if this exceedance is met to inform staff/TCM action needs to be taken such as ceasing operations, providing extra localized suppression or waiting until wind has reduced.

Data trends will be reviewed to identify trends. If trends are identified then the associated activities will be received and amended for example change of location, speed of processing.

These trends and actions will be recorded in the site diary and as apart of an annual review of this management plan any changes made will be incorporated in to business as usual activities moving forward.

4.4 Quality Assurance/Quality Control and Record Keeping

The monitoring equipment will be maintained by a third party contractor. They will record.

- The make and model of the monitoring equipment
- The serial number of the monitoring equipment;
- When and how the data is checked
- When the equipment is calibrated;
- How the equipment is calibrated;
- They will provide qualifications and training records of who carries out the calibration
- When the equipment is routinely inspected;
- If the equipment is damaged and/or no longer able to collect reliable data.

4.5 Reporting of Data

Information is not required to be reported to the EA but will be available on request of a requesting officer.

4.6 Additional Detailed Monthly Reporting

If 75µg/m3 over a 5 minute period is exceeded repeatedly then a root cause investigation will be carried out by the TCM and or director and a sch 5 notice submitted to the EA including but not limited to a review of Table 4 Source-Pathway-Receptor-Routes.

5 ACTIONS WHEN ALARM LEVEL IS TRIGGERED

5.1 Visual Monitoring

Trigger levels visual dust identified by a member of staff or TCM during normal operational parameters or a complaint received either from a member of the public or EA.

1. The TCM assesses yard activities and the nature of the waste handling and deliveries immediately prior to the alarm being activated, to work out what has caused the alarm to be activated.
2. If the source cannot be ascertained with 100% confidence, the TCM on duty suspends the **likely** dust/particulate generating activities, i.e. processing or blending.
3. If the source is within the site's control, the TCM on duty takes appropriate action in terms of dust abatement, to ensure that the alarm is not re-activated. This may take the form of the following;

(a) Investigating the source of the dust/particulates to prevent a re-occurrence.
(b) Suspending operations which are not being conducted using best-practice controls as set out in Table 3 Mobile Plant.
(c) Additional use of the dust abatement measures.
(d) Logging findings of a – c in the Site Event Log and also in the reporting template within the relevant appendix of the Environmental Permit.

Once dust has been mitigated a review will take place to identify the overall cause of the incident and or recommendations to improve process and or mitigation methods.

5.2 PM10 Monitoring triggers

The following actions are taken:

1. The Site Manager assesses yard activities and the nature of the waste handling and deliveries immediately prior to the alarm being activated, to work out what has caused the alarm to be activated.
2. If the source cannot be ascertained with 100% confidence, the Site Manager on duty suspends the **likely** dust/particulate generating activities
3. If the source is within the site's control, the Site Manager on duty takes appropriate action in terms of dust/particulate abatement, to ensure that the alarm is not re-activated. This may take the form of the following;

    (a) Investigating the source of the dust/particulates to prevent a re-occurrence.
    (b) Suspending operations which are not being conducted using best-practice controls as set out in Table 5 Measures to Control Dust/Particules (PM10) and other Emissions.
    (c) Additional use of the dust abatement measures.
    (d) Logging findings of a – c in the site diary, and also in the reporting template within the relevant appendix of the Environmental Permit.

If an effective abatement technique cannot be identified and implemented, and observed PM_{10} levels remain above the action level for 6 consecutive, 5-minute mean readings (i.e. 25 minutes) concurrent with recorded wind directions suggesting that the source of particulate could be from the site activities, then operations should be

suspended until measured PM concentrations drop below the action level of 75 µg/m^3 for 6 consecutive, 5-minute mean readings.

In all cases, any new "lessons learnt" from the Site Manager's investigations are considered by the company directors and implemented into dust & particulate emission management plan (if not already included), to prevent a re-occurrence of the alarm.

The alarm is not the sole indicator of a dust event at the site; the continuous visual monitoring of potential dust sources and activities safeguard all play a very important part in managing dust and particulates.

6 REPORTING AND COMPLAINTS RESPONSE

The TCM is responsible for responding to complaints and implementing the complaint procedure.

Upon receipt of a complaint, either directly from a neighbouring resident or indirectly via the Regulator. The following information will be requested but may not be provided in full:

- name;
- address;
- contact details;
- date(s) and time(s) to which the complaint relates; and
- nature of the complaint and any other details which may assist in the identification of the source, activity or circumstances which prompted the complaint.

The timings and description of the complaint will be analysed in conjunction with the activities and meteorological conditions logged on site without delay to identify the offending source or activity. The complainant may be asked to keep an ongoing log for correlation with the site operational log. Once the source or activity is identified suitable mitigation measures will be implemented immediately to prevent future dust emissions.

Where contact details are made available, the complainant will be contacted within 24 hours to check that the mitigation has been effective.

The complaints information and subsequent investigation will be recorded in Rock Solid Processing Limited (appendix B) or other format with relevant information.

6.1 Engagement with the Community

Neighbours will be provided with contact details to make complaints/provide feedback as shown in Management Responsibilities below.

6.2 Reporting of Complaints

Appendix B provides details of how complaints will be noted and recorded. Following investigation of a complaint the complainant will be contacted to be informed what the source of the dust was, why the issue occurred and what mitigation measures have been implemented to prevent any re-occurrence.

6.3 Management Responsibilities

The nominated person responsible for responding to complaints and implementing the complaint procedure is the TCM.

Contact Details:

Name	Contact Details
Site Manager	Tel: TBC
	Email: TBC

7 RECORD KEEPING

As a minimum, the following records must be kept to ensure compliance with the requirements of the Environmental Permit:

- A copy of the permit
- Risk assessments
- Competence and training records
- Duty of Care documentation and Environment Agency waste returns
- Other legally required documents
- Operational procedures
- Compliance records
-

Records must be retained for 6 years unless they relate to off-site environmental or health effects, or the condition of the land or groundwater when they shall be retained until permit surrender.

8 MANAGEMENT PLAN REVIEW

The EMP will be reviewed as a minimum at least annually or following any substantial change in site operations or complaint of dust, particulate matter emissions or at the request of the Environment Agency.

Other activities which may prompt review of the EMP are variations to the environmental permit, accident, complaint, breach or a change in the site setting or sensitive receptors.

Where the review requires changes, this will be documented and maintained with the site records, for example, waste storage volumes, types of waste, changes to abatement measures, new or altered equipment.

9 AVAILABILITY EMP

All site operational staff will be trained in the contents of the EMP to ensure compliance and consistent operation of waste activities.

A copy of the EMP will be made available at the site for reference purposes and is available on request to the Environment Agency and other interested parties.

10 SUMMARY

The EMP seeks to ensure that by the adoption of industry best practice and appropriate measures, dust emissions are adequately controlled within the site and do not cause any significant impacts on amenity or the environment beyond the permit boundary.

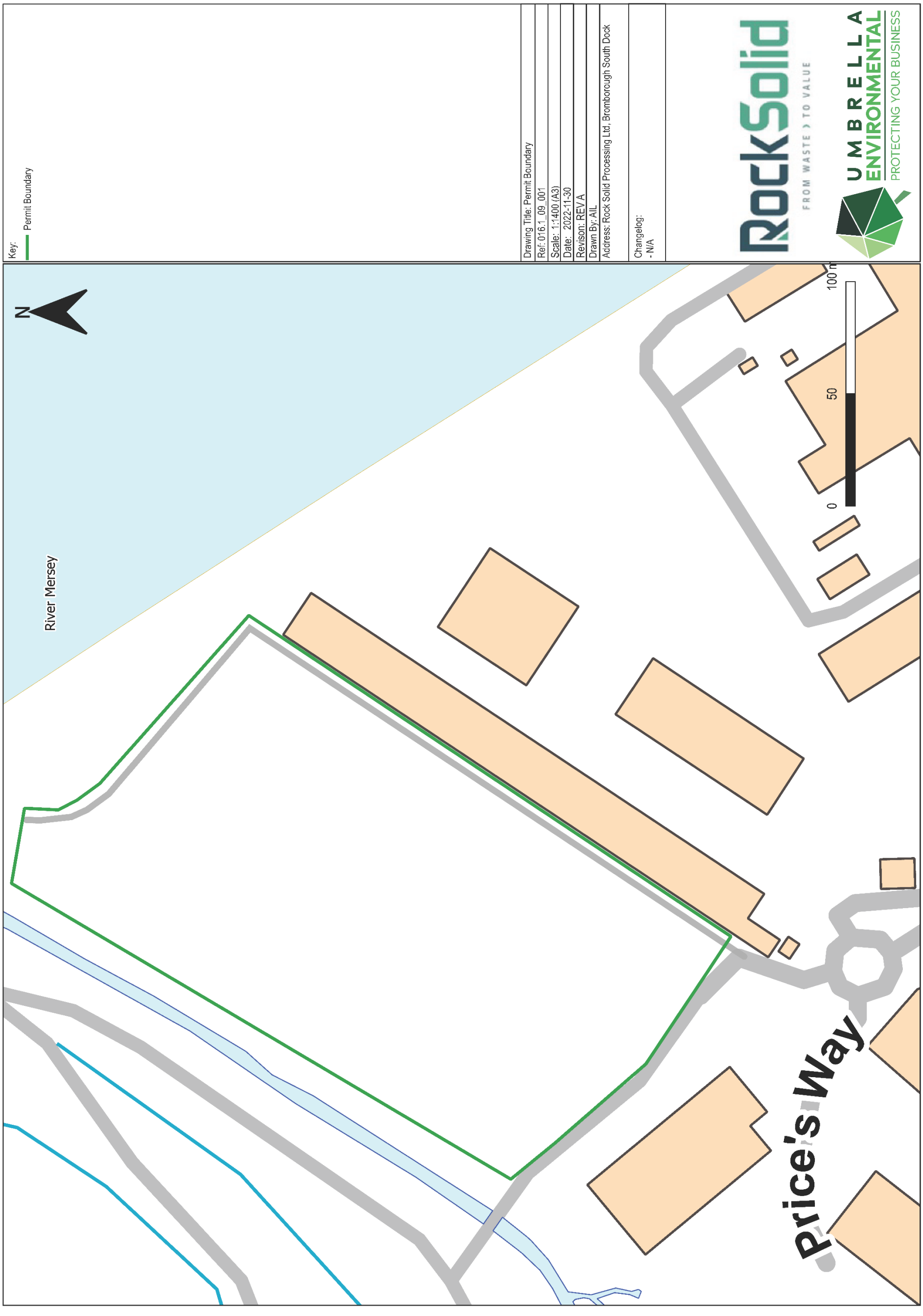
This EMP describes how the operator is fully committed to operating responsibly and in compliance with the Environmental Permit.

The EMP will be reviewed annually and in the event of any complaint regarding dust emissions to ensure its provisions remain effective.

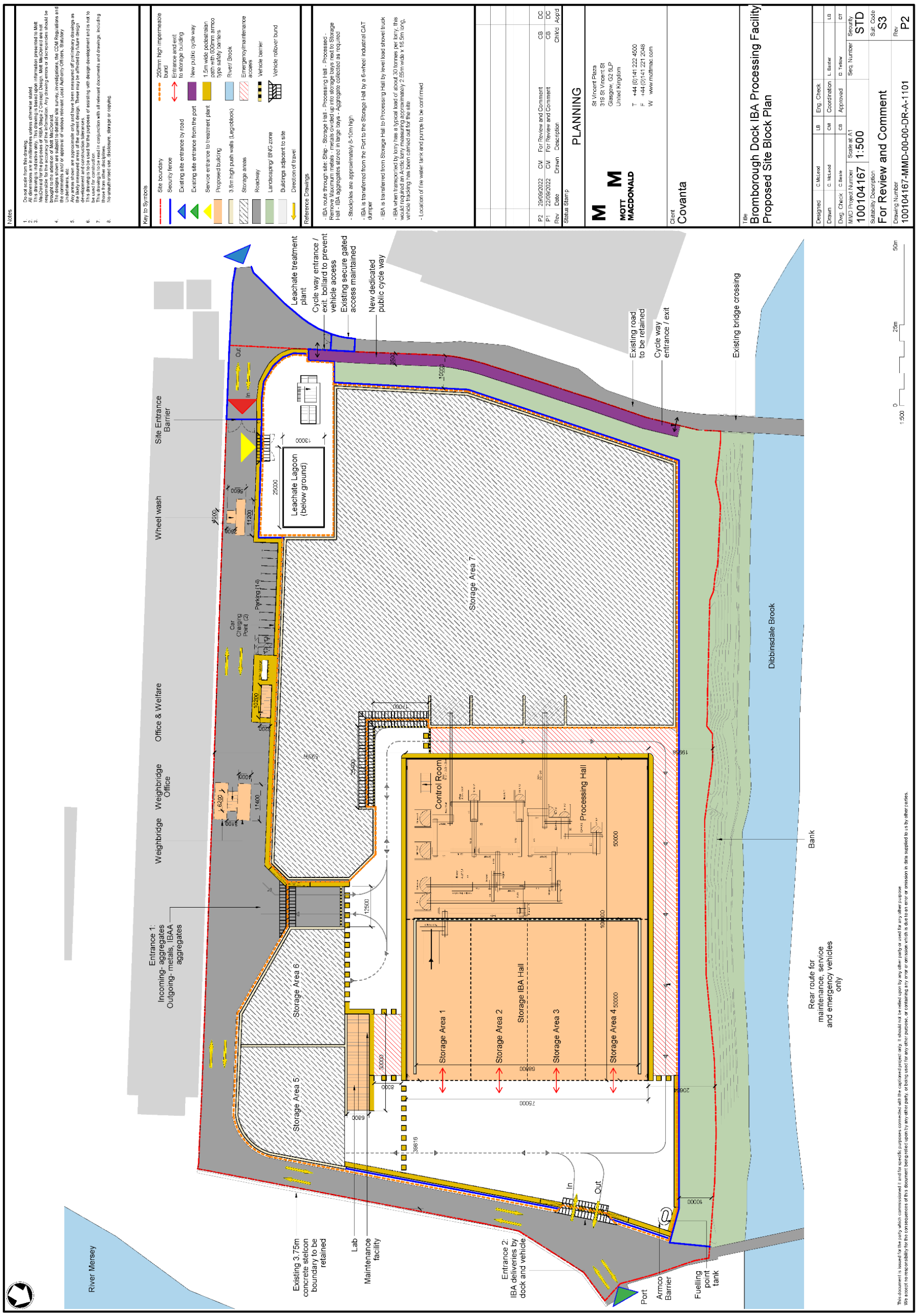
Beyond normal best available techniques the operations of the site will have little to no impact therefore no formal mitigation is required see section 6.3 app C.

11 DRAWINGS

Drawing 1 Permit Boundary 016.1_09_001



Drawing 2 Site plan : 100104167-MMD-00-00-DR-A-1101 - Proposed Site Block Plan



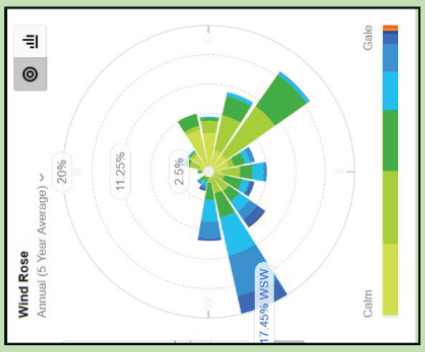
Drawing 3 Sensitive Receptors 1 km Plan 016.1_09_002

Key:
- Permit Boundary
- 1 Km Buffer
- Heritage ID
- Non Designated Site ID
- Non Designated Site Area
- Critical Infrastructure ID
- Critical Infrastructure Area
- Designated Site ID
- Designated Site Area
- Commercial ID
- Commercial Area
- Recreational ID
- Recreational Areas
- Public Use ID
- Public Use Area
- Agricultural ID
- Agricultural Area
- Residential ID
- Residential Area

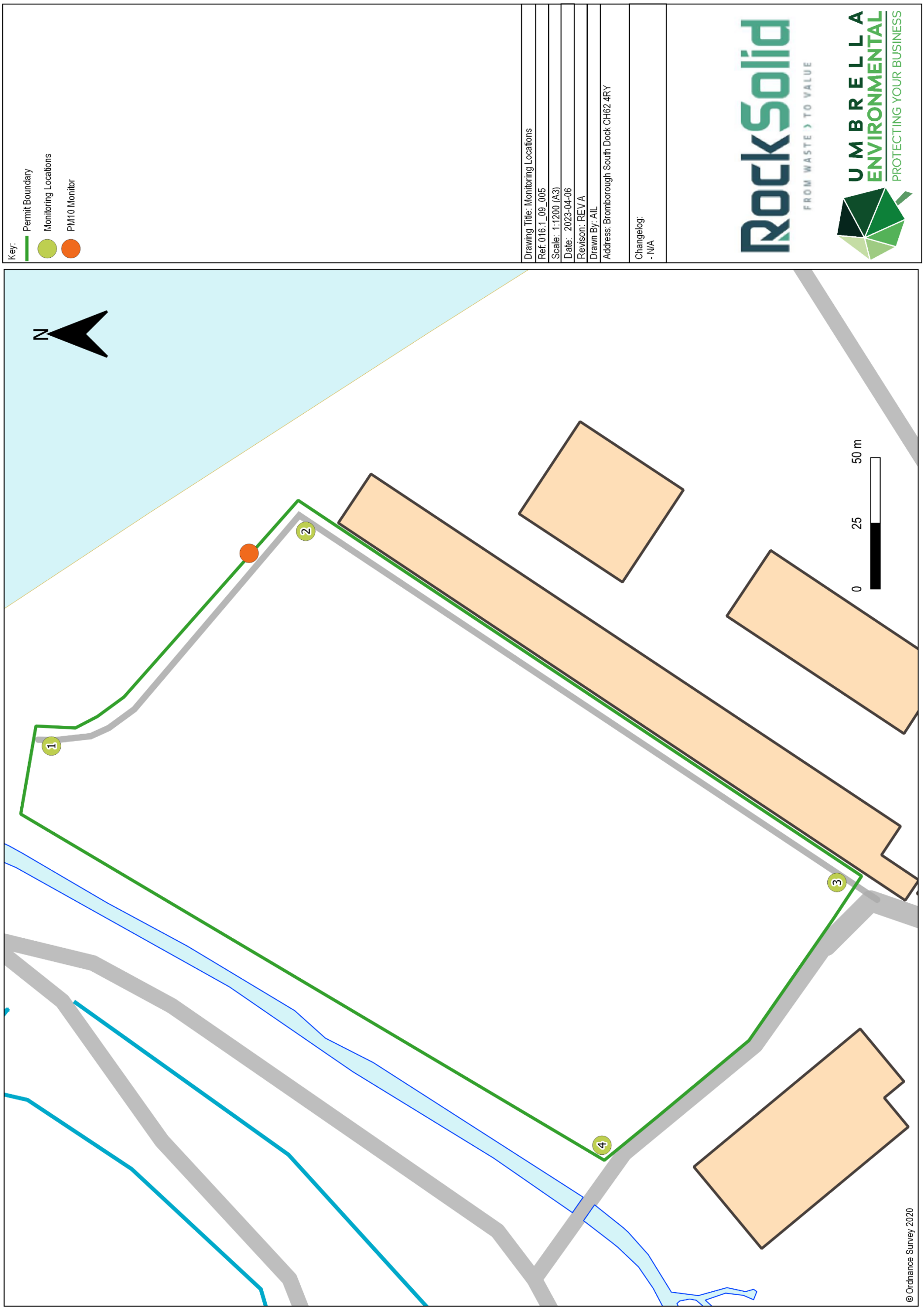
Drawing Title: Sensitive Receptors 1 km
Ref: 016.1_09_002
Scale: 1:8500 (A3)
Date: 2022-11-30
Revison: REV A
Drawn By: AIL
Address: Bromborough South Dock CH62 4RY

Changelog:
- N/A

RockSolid
FROM WASTE > TO VALUE



Drawing 4 Visual Dust Monitoring Locations 016.1_09_005



12 APPENDICES

Appendix A Beaufort Scale

Beaufort wind scale	Wind Speed			Limits of wind speed			Wind descriptive terms
	Knots	mph	ms-1	Knots	mph	ms-1	
0	0	0	0	<1	<1.15	<1	Calm
1	2	2.3	1	1-3	1.15-3.45	1-2	Light air
2	5	5.75	3	4-6	4.6-6.9	2-3	Light breeze
3	9	10.35	5	7-10	8.05-11.5	4-5	Gentle breeze
4	13	14.95	7	11-16	12.65-18.4	6-8	Moderate breeze
5	19	21.85	10	17-21	19.55-24.15	9-11	Fresh breeze
6	24	27.6	12	22-27	25.3-31.05	11-14	Strong breeze
7	30	34.5	15	28-33	32.2-37.95	14-17	Near gale
8	37	42.55	19	34-40	39.1-46	17-21	Gale
9	44	50.6	23	41-47	47.15-54.05	21-24	Strong gale*
10	52	59.8	27	48-55	55.2-63.25	25-28	Storm
11	60	69	31	56-63	64.4-72.45	29-32	Violent storm
12	-	-	-	64+	73.6	33+	Hurricane

https://www.metoffice.gov.uk/weather/guides/coast-and-sea/beaufort-scale

*** Notes**

- The official term is Strong gale, however, the Met Office uses the descriptive term Severe gale
- To convert knots to mph multiply by 1.15, for m/s multiply by 0.514.

Appendix B OS.02.04.F01 Emission Complaint Form I1

Complaint Details
Complainant Name
Address Postcode
Complainant Contact Details
Tel
Email
Date
Complaint Details
Investigation Details
Investigation carried out by -
Name
Position
Date & time investigation carried out
Weather conditions
Wind direction and speed
Investigation findings
Feedback given to Environment Agency and/or local authority
Date feedback given
Feedback given to public
Date feedback given
Review and Improve
Improvements needed to prevent a reoccurrence -
Proposed date for completion of the improvements
Actual date for completion
If different insert reason for delay
Does the noise and Vibration management plan/Emissions Management Plan need to be updated
Date that the noise and Vibration management plan was updated

MOTT MACDONALD

Bromborough Dock IBA Processing Facility

Air Quality Assessment

September 2022

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Air Quality Assessment

September 2022

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
01	01/09/22	S Oliver	C Mills	C Mills	Issued as per the validation requirements for the planning application

Document reference: 100104167-MDD-00-RP-EN-0010

Information class: Standard

Contents

Tables

Figures

1 Introduction

1.1 Overview

Mott MacDonald has been commissioned by Covanta Energy to undertake an air quality assessment to accompany the planning application for the development of an aggregate processing facility, parking provision and other ancillary development in Bromborough (hereafter referred to as 'the proposed development').

The aggregate processing facility will manufacture incinerator bottom ash aggregate (IBAA) from incinerator bottom ash (IBA); the residual bottom ash from energy recovery facilities. The process will recover metals and produce the aggregate for use in the construction industry. IBAA is a heterogeneous product which minimises landfill and reduces the need to quarry new materials.

This report provides an assessment of potential air quality impacts to accompany the planning application to be submitted to Wirral Metropolitan Borough Council (WMBC).

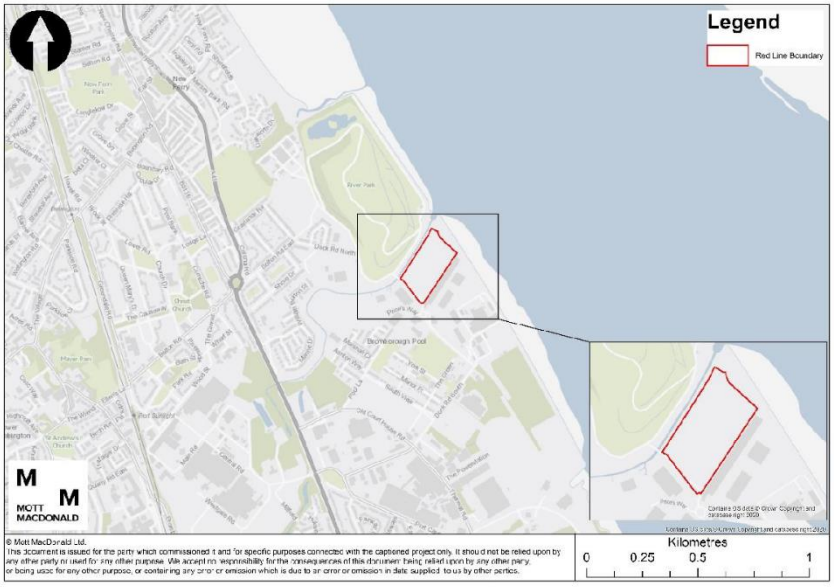
The report provides an assessment of the following key impacts associated with the construction and operational phases of the proposed development:

- nuisance, impact upon health and/or loss of amenity caused by construction and operational dust on sensitive receptors
- changes in pollutant concentrations caused by the proposed development

1.2 Site location

The proposed development is located within the Bromborough Dock (South) Landfill Site, Dock Road South, Bromborough, CH62 4SU. The site is bounded to the northwest by the Dibbinsdale Brook, to northeast by Mersey Wharf and the River Mersey, which is a few metres beyond. The southeast boundary is bounded by warehouses operated by Mersey Wharf. The southwest boundary is formed by Dock Road South, which, at this section, is a private road with gated access to the United Utilities Bromborough wastewater treatment works located to the northwest of Dibbinsdale Brook. The proposed development location is presented below on Figure 1.1

Figure 1.1: Proposed development location



Source: Mott MacDonald 2022.

1.3 Key pollutants

The assessment considers concentrations of nitrogen dioxide (NO_2), dust and particulate matter (PM_{10} and $PM_{2.5}$) only as these are the key pollutants of concern associated with the proposed development. A description of these pollutants is provided below.

1.3.1 Oxides of Nitrogen

Oxides of nitrogen is a term used to describe a mixture of nitric oxide (NO) and NO_2, referred to collectively as NO_x. These are primarily formed from atmospheric and fuel nitrogen as a result of high temperature combustion. The main sources in the UK are road traffic and power generation.

During the process of combustion, atmospheric and fuel nitrogen is partially oxidised via a series of complex reactions to NO. The process is dependent on the temperature, pressure, oxygen concentration and residence time of the combustion gases in the combustion zone. Most NO_x exhausting from a combustion process is in the form of NO, which is a colourless and tasteless gas. It is readily oxidised to NO_2, a more harmful form of NO_x, by chemical reaction with ozone and other chemicals in the atmosphere. NO_2 is a yellowish-orange to reddish-brown gas with a pungent, irritating odour and is a strong oxidant.

1.3.2 Dust

'Dust' is a generic term which usually refers to particulate matter in the size range 1-75 microns in diameter[1]. Dust can arise from numerous construction activities such as concrete-batching, piling, sand blasting, wind erosion on material stockpiles and earth-moving activities. It can be mechanically transported either by wind or through the movement of vehicles onto the public highway (transport of debris on vehicle wheels, or uncovered loads).

1.3.3 Particulate matter

Particulate matter is formed of solid and liquid particles, both organic and inorganic, that are present in the atmosphere. PM_{10} is defined as particulate matter with a diameter of 10 microns (µm) or less. $PM_{2.5}$ is defined as particulate matter with a diameter of 2.5 microns or less. Exposure to high concentrations of particulate matter smaller than the PM_{10} fraction can cause harmful cardiovascular and respiratory effects in humans.

Primary sources are numerous; anthropogenic sources include power stations, other industrial processes, road transport, domestic wood burning and trans-boundary pollution and natural sources include erosion of natural materials, oceans (sea salt) and dust storms. Secondary particulate matter originates as other pollutants which are re-formed into aerosols in the atmosphere. Secondary particulates are significant contributors to the overall atmospheric loading of particulates. In urban areas, road traffic is generally the greatest source of fine particulate matter, although localised effects are also associated with construction and demolition activity.

[1] Building Research Establishment (2003). The 'Control of Dust from Construction and Demolition Activities'.

2 Legislation and policy

2.1 Legislation

2.1.1 England

The Air Quality Standards Regulations 2010[2], Air Quality Standards (amendment) Regulations 2016[3],Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019[4] and Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[5] implement Directive 2008/50/EC on ambient air quality[6].

These define limit values and times by which they are to be achieved for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

The limit values apply everywhere, with the exception of:

- Any locations situated within areas where members of the public do not have access and there is no fixed habitation.
- In accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply.
- On the carriageway of roads.
- On the central reservations of roads except where there is normally pedestrian access to the central reservation.

The Department for Environment Food and Rural Affairs (Defra) assesses and reports on the compliance with the limit values for each of the 43 zones and agglomerations across the UK. Zones and/or agglomerations achieve compliance when everywhere within the zone and/or agglomeration (excepting locations provided in the Directive) does not exceed the relevant limit value.

Part IV of the Environment Act 1995[7] (as amended in Schedule 11 of the Environment Act 2021[8]) requires that every local authority shall periodically carry out a review of air quality within its area, including predictions of likely future air quality. The air quality objectives specifically for use by local authorities in carrying out their air quality management duties are set out in the Air Quality (England) Regulations 2000[9] and the Air Quality (England) (Amendment) Regulations

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2 Statutory Instrument. (2010), *The Air Quality Standards Regulations*, No. 1001.

3 Statutory Instrument. (2016) *The Air Quality Standards (Amendment) Regulations*, No. 1184.

4 Statutory Instrument. (2019) Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations

5 Statutory Instrument. (2020) Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020, No. 1313.

6 European Union. (April 2008) *Directive on ambient air quality and cleaner Air for Europe, Directive 2008/50/EC* Official Journal, vol. 152, pp. 0001-0044

7 Department for Environment Food and Rural Affairs. (2003) Part IV of the Environment Act 1995 Local Air Quality Management

8 Statutory Instrument. (2021) Chapter 30, Schedule 11 Local Air Quality Management Framework of Environment Act 2021.

9 Statutory Instrument. (2000) Air Quality (England) Regulations, No. 928

2002[10]. In most cases, the air quality objectives are set at the same pollutant concentrations as the limit values specified in the air quality Directive although compliance dates differ.

As part of the review of air quality, the local authority must assess whether air quality objectives are being achieved, or likely to be achieved within the relevant periods and identify the key sources of emissions responsible for the failure to achieve the objectives. Any parts of a local authority's area where the objectives are not being achieved or are not likely to be achieved within the relevant period must be identified and declared as an Air Quality Management Area (AQMA). Once such a declaration has been made, local authorities are under a duty to prepare an Action Plan which sets out measures to pursue the achievement of the air quality objectives within the AQMA.

The Environment Act also requires that the UK Government produces a national 'air quality strategy' (AQS) containing standards, objectives and measures for improving ambient air quality and to keep these policies under review.

2.1.2 Statutory Nuisance

Section 79(1)(d) of the Environmental Protection Act 1990[11] defines one type of 'statutory nuisance' as "*any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance*". Where a local authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. Failure to comply with an abatement notice is an offence. Best practicable means is a widely-used defence by operators, if employed to prevent or to counteract the effects of the nuisance.

2.2 Policy

2.2.1 UK Air Quality strategy

The Environment Act requires the UK Government to produce a national Air Quality Strategy. The Air Quality Strategy establishes the UK framework for air quality improvements. The measures agreed at the national and international level are the foundations on which the strategy is based. The 2007 Air Quality Strategy has now been superseded as of the 14th January 2019 with the Clean Air Strategy 2019 (CAS)[12].

The CAS does not set legally binding objectives, the CAS instead has targets for reducing total UK emissions of nitrogen oxides (NOx) and fine particulate matter ($PM_{2.5}$) from sectors such as road transport, domestic sources and construction plant (non-road mobile machinery or NRMM).

2.2.2 National planning policy

2.2.2.1 National Planning Policy Framework

The revised National Planning Policy Framework[13] was published in July 2021 and sets out the Government's planning policies for England. With regard to air quality, it states that:

"*Planning policies and decisions should contribute to and enhance the natural and local environment by: …preventing new and existing development from contributing to, being put at*

[10] Statutory Instrument. (2002) Air Quality (England) (Amendment) Regulations, No. 3043.
[11] Parliament of the United Kingdom (1990) Environmental Protection Act 1990
[12] Department for Environment Food and Rural Affairs. (January 2019), 'The Clean Air Strategy'
[13] Ministry of Housing, Communities and Local Government (July 2021). National Planning Policy Framework

unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air quality…"

And:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas.

"Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible, these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications.

Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

The NPPF also includes a minerals section. The NPPG provides advice on the type and characteristics of receptors which should be included in a dust assessment and recognises that both topographical and meteorological conditions should be considered when undertaking the assessment. The guidance developed by the IAQM notes these requirements and has been developed in accordance with this advice.

2.2.2.2 National Planning Practice Guidance

On 6 March 2014, the Department for Communities and Local Government (DCLG) published a national planning practice guidance web-based resource[14] which was updated on 1st November 2019.

The National Planning Practice Guidance includes a dedicated section on air quality. It notes that, for new planning applications, the local planning authority may require information on:

- "*The 'baseline' local air quality, including what would happen to air quality in the absence of the development*
- *"whether the Scheme could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity) and*
- *"whether occupiers or users of the development could experience poor living conditions or health due to poor air quality.*"

It also states the following in relation to determining whether air quality is relevant to a planning decision:

"Whether air quality is relevant to a planning decision will depend on the Scheme and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a

[14] National Planning Practice Guidance web-based resource. Accessible at: https://www.gov.uk/government/collections/planning-practice-guidance

material consideration if the Scheme would be particularly sensitive to poor air quality in its vicinity.)"[15].

2.2.3 Local policy

WMBC are currently in the process of consulting on a new local plan, this is the Wirral Local Plan 2021 – 2037 which will soon be submitted to the Secretary of State for examination. Within the submission draft there is one policy of relevance to the assessment, this is Policy WD14 – Pollution and Risk, which states:

'A. Development proposals that will result in an unacceptable increase in the risk to human health and the environment, impose significant restrictions on the continued operation of existing licenced or controlled processes, or that would lead to an existing use being classified as a statutory nuisance or to the designation of an Air Quality Management Area will not be permitted.
B. Development proposals with the potential to give rise to pollution to soil, air or water or from insects, noise or artificial light or increase the risk of accident hazard will not normally be permitted unless it can be clearly demonstrated that:

1. all practical measures have been taken to minimise potential risk and harm to human health and safety, nature conservation interests, property and the built and natural environment; and

2. all practical measures have been taken to minimise pollution levels and mitigate the impacts of the pollution, including exposure to air pollution; and

3. the residual risk of harm to human health and the environment will be acceptable and will not cause unacceptable harm to the general amenity of neighbouring uses and the character of the area, either individually or cumulatively.'

The adopted local plan for the area is currently the Unitary Development Plan for Wirral which was adopted in 2000. A number of these policies have been withdrawn. There is one policy still in effect with relevance to the air quality assessment, this is Policy PO1 – Potentially Polluting Development which states:

'Potentially polluting development or land-use will only be permitted when the Local Planning Authority is satisfied that:

- *(i) The proposed development wouldn't not cause harm or nuisance to neighbouring uses, the natural environment or general amenity as a result of discharges to air, land or water, or from noise, smells, dust, soot, ash, grit or vibration;*
- *(ii) Any measures required to comply with pollution control legislation will not lead to an unacceptable loss of amenity by virtue of noise or visual intrusion; and*
- *(iii) The real or perceived risk of a pollution incident occurring and the extent of its potential consequences, would not have unacceptable land-use implication beyond the boundary of the site, including prejudicing the realisation of land-use and other environmental planning objectives set out elsewhere in the plan.'*

[15] National Planning Practice Guidance 'Air Quality Section'. Accessible at: https://www.gov.uk/guidance/air-quality--3

2.3 Summary

Air quality objectives and limit values are summarised in Table 2-1. As the local planning authority is responsible for determining this planning application, air quality impacts have been considered against the air quality objectives only.

Table 2-1: Relevant Air Quality Objectives and Limit Values

Pollutant	Averaging Period	Concentration	Allowance	Attainment Date	
				Air Quality Objectives	Limit Values
Nitrogen dioxide (NO_2)	Annual	40 µg/m^3	-	31 December 2005[a]	1 January 2010[c]
	1-Hour	200 µg/m^3	18	31 December 2005[a]	1 January 2010[c]
Particulates (PM_{10})	Annual	40 µg/m^3	-	31 December 2004[a]	1 January 2005[c]
	24-Hour	50 µg/m^3	35	31 December 2004[a]	1 January 2005[c]
Fine particulates ($PM_{2.5}$)[e]	Annual	20 µg/m^3	-	-	1 January 2020[c]
		25 µg/m^3	-	2020[b]	-
NOx[d]	Annual	30 µg/m^3	-	31 December 2000[a]	19 July 2001[c]

Notes:
[a] Air Quality (England) Regulations 2000 as amended
[b] Air Quality Strategy 2007
[c] EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe, as transposed into UK Law
[d] Designated for the protection of vegetation and ecosystems and also referred to as the 'critical level' for NOx. The policy of the UK statutory nature conservation agencies is to apply the annual mean NOx criterion in internationally designated conservation sites and Site of Special Scientific Interest (SSSI) on a precautionary basis, as the limit value applies only to locations more than 20km from towns with more than 250,000 inhabitants or more than 5km from other built-up areas, industrial installations or motorways.
[e] As the Air Quality Strategy 2007 and EU Directive 2008/50/EC have a different numerical standard for $PM_{2.5}$, the more stringent standard of 20µg/m^3 has been adopted for this assessment.

Table 2-2 provides details of where the respective objectives should and should not apply and therefore the types of receptors that are relevant to the assessment of air quality.

Table 2-2: Locations where the Air Quality Objectives Apply

Averaging Period	Objectives should apply at:	Objectives should not apply at:
Annual	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes, etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
24-Hour	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
1-Hour	All locations where the annual mean and 24-hour mean objectives apply.	Kerbside sites where the public would not be expected to have regular access.

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Averaging Period	Objectives should apply at:	Objectives should not apply at:
	Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations, etc., which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	

Source: Defra TG22[16].

[16] Department for Environment, Food and Rural Affairs and Devolved Administrations (August 2022). Local Air Quality Management – Technical Guidance LAQM.TG22.

3 Methodology

3.1 Overview

This section sets out the approach that has been taken for the assessment of impacts on air quality during construction and operation as a result of the proposed development.

3.2 Construction phase

3.2.1 Overview

Construction activities can result in temporary effects from dust. 'Dust' is a generic term which usually refers to particulate matter in the size range 1-75 microns in diameter; the most common impacts from dust emissions are soiling and increased ambient PM_{10} concentrations. Dust can be mechanically transported either by wind or re-suspension by vehicles. It can also arise from wind erosion on material stockpiles and earth moving activities. Further details on the construction dust assessment can be found below.

3.2.2 Construction dust assessment

Guidance from the IAQM[17] recommends splitting the construction phase into four separate source categories and determining the dust risk associated with each of these individually. This assessment has determined the risk of each of the following source categories:

- Demolition
- Earthworks
- Construction
- Track out (the transport of dust and dirt onto the public road network).

The risk of each source for dust effects is described as 'negligible', 'low risk', 'medium risk' or 'high risk' depending on the nature and scale of the construction activities and the proximity of sensitive receptors to the construction site boundary. The assessment is used to define appropriate mitigation measures to reduce the level of effects such that they are not significant.

The assessment considers three separate effects from dust:

- Annoyance due to dust soiling
- Harm to ecological receptors, and
- The risk of health effects due to a significant increase in exposure to PM_{10}

Step 1 of the assessment applies screening criteria to the proposed development which states that an assessment will normally be required where there is:

- A 'human receptor' within:
  - 350m of the boundary of the site, or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s)
- An 'ecological receptor' within:

[17] Institute of Air Quality Management (2014) 'Guidance for the assessment of dust from demolition and construction'.

- 50m of the boundary of the site, or
- 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s)

No further assessment is required if there are no receptors within the defined boundaries.

Step 2A of the assessment is to determine the overall dust-raising magnitude ('small', 'medium' or 'large') from each of the dust sources identified (demolition, earthworks, construction and trackout) in accordance with the criteria outlined in Table 7-1 in Appendix A.

Step 2B of the assessment involves defining the sensitivity of receptors (as high, medium or low) for each dust effect (dust soiling, human health and ecosystem impacts) in accordance with the criteria presented within Table 7-2 in Appendix A.

The sensitivity of the surrounding area is then determined for each dust effect by considering the criteria in Table 7-3, Table 7-4 and Table 7-5 in Appendix A. Criteria presented in these tables are based on the distance of the source to the closest receptors, the receptor sensitivity, and in the case of PM_{10} effects, the local background concentration. The highest level of area sensitivity defined for each dust effect has been used in the assessment.

The final step of the assessment (Step 2C) combines the dust emission magnitude and the sensitivity of the area, to determine the overall dust risk category for each dust source and for each dust effect. The criteria used to define the dust risk category for each dust source and effect is presented within Table 7-6, Table 7-7, Table 7-8 and Table 7-9 in Appendix A.

The dust risk category defined for each dust source and effect is then used to determine appropriate site specific mitigation measures to be adopted. It should be noted that in line with the recommendations of IAQM guidance, significance is only assigned to construction effects following mitigation.

At the time of assessment, no detailed construction information was available, as such reasoned assumptions were used to conduct the assessment. These assumptions were based on the size of the existing structures on site, the proposed development site area, the development proposals and estimations of Heavy Duty Vehicle (HDV) movements.

Results of the construction phase assessment are presented in Section 5.2.

3.2.3 Construction site plant emissions

Construction work requires the use of a range of site plant, such as excavators, piling equipment, cranes and on site generators. All construction plants have an energy demand and some may result in direct emissions to air from exhausts. Guidance from the IAQM[17] notes that effects from exhaust emissions from on-site plant are unlikely to be significant. Given the local and temporary nature of site plant, effects of plant emissions on local air quality are considered to be of negligible significance relative to the surrounding road traffic contributions on the local road network. Construction plant emissions have therefore not been assessed further. Nevertheless, mitigation measures to reduce the effect of site plant on local air quality are presented in Section 6.2.

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3.2.4 Construction road traffic emissions

EPUK and IAQM guidance[18] indicates that assessment of construction traffic emissions is only likely to be required for large, long-term construction sites that will generate an additional annual average daily traffic (AADT) flow of 500 Light Duty Vehicles (LDV) movements or more per day or changes of 100 Heavy Duty Vehicle (HDV)[19] movements or more per day (outside of an AQMA) for a period of a year or more. At this stage, the number of HDV movements is unknown, however, it is anticipated that the construction phase will not meet this criterion and on this basis such emissions have not been considered further.

3.3 Operation

3.3.1 Operational traffic

Operation of the proposed development has the potential to generate emissions due to additional traffic on the local road network. To determine the need for an assessment of operational traffic, traffic changes on the local road network were screened against criteria set out within EPUK and IAQM guidance[18] as agreed with the EHO at WMBC. These criteria are:

- a change of LDV flows of more than 100 AADT within or adjacent to an AQMA, or with a change of 500 AADT outside of an AQMA and/or
- a change of HDV) flows of more than 25 AADT within or adjacent to an AQMA or a change of 100 HDV flows outside of an AQMA.

Traffic flow changes have been provide by the Traffic and Transport consultant on the project (Mott MacDonald). The traffic flow changes on local roads as a result of the proposed development are…

- a change in LDV flows of up to 60 AADT
- a change in HDV flows of up to 99 AADT

As the proposed development is not within or adjacent to an AQMA, the traffic flow changes fall below the screening criteria for an assessment of operational road traffic emissions and these effects have not been considered further.

3.3.2 Energy generation

The proposed development is fully powered by electricity with connections to the national grid. There is no proposed combustion equipment on site and therefore no proposed emissions to air as a result of site energy generation.

3.3.3 Operational minerals processing

3.3.3.1 Overview

IAQM guidance[20] recommends a qualitative approach to the assessment of dust impacts as a result of mineral operations using the 'Source-Pathway-Receptor' approach. This presents the hypothetical relationship between the source of the pollutants, the pathway to potential

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[18] Institute of Air Quality Management & Environmental Protection UK (2017). 'Land-use planning & development control: planning for air quality'

[19] HDV refers to vehicles with a gross weight greater than 3.5 tonnes and typically includes heavy goods vehicles, buses and coaches

[20] Institute of Air Quality Management (2016). 'Guidance on the assessment of mineral dust impacts for planning.'

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exposure and how the receptor may be impacted. The potential effects of dust emissions from the operation of the proposed development include:

- Disamenity as a result of dust soiling
- Harm to ecological receptors
- The risk of effects due to increased exposure to particulates

3.3.3.2 Operational disamenity and ecological effects

Step 1 of the assessment is to determine the baseline conditions of the site and surrounding area including:

- Extent, location, scale and duration of existing and proposed operations;
- Mineral type and characteristics
- Processing and handling activities
- Additional sources of dust generation in the study area
- Background pollutant concentrations
- Location and direction or receptors
- Topographical features
- Meteorological conditions

Step 2 of the assessment is to estimate the dust impact risk ('negligible', 'low', 'medium' or 'high') as result of pathway effectiveness and residual source emissions in accordance with Table 7-10 in Appendix B.

Step 3 of the assessment combines the dust impact risk with the receptor sensitivity to determine the magnitude of dust effect for each individual receptor assessed in accordance with Table 7-11 in Appendix B. The sensitivity of each receptor is based on the criteria provided in Table 7-2 in Appendix A.

An overall effect from dust deposition on the surrounding area is required by taking into consideration the magnitude of effects at each receptor and the number of receptors. Where relevant, a separate overall ecological effect is also required if ecologically designated sites are located within 400m of dust raising activities.

3.3.3.3 Receptors

Guidance from the IAQM[20] states that the adverse impacts from operational mineral dust are commonly limited to 400m from the site boundary. Further than 400m, the impacts are typically not discernible from the background concentrations. Receptors are presented below in Table 3-1 and Figure 3.1.

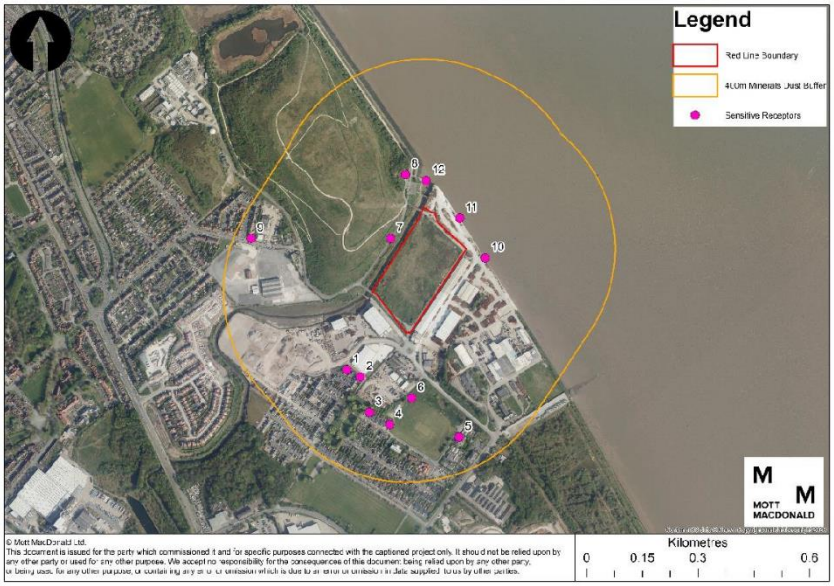
There are residential properties, an ecologically designated site (Mersey Estuary Special Protection Area (SPA)), commercial premises, park and sports facilities within 400m of the proposed development. Highly sensitive receptors such as the Autism Together residential have been included within the assessment in agreement with the EHO at WMBC.

Table 3-1: Operation mineral dust receptors

Receptor ID	Receptor description	Receptor type	National grid reference	
			X	Y
1	Pool Lane Receptor 1	Residential	334763	384448

Receptor ID	Receptor description	Receptor type	National grid reference	
			X	Y
2	Pool Lane Receptor 2	Residential	334798	384429
3	York Street Receptor 1	Residential	334823	384334
4	York Street Receptor 2	Residential	334877	384300
5	Autism Together	Residential (Autism Charity)	335064	384267
6	Maritime Cricket Club	Cricket Club	334937	384372
7	Port Sunlight River Park	Park	334880	384801
8	Cafe - Port Sunlight River Park	Café	334920	384973
9	34 Sparks Croft	Residential	334505	384801
10	Mersey Estuary SPA 1	Ecological	335135	384749
11	Mersey Estuary SPA 2	Ecological	335066	384855
12	Mersey Estuary SPA 3	Ecological	334976	384957

Figure 3.1: Operational mineral dust receptors



Source: Mott MacDonald 2022

3.3.3.4 Meteorological conditions

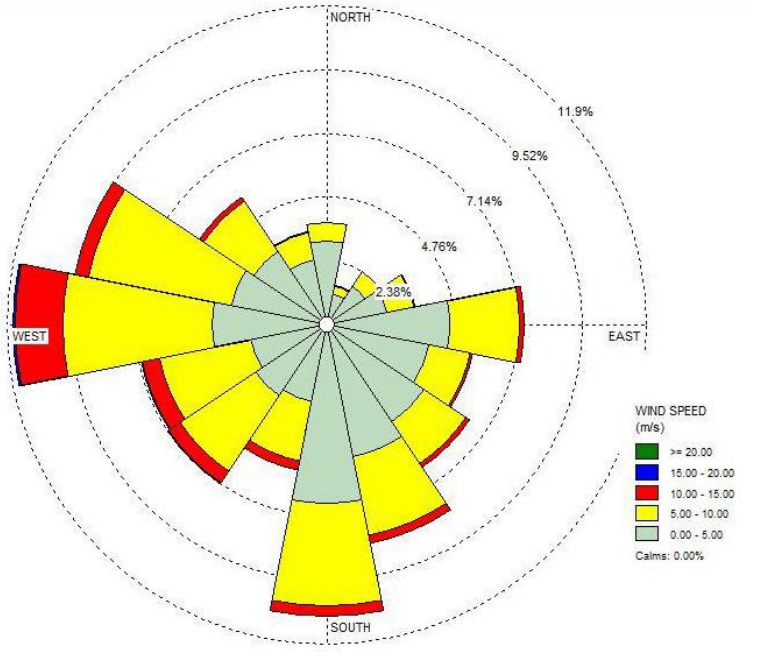
Wind speed and direction are the dominant meteorological conditions which determine the quantity of dust transported as a result of dust raising activities and in which direction it travels. Meteorological monitoring stations were reviewed to identify the likely conditions present on site.

Following consideration of available meteorological data, Liverpool John Lennon Airport is considered representative of site conditions, this site is located across the estuary at Liverpool approximately 8.9km south-east. This site is considered representative of site conditions given its close proximity. The wind rose for the Liverpool John Lennon Airport is presented below in Figure 3.2. The use of this meteorological site has been agreed with the EHO at WMBC for the assessment.

Wind roses summarise the occurrence of winds at a specified location via representing their strength, direction and frequency. The wind rose generated for the proposed development is divided into 16 cardinal directions and winds displayed in the rose represent wind originating from that specific cardinal direction. Wind speeds are demonstrated by the different colours coded on the wind rose.

The dotted circles represent the percentage frequency of occurrence. Wind speeds of less than 5 m/s are considered not to have sufficient speed to generate fugitive dust emissions in accordance with IAQM guidance.

Figure 3.2: Wind rose for Liverpool John Lennon Airport 2013-2015



Source: Mott MacDonald 2022.

As demonstrated on Figure 3.2, winds with sufficient speed to produce fugitive dust emissions from the proposed development were predominantly from the west and to a lesser degree from the south. Conditions unfavourable to fugitive dust emissions generation (I.e., winds <5m/s) were experienced approximately 55.8% of the time.

3.3.3.5 Operational health effects

The guidance recommends assessing potential health risks associated with increased exposure to PM_{10}. Smaller particles such as $PM_{2.5}$ are considered unlikely to be emitted from the proposed development as $PM_{2.5}$ is commonly formed via high temperature thermal combustion activities and not via physical mechanical activities such as materials handling operations. Assessment of $PM_{2.5}$ is thus excluded from the assessment.

An assessment is required if the background PM_{10} concentration exceeds 17$\mu g/m^3$. Below this concentration, it is considered unlikely that the process contribution (PC) would lead to an exceedance of the annual mean objective of 40 $\mu g/m^3$. The background concentrations provided by Defra and presented in Section 4.4 indicate that the annual mean PM_{10} concentration is 10.6 $\mu g/m^3$ at the proposed development and as such, no further assessment of the potential health effects is required.

3.3.3.6 Residual dust effects

The final step of the assessment requires professional judgement to derive an overall conclusion of the likely significance of collective dust effects, inclusive of disamenity, health and ecological effects. Results of the operational phase assessment are presented in Section 5.3.

3.4 Consultation

The assessment methodology and scope was discussed with the environmental health officer (EHO) responsible for air quality at WMBC. This was initially undertaken via telephone conversation on the 19th July 2022 and was followed up via email. Confirmation of the agreement of scope and methodology was received via email on the 27th July 2022.

4 Baseline Conditions

4.1 Overview

Information on air quality in the UK can be obtained from a variety of sources including local authorities, national network monitoring sites and other published sources. Data has been obtained from WMBC and Defra to inform the baseline. It was not possible to obtain monitoring data from WMBC for 2021, therefore monitoring data from 2020, the most recent full year of monitoring data available, has been presented instead.

It should however be noted that the 2020 data (and also 2021 data if it was available) may be lower than previous years. This is due to the effects of coronavirus national lockdowns on ambient air quality monitoring data. National lockdown restrictions led to reduced vehicle emissions during national lockdown periods, which in turn led to lower ambient pollutant concentrations. The 2020 data may therefore present an underrepresentation of ambient pollutant concentrations to determine the usual baseline conditions. The 2019 data is therefore the most recent likely representation of the air quality baseline conditions.

There are no air quality management areas (AQMAs) declared within the WMBC administrative area. The closest AQMA is the Liverpool City AQMA located approximately 2.1km north-east of the site across the Mersey Estuary, this AQMA covers the entirety of the Liverpool City Council administrative area. The proposed development will not impact upon this AQMA.

4.2 Local authority automatic monitoring

There are two automatic monitoring sites within the WMBC administrative area. One of these is located in Central Birkenhead and is not considered representative of site conditions due to it being in the centre of a town that will be heavily influenced by transport emissions, this site is not considered further. The other is located at an urban background location 3.3km north-west of the proposed development in Tranmere. This monitoring site is an urban background site and is considered representative of site conditions, this is due to both locations being background locations with similar proximities to the local road networks. This site monitors NO_2 and $PM_{2.5}$ and its location is presented on Figure 4.1.

The NO_2 data from the Wirral Tranmere site is presented below in Table 4-1. There were no monitored exceedances of the annual mean objective from 2018 to 2020 and the concentrations were well below the annual mean objective level. There were also no recorded exceedances of the short-term objective of 200µg/m^3 (not to be exceeded more than 18 times per year) during this time.

Table 4-1: WMBC NO_2 automatic monitoring data

Site ID	British national grid coordinates		Site type	Data capture 2019 (%)	Annual mean NO_2 concentration (µg/m^3) / Exceedances of short-term objective (-)		
	X	Y			2018	2019	2020
CM1 – Wirral Tranmere	332054	3867111	Urban Background	99	18 (0)	16 (0)	9.6 (0)

Source: 2021 Annual Status Report, Wirral Metropolitan Borough Council.
Note: Values presented as whole numbers before 2020 result in WMBC 2021 report.

Table 4.1 shows that $PM_{2.5}$ concentrations at the Wirral Tranmere are well below the annual mean objective between 2018 – 2020. Concentrations have been relatively stable during this time. Though there is no PM_{10} monitoring undertaken in the area, $PM_{2.5}$ concentrations are a good indicator of PM_{10} concentrations as they are a constituent of PM_{10}. The low $PM_{2.5}$ concentrations would indicate that PM_{10} concentrations are also below and below the objective levels.

Table 4-2: WMBC $PM_{2.5}$ automatic monitoring data

Site ID	British national grid coordinates		Site type	Data capture 2019	Annual mean $PM_{2.5}$ concentration ($\mu g/m^3$)		
	X	Y			2018	2019	2020
CM1 – Wirral Tranmere	332054	3867111	Urban Background	95	8	8	7

Source: 2021 Annual Status Report, Wirral Metropolitan Borough Council.
Note: Values presented to no decimal places in WMBC 2021 ASR report.

4.3 Local authority diffusion tube monitoring

WMBC undertakes NO_2 diffusion tube monitoring across its administrative area, there were six diffusion tubes located within 1km of the proposed development. These tubes are all located on the A41, with five of them located around the A41/New Chester Road roundabout. The tubes located around the roundabout are likely to be heavily influenced by road traffic emissions from the junction, which is not representative of site conditions as concentrations will be much lower on site due to the distance from the A41 and New Chester Road. There are no monitored exceedances of the annual mean objectives measured at these monitoring sites in 2018 – 2020.

Diffusion tube W27 is located south on the A41 from the roundabout, it is located 700m west of the proposed development. The concentrations on this road are likely slightly higher than the proposed development site. The concentrations from this diffusion tube are presented in Table 4-3 and its located is presented on Figure 4.1. The results show that concentrations at W27 were below the NO_2 annual mean objective in 2018 – 2020.

Table 4-3: WMBC diffusion tube monitoring

Site ID	Site description	British national grid coordinates		Site type	Data capture 2019	Annual mean NO_2 concentration ($\mu g/m^3$)		
		X	Y			2018[a]	2019[b]	2020[c]
W5	Bolton Road East, New Ferry	334128	384634	Roadside	100	32	33	27
W12	New Chester Road, New Ferry	334061	384617	Kerbside	100	38	39	33
W13	New Chester Road, New Ferry	334113	384588	Roadside	100	23	21	17
W18 /19	New Chester Road	334097	384546	Roadside	50[d]	-	33	27
W34 /19	New Chester Road, Tranmere	334096	384535	Roadside	50[d]	-	24	21
W27	New Chester Road, New Ferry	334194	384348	Roadside	83	25	26	17

Source: 2021 Annual Status Report, Wirral Metropolitan Borough Council.
Note: Results have been bias adjusted by WMBC. Values presented to no decimal places in WMBC 2021 ASR report. (-) indicates that no monitoring was undertaken at monitoring site in that year.
[a] Bias adjustment factor of 0.76 applied.

[b] Bias adjustment factor of 0.75 applied.
[c] Bias adjustment factor 0f 0.77 applied.
[d] Annualisation undertaken by WMBC as data capture is less than 75%

Figure 4.1: Monitoring locations

Source: Mott MacDonald 2022.

4.4 Defra projected background concentrations

Defra provides mapped future year projections of background pollution concentrations for NOx, NO_2, PM_{10} and $PM_{2.5}$ for each 1km grid square across the UK for all years between 2018 to 2030[21]. The maps include a breakdown of background concentrations by emission source, including road and industrial sources, which have been calibrated against 2018 (the baseline year) UK monitoring data.

The maximum background concentrations for the 1km grid squares containing the proposed development in 2022 are presented in Table 4-4 below. The data shows background concentrations are all below the relevant objectives.

Table 4-4: Projected background concentrations (µg/m^3) of NO_x, NO_2, PM_{10} and $PM_{2.5}$

Year	Pollutant			
	NOx	NO_2	PM_{10}	$PM_{2.5}$
2022	21.5	15.4	10.6	7.2

Source: Defra (2018)
Note: The background concentrations shown are for the 1km square centred on 334500, 384500.

[21] Defra Background maps (2018) [Online] Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps

4.5 Summary

There are no AQMAs designated in WMBC administrative area which indicates that there are no areas currently exceeding the air quality objectives. The available monitoring data recorded at automatic monitoring and diffusion tube monitoring sites confirms that there are no exceedances of NO_2 or $PM_{2.5}$ air quality objectives in 2018 – 2020. Monitored NO_2 concentrations on the local strategic road network also show no exceedances of the annual mean objective.

The Defra projected backgrounds concentrations show that concentrations at the proposed development are unlikely to exceed the relevant objectives for all relevant pollutants.

5 Potential Impacts

5.1 Overview

This section provides details of the likely effects predicted to occur from the construction and operation of the proposed development.

5.2 Construction dust assessment

Construction dust emissions from the proposed development will only occur during the construction phase and therefore are described as temporary. The dust emission magnitude descriptors that have been applied to each of the construction activities are presented in Table 5-1 along with the justification for the selections.

Table 5-1: Dust emission magnitude

Activity	Dust emission magnitude	Justification
Demolition	N/A	No demolition required as there are currently no significant structures on site.
Earthworks	Large	Total area of earthworks is estimated to be 39,000m^2 based on measurements from the site red line boundary, this is above the threshold for a large magnitude of 10,000m^2.
Construction	Medium	There is a building footprint of 7,500m^2 with a building height of 13m, which equates to an overall building volume of 97,500m^3. This is between the medium threshold of 25,000m^3 – 100,000m^3.
Trackout	Large	Detailed construction vehicle traffic data is not available, a large magnitude has been selected as a conservative estimate. A large magnitude indicates movements of > 50 HDV movements per day. Movements over 50 would only be during peak periods and once averaged over a full year would be below the requirements for an assessment of construction traffic road emissions.

The sensitivity of receptors to dust soiling and PM_{10} was determined through the identification of the number of receptors within a range of distance bands and by annual mean PM_{10} concentrations. These distance bands were calculated from the red line boundary.

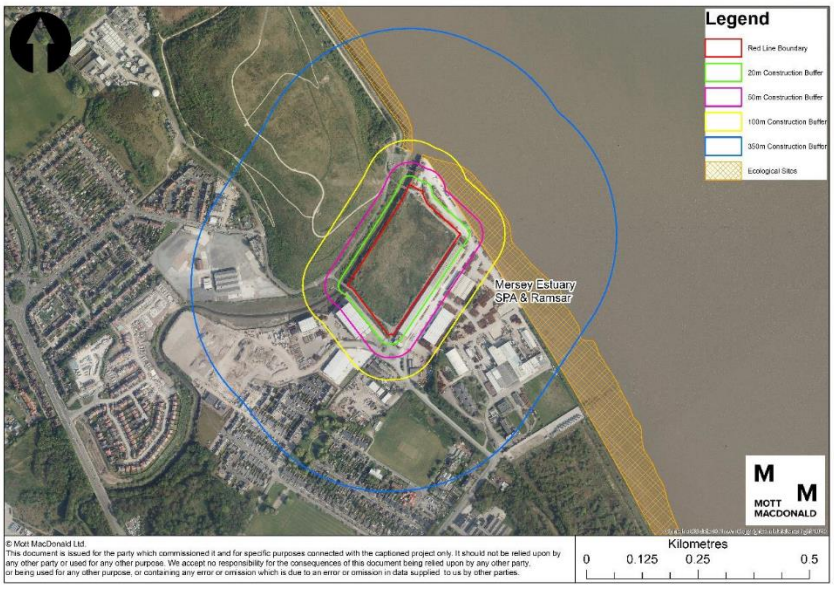
Figure 5.1, Figure 5.2 and Table 5-2 present the sensitivity of the area to the identified construction activities associated. The criteria to determine sensitivity is presented in Table 7-2, Table 7-3, Table 7-4 and Table 7-5 in Appendix A.

As presented on Figure 5.1, the area of the highest sensitivity is to the south of the scheme, where there are over 10 high sensitivity receptors within 350m of the proposed development. These include residences on Pool Lane and York Street, there is also the Autism Together residential charity located on The Grn.

Table 5-2: Receptor sensitivity

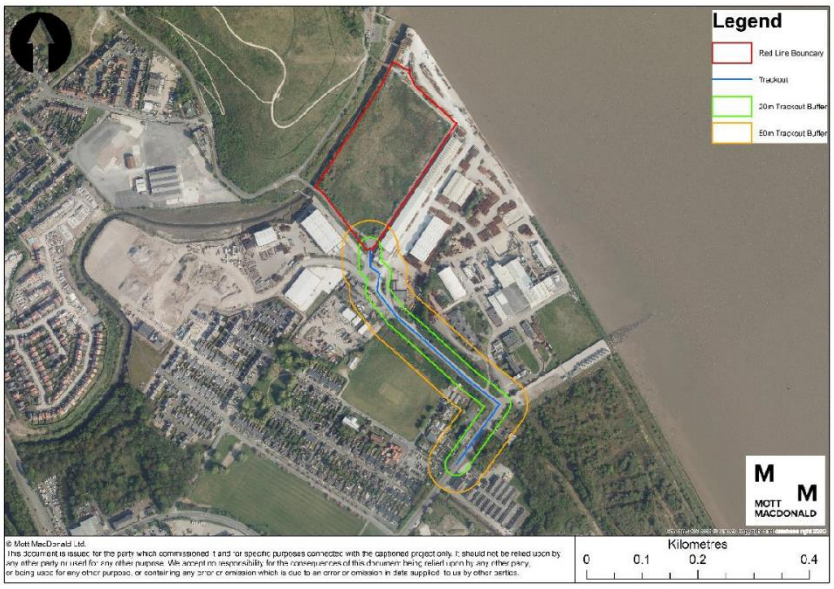
Activity	Dust soiling		Health effects of PM_{10}		Ecological	
	Sensitivity	Comment	Sensitivity	Comment	Sensitivity	Comment
Demolition	N/A	N/A	N/A	N/A	N/A	N/A
Earthworks	Low	There are 10-100 high sensitivity residential receptors within 350m located on Pool Lane and York Street. There is also the Autism Together residential charity located on The Grn which is a high sensitivity receptor, this is 300m south-east of the site. There are 1-10 medium sensitivity receptors (commercial premises) within 100m.	Low	Background annual mean PM_{10} concentration on site is 10.6µg/m^3. There are high sensitivity residential receptors within 350m located on Pool Lane and York Street. There is also the Autism Together residential charity located on The Grn which is a high sensitivity receptor, this is 300m south-east of the site. There are 1-10 medium sensitivity receptors (commercial premises) within 50m of the trackout route.	Medium	The Mersey Estuary Ramsar and Special Protection area is located within 50m of the site boundary to the north east of the site boundary.
Construction	Low		Low		Medium	
Trackout	Medium	There is 1 high sensitivity receptor within 50m, this is the Autism Together residential charity located on The Grn, as this is a particularly sensitive receptor with multiple residents, the magnitude has been increased by selecting 10-100 to increase from low sensitivity to medium sensitivity.	Low	Background annual mean PM_{10} concentration on site is 10.6µg/m^3. There is 1 high sensitivity receptor within 50m which is the Autism Together residential charity located on The Grn. There are 1-10 medium sensitivity receptors (commercial premises) within 50m of the trackout route.	N/A	No ecological receptors within 50m of trackout route.

Figure 5.1: Construction buffers



Source: Mott MacDonald 2022.

Figure 5.2: Construction trackout buffers



Source: Mott MacDonald 2022.

The overall risk of receptors to dust soiling effects and PM_{10} effects are presented in Table 5-3 Risk is based on the criteria presented in Appendix A.

Table 5-3:Summary of the risk of construction dust effects

Activity	Dust soiling effects	PM_{10} effects	Ecological effects
Demolition	N/A	N/A	N/A
Earthworks	Low risk	Low risk	Medium risk
Construction	Low risk	Low risk	Medium risk
Track Out	Medium risk	Medium risk	N/A

As presented in Table 5-3, dust soiling and PM_{10} effects for the proposed development are assessed to be 'low' to 'medium' risk, and ecological effects are assessed to be 'medium' risk without mitigation. Mitigation measures appropriate for the proposed development have been presented in Section 6 and incorporation of such measures within a Construction Environmental Management Plan (CEMP) is expected to reduce the predicted risk of construction effects such that effects are not considered to be significant.

5.3 Operational mineral dust assessment

5.3.1 Dust disamenity

5.3.1.1 Step 1 – Description of the site characteristic and baseline conditions

The proposed development will import IBA and process it to produce IBAA, which will then be exported from the site and distributed. The site will consist of the processing hall and storage areas for both IBA and IBAA.

IBA will arrive on site wet, it will then undergo days of storage where it will dry out. IBA produces a hard cement like outside shell once it has dried out prior to undergoing processing. There is limited potential for dust from the IBA due to these characteristics.

The IBAA storage areas are outside in open air, where there are fixed and mobile misting cannons to mitigate potential dust impacts from the IBAA stockpiles.

The majority of IBA deliveries to site will arrive via ship on the Mersey Estuary, the remaining deliveries to site will arrive via HGV on the local road network. The processed IBAA will be removed from site via HGV on the local road network. All trucks delivering to and removing material from site will be covered and enclosed.

The baseline conditions, including background PM_{10} and $PM_{2.5}$ concentrations on site are presented in Section 4.

5.3.1.2 Step 2 – Estimate dust impact risk

The dust impact risk for each assessed receptor is presented below. This takes account of the residual source emissions and the effectiveness of the pathway to each of the receptors.

Residual source emission

The residual source impact was determined for each of the main operational activities listed in Table 5-4. More than one of these activities may occur on site at any one time, and this was taken into consideration within the assessment.

The residual source emissions were based on the scale of anticipated operations and accounted for designed-in mitigation. The largest residual source emissions is 'medium'.

Table 5-4: Residual source emission classification

Activity	Residual source emission	Comment
Site preparation and restoration	N/A	Relevant to the construction phase only and covered within the construction dust assessment presented in Section 5.2.
Mineral extraction	N/A	No mineral extraction on site. All raw materials imported to site
Materials handling	Small	Several material handling activities are undertaken on site. The main dust raising activities involve the movement of IBA from imports via shipping to the storage areas and subsequent movement to the processing hall and the movement of the IBAA from the processing hall to storage areas and then subsequent loading onto transportation for export from the site. IBA is imported to the site moist, and once dry prior to processing becomes hardened with a concrete like exterior meaning there is low risk of dust whipping. The processing hall is located within a fully closed building and has mitigation employed such as misting cannons for dust suppression. The IBAA storage areas are located in the open air, they have fixed and mobile misting cannons for dust suppression.

Activity	Residual source emission	Comment
On-site transportation	Small	Materials will require to be moved around site. IBA will be stored in a stockpile where it will be required to be transported into the IBA processing building. Once processed the IBAA will be removed from the building and stored in a different stockpile. The buildings contain dust suppression in the form of misting cannons and there are fixed and mobile misting cannons on site for use when transporting materials in conditions with the potential to generate dust.
Mineral processing	Small	Mineral processing is undertaken within the processing hall, this is a fully enclosed building with dust suppression misting sprays installed inside. There is therefore a very low risk of any fugitive emissions during the processing stage.
Stockpiles and exposed surfaces	Small	Frequent material transfers from the stockpiles are anticipated with the daily loading and unloading of IBA and IBAA. These areas have fixed and mobile misting cannons for dust suppression. The main IBA storage area is within a covered building, though this building is not fully enclosed.
Off-site transportation	Small	There will be up to 49 HDVs a day entering and leaving the site to import and export materials. All HDVs will be fully enclosed and covered to reduce the risk of dust emissions.

Estimation of pathway effectiveness

The site specific factors considered to determine the effectiveness of the pathway include:

- Distance and direction of receptors
- Prevailing wind direction
- Designed-in mitigation

The pathway effectiveness for each receptor location is shown in Table 5-5. Figure 3.1 shows the location of the identified receptors. Receptors selected represent the worst case receptors that have the potential to be affected. There is one ecological receptor, this is the Mersey Estuary Special Protection Area (SPA).

The frequency of prevailing wind direction at each receptor within 400m of the site boundary has been calculated based on three years of meteorological data (2013 to 2015) from the Liverpool John Lennon Airport meteorological station. The resulting frequency of moderate to high wind speeds (e.g. winds >5m/s) with the potential of carrying airborne dust particles have been assigned to the categories in Table 7-12 in Appendix B based on 16 wind direction sectors matching 16 cardinal directions.

The category of wind frequency has then been combined with the distance from each receptor to the site boundary based on categories presented in Table 7-13 in Appendix B to provide a pathway effectiveness category, as shown in Table 7-14 in Appendix B.

Rainfall has the potential to reduce dust generation as dry materials are more easily raised into the air. The assessment has not incorporated the effect of rainfall to provide a worst case assessment. It should be noted that existing vegetation around the site perimeter will be retained which will reduce the pathway effectiveness. This has not been incorporated into the calculations at this stage in order to provide a worst case assessment.

Table 5-5: Pathway effectiveness at receptors

ID	National grid reference		Direction from dust source	Frequency of wind from direction from dust source (%)	Frequency category	Distance from site (m)	Distance category	Pathway effectiveness
	X	Y						
1	334 763	384 448	SW	4	Infrequent	211	Distant	Ineffective
2	334 798	384 429	SSW	3	Infrequent	206	Distant	Ineffective
3	334 823	384 334	SSW	3	Infrequent	273	Distant	Ineffective
4	334 877	384 300	S	4	Infrequent	292	Distant	Ineffective
5	335 064	384 267	SSE	3	Infrequent	348	Distant	Ineffective
6	334 937	384 372	S	4	Infrequent	216	Distant	Ineffective
7	334 880	384 801	WNW	6	Moderately Frequent	45	Close	Moderately Effective
8	334 920	384 973	NW	2	Infrequent	215	Distant	Ineffective
9	334 505	384 801	WNW	6	Moderately Frequent	375	Distant	Ineffective
10	335 135	384 749	ESE	2	Infrequent	67	Close	Moderately Effective
11	335 066	384 855	NNE	0	Infrequent	62	Close	Ineffective
12	334 976	384 957	NNW	1	Infrequent	172	Intermediate	Ineffective

Dust impact risk

The residual source emissions from Table 5-4 and the pathway effectiveness from Table 5-5 has been combined for each receptor to predict the dust risk impact, based on the matrix provided in Table 7-10 in Appendix B and are presented in Table 5-6.

Table 5-6: Magnitude of dust effect at receptors

Receptor ID	Maximum residual source emissions	Pathway effectiveness	Dust risk impact
1	Small	Ineffective	Negligible Risk
2	Small	Ineffective	Negligible Risk
3	Small	Ineffective	Negligible Risk
4	Small	Ineffective	Negligible Risk
5	Small	Ineffective	Negligible Risk
6	Small	Ineffective	Negligible Risk
7	Small	Moderately Effective	Negligible Risk
8	Small	Ineffective	Negligible Risk
9	Small	Ineffective	Negligible Risk

Receptor ID	Maximum residual source emissions	Pathway effectiveness	Dust risk impact
10	Small	Moderately Effective	Negligible Risk
11	Small	Ineffective	Negligible Risk
12	Small	Ineffective	Negligible Risk

5.3.1.3 Step 3 – Estimation of dust impact magnitude

The dust risk impact has been combined with the receptor sensitivity (based on Table 7-2 in Appendix A) to provide a magnitude of dust effect at each receptor location, based on the matrix provided in Table 7-11 in Appendix B. This is indicated in Table 5-6.

Table 5-7: Magnitude of dust effect at receptors

Receptor ID	Dust risk impact	Receptor sensitivity	Magnitude of dust effect
1	Negligible Risk	High	Negligible Effect
2	Negligible Risk	High	Negligible Effect
3	Negligible Risk	High	Negligible Effect
4	Negligible Risk	High	Negligible Effect
5	Negligible Risk	High	Negligible Effect
6	Negligible Risk	Medium	Negligible Effect
7	Negligible Risk	Medium	Negligible Effect
8	Negligible Risk	High	Negligible Effect
9	Negligible Risk	High	Negligible Effect
10	Negligible Risk	High	Negligible Effect
11	Negligible Risk	High	Negligible Effect
12	Negligible Risk	High	Negligible Effect

5.3.1.4 Summary

The magnitude of dust effect at all receptors is negligible. The overall effect of the proposed development is not significant. Mitigation measures employed to suppress dust emissions are considered appropriate to mitigate any potential effects. A summary of dust disamenity effects is presented below in Table 5-8.

Table 5-8: Summary of dust disamenity effects at specific receptors

ID	Receptor description	Direction from dust source	Residual source emissions	Pathway effectiveness	Dust impact risk	Receptor sensitivity	Magnitude of dust effect
1	Pool Lane Receptor 1	SW	Small	Ineffective	Negligible Risk	High	Negligible Effect
2	Pool Lane Receptor 2	SSW	Small	Ineffective	Negligible Risk	High	Negligible Effect
3	York Street Receptor 1	SSW	Small	Ineffective	Negligible Risk	High	Negligible Effect
4	York Street Receptor 2	S	Small	Ineffective	Negligible Risk	High	Negligible Effect
5	Autism Together	SSE	Small	Ineffective	Negligible Risk	High	Negligible Effect
6	Maritime Cricket Club	S	Small	Ineffective	Negligible Risk	Medium	Negligible Effect

ID	Receptor description	Direction from dust source	Residual source emissions	Pathway effectiveness	Dust impact risk	Receptor sensitivity	Magnitude of dust effect
7	Port Sunlight River Park	WNW	Small	Moderately Effective	Negligible Risk	Medium	Negligible Effect
8	Cafe - Port Sunlight River Park	NW	Small	Ineffective	Negligible Risk	High	Negligible Effect
9	34 Sparks Croft	WNW	Small	Ineffective	Negligible Risk	High	Negligible Effect
10	Mersey Estuary SPA 1	ESE	Small	Moderately Effective	Negligible Risk	High	Negligible Effect
11	Mersey Estuary SPA 2	NNE	Small	Ineffective	Negligible Risk	High	Negligible Effect
12	Mersey Estuary SPA 3	NNW	Small	Ineffective	Negligible Risk	High	Negligible Effect

6 Mitigation

6.1 Overview

This section presents the proposed mitigation to reduce the potential impacts predicted in the preceding sections.

6.2 Construction

The construction phase activities are predicted to have a 'low to medium risk' for dust soiling and PM_{10} effects and have a 'medium risk' for ecological effects without mitigation. Best practice mitigation measures should be introduced to reduce the risk to negligible and should include techniques such as those outlined in IAQM guidance for a 'medium risk' construction site. These are presented below:

- General
  - develop and implement a stakeholder communications plan that includes community engagement before work commences on site
  - display the name and contact details of person(s) accountable for air quality and dust issues on the application site boundary
  - display head or regional office contact information
  - record all dust and air quality complaints, identify causes and take appropriate action and record measures to reduce emissions
  - make the complaints log available to local authority when asked
  - record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation is recorded in the log book
  - carry out regular on and off site inspections, especially where receptors are to monitor dust and record inspection results. An inspection log should be made available to the local authority when asked
  - increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions and dust are being carried out, and during prolonged dry or windy conditions
  - plan site layout so that machinery and dust causing activities are away from receptors, as far as is possible
  - erect solid screens or barriers around dusty activities or the application site boundary that are at least as high as any stockpiles on site. Keep clean using wet methods
  - fully enclosure 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. A record of any site run off should be kept and actions to prevent reoccurrence
  - 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
  - cover, seed or fence stockpiles to prevent wind whipping
  - only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques
  - ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, (using recycled water supply where possible)
  - use enclosed chutes and 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
  - no burning of waste
  - reuse and recycle waste to reduce dust from waste materials
- Operating vehicle/machinery and sustainable travel
  - ensure all vehicles switch off 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
  - produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials
- 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 topsoil, as soon as practicable
  - only remove the cover in small areas during work and not all at once
- 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.
  - ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
  - for smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
- Trackout
  - use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material trackout out of the site. This may require the sweeper being continuously in use.
  - avoid dry sweeping of large areas.
  - ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport.
  - inspect on-site haul routes for integrity and repair where required.
  - record all inspections of haul routes and any subsequent action in a site log book.
  - implement a wheel washing system.
  - ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
  - access gates to be located at least 10m from receptors where possible.

6.3 Operation

There are no mitigation measures required for the operation of the proposed development other than those embedded into the design.

7 Conclusion

This report provides an assessment of the following key impacts associated with the construction and operational phase of the proposed development:

- Nuisance, impact upon health and/or loss of amenity caused by construction dust and operational dust on sensitive receptors
- Changes in pollutants concentrations caused by the proposed development

A qualitative assessment of construction dust effects has been undertaken for the proposed development. There is predicted to be a 'low to medium risk' for dust soiling and PM_{10} effects and a 'medium risk' to ecological impacts prior to mitigation. Following the appropriate implementation of the mitigation measures listed in Section 6.2, impacts are predicted to not be significant.

Operational traffic flow changes as a result of the proposed development have been screened against IAQM/EPUK guidance, the changes are below the criteria for requiring a detailed assessment and operational traffic have not been considered further within the assessment.

A qualitative assessment of operational dust disamenity effects has been undertaken for the proposed development. The proposed development is predicted to lead to a negligible effect at all receptors, impacts are therefore predicted to be not significant.

The potential for human health impacts resulting from operational phase mineral dust are not significant, a full assessment of impacts has not been required due to the low background concentrations of PM_{10} in the area.

The proposed development is not considered to conflict with any national, regional or local planning policy within WMBC.

A. Dust assessment criteria

Table 7-1: Determination of dust raising magnitude

Source	Large	Medium	Small
Demolition	Total building volume > 50,000m^3, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities > 20m above ground	Total building volume 20,000m^3 - 50,000m^3, potentially dusty construction material, demolition activities 10-20m above ground level	Total building volume <20,000m^3, construction material with low potential for dust release (e.g. .metal cladding or timber), demolition activities <10m above ground, demolition during wetter months
Earthworks	Total site area >10,000m^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 >8m in height, total material moved >100,000 tonnes	Total site area 2,500m^2 – 10,000m2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4m – 8m in height, total material moved 20,000 tonne – 100,000 tonne	Total site area <2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <10,000tonne, earthworks during wetter months
Construction	Total building volume >100,000m^3, piling, on site concrete batching; sandblasting	Total building volume 25,000m3 – 100,000m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching	Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout	>100 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m	25-100 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m	<25 HDV (>3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50m

Table 7-2: Receptor sensitivity

Sensitivity of effect	High	Medium	Low
Sensitivities of people to dust soiling effects	Users can reasonably expect an 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. Indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks b and car showrooms.	Users would expect a 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. Indicative examples include parks and places of work.	The enjoyment of amenity would not reasonably be expected a; or Property 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. Indicative examples include playing fields, farmland (unless

Sensitivity of effect	High	Medium	Low
			commercially-sensitive horticultural), footpaths, short term car parks b and roads.
Sensitivities of people to the health effects of PM_{10}	Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).c Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	Locations where the people exposed are workers d, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	Locations where human exposure is transient e Indicative examples include public footpaths, playing fields, parks and shopping streets.
Sensitivities of receptors to ecological effects	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 such as vascular species included in the Red Data List For Great Britain g. Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.	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. • Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.	Locations with a local designation where the features may be affected by dust deposition. Indicative example is a local Nature Reserve with dust sensitive features.

A People's expectations will vary depending on the existing dust deposition in the area
B Car parks can have a range of sensitivities depending on the duration and frequency that people would be expected to park their cars there, and the level of amenity they could reasonably expect whilst doing so. Car parks associated with work place or residential parking might have a high level of sensitivity compared to car parks used less frequently and for shorter durations, such as those associated with shopping. Cases should be examined on their own merits.
C This follows Defra guidance as set out in LAQM.TG(22).
D Notwithstanding the fact that the air quality objectives and limit values do not apply to people in the workplace, such people can be affected to exposure of PM10. However, they are considered to be less sensitive than the general public as a whole because those most sensitive to the effects of air pollution, such as young children are not normally workers. For this reason workers have been included in the medium sensitivity category.
E There are no standards that apply to short-term exposure, e.g. one or two hours, but there is still a risk of health impacts, albeit less certain.
F A Habitat Regulation Assessment of the site may be required as part of the planning process, if the site lies close to an internationally designated site i.e. Special Conservation Areas (SACs), Special Protection Areas (SPAs) designated under the Habitats Directive (92/43/EEC) and RAMSAR sites.
G Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.

Table 7-3: Sensitivity of the area to dust soiling effects on people and property

Receptor sensitivity	Number of receptors	Distance from the source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low

Receptor sensitivity	Number of receptors	Distance from the source (m)			
		<20	<50	<100	<350
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 7-4: Sensitivity of the area to human health impacts

Receptor sensitivity	Annual mean PM_{10} concentration	Number of receptors	Distance from the source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 7-5: Sensitivity of the area to ecological impacts

Receptor sensitivity	Distance from the source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Table 7-6: Risk of dust impacts - demolition

Sensitivity of area	Dust emissions magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 7-7: Risk of dust impacts - earthworks

Sensitivity of area	Dust emissions magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 7-8: Risk of dust impacts - construction

Sensitivity of area	Dust emissions magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 7-9: Risk of dust impacts – trackout

Sensitivity of area	Dust emissions magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

B. Operational mineral assessment criteria

Table 7-10: Dust impact risk

Pathway effectiveness	Residual source emissions		
	Small	Medium	Large
Highly effective pathway	Low Risk	Medium Risk	High Risk
Moderately effective pathway	Negligible Risk	Low Risk	Medium Risk
Ineffective pathway	Negligible Risk	Negligible Risk	Low Risk

Table 7-11: Magnitude of dust effects

Dust impact risk	Receptor sensitivity		
	Low	Medium	High
High Risk	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium Risk	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

Table 7-12: Categorisation of frequency of potential dusty winds

Frequency category	Criteria
Infrequent	Frequency of winds (>5m / s) from the direction of the dust source on all days are less than 5%
Moderately Frequent	Frequency of winds (>5m / s) from the direction of the dust source on all days are between 5% and 12%
Frequent	Frequency of winds (>5m / s) from the direction of the dust source on all days are between 12% and 20%
Very Frequent	Frequency of winds (>5m / s) from the direction of the dust source on all days are greater than 20%

Table 7-13: Categorisation of receptor distance from source

Category	Criteria
Distant	Receptor is between 200m and 400m from the site boundary
Intermediate	Receptor is between 100m and 200m from the site boundary
Close	Receptor is less than 100m from the site boundary

Table 7-14: Pathway Effectiveness Matrix

Receptor distance category	Frequency of potentially dusty winds			
	Infrequent	Moderately frequent	Frequent	Very frequent
Close	Ineffective	Moderately Effective	Highly Effective	Highly Effective
Intermediate	Ineffective	Moderately Effective	Moderately Effective	Highly Effective
Distant	Ineffective	Ineffective	Moderately Effective	Moderately Effective

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