Galloper Wind Farm Project

Environmental Statement – Chapter 27: Air Quality

October 2011

Document Reference – 5.2.27

Galloper Wind Farm Limited

RWE npower renewables

SSE Renewables

ROYAL HASKONING Enhancing Society

Document title	Galloper Wind Farm Project Environmental Statement – Chapter 27 Air Quality
Document short title	Galloper Wind Farm ES
Document Reference	5.2.27
Regulation Reference	APFP Regulations, 5(2)(a)
Version	11
Status	Final Report
Date	October 2011
Project name	Galloper Wind Farm Project
Client	Galloper Wind Farm Limited
Royal Haskoning Reference	9V3083/R01/303424/Exet

Drafted by		Damian Pawson	
Checked by		Rufus Howard, Jon Allen	
Date/initials check		RAH, JA	20.07.2011, 08.09.2011
Approved by		Dr. Martin Budd (Royal Haskoning)	
Date/initials approval		MB	09.09.2011
GWFL Checked by		Kate Harvey	
Date/initials approval		KH	04.11.2011

CONTENTS

			Page
27	AIR QUALITY		1
	27.1	Introduction	1
	27.2	Guidance and Consultation	1
	27.3	Methodology	5
	27.4	Existing Environment	12
	27.5	Assessment of Impacts – Worst Case Definition	14
	27.6	Assessment of Impacts during the Construction Phase	14
	27.7	Assessment of Impacts during the Operational Phase	19
	27.8	Assessment of Impacts during the Decommissioning Phase	20
	27.9	Inter-relationships	20
	27.10	Cumulative Impacts	21
	27.11	Monitoring	23
	27.12	Summary	23
	27.13	References	25

27 AIR QUALITY

27.1 Introduction

27.1.1 This Chapter of the Environmental Statement (ES) assesses the potential impacts of the onshore electrical connection for Galloper Wind Farm (GWF) on air quality receptors. It has assessed both the positive and negative impacts for the construction, operation, and decommissioning phases of the development.

27.1.2 Potential dust emissions associated with onshore construction activities are considered, in addition to vehicle exhaust emissions from construction, operational and decommissioning activities. Details of the proposed mitigation that will be undertaken by Galloper Wind Farm Limited (GWFL) are also provided.

27.1.3 Other Chapters within this ES that are of relevance to the assessment of, and impacts upon, air quality include **Chapter 25 Traffic and Transport** and **Chapter 23 Terrestrial Ecology**.

27.1.4 Given the distance between the offshore element of the development and the nearest point to the coastline (approximately 27km), any emissions to air from activities associated with the construction, operation and decommissioning of the offshore elements of GWF are considered insignificant within the context of local air quality. Therefore, these have not been assessed further within this Chapter.

27.1.5 This assessment has also been informed by the recent construction of the Greater Gabbard Offshore Wind Farm (GGOWF) onshore substation and cable corridor, which is adjacent to the proposed GWF onshore development.

27.2 Guidance and Consultation

Legislation, policy and guidance

27.2.1 National Policy Statements (NPS) provide the primary basis on which the Infrastructure Planning Commission (IPC) is required to make its decisions. In preparing this chapter the following NPS were reviewed:

- Overarching National Policy Statement (NPS) for Energy (EN-1) (DECC, 2011a);
- NPS for Electricity Network Infrastructure (EN-5) (DECC, 2011b).

27.2.2 The specific assessment requirements for air quality, as detailed within the NPSs, are repeated in the following paragraphs. The assessment requirements suggested within the NPSs have been applied to this assessment and where appropriate the specific sections of this Chapter that address the issues are indicated. Where any part of the NPS guidance has

not been followed within this assessment, it is stated after the NPS text and a justification provided.

27.2.3 EN-5 is the primary decision-making guidance document for the Infrastructure Planning Commission (IPC) on nationally significant electricity network infrastructure in England and Wales. However, EN-5 does not specifically consider air quality impacts.

27.2.4 EN-1 contains generic requirements for the assessment of impacts on air quality arising from Nationally Significant Infrastructure Projects (NSIPs) and their associated development.

27.2.5 Section 5.2.2 of EN-1 states: "*Any ES on air emissions will include an assessment of CO_2 emissions, but the policies set out in Section 2 [of EN-1], including the EU ETS, apply to these emissions. The IPC does not, therefore need to assess individual applications in terms of carbon emissions against carbon budgets…"*

GWF will have a net benefit on carbon budgets and as such an assessment of CO_2 emissions has not been undertaken within this chapter.

27.2.6 In relation to the assessment requirements, Section 5.2.7 of EN-1 states that: "*The ES should describe*:

- *any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project*

  see **Sections 27.6**, **27.7** and **27.8**;
- *the predicted absolute emission levels of the proposed project, after mitigation methods have been applied*

  see **Sections 27.6**, **27.7** and **27.8**;
- *existing air quality levels and the relative change in air quality from existing levels*

  see **Sections 27.6**, **27.7** and **27.8**; and
- *any potential eutrophication impacts*."

  There are no discharges associated with GWF; however, potential impacts to receiving waters are considered in **Chapter 22**.

27.2.7 Air pollution can have adverse effects on the health of humans and ecosystems. European Union (EU) legislation forms the basis of UK air quality policy. The EU Air Quality Framework Directive 96/62/EC on Ambient Air Quality Assessment and Management entered into force in September 1996. Directive 96/62/EC and the first three daughter directives were combined to form the new EU Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe, which came into force in June 2008.

27.2.8 In the UK, the 1995 Environment Act required the preparation of a national Air Quality Strategy (AQS) which set air quality standards and objectives for specified pollutants. The Act also outlined measures to be taken by local planning authorities (LPAs) in relation to meeting these standards and objectives (the Local Air Quality Management (LAQM) system).

27.2.9 The UK AQS was originally adopted in 1997 (DoE, 1997), and has been reviewed and updated as necessary in order to take account of the evolving EU Legislation, technical and policy developments, and the latest information on the health effects of air pollution. The strategy was revised and reissued in 2000 as the AQS for England, Scotland, Wales and Northern Ireland. The latest version was published in July 2007 (DETR, 2007).

27.2.10 The standards and objectives relevant to the LAQM framework have been prescribed through the Air Quality (England) Regulations (2000), and the Air Quality (England) (Amendment) Regulations 2002. The EU Limit Values have been implemented via the Air Quality Standards Regulations 2007, as amended 2010. The current prescribed standards and objectives are presented in **Table 27.1**. Air quality standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence of how each pollutant affects human health. Air quality objectives lay down Government policy, and as such, incorporated target dates by which each standard is to be achieved, taking into account economic considerations, practicability, and technical feasibility.

27.2.11 Where an air quality objective is unlikely to be met by the relevant deadline, local authorities must designate those areas as Air Quality Management Areas (AQMAs). Following the designation of AQMAs, local authorities are required to develop Air Quality Action Plans (AQAPs) to identify and implement actions to improve air quality locally.

Table 27.1 Air Quality Strategy objectives (England) for the purposes of LAQM

Pollutant	Air quality objective	
	Concentration	**Measured as**
Benzene	5 $\mu g.m^{-3}$	Annual mean
1,3 Butadiene	2.25 $\mu g.m^{-3}$	Running annual mean
Carbon monoxide	10 $mg.m^{-3}$	Maximum daily running 8-hour mean
Lead	0.25 $\mu g.m^{-3}$	Annual mean
Nitrogen dioxide (NO_2)	200 $\mu g.m^{-3}$	1 hour mean not to be exceeded more than 18 times per year
	40 $\mu g.m^{-3}$	Annual mean
Particles (PM_{10})	50 $\mu g.m^{-3}$	24-hour mean not to be exceeded more than 35 times per year
	40 $\mu g.m^{-3}$	Annual mean

Pollutant	Air quality objective	
	Concentration	**Measured as**
Particles ($PM_{2.5}$)	25 µg.m^{-3}	Annual mean (target to be achieved by 2020)
	15% cut in annual mean (urban background exposure target to be achieved between 2010 and 2020)	
Sulphur dioxide (SO_2)	350 µg.m^{-3}	1-hour mean not to be exceeded more than 24 times a year
	125 µg.m^{-3}	24-hour mean not to be exceeded more than three times a year
	266 µg.m^{-3}	15-minute mean not to be exceeded more than 35 times a year

Planning Policy Statement 23: Planning and Pollution Control – Annex 1 Pollution Control, Air and Water Quality (ODPM, 2004)

27.2.12 Planning Policy Statement (PPS) 23 advises that any air quality consideration that relates to the use and development of land is capable of being a material planning consideration. Whilst EN-1 notes that relevant PPS have been taken into account within the NPS, the content of PPS23 is repeated here for clarity.

27.2.13 Section 1G.1 of PPS23 (Annex 1) states*: The impact of a development on air quality is likely to be particularly important where:*

- *The development is proposed inside, or adjacent to, an AQMA;*
- *The development could in itself result in the designation of an AQMA; and/or*
- *To grant planning permission would conflict with, or render unworkable, elements of the Local Authority's AQAP.*

Consultation

27.2.14 As part of ongoing consultation, key stakeholders were invited to respond to a scoping document produced as part of the EIA process (GWFL, 2010). **Table 27.2** summarises issues that were highlighted by the consultees in the IPC Scoping Opinion (IPC, 2010) and indicates which sections of the assessment address each issue.

27.2.15 Further consultation was undertaken through formal Section 42 consultation under the Planning Act 2008 (see **Chapter 7 Consultation**) via the submission of a Preliminary Environmental Report (PER). Community consultation under Section 47 has also been carried out in parallel with the Section 42 statutory consultation. The process for community consultation is set out in a Statement of Community Consultation (SoCC) (see **Chapter 7**). **Table 27.2** also summarises issues that were highlighted throughout the consultation period.

27.2.16 Full details of responses received are presented in the IPC Scoping Opinion report (IPC, 2010) and the Consultation Report that accompanies the Development Consent Order (DCO) for this application.

Table 27.2 Summary of consultation and issues relevant to air quality

Date	Consultee	Summary of issue	Section where addressed
August 2010	IPC (Scoping Opinion)	Air quality impacts associated with construction traffic and plant to be addressed, including cumulative impacts.	These are considered in Sections 27.6 (construction) and 27.10 (cumulative)
August 2010	IPC (Scoping Opinion)	Air quality and dust levels should be considered on and off site, including access roads and local footpaths.	These are considered within Section 27.6
August 2010	IPC (Scoping Opinion)	Consideration to be given to appropriate mitigation measures.	Mitigation measures are provided within Sections 27.6-27.8 where impacts are identified.
November 2010	SCDC	Assessment of cumulative impacts of construction traffic emissions and emissions from construction activities to be included.	There are no traffic related air quality impacts above negligible and therefore no possibility of a cumulative impact. See Section 27.6
November 2010	SCDC	Assessment of emissions associated with the construction of the cable sealing compounds.	The entire GWF footprint is assessed for the potential to produce air quality emissions during construction, see Section 27.6.
July 2011	SCDC – Development and Building Control (Section 42)	No objections, in principle, to the development and consider that the PER is reasonably sufficient in detailing the impacts in respect to noise and air quality.	Noted

27.3 Methodology

Study area

27.3.1 The onshore development footprint (as shown in **Figure 1.3**) encompasses the GWF substation (comprising the GWF compound and transmission compound), sealing end compounds and associated laydown areas, and access tracks. It also includes the footprint of the cable corridor above Mean High Water Spring (MHWS) to the GWF substation, including the onshore

transition bays, and the cabling between the GWF substation and the sealing end compounds.

27.3.2 For air quality impacts, the study area also includes the proposed construction vehicle route, between the A12 and the onshore development footprint, as shown on **Figure 25.1**.

27.3.3 The study area also includes any receptors sensitive to dust and vehicle emissions within 200m of the proposed onshore cable route and substation location.

Characterisation of the existing environment

27.3.4 Existing baseline air quality conditions within the area encompassing the proposed onshore cable route were assessed using UK pollutant maps available from the UK Air Quality Archive (http://uk-air.defra.gov.uk). SCDC's most recently published LAQM reports were reviewed with respect to existing air quality, in addition to SCDC's collated air quality monitoring data recorded in proximity to the onshore cable route.

Assessment of impacts

Construction phase: dust

27.3.5 The Department of Environment Food and Rural Affairs (DEFRA) Local Air Quality Management Technical Guidance document (LAQM.TG(09)) (DEFRA, 2009) states that potential exposure to airborne dust beyond 200m of a source can be ignored (for the purposes of assessment against the PM_{10} objective) if the background concentration is less than 26µg.m^{-3}. Given that the annual mean PM_{10} background concentrations for the relevant grid squares encompassing the study area are below 26 µg.m^{-3}, for all assessed years a screening exercise was undertaken to identify potentially sensitive receptors within 200m of the proposed onshore cable route and substation location.

27.3.6 Annual and seasonal wind flow patterns were analysed and used to determine the potential for exposure of the identified receptors to airborne dust. Wind speed and direction data were acquired from the nearest Meteorological Office climate station, at Walton-on-the-Naze for the year 2006, located approximately 45km to the south of the onshore cable corridor.

27.3.7 These data were used to represent air flow and therefore dispersion characteristics along the proposed cable route and at the proposed substation site.

Construction phase: vehicle emissions

27.3.8 Exhaust emissions from construction vehicles have the potential to adversely impact local air quality, particularly local ambient concentrations of nitrogen dioxide (NO_2) and PM_{10}, the two constituent pollutants of vehicle emissions which are most likely to breach their respective health-based objectives.

27.3.9 The transport assessment carried out for the proposed onshore development assumed a worst case scenario that the peak construction works will take place during a 12 month period (2014). Construction vehicle emissions were assessed for 2014 as this would represent the period with the greatest potential for air quality impacts. Baseline traffic data were calculated as 24 hour annual average daily traffic (24 hour AADT) flows for the year 2014 (the 'without GWF construction' scenario). The 'with GWF construction' scenario was based on the most intensive peak traffic movements. This assumed a maximum of 72 heavy goods vehicle (HGV) deliveries (144 movements) each day, although in practice this peak scenario would only be expected to occur on two days during the substation build, with average traffic movements expected to be much lower.

27.3.10 In addition, a traffic model was developed (further details are provided in **Chapter 25 Traffic and Transport**) using known baseline traffic flows and factoring in predicted future traffic growth. This model also took into account other known activities in the area (and their associated traffic profiles) such as Sizewell A decommissioning traffic, Sizewell B Dry Fuel Store construction traffic and a reduction in Sizewell A operational staff traffic. As such, the predicted 2014 traffic profile could be compared with and without GWF construction traffic. The data, presented in **Table 27.3**, enabled a screening assessment of construction vehicle emissions, in terms of local concentrations of NO_2 and PM_{10} in accordance with Environmental Protection UK guidance document – *Development Control: Planning for Air Quality* (EPUK, 2010) – which provides the recommended criteria for undertaking an air quality assessment.

Table 27.3 Baseline 24 hour AADT traffic flows ('without GWF construction') and baseline plus peak construction traffic AADT flows ('with GWF construction') on the assessed road network

Road	Without GWF Construction	With GWF Construction	
	Total AADT	Total AADT	% Increase
B1125 Blythburgh Road	2510	2510	0%
B1122 Abbey Road (Lover's Lane - Potters Street)	1947	2169	11.40%
Lover's Lane (Valley Road - Abbey Road)	901	1133	25.68%
King George Avenue	1288	1396	8.37%
Lover's Lane (E of King George Avenue)	1872	2212	18.17%
Aldeburgh Road	5459	5557	1.79%

Road	Without GWF Construction	With GWF Construction	
B1069 Snape Road (N of junction with A1094)	5795	5893	1.68%
B1069 Snape Road (N of junction with B1069)	3081	3081	0%
A1094 Farnham Road	7511	7609	1.31%
B1119 Church Hill	3340	3360	0.60%
A12 Main Road	12346	12568	1.80%
B1122 Middleton Road	3303	3525	6.73%
Lover's Lane (E of Abbey Road)	873	1105	26.54%
B1122 Abbey Road (S of Lover's Lane)	1362	1372	0.71%
Sizewell Gap (W of Sizewell entrance)	1711	1711	0%
Sizewell Entrance	1669	1669	0%
Sizewell Gap (E of Sizewell entrance)	42	42	0.%
Lover's Lane (W of Galloper entrance)	1870	2210	18.17%
Lover's Lane (E of Galloper entrance)	1711	1711	0%

27.3.11 The effects of construction dust and emissions from non-road mobile machinery (NRMM) are dependent upon a variety of factors including operational on-times, loading, ground, the transient nature of the works and meteorological conditions, all of which are difficult to quantify accurately. As a result, emissions from NRMM were considered qualitatively within the context of existing air quality conditions. The proposed NRMM to be used throughout the onshore construction works are presented in **Table 27.4**.

Table 27.4 Onshore works construction plant (NRMM)

Phase	Plant
Site Preparation (including landform)	Dump truck 25t
	Mobile crane
	Grader
	Compressor for site cabin
	Tracked excavator
	Hydraulic piling
Substation works	Mobile crane
	Silent generator
	Concrete pump and cement mixer
	Wheeled loader
	Tracked excavator
Onshore cabling	Lorry
	Tracked excavator
	Dump truck 25t
Transition bays	Concrete pump and cement mixer
	Tracked excavator
	Dump truck 25t
HDD works + cable pull	Tracked excavator
	Directional drill generator
	Wheeled loader
	Drilling rig
Site demobilisation	Mobile crane
	Lorry

27.3.12 Based on the anticipated construction activities no other impacts from other known pollutants are expected to arise from the proposed GWF construction phase other than PM_{10} and NO_2.

Operational phase

27.3.13 The impact on local air quality associated with the operational phase of the development was assessed qualitatively, given that traffic volumes would return to existing levels following completion of the development.

Decommissioning phase

27.3.14 When GWF is decommissioned it will adhere to any future or modified legislation relevant at that time. The specific onshore decommissioning processes are expected to include:

- Export cables between the landfall and the substation site will be disconnected and left in situ;
- Any equipment installed within the onshore transition bays will remain in situ, unless otherwise agreed with the relevant planning authority;
- The above ground substation assets (comprising the GWF compound and the transmission compound) will be dismantled and removed from site;
- The substation foundations will be removed to 1m below ground level; and
- The landform will be retained.

Cumulative impacts

27.3.15 The traffic data described above, utilised within the construction traffic DMRB assessment, incorporates traffic associated with the decommissioning of Sizewell A and for the construction of the Sizewell B Dry Fuel Store. As such, a cumulative assessment of vehicle emissions, associated with these developments and the onshore construction works for GWF, is captured as part of the construction stage impact assessment. The potential for cumulative dust generation is, however, considered within the cumulative impact assessment.

Receptor sensitivity

27.3.16 Receptors potentially sensitive to dust emissions were identified in proximity to the proposed onshore cable route, following guidance from Minerals Policy Statement 2 (ODPM, 2005), as presented in **Table 27.5**.

Table 27.5 Receptor sensitivity with respect to fugitive construction dust emissions

High Sensitivity	Medium Sensitivity	Low Sensitivity
Hospitals and Clinics	Schools	Farms
Retirement Homes	Residential Areas	Light and Heavy Industry
Hi-Tech Industries	Public access areas	Outdoor Storage
Food Processing	Food Retailers	
	Offices	

Impact magnitude

Impact magnitude is derived using the receptor sensitivity to dust emissions against the distance between the receptor and the fugitive dust source. This is presented in **Table 27.6**

Table 27.6 Impact magnitude matrix

		Receptor Sensitivity		
		Low	**Medium**	**High**
Distance between dust source and receptor (m)	**> 200m**	Negligible	Negligible	Negligible
	100-200	Negligible	Negligible	Low
	50-100	Low	Medium	Medium
	0-50	Low	Medium	High

Significance Criteria

27.3.17 The impact magnitude, combined with the use of annual hourly sequential wind data representative of the region, allows the potential impact on air quality from fugitive dust emissions at sensitive receptors to be considered, in accordance with the significance matrix presented in **Table 27.7**.

Table 27.7 Significance matrix

Value / Sensitivity	Magnitude			
	High	**Medium**	**Low**	**Negligible**
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Minor	Negligible	Negligible
Low	Minor	Negligible	Negligible	Negligible

Note: Shaded cells (red to yellow) indicate the magnitude of anticipated impacts, ranging from severe to neutral (no impact)

27.4 Existing Environment

Local air quality management reports

27.4.1 SCDC has had specific duties under the Government's Local Air Quality Management legislation since the regime was formalised in 1997. Consequently, there has been an ongoing review and assessment of air quality in the district, with a series of screening assessments, detailed assessments, and progress reports submitted to DEFRA and consultees as required.

27.4.2 There are currently two designated AQMAs within the District, declared due to monitored and modelled exceedances of the NO_2 annual mean objective. These AQMAs were designated at properties in Woodbridge and Felixstowe. However these AQMAs are not in the vicinity of the areas encompassing the onshore cable route and substation, which are located over 20km to the north-east of the nearest AQMA.

27.4.3 The 2010 Air Quality Progress Report (SCDC, 2010) did not identify the need to proceed to a Detailed Assessment for any of the Air Quality Strategy pollutants.

Local air quality monitoring

27.4.4 SCDC do not undertake any monitoring of air pollutants within the vicinity of the proposed onshore cable route and substation location. Therefore, these locations are considered to be within an area where SCDC do not anticipate that the air quality objectives, including those for NO_2 and PM_{10}, are likely to be exceeded.

Background air quality

27.4.5 Background concentrations of NO_2 and PM_{10} obtained from the National Air Quality Archive pollutant maps, available for the grid squares encompassing the onshore cable route and substation (646500, 262500 / 647500, 262500), are presented in **Table 27.8**.

27.4.6 All background concentrations are well below the respective annual mean air quality objectives in 2010 (existing) and 2013 – 2015 (proposed construction years).

Table 27.8 Annual mean background pollutant concentrations (µg.m^{-3}) obtained for two 1 x 1km grid squares covering the onshore cable route (with centre points 646500, 262500 and 647500, 262500)

Year	Grid Squares	Pollutant concentration (µg.m^{-3})		
		NO_x	NO_2	PM_{10}
2010	646500, 262500	13.2	9.4	16.1
	647500, 262500	12.8	9.2	15.6
2013	646500, 262500	12.1	8.7	15.7
	647500, 262500	11.8	8.5	15.3
2014	646500, 262500	11.8	8.5	15.6
	647500, 262500	11.5	8.3	15.1
2015	646500, 262500	11.4	8.3	15.5
	647500, 262500	11.1	8.0	15.0
Annual mean objective (µg.m^{-3})		**-**	**40**	**40**

Local air quality context summary

27.4.7 There are no AQMAs within 20km of the proposed onshore works, and the onshore works sit in an area where SCDC do not anticipate that the air quality objectives are likely to be exceeded. In addition annual background pollutant concentrations are well below the respective annual mean objectives. Overall this indicates that air quality is relatively good in the study area.

Receptor sensitivity within the study area

27.4.8 Receptors sensitive to construction dust emissions, located within 200m of potential sources along the proposed cable corridor and substation site, are presented in **Table 27.9**.

Table 27.9 Potentially sensitive receptors within 200m of the proposed onshore works

Receptor	Location	Distance (m) and direction from the proposed onshore works at closest point	Receptor Sensitivity
1	Coastguard Cottages, off Sizewell Gap	25m North	Medium
2	Public House (Vulcan Arms), Sizewell Gap	30m North	Medium
3	Home Farm, off Sizewell Gap	80m South	Low - Medium
4	Rosery Cottages	120m North-East	Medium
5	Sizewell Marshes Site of Special Scientific Interest (SSSI)	10m North	Medium
6	Sandy Lane Public Right of Way	10m North	Medium
7	Sizewell Beach	0m	Medium

27.5 Assessment of Impacts – Worst Case Definition

27.5.1 Within the onshore development footprint appreciable flexibility is only permitted within the GWF compound, transmission compound and onshore cable corridor. Flexibility within the two compounds applies to equipment / building location and the finished floor level. Since this assessment considers the impact of the entire footprint of both compounds this flexibility is not relevant to the air quality assessment. Flexibility within the cable corridor permits the permanent works to lie within a defined overall extent of the temporary works. Since this assessment considers the impact of the entire temporary works, and there is no distinction between that temporary or permanent nature, the flexibility is not relevant to this assessment.

27.5.2 Full details on the range of flexibility being considered by GWFL are provided in **Chapter 5 Project Details**. The proposed onshore development footprint is as presented in **Figure 1.3**.

27.6 Assessment of Impacts during the Construction Phase

Construction dust

27.6.1 Dust emitted by construction activities has the potential to impact upon nearby receptors, such as residential properties and sensitive habitats, via soiling of surfaces. In addition, a proportion of dust emitted will be in the form of fine particles (PM_{10}), which can have an adverse impact on human health.

- The predominant source of potential fugitive dust emissions are anticipated to relate to construction activities associated with the onshore cable corridor and substation, including: The excavation of trenches and associated earthworks, relating to the laying of the onshore cables, in addition to the construction of the substation and associated sealing end compounds;
- The loading and unloading of disaggregated material;
- The re-suspension of dust from construction vehicle movements on roads adjacent to the construction site; and
- The exposure of stockpiled earth material to potential wind erosion, particularly in relation to site levelling and visual mitigation works and excavation of ground top layers to facilitate temporary portacabins, lay down facilities and car parking relating to substation construction activities.

27.6.2 Typically the effects of construction dust emissions from sources such as those listed above are difficult to quantify accurately given the number of variables involved, including:

- The amount of moisture in the soil and time of year;
- The nature of the dust emitted;
- The distance to and nature of sensitive receptors; and
- The meteorological conditions at the time of the activity.

27.6.3 The most sensitive receptors to construction dust emissions, located within 200m of potential sources along the proposed cable corridor and substation site, are presented in **Table 27.9**. The degree of impact that potential dust emissions would have on these receptors is dependent upon the prevailing factors outlined above.

27.6.4 As the onshore construction works, including the peak period, are programmed to take place over at least, or longer than, twelve months, the hourly sequential wind data obtained from the Walton-on-the-Naze meteorological station were analysed to identify the typical wind conditions experienced on an annual and seasonal basis. The results of this analysis are presented in **Table 27.10**, with the annual wind rose plot presented as **Figure 27.1.**

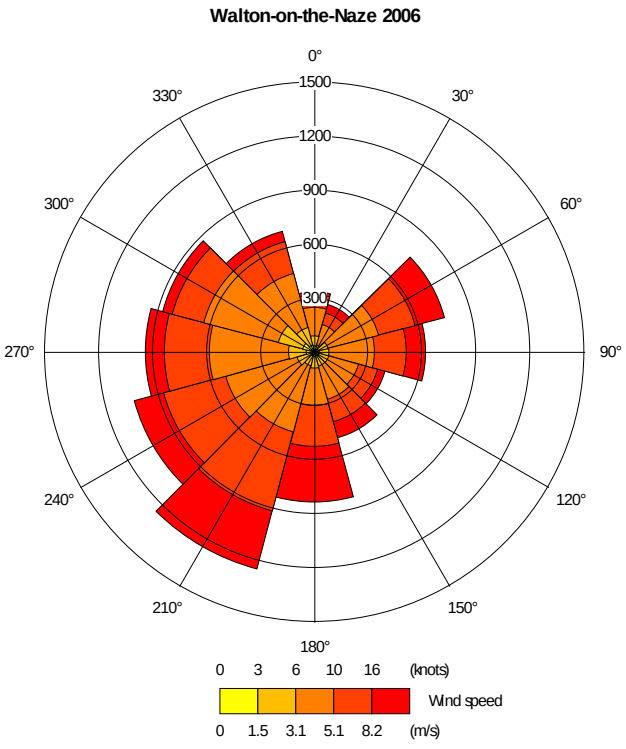
27.6.5 It should be noted that wind conditions at the local scale (i.e. along the cable corridor and at the substation) may vary from those presented in **Table 27.10**, due to the influence of buildings and surface roughness variations. As such, this analysis is used only as an indication of typical prevailing wind conditions.

Table 27.10 Annual and seasonal prevailing wind conditions (2006) obtained from the Walton-on-the-Naze meteorological station, representative of the onshore cable corridor area

Months (year)	Wind direction (from)	Frequency of direction (%)	Modal speed class * (m.s-1)
Annual	South-west	18%	5.7 – 8.8
	West	17%	3.6 – 5.7
	South	16%	5.7 – 8.8
Spring (March – May)	West	20%	3.6 – 5.7
	South-west	18%	5.7 – 8.8
	East	13%	3.6 – 5.7
Summer (June – August)	South	15%	3.6 – 5.7
	West	14%	
	East	13%	
Autumn (Sept – Nov)	South-west	23%	5.7 – 8.8
	South	21%	5.7 – 8.8
	West	21%	3.6 – 5.7
Winter (Dec – Jan)	South-west	21%	5.7 – 8.8
	North-west	15%	3.6 – 5.7
	South	13%	5.7 – 8.8

* Based on data split into 6 wind speed classes.

Figure 27.1 Wind Rose for Walton on the Naze (2006)



27.6.6 It is evident from **Table 27.10** and **Figure 27.1** that the annual prevailing wind is from the south-west, with strong components from the west and south. As the construction period will be longer than a year, on average, it can be predicted that the wind will blow predominantly from the south-west. As such, receptors 1 (Coastguard Cottages), 2 (Public House, Sizewell Gap), and 4 (Rosery Cottages), 5 (Sizewell Marshes SSSI) 6 (Sandy Lane) and 7 (Sizewell Beach) are considered to be most susceptible to exposure to fugitive dust emissions on an annual basis.

27.6.7 On a seasonal basis, prevailing winds in the spring and summer are statistically more likely to be westerly and southerly, thus reinforcing the potential exposure to fugitive dust emissions at receptors 1, 2, 4, 5 and 6. There is also a strong easterly wind component in these months. Autumn and winter exhibit a south-west prevailing wind, with a north-west component in the winter months. The north-west wind component will potentially transport fugitive dust emissions to receptor 3 (Home Farm).

27.6.8 Given the prevailing wind direction this is considered to represent a localised, temporary effect of low to medium magnitude for receptors 1, 2, 4, 5, 6 and 7 and of negligible magnitude at receptor 3, in accordance with the impact magnitude matrix for construction dust (**Table 27.6**).

27.6.9 Receptors 1, 2, 4, 5, 6 and 7 are predicted to experience an effect of low to medium magnitude. Given the transient nature of the construction phase and that the receptor is of medium sensitivity, a **minor adverse** air quality impact is predicted in the absence of mitigation, in accordance with the significance matrix (**Table 27.7**). These impacts are primarily related to construction activities associated with the cable corridor sections closest to these receptors and would last for the duration of construction in these areas only.

27.6.10 Receptor 3 is predicted to experience an effect of negligible magnitude and therefore of **negligible significance**.

27.6.11 In terms of the fine particulate (PM_{10}) fraction of the total fugitive dust emissions, no significant air quality impacts are predicted at the identified receptors. This is due to the transient, short-term nature of the construction activities; in addition to the low existing background concentrations of PM_{10} (see **Table 27.8**).

Vehicle emissions and NRMM

27.6.12 The construction traffic movements predicted to occur during the construction period are presented in **Table 27.5**. These data were used to facilitate a qualitative screening assessment of local air quality impacts, with respect to construction vehicle emissions in accordance with EPUK guidance.

27.6.13 There are no predicted increases in traffic on the assessed construction route above 5% of the baseline traffic, where the baseline AADT is above 5,000 vehicles (see **Table 27.3**). Furthermore, there are no predicted increases in HGVs on the assessed road network of over 200 movements per day. This

is in accordance with *Development Control: Planning for Air Quality*' (EPUK, 2010) – which provides the recommended criteria for undertaking an air quality assessment. As these criteria for an assessment are not satisfied, and given the existing low background concentration of NO_2 and PM_{10}, a **negligible** air quality impact is predicted at the identified receptors for the duration of the construction phase.

27.6.14 Exhaust emissions of NO_2 and PM_{10} from the proposed on site NRMM will be significantly lower within the context of baseline vehicle emissions. Further to this, existing background levels of these pollutants are low relative to the respective air quality objectives and emissions contributions from NRMM will be both localised and temporary in duration. As such, a **negligible** air quality impact is predicted in terms of emissions from NRMM.

Mitigation and residual impact

Construction dust

27.6.15 A range of environmental management controls will be developed with reference to the both the Building Research Establishment (BRE) guidance (2004) and the Greater London Authority and London Council's Best Practice Guidance (2006). These controls will be designed to prevent or minimise the release of dust, and to prevent it entering the atmosphere, and/or being deposited on nearby receptors. Particular attention will be paid to construction work that must unavoidably take place close to identified sensitive receptors.

27.6.16 A Construction Code of Practice (CCoP) will be developed for the scheme, capturing all the onshore commitments, and integrated as contractual requirements. The CCoP will include the following measures for all construction activities occurring along the proposed onshore cable corridor:

- Damping down surfaces during dry, windy weather using water bowsers;
- Erection of appropriate hoarding and/or fencing, particularly adjacent to identified sensitive properties adjacent to the cable route, to reduce dust dispersion and restrict public access, and sheeting of properties and vehicles removing excavated material;
- Use of a wheel wash where practicable, limiting of vehicle speeds on site, avoidance of unnecessary idling of engines and routing of site traffic as far from residential and commercial properties as possible;
- Prevention of dust-contaminated run-off water from the site;
- Use of a road sweeper to clean mud and other deposited particulates from public highway; and
- Completion of temporary works area reinstatement, landscaping works and drainage as soon as possible after construction completion to

reduce the effect and duration of bare soil being exposed before vegetation growth stabilises the soil surface.

27.6.17 Such measures are routinely and successfully applied to construction projects throughout the UK, and are capable of significantly reducing the potential for negative dust soiling impacts associated with the various stages of construction work. The implementation of these measures is predicted to reduce the magnitude of the identified impacts to low. As such, the potential residual impact is predicted to be **negligible** at all identified receptors.

Vehicle emissions and NRMM

27.6.18 Vehicle emissions and NRMM emissions were shown to be negligible**.** Nevertheless there is a range of good-practice control and management measures which will be considered as construction site best practice and implemented through the CCoP. These measures are outlined below:

- Construction vehicles and static plant will be well maintained. If any emissions of dark smoke occur then the relevant machinery will be stopped immediately and any problem rectified;
- All NRMM will use fuel equivalent to ultra low sulphur diesel (fuel meeting the specification within EN590:2004);
- All NRMM will comply with either the current or previous EU Directive Staged Emission Standards (97/68/EC, 2002/88/EC, and 2004/26/EC). As new emission standards are introduced the acceptable standards will be updated to the previous and most current standard;
- All NRMM will be fitted with Diesel Particulate Filters (DPF) conforming to defined and demonstrated filtration efficiency (load/duty cycle permitting); and
- The ongoing conformity of plant retrofitted with DPF, to a defined performance standard, will be ensured through a programme of on-site checks.

27.6.19 Successful implementation of the above good practice control and management measures will ensure that emissions from construction vehicles and NRMM used during construction remain **negligible**.

27.7 Assessment of Impacts during the Operational Phase

27.7.1 Following the completion of the construction phase, traffic volumes on the affected road network will return to normal. Occasional maintenance vehicles may be required to periodically visit the substation. However, the exhaust emissions associated with these vehicle movements, in the context of baseline traffic levels and air quality, will have **no impact** on local air quality.

27.8 Assessment of Impacts during the Decommissioning Phase

27.8.1 When GWF is decommissioned it will adhere to any future or modified legislation relevant at that time. The specific onshore decommissioning processes are expected to include:

- Export cables between the landfall and the substation site will be disconnected and left in situ;
- Any equipment installed within the onshore transition bays will remain in situ, unless otherwise agreed with the relevant planning authority;
- The above ground substation assets (comprising the GWF compound and the transmission compound) will be dismantled and removed from site;
- The substation foundations will be removed to 1m below ground level; and
- The landform will be retained.

27.8.2 Decommissioning of the onshore cables and substation are expected to include similar activities to those adopted throughout the construction phase. As such, in terms of dust emissions associated with decommissioning activities, it is predicted that **negligible** to **minor adverse impacts** will occur at the previously identified dust sensitive receptors, as well as any new receptors which may be present when GWF is decommissioned.

Mitigation and residual impact

27.8.3 Similar mitigation measures to those detailed for the construction phase would be employed during the decommissioning phase. This would ensure that a **negligible** impact with respect to potential fugitive dust emissions will be maintained, in addition to a **negligible** impact to air quality with respect to emissions from HGVs and NRMM.

27.9 Inter-relationships

27.9.1 **Table 27.11** summarises those inter-relationships that are considered of relevance to air quality and, identifies where within the ES these topics have been considered.

27.9.2 **Chapter 28 Inter-relationships** provides a more detailed holistic overview of other potential impacts that may manifest on air quality receptors.

Table 27.11 Air quality inter-relationships

Inter-relationship	Section where addressed	Linked Chapter
Influence of both noise and air quality impacts on human receptors	Section 26.6	Chapter 26 Noise
Influence of both reduced amenity and air quality impacts to users of the local footpaths	Section 24.6	Chapter 24 Land use, tourism and recreation

27.10 Cumulative Impacts

27.10.1 The unmitigated impacts identified during the construction (**Section 27.6**), and decommissioning phases (**Section 27.8**) of the GWF project comprise:

- Negligible to minor adverse air quality impacts with respect to dust generated during construction and decommissioning.

27.10.2 No impacts with effects above negligible are anticipated for the operational phase of the project.

27.10.3 Other onshore activities in the study area include the GGOWF onshore electrical connection, Sizewell B Dry Fuel Store, proposed new nuclear development (Sizewell C) and the decommissioning of Sizewell A.

GWF construction and other onshore activities

GGOWF onshore electrical connection

27.10.4 GGOWF has a development footprint immediately adjacent to GWF. No significant air quality impacts are reported within the associated ES (GGOWL, 2005). In addition the construction phase of GGOWF will be completed before GWF begins construction. Therefore, there will be no cumulative impact associated with the construction of GWF and the construction of the GGOWF.

Sizewell B Dry Fuel Store

27.10.5 The Sizewell B Dry Fuel Store ES does not identify any significant air quality impacts (BEGL, 2010). Therefore, there will be no cumulative impact associated with the construction of GWF and the construction of the Sizewell B Dry Fuel Store.

Sizewell C

27.10.6 Given the absence of any details of the Sizewell C proposals it is not possible to undertake a quantitative assessment of this potential cumulative impact at this stage.

Sizewell A decommissioning

27.10.7 The main decommissioning activity associated with this (the preparation for care and maintenance stage) is programmed to take place between 2009 and 2019 (British Nuclear Group, 2005). The associated ES reports the potential for major adverse dust emissions to properties within 1km (which will include Rosery Cottages, Sizewell Village, Coastguard Cottages and the Vulcan Arms public house).

27.10.8 Sizewell A demolition activities (the source of the air quality impact) are reported to be complete by 2014 (British Nuclear Group, 2005). However, should the Sizewell A demolition activity extend beyond 2014 and overlap with the construction of GWF there is the potential for the unmitigated impacts to result in a cumulative air quality impact.

27.10.9 Air quality impacts associated with Sizewell A decommissioning and GWF construction can both be managed through appropriate mitigation and reduced to negligible. Provided that the mitigation measures for both activities are fully implemented cumulative residual impacts are expected to reduce to negligible.

27.10.10 Overall there are not considered to be any significant cumulative impacts between the construction of GWF and any other known or planned activities.

GWF decommissioning and other onshore activities

27.10.11 GWF will have an operational design life of 25 years and would be programmed for decommissioning in approximately 2045.

GGOWF onshore electrical connection

27.10.12 GGOWF also has an operational design life of 25 years and there is the potential that both GWF and GGOWF could be decommissioned at the same time. The GGOWF ES does not report any air quality impacts during decommissioning (GGOWL, 2005). Given the similarity of the two developments some air quality impacts during decommissioning would be expected in the absence of mitigation. However, there is not expected to be an associated increase in magnitude for any of the air quality impacts reported in this chapter. Therefore there are not anticipated to be any cumulative impacts with the decommissioning of GWF.

Sizewell B Dry Fuel Store

27.10.13 Sizewell B Dry Fuel Store will still be operational at this time (expected to be operational until 2099). There are no reported air quality impacts during the operation of the dry fuel store (BEGL, 2010), therefore there are not anticipated to be any cumulative impacts with the decommissioning of GWF.

Sizewell C

27.10.14 It is assumed that Sizewell C will be operational in 2045. The expected operational lifetime of Sizewell C is in excess of 60 years (DECC, 2010) and

it is expected that the earliest that it would begin decommissioning would be approximately 2080. Given the absence of any details of the Sizewell C proposal it is not possible to undertake a quantitative assessment of the potential cumulative impact with the decommissioning of GWF at this stage.

Sizewell A decommissioning

27.10.15 Sizewell A will be in its 'care and maintenance' stage of decommissioning between 2019 and 2100. The associated ES did not report any significant air quality impacts during this stage (British Nuclear Group, 2005). Therefore there are not anticipated to be any cumulative impacts with the decommissioning of GWF.

27.10.16 Overall there are not considered to be any significant cumulative impacts between the decommissioning of GWF and any other known or planned activities.

27.11 Monitoring

27.11.1 No specific monitoring for air quality impacts is proposed.

27.12 Summary

27.12.1 **Table 27.12** provides a summary of the predicted impacts associated with the construction, operation and decommissioning of GWF, upon air quality.

Table 27.12 Summary

Description of Impact	Impact	Potential Mitigation Measures	Residual impact
Construction Phase			
Construction related dust	Negligible to minor adverse	A range of environmental management controls developed with reference to the Building Research Establishment (BRE) guidance and the Greater London Authority and London Councils Best Practice Guidance. These will be detailed within the CCoP	Negligible
Construction related vehicle emissions	Negligible	A range of construction site best practice, which will be detailed within the CCoP.	Negligible
Operation Phase			
Operational	No impact	n/a	n/a

Description of Impact	Impact	Potential Mitigation Measures	Residual impact
impacts			
Decommissioning Phase			
Construction related dust	Negligible to minor adverse	A range of environmental management controls developed with reference to the Building Research Establishment (BRE) guidance and the Greater London Authority and London Councils Best Practice Guidance. These would be monitored on site by the ECW.	Negligible

27.12.2 The unmitigated impacts identified during the construction, operation, and decommissioning phases of the GWF project comprise minor adverse air quality impacts with respect to dust generated during construction and decommissioning.

27.12.3 It has been identified that there is the potential for the unmitigated air quality effects associated with the construction of GWF and the decommissioning of Sizewell A to result in a cumulative impact. Provided that the described mitigation for each activity is fully implemented the impacts will reduce to negligible and the cumulative impact will reduce to negligible.

27.12.4 There will be no air quality impacts arising from other activities in the area and therefore there are not anticipated to be any other cumulative air quality impacts.

27.13 References

British Energy Generation Ltd (2010). Sizewell B Dry Fuel Store Environmental Statement.

British Nuclear Group (2005) Sizewell A Environmental Statement

Building Research Establishment (BRE), 2004. Controlling Particles, Vapour and Noise Pollution from Construction Sites.

Department of Energy and Climate Change (2010) Planning For New Energy Infrastructure – Appraisal of Sustainability of the revised draft Nuclear National Policy Statement

Department of Energy and Climate Change (2011a) Overarching National Policy Statement for Energy (EN-1)

Department of Energy and Climate Change (2011b) National Policy Statement for Electricity Network Infrastructure (EN-5)

Department for Environment, Food and Rural Affairs (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. London: HMSO.

Department for the Environment Food and Rural Affairs (2009). Local Air Quality Management Technical Guidance Document LAQM.TG(09). London: DEFRA.

Department for Environment, Food and Rural Affairs Air Quality Archive (2010). http://laqm1.defra.gov.uk/review/tools/background.php, website accessed 22 December 2010.

Department of the Environment, Transport & the Regions (DETR) (2000). UK Air Quality Strategy. London:HMSO.

EPUK, (2010). Development Control: Planning for Air Quality, 2010 Update.

Galloper Wind Farm Ltd (2011) Galloper Wind Farm Preliminary Environmental Report

Greater London Authority and London Councils (2006). The Control of Dust and Emissions from Construction and Demolition – Best Practice Guidance.

IPC (2010). Scoping opinion proposed Galloper Wind Farm Project, August 2010. Available at http://infrastructure.independent.gov.uk/wp-content/uploads/2010/09/Galloper-scoping-opinion_web.pdf

Office of the Deputy Prime Minister (2004). Planning Policy Statement 23: Planning and Pollution Control. The Stationary Office.

Office of the Deputy Prime Minister (2005) Minerals Policy Statement 2 – Controlling and mitigating the environmental effects of mineral extraction in England, London: TSO.

Scottish and Southern Energy Renewables & RWE Npower Renewables (2010) Galloper Wind Farm Project Scoping Study

Suffolk Coastal District Council (2010). Air Quality Progress Report 2010.