(2) Please Scan and return to Dave.

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Your ref

Our ref 056972

David Norris
Major Applications Co-ordinator
South Somerset District Council
Council Offices
Brympton Way
Yeovil
Somerset
BA20 2HT

17 October 2007

Dear David

Proposed Extension to the Quedam Centre, Yeovil
Planning Application Reference: 07/03898/FUL

I refer to the above planning application, submitted to South Somerset District Council on 17th August 2007.

Please find enclosed updated information regarding receptor 20 referred to in Chapter 6, Air Quality of the Volume 1 Environmental Statement. The chapter has been updated (shown in track changes) and is now attached to form an addendum to Chapter 6 of the Volume 1 Environmental Statement.

I also enclose 'Appendix 1 – Model Verification'. It forms the Chapter 6 Air Quality Technical Appendices and was not previously included as a result of an administrative error.

If you have any questions regarding the above, please do not hesitate to call Julia Chowings (020 7896 8098) or me.

Yours sincerely

Kate Keens.

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6. Air Quality

Introduction

6.1 Air Quality Consultants Ltd has been commissioned to carry out an air quality assessment of the proposed Quedam Centre extension, Yeovil. The proposed development lies within Yeovil Town Centre. The Yeovil Air Quality Management Area (AQMA), declared by South Somerset District Council (SSDC) for measured exceedences of the annual mean nitrogen dioxide objective, covers the whole of the built-up area of Yeovil and thus encompasses the proposed development. Consideration is therefore given to the potential impacts of any changes in traffic flows brought about by the development, on the air quality within the AQMA.

6.2 The proposal is for the redevelopment of the existing Vincents garage site and Quedam Centre car park to provide an extension to the existing Quedam Centre, comprising two levels of basement car parking and servicing, three levels of retail floorspace above and pubic toilets. The development would lead to changes in traffic flows on the local roads, which may impact on air quality for existing residential properties. The main air pollutants of concern related to traffic emissions are nitrogen dioxide and fine particulate matter (PM_{10}).

6.3 There is also the potential for the construction activities to impact upon existing properties. The main pollutants of concern related to construction activities are dust and fine particulate matter (PM_{10}).

6.4 This report describes recent local air quality conditions, and the predicted air quality in the future assuming that the proposed development goes ahead. The assessment of traffic-related impacts focuses on 2010, which is the anticipated year of opening. The assessment of construction dust impacts focuses on the anticipated duration of the works.

Technical Limitations

6.5 All values presented in this report are the best possible estimates, but uncertainties in the results might cause over-predictions or under-predictions. All of the measured concentrations presented have an intrinsic margin of error. Defra (2007a) suggest that this is of the order of plus or minus 20% for diffusion tube data and plus or minus 10% for automatic measurements. The model results rely on traffic data provided by Denis Wilson Partnership and thus any uncertainties inherent in these data will carry into this assessment. There will be additional uncertainties introduced because the modelling has simplified real-world processes into a series of algorithms. For example: it has been assumed that during each year, the vehicle fleet within the study area will conform to the national (UK) average composition; it has been assumed the emissions per vehicle conform to the factors published in DMRB 11.3; it has been assumed that wind conditions measured at Yeovilton during 2006 will occur throughout the study area during 2007 and 2010; and it has been assumed that the subsequent dispersion of emitted pollutants will conform to a Gaussian distribution over flat terrain. An important step in the assessment is verifying the dispersion model against the measured data. By comparing the model results with measurements, data have been corrected for the apparent under-prediction of the model.

6.6 The assessment is limited to certain pollutants shown by other assessments to be the pollutants of greatest concern. It does not take account of all chemical species that might be released into the air, but it is considered that impacts associated with other pollutants will be smaller than those associated with the pollutants that have been considered.

6.7 The UK Government's Air Quality Expert Group (AQEG) has published a draft report on trends in primary nitrogen dioxide in the UK (AQEG, 2006). This examines evidence that shows that while NOx emissions have fallen in line with predictions made a decade previously, the composition of NOx has, in some urban environments, changed. This may have caused nitrogen dioxide levels at some

locations to fall less rapidly than was expected. The latest guidance from Defra has been followed regarding NOx to NO_2 relationships, but there is still uncertainty as to whether these relationships will continue to apply in 2007 and 2010. Any effect is likely to be greatest close to major roads, where future baseline concentrations may have been underestimated. The issue of primary nitrogen dioxide would not be expected to alter the comparison between concentrations with and without the proposed development. The implications for the conclusions of this assessment are therefore judged to be negligible.

6.8 These limitations to the assessment should be borne in mind when considering the results set out in the following sections. While the model should give an overall accurate picture, i.e. one without bias, there will be uncertainties for individual receptors. Clearly in future years the uncertainties are likely to be greater than they are now. The results are 'best estimates' and have been treated as such in the discussion.

Legislative Context

Air Quality Strategy

6.9 The Air Quality Strategy (DETR, 2000) provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: business; industry; transport; and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The Strategy establishes a Local Air Quality Management (LAQM) regime, whereby every local authority has to carry out a review and assessment of air quality in its area to identify whether the objectives will be achieved at relevant locations, by the applicable date. If this is not expected to be the case, the local authority must declare an Air Quality Management Area (AQMA), and prepare an Action Plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

National Planning Policy

6.10 National policy on air quality and planning is set out in Planning Policy Statement 23 (PPS23) (ODPM, 2004). This contains advice on when air quality should be a material consideration in development control decisions. Existing, and likely future, air quality should be taken into account, as well as the presence of any AQMAs. PPS23 notes that the findings of local authority air quality reviews and assessments will be important, as they will identify local air pollution problems, which may in turn influence the siting of certain types of development. The need for compliance with any statutory environmental quality standards or objectives, including the air quality objectives prescribed by the Air Quality Regulations 2000 and Amending Regulations 2002, will also be a factor in determining whether air quality is a material consideration.

6.11 Further emphasis is given to the importance of air quality objectives and AQMAs in the Appendices to PPS23. 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;
- where the development could in itself result in the designation of an AQMA; and
- where to grant planning permission would conflict with, or render unworkable, elements of a LA's air quality action plan.

6.12 PPS23 states clearly that not all planning applications for developments inside or adjacent to AQMAs 'should be refused, even if the development would result in a deterioration of local air quality.

Local Planning Policies

6.13 In March 2007, SSDC submitted a revised version of its Local Development Scheme (LDS), which establishes a programme for developing policies and proposals which will guide future planning decisions within the District. However, this document is yet to be adopted. Until the Local Development Framework is established within the Council, South Somerset's Local Plan, adopted in April 2006, is the current planning policy framework within the District.

6.14 Yeovil Town Centre Area Action Plan DPD (Development Plan Document) is one of the programmed Local Development Documents as part of the LDF, with the others being the Statement of Community Involvement (SCI), the Core Strategy and the Annual Monitoring Report.

Air Quality Action Plan

6.15 SSDC published its Air Quality Action Plan in 2005. The Plan sets out a package of actions that aim to improve air quality in Yeovil in order to meet the prescribed air quality objectives. The Action Plan focuses on measures to reduce pollution from traffic sources. Many of the measures are included in the Local Transport Plan, however there are additional measures to ensure more rapid compliance with the air quality objectives within the AQMA.

6.16 In total there are 35 actions identified focussing on Highway and Public Transport improvements, the promotion of non-vehicle modes of transport including cycling and walking, and the implementation of Travel Plans. These actions aim to maximise the potential of the existing road network and hence reduce levels of traffic congestion, and to facilitate the use of non-vehicle modes of transport, through the provision of additional bus services and new cycle routes.

Assessment Criteria

Health Criteria

6.17 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of the costs, benefits, feasibility and practicality of achieving the standards. The objectives for use by local authorities are prescribed within the Air Quality Regulations, 2000 (Stationery Office, 2000) and the Air Quality (England) (Amendment) Regulations 2002, (Stationery Office, 2002). The relevant objectives for this assessment are provided in Table 6.1.

Table 6.1: Relevant Air Quality Objectives

Pollutant	Time Period	Objective	To be achieved by[a]
Nitrogen Dioxide	1-hour mean	200 µg/m^3 not to be exceeded more than 18 times a year	2005
	Annual mean	40 µg/m^3	2005
Fine Particles (PM_{10})[b]	24-hour mean	50 µg/m^3 not to be exceeded more than 35 times a year	2004
	Annual mean	40 µg/m^3	2004

[a] The achievement dates for the UK objectives are the end of the specified year.
[b] Measured by the gravimetric method.

6.18 The objectives for nitrogen dioxide and PM_{10} were to have been achieved by 2005 and 2004 respectively, and will continue to apply in all future years thereafter. The Air Quality Strategy Addendum (Defra, 2003) proposed a set of more stringent provisional objectives for PM_{10} to be achieved by 2010. However, the recent review

of the Air Quality Strategy (Defra, 2006) indicates that these provisional PM_{10} objectives will not be brought into Regulation. There is thus no requirement to assess air quality against them and they are not discussed further. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded where the annual mean concentration is below 60 $\mu g/m^3$ (Laxen and Marner, 2003). Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level.

6.19 The European Union has also set limit values for both nitrogen dioxide and PM_{10}. Achievement of these values is a national obligation rather than a local one. The limit values for nitrogen dioxide are the same levels as the UK objectives, and are to be achieved by 2010. The limit values for PM_{10} are also the same level as the UK statutory objectives, and were to be achieved by 2005. The objectives are the same as, or more stringent than, the limit values, thus it is appropriate to focus the assessment on the objectives.

Construction Dust Criteria

6.20 There are no formal assessment criteria for dust. In the absence of formal criteria, a set of distance-based criteria has been developed. These criteria are based on the professional experience of the consultants, drawn from many years of involvement with assessments of many different types of project, together with discussions with many practitioners in the field, and consideration of a range of published reports.

Table 6.2: Assessment criteria for dust from construction activities, with standard mitigation in place

Source		Potential Distance for Significant Effects (distance from source)		
Scale	**Description**	**Soiling**	**PM_{10}[a]**	**Vegetation Effects**
Major	Large construction sites, with high use of haul routes	100 m	25 m	25 m
Moderate	Moderate sized construction sites, with moderate use of haul routes	50 m	15 m	15 m
Minor	Minor construction sites, with limited use of haul routes	25 m	10 m	10 m

[a] The achievement dates for the UK objectives are the end of the specified year.

6.21 There is no official guidance in the UK on how to define the magnitude of air quality impacts, nor their significance. Criteria have therefore been developed by Air Quality Consultants Ltd to define 'impact magnitude' and 'overall impact significance'. The definition of impact magnitude is solely related to the degree of change in pollutant concentrations. Impact significance takes account of the impact magnitude and of the absolute concentrations and how they relate to the air quality objectives or relevant standards. These criteria have been adopted by the Irish National Roads Authority in its 'Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes' (NRA, 2006). They are also set out as an example in the National Society for Clean Air guidance document 'Planning Control: Planning for Air Quality' (NSCA, 2006). The criteria describing the magnitude of change due to the scheme are set out in Table 6.3, while Table 6.4 sets out the significance criteria, which relate the magnitude of change to the air quality objectives.

Table 6.3: Definition of impact magnitude for changes in ambient pollutant concentrations

Magnitude of Change	Annual Mean NO_2 / PM_{10}	Days PM_{10} >50 $\mu g/m^3$

Very large	Increase/decrease > 25%	Increase/decrease > 25 days
Large	Increase/decrease 15-25%	Increase/decrease 15-25 days
Medium	Increase/decrease 10-15%	Increase/decrease 10-15 days
Small	Increase/decrease 5-10%	Increase/decrease 5-10 days
Very Small	Increase/decrease 1-5%	Increase/decrease 1-5 days
Extremely Small	Increase/decrease <1%	Increase/decrease <1 days

Table 6.4: Air Quality Impact Significance Criteria

Absolute Concentration in Relation to Objective	Change in Concentration					
	Extremely Small	Very Small	Small	Medium	Large	Very Large
Decrease with Scheme						
Above Objective with Scheme	slight beneficial	slight beneficial	substantial beneficial	substantial beneficial	very substantial beneficial	very substantial beneficial
Above Objective in Do-min, Below with Scheme	slight beneficial	moderate beneficial	substantial beneficial	substantial beneficial	very substantial beneficial	very substantial beneficial
Below Objective in Do-min	negligible	slight beneficial	slight beneficial	moderate beneficial	moderate beneficial	substantial beneficial
Well Below Objective in Do-min	negligible	negligible	slight beneficial	slight beneficial	slight beneficial	moderate beneficial
Increase with Scheme						
Above Objective in Do-min	slight adverse	slight adverse	substantial adverse	substantial adverse	very substantial adverse	very substantial adverse
Below Objective in Do-min, Above with Scheme	slight adverse	moderate adverse	substantial adverse	substantial adverse	very substantial adverse	very substantial adverse
Below Objective with Scheme	negligible	slight adverse	slight adverse	moderate adverse	moderate adverse	substantial adverse
Well Below Objective with Scheme	negligible	negligible	slight adverse	slight adverse	slight adverse	moderate adverse

'Do-min' = future baseline condition in the assessment year
'Below Objective' = 75-100% of the objective level
'Well Below Objective' = < 75% of the objective level.

Methodology

Existing Conditions

6.22 Information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority. This covers both the study area and nearby sites, the latter being used to provide context for the assessment. The

background concentrations across the study area have been defined using the national pollution maps published by Defra (Defra, 2007b). These cover the whole country on a 1x1 km grid. Future year baseline concentrations have been derived from existing values using the forward projection calculator published by Defra (2007b). This is based on national projections of concentration changes over future years.

Road Traffic Impacts

Sensitive Locations

6.23 Concentrations of nitrogen dioxide and PM_{10} have been predicted at a number of worst-case locations close to the proposed development. Relevant sensitive locations are places where members of the public might be expected to be regularly present over the averaging period of the objectives. For the annual mean and daily mean objectives that are the focus of this assessment, sensitive receptors will generally be residential properties, schools, nursing homes etc.. When selecting these receptors, particular attention has been given to assessing impacts close to junctions, where traffic may become congested, and where there is a combined effect of several road links.

6.24 Twenty existing residential properties within the study area have been identified as receptors for the assessment. In addition, two receptors which represent potential future residential development within the cattle market site, adjacent to the proposed development site, which may be in place by the opening year, have also been identified. These locations are described in Table 6.5. Concentrations have also been modelled at the diffusion tube monitoring sites located within the study area in order to verify the modelled results (refer to chapter 6 of the Technical Appendices).

Table 6.5: Description of Receptor Locations

Receptor	Description
Existing Properties	
Receptor 1	1, Higher Kingston
Receptor 2	19, Kingston
Receptor 3	York Lodge, York Place
Receptor 4	15, The Park
Receptor 5	The Park Junior School, The Park
Receptor 6	Park 5 Apartments, Park Road
Receptor 7	Yeovil District Hospital, closest point to Reckleford
Receptor 8	St. Gildas Catholic Primary School, Mary Street
Receptor 9	20, Mary Street
Receptor 10	19A Market Street
Receptor 11	18 Cecil Street
Receptor 12	1, The old Glovers Arms, Central Road (adjacent to Reckleford)
Receptor 13	53, Earle Street
Receptor	**Description**
Receptor 14	2, Earle Street
Receptor 15	99A, Middle Street
Receptor 16	20, Wyndham Street
Receptor 17	Reckleford Infant Community School, corner of Eastland Road/Reckleford

Receptor 18	Reckleford Infant Community School, closest point to Reckleford
Receptor 19	67, Sherborne Road
Receptor 20	5, Sherborne Road
Proposed Properties	
Receptor 21	Closest proposed property within the cattle market site to Reckleford
Receptor 22	Closest proposed property within the cattle market site to Market Street

Impact Predictions

6.25 Predictions of nitrogen dioxide and PM_{10} concentrations have been carried out for a base year (2007), and the proposed first year of opening (2010). For 2010, predictions have been made assuming both that development does proceed (With Development), and does not proceed (Without Development).

6.26 Air quality has been modelled using the Atmospheric Dispersion Modelling System for Roads (ADMS Roads). ADMS Roads is one of the dispersion models accepted within the Government's Technical Guidance (Defra, 2003b). The model has been run using a full year of meteorological data for 2006 from the meteorological station in Yeovilton.

6.27 The model has been run for three different scenarios:

- 2007;
- 2010 without the proposed development in place; and
- 2010 with the proposed development in place.

6.28 Denis Wilson Partnership have supplied Annual Average Daily Traffic (AADT) flows for 2007 and for 2010, with and without the proposed development in place (Denis Wilson Partnership, 2007), along with % HDVs. Average speeds have been estimated from local speed restrictions and the proximity to junctions.

6.29 Background concentrations due to other sources of air pollution (Table 6.8) have been added to those from the explicitly modelled roads, using the background concentration maps published by Defra (Defra, 2007b).

Construction Impacts

6.30 Locations sensitive to dust emitted during construction will be places where members of the public are regularly present. Residential properties and commercial operations close to the site will be most sensitive to construction dust. Any areas of sensitive vegetation or ecology that is very close to dust sources may also be susceptible to some negative effects.

6.31 It is very difficult to quantify emissions of dust from construction activities. It is thus common practice to provide a qualitative assessment of potential impacts, making reference to the assessment criteria set out in Table 6.2.

Consultation

6.32 Early dialogue took place with the Environmental Health Department at SSDC to establish the main air quality concerns relating to the proposed development site. Following consultation with the Council's Senior Environmental Protection Officer, the method of air quality modelling to be undertaken was agreed, and the most relevant receptor locations clarified.

6.33 The Environmental Health Department of the Council have also provided information and clarification on the specific monitoring stations and their location in relation to the proposed development site. Copies of South Somerset's local air quality assessment reports have been provided by the Council on request.

Baseline Conditions

6.34 The proposed development site is situated in the north-eastern area of Yeovil Town Centre. The site is bounded by Central Road to the north, Market Street to the west, Glovers Walk to the east and Vicarage Walk to the south. It is currently occupied by the existing Quedam Centre multi-storey car park and Vincents garage site (including showroom and service centre).

6.35 There are existing residential properties immediately opposite the development site located on Vincent Street/Vincent Place, and in the future there is likely to be residential properties located on the cattle market site.

6.36 SSDC has investigated air quality within its area as part of its responsibilities under the local air quality regime. It concluded in 2002 that a number of areas within Yeovil would not be able to meet the annual mean objective for nitrogen dioxide by 2005, and as a result the Yeovil Air Quality Management Areas (AQMA) was declared. The AQMA comprises *"the whole of the built-up area of Yeovil....and the main road network in and around the town."* The proposed development site therefore lies within the AQMA. In terms of PM_{10}, SSDC concluded that there are no likely exceedences of the 2004 objectives.

6.37 SSDC operate an automatic air quality monitoring station (AQMS) located at a roadside site alongside the A37 close to the Fiveways Roundabout. The automatic monitor measures nitrogen dioxide concentrations and the site is located less than a kilometre north of the proposed development. Monitoring of nitrogen dioxide is also carried out within Yeovil using diffusion tubes prepared and analysed by Gradko (50% TEA in acetone). Results are presented for those tubes within around 700 m of the proposed development site, and in particular, those adjacent to roads which have been included within the transport assessment.

6.38 Nitrogen dioxide concentrations measured during 2006 are summarised in Table 6.6. Annual mean concentrations at the sites closest to the proposed redevelopment are below the air quality objective. However concentrations measured at Ilchester Road (lamppost) and at Fiveways roundabout exceeded the objective in 2006. The Ilchester Road monitoring site is outside of the area for which traffic data have been provided, and thus it is not possible to assess the impact of the development on concentrations at this location. However, impacts closest to the development will be greatest and therefore any impacts at the Ilchester Road site will be smaller than those predicted at other locations close to the proposed development site.

6.39 Concentrations at the Fiveways site exceeded the annual mean objective in 2006 by a significant margin, however, the concentration at the Fiveways Flats site, which is located on the façade of the building closest to the junction of Kingston and the Roundabout, remained below the objective.

Table 6.6: Summary of Nitrogen Dioxide (NO_2) Monitoring Data

Site	Site Ref	2006 Annual Mean (µg/m^3)
Automatic Monitoring Data		
Yeovil AQMS	Yeo 15X	25.4
Diffusion Tube Data[a]		
Fiveways	Yeo 7	***56.0***
Ilchester Rd (lamppost)	Yeo 11	**42.6**
98 Ilchester Rd	Yeo 12	29.3
Maternity Unit	Yeo 13	30.8
Sparrow Road	Yeo 17	30.5

Wyndam St	Yeo 102	32.9
Bus Station	Yeo 204	28.9
73 Sherborne Road	Yeo 401	33.8
Hillside Residential Home	Yeo 402	29.7
Fiveways Flats	Yeo 407	*36.7*
Objective		**40**

[a] A bias adjustment factor of 1.06 has been applied to the raw diffusion tube data, calculated from a collocation study carried out using triplicate tubes deployed alongside the Yeovil AQMS. The factor presented in the database provided on the Review and Assessment Helpdesk website (version 03/07) for Gradko 50% TEA in Acetone tubes on 2006 is 1.04 (based on 10 studies). Therefore the application of the local factor provides a worst-case assessment of concentrations. Concentrations in bold represent exceedences of the annual mean objective; concentrations underlined are based on fewer than 9 months of monitoring data.

6.40 PM_{10} concentrations were also monitored at the Yeovil AQMS monitoring site during 2006 using a TEOM, and are summarised in Table 6.7. Both the annual mean and daily mean PM_{10} objectives were met in 2006 at this monitoring location.

Table 6.7: Summary of PM_{10} Monitoring Data[a]

Site	Site Type	2006	
		Annual Mean ($\mu g/m^3$)	No. days >50$\mu g/m^3$
Yeovil	Roadside	24.9	3
Objective		**40**	**35**

[a] Gravimetric equivalent

6.41 In addition to these locally measured concentrations, estimated background concentrations for the proposed development site have been obtained from the national maps (Table 6.8).

Table 6.8: Estimated Annual Mean Background Pollutant Concentrations ($\mu g/m^3$)

Year	NOx	NO_2	PM_{10}
2007	22.1	17.5	19.9
2010	20.0	16.7	18.9
Objectives	-	**40**	**40**

6.42 The ADMS roads model has been used to predict baseline concentrations of nitrogen dioxide and PM_{10} at each of the receptors identified in Table 6.5. The results, covering both existing baseline and future year baseline (without development), are set out in Tables 6.9 and 6.10.

Table 6.9: Modelled Annual Mean Baseline Concentrations of Nitrogen Dioxide ($\mu g/m^3$)

Location	2007	2010
Receptor 1	28.0	25.5
Receptor 2	25.7	23.6
Receptor 3	28.3	25.8

Receptor 4	27.7	25.3
Receptor 5	27.7	25.3
Receptor 6	23.4	21.6
Receptor 7	33.1	29.8
Receptor 8	35.3	31.7
Receptor 9	24.4	22.4
Receptor 10	31.9	28.5
Receptor 11	24.7	22.7
Receptor 12	26.6	24.3
Receptor 13	30.2	27.3
Receptor 14	29.2	26.5
Receptor 15	28.4	26.0
Receptor 16	29.4	26.7
Receptor 17	24.0	22.2
Receptor 18	25.9	23.8
Receptor 19	32.3	29.4
Receptor 20	34.5	31.1
Receptor 21	32.8	29.6
Receptor 22	25.6	23.3
Objectives	**40**	**40**

Table 6.10: Modelled Baseline Concentrations of PM_{10} ($\mu g/m^3$)

Location	2007		2010	
	Annual Mean ($\mu g/m^3$)	No. days >50$\mu g/m^{3(a)}$	Annual Mean ($\mu g/m^3$)	No. days >50$\mu g/m^{3(a)}$
Receptor 1	21.2	5	19.9	3
Receptor 2	20.8	4	19.6	3
Receptor 3	21.2	5	19.9	3
Receptor 4	20.9	5	19.7	3
Receptor 5	21.0	5	19.7	3
Receptor 6	20.6	4	19.4	3
Receptor 7	21.6	6	20.2	4
Receptor 8	21.8	6	20.4	4
Receptor 9	20.6	4	19.4	3
Receptor 10	21.5	5	20.1	4
Receptor 11	20.6	4	19.5	3
Receptor 12	20.3	4	19.2	2

Receptor 13	20.5	4	19.3	3
Receptor 14	20.4	4	19.3	3
Receptor 15	20.3	4	19.2	2
Receptor 16	20.8	4	19.7	3
Receptor 17	20.0	3	19.0	2
Receptor 18	20.3	4	19.3	3
Receptor 19	21.3	5	20.0	3
Receptor 20	21.5	5	20.2	4
Receptor 21	21.5	5	20.2	4
Receptor 22	20.7	4	19.5	3
Objectives	**40**	**35**	**40**	**35**

[a] Estimated from the relationship with the annual mean concentration described in Defra (2003b).

6.43 The predicted annual mean concentrations of nitrogen dioxide are below the objectives at all receptors in 2007 and 2010. The predicted annual mean concentrations of PM_{10} are well below the objective in both 2007 and 2010. The numbers of days above 50 $\mu g/m^3$ are also well below the objective at all receptors.

6.44 These results are consistent with the monitoring data for the area which measured no exceedences in 2006, apart from at two locations at the outskirts of the study area.

Operational Impacts

Road Traffic Impacts

6.45 Predicted annual mean concentrations of nitrogen dioxide and PM_{10} and days with PM_{10} >50 $\mu g/m^3$ are set out in Table 6.11, for both the "Without Development" and "With Development" scenarios.

Table 6.11: Predicted Concentrations of Nitrogen Dioxide (NO_2) and PM_{10} in 2010

Location	2010 Without Development			2010 With Development		
	NO_2	PM_{10}		NO_2	PM_{10}	
	Annual Mean ($\mu g/m^3$)	Annual Mean ($\mu g/m^3$)	No. days >50 $\mu g/m^3$[a]	Annual Mean ($\mu g/m^3$)	Annual Mean ($\mu g/m^3$)	No. days >50 $\mu g/m^3$[a]
Receptor 1	25.5	19.9	3	25.6	19.9	3
Receptor 2	23.6	19.6	3	23.7	19.6	3
Receptor 3	25.8	19.9	3	25.9	19.9	3
Receptor 4	25.3	19.7	3	25.4	19.7	3
Receptor 5	25.3	19.7	3	25.4	19.7	3
Receptor 6	21.6	19.4	3	21.6	19.5	3
Receptor 7	29.8	20.2	4	29.9	20.2	4
Receptor 8	31.7	20.4	4	31.6	20.4	4
Receptor 9	22.4	19.4	3	22.4	19.4	3
Receptor 10	28.5	20.1	4	29.2	20.2	4

Receptor 11	22.7	19.5	3	22.7	19.5	3
Receptor 12	24.3	19.2	2	24.2	19.2	2
Receptor 13	27.3	19.3	3	26.9	19.3	3
Receptor 14	26.5	19.3	3	26.4	19.3	3
Receptor 15	26.0	19.2	2	25.8	19.2	2
Receptor 16	26.7	19.7	3	26.6	19.7	3
Receptor 17	22.2	19.0	2	22.0	19.0	2
Receptor 18	23.8	19.3	3	23.6	19.3	3
Receptor 19	29.4	20.0	3	29.1	20.0	3
Receptor 20	31.1	20.2	4	31.1	20.2	4
Receptor 21	29.6	20.2	4	29.6	20.2	4
Receptor 22	23.3	19.5	3	23.5	19.5	3
Objective	**40**	**40**	**35**	**40**	**40**	**35**

[8] Estimated from the relationship with the annual mean concentration described in Defra (2003b).

6.46 Predicted concentrations of nitrogen dioxide remain below the objective at all receptors in 2010, whether the proposed development proceeds or not. Predicted concentrations of PM_{10} remain well below the objective at all receptors, whether the development proceeds or not.

6.47 The changes in annual mean concentrations and days with PM_{10} >50 $\mu g/m^3$ brought about by the development are presented in Table 6.12. The incremental changes in annual mean nitrogen dioxide are very small or extremely small for all receptors, whilst for PM_{10} concentrations there is predicted to be an extremely small change in concentration. Using the criteria set out in Table 6.4, the impacts on nitrogen dioxide concentrations are negligible at all receptor locations. The development is judged to have a negligible impact on PM_{10} concentrations at all receptors. The impact of changes to traffic flows will be even smaller further from the site.

Deleted: , apart from at Receptor 20, where the impact is judged to be slight adverse

Table 6.12: Percentage Change in Predicted Concentrations Between the 'With Development' and 'Without Development' Conditions in 2010

Location	NO_2	PM_{10}	
	Annual Mean ($\mu g/m^3$)	Annual Mean ($\mu g/m^3$)	No. days >50 $\mu g/m^3$
Receptor 1	0.5%	0.1%	0
Receptor 2	0.4%	<0.1%	0
Receptor 3	0.1%	<0.1%	0
Receptor 4	0.3%	<0.1%	0
Receptor 5	0.2%	<0.1%	0
Receptor 6	0.1%	<0.1%	0
Receptor 7	-0.3%	<0.1%	0
Receptor 8	-0.5%	<-0.1%	0
Receptor 9	-1.0%	-0.1%	0
Receptor 10	-0.8%	<-0.1%	0
Receptor 11	-0.5%	<-0.1%	0
Receptor 12	-1.6%	-0.1%	0

Receptor 13	0.2%	<0.1%	0
Receptor 14	-0.6%	<-0.1%	0
Receptor 15	-0.4%	<-0.1%	0
Receptor 16	<-0.1%	<0.1%	0
Receptor 17	<-0.1%	<0.1%	0
Receptor 18	0.6%	0.1%	0
Receptor 19	0.2%	<0.1%	0
Receptor 20	0.1%	0.6%	0
Receptor 21	-0.4%	<-0.1%	0
Receptor 22	<0.1%	<0.1%	0

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Based on un-rounded values; negative values represent a relative improvement with the development in place.

Construction Impacts

6.48 The site is currently occupied by the existing Quedam Centre multi-storey car park and Vincents garage site (including showroom and service centre).

6.49 There will be a requirement to demolish the buildings before construction commences. The greatest potential for construction impacts is likely to be from the initial phase of demolition and site preparation, including excavation, and from the passage of vehicles travelling across unpaved ground during periods of dry weather. There is also the potential for dust emissions during the handling of dusty materials and the cutting of stone/concrete. Dust may also be tracked out of the site onto the adjoining road network. The construction phase is expected to last around 30 months. Any impacts would be of a localised and temporary nature.

6.50 Assuming that standard mitigation measures are applied, the construction activities are judged to be "Major" in scale, based upon the criteria defined in Table 6.2. Thus, significant dust soiling impacts could occur within a distance of up to 100 metres from the source, whilst PM_{10} impacts could extend out to 25 metres.

6.51 Residential properties in Cecil Street, Vincent Street, Reckleford, Central Road and Earle Street, and retail/commercial units in Court Ash, North Lane, Silver Street, Middle Street, Central Road, and Reckleford lie within 100 m of the site boundary and may therefore be at risk of occasional dust-soiling impacts. No residential properties lie within 25 m of the site boundary, and therefore none are at risk of experiencing elevated PM_{10} concentrations.

6.52 Dust can be tracked out of construction sites onto neighbouring roads. This can then be raised as airborne dust by passing vehicles. With mitigation, it is considered that there is a potential for significant dust to be found along off-site roads up to 100 metres from the site entrance, with dust soiling impacts potentially extending up to 50 metres either side of these roads.

6.53 A number of additional properties on Earle Street, Middle Street and Reckleford lie within this area and may therefore occasionally be affected by dust soiling. Of these properties, none lie within 15 m of the roads along which dust trackout may occur, and therefore there are none at risk of experiencing elevated PM_{10} concentrations.

6.54 There are no areas of sensitive vegetation within 15 metres of the site boundary, and any significant impacts can be discounted.

6.55 Any potential for dust impacts would be highly dependent upon the weather, requiring dry conditions coinciding with activities creating dust at the site. Such conditions would only arise occasionally during the demolition and construction periods, further limiting the potential for any significant impacts.

Mitigation Measures

Operational (Road Traffic) Impacts

6.56 Mitigation measures to reduce pollutant emissions from road traffic are principally being delivered by the introduction of more stringent emissions standards, largely via European legislation. Additionally, the development leads to an improvement in air quality at a number of receptor locations due to a new junction allowing traffic to enter Market Street from the eastbound lane of Reckleford, rather than having to travel around the congested gyratory system (Reckleford/Sherborne Road/Wyndham Street). The assessment has not identified a need to apply any mitigation measures.

Construction Impacts

6.57 Measures to mitigate dust emissions would be required during the construction phase of the development in order to reduce impacts upon nearby residential properties. Guidance is available from the Building Research Establishment on controlling dust from construction sites (BRE, 2003), with Part 2 dealing with demolition and site preparation activities. This reflects best practice experience of dust controls and has been used, together with the professional experience of the consultant, to draw up the following set of measures that should, where practicable, be incorporated into the specification for the works. Mitigation should be straightforward, as most of the necessary measures are routinely employed as 'good practice' on construction sites. The measures are likely to include:

- Use of water-sprays to ensure that any unpaved routes across the site are maintained in a damp condition when in use. Use of consolidated surfaces close to residential boundary;
- Imposition and enforcement of a 5mph speed limit on unpaved ground;
- Hard surfacing of the proposed new access road at an early stage of the works;
- Minimising any dust generating activities on very dry or windy days;
- Sheeting of all lorries carrying materials on and off site;
- Location and/or covering of stockpiles as far from sensitive locations as possible, and provision of appropriate hoardings;
- Wherever practicable, off-road plant to use Ultra-Low Sulphur Diesel and be equipped with exhaust after-treatment;
- Regular cleaning of all paved areas on-site;
- Use of a jet-spray vehicle and wheel wash for all vehicles leaving the site;
- Regular use of a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site; and
- Use of water suppression during any cutting of stone or concrete

6.58 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

Cumulative Impacts of the envisaged cattle market development

6.59 This section provides a broad assessment of the cumulative impacts of the possible development of the cattle market site. It is based on the South Somerset District Council's Market Street Area Development Brief ("the Brief") (2007), as there is no current planning application for this development and therefore detailed plans for the possible redevelopment are not available. The Brief details Council's aspirations for cattle market site and designates the majority of the site for residential use, with retail at street level along Market Street. The primary vehicle access to the site is designated from the Central Road/Market Street roundabout. Council envisages building heights on the cattle market site ranging from 4 to 9 storeys.

6.60 The proposed development would lead to changes in traffic flows on the local roads which may impact on air quality for existing residential properties, and for future envisaged residential properties on the cattle market site. The impact of the

proposed development has been assessed at two locations within the cattle market site. These are located adjacent to Reckleford and Market Street. The locations of these receptors were guided by the site layout options provided in the Brief. Currently the envisaged cattle market development is not committed development and therefore it is unclear whether there will be any residential development on the site by 2010. Assessing the impact of the proposed development on locations within the cattle market site for 2010 is therefore a wost-case assessment, as air quality is predicted to improve in future years as continuing improvements in vehicle technologies give rise to lower emissions.

6.61 Predicted concentrations of nitrogen dioxide and PM_{10} remain below the relevant objectives in 2010, at both of the cattle market site receptors, whether the proposed development proceeds or not. The proposed development is predicted to result in an extremely small decrease in concentrations at the receptor closest to Reckleford, and an extremely small increase in concentrations at the receptor closest to Market Street. These changes are judged to be negligible.

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6.62 Traffic data used in the air quality assessment for 2010 do not include any additional movements generated by the cattle market site. The inclusion of any additional traffic is unlikely to lead to exceedences of the objectives at any of the 20 existing receptors assessed within the report. Predicted concentrations in 2010 (with or without the proposed development) are well below the objectives at 18 of the receptors, and the highest concentration at the other two receptors is 31.7 $\mu g/m^3$.

Residual Impacts and Conclusions

6.63 The air quality impacts associated with the construction and operation of the proposed extension to the Quedam Centre, Yeovil have been assessed. Yeovil has been declared as an AQMA for nitrogen dioxide and thus the site lies within an AQMA. Existing monitoring for nitrogen dioxide within a kilometre of the proposed development show that concentrations are currently breaching the annual mean air quality objective at a number of locations, however at the majority of sites, the objective was met in 2006.

6.64 The operational impacts are principally those associated with road traffic emissions. The impact of traffic emissions arising from changes to the traffic flows on the local roads due to the development has been assessed. Concentrations have been modelled for twenty worst-case receptors, representing existing properties where impacts are expected to be greatest, and for two additional locations on the cattle market site which have the potential to comprise residential development in the future.

6.65 It is concluded that concentrations of nitrogen dioxide would be below the objective at all receptors representative of worst-case exposure in 2010, whether the development proceeds or not. PM_{10} concentrations are predicted to be well below the objective, with or without the development in place. This is broadly consistent with monitoring carried out in 2006 at locations closest to the proposed development site.

6.66 The proposed scheme would increase traffic volumes on some local roads and decrease it on others. This is reflected in very small and extremely small increases and decreases in nitrogen dioxide and PM_{10} concentrations, and the impact is judged to be negligible for nitrogen dioxide and PM_{10} concentrations at all receptors.

Deleted: but one receptor, where a slight adverse impact on nitrogen dioxide concentrations is predicted

6.67 The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emission. The qualitative assessment of construction impacts carried out has assumed that the standard mitigation set out in paragraph 6.57 is put in place. Even with these measures in place, there remains a risk that a number of existing off-site properties might potentially be affected by occasional dust soiling impacts, however none would be at risk of experiencing elevated PM_{10} concentrations. Any dust soiling impacts will be temporary and any events will be infrequent. The risk of dust impacts will depend on the coincidence of certain weather conditions with dust raising activities close to a residential property.

Summary of Likely Impacts

Issue	Description of Effect	Geographical Significance I	N	R	D	L	Effect	Mitigation	Significance	Duration
Air Quality	Release of dust and particulate matter / emissions from construction vehicles and plant.					*	Adverse.	Standard mitigation described in paragraph 1.55.	Minor adverse	Short term
	Reduced local air quality arising from additional traffic at a number of receptor locations.					*	Adverse	No specific mitigation identified.	Negligible.	Long term
	Improved local air quality arising from a reduction in traffic at a number of receptor locations.					*	Beneficial	Beneficial effect, therefore no mitigation required.	Negligible	Long term

Deleted: Minor adverse to

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Glossary

Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal.
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date, taking into account costs, benefits, feasibility and practicality. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides.
Exceedence	A period of time where the concentration of a pollutant is greater than the appropriate air quality objective.
AQMA	Air Quality Management Area
ADMS Roads	Atmospheric Dispersion Modelling System for Roads
TEOM	Tapered Element Oscillating Microbalance.
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometers in aerodynamic diameter.
NO_2	Nitrogen dioxide.
NO	Nitric oxide.
NOx	Nitrogen oxides (taken as NO + NO_2).
$\mu g/m^3$	Microgrammes per cubic metre.

Appendix 1 – Model Verification

Nitrogen Dioxide

1.62 Most nitrogen dioxide (NO_2) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides ($NOx = NO + NO_2$). The model has been run to predict annual mean road-NOx concentrations during 2007 at the diffusion tube monitoring locations and the automatic monitoring site that lie within the traffic network modelled within the transport assessment. These sites are YEO 13 (Maternity Unit), YEO 15 (Air Quality Monitoring Station, Kingston), YEO 102 (Wyndham Street) and YEO 401 (73, Sherborne Road).

1.63 The diffusion tube monitoring sites at the Fiveways roundabout have not been included in the model verification, as these sites lie at the edge of the traffic data provided, and traffic flows for all arms of the Fiveways roundabout have not been provided. In addition, the bus station diffusion tube has been omitted from the model verification. This site will be affected by the buses waiting in the station with their engines running. It has therefore not been possible to take this into account accurately within the model.

1.64 The model outputs of road-NOx (i.e. the component of total NOx coming from road traffic) have been compared with the measured road-NOx. Total measured NOx was calculated from the measured NO_2 concentrations at each of the monitoring locations (which were initially projected from 2006 to 2007 using future year projection factors available from Defra, 2007b) using the recently updated NOx from NO_2 calculator[1]. The measured road-NOx contribution was then calculated as the difference between the total and the background value.

1.65 A primary adjustment factor was then determined as the inverse of the slope of the best fit line between the calculated (measured) road contribution and the model derived road contribution, and forced through zero. This adjustment factor was applied to the modelled road-NOx concentration for each receptor to provide an adjusted modelled road-NOx concentration. The appropriate background concentration was added to these concentrations to determine the adjusted total modelled NOx concentration. The road contribution to the total annual mean nitrogen dioxide concentration was then determined from these adjusted modelled concentrations, following the method set out by Defra (2003b), taking into account the most recent guidance (Defra, 2007c):

$$NO_2 \text{ (road)} = NOx \text{ (road)} \times (-0.0719 * LN(NOx(total)) + 0.6248$$

1.66 The total nitrogen dioxide concentration was then determined by adding the background NO_2 concentration to this calculated road contribution. A secondary adjustment factor was finally calculated as the inverse of the slope of the best fit line applied to the adjusted data and forced through zero.

1.67 The following primary and secondary adjustment factors have been applied to all modelled data presented in this report:

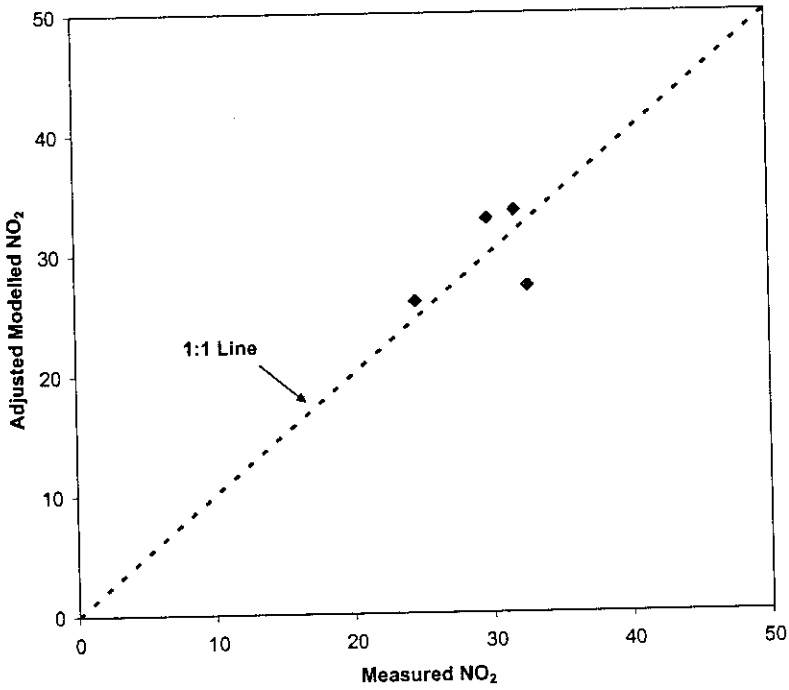
Primary adjustment factor: 3.671

Secondary adjustment factor: 0.962

1.68 The results imply that the model was under-predicting the road-NOx contribution. This is a common experience with this and most other models. The final NO_2 adjustments are minor. Figure A1.1 compares the modelled concentrations at each diffusion tube, after all adjustments have been made, to the measured concentrations at these locations.

[1] http://www.airquality.co.uk/archive/laqm/tools/NOxfromNO2calculator2007.xls

Figure A1.1: Comparison of Measured NO_2 to Fully Adjusted Modelled NO_2 Concentrations



PM_{10}

1.69 Whilst the automatic monitoring station on Kingston also monitors PM_{10}, it was deemed more appropriate to apply the primary adjustment factor determined for nitrogen oxides (as described above) to the predicted PM_{10} concentrations. This factor (3.671) was based on the comparison of a number of sites, and is therefore considered more accurate than a factor calculated using data for only one site. The primary adjustment factor used to adjust the modelled nitrogen oxides data has therefore been applied to all PM_{10} data presented in this report.