



To: George Massingham

From: Nigel Mann

Date: 12th December 2022

Subject: Imperial Wharf, Clifton Marine Parade, Gravesend, Kent, DA11 0DY

The installation of two additional bitumen tanks, load out gantry and the installation of a bitumen emulsion plant and alternative car parking

Air Quality Assessment and Odour Assessment

Planning Application Reference: 20220733

Case Officer: Mr. Peter Price

Date of consultation response: 16th September 2022.

Tetra Tech Air Quality Report Reference: 784-B029584

Tetra Tech (formerly WYG) has undertaken an air quality and odour assessment to support a planning application for the installation of two additional bitumen tanks, load out gantry, the installation of a bitumen emulsion plant and alternative car parking, at Imperial Wharf, Clifton Marine Parade, Gravesend, Kent, DA11 0DY. Report was dated on 30th May 2022.

After reviewing the above report, Gravesham Borough Council's (GBC) Environmental Protection Team issued a consultation response which states:

"This service recommends refusal of this application to increase the size of the existing bitumen installation and to install a bitumen emulsion plant, due to the potential increase in odour of bitumen in the mixed-use area."

A copy of the consultation response is presented in Appendix A.

This technical note presents the works undertaken in response to the comments received from the Environmental Protection Team. This includes:

- 1) Requesting the recent odour complaints data from Gravesham Borough Council through a Freedom of Information Request.
- 2) Discussions with the site operator with regard to their records of any odour complaints.
- 3) Undertaking additional odour dispersion modelling without the installation of carbon filters. A comparison of the odour impact results with and without using the carbon filters, will demonstrate that there would be odour risk and odour complaints if no filters were fitted.
- 4) Modelling sensitivity studies on the predicted odour impact using both met data from London City Airport and from Gravesend Broadness. As the Broadness weather station was closed in 2018, the sensitivity study results have been presented using the 2018 London City Airport met data and the most recent 2018 Broadness met data.
- 5) Presenting the receptor elevations which have been already embedded and considered in the model.



- 6) Response to the Environmental Protection Team's comments on the contents of the reports relevant to both air quality and odour.

Comments from the consultation response are copied in *italic* text and Tetra Tech's responses to the comments are presented in blue.

Gravesham Borough Council



1.0 ODOUR COMPLAINT DATA AND ODOUR IMPACT WITHOUT FILTERS

GBC Comment 1 [Odour Complaints]

“Whilst it is acknowledged that there are odour control measures/mitigation in place in the form of carbon filters, at the existing site, and that they are proposed to be replicated for the proposed additional tanks, a strong smell of bitumen arising from the existing site does occur and so these measures are, like most odour control methods, not 100% effective.

Several attempts have been made by this service to resolve the odour issues however they are still noticeable and unpleasant. The odour of bitumen is discernible to a person in small amounts and therefore unless the mitigation measures were 100% effective there will be a detrimental impact on the locality that will be unpleasant.”

Response to Comment 1 [Odour Complaints]

Freedom of Information (FOI) Request

Tetra Tech has contacted Gravesham Borough Council requesting odour complaints associated with the operations of existing facility received in last 5 years from the residential areas in West Street, The Overcliffe or Pier Road, as well as in the Imperial Retail Park, West Mill and East Mill.

Deborah Wilders, Environmental Protection Team Leader at Gravesham Borough Council, emailed Tetra Tech with following information on 28th November 2022:

“Enquiry Number: GFOI-021761 Bitumen Odour

Response:

Three complaints from the public have been recorded in the last 5 years as briefly detailed below. This is in addition to the consistent odour of bitumen experienced by officers of the Environmental Protection Team in the locality of the site throughout this period.

February 2018 The Overcliffe, Gravesend (south of the plant)

The complaint commenced in February 2018 and was reported by the complainant for several months. The report was that the smell was really strong. The complainant acknowledged that the smell was worse when there was a temperature inversion, and the wind was in the direction towards The Overcliffe.

April 2018 Fairfield Square, Stuart Road, Gravesend (east of the plant)

The complaint commenced in April 2018 and continued for several months. The report was that the smell was frequent and often coincided with the ship deliveries although not every time as the complainant could see the jetty and when ships were moored etc. This complainant reported that



despite action being taken by the site management the smell was more frequent and stronger. They reported they could clearly smell bitumen. Throughout September and October 2018, the impact of the odour reportedly caused the complainant to close windows and balcony doors as the smell was entering the apartment. They also reported that the customers in B&Q DIY store in the retail park were commenting on the smell in store. The complainant was becoming very concerned with regards to the impact on health of the odour including concerns as to whether it was carcinogenic.

May 2018 Pier Road (west of the plant)

The resident reported a problem in May 2018 and continued to make reports for several months. They described it as “a very strong bitumen odour coming from the nearby bitumen business based at the shore”. They reported that “on every occasion a ship comes to load or unload there is a very strong smell of bitumen in the whole area, and it is so strong that I can smell it in the house with windows closed. This is apparent every time the ship arrives and even on cold days, but particularly strong and disturbing during warm weather. There are also occasions where there is no ship, but there is a strong smell.” The complainant also reported that the plant is causing a “big nuisance” and that there is an “overwhelming smell of bitumen which gets into the house and causes our family to be sick and often unable to eat. We have also difficulty sleeping due to this smell. This includes us and our young children.” They reported that “When these bouts of smell occur, they usually last for 2-3 days and very often during weekends, when we do not work and are at home, which is very big nuisance and unacceptable as it has impact on our well-being and us not being able to lead a normal life.”

Investigation and Control Measures.

The Senior Environmental Health Officer dealing with this matter substantiated the odour in the areas where the complainants resided as well as near the bitumen tanks throughout the approx. 18 months the complaint was being investigated. All three of the complainants live in elevated locations above the height of the bitumen plant. The odour was also witnessed by other officers of the team in and around the retail park throughout the five-year period.

The site management acknowledged the complaints and carried out investigations over the approx. 18-month period. Existing control measures were upgraded, and new ones introduced.”

It can be seen that there were three complaints from the public having been recorded in the last 5 years and all complaints occurred in 2018.

There were not any complaints from the public after 2018. It is confirmed that the existing site has employed best practice on site and following the implementation of updated odour control measures and the installation of new carbon filters, there have been no odour complaints from the public.

Odour Benchmarks

Environment Agency Guidance H4 Odour Management (March 2011) and the latest Institute of Air Quality Management (IAQM) Guidance on the Assessment of Odour for Planning (July 2018) provides a methodology



for assessing the impacts of odour based on the field odour survey observations and/or odour dispersion modelling.

The modelling method calculates the 98th percentile of hourly average odour concentrations ($C_{98, 1\text{-hour}}$) over a year, (i.e. H4 guidance allows for odour levels in excess of the odour benchmark for up to 2% of the time, a total of 175 hours, over the course of a year) with the results being expressed as European Odour Unit contours on a map. The exposure contours can then be used to check unacceptable levels of odour pollution against exposure benchmarks at sensitive receptor locations.

The odour assessment report dated 30th May 2022 concluded that the maximum predicted odour concentration at sensitive/residential receptors is below the odour benchmark and the odour effects from the site operations on the sensitive receptors are insignificant.

Odour Complaint Information Held on Site

The manager of the existing facility has confirmed that there have not been any odour complaints since the implementation of odour control measures in 2018 including the installation of new carbon filters. This demonstrates that there are no ongoing odour issues at the Site.

An odour management scheme is in place and this will extend to the proposed development.

A copy of the odour management plan is presented in Appendix B.

Comment 1 [Odour Complaints] Summary

In Summary: Both odour modelling assessment results and odour complaint data demonstrate that:

- The existing site has employed best practice through the implementation of updated odour control measures and the installation of new carbon filters, and this best practice has prevented any odour complaints from the public;
- No public odour complaints (received by either the site or the LPA) since 2018 demonstrates that odour concentrations/levels at sensitive receptors are below the odour assessment benchmark; and
- The site operations are compliant with the UK legislation.

GBC Comment 2 [Odour Assessment]

“Consideration was given to the Odour Assessment by Tetra Tech. Whilst it concludes that the odour impact will be insignificant nevertheless, we are of the opinion that the odour of bitumen is so distinctive that insufficient evidence has been provided to demonstrate to this service that sufficient control measures would be put in place to ensure that the odour would not impact the locality. Carbon filters are considered to be basic technology and insufficient to prevent the odour completely. The report states that there are two potential odour sources firstly air displaced when filling any tank would be captured and passed through an in-line activated carbon filter to control the odour. Most of odour will be removed by the filter, however, it is likely there will be small amount of the residual odour being released. Secondly a potential odour release source would be the filling of lorry tanks when odorous air of the lorry tank is being displaced by the bitumen. (Section 7.1 Potential Odour Release).”

Response to Comment 2 [Odour Assessment]

Residual Odour Emissions from Carbon Filters have been assessed.

The odour emission rate from the carbon filter has been calculated based on the following manufacturer information on filter specification:

- Filter maximum air volume flow: 200 m³/hr of odorous air; and 1,800 m³/hr of fresh air.
- Pollutants in the carbon filter entrance: Hydrogen sulphide of 10,000 mg/m³; hydrocarbon C1-C14 of 10,000 mg/m³.
- Pollutants in the carbon filter exit: Hydrogen sulphide of 3 mg/m³ and respectively 15 g/h; hydrocarbon 500 g/h.

A total odour emission of 2,758 OU_E/s from the filter stack has been used in modelling for the assessment.

GBC Comment 3 [Odour Receptors]

“Table 7-6 shows the results of the odour assessment carried out by Tetra Tech. There is an increase predicted at 16 of the 25 sensitive receptors yet the report states that this is negligible. Figure 7-1 shows the contours of the increase in odour levels. This service does not consider the presence of odour of bitumen at a residential receptor to be acceptable at any level and certainly not an increase on current levels due to the proposed expansion of the site already poorly located. The findings of the report do not appear to consider that the residential properties are on top of chalk spines with the installation being slightly higher than at river level. Therefore the residential properties are at approx. the same height as the vents on the tanks etc.

Response to Comment 3 [Odour Receptors]

Table 7-6 shows the predicted odour concentrations using 3 different years of weather conditions from 2017, 2018 and 2019 met year data. It should be noted that the higher odour levels found using 2019 meteorological data when compared to those found using 2017 data, do not represent an increase in odour, they simply demonstrate the annual variations in different years depending on meteorological conditions across that period. Using the maximum predicted concentrations from a particular met data year produces a worst-case assessment.

Figure 7.1 shows the predicted the 98thile Short-Term (Hourly) Concentrations of Odour.

A digital terrain file in the UK Ordnance Survey (OS) Landranger format (.NTF) has been used in the assessment. The receptor heights which have been already embedded and considered in the model are presented in **Table 1-1** below.

Table 1-1. Table Modelled Sensitive Receptors with the Receptor Elevations

Site ID	Discrete Sensitive Receptor	UK NGR (m)		Elevations (m)
		X	Y	
D1	Unit 1 Ellandaye House, The Shore	563795	174458	8.7
D2	52 Pier Road	563786	174429	10.7
D3	46 Pier Road	563784	174393	11.5
D4	40 Pier Road	563787	174353	12.3
D5	Full Gospel Church, 32 Pier Road	563794	174331	14.5
D6	24 Pier Road	563806	174262	20.6
D7	16 Pier Road	563812	174215	19.9
D8	1 Pier Road	563824	174127	17.6
D9	36 Overcliffe	563898	174091	20.8
D10	33 Overcliffe	563956	174095	20.4
D11	26 Overcliffe	564034	174101	21.8
D12	18 Overcliffe	564133	174107	20.5
D13	15 Overcliffe	564189	174111	20.4
D14	10 Overcliffe	564263	174113	20.3
D15	Flat 10, Pioneer Court, Overcliffe	564324	174116	19.5
D16	Gravesham Community Hospital	564426	174232	13.4
D17	23 Fairfield Square, Stuart Road	564343	174248	10.8
D18	53 Fairfield Square, Stuart Road	564347	174281	11.0
D19	11 Stuart Road	564430	174311	11.0
D20	Flat 67, the Maltings, Clifton Road	564426	174424	4.8
D21	Flat 1, Baltic Wharf, Clifton Marine Parade	564245	174474	1.6
D22	Flat 43, Baltic Wharf, Clifton Marine Parade	564300	174472	1.7
D23	Halfords (commercial/retail premises)	564092	174436	1.6

D24	Carpentryright (commercial/retail premises)	564133	174449	1.0
D25	ITAB Shop (commercial/retail premises)	563988	174410	2.8
D26	Thames Estuary and Marshes Ramsar	567320	173900	2.0

GBC Comment 4 [Odour Mitigation Measures]

“There is an expectation that innovative mitigation measures would need to be employed at a site surrounded by non-industrial uses and residential properties to ensure that there is no odour impact on the locality. Even if best available techniques/technology were employed there is likely to be an increase on the current level of odour in the locality, due to the strong smell of bitumen and the expansion of the site, which we consider to be unacceptable. The storage of bitumen is better sited away from residential and retail uses.”

Response to Comment 4 [Odour Mitigation Measures]

The odour complaint history check demonstrated that there were not any complaints from the public after 2018. It is confirmed that the existing site has employed best practice on site and following the implementation of updated odour control measures and the installation of new carbon filters, there have been no odour complaints from the public.

Environment Agency Guidance H4 Odour Management (March 2011) and the latest Institute of Air Quality Management (IAQM) Guidance on the Assessment of Odour for Planning (July 2018) provides a methodology for assessing the impacts of odour when using odour dispersion modelling.

Odour modelling results/concentrations at the 98th percentile of hourly average odour concentrations ($C_{98, 1\text{-hour}}$) over a year are used to compare to the odour benchmark. H4 guidance states that the odour levels are not to be exceeded more than 175 hours (2% of the time) over a year. Therefore, the guidance allows for some odour to be detectable for this amount of time and, in accordance with the guidance, this is considered acceptable. The assessments undertaken demonstrate that there are not, and will not be, persistent unpleasant odour from the site, and as a result there have been no odour complaints since the improved control measures were implemented in 2018.

Activated carbon filters were fitted to the existing facility in 2018 which utilise absorption to remove odour coming from the tanks' vent pipes. The two additional storage tanks will also make use of the activated carbon filter. As the odour emission rates in the assessment were calculated using the activated carbon filter's maximum air volume flow, the predicted odour impact from the operations of both the existing plant and the proposed expansion of the site have been assessed.

GBC Comment 5 [Site Location and Odour Conclusion]

“The storage of bitumen is better sited away from residential and retail uses.”

“The conclusion of the report is that “odour emissions from the operations of the existing bitumen tanks and

two proposed bitumen tank operations were assessed and the maximum predicted odour concentration at sensitive/residential receptors is below the odour benchmark. The odour effects from the site operations on the sensitive receptors are insignificant.” This service does not agree with this conclusion based on local knowledge and experience of the odour from the exiting site.”

Response to Comment 5 [Site Location and Odour Conclusion]

The site is an existing bitumen terminal which has been established at this location for a significant number of years, with Google Earth images showing it dates back to at least 1990. Positioning of tanks has been given careful consideration so they are not significantly closer to residential receptors than the existing bitumen tanks, with the closest property being approximately 135m away. The proposed facility is well placed to serve the needs of the area and it makes use of the existing wharf facilities. The proposed facility will use the existing carbon filters which are already placed at best possible locations away from the receptors. The fact that there have been no odour complaints since 2018 demonstrates that the site has implemented best practice with the updated odour control measures and use of new carbon filters to prevent any odour complaints from the public.

Odour Modelling Assessment without Carbon Filters

Odour modelling exercises have been undertaken to study what the odour impact would be without the installation of carbon filters. A comparison of the odour impact results with and without using the carbon filters has been presented.

The odour emission rate from the carbon filter has been calculated based on the following information:

- Filter maximum air volume flow: 200 m³/hr of odorous air; and 1,800 m³/hr of fresh air.
- Pollutants in the carbon filter entrance: Hydrogen sulphide of 10,000 mg/m³; hydrocarbon C1 - C14 of 10,000 mg/m³.
- Pollutants in the carbon filter exit: Hydrogen sulphide of 3 mg/m³ and respectively 15 g/h; hydrocarbon 500 g/h.

Table 1-2. Odour Emissions from Carbon Filter for the Assessment and Stack Parameters

Parameter	Odour Emissions	Unit
Filter Air Volume	1,800 + 200 = 2,000	m ³ /hr
Odour Emissions from Hydrogen Sulphide (H₂S)		
Hydrogen Sulphide (H ₂ S) Concentration before the Filter	10,000	mg/m ³
Hydrogen Sulphide Concentration after the Filter	3	mg/m ³
Hydrogen Sulphide Mass Emission Rate after the Filter	15	g/hr
H ₂ S Odour Detection Threshold	1 OU _E Unit = 0.0005 ppm	-
H ₂ S Odour Detection Threshold	1 OU _E Unit = 0.000697 mg/m ³	-
H ₂ S Odour Concentration in Exhaust Air	4,305	OU _E /m ³
H ₂ S Odour Emission Rate	2,394	OU _E /s
Odour Emissions from Hydrocarbon		
Hydrocarbon Mass Emission Rate after the Filter	500	g/hr
Hydrocarbon Odour Detection Threshold	1 OU _E Unit = 100 ppb	-

	1 OU _E Unit = 0.1 ppm	
Hydrocarbon Odour Detection Threshold	1 OU _E Unit = 0.415 mg/m ³	-
Hydrocarbon Odour Concentration in Exhaust Air	659	OU _E /m ³
Hydrocarbon Odour Emission Rate	366	OU _E /s
Total Odour Emission Rate	2,394 + 366 = 2,758	OU _E /s
Stack Diameter	0.2	m
Stack velocity	17.68	m/s
Stack Height	5.6	m

Table 1-3. Odour Emissions without Carbon Filter

Parameter	Odour Emissions Without Filter	Unit
Odour Emissions from Hydrogen Sulphide (H₂S)		
Air Volume from filling tanks	200	m ³ /hr
Hydrogen Sulphide (H ₂ S) Concentration without the Filter	10,000	mg/m ³
Hydrogen Sulphide Mass Emission Rate without the Filter	2000	g/hr
H ₂ S Odour Detection Threshold	1 OU _E Unit = 0.0005 ppm	-
H ₂ S Odour Detection Threshold	1 OU _E Unit = 0.000697 mg/m ³	-
H ₂ S Odour Concentration in Exhaust Air	14348592	OU _E /m ³
H ₂ S Odour Emission Rate	797144	OU _E /s
Odour Emissions from Hydrocarbon		
Air Volume from filling tanks	200	m ³ /hr
Hydrocarbon Concentration without the Filter	10,000	mg/m ³
Hydrocarbon Odour Detection Threshold	1 OU _E Unit = 0.1 ppm	-
Hydrocarbon Odour Detection Threshold	1 OU _E Unit = 0.152 mg/m ³	-
Hydrocarbon Odour Concentration in Exhaust Air	65934	OU _E /m ³
Hydrocarbon Odour Emission Rate	3663	OU _E /s
Total Odour Emission Rate	800807	OU _E /s
Stack gas temperature	160	°C
Stack Diameter	0.5 (assume same as truck filling)	m
Stack velocity	0.078 (assume same as truck filling)	m/s
Stack Height	17.8 (assume the outlet on the top of existing Tank 1)	m

The results of the model predictions at each discrete receptor with and without use of the filters are summarised in **Table 1-4**. The results are presented at the 98thile of hourly averages (Environment Agency, March 2011).

Table 1-4. The 98th %ile Maximum Short-Term (Hourly) Concentrations of Odour

Site ID	Discrete Sensitive Receptor	Predicted Hourly PEC OU _E /m ³	
		With Filter - 2019 Met Data	Without Filter - 2019 Met Data
D1	Unit 1 Ellandaye House, The Shore	0.47	58.03
D2	52 Pier Road	0.35	55.01
D3	46 Pier Road	0.29	56.69
D4	40 Pier Road	0.21	46.58
D5	Full Gospel Church, 32 Pier Road	0.17	40.42
D6	24 Pier Road	0.11	17.05
D7	16 Pier Road	0.08	10.94
D8	1 Pier Road	0.06	7.01
D9	36 Overcliffe	0.07	8.25
D10	33 Overcliffe	0.08	12.90
D11	26 Overcliffe	0.08	16.32
D12	18 Overcliffe	0.07	18.35
D13	15 Overcliffe	0.06	12.27
D14	10 Overcliffe	0.05	7.77
D15	Flat 10, Pioneer Court, Overcliffe	0.04	6.24
D16	Gravesend Community Hospital	0.03	10.08
D17	23 Fairfield Square, Stuart Road	0.04	14.25
D18	53 Fairfield Square, Stuart Road	0.05	15.13
D19	11 Stuart Road	0.04	8.13
D20	Flat 67, the Maltings, Clifton Road	0.03	6.02
D21	Flat 1, Baltic Wharf, Clifton Marine Parade	0.09	16.46
D22	Flat 43, Baltic Wharf, Clifton Marine Parade	0.06	11.55
D23	Halfords (commercial/retail premises)	0.36	127.28
D24	Carpetright (commercial/retail premises)	0.25	58.00
D25	ITAB Shop (commercial/retail premises)	0.32	255.80

Notes:

- 1 There is no background for odour and hence the PC = PEC.

The predicted odour concentrations at the existing residential receptors without carbon filters would be greater than 5 OU_E/m³. It should be noted that the predicted odour concentrations in **Table 1-4** are the worst-case scenario by assuming the bitumen filling from the ships' cargoes continually.

IAQM Guidance on the assessment of odour for planning (version 1.1 – July 2018) states the following:

- C_{98} 1-hour $>10 \text{ ou}_\text{e}/\text{m}^3$ - complaints are highly likely and odour exposure at these levels represents an actionable nuisance;
- C_{98} 1-hour $>5 \text{ ou}_\text{e}/\text{m}^3$ - complaints may occur and depending on the sensitivity of the locality and nature of the odour this level may constitute a nuisance; and

Therefore, complaints would be highly likely to occur if the carbon filter had not been used.

This odour modelling exercise has demonstrated that the installation of the carbon filters has reduced the odour impact on the surrounding receptors and this is reflected by the absence of complaints after the installing the filters.

As such, the odour effects at the receptors from the operations of the proposed installation of two additional bitumen tanks are predicted to be 'Negligible'.

GBC Comment 6 [Odour Impact]

"If this application were permitted with the current design and mitigation the odour will likely impact the locality, as is predicted by this service, and there will be no resolution for those impacted. Therefore we recommend that the application be refused until such time as the design is amended to include 100% abatement of the odour".

Response to Comment 6 [Odour Impact]

The results of the odour modelling exercise and the fact that there have not been any recent odour complaints received following the installation of the carbon filters, demonstrates that the filter odour abatement measures and the application of the odour management plan have a positive effect on the odour control.

Modelling Sensitivity Studies on Meteorological Data

Modelling sensitivity studies on the predicted odour impact have been undertaken using met data from both London City Airport and Gravesend-Broadness. As Broadness weather station was closed in 2018, the sensitivity study results have been presented using the 2018 London City Airport met data and the most recent 2018 Broadness met data. The results are shown in **Table 1-5**.

Table 1-5. The 98th %ile Maximum Short-Term (Hourly) Concentrations of Odour

Site ID	Discrete Sensitive Receptor	Predicted Hourly PEC OU _e /m ³	
		London City Airport - 2018 Met Data	Gravesend-Broadness - 2018 Met Data
D1	Unit 1 Ellandaye House, The Shore	0.47	0.81
D2	52 Pier Road	0.35	0.65
D3	46 Pier Road	0.28	0.46
D4	40 Pier Road	0.20	0.32
D5	Full Gospel Church, 32 Pier Road	0.16	0.23
D6	24 Pier Road	0.11	0.16
D7	16 Pier Road	0.08	0.13
D8	1 Pier Road	0.06	0.08
D9	36 Overcliffe	0.06	0.08
D10	33 Overcliffe	0.06	0.08
D11	26 Overcliffe	0.06	0.08
D12	18 Overcliffe	0.05	0.07
D13	15 Overcliffe	0.04	0.06
D14	10 Overcliffe	0.03	0.05
D15	Flat 10, Pioneer Court, Overcliffe	0.03	0.04
D16	Gravesham Community Hospital	0.03	0.04
D17	23 Fairfield Square, Stuart Road	0.03	0.07
D18	53 Fairfield Square, Stuart Road	0.04	0.07
D19	11 Stuart Road	0.03	0.06
D20	Flat 67, the Maltings, Clifton Road	0.03	0.06
D21	Flat 1, Baltic Wharf, Clifton Marine Parade	0.08	0.16
D22	Flat 43, Baltic Wharf, Clifton Marine Parade	0.06	0.12
D23	Halfords (commercial/retail premises)	0.36	0.54
D24	Carpentryright (commercial/retail premises)	0.23	0.35
D25	ITAB Shop (commercial/retail premises)	0.31	0.50

Notes:

- 1 There is no background for odour and hence the PC = PEC.

Table 1-5 shows that the predicted odour concentrations using Gravesend-Broadness met data are higher than the ones using the London City Airport met data.

Therefore, 3 year met data from Gravesend-Broadness weather station has been used to re-run the models, with the results presented and discussed below.

The results of the model predictions at each discrete receptor using 3 year met data from the Gravesend-Broadness weather station are summarised in **Table 1-6**. The results are presented at the 98th %ile of hourly averages (Environment Agency, March 2011).

Table 1-6. The 98th %ile Maximum Short-Term (Hourly) Concentrations of Odour – Gravesend-Broadness Weather Station

Site ID	Discrete Sensitive Receptor	Predicted Hourly PEC OU _E /m ³		
		2016 Met Data	2017 Met Data	2018 Met Data
D1	Unit 1 Ellandaye House, The Shore	1.09	0.79	0.81
D2	52 Pier Road	0.72	0.64	0.65
D3	46 Pier Road	0.48	0.45	0.46
D4	40 Pier Road	0.33	0.32	0.32
D5	Full Gospel Church, 32 Pier Road	0.26	0.22	0.23
D6	24 Pier Road	0.16	0.11	0.16
D7	16 Pier Road	0.13	0.09	0.13
D8	1 Pier Road	0.09	0.06	0.08
D9	36 Overcliffe	0.09	0.05	0.08
D10	33 Overcliffe	0.10	0.05	0.08
D11	26 Overcliffe	0.09	0.06	0.08
D12	18 Overcliffe	0.07	0.06	0.07
D13	15 Overcliffe	0.07	0.05	0.06
D14	10 Overcliffe	0.06	0.05	0.05
D15	Flat 10, Pioneer Court, Overcliffe	0.05	0.05	0.04
D16	Gravesham Community Hospital	0.05	0.04	0.04
D17	23 Fairfield Square, Stuart Road	0.07	0.07	0.07
D18	53 Fairfield Square, Stuart Road	0.07	0.07	0.07
D19	11 Stuart Road	0.06	0.05	0.06
D20	Flat 67, the Maltings, Clifton Road	0.10	0.06	0.06
D21	Flat 1, Baltic Wharf, Clifton Marine Parade	0.19	0.15	0.16
D22	Flat 43, Baltic Wharf, Clifton Marine Parade	0.16	0.11	0.12
D23	Halfords (commercial/retail premises)	0.54	0.53	0.54
D24	Carpetright (commercial/retail premises)	0.36	0.36	0.35
D25	ITAB Shop (commercial/retail premises)	0.86	0.48	0.50

Notes:

- 1 There is no background for odour and hence the PC = PEC.

The odour emissions from the sources considered were assessed for all 3 years of meteorological data from Gravesend-Broadness weather station. The results indicate that the maximum predicted odour concentration at sensitive/residential receptors using 3 years of meteorological data is 1.09 OU_E/m³, which occurs at Unit 1 Ellandaye House, The Shore (D1) and does not exceed the 3.0 OU_E/m³ assessment level at the 98th %ile.

Odour Effects on Receptors

The magnitudes of odour effects on receptors for 2016, the year resulting in maximum total short-term odour concentrations, are presented in **Table 1-7**. The residential dwellings are assessed as high sensitivity receptors.

Table 1-7. Modelled Sensitive Receptors for Odour Assessment

Site ID	Discrete Sensitive Receptor	Predicted Hourly PEC OU _E /m ³	Odour Effect on High Sensitivity Receptors
		2016 Met Data	2016 Met Data
D1	Unit 1 Ellandaye House, The Shore	1.09	Negligible
D2	52 Pier Road	0.72	Negligible
D3	46 Pier Road	0.48	Negligible
D4	40 Pier Road	0.33	Negligible
D5	Full Gospel Church, 32 Pier Road	0.26	Negligible
D6	24 Pier Road	0.16	Negligible
D7	16 Pier Road	0.13	Negligible
D8	1 Pier Road	0.09	Negligible
D9	36 Overcliffe	0.09	Negligible
D10	33 Overcliffe	0.10	Negligible
D11	26 Overcliffe	0.09	Negligible
D12	18 Overcliffe	0.07	Negligible
D13	15 Overcliffe	0.07	Negligible
D14	10 Overcliffe	0.06	Negligible
D15	Flat 10, Pioneer Court, Overcliffe	0.05	Negligible
D16	Gravesham Community Hospital	0.05	Negligible
D17	23 Fairfield Square, Stuart Road	0.07	Negligible
D18	53 Fairfield Square, Stuart Road	0.07	Negligible
D19	11 Stuart Road	0.06	Negligible
D20	Flat 67, the Maltings, Clifton Road	0.10	Negligible
D21	Flat 1, Baltic Wharf, Clifton Marine Parade	0.19	Negligible
D22	Flat 43, Baltic Wharf, Clifton Marine Parade	0.16	Negligible
D23	Halfords (commercial/retail premises)	0.54	Negligible
D24	Carpetright (commercial/retail premises)	0.36	Negligible
D25	ITAB Shop (commercial/retail premises)	0.86	Negligible

Note: Bitumen odours are considered to be moderately offensive and on a par with fat frying and livestock odours.

The results indicate that the predicted odour concentrations at the existing residential receptors using 2016 meteorological data range from 0.10 OU_E/m³ to 1.09 OU_E/m³.

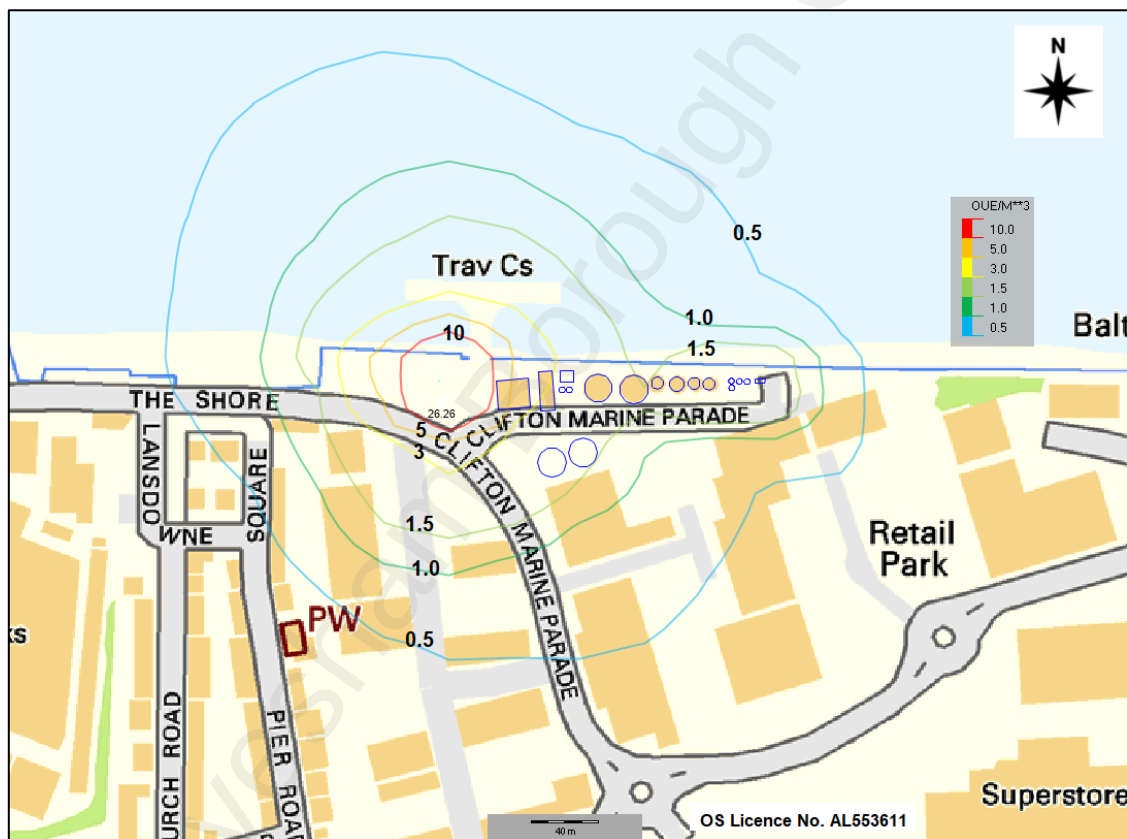
The odour effects at the receptors are predicted to be 'Negligible'. This is no change from the previous assessment.

Therefore, the predicted short-term odour emissions from the Site are considered acceptable.

The contour plot of the predicted odour concentrations using 2016 meteorological data both inside and outside the site boundary is presented in **Figure 1-1**.

Figure 1-1 shows that the predicted maximum concentrations occur adjacent to the lorry tank filling, with a predicted decrease in concentrations with increased distance from the odour sources.

Figure 1-1. Predicted the 98thile Short-Term (Hourly) Concentrations of Odour



2.0 AIR QUALITY

GBC Comment 7 [Air Quality – Local Receptor Height]

“Consideration has been given to the AQ Assessment by Tetra Tech. In terms of the impact on the local air quality i.e. the NO₂ nitrogen dioxide emissions from the new 1750KW heater in addition to the two existing 1750KW heaters, whilst the AQ assessment indicates that this is negligible impact on the annual mean and only a small one on the hourly mean there is an expectation that there is sufficient new technology to design out any detrimental impact on air quality. The report does not appear to take into consideration that the local sensitive receptors are located at high level on the chalk spines well above the site and therefore much more likely to be impacted on by the emissions from an industrial stack.”

Response to Comment 7 [Air Quality – Local Receptor Height]

A digital terrain file in the UK Ordnance Survey (OS) Landranger format (.NTF) has been used in the assessment. As presented in **Table 1-1**, the receptor heights have been embedded and considered in the model. In addition, contour plot results are derived from a grid receptor which includes terrain/receptor elevation heights.

GBC Comment 8 [Air Quality – Cumulative Impact]

“The council is duty bound to pursue an improvement in air quality in its area and as such the air quality objectives should not be viewed as a ceiling below which any increase is acceptable. The cumulative impact of new developments which have a detrimental impact on air quality, albeit small, erode the significant improvement in air quality in the locality that the council has achieved. Therefore new development should be designed to introduce no increase in emissions or should employ suitable mitigation measures to prevent any impact. It is considered that insufficient information has been provided of the proposed mitigation measures to be put in place to ensure that any emissions to air do not detrimentally impact any sensitive receptors at all.”

Response to Comment 8 [Air Quality – Cumulative Impact]

Cumulative impact from two existing gas burners and proposed new gas burner have been assessed.

It should be noted that the NO_x emission rate has been derived using the burner exhaust gas analysis report and a 50% increase than the measured concentrations have been used to produce a worst-case assessment.

The long-term emissions of NO₂ from the source considered were assessed using 2016 Broadness met data (which produces the maximum PC) is presented in **Figure 1-1**.

The worst-case assessment which has been undertaken shows that the long-term NO₂ impact is well below 0.5% of AQS, which is a negligible effect. Therefore, the assessment demonstrates that the development will not detrimentally impact sensitive receptors.

Furthermore, the odour control measures which were implemented in 2018 to address 3 complaints have resulted in a beneficial impact as demonstrated by the fact that there have been no complaints about odour from the site since then. The control measures, including the installation of new filters, are considered to have had a positive effect on local air quality by reducing odour levels from the long established existing facility, and the assessment shows that the mitigation they provide is suitable to prevent any complaints as a result of the proposals.

In addition to the effective odour control measures implemented, the Applicant has also committed to the following sustainability targets:

- All office-based staff should be using zero emission travel (bike, electric car, public transport or walking) by end of 2025.
- Provide cycle to work scheme by 2022.

The implementation of these sustainability measures will positively contribute towards helping GBC achieve their goal of improving air quality in the locality.

Table 2-1. Long-Term (Annual Mean) Concentrations of NO₂ and Impact Description of Effects at Receptors – Gravesend-Broadness Weather Station

Receptors		Predicted Annual Mean Concentration (µg/m ³) – 2016 Met Data, and NO ₂ Impact Description at Receptors						
ID	Name	Process Contribution (PC) (µg/m ³)	PC as %age of AQO	Traffic Background (µg/m ³)	PEC (PC + Background) (µg/m ³)	PEC as percentage of AQO	PEC as percentage of AQAL	Impact Descriptor
D1	Unit 1 Ellandaye House, The Shore	0.025	0.06	27.97	28.00	69.99	≤75% of AQAL	Negligible
D2	52 Pier Road	0.024	0.06	27.19	27.21	68.04	≤75% of AQAL	Negligible
D3	46 Pier Road	0.021	0.05	27.10	27.12	67.80	≤75% of AQAL	Negligible
D4	40 Pier Road	0.015	0.04	27.18	27.20	67.99	≤75% of AQAL	Negligible
D5	Full Gospel Church, 32 Pier Road	0.013	0.03	27.28	27.29	68.23	≤75% of AQAL	Negligible
D6	24 Pier Road	0.008	0.02	27.80	27.81	69.52	≤75% of AQAL	Negligible
D7	16 Pier Road	0.007	0.02	28.57	28.58	71.44	≤75% of AQAL	Negligible
D8	1 Pier Road	0.006	0.01	38.21	38.22	95.54	95-102% of AQAL	Negligible
D9	36 Overcliffe	0.006	0.01	33.61	33.62	84.04	76-94% of AQAL	Negligible
D10	33 Overcliffe	0.007	0.02	31.70	31.71	79.27	76-94% of AQAL	Negligible
D11	26 Overcliffe	0.007	0.02	33.90	33.91	84.77	76-94% of AQAL	Negligible
D12	18 Overcliffe	0.007	0.02	33.59	33.60	83.99	76-94% of AQAL	Negligible
D13	15 Overcliffe	0.006	0.01	33.67	33.68	84.19	76-94% of AQAL	Negligible
D14	10 Overcliffe	0.005	0.01	33.44	33.44	83.61	76-94% of AQAL	Negligible



D15	Flat 10, Pioneer Court, Overcliffe	0.004	0.01	33.72	33.72	84.31	76-94% of AQAL	Negligible
D16	Gravesham Community Hospital	0.004	0.01	35.81	35.81	89.53	76-94% of AQAL	Negligible
D17	23 Fairfield Square, Stuart Road	0.005	0.01	31.52	31.53	78.81	76-94% of AQAL	Negligible
D18	53 Fairfield Square, Stuart Road	0.006	0.01	31.48	31.49	78.71	76-94% of AQAL	Negligible
D19	11 Stuart Road	0.004	0.01	34.76	34.76	86.91	76-94% of AQAL	Negligible
D20	Flat 67, the Maltings, Clifton Road	0.005	0.01	39.67	39.68	99.19	95-102% of AQAL	Negligible
D21	Flat 1, Baltic Wharf, Clifton Marine Parade	0.014	0.04	30.43	30.44	76.11	76-94% of AQAL	Negligible
D22	Flat 43, Baltic Wharf, Clifton Marine Parade	0.010	0.03	30.87	30.88	77.20	76-94% of AQAL	Negligible
D23	Halfords (commercial/retail premises)	0.045	0.11	30.19	30.23	75.59	76-94% of AQAL	Negligible
D24	Carpentryright (commercial/retail premises)	0.032	0.08	30.19	30.22	75.55	76-94% of AQAL	Negligible
D25	ITAB Shop (commercial/retail premises)	0.174	0.44	27.50	27.67	69.19	≤75% of AQAL	Negligible
AQO		40 µg/m ³						

Table 2-1 shows that the percentage changes in process contribution of NO₂ relative to the AQAL as a result of the facility operations at all receptor locations, with respect to NO₂ exposure, are determined to be 0.44% or less. The impact is determined to be 'negligible'. Therefore, the effect of the facility operations on the local area is considered to be insignificant.

3.0 AIR QUALITY AND ODOUR

GBC Comment 9 [Air Quality and Odour]

“With regards to the contents of the report - the receptors identified in Table 5.2 are agreed as to be those most likely impacted by the installation.

The meteorological data i.e. the weather station information was obtained for the London City Airport with likely a different weather pattern to the site in Gravesend which is on the riverside in the estuary. A more appropriate estuarial location such as the weather station at Broadness in Gravesham which would likely indicate a higher number of days of wind from a north easterly or north north easterly direction than the wind rose figures in the AQ report as such this may have influenced the amount of impact from the site on the nearby residential properties when there are winds blowing in from the estuary i.e. north east etc.

“The height of the buildings and tanks are given in table 5-4. These range from 2.4m for the Emulsion plant to 17.1m for the proposed tanks. The existing tanks are indicated as 17.8m tall. The proposed tanks are nearer to the residential properties on The Overcliffe and in Pier Road. The terrain is indicated as having been considered in the assessment. However the height of the nearby buildings and the height at which the residential units are located is not indicated. The properties in Pier Road and The Overcliffe are at much higher level than the ground on which the installation is built as such they are approximately the same height as the vents to the tanks thus creating a situation where the odour is released at height similar to the height of the nearby residential properties. Therefore the odour is likely to affect the nearby residential properties in a much more significant way than if they were built at the same ground level as the installation.”

Response to Comment 9 [Air Quality and Odour]

The terrain has been considered in the assessment and the elevations used in the model are detailed below in **Table 3-1**. For example, the elevations of the receptor at Pier Road are up to 20.5m and Overcliffe 21.84 m.

Table 3-1. Modelled Emission Sources and Sensitive Receptors with Elevations

Site ID	Discrete Sensitive Receptor	UK NGR (m)		Elevations (m)
		X	Y	
Emission source elevation				
TRUCK	Truck loading	563880	174485	1.87
FILTER	Carbon Filter	564073	174483	1
Burner	Existing Burner No. 1	564009	174474	1.42
Burner	Existing Burner No. 2	564009	174476	1.40
Burner	New Burner	563955	174448	2.03
Receptors				
D1	Unit 1 Ellandaye House, The Shore	563795	174458	8.7
D2	52 Pier Road	563786	174429	10.7
D3	46 Pier Road	563784	174393	11.5



D4	40 Pier Road	563787	174353	12.3
D5	Full Gospel Church, 32 Pier Road	563794	174331	14.5
D6	24 Pier Road	563806	174262	20.6
D7	16 Pier Road	563812	174215	19.9
D8	1 Pier Road	563824	174127	17.6
D9	36 Overcliffe	563898	174091	20.8
D10	33 Overcliffe	563956	174095	20.4
D11	26 Overcliffe	564034	174101	21.8
D12	18 Overcliffe	564133	174107	20.5
D13	15 Overcliffe	564189	174111	20.4
D14	10 Overcliffe	564263	174113	20.3
D15	Flat 10, Pioneer Court, Overcliffe	564324	174116	19.5
D16	Gravesham Community Hospital	564426	174232	13.4
D17	23 Fairfield Square, Stuart Road	564343	174248	10.8
D18	53 Fairfield Square, Stuart Road	564347	174281	11.0
D19	11 Stuart Road	564430	174311	11.0
D20	Flat 67, the Maltings, Clifton Road	564426	174424	4.8
D21	Flat 1, Baltic Wharf, Clifton Marine Parade	564245	174474	1.6
D22	Flat 43, Baltic Wharf, Clifton Marine Parade	564300	174472	1.7
D23	Halfords (commercial/retail premises)	564092	174436	1.6
D24	Carpentright (commercial/retail premises)	564133	174449	1.0
D25	ITAB Shop (commercial/retail premises)	563988	174410	2.8
D26	Thames Estuary and Marshes Ramsar	567320	173900	2.0



4.0 SUMMARY AND CONCLUSION

Odour Assessment

An odour complaints check shows that there were 3 complaints from the public regarding odour from the site recorded in the last 5 years, all occurring in 2018. To address these complaints, updated best-practice odour control measures were implemented including the installation of new carbon filters. Following implementation of these measures there have been no further complaints regarding odour from the site, which demonstrates their effectiveness in preventing detrimental effects at nearby sensitive receptor locations.

Odour modelling results at the 98th percentile of hourly average odour concentrations ($C_{98, 1\text{-hour}}$) over a year have been used to compare against the odour benchmark. H4 guidance states that odour levels are not to be exceeded for more than 175 hours (2% of the time) over the course a year. Therefore, the guidance allows for some odour to be detectable for this amount of time and, in accordance with the guidance, this is considered acceptable. The assessments undertaken demonstrate that there are not, and will not be, persistent unpleasant odour from the site, and as a result there have been no odour complaints since the improved control measures were implemented in 2018.

With regard to the site location, the site is an existing bitumen terminal which has been established for a significant number of years. Positioning of tanks has been given careful consideration so they are not significantly closer to residential receptors than the existing bitumen tanks, with the closest property being approximately 135m away. The proposed facility is well placed to serve the needs of the area and it makes use of the existing wharf facilities. The proposed facility will use the existing carbon filters which are already positioned in the best possible location to away from the receptors. The fact that there have been no odour complaints since 2018 demonstrates that the site has successfully employed best-practice through the implementation of updated odour control measures and installation of new carbon filters.

Therefore, the odour modelling assessment results and odour complaint data check undertaken demonstrate that:

- The predicted odour concentration at sensitive/residential receptors is below the odour benchmark;
- The odour effects from the site operations on the sensitive receptors are insignificant;
- The existing site has successfully employed best-practice through updated odour control measures and the installation of new carbon filters;
- The existing control measures are suitable to prevent any adverse effects as a result of the new proposals;
- No public odour complaints since 2018 demonstrates that odour concentrations/levels at sensitive/residential receptors are below the odour assessment benchmark; and
- The site operations are compliant with the UK legislation.

Air Quality Assessment

The NO_x emission rate used in the air quality assessment has been derived using the burner exhaust gas analysis report and a 50% increase from the measured concentrations have been used to produce a worst-



case assessment.

The worst-case assessment undertaken shows the percentage changes in process contribution of NO₂ relative to the AQAL as a result of the facility operations at all receptor locations, with respect to NO₂ long-term exposure, are determined to be 0.44% or less. The impact is determined to be 'negligible' and the proposed site operations in terms of air quality impact on the surrounding environment are compliant with UK legislation.

Furthermore, the odour control measures which were implemented in 2018 to address complaints have resulted in a beneficial impact as demonstrated by the fact that there have been no complaints about odour from the site since then. The control measures, including the installation of new filters, are considered to have had a positive effect on local air quality by reducing odour levels from the long established existing facility, and the assessment shows that the mitigation they provide is suitable to prevent any complaints as a result of the proposals.

The Applicant has also committed to sustainability targets including all office-based staff using zero emission travel and provision of a cycle to work scheme. The implementation of these sustainability measures will positively contribute towards helping GBC achieve their goal of improving air quality in the locality.

Therefore, the effect of the facility operations on the local area is considered to be insignificant and the assessment demonstrates that the development will not detrimentally impact nearby sensitive receptors.

Matthew Smith
Principal Environmental Consultant
Tetra Tech

Nigel Mann
Director
Tetra Tech

APPENDIX A GBC ENVIRONMENTAL PROTECTION RESPONSE

Environmental Protection Comments

Case Number	20220733
Case Officer	Mr Peter Price
Address	FM Conway, Imperial Wharf, Clifton Marine Parade, Gravesend, Kent, DA11 0DY

Proposal	The installation of two additional bitumen tanks, load out gantry and the installation of a bitumen emulsion plant and alternative car parking.
Consultation Expiry Date	9 August 2022
Date of Response	16 September 2022

This service recommends refusal of this application to increase the size of the existing bitumen installation and to install a bitumen emulsion plant, due to the potential increase in odour of bitumen in the mixed-use area.

Additionally the increase in nitrogen dioxide levels at nearby receptors from emissions to air from the 1750KW heating plant is considered to be avoidable with modern mitigation methods as such even a small impact on the locality is considered unacceptable.

This service is not against the siting of this installation in the borough in a suitable location however it is considered that this location is inappropriate for the current site which came back into use after many years derelict and as such did not require any permissions to continue the old use of the storage of bitumen. However in order to be an acceptable development in this borough the mitigation measures for odour control and emissions to air relevant to Local Air Quality Management need to be such that there is no detrimental impact on the locality.

Odour

The existing installation is odorous in nature and already impacts the residential areas in the locality including West Street, The Overcliffe and in Pier Road. The odour is that of bitumen. As well as being able to smell the bitumen odour in the residential areas the odour can also be smelt in the Imperial Retail Park, West Mill and East Mill. Odour assessments carried out by modelling software do not reflect the reality on the ground.

Whilst it is acknowledged that there are odour control measures/mitigation in place in the form of carbon filters, at the existing site, and that they are proposed to be replicated for the proposed additional tanks, a strong smell of bitumen arising from the existing site does occur and so these measures are, like most odour control methods, not 100% effective.

Several attempts have been made by this service to resolve the odour issues however they are still noticeable and unpleasant. The odour of bitumen is discernible to a person in small amounts and therefore unless the mitigation measures were 100% effective there will be a detrimental impact on the locality that will be unpleasant.

Consideration was given to the Odour Assessment by Tetra Tech. Whilst it concludes that the odour impact will be insignificant nevertheless, we are of the opinion that the odour of bitumen is so distinctive that insufficient evidence has been provided to demonstrate to this service that sufficient control measures would be put in place to ensure that the odour would not impact the locality. Carbon filters are considered to be basic technology and insufficient to prevent the odour completely. The report states that there are two potential odour sources firstly air displaced when filling any tank would be captured and passed through an in-line activated carbon filter to control the odour. Most of odour will be removed by the filter, however, it is likely there will be small amount of the residual odour being released. Secondly a potential odour release source would be the filling of lorry tanks when odorous air of the lorry tank is being displaced by the bitumen. (Section 7.1 Potential Odour Release).

Table 7-6 shows the results of the odour assessment carried out by Tetra Tech. There is an increase predicted at 16 of the 25 sensitive receptors yet the report states that this is negligible. Figure 7-1 shows the contours of the increase in odour levels. This service does not consider the presence of odour of bitumen at a residential receptor to be acceptable at any level and certainly not an increase on current levels due to the proposed expansion of the site already poorly located. The findings of the report do not appear to consider that the residential properties are on top of chalk spines with the installation being slightly higher than at river level. Therefore the residential properties are at approx. the same height as the vents on the tanks etc.

There is an expectation that innovative mitigation measures would need to be employed at a site surrounded by non-industrial uses and residential properties to ensure that there is no odour impact on the locality. Even if best available techniques/technology were employed there is likely to be an increase on the current level of odour in the locality, due to the strong smell of bitumen and the expansion of the site, which we consider to be unacceptable. The storage of bitumen is better sited away from residential and retail uses.

The conclusion of the report is that “odour emissions from the operations of the existing bitumen tanks and two proposed bitumen tank operations were assessed and the maximum predicted odour concentration at sensitive/residential receptors is below the odour benchmark. The odour effects from the site operations on the sensitive receptors are insignificant.” This service does not agree with this conclusion based on local knowledge and experience of the odour from the exiting site.

If this application were permitted with the current design and mitigation the odour will likely impact the locality, as is predicted by this service, and there will be no resolution for those impacted. Therefore we recommend that the application be refused until such time as the design is amended to include 100% abatement of the odour.

Air Quality

Consideration has been given to the AQ Assessment by Tetra Tech. In terms of the impact on the local air quality i.e. the NO₂ nitrogen dioxide emissions from the new 1750KW heater in addition to the two existing 1750KW heaters, whilst the AQ assessment indicates that this is negligible impact on the annual mean and only a small one on the hourly mean there is an expectation that there is sufficient new technology to design out any detrimental impact on air quality. The report does not

appear to take into consideration that the local sensitive receptors are located at high level on the chalk spines well above the site and therefore much more likely to be impacted on by the emissions from an industrial stack.

The council is duty bound to pursue an improvement in air quality in its area and as such the air quality objectives should not be viewed as a ceiling below which any increase is acceptable. The cumulative impact of new developments which have a detrimental impact on air quality, albeit small, erode the significant improvement in air quality in the locality that the council has achieved. Therefore new development should be designed to introduce no increase in emissions or should employ suitable mitigation measures to prevent any impact. It is considered that insufficient information has been provided of the proposed mitigation measures to be put in place to ensure that any emissions to air do not detrimentally impact any sensitive receptors at all.

Comments on the contents of the reports relevant to both air quality and odour.

With regards to the contents of the report - the receptors identified in Table 5.2 are agreed as to be those most likely impacted by the installation.

The meteorological data i.e. the weather station information was obtained for the London City Airport with likely a different weather pattern to the site in Gravesend which is on the riverside in the estuary. A more appropriate estuarial location such as the weather station at Broadness in Gravesham which would likely indicate a higher number of days of wind from a north easterly or north easterly direction than the wind rose figures in the AQ report as such this may have influenced the amount of impact from the site on the nearby residential properties when there are winds blowing in from the estuary i.e. north east etc.

The height of the buildings and tanks are given in table 5-4. These range from 2.4m for the Emulsion plant to 17.1m for the proposed tanks. The existing tanks are indicated as 17.8m tall. The proposed tanks are nearer to the residential properties on The Overcliffe and in Pier Road. The terrain is indicated as having been considered in the assessment. However the height of the nearby buildings and the height at which the residential units are located is not indicated. The properties in Pier Road and The Overcliffe are at much higher level than the ground on which the installation is built as such they are approximately the same height as the vents to the tanks thus creating a situation where the odour is released at height similar to the height of the nearby residential properties. Therefore the odour is likely to affect the nearby residential properties in a much more significant way than if they were built at the same ground level as the installation.

The following to be considered:

Lighting

Artificial lighting can cause a statutory nuisance under the Environmental Protection Act 1990. It is important that the applicants are not permitted to install external lighting that illuminate anything other than the ground within the curtilage of the new development in order to assist in preventing a nuisance from occurring (which would be most likely if the bedrooms on nearby properties are illuminated).

Contaminated Land

If during construction/demolition works, evidence of potential contamination is encountered, works shall cease and the site fully assessed to enable an appropriate remediation plan to be developed. Works shall not recommence until an appropriate remediation scheme has been submitted to, and approved in writing by, the local planning authority and the remediation has been completed. Upon



completion of the building works, this condition shall not be discharged until a closure report has been submitted to, and approved in writing by, the local planning authority. The closure report shall include:

- A) Details of any sampling and remediation works conducted and quality assurance certificates to show that the works have been carried out in full in accordance with the approved methodology.
- B) Details of any post-remedial sampling and analysis to show the site has reached the required clean-up criteria, together with the necessary documentation detailing what waste materials have been removed from the site.
- C) Even if no contamination has been discovered during the build then evidence (for example, photos or letters from site manager) to show that no contamination was discovered should be included.

Code of Practice on Construction and Demolition

Please apply



APPENDIX B ODOUR MANAGEMENT PLAN

Gravesham Borough Council



F M Conway Ltd

**Imperial Wharf,
Clifton Marine Parade,
Gravesend,
Kent. DA11 0DY**

Odour Management Plan

April 2019

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1. Introduction

This plan covers the storage, loading and production facility at FM Conway, Imperial Wharf, Clifton Marine Parade, Gravesend, Kent. DA11 0DY

The Site extends to approximately 4 hectares (Ha) and is situated on the Imperial Industrial Estate. The Site is bounded to the South, East and West by industrial estate with residential properties situated behind. To the North the site is bounded by the River Thames.

Odour assessments have been produced for the Site as follows and should be read alongside this report:

This Odour Management Plan is for the control of odour from the site during operational procedures and this document is produced to summarise proposed mitigation measures.

1.1 Sensitive Receptors

Sensitive receptors include, but are not limited to, hospitals, schools, childcare facilities, elderly housing and convalescent facilities. These are areas where the occupants are more susceptible to the adverse effects of exposure to high levels of odour.

Sensitive receptors identified in the Odour assessment are as listed below:-

Table 1.2 Sensitive Receptors within 500 m of the Site.

RECEPTOR	DESCRIPTION	DIRECTION FROM CLOSEST BOUNDARY OF SITE	DISTANCE FROM SITE BOUNDARY (M)
RIVER THAMES	RIVER	NORTH	1
BUSINESS ON IMPERIAL INDUSTRIAL ESTATE	COMMERCIAL/INDUSTRIAL PREMISES	SOUTH / EAST / WEST	50/100
BUSINESS ON IMPERIAL INDUSTRIAL ESTATE	THE SHORE RECREATION AREA	EAST	50
BUSINESS ON IMPERIAL INDUSTRIAL ESTATE	CLIFTON MARINE RECREATION ROAD	WEST	100
PROPERTIES IN PIER ROAD	RESIDENCE	EAST	200
PROPERTIES IN CLIFTON MARINE PARADE	RESIDENCE	WEST	200
PROPERTIES IN OVERCLIFFE	RESIDENCE	SOUTH	350
PROPERTIES IN FAIRFIELD COURT STUART ROAD	RESIDENCE	SOUTH WEST	350
GRAVESHAM COMMUNITY HOSPITAL	HEALTH CENTRE	SOUTH WEST	500

Table 1.3 Aerial view of Sensitive Receptors within 700m of the Site.



KEY:-

		LOCAL HOSPITAL
		RESIDENTIAL
		RECREATION GROUND
		INDUSTRIAL AREA

2. Operations at the Site

2.1 Nature of the Proposed Operations

The principals of the development are to allow for the installation and operation of a PMB manufacturing plant which is incorporated with the existing business of the storage of Pen grade binder delivered by Sea into Clifton Marine Parade, Gravesend, Kent. DA11 0DY

Activities considered in this assessment include:

- Bitumen vessel discharge by river;
- PMB blending plant;
- Bitumen storage;
- Bitumen discharge by road tanker

2.2 Bitumen Imports and Transfers

- **Bitumen Imports**

5000t Bitumen vessel berthing at Imperial Wharf, Gravesend. Delivery and discharge via an 8 inch hose into two holding tanks both having a capacity of 3000t. Pressure discharge applied by delivering vessel starting at 0.5bar gradually increasing to 8bar maximum.

- **Bitumen transfers**

Bitumen is transferred from tank to tank via sealed pipework and pumps.

Bitumen is transferred to the PMB plant via sealed pipework and pumped directly into a holding hopper called a mixer. Polymers are introduced at this point and mixed together to produce PMB (Polymer Modified Binder).

- **Other imports**

In terms of other imports to the Site, this would largely comprise, of a polymer additive delivered by HGV. Each delivery has a capacity of 22mt delivered in large 1t bags.

No odour or dust is omitted from this product.

2.3 Exports

Exports from Site include Pen grade and PMB binders. Loading onto HGV road tankers via a sealed delivery hose in the top of the bitumen tankers, max nett capacity of each vehicle is 28t.

The combined imports and exports to and from the Site are likely to generate total annual HGV movements as follows:

• Bitumen Imports/Exports	91,200	-	HGV Movements	3257
• Other Imports	264	-	HGV Movements	12
• Total	91,464	-	Total	3269



2.4 Working Hours

- **Working hours**

Broadly, it is proposed that the following elements of the Proposed Development have unrestricted working hours:

- The manufacture PMB binders;
- The importation and storage of Bitumen and Polymers;

- **F M Conway LGV and Driver Overview**

- **Site based vehicles**

The below vehicles will be on site.

- Up to ten Bitumen Tankers for deliveries to site – 44tmgw



Figure 1 F M Conway Vehicle

- Proposed 4 Bitumen tankers in F M Conway (FMC) livery
- Bitumen tanker owned by FMC and driven by FMC employees.

3. Odour Management Measures

This document ensures that

- Odour effects are considered as part of routine inspection and/or activity based which are recorded, please see a copy of site document below.
- The three activity areas are as follows:-

1. Ship discharge. 2. HGV load out. 3. Bitumen blending

ENVIRONMENTAL LOG			MONTH:		ODOUR				VESSEL BERTHED	LORRY LOADING	HAUL ROAD CLEAN	ROAD SWEEPER	BOUNDARY	WHARF	WEATHER	COMMENTS	EMPLOYEE INITIALS
DATE	TIME OF ASSESSMENT		POSITION OF OBSERVATION	WIND DIRECTION VISUAL	NIL	SLIGHT	MODERATE	STRONG	YES \ NO	YES \ NO	SATISFACTORY	UNSATISFACTORY	YES \ NO	SATISFACTORY			
	1	AM															
	2	PM															
	1	AM															
	2	PM															
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	2	PM															

- Odour are primarily controlled at source by good operational practices, including physical and management control measures; and
- All appropriate measures are taken to prevent or, where that is not reasonable practicable, to reduce emissions to air from the site at nearby receptors.
- Two olfactory test will be carried out at three separate locations during the vessel discharge, the locations identified area as follows:

1. Pier Road. 2. Imperial Business Park. 3. Baltic Wharf

3.1 Definition of Odour Management Plan

The definition and the main purpose of the odour management plan are summarised below:

- A management plan is a live working document that formalises and describes how odour issues will be managed on site. The plan forms part of the operational management system (indeed it may form part of a site's wider Environmental Management System or Integrated ManagementSystem);
- The plan shows how odours will be managed and controlled so as to prevent or minimise impacts. As well as covering normal operations, it should anticipate and plan for abnormal events and foreseeable accidents and incidents;
- It is not an impact assessment; it is a mitigation/control measure; and
- It should not be complex; simple plans are needed, that can be easily actioned by the site operatives.

3.2 Odour Management Plan

The measures to be implemented are contained in the table below.

General	
1.	PMB construction – the installation of a carbon filter to draw of any odour emissions produced from vessel discharge and the loading process of road tankers. Monitored and changed as and when needed.
2.	Erect screen around vehicle loading area.
3.	Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable
4.	Use covered skips.
5.	Annual review of the odour management plan.
6.	If, the duty foreman or site TCM witnesses strong odours coming off site they will instruct verbally the plant operators to cease operations immediately. The reason and current weather conditions will be recorded on the daily report along with any technical data from the site monitoring equipment and the time the operations where ceased.
7.	A bespoke perfumed demister water system has been installed to cover operational areas of ship discharge to mask any odours being emitted to air.
Communications	
8.	Display the name and contact details of the person(s) accountable for air quality issues on the site boundary.
9.	Notification of nearby residents and businesses may include letters, door knocking residents and/or advertisements (e.g. print).
10.	Staff will be trained in the required procedures for implementing the OMP. This will be given by means of a tool box talk covering the relevant aspects of the OMP. A training record will be kept as part of the appendix to the sites copy of the OMP.
11.	In the case of work required in response to an emergency, the local authority and local residents will be advised as soon as reasonably practicable that emergency work is taking place. Potentially affected residents will also be notified of contact details for a relevant member of the project team in the incidence of undue disturbance.
12.	Good relations can be developed by keeping people informed of progress and by treating complaints fairly and expeditiously. All complaints will be recorded, identifying cause(s) and appropriate measures to reduce emissions in a timely manner, and record measures taken. The complaints log will be made available to the local authority when requested.
13.	Records of any exceptional incidents that cause high odour emissions, either on – or off site will be kept in the log book along with the action taken to resolve the situation.

Monitoring – Full details in Section 4	
14.	A visual site inspection is to be carried out prior to the commencement of discharge and loading activities by the site foreman. The weather conditions will be taken into consideration before activities commences. Details to be recorded on the Daily environmental log.
15.	If at any time odours reach the thresholds then the site operations may have to cease until the issue can be resolved.
16.	Odour Monitoring as below, the monitoring will occur prior and during all operational activities.
Vehicles and Plant	
17.	Ensure all vehicles switch off engines when stationary – no idling vehicles.
18.	Vehicle exhaust pipes will not discharge directly at the ground and all site vehicle engines, generators, or site plant engines will be switched off when not in use.
19.	Plant and equipment will be kept in good repair and regularly maintained in accordance with the manufacturer's specifications, including meeting statutory emissions standards where applicable. Maintenance will include visual checks to ensure black smoke is not emitted at times other than at ignition.
20.	Plant and equipment maintenance records will be kept on site for the retention period as outlined in the company IMS.
21.	<u>Road cleaning</u> - Regular inspections of Clifton Marine Parade and the local public highway will be undertaken to ensure the routes are kept clear of debris. Should the inspections deem it necessary, a mechanical road sweeper with vacuum facilities, spray facilities and on board storage will be dispatched.

4. Monitoring Methodology

4.1 Quality Assurance/Quality Control and Record Keeping

The site will operate the following procedures to ensure that the monitoring equipment works correctly.

- Monitoring Equipment: Vantage VUE
- Calibration: As per manufactures recommendations.
- Maintenance: As per manufactures recommendations.
- End of life: Replace
- Records: Recorded and stored in shipping office.
- Check against BBC weather forecast via internet.

4.2 Odour Monitoring Assessment Criteria

Daily Odour observations will be undertaken on site.

All operational staff will be responsible for reporting any odour and dust problems immediately to the designated responsible person.

Regular olfactory monitoring (odour sniffing) will be undertaken at the site boundary by operational staff. Installation of

Observations including time, date, weather conditions, temperature, wind strength, wind direction, intensity, odour type and sensitivity will be recorded in an Odour Report Form. Site operating conditions at the time of survey will also be recorded, enabling the identification of any 'abnormal' site operating conditions such as downtime for refurbishment or maintenance.

Surveys will be conducted utilising the Environment Agency's protocol for testing ("sniff testing") as described in Appendix 8 of the Technical Guidance Note H4 'Horizontal Guidance for Odour Part 1' (2002). The protocol is derived from methodologies set out in VDI 3883 Part 1, VDI 3883 Part 2 and VDI 3940. The VDI standards are the German equivalent to British Standards.

The odour assessment methodology requires the assessor to use their own sense of smell to detect odour. The assessor should move from areas of weaker odour to stronger.

A description of the odour intensity and its extent will be recorded using the following classification system:

Odour Intensity:

1. No detectable odour
2. Faint odour (barely detectable, need to stand still and inhale facing into the wind)
3. Moderate odour (odour easily detected while walking and breathing normally, possibly offensive)
4. Strong odour (bearable, but offensive odour – will make clothes/hair smell?)
5. Very strong odour (when you really wish you were somewhere else)

Odour Extent (assuming odour detectable, if not then 0):

1. Local and non-persistent (only detected during brief periods when wind drops or blows)
2. Non-persistent as above, but detected away from site boundary
3. Persistent, but fairly localised
4. Persistent and pervasive up to 50 m from site boundary
5. Persistent and widespread (odour detected >50 m from site boundary)

Wind direction and wind speed will need to be taken during the surveys with an

anemometer Traffic light criteria will be used for assessment as below.

4.3 Traffic Light Criteria for Odour

Alert level	Odour Intensity	Odour Extent
Red (<i>at this level all works to cease immediately, investigate cause of exceedance and use alternative methods where appropriate</i>)	5	5
Amber (<i>continual monitoring and investigation of alternative methods where appropriate</i>)	4	4
Green (<i>early warning/no action required</i>)	0-3	0-3

Actions to be taken if 'Amber' criteria reached

- Carry out a more detailed investigation to identify the source of the odour emissions.
- Investigate the possibilities that the source may come from outside the site boundaries by undertaking off site monitoring.
- Undertake off site sniff testing to establish extent of odour.

Actions to be taken if 'Red' criteria reached

- The site foreman assesses the operational process and the nature of the handling and deliveries immediately prior to the alarm being activated, to work out what has caused the threshold to be reached.
- If the source cannot be ascertained with 100% confidence, the site foreman on duty suspends the likely odour generating activities.
- If the source is within the sites control, the site foreman on duty takes appropriate action in terms of odour abatement, to ensure that the threshold is not breached. This may take the form of the following;
 - Suspending operations which are not being conducted using best practice controls.
 - Logging findings of the above in the site diary, and in the reporting template within the relevant appendix of the Environmental Permit.