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STOREYS EDWARD SYMMONS

Port Of Tyne, South Shields

Dust Assessment

November 2014

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Wardell Armstrong

City Quadrant, 11 Waterloo Square, Newcastle upon Tyne, NE1 4DP, United Kingdom
Telephone: +44 (0)191 232 0943 Facsimile: +44 (0)191 261 1572 www.wardell-armstrong.com



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Port Of Tyne, South Shields

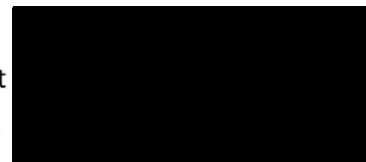
Dust Assessment

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PREPARED BY:

Helen Simpson

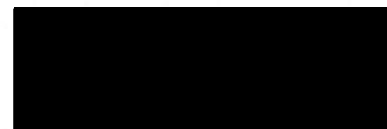
Principal Environmental Scientist



APPROVED BY:

Mark Dawson

Technical Director



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ENVIRONMENT AND SUSTAINABILITY
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WASTE RESOURCE MANAGEMENT

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EXECUTIVE SUMMARY

This report summarises the predicted the short- and long-term cumulative dust impacts arising from proposed new wood pellet handling operations at the Port of Tyne in line with the Environment Agency's Technical Guidance note M17. The assessment employs existing dust deposition data gathered by the Port of Tyne to define the current dust deposition baseline arising from all sources. Data from independent observations of ship to shore operations undertaken by Wardell Armstrong have then been used as a framework to estimate both short- and long term-dust emission rates from the proposed new operations. A combination of existing complaint data and time averaged weather data has then been used to predict additional short- and long-term dust deposition impacts which may arise from the proposed new wood pellet handling operations. Predicted deposition rates have been calculated based on the worst case assumption that all emissions from the process would be deposited on sensitive receptors, although in reality this would not be the case.

The assessment shows that existing and annual average deposition load is well below the background level defined for urban areas; and that with the new wood pellet handling operations in place deposition would remain well below the defined background. Similarly the assessment shows that existing and predicted short-term impacts would also remain well below the prescribed custom and practice deposition limit.

1 INTRODUCTION

- 1.1.1 This report sets out and discusses the results of a dust assessment, undertaken in support of the planning application for the proposed new wood pellet handling operations at the Port of Tyne. The report should be read in conjunction with the Environmental Statement which details the proposals.
- 1.1.2 Throughout this report the existing wood pellet handling operations at the Port of Tyne are referred to as the Existing Operations and the proposed new wood pellet handling operations considered as part of the current planning application are referred to as the Proposed New Operations. The area contained within the application boundary for the Proposed New Operations is referred to as the Site.
- 1.1.3 The report provides information on the existing dust deposition situation in the vicinity of the Port of Tyne; and quantitatively estimates the level of dust deposition which may arise from the Proposed New Operations, based upon guidance contained in Environment Agency Technical Guidance Note M17¹. The report also details mitigation measures which would be used to further reduce the potential for dust emissions from Proposed New Operations and hence deposition levels. . The assessment considers whether dust impacts are likely to arise at both short- and long-term intervals and draws conclusions as to whether they would lead to significant deposition effects at sensitive receptors. The assessment also considers the cumulative dust impact of the Existing Operations and the Proposed New Operations.

2 PLANNING POLICY CONTEXT

2.1 Policy and Guidance

- 2.1.1 “Dust” is a generic term and has no universally recognised definition. However, Government guidance (HSMO 1995)² described “dust” as comprising organic or inorganic particles in the size range of 1-75µm. Additionally, BS6069 (Part 2) *Characterization of Air Quality Glossary* (1987) also uses the term “dust” to describe particulate matter in the size range 1–75 µm in diameter, which is primarily composed of mineral materials and soil particles. Particles less than 1µm behave more like gases than solids and are generally referred to as “fume” whereas particles larger than 75µm are termed “grit”.

¹ Environment Agency, April 2014, Technical Guidance Note M17: Monitoring of Particulate Matter in Ambient Air around Waste Facilities.

² Arup Environmental/ Ove Arup and Partners, on behalf of the Department of the Environment (December 1995) The Environmental Effects of Dust from Surface Mineral Workings, HSMO 1995

- 2.1.2 However, wood dust is fibrous, occurring as thin flakes, as opposed to angular or sub-angular mineral dust particles. Wood dust also tends to be of a larger particle size and is less dense than mineral dust (approximately 0.7kg/m^3 particle density compared to approximately $2.4 - 2.7\text{kg/m}^3$), and larger wood dust particles are considered as friable dust. Therefore wood dust does not behave like normal (mineral) dust particles and the definitions in Section 2.2.1, above, are not applicable. . The Dangerous Substances and Explosive Atmospheres (DSEAR) Regulations (2002), which consider explosion hazards arising from flammable dusts, define dust as particles less than $500\mu\text{m}$. This definition is more applicable to wood dusts and is therefore used within this assessment.
- 2.1.3 The potential for dust arising from industrial sites, such as the Port of Tyne, is generally a matter of public concern. The main concern being that there would be a regular and persistent nuisance, which would affect local amenity and the quality of life for local people. The level of concern, and potential for nuisance, may be directly related to the number and proximity of residential areas to the site.
- 2.1.4 The amount of dust which may cause complaint or nuisance in a particular circumstance is difficult to determine accurately as, in part, it depends upon the perceptions of individual residents or households; and there are no statutory limits such as those applicable to suspended particulates or gaseous pollutants. The only guidance which can be cited as being relevant is the Environment Agency's Technical Guidance Note M17¹, which was designed to manage fugitive dust impacts from landfill sites. This guidance has previously been successfully used in relation to the control of fugitive emissions of wood dust and is hence relevant in this case.
- 2.1.5 Dust complaints are usually associated with periods of peak deposition, occurring during particular weather conditions. There is a "normal" level of dust deposition in every community and it is only when the rate of deposition is high relative to the norm that complaints tend to occur. The effect of dust on a community can be determined by five main factors:
- The location of the potential dust source relative to the community;
 - The duration of the Site activities that contribute to dust;
 - The short-term dustiness during periods of dry weather (climatic factors);
 - The frequency or regularity with which these occur; and
 - The effectiveness of dust control measures adopted by the Site operator.

3 ASSESSMENT METHODOLOGY

3.1 Consultation and Scope of Assessment

3.1.1 Consultation was initially undertaken, with Ian Rutherford at South Tyneside Council to agree the most representative meteorological recording station in the vicinity of the Site. It was agreed that the Boulmer recording station would be the most representative location from which to obtain meteorological data. Following the submission of the initial dust impact assessment (in planning application ST/0003/14/FUL) further feedback was received from Mr Rutherford. Notably in the response dated 14th March 2014, Mr Rutherford challenged the environmental risk assessment methodology and suggested that an estimate of the mass emissions rates should have been made. Therefore this revised assessment includes calculations for mass emission rates.

3.2 Dust Assessment Methodology

3.2.1 Analysis has shown that wood pellet dust, due to its fibrous nature, does not form particles which could be considered to be respirable (PM₁₀). It does however form dust particles which could be considered as being inhalable (leading to potential irritation and/or sensitisation of the respiratory tract). Although it should be noted that the ground level concentrations experienced off-site are several orders of magnitude below work place exposure levels as defined by Health and Safety Executive's (HSE) guidance document EH40. It is therefore not believed that there is any significant human health effect associated with the fugitive emission of wood pellet dust. The main issue associated with the offsite deposition of wood dust is one of annoyance to local residents and businesses.

3.2.2 There are currently no UK statutory standards or limits for the assessment of deposited dust and its tendency for causing annoyance. Similarly, no official air quality criterion for dust deposition has been set at a European or World Health Organisation (WHO) level. However, the Environment Agency's Technical Guidance Note M17¹ sets out a custom and practice framework, based upon time averaged dust deposition rates; and is the only guidance which can be referenced as being appropriate in this case. In order to assess the potential dust impacts which may arise from the Proposed New Operations, a semi-quantitative assessment has been undertaken, based upon observations of dust release rates at the Port and local meteorological data, to estimate the amount of time that each receptor may potentially be exposed to wood dust. The assessment assumes that all emissions would be deposited on sensitive

receptors, although in reality this would not be the case, and is therefore considered to represent a worst case scenario.

- 3.2.3 Within the assessment both short- and long-term deposition rates have been derived based upon a defined rationale and the values compared with custom and practice limits within M17 technical guidance¹ (although it should be noted that M17 does not distinguish between short- and long-term deposition rates). The baseline assessment has been established through a review of monitored dust deposition data for the period January 2012 to August 2014.
- 3.2.4 It should be noted that dust deposition in the vicinity of the Port of Tyne is assessed by means of “Frisbee” gauges which are deployed in key locations for 2 weeks at a time, on a continuous basis. The gauges are analysed in accordance with procedures contained in BS2690, BS6068 and ISO 7888. Frisbee gauges are non-directional and hence do not indicate the source of the dust; and the dusts collected come from a large range of local dust sources and include soil, pollen, sea salt and mineral dusts as well as wood dust. The measured values hence assess total deposition (as mg/m²/day) arising from all sources. For purposes of this assessment it has been assumed that **all** deposition monitored by the Frisbee gauges is due to wood dust from the Existing Operation and therefore the rate of wood dust deposition has been significantly overstated, but provides a worst case scenario. It should also be noted that microscopy of dust slides, deployed and analysed as part of the Port of Tyne Dust Management Plan, shows that wood dust accounts for a very small proportion of the deposited material.
- 3.2.5 The assessment assesses the incremental increase in deposition rates from the Proposed New Operations, including a cumulative assessment to assess the total net impact which would arise from the combined working of the Existing and Proposed New Operations. The assessment also considers the proposed measures to further control dust with regard to their potential to reduce effects yet further.
- 3.3 Sensitive Receptors**
- 3.3.1 Dust sensitive receptors have been identified based upon the history of dust complaints arising from the existing operations and are detailed in Table 1 below and are also shown on drawing number NT11395-114.

Table 1 Dust Sensitive Receptor Locations					
Receptor	Address	Grid Reference		Approximate Distance from Proposed New Operations (metres)	Direction from Site
		X	Y		
DSR1	1 Thornton Avenue	435577	565371	365	East
DSR2	Mitre Motors, 12 Mitre Place	435697	565393	485	East
DSR3	300 Taylor Street	435758	565499	540	East
DSR4	34 Vernon Close	435741	565601	540	East
DSR5	30 Raleigh Close	435754	565742	455	East
DSR6	186 Dock Street	435618	564987	545	Southeast

3.3.2 There are no sensitive statutory designated habitat sites located within a 2km radius of the Site. Ecological receptors have not therefore been considered within the dust assessment.

3.4 Information Sources

3.4.1 The following sources of information have been used in the preparation of this report:

- Port of Tyne dust deposition data January 2012 to August 2014.
- Wardell Armstrong operational compliance team observation data August 2013 to August 2014.
- Port of Tyne 2013-2014 complaint record.
- Environment Agency Technical Guidance Note M17.
- Meteorological data for period 2003-2012 from Boulmer recording station, obtained from ADM Limited; and
- Site Layout Drawing 7157-0000-0100 Rev A4

4 SIGNIFICANCE CRITERIA

4.1 Dust Assessment

4.1.1 The Environment Agency Technical Guidance Note M17 defines the background dust deposition rates for urban areas as 80 mg/m²/day and gives a custom and practice deposition limit of 200 mg/m²/day, above which it is considered that complaints are 'likely'.

- 4.1.2 As previously noted in Section 2.1 dust deposition levels below the custom and practice limit, or even the 'normal' background level, may still result in public complaints dependent upon the tolerance level within the local community.

5 BASELINE SITUATION

5.1 Dust Assessment

- 5.1.1 Wood dust particles sized 10-500 µm have the potential to cause dust annoyance. Microscopy analysis of on-site and off-site dust slide samples has shown that the majority of wood dust particles > 300 µm generated by Existing Operations tend to fall out of the air stream and settle out within the immediate vicinity of the emission source. Fugitive dust is that which escapes from the immediate vicinity of the emission source and may affect the area surrounding the Site.

- 5.1.2 The Port of Tyne is located in an area with a mix of industrial, commercial and residential uses. Existing dust sources in the vicinity of the Site include:

- Coal, wood pellet and scrap metal operations at the Port; and
- Industrial and commercial operations in the vicinity of the Port including the handling and working of scrap metal, steel, timber and aggregate.

Existing Operations

- 5.1.3 Importation of wood pellets commenced at the port on the 5th September 2010 to supply the expanding co-firing market at major UK coal-fired power stations. Current operations comprise the following:

- Unloading of wood pellets from bulk cargo vessels, by grab at the quay, into custom built hoppers with integral extraction and dust abatements systems;
- Hoppers then load dump trucks beneath, within a fully sheeted loading facility;
- Dump trucks transfer the wood pellets to a wood pellet storage shed; and
- Wood pellets are then autofed from the large silo onto a train for onward transport.

- 5.1.4 When there is a wood pellet vessel in port, Existing Operations are carried out on a 24-7 basis. The frequency of vessel arrival / wood pellet unloading through Existing Operations is dependent upon the needs of customers; however it is predicted that Existing Operations will remain at or close to current levels and would continue alongside the Proposed New Operations.

Proposed New Operations

5.1.5 The Proposed New Operations would comprise the following:

- Unloading of wood pellets from bulk cargo vessels, by grab at the quay, into custom built hoppers with integral extraction and dust abatements systems in the same way as with Existing Operations;
- Hoppers then load dump trucks beneath, within a fully sheeted loading facility as per Existing Operations;
- Dump trucks then tip the wood pellets into Samson Unloaders which are sheeted except at the entry point and equipped with integral high volume extraction and bag filtration equipment.
- Transfer of wood pellets via enclosed conveyor system to storage silos;
- Transfer of wood pellets via enclosed conveyor system from storage silos to the rail silo; and
- Wood pellets then autofed from the rail silo onto a train for onward transport.

Contingency Operations

5.1.6 The following Contingency Operations are proposed should the Proposed New Operations experience mechanical failure. In the event of a conveyor failure the system would be equipped with a bypass conveyor to transfer material from the Samson unloaders directly onto the silo reclaim conveyor to bypass the silos and divert material directly to the railhead. Vessel unloading would continue, however material would be temporarily stored in one of the various sheds until it could be recovered back into the storage silos.

Potential Dust Sources

5.1.7 Dust emissions from the Existing Operations and Proposed New Operations have the potential to increase levels of suspended particulates and deposited dust in the surrounding area, both as short-term peaks and over a longer period. Fugitive dust may be blown off Site during adverse weather conditions to affect surrounding receptors. The main potential sources of dust, associated with the site are:

Existing Operations

- Open hold of ship during unloading;
- Hoppers during unloading;
- Vehicles transporting wood pellet to wood pellet storage shed;

- Fugitive emissions from open doorways and vents in wood pellet storage shed (NB high levels of ventilation are required to conform to DSEAR and prevent explosive atmospheres evolving); and
- Auto-loading of rail trucks from the Rail Silo.

Proposed New Operations

- Open hold of ship during unloading;
- Hoppers during unloading;
- Vehicles transporting wood pellet to conveyor system;
- Vehicles tipping in Samson Unloaders;
- Junctions of conveyor system transporting wood pellets; and
- Auto-loading of rail trucks from the Rail Silo.

Contingency Operations for Proposed New Operations

- Open hold of ship during unloading;
- Hoppers during unloading;
- Junctions of conveyor system transporting wood pellets;
- Vehicles transporting wood pellet between conveyor system or wood pellet storage shed, if required
- Vehicles tipping in Samson Unloaders; and
- Auto-loading of rail trucks from the Rail Silo.

6 DUST IMPACT ASSESSMENT

6.1 Baseline data

6.1.1 As part of the Port of Tyne Dust Management plan, non-directional dust deposition data have been obtained. The Frisbee gauge was initially located at “The Captains Row”, a location representative of the Lytton Park Estate which has been the source of almost all public complaints. However, due to ongoing vandalism the gauge was relocated to the car park of the former McNulty’s site (50 metres from the original location) on 12th November 2013.

6.1.2 The data, which have been gathered since late 2011, represent the total dust deposition rate from all local sources including Existing wood pellet handling Operations at the Port of Tyne. For practical considerations Frisbee gauges were

continuously deployed, with two-week sampling intervals, as described in Section 3.3.4.

6.1.3 The chart in Appendix 1 shows the all monitored dust deposition data from the Captain's Row / McNulty gauge, against the accepted urban background deposition value and the custom and practice deposition limit set out in Technical Guidance Note M17¹; and the number of public complaints received in the same periods. It should be noted that due to the ongoing vandalism issues no data are available for the period June and September 2013.

6.1.4 The monitored deposition data, which serve as the baseline for the consideration of the additional load arising from the Proposed New Operations, show that the annual average dust deposition rate from all sources at The Captains Row / McNulty's, and hence the surrounding residential area is at an annual average of 42.6 mg/m²/day which is well below the background level for an urban area as defined by Technical Guidance Note M17¹ (80 mg/m²/day). Additionally, microscopic analysis of dust slides has shown that wood dust accounts for only a small proportion of the total dust deposited.

6.1.5 The short-term daily average (over two weeks) deposition rate based upon the 97.5th percentile (mean plus two standard deviations) value is 89.1 mg/m²/day, which, although marginally above the urban background as defined by M17, is still 44.5% of the custom and practice limit. This value excludes the high peak in July 2014 where the sample was noted by Port of Tyne technicians as being contaminated with seagull droppings. Such contamination spoils the sample and leads to the recorded level of deposition being artificially high.

6.1.6 The data also show that there is little or no correlation between the observed dust deposition rates and the numbers of complaints received, indicating that local tolerance to dust is lower than the guidance would typically suggest.

6.2 **Estimated dust deposition load arising from existing operations**

6.2.1 In April 2013 Wardell Armstrong were commissioned to undertake round-the-clock observations of the existing quayside wood pellet unloading operations (from ship via eco-hopper to tipper truck) with a remit of identifying all sources of dust emissions and their severity. The monitoring team were also tasked with providing immediate feedback to port operations staff and management in order that corrective actions / mitigation could be implemented as soon as possible. As a result of this work, the Port

has collated independent and consistent data from the unloading of 46 vessels between August 2013 and August 2014 (covering 219 days of operation). This accounts for the handling of approximately 1.7 Million tonnes of wood pellet.

6.2.2 Through this work the six following dust release severity categories were established:

- Slight
- Minor
- Minor-moderate
- Moderate
- Moderate-severe
- Severe

6.2.3 The following main sources of release were also established

- Dust from hold of vessel
- Grab leaking during slew to hopper
- Product on top of grabs falling or blown off during slew
- Grab open leaving hopper
- Dust from top of hopper
- Dust from front of hopper
- Dust from rear of hopper
- Wagons overfilled leading to spillage of dust and whole pellets
- Dust from clean-down cycle (cleaning of dust abatement equipment carried out at the start of each 12-hour shift)
- Dust generated by the action of the road sweeper
- Windblown dust arising from quay

6.2.4 In order to estimate the overall mass emission from those 46 vessels the data in each source and severity category has been totalised and the number of events multiplied by a mass emission value based upon the severity. These values were estimated using an assumed worst case volumetric release and a worst case dust concentration of 1000 mg/m³ (based upon measured data). The mass emission values used for each category of release are summarised in Table 2 below.

Table 2 Mass Emission Values	
Severity of dust release	Calculated emission (kg)
Slight	0.01
Minor	0.02
Minor-moderate	0.05
Moderate	0.25
Moderate-severe	0.5
Severe	1

- 6.2.5 Minor and slight emission events were the most frequent in number, however they accounted for rather less mass than moderate emissions which accounted for the largest overall mass release. Severe emissions only accounted for a very small proportion of the total.
- 6.2.6 The total emissions rate over the entire operating period was then determined by dividing the total mass release against the total operating time. Using this technique a total mass emission of 1.61 tonnes has been released over the 219 days of operation yielding an average instantaneous release rate of 7.35 kg/day (arising from all sources) which corresponds to an annualised average of 4.4 kg/day.
- 6.2.7 In order to determine the short-term (peak) impact rate the total mass emissions recorded during the unloading of each vessel (typical unloading period is 5 days) have been determined and the 95th percentile value calculated (mean + 2 standard deviations) in the same manner that the short-term deposition rate was determined from the recorded data. This yielded a value of 15.5 kg/day.
- 6.2.8 In the following sections, the above data have been used in conjunction with weather data and observations around impact areas in order to determine the short-term average deposition (based upon 2 weeks) and annual average deposition rates. The results have then been assessed against the custom and practice limits within the Technical Guidance Note M17¹ to determine their overall significance.

6.3 Meteorological Data

- 6.3.1 In order to provide information on how dust deposition might be affected by local weather conditions, wind speed, wind direction and rainfall data have been obtained from ADM Limited for the ten year period 2003-2012. These data have been obtained from the Boulmer recording station, which is considered by South Tyneside Council to be the most representative meteorological recording station. The Boulmer recording station is situated approximately 49km north of the Port of Tyne at 27m AOD.

- 6.3.2 Various published figures are given for the threshold of wind speed at which dust particles begin to be lifted from an exposed surface. In dry conditions a wind speed of 5.5-6.0m/s (11.3-12.3 knots), measured at the Meteorological Office standard height of 10 metres above ground level, is required to raise some dust, but significant amounts will only have the potential to be raised by Site activity. This equates to Force 4 “Moderate Breeze” on the Beaufort Scale, which is defined as 5.5 to 7.9 m/s.
- 6.3.3 However, due to the fibrous and more buoyant nature of wood dust particles they can be raised from exposed surfaces or from elevated release points and carried offsite at velocities lower than this. In the experience of the Port of Tyne, wind velocities in the range 6 to 12 Knots (3.1 to 6.2 m/s) are typically able to lift and carry wood dust from Existing Operations offsite and deposit it at sensitive receptors.
- 6.3.4 This is demonstrated by the chart below which shows the recorded wind velocities at which verified wood dust deposition complaints were received. It can be seen that 54 out of 61 complaints occurred when wind velocities were in the range 6 – 12 knots. Four complaints were received when wind velocity was between 4 and 5 knots and two complaints were received when the wind velocity was 15 knots. Therefore for the purposes of this assessment and to provide a worst case scenario, wind velocities in the range 4 – 16 knots (2.21 – 8.2 m/s) are considered capable of depositing wood dust at sensitive receptors. Wind velocities higher than 16 knots (8.2 m/s) result in dust being carried over greater distances and undergoing greater dilution and dispersion before being deposited over a wider area. This is borne out by the fact that 60 out of 61 of the complaints received in the last two years have been from the Lytton Park Estate, to the east of the Port, adjacent to The Captain’s Row (range 320-720 metres from source). Therefore, for the purposes of this assessment an impact range or zone of 320 to 720 metres has been considered.
- 6.3.5 As shown in the chart, a single complaint was received when wind velocity was 20 knots. Although this complaint was verified by the Port of Tyne as being due to the deposition of wood dust, upon further investigation, the complaint location was adjacent to an eco-home development which has a wood pellet fired heating system and wood pellet storage silo. This was also the only complaint not to be received from the Lytton Park Estate. It was therefore concluded that the source of the wood dust which gave rise to the complaint was the eco-home development and not the Port of Tyne. The 20 knot complaint was therefore excluded from the analysis of wind velocity and impact range as including it would have expanded the deposition range beyond

the identified 320 to 720 m from source and hence lowered the per area deposition values. Omission of this data point therefore ensures that a worst case scenario is considered.

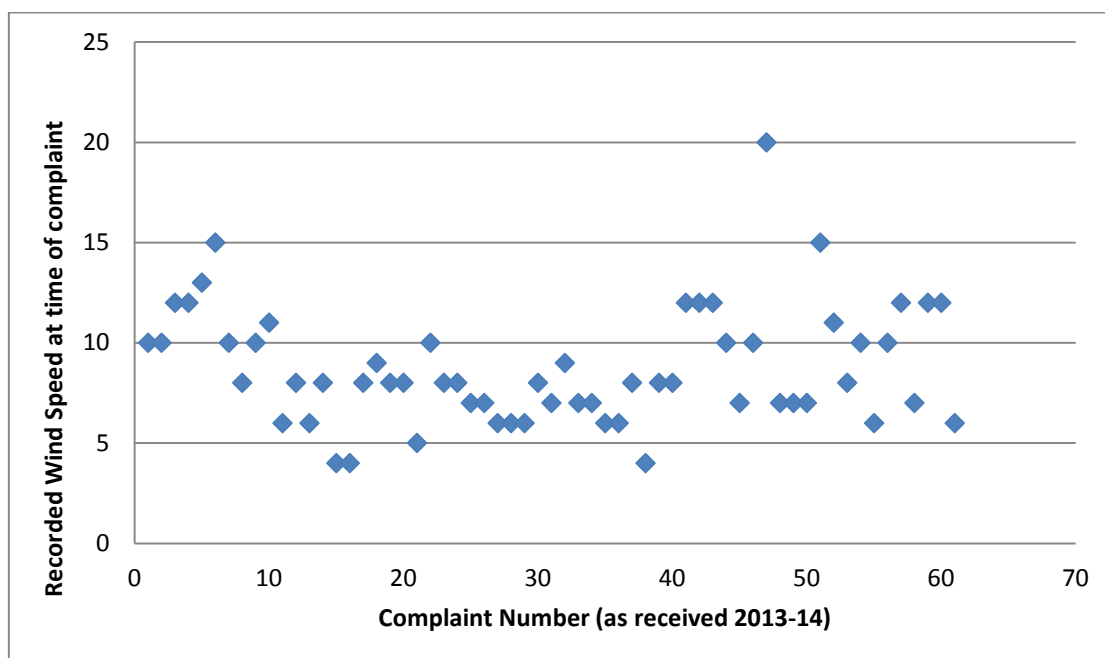


Chart 1

Recorded wind speed (knots) for each complaint received by Port of Tyne in 2013-14

6.3.6 For the purpose of the dust assessment the wind frequencies in the range 4-16 knots have been split into the following directional sectors

Wind Direction:

- 346° - 15°
- 16° - 45°
- 46° - 75°
- 76° - 105°
- 106° - 135°
- 136° - 165°
- 166° - 195°
- 196° - 225°
- 226° - 255°
- 256° - 285°
- 286° - 315°

- 316° - 345°

6.4 Predicted wood dust deposition load arising from the proposed new operations

- 6.4.1 A forecast throughput of 1.4 to 1.7 million tonnes/annum has been specified by the customer, the higher of which equates to the same throughput handled by Existing Operations in the last 13 months (August 2013 – August 2014).
- 6.4.2 A significant number of operational improvements were made during time in which the Wardell Armstrong emission monitoring and reporting was conducted, leading to a reduction in dust emission rates over time. However, as a worst case estimate, it is assumed that the same mass emissions will arise from the Proposed New Operations as occurred from the Existing Operations in the period August 2013 to August 2014.
- 6.4.3 As justified in Section 6.3.3, on a worst case basis, wind velocities in the range of 4-16 knots have the potential to result in wood dust deposition at the identified sensitive receptors. The weather data suggests that, on average, wind velocities in this range occur 78% of the time.
- 6.4.4 The average number of hours per year in which wind in the range 4-16 knots may be expected, from each direction, has been calculated from the ten years of meteorological data for the Boulmer recording station. The analysis only considers dry conditions (hours in days with rainfall of less than 0.2mm), because significant emission of dust is less likely to occur during wet conditions, as erosion from dampened surfaces is extremely limited and wood pellet unloading operations are halted during rainfall events as the product cannot be allowed to get wet.
- 6.4.5 This number of days in which wind velocities fall within speed and direction criteria has then been normalised to the operating time for the Proposed New Operations of 219 days/annum to infer the wind directional frequency during Proposed New wood pellet Operations. Note, as Existing Operations took 219 working days to unload 1.7 Million tonnes of wood pellets, it has been assumed that the Proposed New Operations would also take 219 days to unload 1.7 Million tonnes, the maximum annual throughput identified by the customer.
- 6.4.6 These data have then been used in conjunction with the mass emission rate determined in Section 6.2.5 to infer annual directional emission rates for each sector. The results are detailed in Table 3.

Table 3 Wind Frequency Analysis – Average Number of Hours per Year (Dry Conditions Only – Rainfall of Less than 0.2mm)					
Direction Category	Cardinal Direction	Speed Class 4-16 knots			
		Average No. of days days/yr when wind in speed range and direction category	% Time	No. of these days days whilst handling wood pellet	Directional Mass emission rate using 7.35 kg/day deposition rate (kg/annum)
346° - 15°	N	15.55	4.256	9.32	68.5
16° - 45°	NNE	13.94	3.817	8.48	62.3
46° - 75°	ENE	8.27	2.265	4.96	36.5
76° - 105°	E	7.95	2.177	4.77	35.0
106° - 135°	ESE	13.14	3.597	7.84	57.6
136° - 165°	SSE	32.26	8.833	19.34	142.2
166° - 195°	S	33.90	9.281	20.33	149.4
196° - 225°	SSW	30.05	8.227	18.02	132.4
226° - 255°	WSW	48.04	13.15	28.80	211.7
256° - 285°	W	41.34	11.32	24.79	182.2
286° - 315°	WNW	25.77	7.06	15.45	113.6
316° - 345°	NNW	16.88	4.62	10.12	74.4
Totals		287.1	78.6	172.2	1265.8

- 6.4.7 As detailed in Section 6.3.3 wind velocities of 4-16 knots are conservatively assumed to result in observed wood dust deposition in a zone between 320 m and 720 m from the source. This accounts for wood dust deposition over a total area of 1,307,072 m².
- 6.4.8 The number of operational days where a wind speed of 4-16 knots is blowing towards the directional sectors for each of the sensitive receptors has been determined, as shown in Table 4.
- 6.4.9 The directional mass emission rate in kg/annum has then been calculated and those data used to calculate the annualised deposition rate for each sector.

Table 4 Number of operational days where a wind speed of 4-16 knots is blowing towards the directional sectors					
Receptor	Wind Sector (winds blowing from the Proposed New Operations towards the	Sector deposition area (m²)	No. of dry operational days when wind in range 4 – 16 knots is approaching from the relevant sector	Direction mass emission rate for sector (kg/annum)	Sector annualised deposition rate from proposed new operations (mg/m²/day)
DSR 1	226-345	432,060	79.16	581.9	3.7
DSR 2	226-315	323,137	69.04	507.4	4.3
DSR 3	226-315	323,137	69.04	507.4	4.3
DSR 4	226-315	323,137	69.04	507.4	4.3
DSR 5	226-315	323,137	69.04	507.4	4.3
DSR 6	256-345	323,137	50.36	370.2	3.1

6.5 Predicted Annual Average Impact arising from Proposed New Operations

6.5.1 Table 5 summarises the predicted additional deposition load due to Proposed New Operations in comparison to the monitored annual average deposition. The Proposed New Operations are predicted to add between 3.1 and 4.3 mg/m²/day to the existing annual average baseline of 42.6 mg/m²/day, depending upon the receptor location. The mean predicted increase in annual average deposition across the six identified receptors is 4.0 mg/m²/day. It can be seen that the net deposition impact of the Proposed New Operations is well below the urban background deposition level of 80 mg/m²/day, as identified in Technical Guidance Note M17¹; and does not exceed 24% of the custom and practice limit of 200 mg/m²/day.

Table 5 Predicted increase in Deposition due to the Proposed New Operations					
Receptor	Wind Sector (winds blowing from the Proposed New Operations towards the receptor (°)	Current measured background annual average deposition arising from all sources (mg/m ² /day)	Additional annual average deposition load arising from Proposed New Operations (mg/m ² /day)	Annual average dust deposition load (baseline plus new operations) (mg/m ² /day)	Percentage of M17 custom and practice limit of 200 (mg/m ² /day)
DSR 1	226-345	42.6	3.7	46.3	23.2
DSR 2	226-315	42.6	4.3	46.9	23.5
DSR 3	226-315	42.6	4.3	46.9	23.5
DSR 4	226-315	42.6	4.3	46.9	23.5
DSR 5	226-315	42.6	4.3	46.9	23.5
DSR 6	256-345	42.6	3.1	45.7	22.9

6.6 Predicted Short-Term Impact arising from Proposed New Operations

- 6.6.1 As detailed in Section 6.1.5 the 97.5th percentile (mean plus 2 standard deviations) of the existing measured deposition data is 89.1 mg/m²/day based upon a sampling period of two weeks.
- 6.6.2 Although the predicted annual average deposition arising from Proposed New wood pellet handling Operations is quite low, the peak daily deposition would be higher. The short-term (peak) dust deposition impact arising from Proposed New Operations therefore needs to be considered along with the peak background level to also assess whether, in the short-term, 'complaints are likely' in line with the Technical Guidance Note M17¹.
- 6.6.3 In order to assess short-term peak impact, the total dust deposition from the unloading of each of the 46 vessels unloaded between August 2013 and August 2014 was assessed and, in the same way as the peak background deposition was determined, the 97.5th percentile of vessel emissions was calculated. This yielded a value of 15.5 kg/day which, in the same way as above, was divided by the area of each sector to derive peak daily deposition rates.
- 6.6.4 Table 6 below shows that the short-term dust deposition rate, based upon the 97.5th percentile, does not exceed 70% of the custom and practice limit of 200 mg/m²/day.

Table 6 Short-term dust deposition rate for each of the six identified receptors (mg/m²/day)					
Receptor	Wind Sector (winds blowing from the Proposed New Operations towards the receptor (°)	97.5th percentile of current measured background deposition arising from all sources (mg/m²/day)	Additional annual deposition load arising from Proposed New Operations (mg/m²/day)	Net 97.5th percentile deposition load (mg/m²/day)	Percentage of custom and practice limit of 200 mg/m²/day
DSR 1	226-345	89	35.87	139.7	69.9
DSR 2	226-315	89	47.97	137.0	68.5
DSR 3	226-315	89	47.97	137.0	68.5
DSR 4	226-315	89	47.97	137.0	68.5
DSR 5	226-315	89	47.97	137.0	68.5
DSR 6	256-345	89	47.97	137.0	68.5

6.6.5 Therefore as the 200 mg/m²/day custom and practice threshold for likely deposition complaints, as defined in Technical Guidance Note M171, would not be exceeded; complaints would not be expected to result from the Proposed New Operations. This assessment however depends heavily upon the tolerance of the local community and may not hold true if they are sensitised to the issue which appears to be the case at the Port of Tyne. Indeed the chart below shows that wood dust deposition complaints have been received even when measured deposition rates have been well below the background for urban areas.

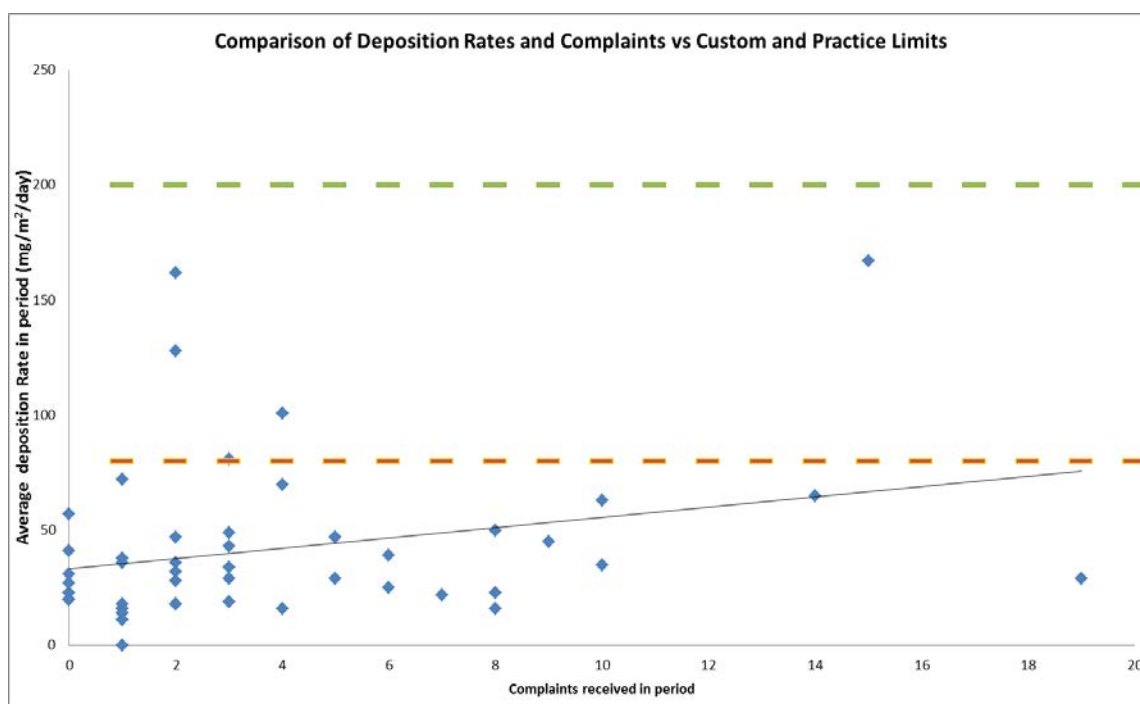


Chart 2

Comparison of Deposition Rates and Complaints vs Custom and Practice Limits

7 OPERATIONAL IMPACT ASSESSMENT SUMMARY

7.1 Introduction

- 7.1.1 As can be seen from the assessment above, monitored deposition data have been used to determine both short-term and annual average background dust deposition levels from all local sources, including Existing wood pellet handling Operations. The independent observations of Existing wood pellet unloading Operations, undertaken by Wardell Armstrong, have then been used as a framework to estimate both short- and long-term dust emission rates from the Existing Operations and hence the Proposed New Operations. A combination of existing complaint data and time averaged weather data have been used to derive a worst case estimate of the additional short- and long-term dust deposition impacts of the Proposed New Operations. These impacts were calculated as a worst case and assume that all dust is deposited on sensitive receptors. Table 7 summarises the results of the assessment.

Table 7 Assessment Summary						
Receptor	Current measured annual average background deposition arising from all sources (mg/m ² /day)	97.5 th percentile of current measured background deposition arising from all sources data (mg/m ² /day)	Additional annual average deposition load arising from Proposed New Operations (mg/m ² /day)	97.5 th percentile of additional deposition load arising from proposed new operations (mg/m ² /day)	Annual average percentage of custom and practice limit of 200 mg/m ² /day	Short term average percentage of custom and practice limit of 200 mg/m ² /day
DSR 1	42.6	89	3.7	35.87	23.2	69.9
DSR 2	42.6	89	4.3	47.97	23.5	68.5
DSR 3	42.6	89	4.3	47.97	23.5	68.5
DSR 4	42.6	89	4.3	47.97	23.5	68.5
DSR 5	42.6	89	4.3	47.97	23.5	68.5
DSR 6	42.6	89	3.1	47.97	22.9	68.5

7.1.2 The predicted short-term cumulative impact of Existing and Proposed New Operations is well below the background deposition level for urban areas of 80 mg/m²/day, as defined by Technical Guidance Note M17¹. Whilst the long-term cumulative impact of Existing and Proposed New Operations (89.1 mg/m²/day) exceeds the urban background, it is still well within the custom and practice limit of 200 mg/m²/day at which complaints are considered 'likely'.

7.2 Additional dust mitigation measures,

7.2.1 As mentioned in Section 6.4.2 a number of operational improvements have already been made to the Existing Operations to reduce the frequency and severity of dust emissions, such as:

- A significant number of emissions were recorded in early 2014 arising from the failure of hopper speed doors. These have now been replaced and the incidence and severity of "emission from the bottom of the hoppers" has reduced.
- In 2013 there were a significant number of tipper truck overfilling events, as two significantly different truck sizes were being employed. Truck size has since been standardised and the incidence of overfilling events has reduced.
- A new eco hopper was brought into service in April 2014, however emissions from the top of the new hopper were significantly higher than from the two existing hoppers. The increased emissions were investigated and were found to be due to

increased air blade velocity. The air velocity has since been reduced and the unit is now performing in line with expectations.

7.2.2 The design of the Proposed New Operations has been developed with dust mitigation in mind, by seeking to enclose potentially dusty operations wherever possible. The following mitigation measures would therefore been incorporated into the design of the Proposed New Operations.

- Custom built hoppers with integral extraction and dust abatements systems. The custom design of the hoppers would be informed through the experience of Port staff operating the existing hoppers, with design (dust reduction) improvements made where ever possible.
- The three existing hoppers purchased in 2012 and 2014 to limit dust emissions have an enclosed design and high capacity extraction systems with an extraction rate of 80,000m³ per hour. Additionally, the eco hopper purchased in 2014 has an on-board vacuum cleaning system and the Port plans to retro-fit similar systems to the units purchased in 2012. New hoppers purchased for the Proposed New Operations would also have on-board vacuum cleaning systems.
- Dump trucks would be covered and would be filled within a contained area beneath hoppers;
- Dump trucks would unload wood pellets into proprietary Sampson Unloaders which would deliver wood pellets onto the enclosed conveyor system. The Sampson Unloaders would be fully sheeted (except for the entry point which is equipped with curtains) and equipped with high integrity ventilation and bag filtration systems. Emissions from these units are expected to be minimal;
- A fully enclosed conveyor system to transport wood pellets between the Sampson Unloaders and the main storage silos;
- A fully enclosed conveyor system to transport wood pellets between the storage silos and the rail silo;
- Dust filter systems would be installed at the transfer points on the conveyor system to limit the potential for fugitive dust emissions;
- Dust bosses would be employed as required;
- Road sweeper(s) would be employed as required during unloading to clear any dust deposited in the vicinity of the unloading operations;

- Trains would be autofed from the silo into the rail trucks to minimise dust emissions;
- Additional sheeting installed at rail loading silo to enclose the truck being loaded and those either side to minimise emissions; and
- Vacuum cleaning system for rail unloading area and silo.

Dust Management Plan (Proposed New Operations)

7.2.3 The dust mitigation measures for the Proposed New Operations would be incorporated into the Port's existing Dust Management Plan. The Dust Management Plan includes the following information:

- General overview and history of dust issues;
- Identification of specific dust sources and mitigation measures for each operation;
- Dust and PM₁₀ monitoring regime;
- Review and reporting process;
- Impact of tenants;
- Improvement plan; and
- Appendices including a Dust Inventory, details of operations procedures in place, training materials and complaints protocol.

8 CONSTRUCTION PHASE DUST ASSESSMENT

8.1 Key Construction Activities

8.1.1 The construction phase of the buildings and infrastructure for the Proposed New Operations comprises:

- Alteration of the existing port side facility;
- Construction of wood pellet handling, reception, storage facility and rail loading facility; and
- Enabling works including roads and rail.

8.1.2 The nearest existing sensitive receptors are located approximately 210m from the Proposed New Operations, however the construction works may be undertaken closer to the receptors.

8.1.3 As the construction phase operations have the potential to generate dust that may propagate beyond the site boundary, specific mitigation measures would need to be

implemented to minimise dust emissions. These measures are discussed further in the following sections of this report.

8.2 Cumulative Construction Impacts

8.2.1 In addition to the construction of the buildings and infrastructure for the Proposed New Operations, the project to extend Riverside Quay are also currently being undertaken at the Port of Tyne. This involves land reclamation activities as well as piling for the new quay structures and dredging to deepen the berths. Further projects which are currently at the planning stage also have the potential occur at the same time as the construction of the buildings and infrastructure for the Proposed New Operations and therefore the potential for cumulative impacts has been considered.

8.2.2 It is understood that both the construction of the buildings and infrastructure for the Proposed New Operations are the responsibility of the principal contractor. The planned Riverside quay extension, including dredging and infilling of existing docks, as well as land reclamation are however the responsibility of the Port of Tyne. The dust mitigation measures to be implemented by the principal contractor for the construction of the buildings and infrastructure for the Proposed New Operations, as detailed below will also be implemented by Port of Tyne (or its appointed contractor) for the quay works, dredging and infilling of existing docks and land reclamation.

8.3 Construction phase mitigation measures

8.3.1 Key dust mitigation measures include

- A Pre-Construction Dust Management Plan has been produced and will be further developed as details of the works are identified;
- Thorough investigation of any air quality complaints regarding project activities, identification of the causes, and implementation of remedial measures to rectify the situation;
- Recognition of all relevant statutory conditions and codes of practice will be taken in regard of the production of noise, dust and vibration emanating from the works;
- Ensure that the activities creating a dust are kept to an absolute minimum and, where necessary, carried out at such times as to cause minimum disruption to the adjoining businesses, neighbours and the general public;
- Wheel wash facilities will be provided if required;
- The surfacing of permanent roads and car parks early in the project so that delivery vehicles do not have to traffic on unmade ground;

- A road sweeper will be used to ensure that the facility roads are kept clean;
- The site exit will be monitored throughout the day by the Gateman and a road sweeper will be called in as and when required;
- Liaison with local authority and Environment Agency as appropriate prior to and throughout the construction phase;
- A project management system will be implemented, based on the principal contractor's management system; and
- The effectiveness of the relevant parts of the management system will be verified by audit.

8.3.2 Therefore, with the additional mitigation measures detailed above in place, it is predicted that the dust impact arising from construction activities at all dust sensitive receptors will be small.

9 RESIDUAL IMPACTS

9.1.1 The implementation of the dust mitigation measures detailed within this report will ensure that any residual effect at nearby sensitive receptors due to dust from the Proposed New Operations and their construction will be acceptable and in line with current guidance.

10 CONCLUSIONS

10.1.1 Monitored deposition data shows that the current annual average dust deposition load at local sensitive receptors (complainants) is well below the background level described in Technical Guidance Note M17. The Proposed New Operations are predicted to increase annual average deposition rates by approximately 4.0 mg/m²/day, however the cumulative annual average impact is still expected to remain well below background values.

10.1.2 The short-term (peak) impact, whilst somewhat higher than the annual average is still only slightly above background values. The Proposed New Operations are predicted to add around 50% to the short-term background levels, but cumulative deposition load is predicted to remain well within custom and practice deposition levels.

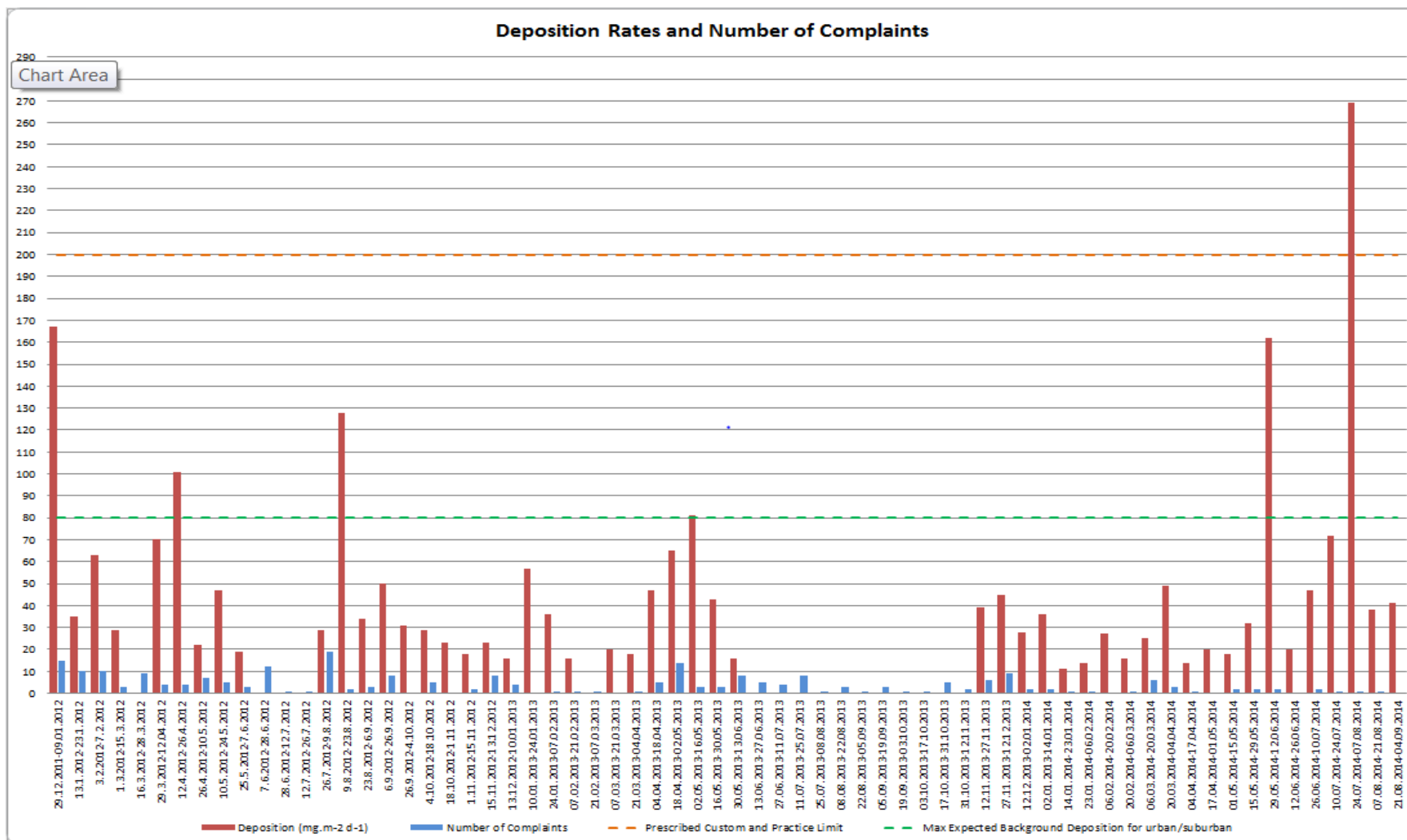
10.1.3 The effective implementation of the design and operational dust mitigation measures detailed within this report will ensure that any residual effect at nearby sensitive receptors due to dust from the Proposed New Operations will be further reduced.

10.1.4 The construction activities associated with this project and other projects that are happening concurrently have the potential to further increase short-term dust load, however good project management practices and effective mitigation measures shall ensure that short-term dust impacts arising from construction activities are acceptable.

APPENDIX 1

**Chart showing Port of Tyne Dust
Deposition Rates vs M17 guidance and
numbers of public Complaints**

APPENDIX 1 CHART SHOWING PORT OF TYNE DUST DEPOSITION RATES VS M17 GUIDANCE AND NUMBERS OF PUBLIC COMPLAINTS



DRAWINGS



KEY
● Dust Sensitive Receptors

Receptor Address		Grid Reference	
		X	Y
DSR1	1 Thornton Avenue	435577	565371
DSR2	Mitre Motors, 12 Mitre Place	435697	565393
DSR3	300 Taylor Street	435758	565499
DSR4	34 Vernon Close	435741	565601
DSR5	30 Raleigh Close	435754	565742
DSR6	186 Dock Street	435618	564987

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
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CLIENT
Storeys Edward Symmons

PROJECT
Port of Tyne

DRAWING TITLE
Dust Sensitive Receptor Locations

DRG No NT11395/114	SCALE 1:12 500 @ A3	DATE November 2014
DRAWN BY DW	CHECKED BY HS	APPROVED BY DB

☐ STOKE-ON-TRENT (HEAD OFFICE) TEL 0178 227 6700	☐ CARDIFF TEL 029 2072 9191
☒ NEWCASTLE UPON TYNE TEL 0191 232 0943	☐ LONDON TEL 0207 287 2872
☐ WEST BROMWICH TEL 0121 580 0909	☐ SHEFFIELD TEL 0114 245 6244
☐ GREATER MANCHESTER TEL 0194 226 0101	☐ EDINBURGH TEL 0131 555 3311



wardell
armstrong

your earth our world

STOKE-ON-TRENT
Sir Henry Doulton House
Forge Lane
Etruria
Stoke-on-Trent
ST1 5BD
Tel: +44 (0)845 111 7777

CARDIFF
22 Windsor Place
Cardiff
CF10 3BY
Tel: +44 (0)29 2072 9191

EDINBURGH
Suite 2/3, Great Michael House
14 Links Place
Edinburgh
EH6 7EZ
Tel: +44 (0)131 555 3311

GREATER MANCHESTER
2 The Avenue
Leigh
Greater Manchester
WN7 1ES
Tel: +44 (0)1942 260101

LONDON
Third Floor
46 Chancery Lane
London
WC2A 1JE
Tel: +44 (0)20 7242 3243

NEWCASTLE UPON TYNE
City Quadrant
11 Waterloo Square
Newcastle upon Tyne
NE1 4DP
Tel: +44 (0)191 232 0943

PENRYN
Tremough Innovation Centre
Tremough Campus
Penryn
Cornwall
TR10 9TA
Tel: +44 (0)1872 560738

SHEFFIELD
Unit 5
Newton Business Centre
Newton Chambers Road
Thorncliffe Park
Chapelton
Sheffield
S35 2PH
Tel: +44 (0)114 245 6244

TRURO
Wheal Jane
Baldhu
Truro
Cornwall
TR3 6EH
Tel: +44 (0)1872 560738

WEST BROMWICH
Thynne Court
Thynne Street
West Bromwich
West Midlands
B70 6PH
Tel: +44 (0)121 580 0909

International offices:

ALMATY
29/6 Satpaev Avenue
Rakhat Palace Hotel
Office Tower, 7th Floor
Almaty
050040
Kazakhstan
Tel : +7-727-3341310

MOSCOW
Suite 2, Block 10,
Letnikovskaya St.
Moscow, Russia
115114
Tel: +7(495) 980 07 67

Wardell Armstrong Archaeology:

CUMBRIA
Cocklakes Yard
Carlisle
Cumbria
CA4 0BQ
Tel: +44 (0)1228 564820

