Appendix B5.B – Experian Household and Population Estimates and Projections

To inform our audit we sought an external review of this study by an economist within Halcrow and conclusions were that CE's forecasts seem to have been made on a sound basis. The report below is for reference only, though it must be understood that these do not necessarily inform the Reporter's opinion.

Experian has provided Thames Water with projections of the total population and total number of households within the Thames Water supply area up to 2040. Forecasting population growth trends is by its nature an inexact science, and presents a range of methodological and practical challenges. Experian has produced a methodological guide to its projections, which sets out their approach to tackling these challenges. Halcrow has reviewed Experian's projections and the methodology adopted in producing them. The following is a summary of Halcrow's view on the projections.

Overview

Experian estimate the growth in population and household numbers since 2001, the date of the last UK census, and provide projections up to 2040. Experian have produced three forecasts: trend-based; policy-based; and most likely scenario. The trend-based forecast extrapolates existing trends in population and household growth until 2040, while the more sophisticated policy-based forecast takes into account pipeline housing developments and housing targets laid out in various spatial plans. The most-likely scenario forecast is an attempt to reconcile the policy- and trend-based forecasts, and forms Experian's headline prediction for population and household growth until 2040.

Forecasting is done at output area (OA) level, allowing Experian to tailor the geographic fit of their forecasts for each water resource zone (WRZ). Data from local and unitary authority district level (LAUAD), as well as regional and national levels, are used to calibrate OA level data. Output areas were the smallest area used in the 2001 census, and comprise at least 40 households.
Experian's estimates and forecasts are benchmarked from 2001, the date of the last census, as this is the last official and comprehensive population study to go down to OA level. More recent population estimates and projections, most notably the ONS' 2006 mid-year estimates and projections, only go down to sub-national level. This means that Experian must estimate changes in households and population at the OA level from 2001 to 2008, introducing degrees of uncertainty even before the forecasting begins.

Experian's methodology

Trend-based

Experian's trend-based population and household forecasts are based on existing ONS and CLG forecasts, and are refined to fit the exact geographic areas of the WRZs. Data at the OA level from the 2001 census is brought forward, and checked against LAUAD level data from the ONS' 2006 mid-year estimates and projections. As the ONS 2006 projections only go as far as 2031, national level projections are used up to 2040.

The number of households is derived from CLG projections for average household size. Household population is calculated by subtracting communal population from total population; communal population is held constant from 2001 to 2040. Household population is then divided by average household size (which is estimated at a regional level) to give household estimates. The 2004-based CLG projections show average household size steadily decreasing over time, but end in 2029; Experian has assumed representative rates remain constant after this date, but they continue to fall (albeit at a slower pace) due to "changing demographic structure."

Policy-based

Experian's policy-based forecasts use the housing allocations set out within Regional Spatial Strategies and other relevant spatial plans to forecast future household and population growth. Spatial plans include targets for new housing over the long-term; since planning authorities exercise a great deal of control over the level of expansion permitted within an area, it is important to incorporate policy considerations into population forecasts. Housing allocations in Regional Spatial Strategies end at 2026, and so Experian has tied the policy-based projection to the trend-based projection after this date.

As with the trend-based projections, the housing allocations from regional and sub-regional level have been divided up among OAs, allowing the policy-based projections to be applied to the WRZs. Household population has been calculated by multiplying the number of households by the CLG household representative rates for the district, and communal population added to find total population. The fact that housing allocations are mainly drawn up on a regional basis makes it hard to check them against Experian's forecasts, because the WRZs cut across regional boundaries.

Population Projections

Both the trend- and policy-based projections have been supplemented by information about housing developments currently in the pipeline. Data sourced from a leading demographic agency regarding the planning status of pipeline developments is used, and build probabilities are assigned to each house according to the stage in the planning process. This method updates household and population projections in each OA with information about current developments.

Bespoke spatial analysis

WRZ level projections are derived from OA level data using Alteryx 2.5 and Micromarketer. All OAs which fall fully within a WRZ are included, while where WRZs cut across OA boundaries, the OA is divided up by percentage.

Most likely scenario
Having produced trend- and policy-based projections, Experian seeks to draw the two together into a "most likely scenario," which represents Experian's view on how population and household numbers will change over time. This scenario is derived by first constraining the policy-based estimate to the trend-based population for England as a whole, and then setting the most likely scenario halfway between this constrained policy-based estimate and the trend-based estimate. The first part of this process seems somewhat controversial, and in the case of Thames Water, causes the most likely scenario to be above both the trend- and (unconstrained) policy-based estimates. The rationale behind constraining the policy-based forecast to the national trend is that policy is not fixed, but will adapt to national trends in the future. The implication of this is that, within the Thames Water WRZs, housing allocations will be upgraded in future to cater for the trend growth in household population in England.

Issues with Experian's methodology

To inform our audit we sought an external review of this study by an economist within Halcrow and conclusions were that CE's forecasts seem to have been made on a sound basis. It must be understood that the views expressed below are not necessarily the Reporter's opinion.

The following section outlines possible problems or issues with Experian's population and household forecasts identified by Halcrow, which may require further clarification.

Constrained policy-based estimate
Experian's most likely scenario projection hinges on "constraining" their policy-based projection to the national trend level. This process has a large impact on the overall result, but the methodological guide makes very little mention of the method behind constraining the policy-based estimate. Constraining the policy-based projection seems to undermine the original policy-based projection; in the case of Thames Water, this constraining process causes the most likely scenario to exceed both the trend- and policy-based projections, meaning it skews the headline population forecast considerably.

Constraining the policy-based projection for the Thames Water area in this way may not fit with the area's spatial context. Parts of the Thames Water area, particularly in London, are already heavily populated, and lack sufficient space for development of further housing. While housing allocations around

the country may be increased in future spatial plans bring policy in line with trend population growth, the Thames Water area may lack extra capacity to expand its housing stock. The area's high population may also cause the constrained policy-based projection to rise by a large amount; this large projected rise in the future housing allocation may reflect an arbitrary statistical imposition rather than the actual policy situation in the Thames Water area.

Thames Sewerage Area

Experian has not provided estimates or projections for the Thames Water sewerage area; Thames Water has had access to OA level data for all areas within the sewerage area from Experian. Thames Water has used its "Popsys" methodology to produce projections of household numbers and total population up to 2031 within the sewerage area. However, no details of the Popsys methodology is included, and it is not clear how the OA level data was converted to WRZ level.

Impact of economic conditions

Experian's methodological guide states clearly that their estimates and forecasts take no account of short-term fluctuations in the economy. They argue that long-term population trends even out over time, and that Environment Agency guidelines dictate that long-term population forecasts should not take economic fluctuations into account. However, the current severe economic downturn may have long-term effects on population and household growth beyond the duration of the economic downturn. In particular, migration and house building may be affected by the economic downturn; in the former case, economic migrants to the UK may return to their homeland, altering the long-term level of population, while the current turmoil and restructuring in the property markets and construction industry may limit the long-term capacity for building new houses in the UK. A report by Cambridge Econometrics, commissioned by Thames Water, highlights both of these factors, and downgrades Experian's forecasts for population and households due to the economic downturn. This stance suggests that there may be long-term implications for population and household numbers arising from economic fluctuations. It is worth noting that Appendix C of Experian's report highlights the effect that migration may have on average household size, and shows how average household size could have been calculated using the labour force survey, rather than being based on CLG projections. However, Experian's final projections take no account of fluctuations in the rate of migration, and assume an infinite capacity to increase the housing stock in the long-term.

Analysis of Experian's projections

Experian's "headline" projections (i.e. the most likely scenarios) show the total population of the Thames Water supply area increasing from 8,056,795 in

2006 to 10,197,890 in 2040. This marks an increase of 2,141,094 (26.58%) over 35 years, an average annual increase of 0.76%. By comparison, the trend-based estimate shows an average annual increase of 0.72%, and the policy-based estimate 0.66%.
Experian's projections (most likely scenario) show the number of households in the Thames Water supply area increasing from 3,390,156 to 4,667,217 between 2006 and 2040, an annual average of 1.08% increase. This method displays a faster rate of household growth than both trend-based (1.04% average annual increase) and policy-based (0.96%) methods.

It is hard to make a judgement on how accurate these projections are likely to be. The large time frame, along with the difficulty involved in estimating population and household numbers at all, mean that Experian's forecasts are meant as broad estimates rather than exact predictions. Indeed, even long-term government policy, as embodied in the Regional Spatial Strategies, can not be taken as a constant, which is an important consideration given the importance placed on policy in Experian's projections. Rather than attempt to support or dispute the figures for future population and household numbers provided by Experian, it will be more illuminating to analyse the differences between their different methods of projection, and compare Experian's projections with those provided by the ONS and CLG.

Figure 1 below compares the trend-based, policy-based and most likely scenario projections for household numbers in terms of the annual growth rate. There are several features to be noted:

1. Growth rates for all three measures are convergent before 2006, and after 2026; in the latter case, this is because housing allocations only go up to 2026. The period of divergence, between 2006 and 2026, is marked by vertical black lines in figure 1.

2. The policy-based projection is much smoother from year to year than the trend-based and most likely scenarios, reflecting the smoothing of housing allocations across time.

3. The policy-based projection is consistently lower than the other two projections between 2006 and 2026. This could either reflect housing allocations which are not sufficient to keep pace with the trend growth in household numbers, or it could reflect capacity constraints on house building which will limit household growth in the future.

4. The overall trend from 2006 to 2040 is for growth in household numbers to slow slightly over time, falling by around 0.2 to 0.3 percentage points over the period.

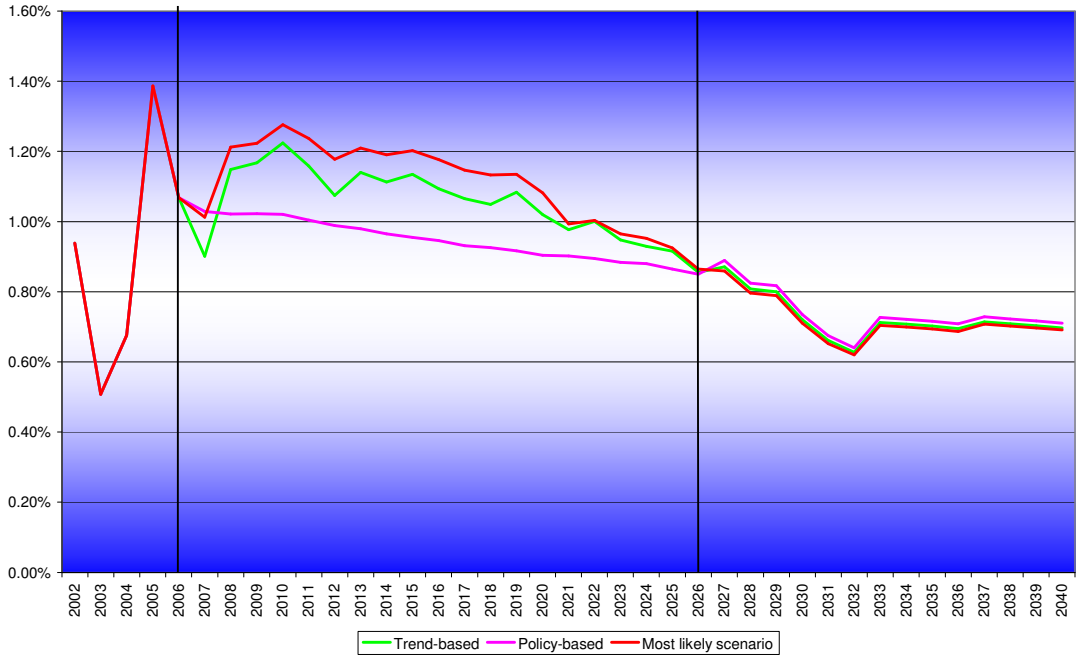

Figure 1: Experian's three projections for household numbers, annual growth percentage

Figure 2 below shows the annual growth rate for total population in the Thames Water supply area, according to all three of Experian's projection methods. As with figure 1 above, the main point to note is that the policy-based projection is consistently lower than the trend-based and most likely scenario projections. Again, this could either reflect underprovision of housing allocations, or capacity constraints on housing which could limit future population growth.

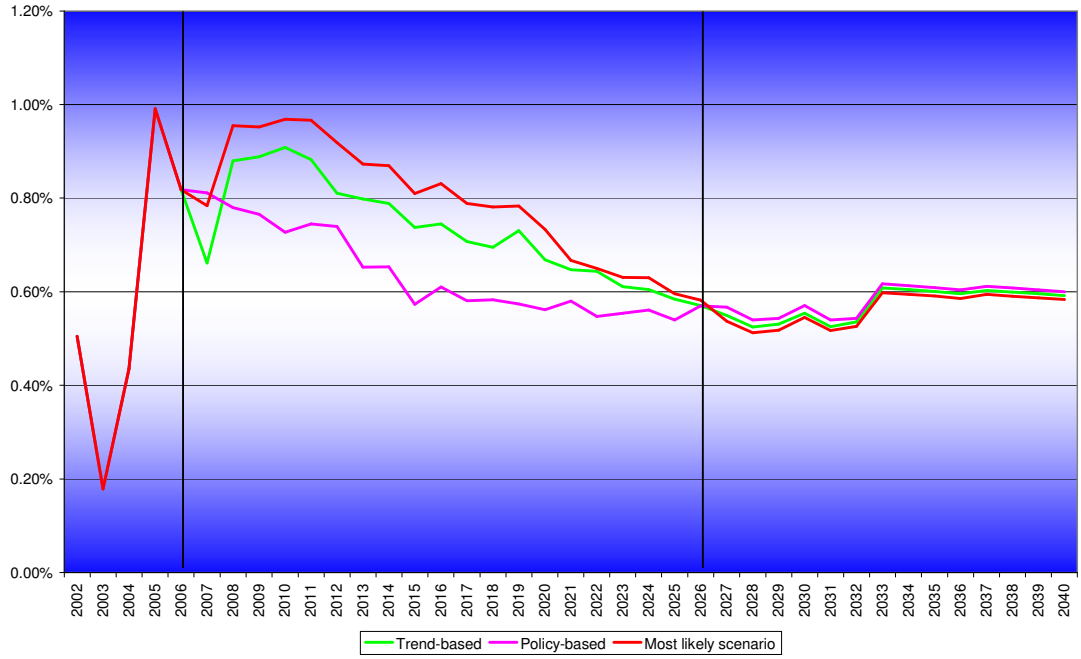

Figure 2: Experian's three projections for total population, annual percentage growth

Finally, it is worth considering how, under Experian's projections, total population growth in the Thames Water supply area compares to total population growth in England, as projected by the ONS. This comparison is important, because the national population projections from the ONS form a key part of Experian's method of constraining their policy-based projection. As of 2006, 15.77% of the population of England lives within the Thames Water supply area (this figure is derived from Experian and ONS forecasts). Under Experian's most likely scenario forecast, this percentage will increase to 16.00% by 2019. However, under the policy-based projection, the percentage will fall slightly to 15.61% by 2019, and will fall further, to 15.47% by 2030. The implications of this are clear; Experian's most likely scenario projects that the Thames Water supply area will grow faster than the nation as a whole. However, current policy provisions (which take a long term view) would see the share of England's population living in the Thames Water area fall. Therefore, in order for Experian's most likely projection to hold, there will have to be a significant upwards revision of the housing allocations set out for the Thames Water supply area in future London Plan and South East Regional Spatial Strategy documents. This is a large assumption, and one which can easily call into question the rationale behind Experian's methodology in arriving at their "most likely scenario."

Appendix B5.C – Cambridge Econometrics – A review of economic, population and property forecasts

To inform our audit we sought an external review of this study by an economist within Halcrow and conclusions were that CE's forecasts seem to have been made on a sound basis. The report below is for reference only, though it must be understood that these do not necessarily inform the Reporter's opinion.

The Cambridge Econometrics report "Assessment of Economic Downturn on Planned Properties and Population Growth" is split into three main sections: Prospects for Economic Growth; Outlook for Demographic Change; and the Housing Market. Accordingly, this review will deal with each section in turn.

Prospects for Economic Growth

This section updates the January 2008 economic forecasts made by CE (published February 2008) in the light of a worsening economic outlook. The section considers both the UK economy as a whole, and the economy of the Thames Water area.

UK Economy

CE's January forecasts for UK economic growth between 2008 and 2011 are significantly downgraded in the October forecasts, as a result of the increased severity of the global financial crisis. However, the report concludes that the current economic downturn will not affect the UK's underlying long-term growth trend.

Table 1 below shows how CE's October forecasts have been downgraded from their January levels. Most significant is the expectation of negative growth (-1.4%) during 2009, with the economy stagnating during 2010, and recovering slowly during 2011 before returning to its long-term trend rate. (Note: CE forecasts GVA rather than GDP; Box 1 below explains the difference between the two).

	2008	2009	2010	2011	2011 – 2015 (pa)	2016 – 2020 (pa)
October 2008	1.0%	-1.4%	0.2%	1.5%	2.9%	2.5%
January 2008	1.8%	2.4%	2.8%	2.6%	2.5%	2.7%

Table 1: CE's growth forecasts for January and October 2008 compared

The January forecasts represent those which have been used by Thames Water for investment planning.

In spite of the significant downgrading taking place in CE's October forecasts, recent evidence suggests that they may need downgrading further. Growth figures for the fourth quarter of 2008, released on 23rd January, showed a sharper-than-expected 1.5% decrease in GDP for the quarter (ONS). This weak fourth quarter performance brought the overall figure for GDP growth in 2008 down to 0.74% (ONS), which is substantially lower than the 1% forecasted by CE just three months before the end of the year. The contraction in Q4 2008 suggests that CE, like many other analysts, may have underestimated the detrimental effect that the global financial crisis has had on the UK economy. It appears likely that CE has underestimated the depth of the recession the UK economy is facing.

The contraction in growth for Q4 2008 was so severe that it has significant implications for forecasts for 2009 and beyond. The UK's GDP for Q4 2008 was at its lowest level since Q1 2007, and represented a 1.76% decline since the same quarter in 2007. If the UK were to achieve the same GDP from Q4 2008 in all four quarters of 2009, the average growth for 2009 would be -1.45% which is 0.05% lower than CE's forecast. However, this scenario would represent no further net contraction of the economy from its present state during 2009, which is out of line with most predictions. Therefore, it is probable that CE's forecast for 2009 remains too high.

It is more difficult to comment on CE's forecasts for 2010 and beyond, because they reflect a gradual economic recovery which is still widely expected. CE's forecasts for growth in 2010 (0.2%) are considerably lower than Eurostat's (2.45%) and the IMF's (2.24%). This reflects CE's view that the economic recovery will be slow, with growth below trend until 2012.

Perhaps the most contentious prediction made by CE is that the current economic downturn will not affect long-term growth rates. This prediction assumes that the current downturn is a short-term fall in aggregate demand, with no long-term effects on the economy. However, there has been significant restructuring of the UK economy in the wake of the economic downturn, most obviously in the banking sector, where several major companies have been supported by the government, some passing under state control. The government is also considering large-scale interventions in other markets, particularly in the manufacturing sector. The legacy of state intervention may reduce long-term growth trends, at least until the state is able to divest its stakes in private sector companies.

The banking sector is also likely to alter its lending habits, and to be subject to tighter regulation in future. This regulation may constrain financial innovation, while reducing levels credit available in the economy. Because of the broad importance of the banking and financial service sectors to the economy, both

in terms of providing credit and generating wealth, any long-term restructuring in this sector will inevitably affect long-term growth rates.

CE also makes qualitative forecasts for employment and inflation, but offers no precise figures in these areas. CE notes the sharp rise in inflation which occurred during 2008, but states that the inflationary risk has abated. This conclusion appears to have been corroborated by inflation statistics for December 2008 showing CPI inflation at 3.1%, down sharply from its peak at 5.2% in September 2008 (ONS). CE also notes that the inflation seen during 2008 has not caused significant wage pressures, possibly due to rising unemployment.

Meanwhile, CE states that unemployment is expected to continue falling throughout 2010 and 2011, which appears generally consistent with the lag normally observed between employment and output.

Box 1: CE's forecasts use Gross Value Added (GVA) as a measure of output rather than the more familiar GDP. GDP is more widely used to measure the overall performance of an economy, while GVA measures the contribution made to the economy by industries, and so can allow sectors of the economy to be compared. The two measures are broadly the same, but GVA does not include product taxes, such as VAT, and does include subsidies on products in its output accounting.

Thames Water area economy

CE forecasts that the Thames Water area will be affected more than the rest of the UK by the economic downturn. As for the UK, the October forecasts have significantly downgraded the growth prospects forecast in January. However, CE also predicts long-term growth trends in the Thames Water area above the UK-wide level. London is identified as the weakest area within the Thames Water area in the short-term, as it has been hit disproportionately by the downturn in financial services and commercial property sectors, although some of these effects have been offset by major infrastructure projects scheduled in the capital, including Crossrail and the 2012 Olympics.

CE may have underestimated the impact the economic downturn will have on the Thames Water area, especially in London. A report from the Centre for Economics and Business Research (CEBR) claims that London will be the worst hit area of the UK, with GVA likely to fall by as much as 3.4% in 2009 due to the capital's reliance on financial services. By contrast, CE forecasts that GVA in London will fall by just 1.5% in 2009.

While the text in CE's report talks about short-term growth slowing down much faster in the Thames Water area than across the UK, the figures provided in the report do not actually tally with this analysis. In fact, GVA for

the Thames Water supply area is forecast down 1.4% in 2009 (the same as the UK forecast), while it is down 1.3% in the sewage area. Given the pessimistic outlook for London coming from other sources, and London's importance to the Thames Water area's economy, it appears likely that CE forecasts display unfounded optimism.

Demographic Change

CE's population growth forecasts are based on ONS forecasts, but are updated to take account of the impact of the economic downturn on migration. The latest ONS population statistics considered in the report are for 2006, and so there is considerable scope for revising these.

CE predicts that the overall impact of the economic downturn will be to reduce population growth, due to its disincentive effect on inmigration. CE forecasts population growth of 0.5% per annum until 2020, significantly lower than the 0.7% per annum forecast from the ONS. These forecasts would mean population growth which is lower than the ONS forecast by 1.6 million in 2020, and lower by 712,000 in 2010.

These forecasts appear to be made on reasonable grounds, especially given that the ONS statistics were produced more than a year ago, during a time of economic prosperity. The main driver of slower population growth, according to CE, is a fall in inmigration caused by the economic downturn. The arguments made for this appear sound; falling employment in the UK reduces opportunities for migrants, while the construction sector, which has relied heavily on migrant labour from Eastern Europe, has been disproportionately affected. Meanwhile, the economies in the home countries of many migrants, particularly in Eastern Europe, are seeing real wages rise, and have been relatively less affected by the global financial crisis, causing many inmigrants to return to their home countries. Indeed, CE forecasts net outmigration from the UK of 26,000 in 2009 and 2010. CE also notes that outmigration from the UK is likely to be lowered by falls in house and asset prices, although this effect is likely to be dominated by the negative effects on inmigration.

CE notes that London and the South East are both the main destinations for inmigration, and the main sources of outmigration in the UK. Therefore, any change in population growth trends is likely to be magnified within the Thames Water area. CE forecasts that population in the Thames Water area will increase by 0.7% pa from 2006 to 2020, which is lower than the 0.9% pa that CE forecast in February, and lower than Experian's "Most Likely Scenario" forecast (also 0.9% pa).

CE's estimates for changes in the number of households use projections of average household size provided by the Department for Communities and Local Government (CLG). Using these projections, CE forecasts that the number of households in the Thames Water area will increase by 608,000

from 2006 to 2020, down from 731,000 in their February forecast. However, Experian's forecast is much lower at 492,000 extra households, which uses a slower fall in average household size than projected by CLG, and takes account of lower housing completions. The London Plan adopts a target for new housing provision of at least 23,000 a year, which was set by the Greater London Authority in 2000, while the 2006 South East plan targets 28,900 new houses per annum. This means that the target for the total stock of new housing across London and the South East by 2020 amounts to approximately 725,000. Given that the population of the Thames Water supply area is only around 51% of the total population of London and the South East combined, it appears highly unlikely that the existing targets will lead to an extra 608,000 new households being created in the Thames Water supply area, as CE forecasts. In order for CE's household forecasts to hold, housing allocations will need to be substantially upgraded.

The Housing Market

CE's forecast for the housing market initially considers CLG statistics, which appear extremely optimistic. CLG claims that house prices displayed a rise during Q2 and Q3 of 2008, and that housing starts in London and the South East increased; this assessment is at odds with both data from industry sources (Halifax, Nationwide cited in CE's report), and with a wealth of anecdotal evidence suggesting that both housing transactions and building has almost stopped. CE notes both of these inconsistencies. Although CLG might appear to be a reputable source for data on the housing market, the number one authority on house prices is the Land Registry, as they log all housing market transactions. The Land Registry reports that house prices in England and Wales fell by 13.5% in 2008; for London, the fall was 12.9%, while in the South East it was 14.9%. Using CLG figures rather than Land Registry figures as the starting point for analysis of house prices offers an artificially optimistic impression of the housing market.

CE's projections for the housing market take into account both short-term factors constraining demand, such as credit constraints and falls in company values, and potential long-term constraints on capacity arising from skill shortages once output recovers. CE's projections appear entirely reasonable; housing starts for 2009 and 2010 are downgraded to around 40% of the level they were forecast at in January 2008 for both the Thames Water sewage and water supply areas. Later increases in output, to compensate for shortages, are forecast, but at limited levels (around 8% higher than previously forecast).

In total, CE forecasts 280,400 housing starts in the Thames Water supply area between 2006 and 2020, the vast majority (190,300) of which are expected in London. This corresponds to around 25,000 house starts a year within the Thames Water area after the downturn has passed. Within the Thames Water sewerage area, 453,600 housing starts are forecast by 2020,

split evenly between London and the rest of the area. This corresponds to upwards of 40,000 housing starts a year from 2011 onwards.

Evaluating the report

To inform our audit we sought an external review of this study by an economist within Halcrow and conclusions were that CE's forecasts seem to have been made on a sound basis. It must be understood that the views expressed below are not necessarily the Reporter's opinion.

In general, CE's forecasts seem to have been made on a sound basis. Some of the forecasts, particularly those relating to economic growth, now look a little out of date due to drastic changes in the economic climate since October. The major issues in the report which should be highlighted are:

- The overall GVA growth predictions for the UK economy for 2008 and 2009 look too optimistic in the light of a recent deterioration in the economy. The 2008 forecast has already been undershot by a quarter of a percent, while the 2009 forecast would represent no further contraction in the UK economy from its position in Q4 2008.
- GVA growth forecasts for Thames Water supply and sewerage areas are too high. A number of problems exist here:
    - The UK figures overall should probably be downgraded, leading to downwards revision of the Thames Water area figures
    - The GVA growth figures quoted in the tables do not tally with the impression given by the text that the Thames Water areas will perform worse than the UK overall
    - The forecast for London in particular appears to be significantly over-optimistic, with other forecasts suggesting it could be 2% lower.
- The CE forecast for growth in the number of households (608,000) in the Thames Water area does not tally with its forecast for the number of new houses built (estimated at around 362,500) by 2020. It is not clear how numbers of households can grow so much faster than the number of houses, or whether these housing targets are likely to be significantly revised upwards.
- CE should use Land Registry figures rather than CLG figures in introducing its analysis of house prices; that said, CE's analysis does seem more realistic and robust than the CLG figures it quotes.