

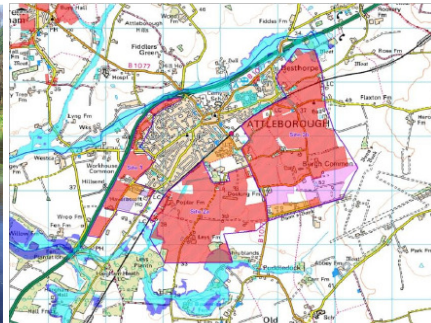
Breckland Council

Breckland Water Cycle Study

Outline Study

Non-Technical Summary

November 2008



Prepared for:

Revision Schedule

Breckland Water Cycle Study – Outline Study November 2008

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01	27.10.2008	Draft Non-Technical Summary	Sarah Kelly Assistant Water Specialist	Carl Pelling Senior Consultant - Water	Damon O'Brien Technical Director
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Breckland Water Cycle Study

Breckland is set to become one of the fastest growing areas in the East of England. Over the period 2001 to 2021, it is expected that up to 15,200 homes will be built within the Breckland area, representing a challenge to Breckland District Council (BDC) in ensuring the environment has the capacity to sustain this level of proposed growth and development.

In Breckland, the draft Local Development Framework (LDF) Core Strategy, in line with the East of England Regional Spatial Strategy (RSS) and national planning policy, will focus growth (up to 2026) to sustainable locations where services, jobs and infrastructure exist. A revised preferred options of the Core Strategy, published and consulted on in early 2008, identified the market towns of Attleborough, Dereham, Swaffham and Watton as sustainable locations for growth. Thetford, identified as a Key Centre for Development and Change in the RSS and a National Growth Point by Communities and Local Government, has had a separate Outline Water Cycle Study (WCS).

The Breckland district, located in central Norfolk, is predominantly rural and covers an area of 1,300km². Around half of the District's 121,000 population lives in the five towns of Thetford, Dereham, Attleborough, Swaffham and Watton. Agriculture, predominately arable farming, is a key economic activity in the Breckland area and requires significant water resources to grow crops and for use in the associated processing industries.

The East Anglian climate is one of relatively cold winters and dry summers and results in region being 34% drier and 6% hotter than the average for England and Wales. The Breckland District is underlain by Chalk which is a significant aquifer. Groundwater from aquifers such as these provides by far the greatest proportion of public water supply in East Anglia, via groundwater abstractions. However a number of these abstractions have been under investigation over their impact on protected sites of nature conservation which rely on water levels to support their habitats and ecosystems e.g. Special Areas of Conservation (SAC) and Sites of Special Scientific Interest (SSSI). Summer surface water in rivers in the region is committed to existing abstractions and Breckland is one of two areas in Norfolk where winter river flow is not generally available for abstraction. Large areas of the District have been identified by the Environment Agency as Nitrate and Groundwater Vulnerable Zones, and this is at least in part due to lack of available dilution due to generally low average rainfall.



Breckland is divided by a watershed which dissects the District along the clay plateau which runs north-south through the district until just north of Attleborough. This means that rainfall falling just to the west of the central plateau and South of Attleborough is channelled into streams and rivers flowing westwards (The River Wissey, Watton Brook and River Thet) where they eventually join the wash. Rainfall falling to the north of Attleborough but east of the plateau is channelled into streams and rivers flowing eastwards towards the Broads (River Tud, Wending Beck and the Blackwater River). The significance of the watershed is that the major towns of the district (with the exception of Thetford) are located near to the headwaters of streams or rivers, where water available for abstraction and dilution of discharges is much less in the summer. In addition, several of these rivers are of European, National and Local Designation and include Local Nature Reserves.

Localised flooding as a result of poor land drainage is regarded as a significant local issue for several communities in Breckland, though Breckland's geographical position with respect to the watershed and it being on the upper reaches of several watercourse means that the scale of fluvial flooding is limited.

In order to assess these and other associated water issues, a Breckland WCS Project Steering Group was assembled to manage the delivery of a WCS for the district. This Group is made up of representatives from Breckland Council, Environment Agency, Norfolk County Council, Anglian Water Services, and Natural England, all of which have a vested interest in future development in the Breckland District and/or its impact on water cycle infrastructure and environment.

The Water Cycle

In its simplest form, the Water Cycle can be defined as ‘the process by which water is continually recycling between the earth’s surface and the atmosphere’. Without considering human influences, it is simply the process by which rain falls, and either flows over the earth’s surface or is stored (as groundwater, ice or lakes) and is then returned to the atmosphere (via evaporation from the sea, the soil, surface water or animal and plant life) ready for the whole process to repeat again.

In the context of this study, the ‘water cycle’ has a broader definition than the simple water or ‘hydrological’ cycle. The human influence on the water cycle introduces many new factors into the cycle through the need to abstract water from the natural environment, use it for numerous purposes and then return to the natural system. The development and introduction of technology such as pipes, pumps, drains, and chemical treatment processes has meant that human development has been able to manipulate the natural water cycle to suit its needs and to facilitate growth and development. ‘Water Cycle’ in this context is therefore defined as both the natural water related environment (such as rivers, wetland ecosystems, aquifers etc), and the water infrastructure (hard engineering focused elements such as: water treatment works, supply pipelines and pumping stations) which are used by human activity to manipulate the cycle.

In directly manipulating elements of the water cycle, man affects many changes to the natural water cycle which can often be negative. To facilitate growth and development, there is a requirement for clean water supply which is taken from natural sources (often depleting groundwater stores or surface systems); the treatment of waste water which has to be returned to the system (affecting the quality of receiving waters); and the alteration and management of natural surface water flow paths which has implications for flood risk. These impacts can indirectly affect ecology which can be dependent on the natural features of a water cycle for example wading birds and wetland habitat, or brown trout breeding in a Chalk stream which derives much of its flow from groundwater sources.

In many parts of the UK, some elements of the natural water cycle are considered to be at, or close to their limit in terms of how much more they can be manipulated. This is especially relevant for the east of England where rainfall and hence available water for supply is the lowest in the UK. Further development will lead to an increase in demand for water supply and a commensurate increase in the requirement for waste water treatment; in addition, flood risk may increase if development is not planned for in a strategic manner. The sustainability of the natural elements of the water cycle is therefore at risk.

A WCS is an ideal solution to address this problem. It will ensure that the sustainability of new development is considered with respect to the water cycle, and that new water infrastructure introduced to facilitate growth is planned for in a strategic manner; in so doing, the WCS can ensure that provision of water infrastructure is sufficient such that it maintains a sustainable level of manipulation of the natural water cycle.

Proposed Development and Planning Process

As part of Breckland District Council's overall strategy to meet future growth targets set out in the draft RSS in a sustainable way, the WCS will make up one of a number of strategic studies and plans which will form part of the evidence base supporting the production of Breckland District Council's Local Development Framework (LDF). Specifically, the WCS will form an important evidence base of the Breckland Core Strategy making up part the LDF, as well as providing input to the development of area specific and Development Control Development Plans Documents (DPD) and Supplementary Planning Documents to assist in ensuring the delivery of water cycle management requirements at the local planning application level. Additionally, the WCS will provide justification for the planning of new infrastructure in Anglian Water Service's strategic business planning and provide the Environment Agency and Natural England with a strategic study that identifies and suggests mitigation for potential water environment impacts (including flood risk) such that sustainable development is proposed in the Breckland District and that objections to develop in the District are minimised.

As part of the LDF process, Local Planning Authorities are required to produce evidence based studies which support the selection processes used in deciding on final growth targets and areas to be promoted for growth. The Breckland Water Cycle Study has tested the suitability of the proposed development areas within each of the four towns of Attleborough, Dereham, Swaffham and Watton in the Breckland District taking into account existing and new water infrastructure, whilst considering the impacts of proposed growth to the receiving water cycle environment. The LDF will define the specific site allocations to be taken forward, so at this stage the assessment has been limited to the broad scale and location of growth within each town. The specific detail of delivering the scale of growth should be considered through further technical work to assist the delivery of the LDF.

The water cycle study looked at the growth of around 6,750 homes and 4,700 jobs between 2008 and 2026 within the four towns of Attleborough, Dereham, Swaffham and Watton to quantify the implications of growth. The approximate figures assessed were:

- 4,400 homes and 2,000 jobs within Attleborough;
- 925 homes and 1,800 jobs within Dereham;
- 900 homes and 650 jobs in Swaffham; and
- 525 homes and 250 jobs in Watton.

The majority of the growth is allocated for the town of Attleborough, with only a small increase in the smaller towns of Swaffham and Watton. Sixty-Five percent of the District's employment growth will occur within Attleborough and Dereham. The housing volumes were converted into population estimates to assess the impacts of the growth within the towns on the water cycle.

Water Company Planning

Financial and Asset Planning

Anglian Water Services are responsible for providing both sewerage and wastewater treatment, and the supply of clean water for the Breckland District. Water companies currently plan for Asset Management and infrastructure upgrades and the financial procurement required for these through the Asset Management Plan process which runs in 5-year cycles. The Office of Water Services (OFWAT) is the economic regulator of the water and sewerage industry in England and Wales, and regulates this overall process, deciding on the money available to spend on infrastructure in consultation with the Environment Agency, the Drinking Water Inspectorate (DWI) and consumer groups such as the Consumer Council for Water. The outcome is a Business Plan which is produced by each Water Company setting out the required asset investment over the next 5 year period, the justification for it and the price increases required to fund it.

This consultation process is known as the Periodic Review (PR). Water Companies are preparing for Price Review 2009 (PR09), whereby they are currently drafting their Strategic Business Plans which seek funding for asset investment for the 5 year period covering 2010 – 2015 (known as AMP5). It therefore follows that any new asset (or infrastructure) investment required to meet the requirements of the WCS needs to feed into the drafting of the Strategic Business Plan for PR09. OFWAT will determine the final price limits from this process in November 2009.

If significant water cycle infrastructure requirements are not included in this current price review (PR09), the funding cannot be sought for it until the next Price Review towards the end of AMP5 (PR14) which would result in funding not being available until AMP6 running from 2015 -2020. Water companies are able to submit interim determinations within the 5 year AMP cycles to seek funding for unforeseen investment requirements; however it is considered that infrastructure for planned development should be planned for in sufficient time for to be included in the relevant Business Plan and Price Review.

Water Resource Planning

Water companies are now required to produce Water Resource Management Plans (WRMP) on a statutory basis covering 25 year planning horizons. WRMPs set out how a water company plans to provide and invest in existing and new water resource schemes (e.g. reservoirs, desalination) to meet increases in demand for potable supply, as a result of new development, population growth and climate change over the next 25 year period. When complete, the new statutory WRMPs will be updated in 5-yearly cycles to coincide with the Price Review and AMP process.

At the time of undertaking the Breckland WCS, AWS are in the process of consulting on their draft WRMP09; the WCS has made use of this draft to inform the water resources assessment for growth in Breckland. However, until such time as consultation is complete and the WRMP09 is approved and published in 2009, it is not possible to state with any certainty as to what options will be taken forward.

Water Framework Directive Planning

The WFD was passed into UK law in 2003. The overall requirement of the directive is that all river basins must achieve “good ecological status” by 2015 unless there are grounds for derogation. The WFD will, for the first time, combine water quantity and water quality issues together. An integrated approach to the management of all freshwater bodies, groundwaters, estuaries and coastal waters at the river basin level will be adopted. It will effectively supersede all water related legislation which drives the existing licensing and consenting framework in the UK.

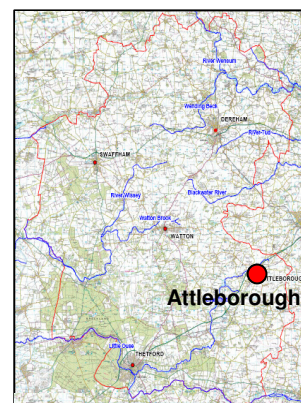
UKTAG1, the advisory body responsible for the implementation of the WFD in the UK, has proposed water quality, ecology, water abstraction and river flow standards to be adopted in order to ensure that water bodies in the UK (including groundwater) meet the required status. These are currently in draft form and will not be formalised until the final River Basin Management Plans are finalised in December 2009 (prior to European Commission sign off). Though it has not been possible to undertake a full assessment of the impact of trying to meet the new WFD standards, the WCS is required to consider the longer term issues with respect to the water cycle and water environment and as such, an assessment of the impact of the interim WFD standards has been undertaken for this study.

¹ The UKTAG (UK Technical Advisory Group) is a working group of experts drawn from environment and conservation agencies. It was formed to provide technical advice to the UK's government administrations and its own member agencies. The UKTAG also includes representatives from the Republic of Ireland.

Attleborough

Water Environment and Flood Risk

Attleborough Waste Water Treatment Works (WWTW), which serves the town of Attleborough and will receive all additional wastewater generated from the proposed growth in the town, discharges into the River Thet. There is currently a significant failure of water quality downstream of Attleborough WWTW, particularly with regards to Dissolved Oxygen (DO) concentrations which are failing to meet the required standard under the existing Environment Agency's River Ecosystem Classification scheme. Strategic investment will be required in wastewater treatment in order to treat the Phosphate, Biochemical Oxygen Demand (BOD) and ammonia discharges from current as well as additional wastewater, in conjunction with measures to reduce diffuse sources of pollution, to meet the proposed WFD standards and improve DO concentrations in the River Thet.



Increase in the use of the existing abstraction licence capacity near Attleborough has the potential to impact on three European designated sites (Norfolk Valley Fens SAC, Breckland SAC and Breckland SPA) and 10 water sensitive Sites of Special Scientific Interest. Additionally there is limited spare capacity in the existing groundwater and surface water resources which could limit development of local sources further.

Fluvial flooding and occasional surface water flooding have been reported within the town of Attleborough. However, suitable development options exist that will avoid flood risk areas or allow mitigation of the flooding sources by, for example, regularly cleaning the ditches to avoid flooding from blockages and not developing on the floodplain. Additionally, assessments have shown that the physical capacity of the River Thet is sufficient to accommodate the additional wastewater discharge that would be generated by the growth in the town, without increasing downstream flood risk.

There will be a requirement to provide site specific mitigation in the form of Sustainable Drainage Systems (SUDS) in the town to manage surface water generated by the development. A range of infiltration SUDS and surface water attenuation are likely to be required due the designation of parts of the proposed development areas within Groundwater Source Protection Zones.

Water Resources and Water Supply

It is predicted that Attleborough will have a significant water deficit of around 4 MI/d by 2026. In the short-term there is likely to be capacity in existing abstraction licences from the Old Buckenham borehole source near Attleborough to meet the increased demand but significant investment in new water resources is required long-term, e.g. by strengthening the links between Attleborough and Watton, allowing water to be pumped from the Carbrooke borehole near Watton, or from the Great Ouse Groundwater Scheme (GOGS).

Wastewater Treatment

Attleborough WWTW has limited capacity in terms of the additional wastewater it can treat up to 2026. The treatment works will require major investment beyond 2013 with it considered that the most cost efficient and sustainable option will be to expand the existing works. The current performance of the works is good, but with the increased effluent load and more stringent water quality standards under the WFD, as mentioned above, there will be a requirement to tighten the BOD, ammonia and Phosphate effluent discharge consents in the future.

Wastewater Network

The existing wastewater network infrastructure within Attleborough can only support less than half the 4,400 new properties and 2,000 jobs proposed growth. The remaining growth would have to be accommodated with new infrastructure. Development to the northwest of the town may be able to drain into the existing sewer network, requiring minor site specific investment, whereas new strategic infrastructure is required to supply the development within greenfield areas to the south of the town.

Dereham

Water Environment and Flood Risk

Dereham Waste Water Treatment Works (WWTW), which serves the town of Dereham and will receive all additional effluent generated from the proposed growth in the town, discharges into the Wendling Beck. There is currently a failure of water quality downstream of Dereham WWTW, particularly with regards to Dissolved Oxygen (DO) concentrations which are failing to meet the required standard under the existing Environment Agency's River Ecosystem Classification scheme. Strategic investment will be required in wastewater treatment in order to treat Phosphate discharge from current and additional wastewater, in conjunction with measures to reduce diffuse sources of pollution, to meet the proposed WFD standards and improve DO concentrations in Wendling Beck.



Increase in the use of the existing abstraction licence capacity near Dereham has the potential to impact on three European designated sites (Norfolk Valley Fens SAC, Broads SAC and Broadlands SPA/Ramsar) and 6 water sensitive Sites of Special Scientific Interest, which may impact on the Bure Broads and Marshes SSSI (the principal relevant element of the Broads SAC/Broadlands SPA). Additionally there is limited spare capacity in the existing groundwater and surface water resources which could limit development of local sources further.

Historically fluvial flooding (from Dereham Stream) and occasional surface water flooding has been reported within the town of Dereham, with the town identified as a hotspot for sewer flooding. However, suitable development options exist that will avoid flood risk areas or allow mitigation of the flooding sources by, for example, regularly cleaning the gullies to avoid flooding from blocked gullies, not developing on the floodplain, and avoiding discharge of wastewater to problematic sewers. Additionally, assessments have shown that the physical capacity of Wendling Beck is sufficient to accommodate the additional wastewater generated by the growth in the town, without increasing downstream flood risk

There will be a requirement to provide site specific mitigation in the form of Sustainable Drainage Systems (SUDS) to development in the town to manage surface water generated by the development. A range of infiltration SUDS and surface water attenuation are likely to be required due to the designation of parts of the proposed development areas within groundwater Source Protection Zones.

Water Resources and Water Supply

It is predicted that Dereham will have a water deficit of less than 1 Ml/d by 2026. In the short-term there is likely to be capacity in existing abstraction licences from the Beetly borehole amongst others near Dereham to meet the increased demand but significant investment in new water resources is required long-term, e.g. by strengthening the links between Dereham and Watton, allowing water to be pumped from the Carbrooke borehole near Watton, or from the Great Ouse Groundwater Scheme (GOGS).

Wastewater Treatment

Dereham WWTW has available capacity in terms of the additional wastewater it can treat to accommodate the proposed growth up to 2026. The current performance of the works is good, but with the increased effluent load and more stringent water quality standards under the WFD, as mentioned above, there may be a requirement to tighten the ammonia and Phosphate effluent discharge consents in the future.

Wastewater Network

There may be scope for new housing development to be served by the existing trunk sewer that serves the WWTW if development is located to the west of the town. Any significant new development to the east of the town is likely to require new strategic infrastructure to supply the new development.

Swaffham

Water Environment and Flood Risk

Swaffham Waste Water Treatment Works (WWTW), which serves the town of Swaffham and will receive all additional wastewater generated from the proposed growth in the town, discharges into the River Wissey. The river is currently assessed as having good water quality and meets the required standards under the Environment Agency's River Ecosystem Classification scheme. However, strategic investment will be required in wastewater treatment in order to treat the Phosphate discharge from current and additional wastewater, in conjunction with measures to reduce diffuse sources of pollution, to meet the proposed WFD standards for the River Wissey.



Increase in the use of the existing abstraction licence capacity (in conjunction with Watton) has the potential to impact on one European designated site (Norfolk Valley Fens SAC), 5 water sensitive Sites of Special Scientific Interest and 4 County Wildlife Sites. Additionally there is limited spare capacity in the existing groundwater and surface water resources which could limit development of local sources further.

Historically sewer flooding has been reported in the north of the town. However, suitable development options exist that will avoid flood risk areas or allow mitigation of the flooding sources by, for example, locating development away from the historical sources of sewer flooding. Additionally, assessments have shown that the physical capacity of the River Wissey is sufficient to accommodate the additional discharge generated by the growth in the town, without increasing flood risk downstream.

There will be a requirement to provide site specific mitigation in the form of Sustainable Drainage Systems (SUDS) to development in the town to manage surface water generated by the development. A range of infiltration SUDS and surface water attenuation are likely to be required due to the designation of parts of the proposed development areas within groundwater Source Protection Zones. Runoff and infiltration will need to be carefully designed to reduce the risk to the major water supply abstraction to the west of the town as the developments within Swaffham will be up gradient of this source.

Water Resources and Water Supply

It is predicted that Swaffham will have a water deficit of around 0.5 Ml/d by 2026. In the short-term there is likely to be capacity in existing abstraction licences from the North Pickenham borehole amongst others near Swaffham, to meet the increased demand but significant investment in new water resources is required long-term, e.g. by strengthening the links between Swaffham and Watton, allowing water to be pumped from the Carbrooke borehole near Watton, or from the Great Ouse Groundwater Scheme (GOGS).

Wastewater Treatment

Swaffham WWTW has available capacity in terms of the additional effluent discharge it can process up to 2026. The current performance of the works is good, but with the increased effluent load and more stringent water quality standards under the WFD there may be a requirement to tighten the BOD, ammonia and Phosphate effluent discharge consents in the future.

Wastewater Network

The existing wastewater network infrastructure within Swaffham will require a new trunk sewer draining directly to the WWTW to serve development to the south of the town. Similarly, development to the west of the town would require significant strategic infrastructure to serve this area, and it is a significant distance from the existing WWTW. Small sized developments could be accommodated with existing infrastructure in northeast of the town.

Watton

Water Environment and Flood Risk

Watton Waste Water Treatment Works (WWTW), which serves the town of Watton and will receive all additional wastewater generated from the proposed growth in the town, discharges into Watton Brook. The river is currently assessed as having good water quality and meets the required standards under the Environment Agency's River Ecosystem Classification scheme. However, strategic investment will be required in wastewater treatment in order to treat the Phosphate discharge from current and additional wastewater, in conjunction with measures to reduce diffuse sources of pollution, to meet the proposed WFD standards for Watton Brook.



Increase in the use of the existing abstraction licence capacity (in conjunction with Swaffham) has the potential to impact on one European designated site (Norfolk Valley Fens SAC), 5 water sensitive Sites of Special Scientific Interest and 4 County Wildlife Sites. Additionally there is limited spare capacity in the existing groundwater and surface water resources which could limit development of local sources further.

Historically fluvial and sewer flooding has been reported in the town. However, suitable development options exist that will avoid flood risk areas or allow mitigation of the flooding sources by locating development away from the historical sources of sewer flooding and not developing on the floodplain, but in some cases these are limited to parts of the identified Development Areas. Additionally, assessments have shown that the physical capacity of Watton Brook is sufficient to accommodate the additional wastewater discharge generated by the growth in the town, without increasing flood risk downstream.

There will be a requirement to provide site specific mitigation in the form of Sustainable Drainage Systems (SUDS) to development in the town to manage surface water generated by the development. A range of infiltration SUDS and surface water attenuation are likely to be required due to the designation of parts of the proposed development areas within groundwater Source Protection Zones. Runoff and infiltration will need to be carefully designed to reduce any risk to the Thetford abstraction sources as Watton is up gradient of these sources.

Water Resources and Water Supply

It is predicted that Watton will have a slight water surplus by 2026 and therefore significant investment in new water resources is unlikely to be required. The extra demand exerted by the proposed development could be met by the Carbrooke borehole source near Watton and this supply strategy would leave sufficient spare licence at Carbrooke in order to meet the extra demands from either Attleborough or Swaffham/Dereham.

Wastewater Treatment

Watton WWTW has available capacity in terms of the additional effluent discharge it can process, to accommodate the proposed growth up to 2026. The current performance of the works is good, but with the increased effluent load and more stringent water quality standards under the WFD, as mentioned above, there may be a requirement to tighten the Phosphate effluent discharge consent in the future.

Wastewater Network

The existing wastewater network infrastructure within Watton may be able to accommodate the proposed growth via the existing trunk sewer that serves the WWTW if development is located in south and west of the town; development to the east (using existing infrastructure) of the town would increase the risk of sewer flooding in the town centre detailed assessment or modelling of the existing network is necessary to determine the presence of headroom within the system to support development in the northern and eastern sections of the town, and it is likely that strategic infrastructure will be required should development be located in these areas.

Sustainable Development

The East of England RSS, among other statutory drivers, has high level policy requirements for development to be sustainable, ensuring that new development is located, designed and implemented in such a way to allow for sustainable provision of water supply and enable timely investment in wastewater treatment and discharge systems to maintain the required standard of water quality. The Breckland WCS aims to meet these requirements by suggesting ways to protect water quality, meet water demand, and provide recommendations for ensuring a sustainable approach to development, including the uses of water efficiency measures, sustainable drainage systems and the production of a developer checklist.

Water Efficiency

Many areas of the country are considered to be water scarce, where there is little or no water available for new developments or other increases in demand. New water efficient developments can be accommodated in areas where existing houses have improved their efficiency so that the water made available by the existing development, can be taken up by the new development. This would mean that there is no additional stress on resources as supply is made up from existing sources. This concept is referred to as achieving 'water neutrality'.

In combination with water efficient measures being undertaken by Anglian Water Services which include maintaining leakage levels at the economic level of leakage and the promotion of schemes to reduce demand, such as the use cistern displacement devices, domestic water audits, and targeted metering, further water saving measures should be investigated, including the fitting of water meters, low flush toilets, low flow showerheads and water butts for gardens.

An assessment of the feasibility of achieving water neutrality was undertaken for the Breckland as a whole and for the individual growth locations of Attleborough, Watton, Swaffham and Dereham. This outline assessment indicated that:

- If retrofitting of water efficient devices was introduced to existing housing stock (without the need for metering), and new housing stock achieved a level 3 or 4 in the code for sustainable homes (CSH), development in Dereham could potentially not require additional water resources and hence be 'water neutral';
- New development in Swaffham would likely require all existing housing stock toilets to be fitted with low flushing replacements as well as retrofitting of water efficient devices, to achieve water neutrality but new development would potentially only need to meet level 1 or level 2 in the CSH;
- Development in Watton would require all existing housing stock toilets to be fitted with low flushing replacements as well as retrofitting of water efficient devices and new housing stock would likely have to meet levels 5 and 6 in the CSH; and
- Development in Attleborough is so significant that water neutrality is not likely to be possible, even if new development reaches codes 5 and 6, and all existing development have new low flushing toilets, retrofitted water saving devices and were put onto meters. New water supplies would still be required to provide the new development with potable water.

Sustainable Drainage Systems (SUDS)

Sustainable Drainage Systems (SUDS) seek to manage surface water as close to its source as possible, mimicking surface water flows arising from the site, prior to the proposed development. Typically this approach involves a move away from piped systems to softer engineering solutions inspired by natural drainage processes. Wherever possible, a SUDS technique should seek to manage flood risk and surface water, maximise green infrastructure linkage (i.e. water storage such as ponds within green open spaces or green river corridors with natural floodplain), maximise ecological enhancement, maximise water quality benefits, and contribute towards the point system for Code for Sustainable Homes grading.

SUDS should initially include infiltration methods such as soakaways and permeable surfacing of roads, drives and parking areas to allow infiltration of water into the surrounding ground and prevent additional runoff into drains. Alternatively detention ponds and tanks, which collect rainfall and surface runoff from a site and discharge into the receiving watercourse through a pipe or overflow system, can be employed where infiltration is problematic or it is affected by the designation of groundwater source protection zones. Rainwater harvesting, the collection of water from roofs and other surfaces into storage tanks, can be implemented to provide water to flush toilets, water gardens and even feed washing machines.

Green areas and open space should be maximised for large development areas where the soil and geology is sufficiently permeable to make it a feasible option. Much of the Breckland District is underlain by permeable geology such as Chalk or Sands and Gravels, with the Chalk considered a major aquifer used for public supply, and therefore due regard needs to be paid to protection of groundwater from pollution pathways that can be created by poorly managed or badly located infiltration SUDS.

Developer Guidance

A Developer Guidance Checklist has been produced to provide guidance and aid understanding for developers on the requirements they need to meet in order to comply with the strategy produced from the WCS. Developers would be asked to use the water cycle developer checklist as part of the planning application process and submit a completed version with their planning applications. As a statutory consultee with regards to flood risk and the water environment, the Environment Agency will need to sign up to the checklist alongside Breckland Council, Natural England and Anglian Water Services. The adoption of the checklist, which refers to different levels of policy, should ensure the sustainable delivery of housing with respect to the Water Cycle and Water Environment.

Detailed Water Cycle Study

The Outline WCS has identified where there are capacity issues with the natural water environment and water infrastructure with respect to proposed growth in the district of Breckland. It has considered how these capacity issues may affect the timing, location and amount of growth in the district and has suggested outline options for how these capacity issues could be overcome dependent on subsequent decisions on the final options for development areas and locations. This information will be used as an evidence base to Breckland District Council's Core Strategy and core policies.

Once the LDF process has moved to the next stage, the Detailed WCS will be commenced to determine the specific options required for the finalised location options and numbers for development. The Detailed Study will also consider how the outline guidance on water efficiency, sustainable design and developer guidance can be further progressed to make them directly applicable to the finalised allocation options.

Summary and Recommendations

Summary

- There is limited capacity at Attleborough waste water treatment works to accept the proposed increase in wastewater generated from growth in the town. Expansion of the works at Attleborough is likely to be required to accommodate the growth beyond 2013.
- The projected growth at Attleborough will require investment in treatment process at the treatment works such that the additional wastewater discharge is treated to a better quality, particularly with respect to BOD and ammonia but this is considered to be within the capability of current technology.
- Water quality downstream of Attleborough and Dereham is currently exceeding the Environment Agency standards for Dissolved Oxygen and hence measures, which could include reed beds, weirs, reaeration, will be required to improve the quality of these rivers.
- All rivers in the towns of Attleborough, Dereham, Swaffham and Watton in the Breckland District WCS currently fail to meet good ecological status under the draft WFD standards for Phosphate. At this stage it is not known whether the river ecology has been impacted by the current high levels of phosphorous but any additional increases should be mitigated, both from waste water treatment work discharges and diffuse sources within the wider Breckland catchments.
- Water cycle infrastructure will be required to meet the growth in the four towns, though the extent or timescales in which it will be required may be delayed dependent on the use and success of water efficiency measures.
- There are no overriding flood risk constraints to any of the development areas in any of the four towns that would require significant flood risk management or mitigation; however development in the east of Watton would require new strategic wastewater network infrastructure to avoid exacerbating flood risk.
- Attleborough, Dereham and Swaffham are predicted to have limited water resource availability up to 2026 and will require water to be pumped from other sources to meet the increased demand.
- A large number of protected sites (SAC, SPA and SSSI) are present within the Breckland District, including the Norfolk Valley Fens SAC which is dependent on natural flow of water up from the underlying Chalk aquifer and are therefore sensitive to changes in the water levels.
- The use of water efficiency measures and sustainable drainage systems should be employed to provide sustainable development in the Breckland District and reduce water supply demands and the volume of water being discharged to the local watercourses. Water neutrality is theoretically possible in Dereham and Swaffham.

Recommendations

- The site specific allocation and phasing of development will need to be determined as part of the Breckland District Council Local Development Framework (LDF) process to ensure that infrastructure is provided where and when required.
- In conjunction with this the Phase 2 Detailed WCS should be undertaken to further consider and investigate the impacts of the proposed site specific developments on the water environment and resources and ensure that development is sustainable particularly with regard to water efficiency and sustainable urban drainage.
- Further, within each town, the phasing of the development areas will need to be defined to ensure that adequate resources and infrastructure are provided in the right place at the right time.