LONDON ASHFORD AIRPORT, LYDD

RESPONSE TO "ASSESSMENT OF THE AIR POLLUTION IMPACTS FROM AN EXPANDED LYDD AIRPORT", CRESSWELL ASSOCIATES, OCTOBER 2008

March 2009

Prepared by
Parsons Brinckerhoff Ltd
29 Cathedral Road
Cardiff
CF11 9HA

Prepared for
London Ashford Airport
Lydd
Kent
TN29 9QL

Report Title:	**Response to "Assessment of the Air Pollution Impacts from an Expanded Lydd Airport", Cresswell Associates, October**
Job No:	**FSE96324A**
Date:	**March 2009**
Prepared by:	**Bethan Tuckett-Jones**
Checked by:	**Mark McLellan**
Approved by:	**John Oakshott**

CONTENTS

SECTION 1

SUMMARY ASSESSMENT

1 SUMMARY ASSESSMENT

1.0 The RSPB-commissioned study undertaken by Cresswell Associates, reported in October 2008 (hereafter referred to as the "Cresswell Report"), has been reviewed in detail. This response has been compiled by specialists in ecology and air quality at Parsons Brinckerhoff (PB), on behalf of London Ashford Airport (LAA), Lydd.

1.0.1 Much of the Cresswell Report is an ecological assessment of Dungeness, and in particular, describes the lichen, plant and invertebrate communities of the Dungeness SAC and Dungeness, Romney Marsh and Rye Bay SSSI. PB takes no issue with the description of floral species composition and community characteristics; indeed, the Cresswell Report supports environmental information submitted by LAA in 2006, 2007 and 2008.

1.0.2 There is one major issue of disagreement between PB and Cresswell Associates, and this forms the basis of the challenge to LAA's expansion proposals in the Cresswell Report. This issue is the '**critical load range'** that should be used to assess the impact of nitrogen deposition on the plant communities present at the SAC.

1.0.3 It should be noted that oxides of nitrogen occur naturally in the air, and therefore background levels of nitrogen deposition are never zero. As a result of human activity across the UK, background levels rose considerably in the twentieth century across the country, including Dungeness. Figure 1 shows the total emissions of nitrogen from all man-made sources in the UK. Total emissions peaked in the early 1990s, then, as a result of European and UK national air quality strategies, have since declined substantially. Current emission levels are equivalent to those last seen in the 1950s, and emissions are expected to continue to decline in the future.

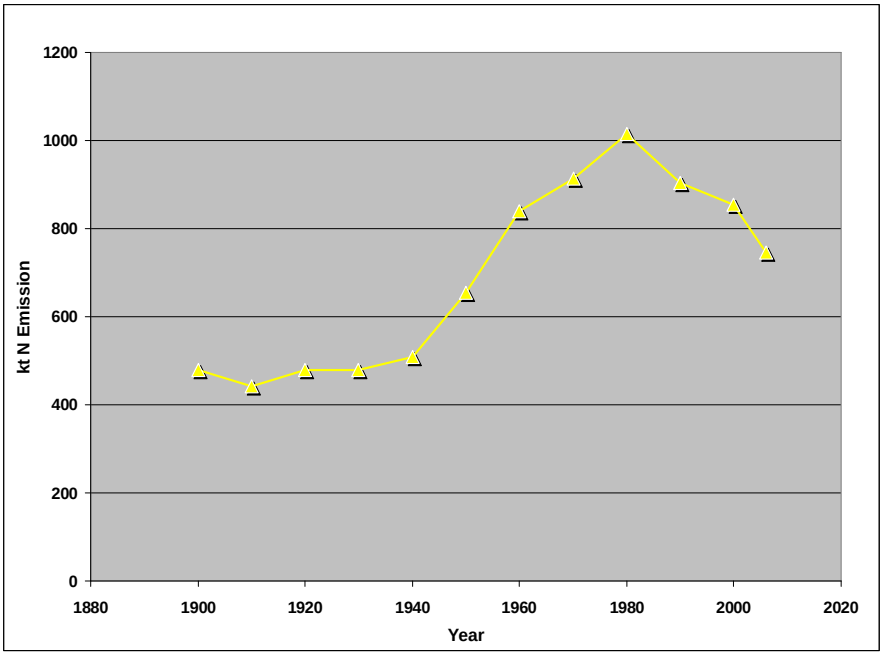

Figure 1. Total nitrogen emissions in the UK between 1900 and 2006. Data from 1900 to 1990 are taken from Fowler *[3]*, data from 2000 and 2006 are taken from UK National Atmospheric Emissions Inventory (www.naei.org.uk).

1.0.4 Consequently, levels of airborne nitrogen and nitrogen deposition have stabilized and are now decreasing. Table 1 shows the measured change in airborne nitrogen and nitrogen deposition over the industrialized areas of north west Europe between 1980 and 2000 *[5]*. The measured data indicate that reductions in emissions are mirrored by reductions in deposition. With current emissions levels equivalent to levels in the 1950s, it is reasonable to assume that current levels of deposition have also been exceeded for several decades. Over Dungeness, deposition levels are predicted to decline by around 2% per year (APIS, www.apis.ac.uk), consistent with the values shown below.

	Emission Change (%)	Deposition Change (%)
Reduced Nitrogen	-22	-18
Oxidised Nitrogen	-31	-34

Table 1. Changes in emissions of reduced (NH_3) and oxidized (NO_X) nitrogen, and their deposition, from 1980 to 2000, expressed as a percentage in relation to 1980 values for industrialized north-west Europe *[5]*.

1.0.5 Modeling of the predicted additional nitrogen loading likely to accrue from the development proposals shows that only a very small area of land around the runway is likely to be affected by increased nitrogen deposition.

1.0.6 The difference of opinion between PB and Cresswell Associates centres around the critical load range that should be used to assess the impact of nitrogen deposition on the plant communities present at the SAC. The impact assessment carried out by PB rests on the nationally and internationally accepted critical load range of 10 - 20 kilograms of nitrogen per hectare per year (kgN/ha/yr).

1.0.7 Cresswell suggest that "*with more recent information on the effects of nitrogen on lichens now available, it appears that this* [range] *may be set too high, and a Critical Level* [sic] *of 5 - 10 kgN/ha*/yr *may be more appropriate to ensure no damage."* The Cresswell Report's own literature study is the source of this "recent information". Whilst this provides useful and interesting research to inform debate on critical load ranges, it is neither appropriate nor acceptable for Cresswell to use their own recommended preference of a 5 - 10 kgN/ha/yr critical load range in a valid impact assessment. Whilst they recognise that the critical load range of 10 - 20 kgN/ha/yr *"is identified by APIS as being appropriate for the Dungeness SAC"* their literature review leads them to take a different view. However, the literature cited makes a weak case for a change in critical level threshold. Cresswell suggest that expert judgement (APIS) should be superseded by "empirical data". However, the studies cited do not support their conclusion that "*the deposition level of 5 - 10 kgN/ha/yr can be justified if not further reduced. However, taking a precautionary approach, the need for lower levels than 5 - 10 kgN/ha/yr especially over the longer term…should not be dismissed."* Rather, some studies quoted that are of direct relevance to the Dungeness SAC suggest that the currently accepted thresholds are acceptable and robust. A 2007 review of the critical loads used in the UK concluded that new survey data are "*not inconsistent*" with the current critical load ranges *[2]*.

1.0.8 The Cresswell proposition of a critical load range of 5 - 10 kgN/ha/yr carries with it a number of serious concerns, some beyond the immediate context of development proposals for LAA. Nitrogen deposition currently exceeds or is very close to the lower limit of the existing critical load range (10 - 20 kgN/ha/yr) in the Lydd area. It is likely that deposition was above this range in the recent past, and that plant communities at

Dungeness have been exposed to higher levels of nitrogen deposition for decades. Despite this, these communities are still present and are robust. The suggestion by the Cresswell Report that some lichen species have (possibly) become extinct as a result of past levels of nitrogen is highly speculative since other factors may be the cause of apparent species loss.

1.0.9 In our opinion, the Cresswell Report provides no basis for adopting a critical load range of 5 - 10 kgN/ha/yr (or lower).

1.0.10 If this lower limit were to be implemented, it would lead to a presumption against any development at all in the Dungeness area which involves nitrogen dioxide emissions. Furthermore, it implies that the nitrogen deposition levels are currently too high and that restrictions on current activities such as the use of private cars would be required.

1.0.11 Since there is no basis for reducing the critical load range against which nitrogen deposition impacts should be measured, the conclusions of previous PB submissions are unaffected. Both applications are predicted to have a negligible impact on the integrity of the Dungeness SAC in the short, medium or long term, in respect of nitrogen deposition impacts.

1.0.12 The area potentially affected by deposited nitrogen is land immediately adjacent to the runway. This land is clear and graded semi-improved grassland rather than exposed shingle. It is proposed in mitigation that a much larger area of the airfield than the area possibly affected is exposed to shingle, forming habitat for lichen and other flora of vegetated shingle, which in turn will provide invertebrate habitat.

SECTION 2

DETAILED ASSESSMENT

2 DETAILED ASSESSMENT

2.1 The RSPB-commissioned study undertaken by Cresswell Associates, reported in October 2008 (hereafter referred to as the "Cresswell Report"), has been reviewed in detail. This response has been compiled by specialists in ecology and air quality at Parsons Brinckerhoff (PB), on behalf of London Ashford Airport (LAA), Lydd.

2.2 Critical Loads

2.2.1 Critical loads can be defined as "a quantitative estimate of an exposure to one or more pollutants below which harmful effects on specified sensitive elements of the environment do not occur, *according to present knowledge*".

2.2.2 The Environmental Statement submitted alongside planning application Y06/1647/SH and Y06/1648/SH in December 2006 assessed deposition of nitrogen against a critical load of 10-15 kgN/ha/hr. This range was subsequently revised upwards to 10–20 kgN/ha/yr following the 2007 update of the Air Pollution Information Service (APIS, www.apis.ac.uk) in the 2007 and 2008 Supplementary Environmental Information. These critical loads are acknowledged as appropriate for use in both national and international studies of exceedences statistics.

2.2.3 The APIS update included the specification of site-specific critical loads for designated sites, including the 'perennial vegetation of stony banks' in the Dungeness SAC *[1]*. The use of site-specific critical loads is considered more appropriate than the straightforward use of the UK mapped critical loads since full account of the details of the individual SACs and SPAs could be made.

2.2.4 Site-specific data for nutrient nitrogen critical loads were derived on the basis of expert judgement on the sensitivities of designated features to eutrophication. Three systems of habitat classification, European Nature Information System (EUNIS), Annex 1 of the Habitats Directive and BAP (UK Biodiversity Action Plan), were used in the linking of designated features of sites to existing empirical critical loads.

2.2.5 For eutrophication, critical loads were largely based on the empirical critical loads reviewed under the UNECE (United Nations Economic Commission for Europe) at the Berne Workshop (UNECE, 2003). However, for perennial vegetation of stony banks, no empirical data was available from the workshop. In the 2007 APIS update, the critical loads for Dungeness were, therefore, based on the expert judgement of the contributors to the study who included the Joint Nature Conservation Committee (JNCC), English Nature, the Environment Agency and the Centre for Ecology and Hydrology (CEH).

2.2.6 Part of a major study, the NERC-DEFRA Terrestrial Umbrella program *[2]* (2004 - 2007), aimed to provide advice on the existing critical loads data sets, including the data from the Berne workshop. Results from new field surveys undertaken for the Terrestrial Umbrella program were considered 'not inconsistent' with the current critical load ranges. A revision of the critical level (atmospheric concentration, rather than deposition rate) for ammonia was recommended, but this is not relevant to the assessment of LAA impacts, since LAA is not and, will not be, a significant source of ammonia.

2.2.7 Therefore, the APIS site-specific data reflects current knowledge in relation to specifying an appropriate critical load range for the vegetated shingle habitat in the Dungeness SAC (10 - 20 kgN/ha/yr). This range is consistent with the national

mapping data which are accepted for use in the assessment of exceedence statistics for Defra.

2.2.8 There is little additional information available to help in selecting the appropriate value for the critical load within the specified range. Therefore, the approach adopted in the ES and supplementary information was to use the lower limit of the range. This is a conservative assumption, as will be demonstrated below.

2.3 Long Term Accumulation of Nitrogen

2.3.1 Cresswell Associates suggest that the subtle effects associated with the gradual accumulation of nitrogen have not been assessed adequately. They also suggest that the airport expansion could "*easily*" represent a tipping point such that adverse changes to the habitats would be "*likely*", even with only a small increase in nitrogen.

2.3.2 As described in Fowler et al (2004) *[3]*, total nitrogen emissions in the UK doubled between 1900 and the 1980s. However, since that time emissions have declined sharply and are currently at levels close to those seen in the 1950s (Figure 1). Measured deposition has also decreased substantially between 1980 and 2000 (Table 1) *[5]*. Nevertheless, nitrogen deposition over Dungeness currently exceeds or is very close to the lower limit of the critical load range (10 kgN/ha/yr).

2.3.3 In the absence of major sources of pollutants in the vicinity of the airport, it is reasonable to assume that nitrogen deposition over Dungeness has followed national emission trends and has been in decline for over 20 years. There is, therefore, little field evidence to suggest that in the short to medium term, the impacts of nitrogen deposition above the lower limit of the critical load range are having a significant impact on the integrity of the site.

2.3.4 Indeed, given the analysis of Fowler, deposition of nitrogen is likely to have exceeded the lower limit of the critical load range for well over 50 years, which suggests that the current species composition are relatively insensitive in the long term to nitrogen deposition at levels towards the lower end of the critical load range or any potential accumulation of nitrogen in the oligotrophic soils.

2.3.5 Cresswell suggest that "*with more recent information on the effects of nitrogen on lichens now available, it appears that this* [range] *may be set too high, and a Critical Level [sic] of 5 - 10 kgN/ha*/yr *may be more appropriate to ensure no damage."* The Cresswell Report's own literature study is the source of this "recent information". Whilst this provides useful and interesting research to inform debate on critical load ranges, it is neither appropriate nor acceptable for Cresswell to use their own recommended preference of a 5 - 10 kgN/ha/yr critical load range in a valid impact assessment. Whilst they recognise that the critical load range of 10 - 20 kgN/ha/yr *"is identified by APIS as being appropriate for the Dungeness SAC"* their literature review leads them to take a different view. However, the literature cited makes a weak case for a change in critical level threshold. Cresswell suggest that expert judgment (APIS) should be superseded by "empirical data". However, the studies cited do not support their conclusion that "*the deposition level of 5 - 10 kgN/ha/yr can be justified if not further reduced. However, taking a precautionary approach, the need for lower levels than 5 - 10 kgN/ha/yr especially over the longer term…should not be dismissed."* Rather, some studies quoted that are of direct relevance to the Dungeness SAC suggest that the currently accepted thresholds are acceptable and robust.

2.3.6 Approximately 170 lichen species have been recorded at Dungeness. Cresswell Associates identify seven lichen species which have become extinct at Dungeness (possibly), and cite pollution effects as the "*probable"* cause. However, the UK report on the conservation status for perennial vegetation of stony banks *[4]* states that the main pressures facing vegetated shingle, with particular reference to Dungeness, include changes to the sediment supply, its natural mobility and the exploitation of the shingle resource. Air pollution is listed as a potential impact, but is considered secondary to direct impacts.

2.3.7 In our view, there is no basis for the proposal by Cresswell Associates that the critical load range for Dungeness should be further reduced to 5 - 10 kgN/ha/yr or lower.

2.3.8 Cresswell Associates question the extent to which 'non-prevailing' wind conditions have been taken into account in the modelling. We can confirm that the dispersion model was run for 5 years of hourly sequential meteorological data i.e. for every hour of the year, for 5 separate years. These datasets include the impacts of both prevailing and non-prevailing winds in the ratio appropriate to the wind climate of Dungeness.

2.3.9 Since there is no basis for reducing the critical load range against which nitrogen deposition impacts should be measured, the conclusions of previous PB submissions are unaffected. Both applications are predicted to have a negligible impact on the integrity of the Dungeness SAC in the short, medium or long term, in respect of nitrogen deposition impacts.

SECTION 3

REFERENCES

3 REFERENCES

1 SNIFFER, February 2007, Source attribution and critical loads assessment for Special Areas of Conservation and Special Protection Areas in the UK, document produced by Centre for Ecology and Hydrology

2 UKREATE, July 2007, Terrestrial Umbrella – Effects of Eutrophication and Acidication on Terrestrial Ecosystems

3 Fowler D, O'Donoghue M, Muller JBA, Smith RI, Dragosits U, Skiba U, Sutton MA and Brimblecombe P (2004) A chronology of nitrogen deposition in the UK between 1900 and 2000. Water, Air, and Soil Pollution: Focus 4 9–23.

4 EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Second report by the United Kingdom under Article 17 on the implementation of the Directive from January 2001 to December 2006. Conservation status assessment for H1220: Perennial vegetation of stony banks

5 Fowler D, Smith R, Muller J, Cape JN, Sutton M, Erisman JW and Fagerli H, (2007) Long Term Trends in Sulphur and Nitrogen Deposition in Europe and the Cause of Non-Linearities. Water, Air and Soil Pollution: Focus 7 41-47.