

Derby HMA Aligned Core Strategies

Preferred Growth Strategy Consultation October 2012

Water Issues Paper

1. Introduction

- 1.1 Water is essential for modern life. However the supply and delivery of water for everyday use, and its disposal following use, and how we deal with rainfall and flooding are just some of the issues that planners try to understand in deciding where best to locate new development.
- 1.2 By working with the Environment Agency, and other relevant authorities we can ensure that new development is not located in areas which flood unless this is absolutely essential. Similarly in working with the water companies we can ensure that future growth is directed to those locations which have the greatest capacity to accommodate further development and where new infrastructure is required that this is delivered in a timely fashion. Moreover in planning for new homes we can also help water companies deliver their services in a cost effective and environmentally sensitive way.
- 1.3 In January 2010 the three Derby Housing Market Area authorities published an Outline Water Cycle Study (OWCS). The Study was undertaken by Entec who were guided by a Water Resources Steering Group. This group was made up of representatives of the four HMA authorities, South Staffordshire Water, Severn Trent Water and the Environment Agency.
- 1.4 The study primarily considered water quality, wastewater treatment and the provision of potable water and its findings were endorsed by all members of the steering group.
- 1.5 Following discussions between the three HMA authorities and the Environment Agency, it was decided that a Detailed Water Cycle Study was not necessary and it was thought that the work could be carried forward by the group itself. The outline study provides the baseline information for the HMA and it was thought that it would be more beneficial to meet with the water companies on a regular basis. Discussions began at the initial strategic site assessment process which allowed both parties to understand the implications of future development – the issues and the constraints and how these can be addressed to ensure that the water companies' infrastructure can be developed to accommodate new development.
- 1.6 Through continued discussions with the two water companies as part of the strategic site allocation process, the findings of the OWCS have been

discussed, refined and updated.

1.7 This position statement provides an up-to-date understanding on the following issues across the Derby Housing Market Area:

- Water supply
- Wastewater treatment and sewerage
- Water quality
- Flood risk
- Surface water flooding
- Sustainable Urban Drainage Systems

2. Water Supply

2.1 It's the job of water companies to provide water for almost all homes and businesses in the Derby Housing Market Area (HMA). Having talked to the water companies that that operate in the Derby HMA it is clear that there is enough water to meet needs up to 2035 (well beyond our planning period) so long as Severn Trent and South Staffordshire Water continue reducing leaks and encouraging homes and business owners to use less water through metering or encouraging efficient building design and use. However, it is also clear that in certain locations the water supply network will require upgrading. It will usually fall to developers to fund infrastructure improvements where there is insufficient capacity in the existing water supply network serving their proposal.

Water Cycle Study Findings

- 2.2 The OWCS, section 4.3.1, indicates that climate change is expected to reduce resource availability further. Severn Trent Water Authority (STWA) predicted in the Draft Water Resource Management Plan (WRMP) that by 2034/2035, the deployable output will reduce by 38.8 megalitres per day (Ml/d). This is equivalent to a reduction of 4.4%.
- 2.3 To rectify the deficit, Severn Trent, in their final planning scenario proposed a combination of demand management and increased supply so that a surplus could be maintained throughout the plan period.
- 2.4 South Staffordshire Water's draft WRMP forecast a surplus in their baseline scenario. Their plan includes a reduction of 3Ml/d groundwater sources in the vicinity of the River Mease (Habitats Directive designation) and Checkhill Bogs Site of Special Scientific Interest (SSSI) to reduce the pressure on habitats protected under the Habitats Directive.
- 2.5 The OWCS, section 4.6, recommends that all new homes achieve the Code for Sustainable Homes Level 3/4 as a minimum.

Current Position

- 2.6 Severn Trent's Final Water Resource Management Plan (STWA, June 2010) sets out the short and long term goals for improving water efficiency. It estimates that by 2015 the company will reduce mains leakage by 453 MI/d and that the household consumption rate will reduce from the current level of 132 litres per head per day (l/h/d) to 129 l/h/d. In the long term STWA highlights that the most significant risk to the supply and demand balance is the impact of climate change. A number of scenarios have been tested and they indicate that the deployable output capability will be reduced by up to 115 MI/d by 2020. To counteract this Severn Trent indicates that a number of new resource schemes will need to be implemented which will improve the resilience of the supply network and provide an additional deployable output to the East Midlands and the Severn and Birmingham zones.
- 2.7 South Staffordshire's Final Water Resource Management Plan (South Staffs Water, August 2009) predicts that demand would slightly increase up to 2026/27 when measured against the 2008/09 levels. The plan highlights however that demand is influenced largely by non-household forecasts. The company recognises that investment is still required to address the Company's metering strategy and address localised supply issues.
- 2.8 South Staffordshire Water have assessed all of the possible strategic sites within their catchment area and have indicated that, overall, there is sufficient capacity to supply water to each development. However, South Staffordshire Water has indicated that the combination of development around Burton-on-Trent, and within South Derbyshire in the Water Resource Zone will reduce water pressure at the Castleway booster site. Thus, contributions from the developments may be required as part of any trunk mains upgrades identified to accommodate growth. South Staffordshire has indicated that additional hydraulic analysis is required to assess future funding contributions for each site.
- 2.9 Severn Trent is yet to provide written comments at this stage of the process, but consider that sufficient capacity can be made available to supply the likely proposed scale of new development.

3. Wastewater Treatment and Sewerage

- 3.1 In order to reduce the effects of bringing forward additional growth, new development will need to deal with surface water (that water which falls as rain on buildings, hardstanding or other impermeable surfaces) separately to foul water (waste water we generate when we use the toilet, shower or washing machines in our homes). In order to achieve this storm water runoff will be collected and stored on site and allowed to drain away into the ground or at a controlled rate to a local watercourse. By adopting Sustainable Urban Drainage Systems (or SUDS) as they are sometimes known, new development can contribute to groundwater recharge and help support

sustainable flows in receiving watercourses. More significantly, however SUDS can help water companies manage and make the most efficient use of their infrastructure.

- 3.2 This is because historically both storm water and foul water from developed areas has all tended to drain into the foul sewer. In many urban areas including large parts of Derby City storm water runoff can be directed to the sewerage network maintained by Severn Trent Water. Where this happens 'clean' storm water, mixes with 'dirty' foul water and once mixed together all of this water then has to be piped to the local sewage (waste water) treatment works where it is cleaned before being released back into the environment.
- 3.3 However, whilst the existing (combined) sewer network and waste water treatment works can cope with some of the variation in flow which occurs between dry and wet weather, in very intense rainfall events significant volumes of rainfall can be delivered to combined sewers and the capacity of the sewer network is often exceeded. Where this happens water companies are able to discharge the mixed foul and surface water straight into local rivers or other waterbodies without waste being treated. Discharges take place at combined sewer overflows (CSOs) and can lead to the pollution of local watercourses and can have very significant impacts on water quality. However, without combined sewer overflows (which act as safety valves) being built into the sewer network incidences of sewer flooding would increase.
- 3.4 The benefit of ensuring new developments separate storm water or surface water flows from foul water flows is that it significantly reduces flows which have to be carried in the sewer network. Moreover where existing headroom in the sewerage network or local waste water treatment works is limited, by separating out storm water runoff and foul water more development can be accommodated before this headroom is used up thus reducing the capital costs of installing new treatment works or sewer capacity as well as reducing operating costs of treating water (as less water needs to be treated than if all water enters a combined sewer).
- 3.5 Further, by reducing the amount of water we use in new development not only does this help the water companies to ensure that they can fully meet the needs of their customers over their own planning horizons but it can also have a positive impact on the quality of watercourses which receive treated waste. This is because by requiring the use of water efficient toilets, showers, and taps, the amount of foul water which subsequently is discharged into the local sewer network is reduced. This in turn helps reduce the amount of pollutants that are discharged into rivers or other waterbodies as even though waste water can arrive at treatment works with high concentrations of pollutants, the water released from treatment works has to meet specific standards in respect of the amount of pollutants per liter. Therefore the less water treated, the lower the overall amounts of pollutants discharged.

- 3.6 Unlike water supply, it falls to the water companies to fund improvements to their foul water network and sewage treatment works. Developer contributions cannot help fund improvements. In order to reduce the likely impact of additional development on the infrastructure and assets of the water companies; help deliver security of water supply over the plan period and help improve water quality in our local rivers, we will seek to locate development in those areas, which have the greatest capacity to accommodate further growth. In addition we will seek to ensure new development uses water sparingly and separates storm water runoff from foul water through the use of Sustainable Urban Drainage Systems on development sites.

Water Cycle Study Findings

- 3.7 The OWCS, Table 5.1, examines the Dry Weather Flow at each of the HMA's treatment works. Dry weather flow is determined by measuring the incoming flow derived from human activity but excludes any storm induced flows.
- 3.8 The Study identified that there are likely to be capacity constraints at some of the wastewater treatment works within the plan period. The treatment works at Fritchley, Duffield, Coton Park, Milton and Findern were found to be already at capacity based on the measured flow from works, provided by STWA. The treatment works at Stanton, Kilburn and Melbourne will potentially exceed their consented flow by 2015 based on the predicted growth used in the OWCS and the Regional Spatial Strategy. The OWCS recommends that STWA concentrate their assessments of growth and investment at Stanton and Melbourne works.
- 3.9 In contrast the OWCS highlighted that there was spare capacity at Spondon's treatment works and could accommodate future growth. However, in section 5.3.2, the capacity of the sewerage (foul sewer network) was highlighted as a constraint to development in, and adjacent to, Derby. The OWCS indicated that the Environment Agency and STWA were aware of this issue, and STWA has included plans in their long-term strategy to deal with existing hydraulic inadequacies in the sewerage system.
- 3.10 In a continuation of section 5.3.2, the OWCS recommends that STWA explore transferring sewerage from the Spondon Water Treatment Works to Findern's treatment facility in South Derbyshire to alleviate pressures in Derby's sewerage network.

Current Position

- 3.11 It was highlighted, through discussions about the provision of future infrastructure, that Severn Trent Water and South Staffordshire Water have a duty under the Water Industry Act 1991 to make connections to their networks. The developer however, bears the cost of providing the sewer and freshwater networks on-site. It was recognised that water providers commence modelling work for sites when they receive applications from

developers to connect to the network and develop the necessary infrastructure when development occurs. Therefore, both companies would welcome an indication from the three authorities of the phasing of future development.

- 3.12 It is the opinion of Severn Trent Water, following the *Barratt Homes Ltd v Dwr Cymru Cyfyngedig (Welsh Water) [2009] UKSC 13* case (“Barratts case”), that the law has been clarified such that this general duty extends to sewerage systems as well as sewage treatment works. To this end if either a) additional capacity or b) improvement (commonly referred to as ‘quality obligation’) is required at a WWTW these must be funded by Severn Trent Water. Such restrictions are necessary to ensure that a water company meets its obligations in a manner that represents the least possible cost to customers. Accepting additional quality obligations outside of the normal procedures will, in effect, place an additional burden on customers that will not have been subject to the proper OWFAT scrutiny, even if they are third party funded.
- 3.13 Since the publication of the OWCS, Severn Trent has re-evaluated their overall strategy for dealing with waste water across the PUA. The company recognise that the large scale diversion of waste water to other treatment works in South Derbyshire was an option but it now considers that reducing surface water run-off and implementing improvements, including improvements to the Sinfin pumping station, would ensure there is capacity to accommodate future growth.
- 3.14 However whilst STW have also indicated that most growth on the edge of Derby would connect to the Spondon treatment works, strategic growth around Littleover could still be served by Findern treatment works where these are located close to existing Sewage Works Catchments.
- 3.15 However, Officer’s from the City Council’s Land Drainage Team feel that the impact on the treatment of waste water in response to our growth strategy needs further consideration. Firstly, they consider that the flood risk in the City will be increased if capacity is not created in the sewer network prior to development proceeding. Secondly, they have highlighted that pumped systems can fail due to both mechanical break down of the pump station or a disruption to the power supply which could result in flooding.
- 3.16 From environmental point of view the combined sewer network in south Derby has a large overflow facility into the Cuttle Brook (a WFD watercourse monitored). The pumping of sewage back into the southern part of the cities sewer network could lead to increased discharge of raw sewage into this watercourse during period of heavy rain. From a sustainability point of view pumping large volumes of water up to 6.5Km across the City does not appear to be a particularly sustainable approach.

- 3.17 The OWCS suggests that the use of Sustainable Urban Drainage Systems should be used to reduce the amount of surface water run-off and this is discussed in Section 7 of this paper.
- 3.18 Our Preferred Growth Strategy currently includes a number of urban extensions primarily located to the south of Derby. This strategy has been developed, taking into account a number of factors which are discussed in more detail in paragraphs 10.20 and 10.28 of Derby City Council's consultation document. However, in summary the issues include:
- Green Belt designation to the east of the City, in neighbouring Erewash Borough Council.
 - The capacity of the road network to the west of Derby, especially the impact on the A38, to accommodate new development.
 - Concerns regarding the capacity of existing schools to the west of the City to accommodate future growth.
 - That development to the west of the City would detrimentally affect the setting of the Grade 1 listed Kedleston Hall Historic Park and Garden.
- 3.19 In response to our strategy, Severn Trent highlighted that development to the south of the City, and hence to the south of the Derwent would entail some sewerage infrastructure crossing the river. It also stated that the infrastructure costs would increase if development occurred to the west of the City as it would be further from Spondon Waste Water Treatment Works.
- 3.20 There may be opportunity for future development in and around Derby City to provide reductions in floodrisk to some existing developed area (for example by removing surface water flows from the existing sewer network).

4. Water Quality

Water Cycle Study Findings

- 4.1 The water quality of the rivers within the study area was highlighted as a potential issue due to elevated nutrient levels. The OWCS indicated that in the Humber Basin indicated that the proportion of waterbodies having good status are as follows:
- Derwent catchment: 27% (although this could rise to 39% by 2015%)
 - Dove Catchment: 24% (although this could rise to 28% by 2015)
 - Lower Trent and Erewash (5%)
 - Tame, Anker and Mease (0%)

The River Mease and Water Quality Objectives

- 4.2 The River Mease is designated at the European level as a Special Area of Conservation (SAC) under the Habitats Directive (92/43/EEC). It is a small lowland level river which is designated on account of its vegetation and freshwater animal species.
- 4.3 The Habitats Directive requires all designated sites to be maintained at, or restored to favourable condition (although the Habitats Directive does not prescribe a timeframe over which restoration is required). It is the responsibility of Natural England to assess the SACs condition against the conservation objectives and classify their conservation status. Currently the SACs condition is classified as 'unfavourable no change' on the basis of elevated nutrient levels (mainly phosphates) within the catchment.
- 4.4 The River Mease, like many watercourses in South Derbyshire and the wider HMA is also failing to meet its objectives under the Water Framework objective due to elevated phosphate levels.
- 4.5 In order to ensure phosphate reductions in the River, the Environment Agency and Natural England have produced a Water Quality (Phosphate) Management Plan (WQMP) for the River Mease. The WQMP identifies a series of measures across the catchment to manage and reduce phosphate levels. One such measure to reduce phosphate levels in the SAC is the development and implementation of a Developer Contribution Scheme (DCS). The DCS has been drafted by specialist consultants on behalf of the River Mease Programme Board, which consists of The Environment Agency, Natural England, Severn Trent Water, North West Leicestershire District Council, Lichfield District Council and South Derbyshire District Council.
- 4.6 The DCS will allow the mitigation of negative effects of new development which would otherwise result in a net increase in phosphate load being discharged into the River Mease SAC catchment, thereby ensuring that such development does not compromise the primary purpose of the WQMP. The DCS will identify further actions, over and above those already progressed through the WQMP that will be implemented, managed and monitored through the use of developer contributions.
- 4.7 The DCS, if adopted in South Derbyshire, would apply to all new development served by wastewater treatment works in the villages of Overseal, Netherseal, Lullington and Smisby. The DCS will not apply to new development connecting to the mains sewer in any other village or town within South Derbyshire of the Derby HMA. A map showing areas within the Mease Catchment is set out in the Derby HMA Outline Water Cycle Study and Appendix 1. A map illustrating the wastewater treatment catchment areas in the Mease Catchment and indeed across the HMA is set out at Appendix 2.

4.8 Contributions would be sought from new development on an equitable basis whereby different sized dwellings make different contributions relative to the scale of their potential impact on water quality in the river.

4.9 The contributions secured as a result of new development will be used to fund a range of measures to reduce phosphates in the SAC including:

- The installation of silt traps.
- Restoring the river to a more natural state and restoring and enhancing natural river function.
- phosphate removal from surface water run off (i.e. diffuse sources) from sites alongside the SAC.

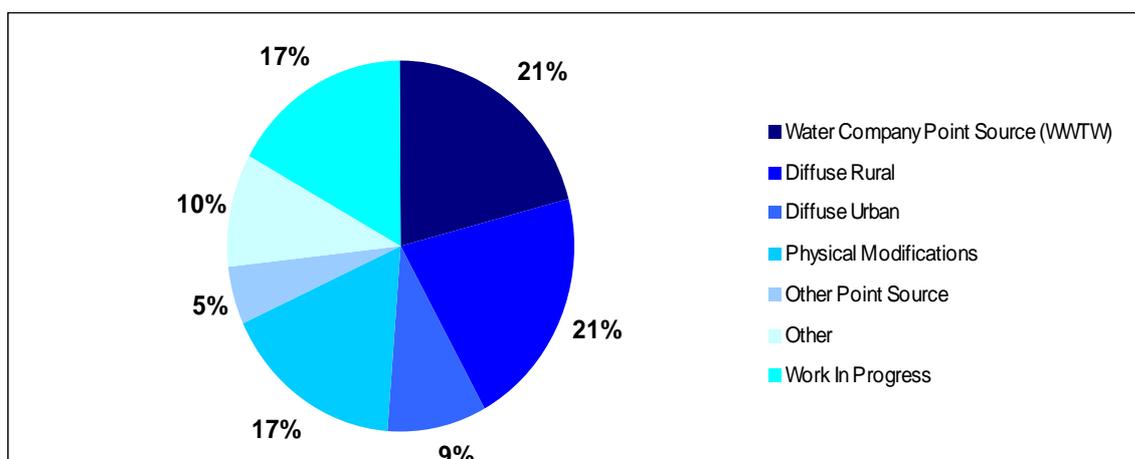
Water Quality Issues outside of the Mease Catchment

4.10 As previously stated water quality is an increasingly important issue throughout the whole of the Derby HMA and indeed all rivers in the UK. This is because the WFD sets out a requirement for all waterbodies (including rivers) to meet good ecological status by 2015.

4.11 There are many factors influencing the quality of water in our rivers and waterbodies. These include:

- treated sewage
- pollution from sewers
- agricultural run-off
- run-off from roads
- private treatment works
- trade discharges

4.12 Currently around a quarter of our region's rivers reach this standard, which means that three quarters do not. The following chart shows the reasons for water bodies in the midlands not achieving good ecological status.



Source Severn Trent Water: (2012)

- 4.13 The above chart indicates that a significant number of rivers are currently failing their WFD objectives as a direct result of identified point sources such as WWTWs. In such cases unilateral measures could be sufficient to ensuring compliance of poorly performing surface waters with the objectives of the WFD. Most failures in compliance however are as a result of diffuse pollution, physical modifications to a watercourse or a combination of different issues. Clearly ensuring compliance with the WFD (which is a statutory requirement) will require a coordinated approach between a number of government agencies, Local Planning Authorities, SUDS Approval Bodies, water companies and other stakeholders.
- 4.14 This coordinated approach is likely to have to stretch beyond simply including policies in the Core Strategy to secure SUDS in new developments (which in any case could be required under statute) and could require LPAs and other Council departments to engage in specific programmes to improve water quality in targeted catchments. SDDC has been engaged by OnTrent to improve nutrient quality on the Egginton Brook. Such projects could involve working with local landowners to provide planning advice or supporting the EA and others to bring forward catchment wide land management strategies.
- 4.15 It is unclear how the requirement to deliver against the WFD will affect new development in poor performing catchments but this issue will be kept under review.

5. FLOOD RISK

- 5.1 Flood risk to people and property can arise from various different sources, including fluvial (from rivers), tidal, surface water run-off (or pluvial), sewers & drains, culverted watercourses, groundwater, as well as through breaching/overtopping of flood defences and from artificial sources such as canals and reservoirs. The risk of flooding can never be totally removed, however through good planning, management and use of sustainable flood mitigation and drainage approaches, the risk and consequences of flooding in many areas can be reduced.
- 5.2 In planning for new housing growth the vulnerability of sites to flooding is a key consideration. Many people think of flooding as simply flooding from rivers or other watercourses but 'fluvial' flooding as it is sometimes known only accounts for around a half of all reported incidents of flooding in homes and businesses. Increasingly flooding from other sources including runoff from land (sometimes known as 'pluvial flooding'), groundwater flooding or sewer flooding accounts for many flood events. These flood events can often occur in locations previously unaffected by flooding.
- 5.3 The Environment Agency and Derby County Council and Derby City Council as the Lead Local Flood Authorities together with the water companies have the responsibility of managing the risk of flooding and minimising the effects

and damage caused. However, national planning guidance advises local planning authorities to avoid building in locations affected by flooding except in exceptional circumstances. The HMA authorities are working with these partner organisations to ensure new housing is steered to locations which are at low risk of flooding. However, in exceptional circumstances, for example where previously developed sites are in need of reuse or new or existing flood defences can protect a development site to a satisfactory standard some development may be accommodated in areas which are at 'floodrisk'. Indeed, the creation of new flood defences can provide benefits to a wider area and lessen the risk of flooding in areas currently at risk.

- 5.4 However, in all cases, we will seek to ensure that new development will not substantially alter local drainage patterns or increase flood risk elsewhere. In order to safeguard existing and new communities from increased levels of floodrisk the authorities will seek to ensure that runoff rates on new development sites will be retained at levels equivalent to before development took place (greenfield run-off rates). On previously used sites we will try and reduce runoff from site compared to previous uses wherever possible.
- 5.5 The Flood and Water Management Act states that the Environment Agency must 'develop, maintain, apply and monitor a strategy for flood and coastal erosion risk management in England' as part of its strategic overview role for flood and coastal erosion risk management. In response to this, the Environment Agency has developed this strategy jointly with the Department for the Environment, Food and Rural Affairs (Defra) to ensure that it reflects government policy.
- 5.6 The National Flood and Coastal Erosion Risk Management Strategy for England is available to view at:
<http://www.environment-agency.gov.uk/research/policy/130073.aspx>
- 5.7 In addition the Environment Agency will continue to be responsible for managing flood risk from main rivers, produce flood risk maps and issue flood warnings to the public.
- 5.8 The Flood and Water Management Act 2010 has also enhanced the role of local authorities so that they take on responsibility for leading the co-ordination of flood risk management in their areas.
- 5.9 Derby City and Derbyshire County Council have been given a new role to manage local flood risk in their areas. These Authorities known as Lead Local Flood Authorities (LLFAs) have a responsibility to draw up a Local Flood Risk Strategy covering local sources of flooding (such as ordinary watercourses, surface water and groundwater), drawing in all the partners, Borough and District Councils, Water Companies, Environment Agency, adjacent LLFAs, and others involved in managing flood risk. The local strategy produced must be consistent with the national strategy.

- 5.10 The first step for the LLFA in determining a Local Flood Risk Strategy is the preparation of a Preliminary Flood Risk Assessment (PFRA). Preliminary Flood Risk Assessments for the Derby City and Derbyshire County Council are available to view at:
<http://cdn.environment-agency.gov.uk/flho1211bvrw-e-e.pdf>
<http://www.derbyshire.gov.uk/environment/flooding/prfa/default.asp>
- 5.11 The responsibilities of the Lead Local Flood Authorities under the Flood and Water Management Act are:
- Coordination of Flood Risk Management
 - Investigating Flood Incidents
 - Maintaining an Asset Register of structures and other features that may have an influence on flood risk
 - Preparing a local strategy for flood risk management
 - SuDs Approving Bodies
- 5.12 The NPPF requires that Local Plans should be supported by Strategic Flood Risk Assessment. This document takes, and refines, flooding information from a variety of sources and, when completed, will allow local authorities to develop appropriate policies in the Local Plan, inform the sustainability appraisal and provide a basis to apply the Sequential Test and Exception Test.
- 5.13 In summary, a SFRA 1 examines the main rivers and watercourses in each administrative area and the associated flood zones (2: medium probability of flooding, 3a: high probability of flooding and 3b: functional floodplain). In addition each SFRA1 provides an assessment of the impact of climate change, existing flood risk measures and their standard of protection.
- 5.14 The Sequential Test aims to ensure that development does not take place in areas at a high risk of flooding when appropriate areas of lower flood risk are available. In addition, it may be necessary to apply the Exception Test where the Sequential Test alone cannot deliver acceptable sites, and where some development is necessary for wider sustainable development.
- 5.15 All three HMA authorities have undertaken a Level 1 Strategic Flood Risk Assessment and the findings have been in the site assessment process. In the case of the City Council, the emerging SFRA 1 was utilised in the process.

Flood Defences

Water Cycle Study Findings

- 5.16 The urban stretches of river through Derby have extensive defences built in the 1930s. The standard of defence provided varies however and is generally well below a 1% AEP flood event. Around Derby, there are a number of

structures and weirs within the River Derwent which increase water levels and reduce channel capacity. Despite the flood defences a high number of properties are expected to flood during a 1% AEP flood event in Derby because the defences provide insufficient protection against flooding from an event of this severity or greater. Although generally protected from the smaller more frequent flood events, the overall flood risk is assessed as high because of the large number of properties at risk during a severe flood event.

- 5.17 Within the Dove catchment land drainage and flood defences have altered the way sediment is carried and deposited in the river by changing the characteristics of the flows in the river and often by changing the channel form itself. This has resulted in less deposition and erosion within the channels where the changes have taken place, however by increasing conveyance through flood risk locations, there is a tendency for sediment deposition to increase in other downstream locations. Flood defences were constructed during the middle and end of the last century to provide protection up to a 1% Annual Exceedance Probability (AEP) flood event – that is the flood that is likely to occur in any one year with a probability of 1%. However recent studies have shown that the standard of protection is generally much lower than previously thought and is around a 2% AEP flood event.

Current Position

- 5.18 Our City, Our River is a joint project between the City Council and the Environment Agency which proposes to reduce the risk of flooding in Derby. The Strategy aims to reduce the risk of flooding in the City by constructing new, re-aligned defences. This approach would allow more space for flood water along the river and ensure that flood risk in upstream and downstream communities is at manageable levels.
- 5.19 The existing flood defences offer a low standard of protection and some are coming to the end of their life. The draft Masterplan recognises that the effects of climate change over the coming decades will lead to more frequent severe flood events in Derby.
- 5.20 The realignment of flood defences through Derby is being treated as an opportunity to encourage the regeneration of the City and improving its connectivity to the River Derwent. The intention is that the Masterplan will guide the provision of flood defences and associated development and act as a material consideration for planning applications.
- 5.21 Following a public consultation, the draft Masterplan was amended and approved by the City Council. Work is now being carried out by the Environment Agency and the City Council to progress the project from the Masterplan through to implementation. It is understood that future policies in the Core Strategy will facilitate the implementation of the Our City, Our River project.

- 5.22 Further information about the Our City, Our River project can be found at <http://www.ourcityourriver.co.uk/>
- 5.23 Following publication of the OWCS the Environment Agency has commenced flood works along the River Dove catchment in South Derbyshire. Villages along the lower reaches of the River Dove between Scropton and the River Trent are at risk of flooding during heavy rainfall. This area has experienced four significant flood events in the last 20 years.
- 5.24 Works to reduce flood risk will consist of around 5km of new and improved flood defenses together with the raising existing defences along the Foston Brook in Scropton, as well as raising and extending localised defences for the River Dove in Hatton, Scropton and Egginton. Planning permission was granted for the scheme in May 2012 and will be completed in autumn 2013.
- 5.25 More information on the scheme can be found at: <http://www.environment-agency.gov.uk/homeandleisure/floods/126402.aspx>
- 5.26 The Northern Flood Culvert protects the City Centre from flooding from the Markeaton and Mackworth Brooks. Currently this watercourse and the flood culvert are being assessed by the Environment Agency to determine what level of protection the culvert provides for the City.
- 5.27 Current funding for flood risk management makes it clear that no funding will be available to resolve flooding affecting new build properties as the information and mechanisms are in the public arena to take stock of the risk before development.

6. Surface Water Flooding

- 6.1 Surface Water Flooding is defined as flooding from sewers, drains and small watercourses which occurs during heavy rainfall in urban areas. It includes:
- Fluvial flooding - flooding from small open channel, or open or culverted watercourses which accept flow from within the urbanised catchment.
 - Pluvial flooding – flooding occurring as a result of high intensity rainfall which collects and ponds or flows over the surface before entering the underground network or adjacent watercourse, or flows over the ground because it cannot enter the network
 - Sewer flooding arising as a result of the capacity of the system being exceeded and further water “backing up”. Capacity problems may arise if the receiving waters are too high, or if recent developments have resulted increases in runoff to the system.
 - Flooding and/or overland flows resulting from groundwater sources, where groundwater is defined as all water which is located below the ground and is in contact with the ground or subsoil.

- Overland flows from outside the nominal catchment or authority boundary, including water from springs.
- 6.2 The City Council's Surface Water Management Plan (SWMP) is a high level assessment; taking data from a number of sources it aims to improve the Council's understanding of factors affecting flooding in Derby. It also forms a basis for future detailed studies.
- 6.3 The final report highlights areas of the City, primarily around the Bramble, Littleover, Markeaton and Chaddesden Brooks, which are at risk from Surface Water Flooding; areas where highway network drainage is a concern and areas at risk from groundwater flooding.
- 6.4 The final section of the document recognizes that the focus of the report was to evaluate and collate all available information relating to flooding and water infrastructure in Derby. However, it carries to highlight that further, more detailed, work is required to help the City Council understand all aspects of flooding across the City and what measures need to be undertaken to alleviate this.

7. Sustainable Urban Drainage Systems

- 7.1 In order to reduce the effects of bringing forward additional growth, new development will need to deal with surface water (that water which falls as rain on buildings, hardstanding or other impermeable surfaces) separately to foul water (waste water we generate when we use the toilet, shower or washing machines in our homes). In order to achieve this storm water run-off will be collected and stored on site and allowed to drain away into the ground or at a controlled rate to a local watercourse. By adopting Sustainable Urban Drainage Systems (or SUDS) as they are sometimes known, new development can contribute to groundwater recharge and help support sustainable flows in receiving watercourses. More significantly, however SUDS can help water companies manage and make the most efficient use of their infrastructure.
- 7.2 This is because historically both storm water and foul water from developed areas has all tended to drain into the foul sewer. In many urban areas including large parts of Derby City, storm water runoff can be directed to the sewerage network maintained by Severn Trent Water. Where this happens 'clean' storm water, mixes with 'dirty' foul water and once mixed together all of this water then has to be piped to the local sewage (waste water) treatment works where it is cleaned before being released back into the environment.
- 7.3 However, whilst the existing (combined) sewer network and waste water treatment works can cope with some of the variation in flow which occurs between dry and wet weather, in very intense rainfall events significant volumes of rainfall can be delivered to combined sewers and the capacity of

the sewer network is often exceeded; an occurrence which frequently happens in certain areas of Derby. Where this happens water companies are able to discharge the mixed foul and surface water straight into local rivers or other waterbodies without waste being treated. Discharges take place at combined sewer overflows (CSOs) and can lead to the pollution of local watercourses and can have very significant impacts on water quality. However, without combined sewer overflows (which act as safety valves) being built into the sewer network incidences of sewer flooding would increase.

- 7.4 The benefit of ensuring new developments separate storm water or surface water flows from foul water flows is that it significantly reduces flows which have to be carried in the sewer network. Moreover where existing headroom in the sewerage network or local waste water treatment works is limited, by separating out storm water runoff and foul water more development can be accommodated before this headroom is used up thus reducing the capital costs of installing new treatment works or sewer capacity as well as reducing operating costs of treating water (as less water needs to be treated than if all water enters a combined sewer).
- 7.5 Further, by reducing the amount of water we use in new development not only does this help the water companies to ensure that they can fully meet the needs of their customers over their own planning horizons but it can also have a positive impact on the quality of watercourses which receive treated waste. This is because by requiring the use of water efficient toilets, showers, and taps, the amount of foul water which subsequently is discharged into the local sewer network is reduced. This in turn helps reduce the amount of pollutants that are discharged into rivers or other waterbodies as even though waste water can arrive at treatment works with high concentrations of pollutants, the water released from treatment works has to meet specific standards in respect of the amount of pollutants per liter. Therefore the less water treated, the lower the overall amounts of pollutants discharged.
- 7.6 Sustainable Urban Drainage Systems (SuDS) are a name given to a drainage approach rather than any particular drainage type. The SuDS manual Ciria C697, paragraph 1.3.1 states that:

Appropriately designed, constructed and maintained SuDS are more sustainable than conventional drainage methods because they can mitigate many of the adverse effects on the environment of stormwater runoff. They achieve this through:

- reducing runoff rates, thus reducing the risk of downstream flooding
- reducing the additional runoff volumes and runoff frequencies that tend to be increased as a result of urbanisation, and which can exacerbate flood risk and damage receiving water quality

- encouraging natural groundwater recharge (where appropriate) to minimise the impacts on aquifers and river baseflows in the receiving catchment
- reducing pollutant concentrations in stormwater, thus protecting the quality of the receiving water body
- acting as a buffer for accidental spills by preventing a direct discharge of high concentrations of contaminants to the receiving water body
- reducing the water volume of surface water runoff discharging to combined sewer systems, thus reducing discharges of polluted water to watercourses via CSO spills
- contributing to the enhanced amenity and aesthetic value of developed areas
- providing habitats for wildlife in urban areas and opportunities for biodiversity enhancement

- 7.7 Under the Floods and Water Management Act, SuDS Approval Bodies (SAB) will decide where surface water is discharged. Both the City Council, as a Unitary Authority, and the County Council will be designated as SABs.
- 7.8 The Outline Water Cycle Study highlights the importance of SuDS in reducing the amount of surface water run-off and, as a consequence, minimising the impact of flooding across the Housing Market Area. In Derby this would relieve the issues over capacity of the combined sewer network.
- 7.9 The Flood and Water Management Act 2010, requires construction work with drainage implications to have its drainage systems for managing surface runoff approved before construction may begin. The Act requires government to publish national standards on the design, construction, operation and maintenance of SuDS. In order for drainage applications to be approved, a SAB must ensure that the applicant has designed the SuDS in accordance with the national standards. Once approved, the SAB must adopt and maintain those SuDS that are functioning properly and serve more than one property. This legislation required to implement relevant sections of the Act is expected to come into force (either partially or fully) in 2013.
- 7.10 Discussions between the HMA authorities and the water companies explored the use of Sustainable Urban Drainage Systems (SuDS), swales and filter strips to reduce the amount of surface water run-off and hence the amount of water entering the Spondon Waste Water Treatment Works during heavy rain. Discussions with the City Council's Land Drainage Team highlighted that there are areas in the City where the introduction of SuDS would be difficult due to the high water table. Concerns were also raised regarding the amount of space which would need to accommodate SuDS, how this would affect the viability of the development. The City Council's Land Drainage Team is currently exploring the possibility of using the green wedges to reduce the

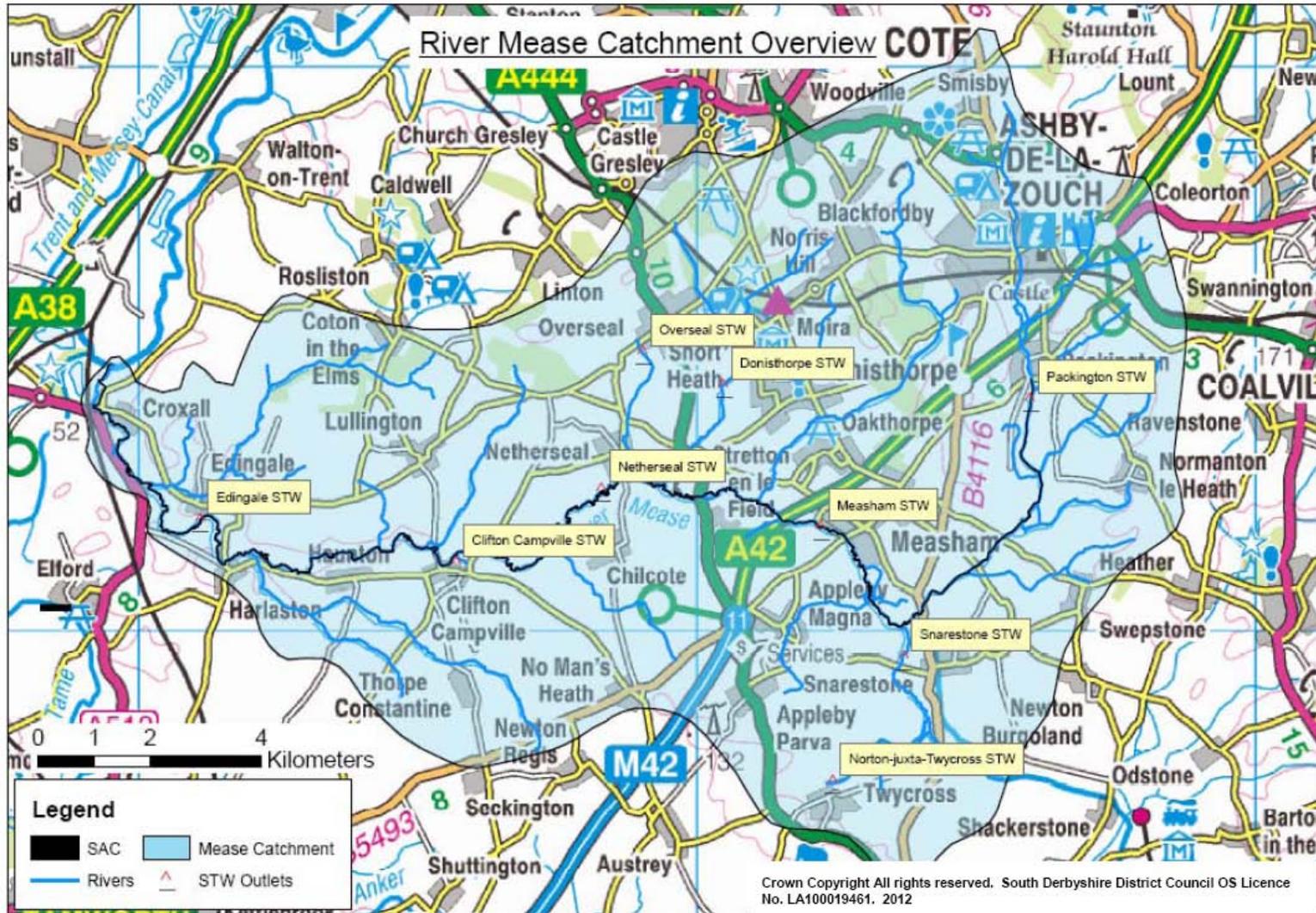
amount of surface water run-off, particularly creating holding ponds. The aim is, during extreme weather, to manage the flow of surface water into the sewage network.

- 7.11 It is the view of Officers that reducing surface water discharge to public sewers is a desirable objective. This is something that will need to be considered and developed as part of the Flood Risk Management Strategy that we are required to produce by the FWMA.
- 7.12 One of the most obvious methods of reducing surface water discharge into the public sewer network is through restricting inflows from new development or redevelopment. The NPPF provides adequate restriction for green field sites, however our ability to control flows from brown field sites is more limited.

8. Additional Work

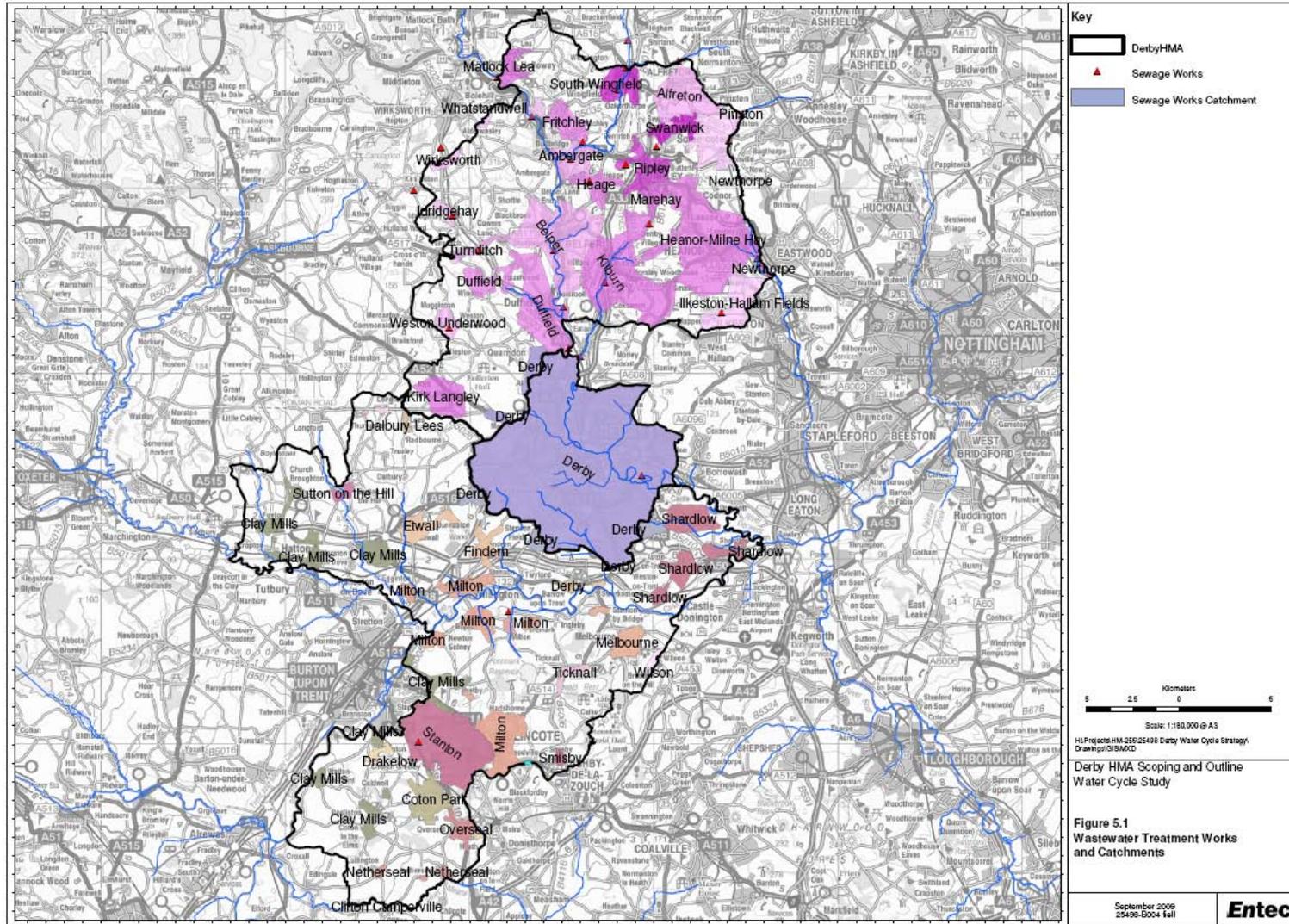
- 8.1 It is apparent that, as each authority works towards the next stage in the Core Strategy process, that additional work needs to be undertaken to ensure that the implications of future development is considered as part of the site assessment process, including:
- Considering the impact future development will have on the treatment of waste water. Continuing discussions are required between Severn Trent and the City Council to understand the impact future development will have on the existing sewer network following concerns raised by the Council's Land Drainage Team over the capacity of the sewer network.
 - Understanding how SuDS can be used across the HMA. The delivery of SuDS is dependent on a number of factors and further work is needed by both the County and City Council to better understand how this can be implemented.
- 8.2 The three authorities will continue to liaise with colleagues at the County and City Council's to develop our understanding of the issues surrounding flooding and drainage further. In addition, they will provide valuable information as we develop our detailed Core Strategy policies.
- 8.3 The final Our City, Our River Masterplan is a major infrastructure and regeneration project which needs to be reflected and addressed in Derby City's Core Strategy.
- 8.4 An updated Strategic Flood Risk Assessment is being undertaken by the City Council's Land Drainage Team. The update refines the findings of the existing draft study and provides a better understanding of flooding across the City.

Appendix 1: Map of River Mease Catchment Area



Source: Environment Agency 2009

Appendix 2: Waste Water Treatment Works Catchments in the Derby HMA



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Source: Derby HMA Water Cycle Study, Entec 2009

