

Future Water Services Infrastructure Priorities for the Major Growth Sites in and around Cambridge

To: **Joint Strategic Growth Implementation Committee**

Date: **4 November 2009**

From: **Delivery Manager, Cambridgeshire Horizons**

Purpose: **To update JSGIC on progress with the Phase 2 Water Cycle Strategy for the Major Growth Sites in and around Cambridge.**

To seek comments on the priorities that will be used to steer the development of the infrastructure programme.

Recommendation: To comment on the report and agree:

a) the six key criteria for assessing future water services infrastructure options

b) the relative criteria weightings identified at a stakeholder workshop on 16.10.09

c) the development of the infrastructure programme for water services infrastructure based on the criteria and weightings

Contact:	Name: Job Title: E-mail address: Telephone No.	Sheryl French Delivery Manager Sheryl.French@cambridgeshirehorizons.co.uk 01223 714052
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1.0 Background

- 1.1 The Water Cycle Strategy brings key partners together to identify future water services infrastructure (WSI) required to support planned growth. The completed strategy will provide a costed programme of infrastructure delivery and form part of the evidence base for the Local Development Frameworks. Looking ahead, the programme of infrastructure will also be used to inform the forthcoming Community Infrastructure Levy, and be used as a mechanism to bring in additional funding.
- 1.2 The Strategy is developed over three phases: Scoping, Outline (Phase 1) and Detailed (Phase 2). The Outline study for the Major Growth Sites in and around Cambridge was completed in September 2008. This identified the headline water constraints to growth, highlighting the site-specific issues for consideration in the detailed phase.
- 1.3 The Detailed (Phase 2) study was commissioned in February 2009, and identifies WSI solutions (for flood risk management, waste water, water quality and water resource management) to facilitate growth and provides site-specific solutions. This technical phase determines the infrastructure that will deliver water services infrastructure provision. A key issue for this phase, is the level of aspiration that we want to achieve. This can range from business as usual to highly aspirational.

2.0 Developing the Infrastructure Programme

- 2.1 The focus for the Water Cycle Strategy to date has been to deliver sustainable development and aspire towards water neutrality (defined by the Environment Agency as “for every new development, total water use across the wider area after the development must be equal to or less than total water use across the wider area before the developmentⁱⁱ⁾). To shape the emerging infrastructure programme, Halcrow have identified four delivery scenarios, shown in the diagram below.
- 2.2 The Infrastructure Delivery Programme is dependent on which of the four scenarios is the preferred way forward. Indicative infrastructure solutions are highlighted in the third column to provide an example of the different types of solutions dependent on the level of policy ambition that the Water Cycle Strategy is to deliver. To help shape the infrastructure programme it is important that members’ priorities are understood.
- 2.3 To determine Member priorities a set of criteria has been developed and the relative importance of these criteria to each other is being assessed. In addition to the criteria, certain core considerations will be examined across each of the scenarios, given their cross-cutting

nature. Lifetime costs, maintainability and compliance. These impact on solutions whichever scenario is agreed as the way forward.

Scenario	Description	Illustrative example of type of infrastructure which may be included
Baseline	Business as usual PR09 Business Plan <i>(i.e. confident this will be able to be delivered)</i>	Traditional piped wastewater drainage and water supply systems Existing, centralised water resource and wastewater treatment facilities, using standard traditional technology and power sources Meet PPS25 but no improvement sought for downstream flood risk Water consumption as predicted in water company plans - no additional demand management measures
Baseline Alternative	Business as usual + different benefits <i>(i.e. testing value of different solutions but still within what is currently deliverable)</i>	Similar to Baseline but... Source control SUDS as standard for new development Consider options for using alternative wastewater treatment facilities Adopt RSS14 target of 105 l/h/d for water consumption Rainwater harvesting for garden use as standard in new homes
Water Vision	Technically feasible but policy/regulatory barriers	Low carbon energy sources for wastewater treatment and water supply Code for Sustainable Homes level 6 water consumption for all new homes Public education programme on water efficiency Integrated urban drainage philosophy for new developments, and regional scale surface water management solutions Special measures to improve water quality and enhance pollution reduction for surface water drainage
Water Vision +	Technically difficult and policy/regulatory barriers	Wide-scale surface water separation to increase capacity for climate change Integrated urban drainage philosophy for new developments and retrofit SUDS in existing urban areas Low energy wastewater treatment processes (e.g. reedbeds, wetlands) Decentralised (local) wastewater treatment and effluent re-use Community hot water systems Greywater recycling for new homes Water Neutrality - CSH6 in new and existing homes; incentivise reduced consumption through variable tariffs



2.4 It should be noted that the 'baseline' scenario describes the current policy position for new developments. 'Baseline plus' describes forthcoming standards and legislation; in due course this scenario will form the new minimum standards. Both scenarios will be included in the study for information. But the issue for discussion – is how much further should we go in terms of aspiration?

3.0 The Criteria

3.1 To develop the infrastructure programme and determine the most appropriate scenario, a clear set of criteria will be needed to inform the options. These criteria were developed at a workshop in April attended by officers with a knowledge of the range of issues the Water Cycle Strategy will look to address. The criteria include:

- **Carbon emissions:** Considering carbon emissions during construction, installation and operation of new WSI
- **Contribution to biodiversity:** Considering how WSI can contribute to biodiversity through creation of wetland habitats, maintaining and improving environmental water quality, and maintaining flows in watercourses to support natural life
- **Amenity value:** Explores the potential amenity value future WSI options can bring to new and existing communities
- **Commercial viability:** An evaluation of the potential commercial return for new WSI by considering the impact on property value of the various water-related infrastructure
- **Outcome certainty:** Considers the level of technological risk associated with the different WSI solutions
- **Adaptability:** Examines the flexibility and future-proofing of different infrastructure in terms of its ability to handle increased growth levels and adapt to changing legislative requirements

Life time cost, maintainability and compliance are assessed across all solutions.

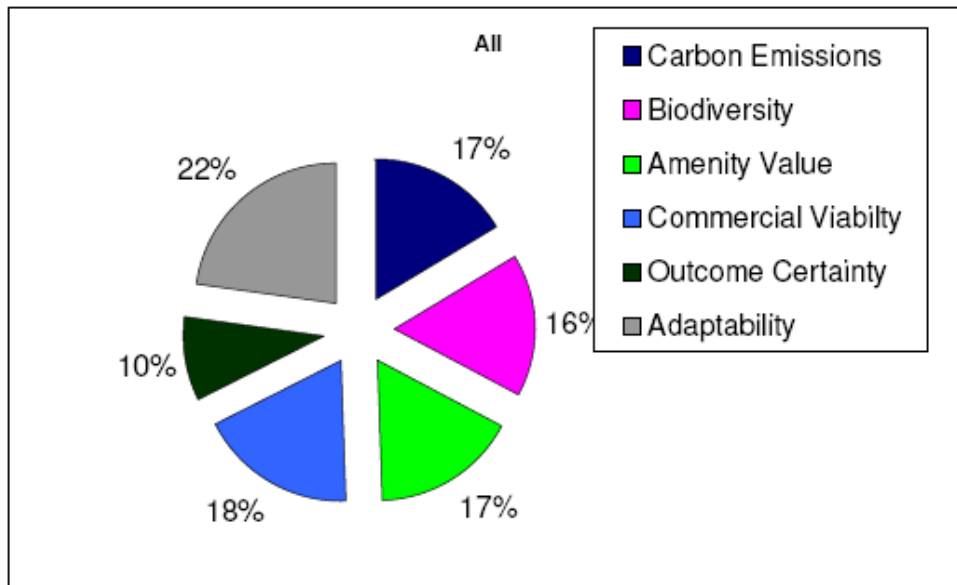
3.2 All the above criteria were agreed as being of central importance to the Strategy. However in order to translate aspiration into an infrastructure programme it is necessary to weight the relative importance of the criteria, to enable prioritisation and to move towards more sustainable approaches to infrastructure.

4.0 How do we assess the criteria and their relative importance?

4.1 A process called Multi-Criteria Analysis (MCA) has been used to assess the criteria. Members and Senior Officers participated in a workshop on 16th October 2009 to help identify the relative importance

of each criterion. For the process and detail on the MCA please see Appendix A.

- 4.2 The result of this workshop is identified in the pie chart below and the relative weighting to be applied to each criteria.



5.0 How will the criteria and their weighting impact on the Infrastructure Programme that will be developed?

5.1 The policy aspiration scenarios (1-4) and the criteria (1-6) will now be used to consider the different types of solutions and options that can be identified for the growth sites to unlock growth and deliver sustainable development.

5.2 For example - Adaptability as a criterion is weighted more highly than Outcome Certainty. This would indicate that it is more important to us to have infrastructure solutions which can be more easily adapted for an unpredictable future compared to those which carry a very low measure of risk. This is not to say that outcome certainty is considered unimportant but that the ability to adapt to a changing future is viewed as more important. The weighting process is all about relative importance. Therefore, if two technical WSI solutions scored equally overall, weighting toward adaptability would tilt the scales in favour of the one that had a higher score for that criterion.

5.3 Another example is that we may wish to consider an aspirational strategy for water resource management but a more business as usual approach to waste water. In this case, we would want to consider recycled grey water for non-potable sources but still conventional treatment of wastewater. Using the mechanism of criteria based assessment, it allows us to try to be flexible and accept that in some areas we may have more opportunity to be innovative.

5.4 A fully worked up example is included in appendix 2.

6.0 Next Steps

6.1 Halcrow are developing the infrastructure programme for WSI. The weighted criteria shown above will now be used by Halcrow to score different infrastructure options and bring forward a preferred programme (or strategy) of infrastructure.

6.2 Developing the Water Cycle Strategy will require further engagement as the technical options are assessed and developed into a programme of works. It is important that members continue to have the opportunity to engage and influence the resulting infrastructure programme.

6.3 Recommendations as per first page of the report.

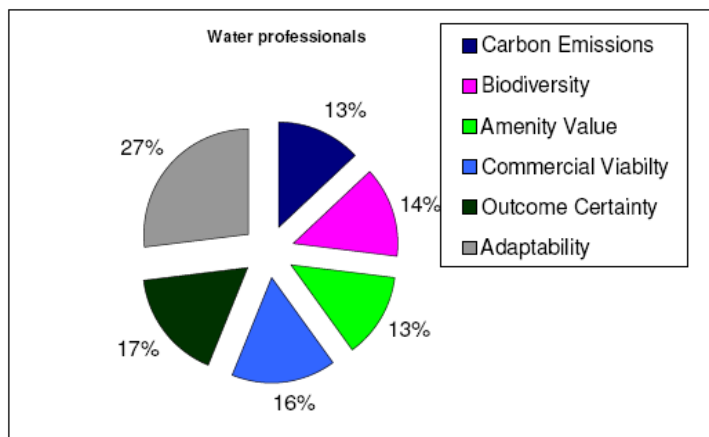
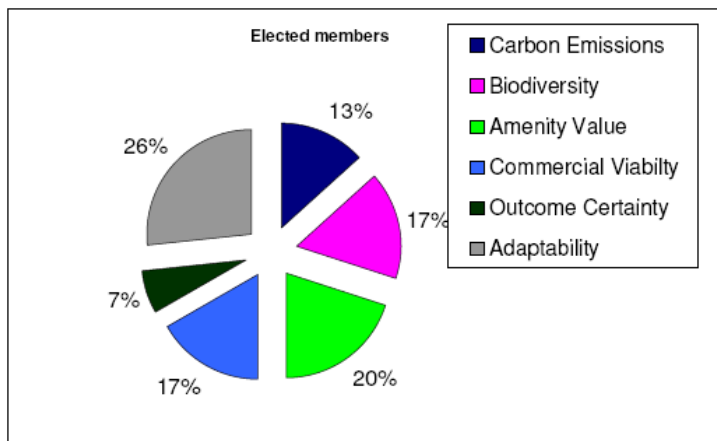
ⁱ Further information regarding Water Neutrality can be found at:

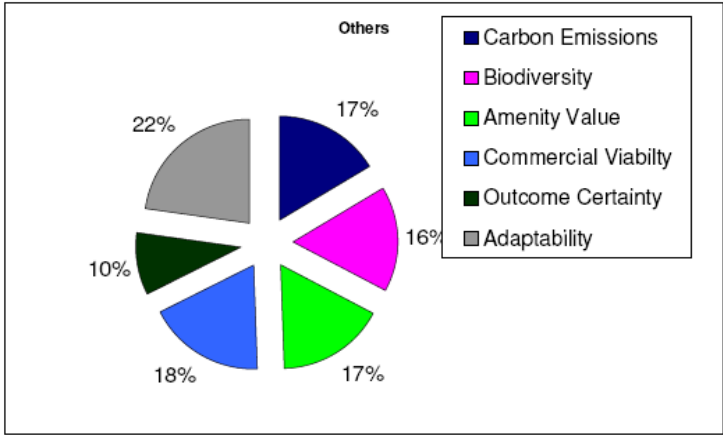
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Appendix 1: Multi Criteria Analysis Workshop 16.10.09

A multi-criteria analysis workshop was held on Friday 16th October, where members, officers and water professionals undertook a prioritisation exercise to rank the six criteria. The full breakdown of results is shown below:

The workshop discussed the six criteria and undertook a prioritisation exercise, which provided a relative weighting for each criterion, the outcome of which is shown below. Results were analysed for all attendees as well as breaking results into sectors: elected members, water-industry professionals, and others (local authority officers, etc), the breakdown of results by sector is shown in appendix 1.





Appendix 2: Worked Example

A2.1 Section 4 of this report described a hypothetical worked example of the criteria weighting process in action. The workings of this weighting process are shown below:

A2.2 A hypothetical decision matrix is shown below to demonstrate how applying the weightings can affect results in practice.

	Carbon	Bio-diversity	Amenity Value	Commercial Viability	Outcome Certainty	Adaptability	Average	Weighted average
Weighting	10	10	30	10	10	10		
Strategy A	2	2	1	3	3	5	2.67	
	50	50	20	30	30	50		38
Strategy B	5	4	1	1	3	1	2.50	
	125	100	20	10	30	10		49

A2.3 Note that whilst hypothetical Strategy A scores highest initially, with an average score of 2.67 compared to Strategy B's 2.50, when we apply the weightings these tilt the scales in the other direction so that Strategy B comes out as our preferred option.

A2.4 This hypothetical example shows how the priorities we express through the weightings actively influence the selection process.

A2.5 We will now consider some of the potential implications of our criteria weightings in relation to our project specific criteria. We will take Adaptability and Outcome Certainty as examples in this case.

A2.6 For example, a scenario could consider an aspirational strategy for water supply, which uses third pipe water supply systems for new development. These allow use of recycled grey water for non-potable sources. Initially this may be for garden use only, but we may want to install systems now which allow us to adapt this to include other non-potable functions in the future, as water availability decreases due to climate change and/or population increases. This would offer us a high degree of adaptability; however, the associated technology is relatively recent in the UK, and its performance is therefore not established over a long period. This means that these types of system carry a relatively high degree of risk in terms of Outcome Certainty (not that they will not work at all; rather that they may not perform exactly as expected, or peoples' behaviours may affect their efficacy, etc). This type of solution might score highly against the Adaptability criterion, but lower against Outcome Certainty.

A2.7 We may be comparing this against a baseline strategy that relies on traditional centralised potable water supply systems. These types of system are less adaptable for future changes. They are, however, very well established in the UK and their performance can therefore be accurately predicted, meaning that they carry a low degree of risk. This type of solution might score highly against the Outcome Certainty criterion, but lower against Adaptability.

	Carbon	Bio-diversity	Amenity Value	Commercial Viability	Outcome Certainty	Adaptability	Avg score	Weighted average score
Weighting	12	20	15	18	5	30		
Baseline (traditional water supply)	2	2	1	3	5	1	2.33	
<i>Weighted score:</i>	24	40	15	54	25	30		31
Aspirational (incl. greywater recycling)	2	2	1	3	1	5	2.33	
<i>Weighted score:</i>	24	40	15	54	5	150		48

A2.8 These two hypothetical strategies are compared in Figure 5.2, using equal scores for all the other criteria and mirror image scores for the two example criteria to facilitate the demonstration. This shows that although both strategies score equally overall, if (as suggested above) we had agreed a higher weighting for the Adaptability criterion than for the Outcome Certainty criterion, then the weighted score shows a clear preference for the more aspirational strategy.

A2.9 This example is entirely hypothetical and is, of course, an extreme simplification of the process to demonstrate how the criteria weightings can influence the outcome of the MCA. Once scenarios have been developed it will be easier to assess the implications of the weightings and the sensitivity of outcomes, at which point the stakeholder group may decide that it would be of value to revisit the process.