

The Aberdeen City and Shire Structure Plan Interim Technical Evaluation

Executive summary

- A technical evaluation has been undertaken to inform the choice of a preferred strategy for the Aberdeen City and Shire Structure Plan.
- A method was used that looked at Infrastructure capacity and requirements, constraints, opportunities and impacts, and other issues, including demand and risk.
- Options 3, 4, 7 and 8 were identified as being particularly problematical. It is concluded that strategies based on dispersed growth poles do not provide the critical mass of development to allow infrastructure improvements to be undertaken. Options based on the new transport corridor are risky, and may be much longer term to allow for the provision of necessary transport infrastructure.
- Options 1, 2, 5 and 6 are seen to be technically feasible, although all options require substantial investment in infrastructure to implement them.

1. Objectives and Purpose

- 1.1 The purpose of this report is to summarise the results of an initial technical assessment of the eight 'spatial options' identified for the Aberdeen City and Shire Structure Plan and to present conclusions on this issue. This assessment has a role in informing the choices that need to be made regarding the strategy that the new structure plan should adopt.
- 1.2 This technical assessment sits alongside three other pieces of work to inform the choice of a strategy for the next structure plan:
 - a public engagement process, which sought to identify those options that had the greatest level of support and their strengths and weaknesses;
 - an appraisal of the options against the draft vision; and
 - an appraisal of the options against the Strategic Environmental Assessment objectives.

2. Method

- 2.1 In relation to the spatial element of the strategy for the new structure plan there has been a focus on eight possible "spatial options". These options represent models for the spatial distribution of development throughout the Aberdeen City and Shire area. The options were generated through an appraisal process, which sought to identify single options which met very high-level objectives and which could be combined to provide synergy and complementarity.
- 2.2 The technical appraisal was designed to give a strategic overview of the eight options by considering a range of 20 themes. While the focus of the evaluation was

largely around the deliverability of the various options, it also addresses the broad strategic constraints and opportunities / impacts of the options.

2.3 Five key questions were asked of each option:

- What is the current infrastructure capacity?
- What additional infrastructure would be required to implement the option?
- What are the constraints on the option?
- What are the opportunities / impacts of the option?
- Can the option be delivered?

2.4 A 'high' growth scenario was used as the reference case on the basis that it would identify all the issues raised by the particular strategy. Spreading the development evenly over the 25-year plan period was the reference case for phasing. The implications (and / or desirability) of varying the scale (low or medium) and phasing (front or back-loading) of development was assessed (where appropriate) as part of the analysis.

2.5 The themes examined are presented in table 1 below.

Table 1: Themes for the technical evaluation

INFRASTRUCTURE CAPACITY & REQUIREMENTS	
Water supply	Telecommunications
Waste water	Education
Gas	Health
Electricity	Transport

CONSTRAINTS	OPPORTUNITIES / IMPACTS	OTHER
Landscape	Ecological footprint	Demand / marketability
Nature conservation	Economic development	Emergency planning
Flooding	Brownfield redevelopment	
Pipelines	Green belt	
	Housing	
	Travel distances / modes	

2.6 It is important to recognise that the level of information collected for the purpose of this assessment will need to be refined when a decision has been made on the provisional strategy that the draft structure plan should follow. An assessment of eight different options would be very inefficient and could not hope to go into the level of detail required to enable all information to be collected, particularly given the resource and time implications for the two Councils and partner organisations. The collection of such detail on the seven options that are not progressed would be

inefficient use of resources for all concerned. For this reason this assessment can only be considered an interim assessment, designed to inform the broad feasibility and desirability of an option.

- 2.7 By fully assessing just one strategy, at that stage it will be necessary to identify in more detail the specific strategic constraints in infrastructure that are likely to have to be overcome. This information will play a large role in informing the specific distribution within the spatial option to be adopted for the draft plan. Indeed, through consultation on the draft plan itself in early 2008, additional levels of detail are likely to become available which will influence the plan itself and subsequent action programmes.
- 2.8 The method used to collect the information summarised in this report was primarily through meetings and correspondence with stakeholders identified under each issue. In addition, a number of surveys were carried out of housing and employment land marketability as well as an assessment of the ecological footprint of the options.

3. Results of the analysis

- 3.1 The results of the assessment for each option are provided below. Appendix 1 provides a summary overview of the individual themes. Some themes, notably electricity and water supply raise issues that are not spatial in their impact; but the impacts they have do not differ significantly between options.
- 3.2 Water supply is a significant issue for the scale of growth in Aberdeen City and Shire, no matter where it is located. Most of the area's potable water is abstracted from the River Dee, and increased demand for water from a substantially greater number of households could have an impact on the water quality of that river, and result in impacts on its interest as a Special Area of Conservation (SAC). Neither Scottish Water, nor SEPA are able to advise, at this time, what an acceptable level of abstraction might be.
- 3.3 The electricity supply network providers cater for demand, and both National Grid and Scottish and Southern Electricity have waived involvement at this stage of the plan-making process, although they would wish to be consulted once a preferred strategic option is identified.

4. Option 1 Most of the development in Aberdeen City, Significant development in edge of city communities.

- 4.1 While this option makes use of existing infrastructure within and around the city the scale of proposed development is such that additional investment would be required. Additional sewerage infrastructure would be necessary, both in terms of extending the network and providing additional treatment capacity at Persley and Nigg. Additional primary and secondary school provision would be required, particularly at Blackburn and Drumoak, necessitating major allocations in these areas to justify new secondary schools. Extensions would be required to other academies in Aberdeenshire, Edge of city communities to accommodate the growth. In Aberdeen City there is negligible capacity in any secondary schools except Torry Academy, and any greenfield land allocations are likely to generate the need for an additional secondary school. This option provides little opportunity

to add to the strategic transport network, or to accommodate future development, and would require widespread transport infrastructure improvements to be implemented.

- 4.2 This option records the lowest ecological footprint (a measure of global impact) of all the options, but scores comparatively poorly in comparison to other city based strategies in terms of the opportunities to make use of brownfield land (but still far better than those strategies which do not include Aberdeen City). It is likely to have the greatest impacts on Greenbelt. It was identified as the second most marketable in terms of the saleability of any homes built. However, it performs less well against transport objectives (ranked 6th of 8), economic development and housing need (both ranked 5th of 8).
- 4.3 Additional police and ambulance infrastructure would be required and the funding for this would be critical to its implementation. The reasons for poor performance against transport objectives has knock-on impacts in terms of congestion on the road network in Aberdeen and a potential deterioration in emergency service response times.

Conclusions on Option 1

- *Makes use of some existing infrastructure, but substantial investment required, particularly in transportation, education, and sewerage.*
- *Has impacts on infrastructure outwith the development areas.*
- *Few environmental or physical constraints to development.*
- *Low risk for the development industry, but does not meet needs or aspirations.*

5. Option 2 Most of the development in Aberdeen City significant development in the existing transport corridor

- 5.1 Significant, but focused, investment in waste water infrastructure would be required to implement this option particularly in terms of sewage treatment capacity at Inverurie, the augmentation at Nigg and Persley, and pumping stations to serve these. Likewise focused investment in transportation infrastructure would be required. It performed best when measured against the Regional Transport Strategy (RTS) objectives (while recognising that this would require significant investment, it would be aided by being focused into a single corridor) and aid the implementation of the Crossrail project. A number of additional primary schools would need to be delivered, along with several secondary schools in both Aberdeen City and Aberdeenshire. Development allocations of up to 6000 should be considered for the Inverurie corridor to facilitate the provision of a new secondary school in this area. In Aberdeen City there is negligible capacity in any secondary schools except Torry Academy, and any greenfield land allocations are likely to generate the need for an additional secondary school. Development of this option, given its concentration of development in and close to Aberdeen has the potential to provide the critical mass of development to facilitate the provision of waste management infrastructure both to the north and south of Aberdeen. Telecommunications infrastructure is facilitated by development along corridors rather than radially.

- 5.2 This option was ranked second in terms of economic development and housing need by concentrating development in Aberdeen and a range of Aberdeenshire settlements. The option was judged to be a marketable option for all types of employment development, although extending the transport corridor was seen as of questionable benefit. The option was also among the best performing in terms of ecological footprint (3/8) and housing demand (3/8). Impacts can be expected on greenbelt designation, as with all Aberdeen-based options.
- 5.3 In terms of police and ambulance infrastructure, this option is thought to minimise the need for additional infrastructure given the concentration of development on settlements already served, although it may impact on current service standards. Peak response times may suffer unless congestion if the transport network is adequately addressed.

Conclusions on of Option 2

- *Performs consistently well against a range of themes.*
- *Focussed investment required on education, transport and sewerage infrastructure.*
- *Few environmental or physical constraints to development.*
- *Relatively low risk for the development industry.*

6. Option 3 Most of the development in Aberdeen City, significant development in a new transport corridor

- 6.1 Additional waste-water infrastructure would be required in all locations to serve additional development. Replacement of Ellon Academy is a priority for Aberdeenshire Council and could be designed to accommodate increased capacity. A new secondary school could be required at Peterhead and /or Maud/New Deer (depending on the transport solution implemented and the overall scale of growth). In Aberdeen City there is negligible capacity in any secondary schools except Torry Academy, and any greenfield land allocations are likely to generate the need for an additional secondary school. Capital costs for investment in the new transport infrastructure required could be very high, but this investment would be necessary for the rural accessibility benefits of this option. Telecommunications infrastructure provision is facilitated by development in a linear corridor.
- 6.2 Significant natural heritage constraints may be posed by the sensitivities of the Ythan Estuary to the effects of eutrophication on flora and fauna due to rising phosphorus levels. Avoidance of this impact would have implications for development costs in the Ythan estuary catchment.
- 6.3 This option was jointly least marketable in housing market terms with Option 4. It was ranked 4/8 against the objectives of the RTS with the recognition that even with significant transport investment in the new corridor to Peterhead there would be a strong likelihood of increased car use (and therefore increased vehicle mileage and consequent environmental impact). This option was seen as incompatible with the provision of high quality employment sites. It makes good use of brownfield land opportunities. Impacts can be expected on greenbelt designation.

Conclusions on Option 3

- *High infrastructure costs.*
- *Implications for Ythan Estuary SAC.*
- *Risky for development industry.*

7. Option 4 Most of the development in Aberdeen City, significant development in growth poles

- 7.1 Additional waste water infrastructure would be required in all locations to serve additional development. Extensions to academies in all Aberdeenshire settlements targeted for growth would be required, although development is unlikely to be of a scale or concentrated to such an extent to justify new academies. In Aberdeen City there is negligible capacity in any secondary schools except Torry Academy, and any greenfield land allocations are likely to generate the need for an additional secondary school. Telecommunications infrastructure would be difficult to provide across all growth poles due to the dispersed nature of development. Under this option it would be impractical to attempt a strategic road or rail development project to cater for the needs of new development and may have a detrimental impact on the existing transport network. It could allow for an improvement in public transport provision for rural communities. This option is unlikely to provide the critical mass of development to enable the provision of waste management infrastructure in Aberdeenshire (with the possible exception of Peterhead) and will give rise to the greatest number of vehicle movements and associated environmental impact from the movement of waste.
- 7.2 This option contains the highest proportion of the North East's vacant and derelict land (96%) due to locating development in Aberdeen and the largest number of additional settlements. It was ranked as the option least compatible with the RTS objectives as it would be impractical to attempt a strategic road or rail project to cater for the new development. It was ranked 6/8 in terms of ecological footprint due to reliance on the private car and the dispersal of development in locations distant from Aberdeen. This option was considered jointly least marketable (with Option 3) in housing market terms and also exhibited the most variation between individual settlements. However, due to the concentration of development in Aberdeen and its spread across Aberdeenshire, this was seen as the optimal solution in terms of meeting housing need. Impacts can be expected on greenbelt designation.
- 7.3 Risk of adverse impact on the River Dee and Ythan Estuary SACs may impact on development in these catchments.

Conclusions on Option 4

- *Widespread infrastructure investment required, difficult to improve transport.*
- *Potential impacts on two SACs.*
- *Opportunities for rural regeneration, but impacts on deliverability of housing and employment sites.*
- *Low demand, high risk for development industry.*

8. Option 5 Most of the development in Aberdeen City, significant development in new settlements

- 8.1 Under this option, need for major new infrastructure is restricted to the locale of the new settlement, requiring substantial investment in waste water, transport, education, fire, police, and health facility provision. As no advantage can be taken of any spare capacity there is an additional cost. Major roads infrastructure would be required to serve the new settlements. In Aberdeen City there is negligible capacity in any secondary schools except Torry Academy, and any greenfield land allocations are likely to generate the need for an additional secondary school. New settlements would simplify education provision in Aberdeenshire.
- 8.2 This option performed well in terms of carbon footprint (2/8) and housing marketability (1/8) but less well against housing need (6/8), economic development (8/8) and transport (5/8) criteria. Concern was expressed about the transport implications of new settlements, if they were not well served by public transport. Impacts can be expected on greenbelt designation. It provides less opportunity for the development of brownfield land than other city-based strategies.
- 8.3 Option 5 is judged to perform well when considering the ability of options to provide employment sites in accessible edge-of-centre/out-of-centre locations and is thought to offer development opportunities in areas that could cater for the needs of future employees. However, it is judged to perform less positively than all other options, in terms of some of the requirements for economic development derived from SPP2 and from the draft ACSEF vision.

Conclusions on Option 5

- *Infrastructure provision simplified but narrow in its benefits. High cost.*
- *No heritage constraints.*
- *Limited economic development opportunities.*
- *Low risk to development industry.*

8. Option 6 Most of the development in the existing transport corridor, significant development in Aberdeen City.

- 8.1 Significant, but focussed, investment in waste water infrastructure would be required to implement this option particularly in terms of sewage treatment capacity at Inverurie and the augmentation at Nigg and Persley, and pumping stations to serve them. Likewise, focussed investment in transportation infrastructure would be required. This option performed very well when measured against the RTS objectives (while recognising that this would require significant investment, it would be aided by being focussed into a single corridor) and aid the implementation of the Crossrail project. A number of additional primary schools would need to be delivered, along with several secondary schools in Aberdeenshire. Due to the scale of development proposed through this option at least 1 new academy would be required in each of the legs of the corridor, if not more. In Aberdeen City there is negligible capacity in any secondary schools except Torry Academy, and any greenfield land allocations are likely to generate the need for an additional secondary school. Development of this option, given its concentration of development close to Aberdeen has the potential to provide the critical mass of development to facilitate the provision of waste management infrastructure both to

the north and south of Aberdeen. Telecommunications infrastructure is facilitated by development along corridors rather than radially.

- 8.2 This option may provide fewer opportunities for economic development in the Aberdeen area and may constrain the growth of the energy industry (with their specific focus on Aberdeen City). The option was average in terms of ecological footprint (4/8) and housing demand (4/8). Impacts can be expected on greenbelt designation, but these are likely to be considerably smaller than the Aberdeen City based options.
- 8.3 In terms of police and ambulance infrastructure, this option is thought to minimise the need for additional infrastructure given the concentration of development on settlements already served, although it may impact on current service standards. Peak response times may suffer unless congestion in the transport network is adequately addressed.

Conclusions on Option 6

- *Greater scale of infrastructure investment required.*
- *Focussed investment required on education, transport and sewerage infrastructure.*
- *Few environmental or physical constraints to development.*
- *May not be as desirable as Option 2.*
- *Relatively low risk for the development industry.*

9. Option 7 Most of the development in the existing transport corridor, significant development in growth poles

- 9.1 This option requires additional waste water infrastructure in all locations to serve additional development. Significant augmentation of the Inverurie sewage treatment works would be required, as well as upgrades to pumping stations and the Nigg sewage treatment works. Telecommunications improvements in the core area could be provided, but the dispersed nature of the growth poles makes improvements difficult. Additional secondary schools would be likely in both legs of the transport corridor and extensions required at many of the other locations. Major investment in the transport network would be required to facilitate accessibility: it would be difficult to provide a single transport solution to accommodate the additional traffic generated by development in the growth poles.
- 9.2 Risk of adverse impact on the River Dee and Ythan Estuary SACs may impact on development in these catchments.
- 9.3 This option has the second highest ecological footprint and (along with Option 8) performed significantly worse than the other six options. The lack of a development focus in Aberdeen results in a very limited capacity for housing need to be met in the City and, with Option 8 has a limited ability to direct new development to brownfield sites (ranked 7/8). It was ranked 7/8 against the RTS objectives and was seen as unsatisfactory given the dispersed nature of development, although to a limited extent it could improve public transport provision in more rural areas. It was seen as incompatible with the provision of high quality employment sites. This option, along with Option 8, would minimise impact on the Green belt.

- 9.4 This option could provide for the growth and diversification of the rural economy. Risks are that demand for employment land in areas close to the city may not be satisfied and that this may discourage existing businesses from re-locating within the region.

Conclusions on Option 7

- *Significant investments required in infrastructure, particularly in transportation and education.*
- *Environmental constraints on some areas.*
- *Provides opportunities for strategic growth in a variety of dispersed locations but may impact negatively on economic growth in the city region as a whole.*
- *Risks of not meeting city-based demand close to the city.*

10. Option 8 Most of the development in the existing transport corridor, significant development in the new transport corridor

- 10.1 Substantial investment in waste water infrastructure would be required, particularly at Inverurie and Nigg, and associated pumping stations. This option is likely to be the most expensive in transport infrastructure terms (with significant risks if that infrastructure is not put in place). Substantial investment would be required in the education estate, requiring two new academies in the existing transport corridor and extension or replacement of academies in the new transport corridor. As development is in corridors, provision of telecommunications infrastructure is facilitated.
- 10.2 This option has the highest ecological footprint of those assessed and (along with Option 7) performed significantly worse than the other six options. It is likely to be the most expensive in transport infrastructure terms (with significant risks if that infrastructure is not put in place). It has the lowest proportion of the North East's vacant and derelict land and is the most challenging option for the provision of affordable housing. The option doesn't perform well in housing marketability terms and it is generally those areas with poorest marketability that have the greatest potential to absorb development in educational terms. However, it does have the potential to complement the Crossrail project (and aid its implementation) as well as open up the area between Aberdeen and Peterhead in economic development terms. This option, along with Option 7, would minimise impact on the Green belt.
- 10.3 Significant natural heritage constraints may be posed by the sensitivities of the Ythan Estuary to the effects of eutrophication on flora and fauna due to rising phosphorus levels. Avoidance of this impact would have implications for development costs in the Ythan estuary catchment.
- 10.4 Although this option was viewed favourably in economic development terms generally, it carries considerable risk if the 'Energetica' strategy is not substantially realised. Even then, however, since Aberdeen is not identified for growth, its economic sustainability has been questioned.

Conclusions on Option 8

- *High infrastructure costs with high risks around the deliverability of transport infrastructure.*
- *Implications for Ythan Estuary SAC*
- *High risk to development industry*

11. Conclusions

- 11.1 What is clear from the assessment is that none of the options are without significant challenges. Some of these can be addressed and mitigated through the plan itself, some through actions which could be built into action programmes, and some through other mechanisms. However, this does emphasise the need to ensure a co-ordinated approach to the delivery of the new plan as well as a continued partnership approach to its development. Appropriate mechanisms will need to be put in place to aid the delivery of the strategy, in a manner which enables appropriate infrastructure to be provided on a timescale that is compatible with the intentions of developers and the needs of the community.
- 11.2 Although it is not the purpose of this particular report to recommend a strategy to be followed, it does clearly emphasise at a strategic level some of the costs, benefits, constraints and risks associated with each of the options and can be used to inform that decision-making process.
- 11.3 It is clear that all eight of the options would require considerable expenditure on new infrastructure to enable their delivery, whether that is for waste management, education, water and waste water, ambulance and police or transport. Delivery of that infrastructure in a timely fashion will be a key issue for the structure plan and associated action programmes.
- 11.4 Those options which include a new transport corridor (Options 3 and 8) appear to present particular challenges around their deliverability, given the cost of transport infrastructure, the consequences of failure to deliver that infrastructure, the timing of infrastructure delivery and the sharp drop-off in housing marketability north of Ellon. The risk is also acknowledged that if these options were taken (particularly Option 8) and the ACSEF 'Energetica' strategy were not to be delivered to a significant extent, it would present a particular challenge to economic growth in the city region. Should either of these strategies be implemented, then they are likely to be longer-term aspirations, rather than providing for relatively short-term needs.
- 11.5 Those options which disperse development may result in insufficient critical mass of development to enable the provision of sufficient quality of infrastructure to mitigate the adverse effects of development. It may not be possible to fund the required improvements to multiple schools and transport systems required to avoid impacts on quality of life.
- 11.6 Options 7 and 8 also stand out in terms of their ecological footprint, being significantly worse than the other six options. They also contain significantly lower quantities of vacant and derelict land than the other options, resulting in a higher proportion of development being required on greenfield sites. In addition, they are also viewed as the least economically sustainable options, due to their dispersal of nearly all growth away from Aberdeen.

- 11.7 This assessment has clearly established that the delivery of any of the eight options will present significant challenges. However, Options 3, 4, 7 and 8 would appear to be particularly problematic to take forward at the current time, although the concept of a new transport corridor could be explored in more detail to inform future plan reviews.
- 11.8 From this interim technical assessment it is therefore concluded that the following options are technically feasible, minimise impacts on constraints, proving realistic opportunities and may have acceptable levels of risk associated with them:
- Option 1 Most of the development in Aberdeen City, significant development in edge of city communities
 - Option 2 Most of the development in Aberdeen City, significant development in the existing transport corridor
 - Option 5 Most of the development in Aberdeen City, significant development in new settlements
 - Option 6 Most of the development the existing transport corridor, significant development in Aberdeen City

Appendix 1: Summary by Theme

Appropriate Assessment – all options have the potential to have significant impacts on the River Dee (SAC), and Loch of Skene (SPA & RAMSAR), while Options 3,4,7 and 8 have the potential to additionally have significant impacts on the Ythan Estuary, Sands of Forvie and Meikle Loch (SPA & RAMSAR). A further 10 designated sites are located in close proximity to possible development, although it is not thought that development would give rise to the possibility of significant impacts on the qualifying interests. Due to the spread of development in Options 4 and 7, these options would see development close to the largest number (16 and 18 respectively) of designated sites, compared to just four in the case of Option 1. River Dee, minimising water abstraction or the construction of infrastructure to better regulate flow would be required to help protect this important environmental asset.

Loch of Skene, managing access to this site is an important issue to prevent further disturbance to qualifying interests, as well as attention to run-off issues which may impact on the quality of the water entering the loch.

Ythan Estuary, development is likely to give rise to waste water treatment issues which will need to be explored in more detail with SNH, SEPA and Scottish Water, but could give rise to significant infrastructure costs.

Site		1	2	3	4	5	6	7	8
<i>Loch of Skene</i>	SPA	Y	Y	Y	Y	Y	Y	Y	Y
<i>Loch of Skene</i>	RAMSAR	Y	Y	Y	Y	Y	Y	Y	Y
<i>River Dee</i>	SAC	Y	Y	Y	Y	Y	Y	Y	Y
<i>Ythan Estuary, Sands of Forvie & Meikle Loch</i>	SPA			Y	Y			Y	Y
<i>Ythan Estuary & Meikle Loch</i>	RAMSAR			Y	Y			Y	Y
Red Moss of Netherly	SAC	N	N		N	N	N	N	N
Buchan Ness to Collieston	SAC			N	N			N	N
Buchan Ness to Collieston	SPA			N	N			N	N
Garron Point	cSAC		N				N	N	N
Fowlsheugh	SPA		N				N		N
Dinnet Oakwood	SAC				N			N	
Glen Tanar	SPA				N			N	
Loch of Strathbeg	SPA				N			N	
Loch of Strathbeg	RAMSAR				N			N	
Muir of Dinnet	SAC				N			N	
Muir of Dinnet	SPA				N			N	
Muir of Dinnet	RAMSAR				N			N	
Troup, Pennan and Lion's Head	SPA				N			N	

Mortlach Moss	SAC							N	N	
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Telecommunications – telecommunications infrastructure is deliverable to each of the eight options. However, technological developments and service requirements mean that BT Openreach are moving away from limited-capacity copper-wire based infrastructure to one based on fibre-optic cables. Trials are currently underway in England with an anticipated roll-out progressively from June 2008 for new developments of over 200 units. Concentration of development in Aberdeen (Options 1 – 5) can provide significant economies of scale, while new corridors have an attraction in terms of minimising the disruption caused while installing the infrastructure (Options 3 and 8). Having new development serviced by fibre-optics is a considerable attraction for both residential and business development given the enhanced network quality and speed as well as the potentially significant cost of retro-fitting the infrastructure. Enabling fibre-optic networks throughout the area (while not necessarily influencing the choice of spatial option) will be important.

Gas – of the settlements investigated as part of the assessment, only Aboyne, Alford, Inch and Maud are not on the domestic gas supply network. Of these, Aboyne and Alford are too far from the network to make gas supply realistic, while Inch and Maud could be supplied depending on the scale and timing of new development (which would need to be significant over a relatively short period of time – which may make connection unviable). This impacts negatively (to a limited extent) on Options 3,4,7 and 8.

Electricity – Infrastructure and service providers considered that involvement at this stage was premature and would rather be involved once a strategy had been chosen.

Brownfield Development – Options 7 and 8 performed particularly poorly in terms of the quantities of brownfield land which is defined as possibly suitable for housing, due to the absence of any significant development in Aberdeen City, which contains almost 80% of the vacant and derelict land in the North East. Differences between the other six options were marginal in comparison, with those options spreading development over a higher number of settlements generally containing more of the available brownfield land. Peterhead and Fraserburgh are the only Aberdeenshire settlements with more than 10ha of vacant and derelict land – making up half of the Aberdeenshire total.

	Options							
	1	2	3	4	5	6	7	8
Percentage of North East Vacant and Derelict Land	80	83	86	96	79	83	18	10
Rank	5	=3	2	1	6	=3	7	8

Flooding – the expansion of all settlements identified in the eight options will need to give attention to the potential flooding issues. However, only a handful of settlements are constrained by flooding to any significant extent.

Education – Significant education infrastructure would be required to deliver a high rate of growth, whichever option were chosen. The co-incidence of new development in the catchment of schools in need of replacement could facilitate this process. Developments in the Blackburn and Drumoak areas of around 6,000 homes could facilitate additional secondary school provision in these areas, while development in the existing transport corridor (Options 2, 6, 7 and 8) could facilitate a new secondary school on both the northern and southern legs. Risks exist around the availability of funding for the replacement of schools. New developments of around 2,000 homes allow for the flexible provision of two primary schools which are able to cope with the early peak in school numbers. The development of new settlements carries risks in terms of the timing of secondary school provision, but has the attraction that funding for such a facility would be simplified because it would be required to be provided as part of the development. However, capacity exists in areas where the market demand for new housing tends to be lower, such as at Banff Academy, Fraserburgh Academy, Mintlaw Academy and Peterhead Academy, where modest growth could be accommodated by the existing school infrastructure. This is also true in Oldmeldrum where capacity still remains in the new academy built in the village. Aberdeen City Council is currently preparing a School Estates Strategy. At the current time, Torry Academy is the only secondary school with capacity of any scale. While there is fairly significant under-capacity issues in many primary schools, these tend to be within the existing built-up area rather than around the edge of the city. Brownfield development, due to its nature and scale is unlikely to give rise to additional educational provision, unless there are significant concentrations in particular areas. However, peripheral expansion in Aberdeen of a substantial scale is likely to result in the need for additional primary and secondary schools, since the available capacity is unlikely to be in locations where the development is located.

Transport – Options 2 and 6 performed best when assessed against the objectives of the Regional Transport Strategy (RTS). Even though significant investment would be required, it would be within a single corridor and would help deliver the Crossrail project. These options performed particularly well against the environmental and economic competitiveness themes of the RTS. However, the cost of those options which included a new transport corridor to Peterhead was seen as a significant drawback, as was the consequences of an inability to deliver the infrastructure. Options which identified significant development in ‘growth poles’ performed worst when measured against the RTS, due to the inability to deliver strategic road or rail infrastructure to cater for the development. Option 4 was therefore ranked as the option least compatible with the RTS, followed by Option 7.

	Options							
	1	2	3	4	5	6	7	8
<i>Rank against Regional Transport Strategy Objectives</i>	6	1	4	8	5	2	7	3

Housing Demand – those options which locate development in or close to Aberdeen are generally seen as those being the most marketable in housing terms. Options 5, 1, 2 and 6 were seen as the most marketable. In general terms, marketability declined with distance

from Aberdeen, with Aberdeen, Westhill, Inverurie and a new settlement in the Kintore / Blackburn area being seen as the most marketable. Inch, Aboyne, and Alford were the settlements which performed best in the Rural Housing Market Area. This would create problems for the deliverability of those options which propose a new transport corridor to Peterhead (Options 3 and 8) and spreading development in Aberdeenshire to numerous 'growth poles' (Options 4 and 7).

	Options							
	1	2	3	4	5	6	7	8
<i>Housing Marketability Rank</i>	2	3	7	8	1	4	6	5

Housing Need – Options which neither concentrated development in Aberdeen (Options 7 and 8) nor concentrated development into a limited number of Aberdeenshire settlements (particularly new settlements) performed particularly poorly. These options, if developed in isolation, could present significant challenges for the provision of affordable housing in either Aberdeen or Aberdeenshire, thus forcing people in housing need to meet that need at potentially significant distances from their desired location.

Ecological footprint – the ecological footprint of the eight options varied due to the availability, attractiveness and use made of sustainable modes of transport (walking, cycling and public transport). Option 1 had the lowest footprint, while Options 7 and 8 had footprints significantly in excess of the other options. In general, those options focussing development within or close to Aberdeen had the lowest ecological footprint. This assessment held everything constant except the spatial distribution of development and its transport implications. In reality, the new structure plan is likely to impact on a number of factors which influence the ecological footprint and these will be assessed further as the plan develops. The outputs of the assessment are per capita footprints at the end of the plan period and can only be used as a comparative measure between the eight options.

	Options							
	1	2	3	4	5	6	7	8
Ecological footprint	4.2747	4.2883	4.2890	4.2948	4.2848	4.2896	4.3230	4.3228
<i>Rank</i>	1	3	5	6	2	4	7	8

Waste – All current waste management facilities are at capacity, along with some waste transfer stations. Significant new infrastructure will be required in the North East, whichever option is chosen, given European Directives etc. The Scottish Executive's 'Strategic Waste Fund' is a source of funding for this infrastructure and the 'Strategic Outline Case' for funding is currently based on a medium-growth scenario. While none of the options are thought to be undeliverable, concentration of development in or close to Aberdeen and along the existing transport corridor has the potential to provide the critical mass to facilitate the provision of infrastructure. Option 4 is likely to result in the largest number of vehicle movements and associated environmental costs and is unlikely to provide critical mass for infrastructure provision in Aberdeenshire (with the possible exception of Peterhead). In addition, options which are unbalanced in terms of the north or south of the structure plan area also present difficulties.

Emergency Services – The availability of additional resources to serve the new development is the risk to the development of the eight options from the perspective of the ambulance and police services, in addition to service standards and police visibility slipping if the resources are not made available. In general, the ambulance service prefers a concentration of development due to economies of scale, whereas the police prefer a more even distribution to provide better opportunities for staffing location and minimising the potential for congestion. Options 2 and 6 appear to present the least challenges for the Police, while new settlements in Option 5 would present the least challenges to the Ambulance Service. Option 4 would require extensive refurbishment and extensions to existing police facilities. In terms of ‘Emergency Planning’, the choice from the eight options is not seen as an issue since the arrangements are flexible and will adapt as required.

Employment Land – Option 2 was judged to be a marketable option for all types of employment development, although extending the corridor both north and south will not accommodate demand to any significant extent. A risk associated with development in the Aberdeen to Peterhead corridor (elements of Options 3 and 8) is that it might not accommodate demand for office or industrial facilities to any significant extent. Those options which proposed development in ‘growth poles’ across Aberdeenshire (Options 4 and 7) performed particularly poorly, being the least marketable for all types of employment development. In terms of providing facilities for the energy industry, Option 8 followed by Option 1 is seen as the most satisfactory.

Economic Development - With regard to the energy sector, economic activity in Aberdeen is seen as being of critical importance for ensuring continued growth while development in the city could also support the growth of knowledge-based industries. Aberdeen, Westhill and Peterhead are all identified as important to the energy sector, resulting in weaknesses in all options since none suggest strategic growth in all three settlements. Options 3, 4, & 7 were considered not to be suitable for providing future high amenity, high quality employment sites. Those options which focus development in Aberdeen and the existing transport corridor perform best when measured against SPP2 and the ACSEF vision and will help to realise the ACSEF strategic priority to provide a fully integrated transport network. Options 7 and 8, since they do not plan for growth in Aberdeen, are thought to be the least economically sustainable options. Options 6 and 8 were judged most favourably overall in economic development terms, although the risks of failing to realise the ACSEF ‘Energetica’ strategy were recognised as a significant risk to Option 8.

Green belt – Development in Aberdeen and those areas closest to Aberdeen are likely to give rise to impacts on the existing green belt. Options 1-5 (those where most development takes place in Aberdeen) would give rise to the largest impacts, while Options 7 & 8 would minimise the impact since the focus of development in these options is in Aberdeenshire. Option 6 lies in the middle, with lower impacts than Options 1-5 since the level of growth in Aberdeen is lower.

Pipelines – there are a number of pipelines crossing the area transporting oil and natural gas from the North Sea south to Grangemouth and beyond. These generally take a corridor from St Fergus, west of Aberdeen and following the coast south to Angus. The corridor to the north of Aberdeen is considerably wider (up to 22km) than that to the south (max 12km). The one exception to this pattern is the pipeline from Aberdeen to Conon Bridge which passes to the south of Huntly. These pipelines act as a constraint on the growth of a number of settlements, although in some cases it may be possible for development to leapfrog a pipeline corridor. Development adjacent to pipelines is subject to consultation with the Health and Safety Executive who use their PADHI (Planning Advice for Developments near Hazardous Installations) methodology to advise on the acceptability of development proposals. The development of all eight options would be constrained to some extent or another by the existence of these pipeline corridors, although the impacts are settlement specific in terms of potentially constraining the direction of expansion.

Landscape – Areas designated for their national importance are limited to the Cairngorms National Park. Local landscape designations in both Aberdeen City and Aberdeenshire generally follow the coast, river valleys and the upland areas in Aberdeenshire and the higher ground within Aberdeen City. While these impact on a number of settlements in the city region and may influence the pattern of growth proposed at the site-specific level, they are not thought to present a barrier to the implementation to any of the options.

Nature Conservation – A number of settlements are in close proximity to sites identified nationally or internationally for their nature conservation importance. The most important of these, the internationally designated sites, have been covered through the Appropriate Assessment section of this report which shows that all eight options have the potential to have an adverse impact on 'Qualifying Interests'. Sites of Special Scientific Interest (SSSIs) have also been identified in proximity to potential development locations, which would need to be taken into account at the site-specific level when determining the direction of growth. However, these do not have a more strategic influence in terms of determining the most appropriate option for development, since they would not prevent the implementation of an option.

Water Supply - An additional factor in relation to water supply is abstraction from the River Dee SAC referred to in the 'Appropriate Assessment' section above. All parts of Aberdeen and Aberdeenshire are part of a linked system of potable water supply, which takes most of its supply from the River Dee. Scottish Water have licences to extract additional water over that which is currently used, and this would make a significant contribution to future demand. However, SEPA and Scottish Natural Heritage have concerns that the nature conservation interests of the Dee would be prejudiced if this licence were to be taken up, and are currently considering what level of future abstraction may be appropriate. SEPA have been requested to report on this issue early, so as to inform the emerging structure plan. Significant water conservation measures are likely to be required from new development as a precautionary and sustainable measure.

Waste Water – Development on a scale consistent with the high growth scenario would require significant new or upgraded infrastructure to deal with waste water treatment. In

terms of the funding for infrastructure, Scottish Water (including PFI contract holders) and developers both potentially have a role to play. Of all the options, Options 2 and 6 would potentially minimise the need for new or upgraded WWTWs (Waste Water Treatment Works), since there are just three sites currently serving this area, with pumping from Stonehaven to Aberdeen and Blackburn to Inverurie and an additional site in the north of Aberdeen. Both Aberdeen WWTWs are owned and managed under the Private Finance Initiative (PFI). In addition, the WWTWs in Peterhead, Fraserburgh and Banff are also owned and managed under PFI arrangements. Combined sewer overflow problems exist in Aberdeen and a number of other settlements which require action. Actions required to deliver the structure plan could be fed into Scottish Water's 2010 – 2014 Delivery Plan and beyond.

Health – NHS Grampian are adopting a strategy for healthcare which encourages services to be provided locally where this is appropriate but centrally where necessary. Technology and specialisation among GP's are seen as facilitating this process, along with an important role for community hospitals. Even though Option 4 was seen as possibly mirroring this approach, none of the options were seen as incompatible with it. Impacts and opportunities on individual GP practices and community hospitals would need to be assessed when a preferred strategy becomes clearer and when the changes in the structure and size of the population in different areas are clearer.