Creating a world fit for the future

Potential sources of odour in Old Wolverton district

Task 2 – Information on potential odour sources

Report for Milton Keynes City Council

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1 Introduction

Ricardo Energy and Environment (Ricardo) has been commissioned by Milton Keynes Council's Environment & Property division to review potential odour sources in the vicinity of Old Wolverton Road to identify which sources are most likely to give rise to the odour emissions which lead to complaints being made.

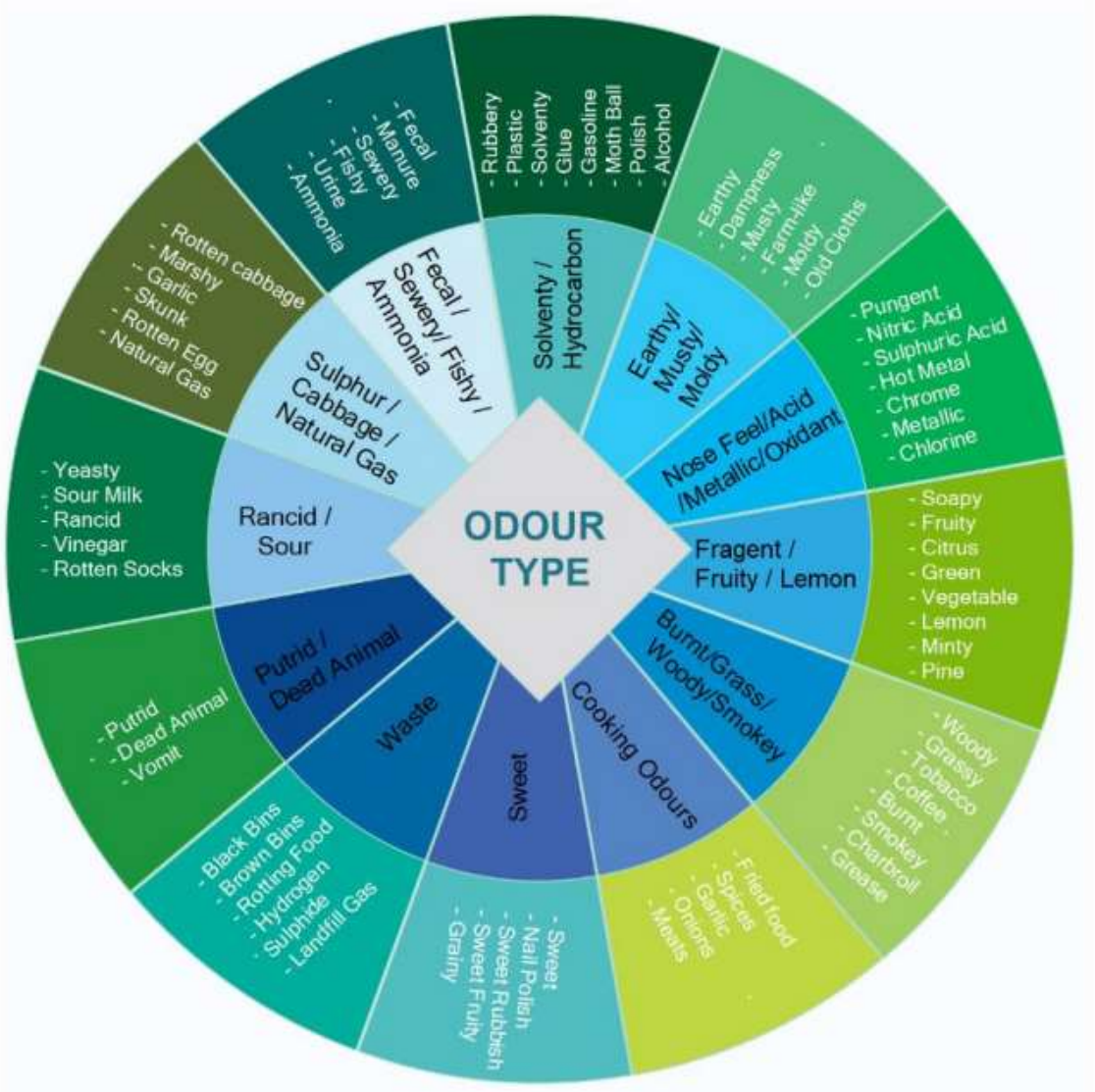
Task 1 in this study has investigated the nature of the complaints made about the nuisance odour to determine:

- The odour descriptors most frequently linked to the complaints.
- Whether there are other features of the complaints that provide evidence as to the source of odour that elicit the complaints (e.g. wind direction, day of week etc.).

The conclusions arising from Task 1 were:

- That there are two odour types being complained about – namely odours linked to rubbish and those linked to a sharp, acidic, burnt plastic tones. If the descriptors correctly describe the odours that were perceived, then our attention (see Figure 1) would be drawn towards waste processing on the one hand, on the other a process/activity that that gives rise to either a 'nose feel' or an acid/metallic/oxidant tone or a burnt tone.
- That the complaints linked to locations along Old Wolverton Road predominantly occurred when the wind blows between the north and east compass directions, Other complaints locations were affected by different wind directions.
- Complaints occur throughout the week (Monday - Sunday)

Figure 1: Odour wheel1



In this task we seek to collate information on potential odour sources in the vicinity of Old Wolverton. Our focus will be on business and other sources along Old Wolverton Road. Figure 2 has been prepared to highlight the relationship between the industrial area within Wolverton along-side the residential areas.

[1] Irish EPA Odour Emissions Guidance Note (Air Guidance Note AG9) (2019)

Figure 2: Annotated Google Earth Image showing area of interest

The approach taken in this review:

- Identifies activities and operations within this area.
- Screens out those activities that are unlikely to have any significant odour emissions.
- identifies activities and operations within this area that are likely to have significant odour emissions and to assess the potential impact of those activities on the residents living near King Stephen Meadows.

2 Initial screening of potential sources

This review seeks to identify those activities and operations which have the potential to emit odour so that more detailed analysis can be carried out.

For this review we have tried to identify all activities and operations that are carried out in the vicinity of Old Wolverton Road. Our review draws on information gathered from:

- Visits to the area while developing the scope for this project.
- Google Earth supported by web-based information.
- Various environmental permits that have been made available by the Milton Keynes Environmental Health department.

The review has been underpinned by Ricardo's professional judgement in relation to measuring and assessing odour emissions from agriculture, waste processes, and from industrial activities.

In screening out activities we have assumed that:

- Commercial (e.g. sale of tiles or building materials) and office-based activities do not emit odour.
- Garage services would not ordinarily emit odour, however operations which deal with solvents (e.g. for touch up painting of cars below the permit threshold) or tyres may emit some odour. The magnitude of such emissions will be low and any odour footprint would be too small to warrant further investigation.
- Small scale manufacturing/engineering is unlikely to emit significant levels of odour. This assumption has been confirmed by Milton Keynes Environmental Heath staff[2] who have not received any complaints about odour from these types of operations.
- Small scale agriculture or low intensity farming because those activities do not involve significant odour producing activities of concern.
- The canal boats moored on the Grand Union Canal will burn solid fuel for heat etc. The magnitude of such emissions will be low and any odour footprint would be too small to warrant further investigation.
- There will be some waste type odour linked to domestic rubbish collection. This is likely to be very transitory, focused on a short period when the refuse vehicle is present, and the wheelie bins are emptied.

The activities and operations that have been highlighted for further investigation are:

- The area to the north of Wolverton beyond the River Ouse is mainly used for arable/ agricultural purposes. From time to time slurry and manure will be applied according to rules and obligations applicable within a Nitrate Vulnerable Zone. This limits the amount of nitrogen that can be applied to a particular crop[3]. It is unlikely that manure would be applied once an arable crop is established (either in the spring or autumn). Due to the transient nature of this type of odour emission it is not possible to assess the odour impact using the same analytical techniques that can be applied to fixed emission sources.
- The SERCO depot as the site is used by refuse vehicles.
- The Viridor depot as the MRF facility will handle recyclate that may be contaminated and will give rise to odour similar to a rubbish bin. The nature of the MRF process means that a rubbish type odour will be released within the MRF building and then to leak out through gaps in the building fabric.
- Vehicles using the Old Wolverton Road to access the MKWRP will emit some odour. This will be transient and linked to the length of time the vehicle is present. More odour could be expected during warm weather. Due to the transient nature of this type of odour emission it is not possible to assess the odour impact using the same analytical techniques that can be applied to fixed emission sources.

[2] Communication with Nicola Adshead (Practitioner – Environmental Health)

[3] https://www.gov.uk/guidance/using-nitrogen-fertilisers-in-nitrate-vulnerable-zones

- Animal feed compounding operators (e.g.Mars Horsecare) will give to some odour, especially where cooking, pelletising and cooling activities are carried out. The nature of the odour will be governed by the ingredients used on site.
- Gemini Rail services have several paint spray booths used for coating rolling stock. The carrier solvent used to transfer paint will be emitted from the process. Such solvents have a sweet organic odour during the spray cycle but may have a slight burnt tone during the bake cycle.
- The MKWRP will release a range of different odours linked to specific parts of the process and will include:
    - Fugitive loss from the initial handling and processing of refuse in the tipping hall
    - Fugitive loss from the dispatch of composted organic matter in the compost/ AD area
    - Treated emissions from the odour control plant serving the reception and mechanical pre-treatment facility
    - Treated emissions from the odour control plant serving the material handling for the digestion and compost processes and for product storage.
    - The emission from the main ATT stack.

Table 1: Summary of activities and operations in the Old Wolverton Road area.

Activity	Address/location	Commentary on activity/ odour sources	Warrants further consideration
Canal boats	Grand Union Canal	A number of Canal boats moor on the Grand Union Canal. These vessels will occasionally cross the Old Wolverton Road. The principle source of odour linked with canal boats will be burning of solid fuel to provide space heating. A typical canal boat is likely to use employ a 3-5kw stove. A 4kw stove working at 80% efficiency would have an air flow rate of about 2.5 litres/second. The odour concentration[4] from a stove is likely to be about 5,000 OU_E/m^3 depending on the fuel. The odour emission from a stove is therefore likely to be around 10 OU_E/s. Some odour is also likely from diesel generators which will be less than for the stove. There will be odour associated with the emission from the stoves and generators. If coal is used as fuel the odour may be describved as 'metallic' or 'steam engine' in nature. The source will be most pronounced during the winter months when heating is most likely to be used.	 The scale of the emission from an individual canal boat is unlikely to be detected beyond the tow path. In combination the emissions may go further but will still be localised. Significant odour emissions unlikely.

[4] Kistler et. al. Odor, gaseous and PM10 emissions from small scale combustion of wood types indigenous to Central Europe. Atmospheric Environment Volume 51, May 2012, Pages 86-93

Activity	Address/location	Commentary on activity/ odour sources	Warrants further consideration
Small allotment	Off Old Wolverton road	Odour may be linked to compost or muck heaps which will be very localised	Significant odour emissions unlikely
Animal husbandry	Manor Farm, Old Wolverton (south of Ouse nature reserve)[5]	Surrounding field laid to pasture, low intensity farming	Significant odour emissions unlikely - muck or manure is not spread
Agricultural holdings	Various location around Wolverton	Fields towards Cosgrove and Haversham are used for arable crops. It is likely that manures and other farm waste may be spread at certain times of the year. Significant levels of muck spreading is unlikely to occur: • During winter periods because of NVZ obligations • When crop have been planted and are growing (winter/spring to harvest (July – October depending on crop)	 During manure and slurry spreading there will be significant levels of odour released and more likely than while spreading is taking place complaints are likely to occur. Unlike point emission predicting the extent and scale of such emissions is difficult.
WH Barley	9 Old Wolverton Rd	Transport and storage service	Odour emissions unlikely
Motor Serve	Old Wolverton Rd	Garage services including a tyre bay	Burnt rubber type odour associated with the tyre bay which may be noticeable away from the garage buildings.
BHS home appliances	Old Wolverton Rd	Corporate office	Odour emissions unlikely

[5] Personal communication with Luke Stacey who manages the farming activities of the Parkland Trust

Activity	Address/location	Commentary on activity/ odour sources	Warrants further consideration
Jewson	Dickerson Road	Builder merchant	Odour emissions unlikely
Sonatest	Dickerson Road	Manufacture of non-destructive testing equipment	Odour emissions unlikely
Arden Park	Waterside Park	Garage services	Odour emissions unlikely
Hyundia	Waterside Park	Garage services	Odour emissions unlikely
Alba Engineering	Waterside Park	Light engineering	Odour emissions unlikely
Thrifty	Waterside Park	Vehicle hire	Odour emissions unlikely
Saski International Ltd	Waterside Park	Furniture supplies	Odour emissions unlikely
Marabese Ceramics	Waterside Park	Commercial operation	Odour emissions unlikely
Quest Engineering	Waterside Park	Light engineering	Odour emissions unlikely
Howdens	Dean Rd	Joinery	Odour emissions unlikely
Insignia	Dean Rd	Sign manufacture	Odour emissions unlikely
Travis Perkins	Dean Rd	Building supplied	Odour emissions unlikely
Custom Foams	Dean Rd	Foam product manufacture	Potential organic odour but localised around factory
Fastfit station	Dean Rd	Garage services	Odour emissions unlikely
Benchmark	Dean Rd	Joinery	Odour emissions unlikely
Pattern One	Dean Rd	Manufacture of car mats	Potential rubber odour but localised around factory
SGS	Canons Rd	Laboratory testing services	Odour emissions unlikely
Jolly Big	Canons Rd	Visual Merchandising	Odour emissions unlikely
Eurocell	Canons Rd	Health and safety supplies	Odour emissions unlikely

Activity	Address/location	Commentary on activity/ odour sources	Warrants further consideration
Blackstar	Canons Rd	Music equipment	Odour emissions unlikely
MK London link	Canons Rd	Courier service	Odour emissions unlikely
Deutsch Tech	Canons Rd	Garage services	Odour emissions unlikely
Total support training	Canons Rd	Training service	Odour emissions unlikely
Mirror outlet	Bridgeturn Avenue	Mirror retailer	Odour emissions unlikely
Techmate	Bridgeturn Avenue	Laboratory equipment supplier	Odour emissions unlikely
Unit nine	Bridgeturn Avenue	Live music	Odour emissions unlikely
Mk steel	Bridgeturn Avenue	Steel & fabrication	Odour emissions unlikely
Sunbelt rentals plant & tools	Bridgeturn Avenue	Equipment hire	Odour emissions unlikely
Oms	Bridgeturn Avenue	Vehicle recovery	Odour emissions unlikely
Fp&s	Bridgeturn Avenue	Truck parts	Odour emissions unlikely
Local access routes	Old Wolverton Rd	HGV Bulkers use the road from Stratford Rd end because they cannot pass under the railway bridge at the other end of Old Wolverton Rd. Deliveries are restricted to the working day Refuse vehicles managed by Serco are based at the Colts Holm Road site. Depending on the collection area these vehicles may use both directions on Old Wolverton Rd, but predominantly use direction towards central MK.	 Potential rubbish bin odour is likely to arise from vehicles while they are present. The odour will be transitory and will only be noticeable to a receptor adjacent to refuse vehicle.

Activity	Address/location	Commentary on activity/ odour sources	Warrants further consideration
		Rubbish collection is restricted to working day, Monday to Friday	The scale of the odour will be affected by ambient temperature and age of waste being collected. MK Environmental Health has recorded 1 odour complaint related to the refuse vehicles (April 2018[6]). Unlike static sources of odour, it is difficult to predict the scale and extent of odour from passing vehicles, although fugitive emissions from passing vehicles will be very localised.
GEA	Old Wolverton Rd	Mechanical engineering	Odour emissions unlikely
Mars Horsecare UK ltd	Old Wolverton Rd	Part B process [EP/40/mars] includes a process for preparing equine fibre feeds for straw etc with adjuncts added before pelletising and a conventional feed compounding process. The regulator accepts that the process is a low (offensive) odour source and does not require odour abatement.	The Council has received 2 complaints about visible dust emissions. These date to incidents in 2012 & 2013. The ingredients used in the process will not include materials of animal origin which means that the odour emission from the process will be of low offensiveness. The odour will smell of warm grains or cereal (e.g. Weetabix like). The main emission from the process will be discharged from the three process vents on the roof of the main building. These emission vents may contain sufficient odour for odour to be detected in the area.

[6] complaint record held by MKCC Environmental Health for the Old Wolverton area

Activity	Address/location	Commentary on activity/ odour sources	Warrants further consideration
			
Gemini		On arrival at the works, the underframe of the rail vehicle is cleaned using an alkaline detergent. If necessary the vehicle body is lifted from its two bogies by crane in the lifting shop prior to being shot blasted in a purpose built booth, with chilled cast iron grit. The wheelset repair process involves dismantling bogies to give 2 wheelsets per bogie. Wheelsets are jet washed with an alkaline detergent in a purpose built plant and shot blasted with an aluminium oxide / plastic medium. Ancillary components, such as brake and traction equipment, are cleaned in small jet wash machines using an alkaline detergent. Smaller intricate components are cleaned by hand with hydrocarbon based solvent (Safety Kleen) in proprietary parts washers. After repairs, bogies, wheelsets and components are finished with brush applied paint and reassembled to the vehicle body. Vehicle electrical and	 Because of the close proximity of the spray boots to the Old Wolverton area the emission from spray booths warrants further investigation.

Activity	Address/location	Commentary on activity/ odour sources	Warrants further consideration
		mechanical repairs are then carried out. Body panels and other small components are resprayed in a Binks-Bullows water-back booth. Vehicle bodies are prepared for painting by filling and sanding using a wet or dry method. Alternatively, vehicle bodies are shot blasted in a purpose built booth. Paint is applied to the rail vehicles according to customer specification, by either spraying in a proprietary spray booth, or by hand brushing in the workshop. Emissions from brush painting operations are into the general working environment, and escape to the atmosphere via natural ventilation. Spray booth emissions pass through dry filters to remove paint particles before release to atmosphere. There are four spray booths used for coating the rail vehicles: a Spray bake booth, a shot blast booth (of a suitable specification for coating application), and two Spray Booth Technology booths. The fourth booth, installed in 2003/4 in the Lifting Shop, has an enclosed preparation area and spray/bake area separated by roller shutter. Various solvents are used in the maintenance of rail stock, either for cleaning or painting vehicles. The site uses over 5 tonnes of solvent a year.	

Activity	Address/location	Commentary on activity/ odour sources	Warrants further consideration
		The emission from spray/baked cycle has the potential to emit odour with a burnt tone. Odour emissions will be released periodically rather than continuously as trains are painted.	
Serco depot	Colts Holm Road	This site provides a central hub for rubbish collection vehicles. The site includes overnight/weekend parking and vehicle maintenance facility. The odour emission from refuse vehicles will depend on the level of contamination and the ambient temperature. The odour is likely to smell similar to a rubbish bin.	 The site is the base for refuse vehicles delivering to the MKWRP. Although no waste is held on site there will be residual odour linked to odour escaping from parked refuse vehicles.
Viridor	Colts Holm Road	This is the materials recovery facility for MK. It receives recycled materials for sorting. The odour emission from a MRF will depend on the level of contamination and the ambient temperature. The odour is likely to smell similar to a rubbish bin.	Some odour will be expected from dirty recyclate. The emission warrants further investigation.

Activity	Address/location	Commentary on activity/ odour sources	Warrants further consideration
			  

Activity	Address/location	Commentary on activity/ odour sources	Warrants further consideration
Cawleys	Old Wolverton Rd	The Crawley site offers a base for the collection and transportation for the removal of hazardous and liquid waste products, non-hazardous commercial and industrial dry waste and a recycling facility for dry recyclables. The site only handles dry recyclable materials which are likely to have low odour potential. Any odour that does arise through fugitive release will be localised. The nature of the odour will be linked to low odour industiral recylables.	 The materials handled on site will not emit significant levels of odour and does not need to be considered further.
MKWRP	Old Wolverton Rd	The installation treats the household waste arising across MK. The installation handles 130,000 tonnes of 'black sack' waste and processes it using various technologies: • Mechanical pre-treatment process recovers recylate for reuse and extracts a food/organic rich fraction which is treated in the anaerobic digestion process. The residue is treated by advanced thermal treatment. • Anaerobic digestion of the food/organic rich fraction is processed under dry conditions to extract a producer gas which is used to generate renewable energy. The digester residue is further processed to produce a compost like material	Odour will be generated throughout the process. The majority of the odour generated will pass to the emission control systems. However, there will be residual odour released from the emission control system which has the potential to impact beyond the site boundary. In addition to controlled emission releases there is likely some uncontrolled released from the buildings when doors are in use.

Activity	Address/location	Commentary on activity/ odour sources	Warrants further consideration
		which is used as a cover material on landfills etc. • Advanced thermal treatment transforms the residue from the separation process into a synthetic gas in a gasification process. The synthetic gas is combusted to generate high temperature steam which creates renewable electricity in a turbine. The site has odour control equipment to treat: • Any odour arising from the delivery, storage and mechanical treatment of waste. This is treated through a series of carbon filters before discharging through a stack. • Any odour arising from the handling of organic material before and after the anaerobic digestion and composting. This is treated through a chemical scrubber and biofilter before discharging through a stack. • Any odour arising from the fuel storage bunker is extracted and treated by the advanced thermal treatment system before discharge through the main stack	 

Activity	Address/location	Commentary on activity/ odour sources	Warrants further consideration
			 

Activity	Address/location	Commentary on activity/ odour sources	Warrants further consideration
			The emissions from the MKWRP need to be considered further.

3 Detailed analysis of sources

3.1 Preamble

As an extension to the screening process we have carried out some simple air dispersion modelling to see what the likely odour contributions linked to activities and operations arising from fixed locations are likely to be. Due to the very short term, transient nature of odour emission linked to refuse vehicles in transit or due to muck spreading, these have not been included in this analysis.

The general approach used is as follows:

- Assign a reasonable odour emission rate to the activity or operation.
- Predict the hourly impact at chosen location using the ADMS air dispersion model.
- Compare the predicted hourly impact against a measure of odour intensity in order to rank individual contributions.

For the purpose of this exercise we are not relying on the conventional odour modelling methodology commonly used for permit compliance against an odour benchmark expressed as a 98th percentile, rather the modelling seeks to determine whether individual contributions has the potential to be detected at a 'faint' or 'distinct' odour. According to Defra odour guidance[7]:

- A detectable odour occurs at an odour concentration of about 1 OU_E/m^3
- A recognisable odour occurs at an odour concentration of about 3 OU_E/m^3
- A faint odour occurs at an odour concentration of about 5 OU_E/m^3
- A distinct odour occurs at an odour concentration of above 10 OU_E/m^3

3.2 Overview of modelling approach

3.2.1 Dispersion model

Ground level concentrations of odour have been modelled using the dispersion model ADMS V5.2. ADMS is an up-to-date dispersion model in which the boundary layer structure is characterised by the height of the boundary layer and the Monin-Obukhov length, a length scale dependent on the friction velocity and heat flux at the surface. The model represents the concentration distributions as Gaussian in stable and neutral conditions, but the vertical distribution is non-Gaussian in convective conditions to take account of the skewed structure of the vertical component of turbulence. The model contains a meteorological pre-processor which calculates the required boundary layer parameters from surface heat flux, wind speed and boundary layer height data. Complex modules within the model allow for the effects of plume rise and the presence of buildings.

3.2.2 Model domain

The modelling has been carried out using one receptor location on King Stephen Meadows (see Figure 4).

3.2.3 Terrain and Land Use

The topographical features surrounding a site will have an influence on the dispersion of pollution in that area. This is accounted for:

- By specifying a surface roughness length in the model input. A surface roughness value of 0.5 m, which represents open parkland or suburbia, was considered appropriate for the Wolverton area.
- By using a terrain file to reflect the change in the height of land around Wolverton. Wind flows may be affected by the terrain of an area which can affect the dispersion of a plume.

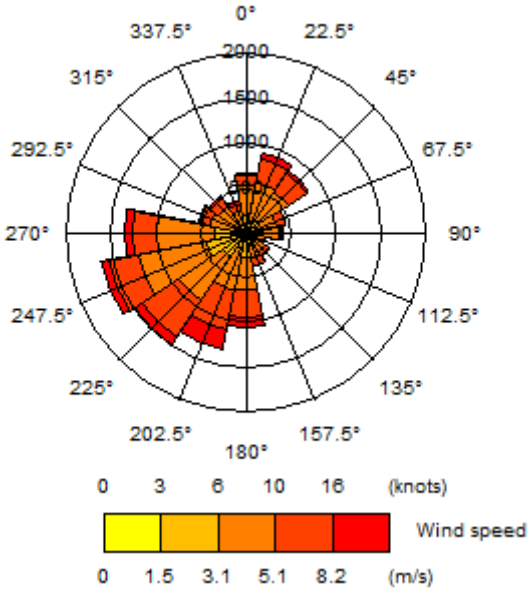
[7] Department for Environment, Food and Rural Affairs Odour Guidance for Local Authorities (2010)

3.2.4 Meteorology

ADMS 5.2 uses a range of hourly sequential meteorological data to calculate atmospheric dispersion.

Meteorological data from January 2020 to June 2021 was obtained from a nearby, representative meteorological station at RAF Bedford. see Figure 3. This is the closest site for which ADMS ready data is available. The period considered links to the complaint period covered by the Task 1 analysis.

Figure 3: Windrose for RAF Bedford for January 2020 to June 2021



3.2.5 Building parameters

ADMS contains an option to model algorithms that account for building downwash effects. Nearby tall buildings can affect the dispersion of emissions from a stack. The main effect can be to increase concentrations in the immediate vicinity of the building, while reducing concentrations further away.

The study has mainly focused on the biofilter enclosure but has also considered the effect of the new garage building on the plume dispersing towards Normanton. Building layouts and dimensions are presented in Table 2. The dispersion model requires the height, length, width, and orientation of the buildings as input data.

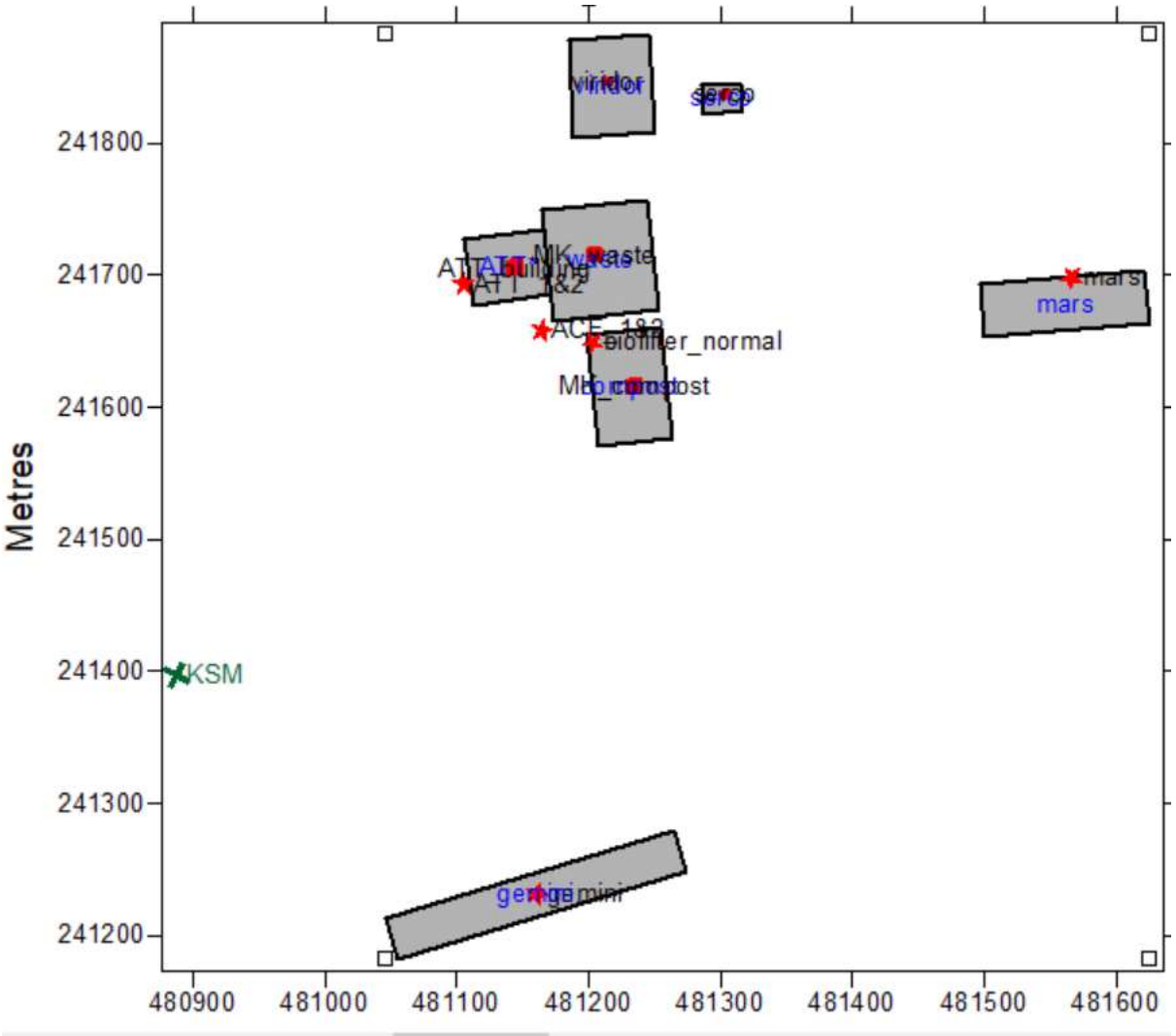
Figure 4 shows the location of the buildings with respect to the receptor location on King Stephen Meadow (KSM).

Table 2: Buildings included in the model

Building	Grid reference	Height (m)	Width (m)	Length (m)	Angle (°)
ATT building	481139,241706	14	50	60	172
Waste reception	481209,241711	10	80	84	84
Compost building	481231,241615	10	56	85	84
Serco	481301,241834	10	30	22	87
Viridor	481217,241843	10	61	74	87
Mars Horsecare Ltd	481561, 241678	30	125	40	85
Gemini (example)#	281160,241231	10	228	32	253

example building used to represent the emission location on the Gemini site

Figure 4: ADMS visualisation showing the buildings, emissions points and receptor location



3.2.6 Odour emission estimates

To differentiate the potential impact between the significant odour sources that have been identified it is necessary to assign an odour emission to each of the sources. Table 3 summarises the emission values that have been chosen for this exercise; these have been taken from:

- Measurements made at MKWRP in 2020.
- Measurements made at another animal feed compounder that did not include meal or bonemeal in their product.
- Measurement made at another paint spray operation.
- Emission limit values set by the EU BAT conclusions for the waste sector.
- Typical concentrations used in the design of waste facilities.

The location of the individual sources is shown in Figure 4 with respect to the receptor location on King Stephen Meadow (KSM).

For this exercise it has been assumed that all of these sources emit at a constant rate. This is unlikely to be true, but provides a conservative estimate:

- The Horsecare and Gemini operations may not operate 24 hour/day seven days a week.
- Emissions for the fugitive sources will be highest during the warmer summer months and lowest during the cooler winter months.

Table 3: Characteristics of source identified for further analysis

Site	Source	Release height	Estimated odour release rate (OU_E/s)	Commentary
Gemini	Example booth emission – assuming only one booth operates at any one time	Roof level emission estimated to be 13m	~10,000	Based on three production lines each with a flow rate of $7m^3/s$ with a concentration estimated to be @ 1500 OU_E/m^3
Mars	Main compounding process	Roof level emission at estimated to be 31m[8]	54,000	Based on three production lines each with a flow rate of $5.5m^3/s$ with a concentration estimated[9] to be @ 3000 OU_E/m^3
Serco	Fugitive emission	Near ground level	9000	Based on a flow rate of 1 ACPH with a concentration estimated to be @ 5000 OU_E/m^3
Viridor	Fugitive emission	Near ground level	50000	Based on a flow rate of 1 ACPH with a concentration estimated to be @ 5000 OU_E/m^3
MKWRP	Waste sorting	Carbon filter stack @ 18m	25,000	Based on a design air flow[10] of $25m^3/s$ and a BATC emission limit of 1000 OU_E/m^3
	Composting/ digestion emission	Biofilter stack @ 19m	17,000	Based on a design air flow of $24.4m^3/s$ and a measured[11] concentration of 700 OU_E/m^3
	ATT stack	ATT stack@ 55m	72,675	Based on a total design air flow of $17.1m^3/s$ and a measured concentration of 4250 OU_E/m^3
	Fugitive – waste area	Near ground level	48,000	Based on a flow rate of 1 ACPH with a measured emission concentration
	Fugitive – compost area	Near ground level	4200	
	Fugitive ATT building	Near ground level	2900	

[8] data for the Mars site was provided by Stephen Maynard of Mars Horsecare Ltd.
[9] value measured by Ricardo at another feed compounding operation manufacturing feed with meal/bonemeal additions (same as Mars)
[10] all MKWRP design data taken from (i) Technical Appendix 7/1 Air Quality (Combustion Pollutants) Assessment SLR Ref: 416.03771.00002-005/APP1 or (ii) Technical Appendix 7/3 Odour Impact Assessment SLR Ref: 416.03771.00002-005_OIA April 2013
[11] measured odour concentration obtained from a sampling exercise carried out by Ricardo in March 2020

3.3 Results of screening dispersion modelling

The results of the screening dispersion modelling are presented as hour averages over the time period used in this study. Figures 5 to 11 show the predicted odour concentration ay King Stephen Meadows for each hour for the period for:

- Fugitive emissions from Serco
- Fugitive emissions from Viridor
- Process emissions from Mars Horsecase
- Process emissions from Gemini
- Process emissions for MKWRP
- Fugitive emissions for MKWRP
- All emissions from MKWRP

In each of these figures the scale on the y-axis is different.

The results are also present in Table 4 as the 98th%ile and 100th%ile concentration. The concentration expressed as the 98th is the most widely used odour benchmark format

Table 4: Predicted odour concentrations (expressed as OU_E/m^3) at the specific receptor location

	Impact concentration (OU_E/m^3 as a 98th%ile)	Impact concentration (OU_E/m^3 as a 100th%ile)	Likely nature of odour
Fugitive emissions from Serco	0.01	0.19	Refuse odour
Fugitive emissions from Viridor	0.10	1.24	Refuse odour
Process emissions from Mars Horsecase	0.17	1.08	Cereal type odour
Process emissions from Gemini	0.14	0.82	Solvent odour with possible burnt tone
All emissions from MKWRP	1.26	8.36	Refuse + some burnt type odour
Process emissions for MKWRP	0.67	3.82	
Fugitive emissions for MKWRP	0.63	6.28	

Figure 5: Predicted ground level odour concentrations (expressed as OU_E/m^3 1 hours mean) at KSM based on estimated fugitive emissions from the SERCO facility

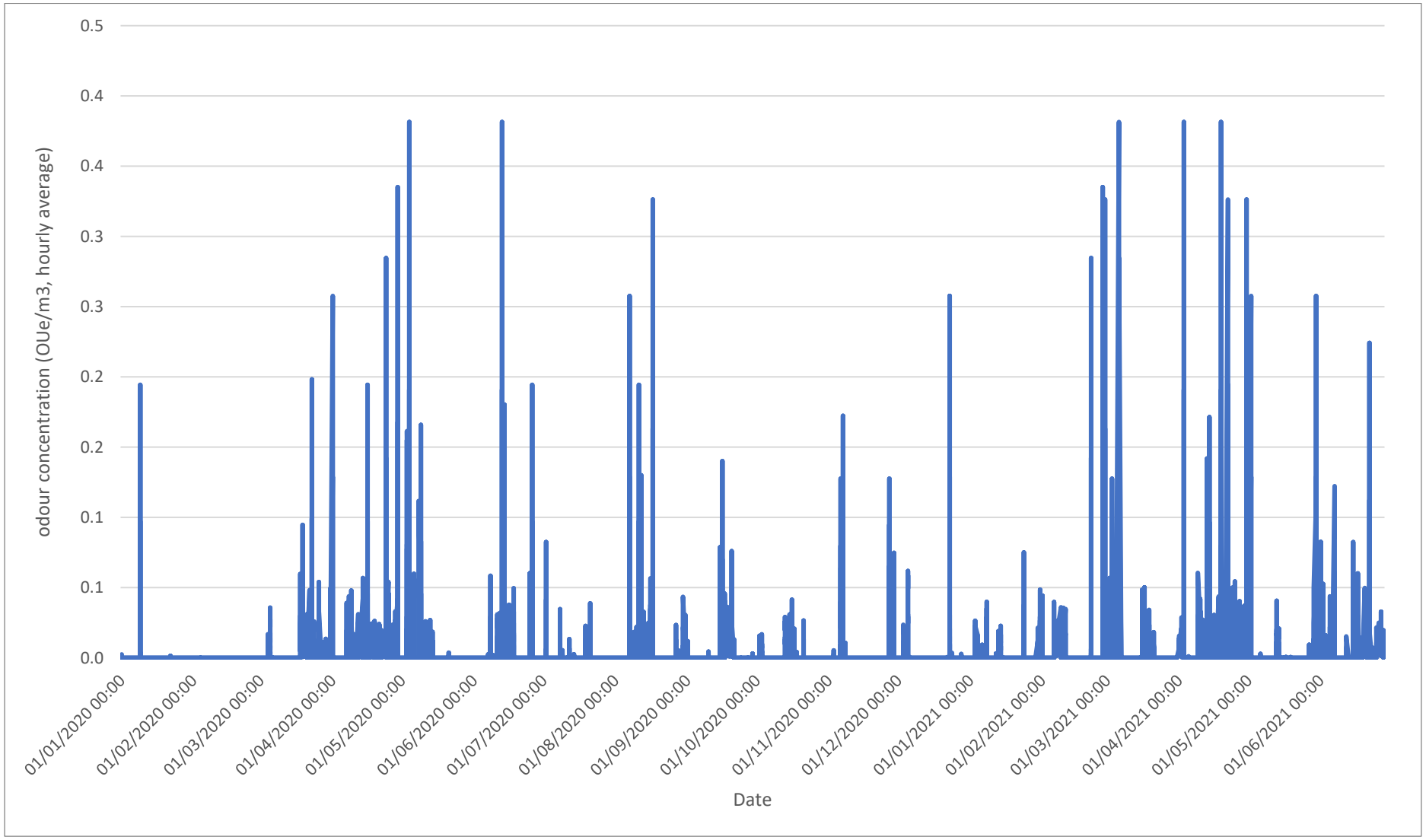


Figure 6: Predicted ground level odour concentrations (expressed as OU_E/m^3 1 hours mean) at KSM based on estimated fugitive emissions from the Viridor facility

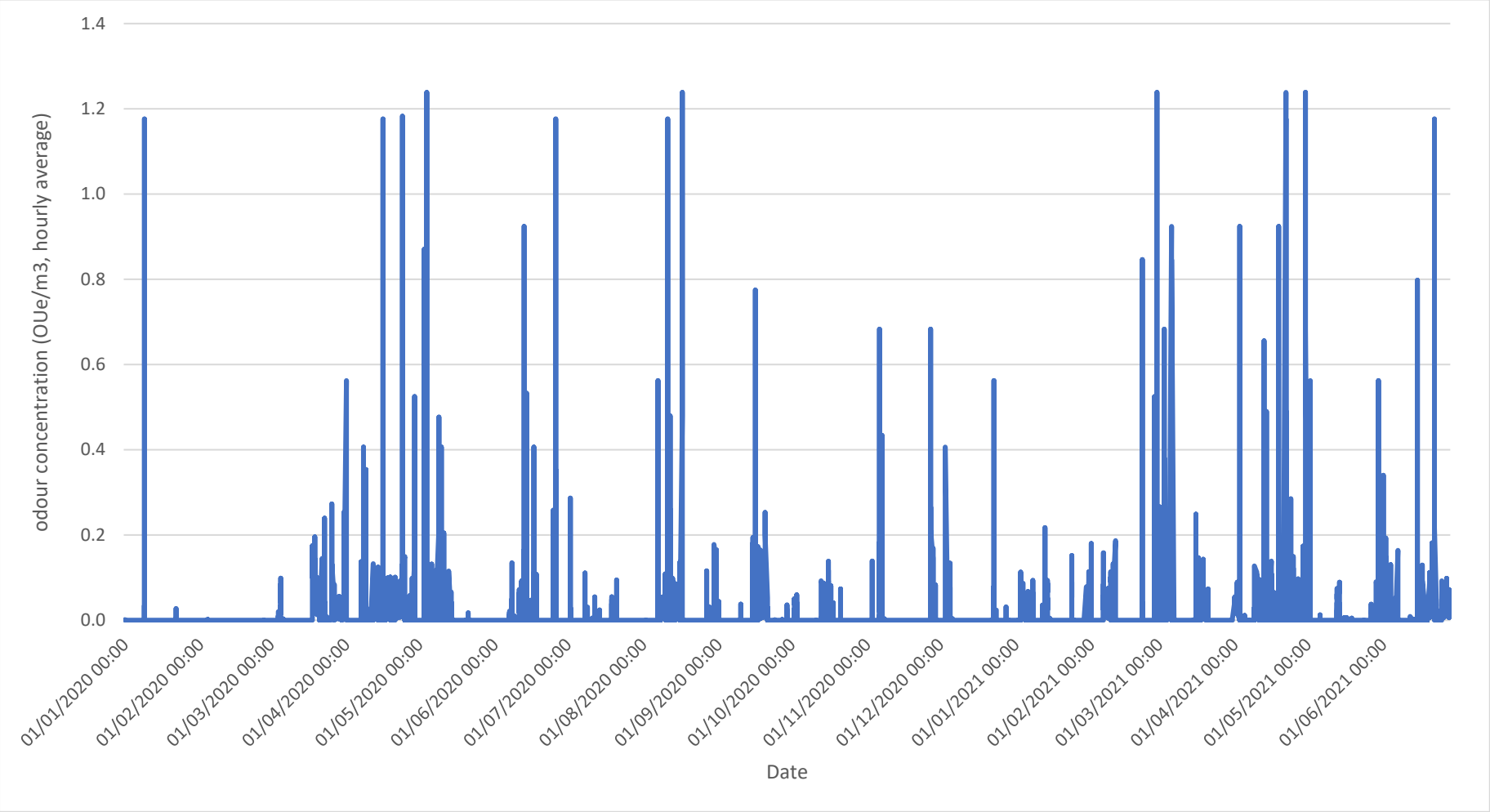


Figure 7: Predicted ground level odour concentrations (expressed as OU_E/m^3 1 hours mean) at KSM based on estimated stack emissions from the Mars Horsecare facility

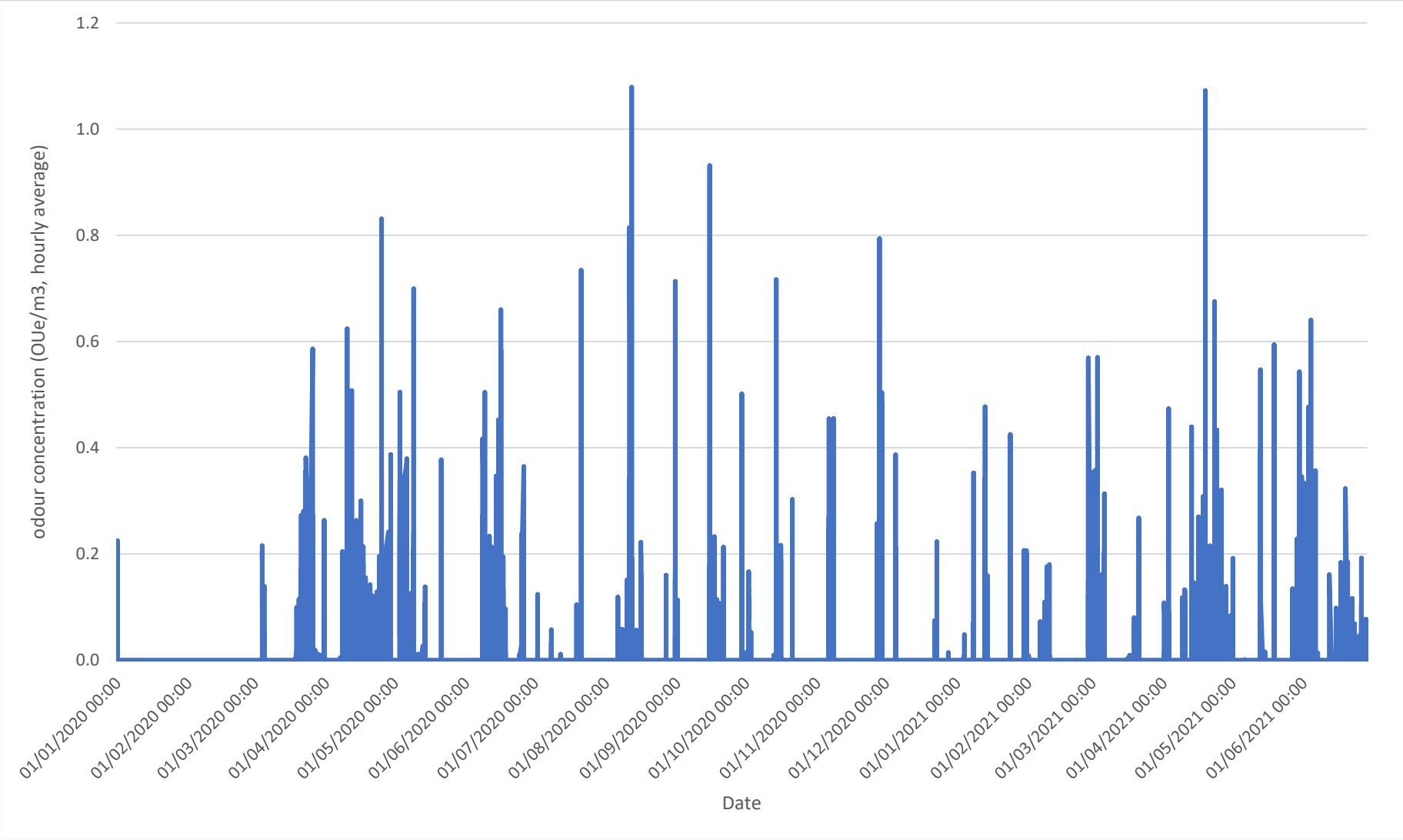


Figure 8: Predicted ground level odour concentrations (expressed as OU_E/m^3 1 hour mean) at KSM based on estimated stack emissions from the Gemini painting facility

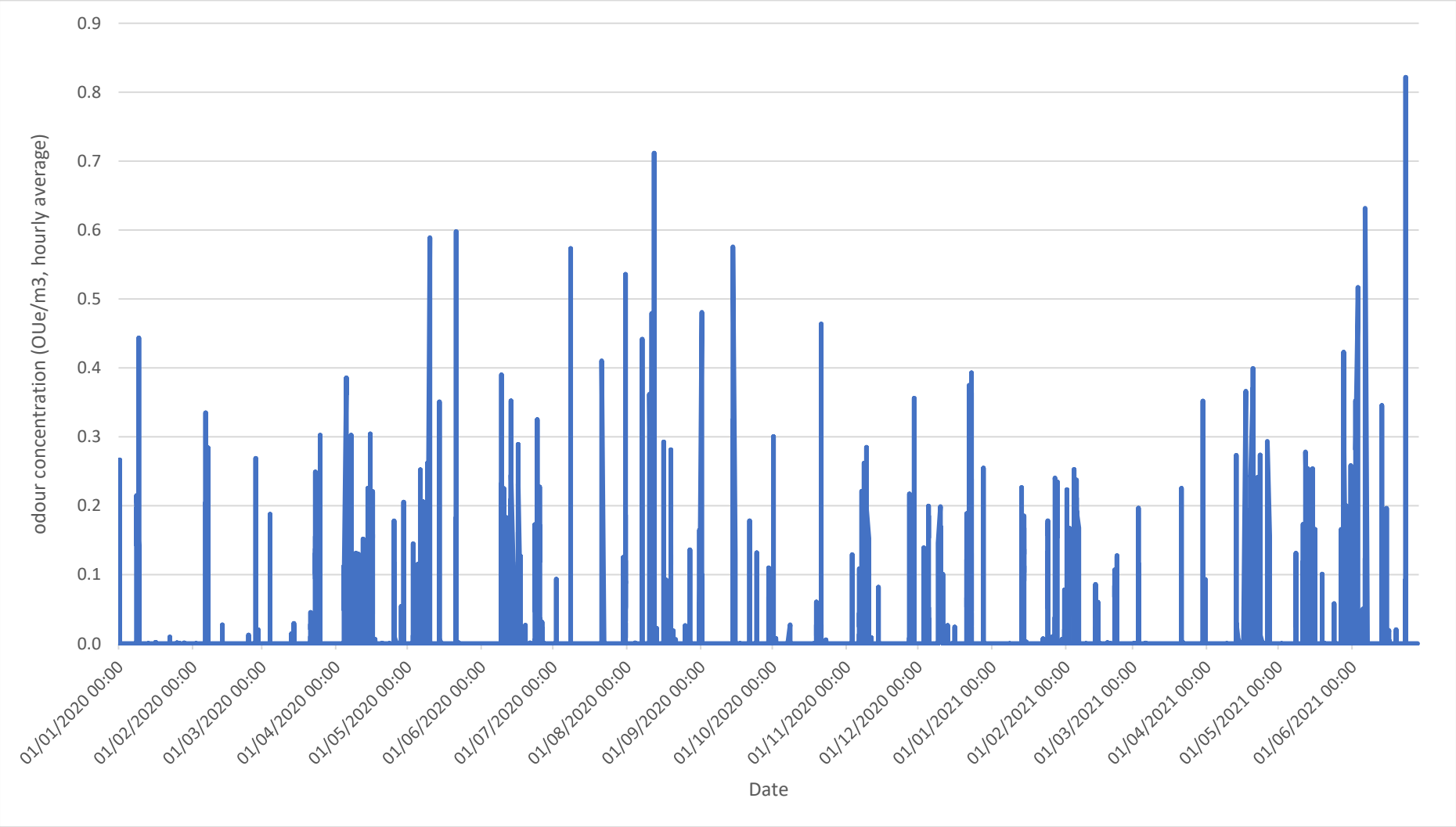


Figure 9: Predicted ground level odour concentrations (expressed as OU_E/m^3 1 hours mean) at KSM based on estimated fugitive emissions from the MKWRP facility

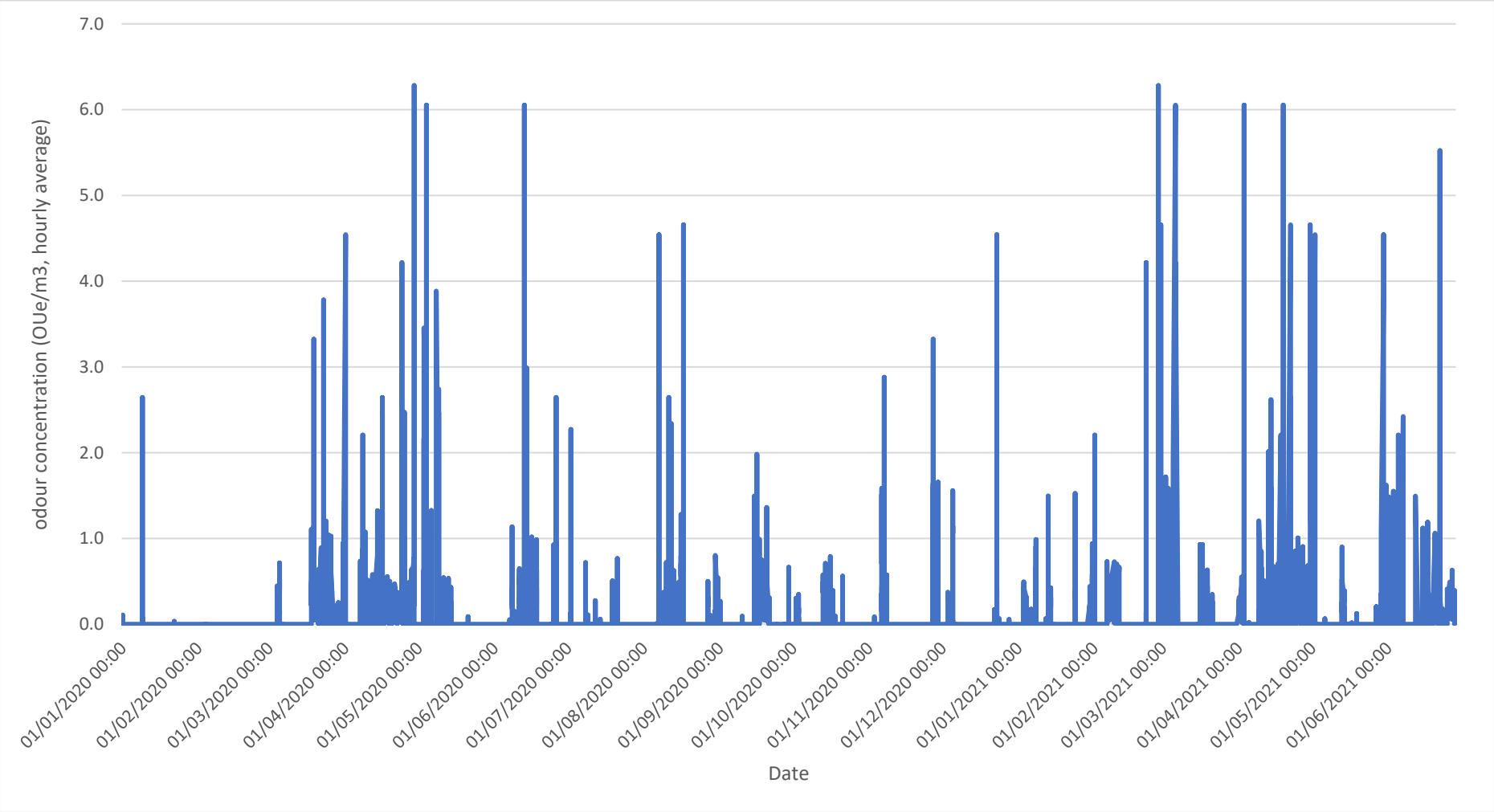


Figure 10: Predicted ground level odour concentrations (expressed as OU_E/m^3 1 hours mean) at KSM based on estimated stack emissions from the MKWRP facility

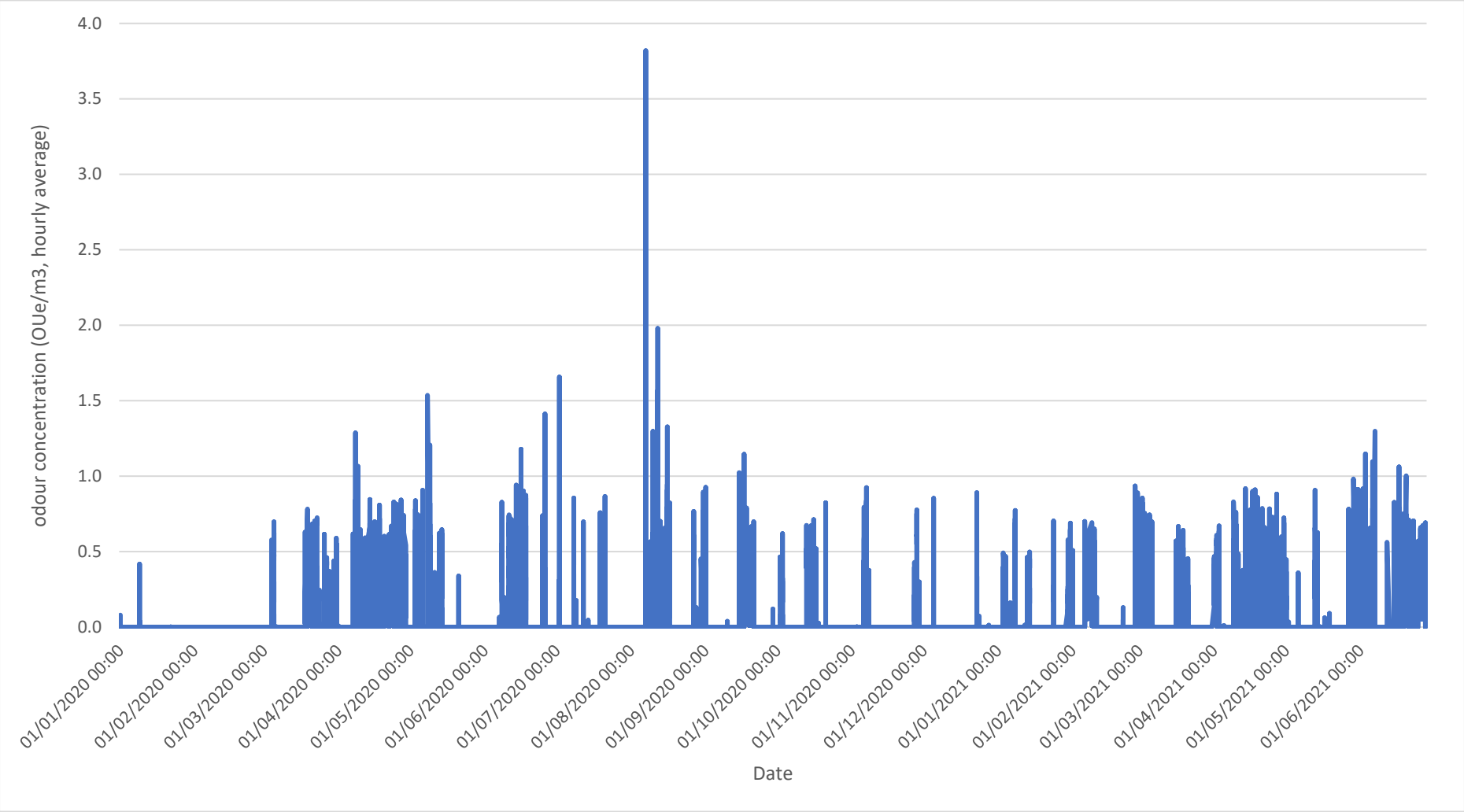
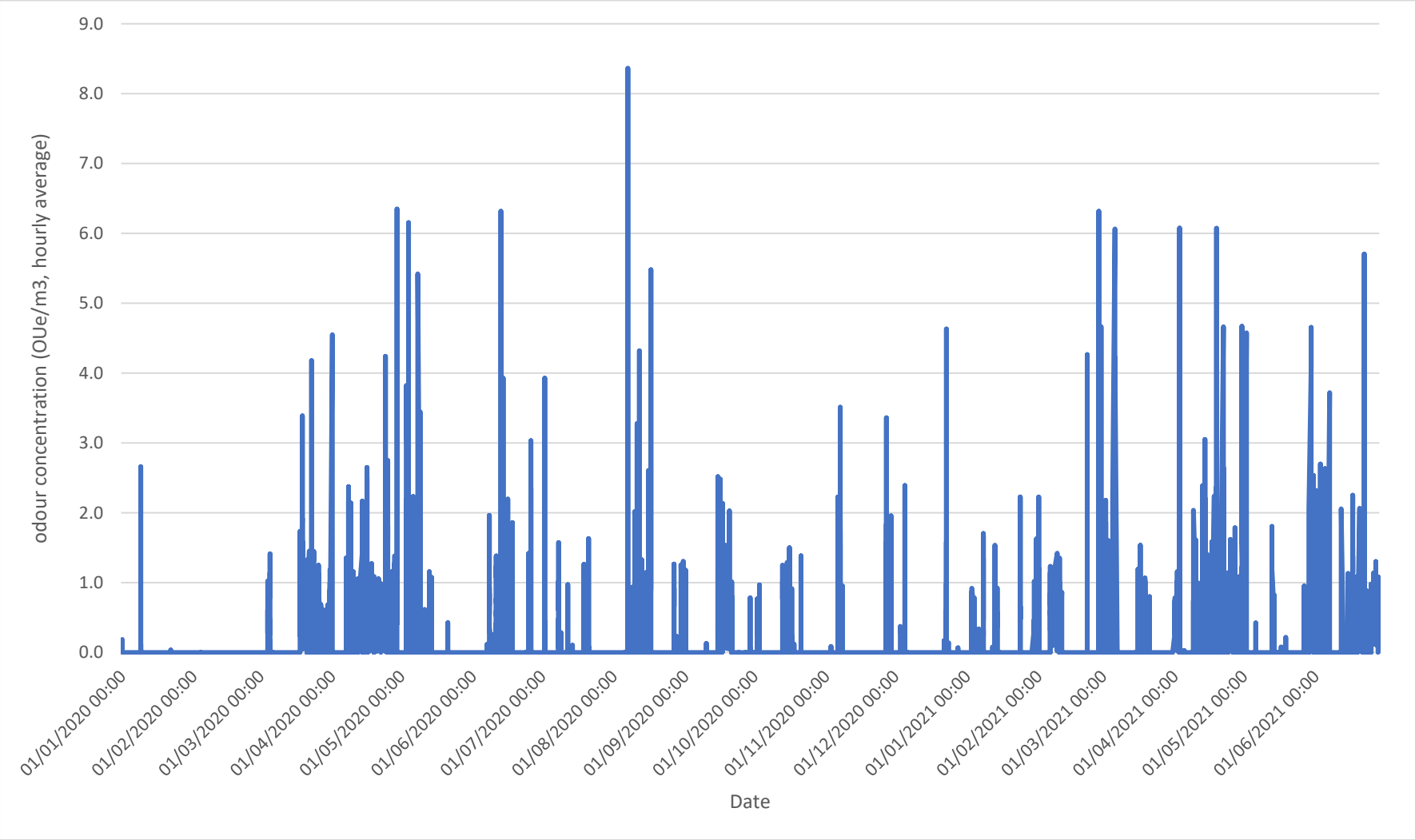


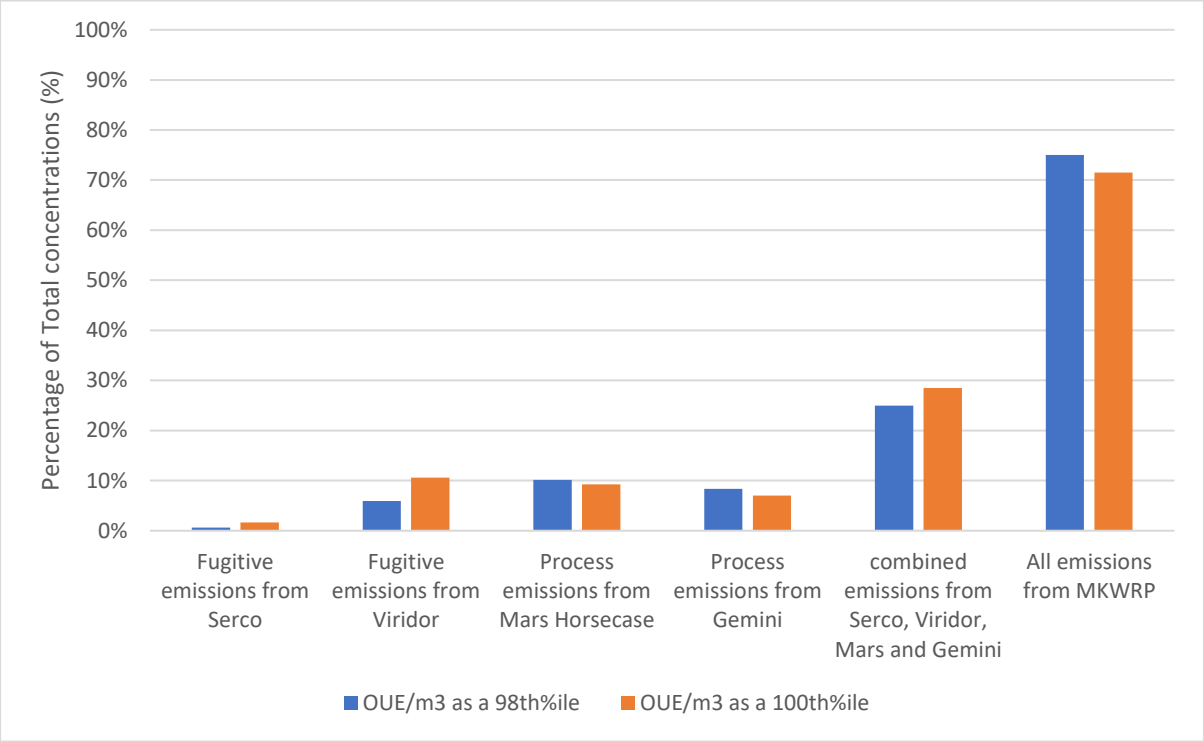
Figure 11: Predicted ground level odour concentrations (expressed as OU_E/m^3 1 hours mean) at KSM based on estimated fugitive and stack emissions from the MKWRP facility



4 Discussion of results

Figure 12 shows a summary of the results from the modelling exercise.

Figure 12: Summary of source contribution to the total odour concentration modelled



From this figure, it is clear that the MKWRP makes the greatest contribution to concentrations of odours at the receptor location , with the site contributing ~70% of the odours at the 98th percentile and at the 100th percentile. In comparison, the other sources modelled is generally predicted to contribute less than 10% each.

5 Conclusion

This report has identified that:

- There are numerous business of various types within the Old Wolverton Road area.
- A number of these business were screened out as they were likely to little or no or very insignificant odour emissions.
- Several operations were screened in for further analysis using odour modelling.
- The odour modelling has confirmed that none of the individual odour emission sources exceed the odour benchmark used for permit related odour compliance, typically taken to be 3 OU_E/m^3 as a 98^{th}%ile.
- The hourly average individual odour concentrations for most of odour sources remains below 5 OU_E/m^3 and is unlikely to be judged greater than a faint odour. There may be some adjustment to be made for fluctuating concentration within the hourly average to increase these predictions.
- The hourly average odour concentrations for the MKWRP depend on the contributions considered and may lie anywhere from ca. 1 to 8 OU_E/m^3. The intensity of the odour may fluctuate between feint and distinct odour. There may be some adjustment to be made for fluctuating concentration within the hourly average to increase these predictions.
- The predictions presented here only address odours at KSM and show that odours from the screened in will occur for a relatively short time, typically less than 2 % of the time.
- It has been found that the MKWRP is likely to contribute 70% of odours at the 98^{th} percentile and at the 100^{th} percentile.

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