

7. Overall Conclusions and Recommendations

7.1 Water Quality

7.1.1 Water Quality of Receiving Waters

Water quality modelling of the Flood Relief Channel shows that increasing the flow of wastewater from Downham Market Wastewater Treatment Works (WwTW) related to growth and planned abstraction by Palm Papers would have very little impact on water quality in the channel. SIMCAT modelling of the impact of increased wastewater flows from the smaller inland works likewise showed only a marginal impact with the possible exception of Harpley WwTW where a greater change in downstream Phosphorus concentrations was predicted. Overall, however, the impacts of growth on impacts of inland WwTWs on downstream water quality are considered to be small and will, therefore, not place any constraint on growth.

7.1.2 Bathing Waters Compliance

Growth in the urban area of King's Lynn should have no effects on Bathing Waters compliance at Heacham and Hunstanton. Local growth around Heacham and Hunstanton may affect management of the surface water and wastewater systems but is unlikely to constitute a significant constraint on growth. The projected increase in incoming DWFs to Heacham WwTW is relatively small, in the order of 4-5% (current PE served is 31,700) and other sources of bacteria are believed to be important. Anglian Water is carrying out investigations to determine the sources of the contamination.

7.2 Sewage Infrastructure Requirements and Costings

Infoworks models for the sewerage networks were updated by AWS to reflect recent and planned future upgrades to the system, and used to model the impact of the proposed growth scenarios and alternative development configurations, with appropriate allowances for climate change. Two scenarios were modelled i) no hydraulic detriment compared to the baseline future scenario i.e. no increase in flooding frequency and ii) no flooding under the 30 year event. Capital cost estimates were derived for upgrades required to the existing system i.e. outside the development sites.

7.2.1 Downham Market

At Downham Market options at four alternative development sites were considered for the additional allocation of 500 dwellings. The solutions considered and the infrastructure upgrades required to produce are presented.

At Development Site 1, Area 1a could be drained by gravity to connect with the existing sewer, whereas Area 1b would require pumping and is also a further distance from a suitable connection point to the existing sewer. The proposed model was run with the majority of the new housing allocation located at Area 1a, and a smaller number

at Area 2a (850 and 250 population respectively). Two options were considered for configuring the sewerage system; both require pipeline upgrades and storage. However, Option 1 is for storage at the WwTW while Option 2 incorporates online storage. There are space constraints at the WwTW site which may limit the options for incorporating storage there.

At development Site 2, Option 1 would involve gravity drainage while Option 2 would require a small area to be pumped. Sites 3 and 4 are located more remotely from the WwTW; for Site 3, sewerage from all or part of the site would need to be pumped, and at Site 4 part of the site would require pumping. For the development of Site 4 there is an option to provide storage at Hythe Pumping Station instead of Downham Market WwTW.

Estimated capital costs for each option are provided to determine the most cost-effective option.

7.2.2 Hunstanton

At Hunstanton the modelling for both Sites 1 and 2 showed there were no system capacity constraints with the proposed growth scenarios, therefore no upgrading will be required.

7.2.3 King's Lynn

At King's Lynn four development configurations (scenarios) were considered, combining infill housing within King's Lynn itself (4,768 dwellings) and development to the northeast and/or the south of the town. Only Scenario 4 incorporated all of the proposed growth to 2026. All scenarios required upgrading of several Pumping Stations (at Gaywood, Gaywood Park, Purfleet Quay, Austin Field, Millfleet and Nar Lane), upgrading of pipelines, and several weir crests would need raising.

Estimated capital costs for each option are provided to determine the most cost-effective option.

7.2.4 Wisbech

AWS are completing their modelling of the Wisbech sewerage network and a report on infrastructure requirements and costs will be issued separately in the future.

7.3 Flood Risk and Drainage

7.3.1 Flood Risk and Development

The Addendum to the Level 1 Strategic Flood Risk Assessment for King's Lynn completed by Entec in April 2010 determined that redevelopment of the urban area of King's Lynn is considered necessary to deliver wider sustainability benefits to the community which could be considered to outweigh risks to flooding. Residential developments proposed in Flood Zone 3 will need to demonstrate the development contributes to the regeneration objectives of the town in order to meet Part A of the Exception Test of PPS25.

Detailed Flood Risk Assessments will be required for all applications within Flood Zone 3 and these will need to show that the development will be safe without increasing flood risk elsewhere, and where possible reduce flood risk overall. Policy recommendations have been made for all development in Zone 3 in King's Lynn Town to help ensure this requirement is met.

Table 7.1 Policy Suggestions for Development in King's Lynn Town within Flood Zone 3 (Including Flood Zone 3a with an Allowance for the Potential Impacts of Climate Change)

Recommendations	
2.	The development must pass the requirements of the PPS25 Sequential Test and where necessary the Exception Test (as indicated by Table D.3 of PPS25). To pass part (a) of the Exception Test the application must demonstrate that the development meets the sustainability and regeneration objectives of King's Lynn town, as set out in Chapter 4 of the Level 2 SFRA;
7	Development in all Flood Zone 3 areas should be for the replacement and redevelopment of existing buildings with no increase in building footprint, unless it can be reasonably demonstrated that the design reduces flood risk through physical measures:
8	Development should include SuDS to reduce surface water runoff where possible;
9	Finished ground floor levels should be raised with at least 300 mm freeboard above the 1% Annual Probability plus climate change predicted flood level ⁹ ;
10	The developer should identify safe escape and access routes in the event of a flood to an area wholly outside the floodplain; and
11	Developments should sign up to the Environment Agency's Floodline Warnings Direct Service.

It is recommended that in line with the Floods and Water Management Act a Local Flood Risk Management Strategy is prepared, to further identify mitigation measures, funding streams for developments to be flood resistant and resilient, flood evacuation procedures and mechanisms to communicate the strategy to the local community.

Twenty seven development sites were identified as located within Flood Zones 2 or 3. Those in Flood Zone 3 (15 sites) will require the Exception Test of PPS25 to be passed in order for residential development to be permitted.

7.3.2 Surface Water Management

A number of recent historic flooding incidents have been reported in King's Lynn, Hunstanton and Downham Market, and almost all were a result of blockages, highlighting the importance of maintenance in drainage infrastructure management. The Level 1 Strategic Flood Risk Assessment (Bullens, 2005 and Faber Maunsell, 2008) identified surface water as one of the key mechanisms of flooding in the study area.

New developments need to ensure that there is sufficient capacity in the existing surface water drainage systems, and should limit the discharge into drainage networks through the use of sustainable drainage systems (SuDS).

All new developments must be served by separate surface water and foul water drainage systems. The redevelopment of brownfield sites must separate any combined drainage systems into surface water and foul water drainage. It is recommended that this requirement is included as a local planning policy.

⁹ As advised by the Environment Agency at the time of planning application

It is recommended that a Surface Water Management Plan (SWMP) is prepared in order to build on the work done in the SFRA and WCS and to provide the vehicle for local organisations to develop a shared understanding of local surface water flood risk in line with Anglian Water's ongoing maintenance of existing sewers. The status of King's Lynn as a Growth Point could provide a unique opportunity to review the existing drainage arrangements and to plan and deliver strategic and sustainable solutions to managing surface water in the settlement. The SWMP would satisfy new requirements under the Floods and Water Management Act and the Flood Risk Regulations to establish a register of assets that will impact on flood risk, and to produce flood risk and flood hazard maps.

A structure for developing the Surface Water management Plan for King's Lynn is presented in Chapter 4.

7.3.3 Internal Drainage Board Infrastructure

Limited hydraulic capacity in the Internal Drainage Board drainage system is a significant issue in Downham Market and the southern part of King's Lynn. In some cases options to improve the system are not available or will require significant investment. This favours growth options away from the southern part of King's Lynn. In Downham Market all of the spatial options have similar hydraulic capacity issues and it is therefore critical that development is carried out in a way that does not increase surface water drainage into the IDB system (i.e. with a focus on SuDS).

7.3.4 Sustainable Drainage

An assessment of the potential to incorporate infiltration Sustainable Urban Drainage (SuDS) for each development site was carried out. The clay dominated geology in the Wisbech area and the majority of King's Lynn means that potential for these techniques may be limited in these areas; infiltration tests will be required at each site to confirm this.

The Flood and Water Management Act adds clarity to the requirements for developers to include sustainable drainage where practicable, to meet standards which reduce flood damage and improve water quality. The right to connect to the public sewer is now conditional on meeting those standards.

A Surface Water Management Plan will help to provide a strategic plan for SuDS across the study area, which will encourage partnership working and clarify roles.

A Draft SuDS policy to be adopted by the Council is presented in Box 7.1.

Box 7.1 Draft SuDS Policy

All development should include appropriate sustainable drainage systems (SUDS) for the disposal of surface water, in order to avoid any increase in flood risk or adverse impact on water quality.

For brownfield developments, SUDS features shall be required so as to achieve a reduction from the existing runoff rate but must at least result in no net additional increase in runoff rates.

SuDS features should normally be provided on-site. If this cannot be achieved, then more strategic forms of SuDS may be appropriate. In such circumstances, developers will need to contribute toward the costs of provision via Section 106 Agreements or the strategic tariff. In all cases, applicants will need to demonstrate that acceptable management arrangements are funded and in place so that these areas are well maintained in future.

SuDS should be sensitively designed and located to promote improved bio-diversity, an enhanced landscape and good quality spaces that improve public amenities in the area.

7.3.5 Climate Change

Assessment showed that for the King's Lynn study area climate change projections from the recent UKCP09 work indicated similar increases in rainfall intensities by the 2080s to the allowances required by PPS25 in flood risk assessment. Projections for sea level rise were also similar, suggesting that the PPS25 allowances may still be valid, and the recent re issue of PPS25 in April 2010 did not incorporate changes to the climate change allowances.

7.4 Water Demand Management

This section of the report sets out the drivers for efficient management of water demand in the King's Lynn and West Norfolk area. The area is classified as under serious water stress (Environment Agency, 2007) and therefore the highest levels of water efficiency activity are appropriate. The national, regional and local policy drivers for water efficiency are reviewed and a proposed water demand management strategy for the Council is set out which will help to meet those policy requirements.

The strategy sets targets for new and existing domestic properties as well as non domestic consumption and Council owned buildings.

7.5 Delivery and Funding of the Water Cycle Study

The implementation phase of the WCS is likely to require additional funding and resources and the WCS should be regularly reviewed and updated to take account of changing policies, revised housing numbers and delivery timescales. Future planning applications should also be 'tested' against the WCS. The Environment Agency WCS guidance recommends the WCS be reviewed every 5 years alongside the review of the core strategy.

Funding

The report identified a number of possible funding options for new infrastructure including Growth Point funding, the new Community Infrastructure Levy and Section 106 contributions. It is recommended that policies are

included within the Core Strategies which allow specifically for the delivery of funding benefits with regard to water infrastructure. It is also likely to be appropriate to provide detail within other LDDs both to specify/ justify the requirements and to provide guidance, in which case a Supplementary Planning Document would appear to be most appropriate.

Timescale

Timescale issues relate to the planning for the enhancements to the sewerage system in relation to the timescales for the developments in King's Lynn and Downham Market. These enhancements, as modelled using the AWS Infoworks sewer network model for this study, need to be identified in the next planning cycle to ensure that they are delivered in a timely manner to avoid increased risk of sewer flooding and overflows as the towns expand.

In addition the proposed developments at King's Lynn and Downham Market may require the IDBs to increase the capacity of connection between the drains and the Flood Relief Channel which involves increasing the size of pipes beneath the railway. Past experience indicates that the planning process with the railways is often prolonged and, therefore, presents a significant risk to the planned housing delivery timescale. If developments in this area are taken forward, discussions with the railway early in the planning process would be a priority.

Stakeholder Buy-in

It is proposed that a workshop is held with the key and extended stakeholders (local councillors, developers, NGOs) to present and receive feed back from the key organisations that the Strategy is likely to affect. The proposed format for this event would be introductory presentations by the key contributors to the study (e.g. King's Lynn and West Norfolk Borough Council, Environment Agency and Anglian Water) followed by a report on the technical content by Entec.

The WCS provides a mechanism to bring together key stakeholders and it will be important that this engagement continues beyond the completion of the study. This might take the form of six monthly meetings to discuss progress with implementation of the strategy.