Project:	**Swale Renewable Energy & Sustainable Development Study**	Job No:	**60199088**
Subject:	**Addendum 2: Transport Carbon Assessment**		
Version	**1**	Date:	**04 April 2012**

1 Introduction

1.1 Aim

This note provides a high level summary of transport and carbon emissions as part of the Swale Renewable Energy & Sustainable Development Study (November 2011). The aim is to provide context around current and forecast traffic levels and their relationship to carbon emissions and set out the next steps to exploring and estimating local emissions.

Following this introduction, there are sections covering:

- national guidance and the policy context;
- local estimates of carbon emissions compared to regional and national estimates;
- traffic forecasts in Swale; and
- conclusions and next steps.

2 National Context

The Climate Change Act established a legally binding target to reduce the UK's greenhouse gas emissions by at least 80% below base year levels by 2050. The Act introduced a system of carbon budgets which provide legally binding limits on the amount of emissions that may be produced in successive five-year periods, beginning in 2008. The first three carbon budgets were set in law in May 2009 and require emissions to be reduced by at least 34% below base year levels in 2020. The fourth carbon budget, covering the period 2023–27, was set in law in June 2011 and requires emissions to be reduced by 50% below 1990 levels.

The Government's 'Carbon Plan – Delivering our low carbon future' (December 2011) sets out the Government's policies and the context behind those in meeting its carbon commitments.

Domestic transport emissions make up approximately a quarter of UK emissions. Most of those emissions come from the oil-based fuels used in road transport. Transport emissions are roughly the same as they were in 1990. Emissions rose before 2007 as the economy grew and transport demand increased, but have since fallen due to improvements in new car efficiency, an increased uptake of biofuels and the recent economic downturn.

Over the next decade, average emissions of new cars are set to fall by around a third, primarily through more efficient combustion engines, with sustainable biofuels also expected to deliver large emissions reductions. During the 2020s, the Government anticipates moving towards the mass market roll-out of ultra-low emission vehicles, although further improvements in the efficiency of conventional vehicles and sustainable biofuels are also anticipated to play a key role.

To support people to make lower carbon travel choices, such as walking, cycling or public transport, the Government is also providing a £560 million Local Sustainable Transport Fund over the next few years.

However, although average carbon emissions per vehicle are forecast to fall significantly, in particular as more new cars come onto the market and replace older models, traffic levels are forecast to increase, negating a significant proportion of this decrease.

Results from the Department for Transport's National Transport Model's central case suggest that by 2035 road traffic is forecast to be 44% higher than the level in 2010 and CO_2 emissions are forecast to decline by around 9%. **Figure 1** illustrates the key results for road traffic, CO_2 and air pollutant emissions.

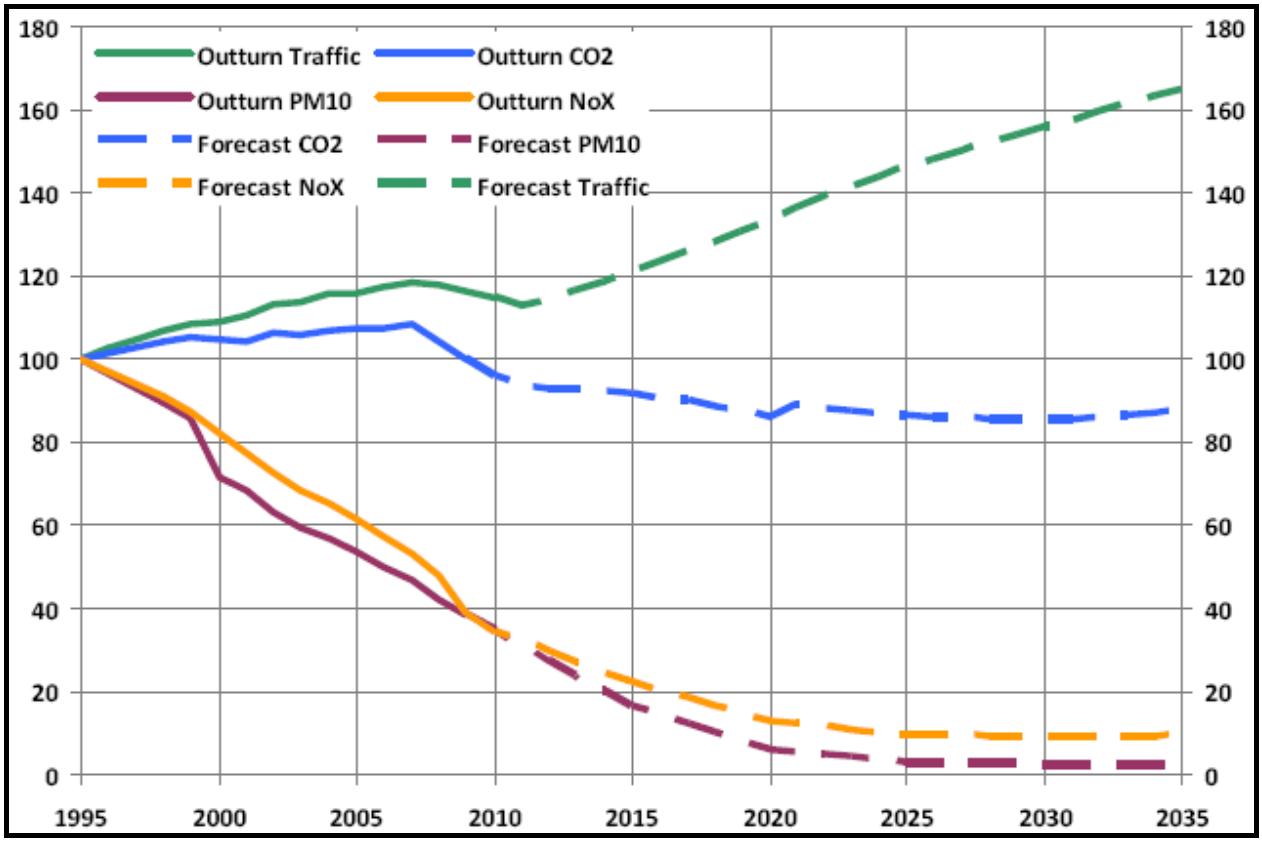

Figure 1: Historic and Forecast Traffic and Emissions, England. Source: NTM 2011, DfT Statistics, NAEI; *Road Traffic Forecasts 2011: Results from the Department for Transport's National Transport Model* (January 2012).

3 Local Context

Transport emissions made up about 21% of carbon emissions in Swale in 2009 (DECC 2009 National Statistics on Carbon Dioxide emissions at Local Authority and Regional level), slightly higher than the average of 19% in the previous 4 years. However, it is significantly less than both the Kent and national proportions of 33% and 27% respectively, as can be seen in **Table 1**.

Table 1 takes into account all the emissions that occur within the boundaries of each local authority; however, the figures in **Table 2** exclude certain emissions, which it has been considered local authorities

are unable to directly influence[1]. Taking this measure from DECC, the total proportion of local road emissions decreases to 17% of local emissions. In practice, there may be through traffic that does not use motorways and locally generated traffic may use the motorways, but the distinction provides a high level view on the extent to which the Local Authority in question might be able to influence emissions.

Table 1: Highways CO_2 emissions estimates compared to emissions from all sectors (kt CO_2)[2]

Area	Year	Local Road Total	Motorways	Road Total incl. motorways	Total emissions all sectors	Road % of total emissions
Swale	2009	181	146	**327**	**1,533**	21%
Kent	2009	2,207	1,215	**3,421**	**10,438**	33%
National	2009	96,828	27,682	**124,510**	**454,969**	27%

Table 2: Local highways CO_2 emissions estimates compared to local emissions from all sectors (kt CO_2)[3]

Area	Year	Road Transport (A roads)	Road Transport (Minor roads)	Road Transport Other	Local Road Total	Total local emissions all sectors	Road % of total local emissions
Swale	2009	105	74	1	**181**	**1,047**	17%
Kent	2009	1,377	818	12	**2,207**	**8,349**	26%
National	2009	55,103	41,248	477	**96,828**	**392,872**	25%

The annual per capita highways emissions for Swale are slightly higher than the Kent average (2.48t per person compared to 2.42t in Kent and 2.01t nationally in 2009). However, taking into account the DECC figures for local emissions that exclude motorways, the Swale per capita figures reduce to 1.37t per person compared to 1.56t in Kent and 1.57t nationally.

4 Traffic and Carbon Emissions

This section provides a brief summary of the issues regarding forecast traffic levels and how these might impact on carbon emissions. It is not intended to be definitive, but to illustrate how carbon emissions might vary given different conditions and what role the Council might play in influencing these.

Kent County Council and Swale Borough Council commissioned the development of a VISUM transport model to forecast traffic levels in 2031 (in the morning and evening weekday peaks). High level headline results were made available to the Swale Renewable Energy & Sustainable Development Study team[4].

[1] Source: DECC Local and regional CO_2 emissions estimates for 2005-2009.

[2] *Ibid*.

[3] *Ibid*.

[4] Jacobs (July 2011) *Swale VISUM Model: LDF Option 1 Forecasting Report (Draft)*; Jacobs (October 2011) Presentation: *Swale VISUM Transport Model 2 - Swale Core Strategy Second Option Forecasting Report: Preliminary Results*; and summary provisional results and notes extracted from VISUM 2 and provided to AECOM by Swale Borough Council. These should be consulted for commentary on the limitations of the modelling and caveats on the results.

The headline conclusions were that highway growth would increase by about 30-35%[5] and congestion would remain a significant problem, increasing by about 25-30%, with the evening peak forecast to be marginally worse than the morning peak.

All else being equal, an increase in car traffic levels of this magnitude would still result in a *decrease* in CO_2 emissions of about 10%[6], broadly in line with national estimates[7] over the next fifteen to twenty years. However, it should be noted that an increase in congestion acts to decrease average speeds and may have a significant impact on fuel efficiency depending on the average speeds involved. If these decrease away from the optimum level this negates some of the benefit of improved fuel efficiency in the future. For example, if the increased traffic levels were associated with a decrease in average speed from, say, 50 kph to 35 kph, the net effect might be to cancel out the improvement in fuel efficiency and CO_2 emissions would remain largely unchanged.

Congestion levels are forecast to increase by about 30%, and as such average speeds are also likely to decrease somewhat. Congestion also increases stop-start conditions, which decreases fuel efficiency and hence results in a relative increase in CO_2 emissions compared to smooth flow conditions.

A summary table of journey time speeds from the VISUM model indicated a 32% reduction in speed in 2031 (for the Preferred LDF Option) on the A249 / A2050 circular route–Sheerness from 38kph to 26kph. Combined with an increase in traffic the net effect might be a small increase in overall CO_2 emissions for this route relative to the base year.

However, it is important to stress that increased congestion is not necessarily reflected by a concomitant change in speed nor a linear change in emissions, as it is dependent on what the actual base year and forecast speeds are. Furthermore, the change in emissions is dependent on the vehicle mix, as some vehicle types, such as HGVs, may have more gradual improvements in fuel efficiency than cars and LGVs; additionally, the take up of new cars and technology may be slower in some areas than others. The Swale VISUM Modelling Report indicated that car traffic would increase by about 28% and 26% (am and pm peaks respectively), LGVs would increase by about 34% and 37% and HGVs would increase by about 26% and 20%.

In the case of HGVs and LGVs there is significant growth forecast in through trips (66% for LGVs and 29% for HGVs) compared to growth within the study area. Although a low proportion of overall traffic, HGVs contribute disproportionately to emissions.

The reports and commentary from the VISUM modelling work make some pertinent points:

- The new schemes, such as the Sittingbourne Northern and Southern Relief Roads (SNRR and SSRR respectively), result in traffic relief in the town centre, in spite of the additional development and growth planned for Swale.
- Depending on the scale and direction of development, growth in traffic will be concentrated on the strategic road network (M2, A249, SNRR and SSRR).

[5] 30% is cited in the report Jacobs (July 2011) *Swale VISUM Model: LDF Option 1 Forecasting Report (Draft)*; 35% was cited in a subsequent presentation made available to the study team.

[6] The change in CO_2 emissions is dependent on which assumptions are used e.g. DfT and webTAG values, the Emissions Factor Toolkit etc and how, for example, biofuels are addressed. The values here are illustrative only.

[7] One difficulty is that the numbers relate to am and pm peak periods only (not unusual in highways models). Further work might be required to understand the possible changes to interpeak and off-peak (including weekend) trips and thus impacts on carbon emissions.

- Major roads take up most of the increase in traffic in the am and pm peaks, which benefits minor roads and the town centre. However, roads in the town centre are still busy, such as the Crown Quay Lane Corridor and the A2.
- The overall increase in traffic will result in a large increase in congestion.

The town centre regeneration will change traffic flows within the town, but the net result is not expected to increase the overall volume of traffic travelling into the centre[8]. The impacts of increased traffic and congestion may be mitigated by 'peak spreading' with traffic spreading out temporally to cope with restricted network capacity. Local Authorities can encourage peak spreading, car sharing, public transport use etc, and there are a variety of social and technological measures (such as alternate work schedules, telecommuting, variable parking charges (if they do not adversely impact on the vitality of the town centre) etc) that can be used or promoted and of which the Local Authorities will be well aware. Travel plans (for example for Kent Science Park) and an array of smarter choice measures may have positive impacts on local travel and engendering behavioural change[9].

The modelling indicates that there may be significant percentage increases in demand for travel by public transport, although this will remain a small proportion of total travel (about 7% for home based work trips) given the relatively low base demand at the moment (about 3%), and the overall impact will be marginal. Nevertheless, there may be scope to tie in targets on patronage and modal share with the new developments. This would complement the measures discussed in the Swale Renewable Energy & Sustainable Development Study on achieving a reduction in CO_2 emissions through new development and decoupling growth in the economy and growth in CO_2 emissions.

5 Next Steps and Links to the Core Draft Strategy

Road traffic contributes a significant proportion of the total carbon emissions in Swale (21%[10]), although lower than the Kent and national averages. Traffic is forecast to increase by about 30-35% and congestion by about 25-30%, although there is likely to be some traffic relief in the town centre depending on the highways developments and use of the relief roads.

Nationally, carbon emissions are expected to decrease by about 10% in spite of a 44% increase in traffic by 2035, and the high level figures provided in the various traffic models suggest a similar order of magnitude change for Swale, all else being equal. A decrease in carbon emissions might be achievable, but it will depend on the vehicle mix and proportion of HGVs (and buses), the impact of congestion on speed and stop-start conditions. Given the indicative range of changes in speeds and the possible change in vehicle mix, decreases in carbon emissions due to improved fuel efficiency might be negated on certain routes[11].

There are large increases in through traffic over which the Local Authority may have little influence. However, the Council has a much more significant role to play in addressing local traffic issues and traffic generated by new developments. There will be increases in traffic associated with the new developments, and the promotion of smarter choices and travel plans may help engender behavioural change and

[8] Draft Core Strategy pa. 5.6.21.

[9] See for example DfT (2010) *The Effects of Smarter Choice Programmes in the Sustainable Travel Towns*.

[10] 17% if only local emissions are counted (which for emissions from roads excludes motorways). DECC *Local and regional CO_2 emissions estimates for 2005-2009*.

[11] The ranges presented here are purely illustrative of possible outcomes, as there was limited data and supporting information made available in the timescales for this study. If further analysis or a more detailed appraisal is required to forecast carbon emissions from traffic, detailed outputs will be required from the traffic model, and it may be necessary to make assumptions on travel outside the modelled peak hours.

provide a framework with which to help decrease carbon emissions, although there may need to be concomitant investment in public transport and facilities to promote other modes, including walking and cycling where feasible. Decreasing carbon emissions to keep as far as practicable in line with the decreases inherent in improved fuel efficiency and vehicle technology will be particularly challenging given the scale of development and forecast traffic growth in the area. The national targets for carbon emissions are tough and transport as a whole may lag being some other sectors in achieving significant reductions.

One of the objectives of the **Sustainable Community Strategy** is to deliver an efficient, integrated, sustainable and multi-modal transport network capable of supporting a growing population and increased economic opportunity. The **Draft Core Strategy** (March 2012) cites transportation as playing a key role in the delivery of the spatial strategy, with new infrastructure helping to support economic growth by providing additional highway capacity and measures to promote equality of access to transport through an integrated and sustainable transport network. The key themes which the transport system will need to address include:

- supporting economic growth;
- promoting equality of independence;
- tackling climate change;
- contributing to safety, security and health; and
- improving the quality of life.

The Draft Core Strategy notes the complexities involved, in particular that success in delivering the spatial strategy will make further demands on the transport systems, especially the road network which comes under pressure at peak times. The spatial strategy, assisted by a Local Transport Strategy, will need to manage these demands with measures to reduce car use and manage transport demand more sustainably, for example through the sensible location of new development to:

- minimise the number and length of journeys people need to make for everyday needs;
- direct transport movements onto public transport and those part of the network where most capacity exists; and
- encourage walking and cycling[12].

Vehicle parking standards have a role to play. The Draft Core Strategy stresses that appropriate provision should be made so that the vitality of town centres is not undermined, but recognises that policies for parking standards in development plans should be used as part of a package of measures to promote sustainable transport choices, the efficient use of land, enable schemes to fit into urban sites, promote linked trips and access to developments for those without the use of a car, tackle congestion, take into account public transport accessibility and provide cycle parking.

The Draft Core Strategy underlines the importance of a balanced and integrated approach to development, regeneration and the environment, with Policy C5 setting out how this will be achieved, including:

- Locating new development in a way which minimises the need to travel and ensuring that it is well located in relation to public transport links and to promote its use through improved access to existing or new services;

[12] Swale Borough Council (March 2012) *Draft Core Strategy: Bearing Fruits* pa. 4.2.19.

- Working with partners to establish a Quality Bus Partnership for Swale which will deliver improved bus stop infrastructure and expansion of the bus network to serve new developments from the earliest stages of occupation and facilitate use of buses for commuting;
- Working with partners, the rail industry and developers to maximise use of rail services for passenger and commercial traffic and improve bus interchange; and
- Working in partnership with Kent County Council, developers and cycling groups to develop integrated walking and cycling routes to link existing and new communities with local services and facilities, public transport and the Green Grid network of recreation routes.

In addition, Policy DM15 sets out approaches to managing transport demand and impact, including:

- Development proposals generating a significant amount of transport movements will be required to support their proposal with the preparation of a Transport Assessment (including a Travel Plan);
- Development proposals should integrate air quality management and environmental quality into the location and design of and access to developments and demonstrate that proposals do not worsen air quality to an unacceptable degree;
- Development proposals should demonstrate that priority is given to the needs of pedestrians and cyclists, including the disabled,
- Development proposals should include facilities for charging plug-in and other ultra low emission vehicles on major developments.