

AYLESBURY VALE LOCAL DEVELOPMENT FRAMEWORK

Core Strategy & Aylesbury Allocated Sites Development Plan Documents

Aylesbury Land Use & Transport Strategy Model : Statement of Findings, April 2007 (Technical Note 3)

Purpose of Note

1. The purpose of this note is to summarise the results of a third stage of model testing conducted as part of the Aylesbury Land Use & Transport Strategy. Aylesbury Vale District Council (AVDC) and Buckinghamshire County Council (BCC) jointly commissioned the consultants Halcrow in 2005 to undertake the Aylesbury Transport Study. The study is a critical part of the evidence gathering for two development plan documents (DPDs) that will form part of the Aylesbury Vale Local Development Framework (AVLDF) - the Core Strategy and Aylesbury Allocated Sites DPD's. This note has been produced as part of the evidence base informing the Preferred Options stage of the two DPD's.

Background

2. In 2005, Halcrow undertook survey/census work and in September of that year, produced a report setting out the [results](#) which described the existing transport conditions in Aylesbury at that time. Halcrow developed the Aylesbury Land Use Transport Strategy (ALUTS2) model and used a series of illustrative scenarios for the Aylesbury area to test the model. In May 2006, they produced a technical note ([known as TN1](#)) outlining the results of those initial tests.
3. Subsequently, Halcrow again ran the model, using three scenarios based on the options for the growth of Aylesbury to 2026, identified in the [AVLDF core strategy and Aylesbury allocated sites Issues and Options consultation booklet](#). In November 2006, they produced a second technical note which includes the results of that testing ([known as TN2](#)).

Options Tested

4. Aylesbury Vale District Council and Buckinghamshire County Council have used the Aylesbury Transport Model to evaluate a number of land use options designed to accommodate some 17,100 additional dwellings at Aylesbury between the model base year of 2005 and the Local Development Framework (LDF) horizon year of 2026. 3,250 of these dwellings are anticipated within the existing urban area and 3,850 are in the Major Development Areas (MDAs) defined in the current Local Plan. The model allows consideration to be given to accommodating the remaining 10,000 dwellings on different combinations of additional greenfield sites seen as having potential for development during the period to be covered by the AVLDF.
5. The greenfield sites include the six sites lettered A to F on Map 1 in the AVLDF Core Strategy and Aylesbury Allocated Sites Issues and Options document issued in June

2006. In addition, and to accord with LDF and Sustainability Appraisal regulations, the two additional sites put forward by potential developers at Aylesbury have been tested through the model. The additional sites are Fleet Marston, to the north-east of Aylesbury adjacent to the A41, and Aylesbury East, to the north of the Grand Union Canal between Burcott and Broughton.

6. Six scenarios have been defined for testing purposes. Each scenario accommodates 10,000 dwellings based on an initial broad assessment of site capacity. The scenarios are:
 - Northern (4,100 dwellings on site A, 1,800 on site B and 4,100 on site C)
 - Southern (3,300 dwellings on site D, 3,100 on site E and 3,600 on site F)
 - North-south hybrid 1 (1,800 dwellings on site B, 4,100 on site C and 4,100 on site D)
 - North-south hybrid 2 (3,250 dwellings on site A, 3,150 on site E and 3,600 on site F)
 - Northern plus Fleet Marston (3,750 on site A, 3,750 on site C and 2,500 at Fleet Marston)
 - Northern plus Aylesbury East (3,350 on site A, 1,800 on site B, 4,000 on site C and 850 at Aylesbury East)
7. Each of these scenarios is complemented by an appropriate arrangement of local facilities, employment sites and educational provision including secondary schools. Transport provision is assumed to include, as far as possible, equivalent (and good) facilities for access to each site by public transport, walking and cycling. The main differences between the scenarios in transport terms are therefore likely to be generated by differences in the levels of highway access that can be provided to serve the individual packages of sites. Hence the main differences in performance between the scenarios are expected to relate to their performance in handling vehicle movement throughout the Aylesbury area, and a basket of indicators has been produced to measure this aspect of their performance.
8. The highway package devised to complement each scenario consists of an appropriate set of single-carriageway link roads serving as access roads to each site. Generally speaking, these link roads extend to the next radial highway route beyond the arc covered by the set of sites making up the scenario. In addition, the completion of the A418 Improvements in the form of an Eastern Link Road and Broughton Stocklake Link Road between the A418 and the A41 to the east of the town was initially assumed in all scenarios. . However, during the testing process it became apparent that the east-west component of this scheme (the Bierton Broughton Stocklake Link Road), providing the main means of access from the A418 to the centre of Aylesbury and bypassing Bierton, could more effectively be provided, for scenarios that included site C and a Northern Link Road, by a spur from the Northern Link Road (Northern Link Road Spur) to the existing A418 between Bierton and Aylesbury. In the case of the Northern plus Aylesbury East scenario, it was judged that both of these components should be included because of the access role they would fulfil in this scenario.
9. The main exception to the pattern of highway improvements outlined above relates to the provision of a link between the A41 north west of the town and the A418 to the west – an Outer Western Link Road. Following early testing this link was introduced

as a component of the Northern scenario. This was done because the performance of this scenario at that stage was extremely poor relative to that of a Southern scenario. Since the overall level of additional highway provision in the Northern scenario was quite small relative to that in the Southern scenario, it was felt that this might be seen as an unfair comparison. The introduction of the additional link did indeed improve the performance of the scenario, but it would have a significant impact on a Park or Garden of Special Historic Interest and an Area of Attractive Landscape and would be close to existing housing over a substantial part of its length.

10. Later improvements to highway configuration enabled the Outer Western Link Road to be dropped from the Northern scenario, but it has been retained in two other scenarios. One of these is the scenario which includes development at Fleet Marston. As this site would rely completely on the A41 for distribution of traffic, it was considered that the only way to disperse traffic effectively would be to provide links to both the adjacent radial routes. The other scenario is North-South hybrid 2, in which this link forms part of the arc joining areas of new development. The significant impacts of constructing the Outer Western Link Road needs to be taken into account when evaluating these scenarios.
11. The other link roads would not affect any national or Local Plan designations and there are generally choices available for the precise routing so that major impacts on existing housing areas can be reduced where they are seen as an issue. The one exception to this is in the areas to both sides of Wendover Road. Development in the Hampden Hall area has left only a small gap close to existing development where the Southern Link Road East could join Wendover Road from the east without requiring property demolition (and continue as the Southern Link Road West). This is probably not as serious as the situation described above for the Outer Western Link Road, as the constraint only applies over a relatively short distance, and any new road would be integrated within new development rather than constituting an intrusion into an otherwise undeveloped environment.

Modelling Methodology

12. The scenario testing programme has been the first major use of the new Aylesbury Transport Model, and the first set of transport forecasts for Aylesbury looking as far ahead as 2026. As testing has progressed it has become apparent that the scale of transport problems within the town revealed in these forecasts is considerably greater than in previous forecasts to 2013. More importantly in relation to the testing of development sites, the impact of problems within the town on the performance of the scenarios varies widely. In general, problems within the town appear to have an impact on the performance of scenarios which worsens as the scale of reliance on northern sites increases, but the problems affecting northern-oriented scenarios appear to be more amenable to practicable remedial measures than those affecting southern-oriented scenarios.
13. It has also been found that enhancement of the standard of the link roads, whilst still keeping them as single carriageways, would be needed to support those in the northern sector but not those in the southern sector. When all of the enhancements that had been identified were incorporated into the scenarios, the range of performance differences between best and worst scenarios was halved between the earliest and latest tests. The range is still significant, but not as decisive as the earliest

tests appeared to indicate. The enhancements that have been made also bring the likely costs of the transport packages closer together than in the earliest tests.

14. When evaluating scenarios that change the current situation as radically as those required to accommodate the level of growth envisaged in Aylesbury, methods that rely on inspection of network conditions in various parts of the town tend not to be very helpful, as there is no really objective way of trading off increased congestion in one part of the town in one scenario against increases elsewhere in another. Hence the evaluation has been carried out using aggregate measures for the whole modelled network, including Aylesbury itself and selected relevant routes extending a considerable distance beyond it. Traditional economic-based evaluations are mainly based on the total travel time for all vehicles on the network, from which differences in the total amount of time that people spend travelling can be calculated and given monetary values. Similarly, total travel distance for all vehicles on the network and the total running costs of the vehicles can be calculated. These calculations also provide a reasonable proxy for environmental impacts, though some reference has to be made to congestion levels as vehicles travelling equivalent times and distances in free-flowing and congested conditions will have different environmental impacts.
15. The main measures chosen for use in this evaluation appear in the table accompanying this report. They are the total travel time on the whole network for the stated periods (shown as “total time”), the total travel distance on the network (shown as “distance”, and a basket of derived quantities that give an indication of total costs of travel across the network and levels of congestion. One other quantity is introduced to help in the estimation of congestion levels, and that is called freemoving time. This is a theoretical time which it would take all the vehicles on the network to complete their journeys if they were not slowed down at all by interactions with other vehicles. The congestion index is defined as the ratio of total time to freemoving time. The generalised cost index is a composite measure which makes use of the average level of trade-off between time and distance which people make when choosing a longer but less congested route in order to save travel time. In this area, modelling work suggests that, on average, people will travel an additional kilometre if it saves them about 0.6 minute. Hence the generalised cost index has been calculated as the total travel time in vehicle-hours plus one hundredth of the total distance in vehicle-kilometres. As the distance component has been factored to give a value equivalent to that of an hour of travel time, the measurement of generalised cost is expressed in units of “cost-hours”.
16. Previous analyses of network performance in 2013 have relied on the model results for the morning peak period, but the radically different network conditions by 2026 make this approach unsafe so the model has been used to simulate conditions in the morning peak and evening peak periods and a representative off-peak period between the peaks. Together, these results can be used to estimate network performance over the main part of the day from 7am to 7pm. The importance of taking all the periods into account can be seen from the fact that congestion index values for the inter-peak period in 2026 are higher in all scenarios than those for both peak periods in 2005. Furthermore, the congestion indices for the evening peak period in 2026 are considerably higher than those for the morning peak for all scenarios.

Findings

17. The relative performance of the various scenarios varies widely depending on the time period in question. In the morning peak, total travel costs (as measured by the generalised cost index) are lowest for the North-south 1 scenario, and highest for the North with Fleet Marston scenario. In the inter-peak period the Southern scenario performs best, and the North-south hybrid 2 scenario worst. And in the evening peak, the North with Fleet Marston scenario performs best and the North with Aylesbury East scenario performs worst.
18. In these circumstances, it is necessary to establish which scenarios appear to give the best performance over the whole day, and the final part of the table gives the aggregate results for this period. The Southern scenario comes out best on this measure, with the Northern scenario not far behind and North-south hybrid 1 very close behind that. Both the Southern and North-south hybrid 1 scenarios also make a good showing against the congestion index, so they are likely to be perceived as working relatively well and their environmental performance (air quality and noise) is likely to be relatively good.
19. Although the percentage difference between scenarios in terms of generalised cost indices is very small – only 0.6% between the Southern and Northern scenarios, for instance, and only 4.0% between the best and worst scenarios, this does not mean that the differences are insignificant. The main reason for their similarity is the large size of the area covered by the model, with large parts of that area relatively unaffected by the choice of scenario for Aylesbury town. However, the absolute differences are still significant. The difference of 685 cost-hours between the Southern and Northern scenarios, when aggregated over 250 working days a year at an approximate economic value of £8 per cost-hour (a generalised but commonly used and accepted value), equates to a difference in movement costs of approximately £1.4 million per year, and the difference between the best and worst performing scenarios comes to over £9 million per year.
20. To summarise the results for each of the six test scenarios, generally on the basis of 12-hour results but mentioning individual time periods where they are particularly notable:
 - The Northern scenario comes out second best when measured in terms of generalised cost index (GCI). In terms of perceived performance and environmental performance it fares less well, with the second worst congestion index (CI), though there is not a very large spread of congestion indices and the difference between second best (Southern) and second worst (Northern) is modest. Nevertheless, the advantage of the Northern scenario over the North-South hybrid 1 scenario in terms of GCI is very slim, whilst its disadvantage in terms of CI is more decisive. Overall, the Northern scenario is therefore judged to be third-best of the tested scenarios.
 - The Southern scenario has the best GCI and the second best CI. The slightly worse CI than that for the North-south hybrid 1 scenario arises from a slightly higher level of excess time as a result of queuing (the difference between total time and freemoving time), but both of these scenarios have a clear advantage over the other scenarios in this respect, and the fact that total travel time is less for the Southern scenario means that the difference in CI between it and the North-south hybrid 1 scenario should probably be regarded as less important

than the GCI values. On this basis, the Southern scenario is judged to offer the best overall performance.

- The North-south hybrid 1 scenario has the third-best GCI and the best CI. As mentioned above, it is only marginally worse than the second-best scenario in terms of GCI but decisively better in terms of CI. It is therefore placed second in the overall ranking.
- The North-south hybrid 2 performs poorly in the morning peak and inter-peak periods, but second best in the evening peak period. It shares this general pattern of performance with the North with Fleet Marston scenario, which suggests that the problematic link road between the A41NW and the A418W may be the main reason for its good showing in the evening peak. Nevertheless, its GCI for the whole day trails behind that of all the other scenarios by a considerable margin and it is judged to be the worst scenario overall in transport terms.
- The North with Fleet Marston scenario performs very poorly in the morning peak, reasonably well in the inter-peak period and best of all the scenarios in the evening peak. Over the whole day, its GCI is second worst, and although it achieves a better CI than the scenario with the third-worst GCI (North with Aylesbury East), it is likely that the latter's much better performance in the time-critical morning peak period would be seen as more important than the former's superiority in the evening peak. Overall, the North with Fleet Marston scenario is therefore ranked fifth.
- The North with Aylesbury East scenario performs well in the morning peak period but poorly in the evening peak. Over the whole day, its GCI and CI values are worse than those of the second and third-placed scenarios, and it is judged to be fourth-best of the scenarios overall.

Conclusions

21. The final rankings emerging from the transport model scenario tests are:

1 st : Southern	4 th : North with Aylesbury East
2 nd : North-south hybrid 1	5 th : North with Fleet Marston
3 rd : Northern	6 th : North-south hybrid 2

TABLE 1

TRANSPORT PERFORMANCE MEASURES FOR TEST SCENARIOS

AM Peak (0700-1000)

Test	Freemoving Time	Total Time	Distance	Speed	Congestion Index	Generalised Cost Index
2005	12845	14605	808730	55.4	1.137	22692
2013	14968	19040	945253	49.6	1.272	28493
2026 options						
Northern	17389	24125	1111171	46.1	1.387	35237
Southern	17353	24114	1118160	46.4	1.390	35296
North south hybrid 1	17521	23799	1119839	47.1	1.358	34998
North south hybrid 2	18055	25271	1152177	45.6	1.400	36792
North with Fleet Marston	18243	26680	1163357	43.6	1.462	38314
North with Aylesbury East	17328	24020	1112866	46.3	1.386	35149

Interpeak (3 hrs)

Test	Freemoving Time	Total Time	Distance	Speed	Congestion Index	Generalised Cost Index
2005	8446	9311	510047	54.8	1.102	14411
2013	9696	11219	588980	52.5	1.157	17109
2026 options						
Northern	11268	13504	694132	51.4	1.198	20445
Southern	11210	13090	701274	53.6	1.168	20102
North-south hybrid 1	11405	13445	706187	52.5	1.179	20507
North south hybrid 2	11836	14368	729229	50.8	1.214	21660
North with Fleet Marston	11336	13491	698704	51.8	1.190	20478
North with Aylesbury East	11256	13579	696129	51.3	1.206	20541

PM peak (1600-1900)

Test	Freemoving Time	Total Time	Distance	Speed	Congestion Index	Generalised Cost Index
2005	12497	14237	782804	55.0	1.139	22065
2013	14487	20015	905733	45.3	1.382	29072
2026 options						
Northern	17241	27635	1090949	39.5	1.603	38545
Southern	17216	27566	1091948	39.6	1.601	38486
North-south hybrid 1	17471	27643	1104781	40.0	1.582	38690
North south hybrid 2	17629	27321	1111969	40.7	1.550	38441
North with Fleet Marston	17275	26305	1098801.7	41.8	1.523	37293
North with Aylesbury East	17299	28220	1097299.9	38.9	1.631	39193

12 hour (0700-1900)

Test	Freemoving Time	Total Time	Distance	Speed	Congestion Index	Generalised Cost Index
2005	42234	47463	2611626.5	55.0	1.124	73579
2013	48846	61493	3028946.7	49.3	1.259	91783
2026 options						
Northern	57167	78767	3590384.5	45.6	1.378	114671
Southern	56988	77860	3612655	46.4	1.366	113986
North-south hybrid 1	57803	78332	3636993.5	46.4	1.355	114702
North south hybrid 2	59355	81328	3722603.4	45.8	1.370	118554
North with Fleet Marston	58189	79967	3659567.5	45.8	1.374	116563
North with Aylesbury East	57139	79399	3602423	45.4	1.390	115423