

Nottinghamshire & Nottingham Waste Core Strategy & Development Control Policies

**Issues & Options
What do you think?**

**Background Paper 8:
Sewage Treatment**



Nottinghamshire
County Council



Nottingham
City Council

1. Introduction

Purpose of this Background Paper

- 1.1 Nottinghamshire County Council and Nottingham City Council are preparing a new set of waste planning policies for Nottinghamshire. These will replace the existing waste local plan and will be part of both councils' new local development frameworks. The new waste policies will be set out in three separate documents. The first of these, the waste core strategy and the development control policies are being prepared together and will set out future requirements, suitable location criteria and appropriate environmental controls. A site-specific document will follow.
- 1.2 As part of preparing these new planning policies for waste, the County Council and City Council have produced a series of background papers to provide more detail on the 'Issues and Options consultation exercise (see below).
- 1.3 This background paper looks at sewage treatment which is a very specific area of waste management. Other papers look at different waste management methods including recycling, composting, incineration, and landfill. Each paper sets out the number, location and capacity of current facilities, likely future needs, and the main planning issues in terms of site location and environmental controls. The general policies and principles of waste management are set out in Background Paper 1. Background Paper 2 provides a basic assessment of how much waste is produced in Nottinghamshire, how it is managed and possible future trends.

Further information

- 1.4 For further information, copies of other background papers or to join in the Issues and Options consultation please contact the Minerals and Waste Policy Team at the County Council or the City Development Team at Nottingham City Council. Details are shown on the back cover.

Please note that, unless stated otherwise, all references to Nottinghamshire within this paper include the City of Nottingham.

2. Process, Site Requirements and Environmental Impacts

Why must sewage be treated?

- 2.1 The millions of litres of water that are used every day in our homes, businesses, on farms and by industry must be carefully treated before it can be released back in to the water supply. It has to be clean so that it will not harm water quality or wildlife and does not pose a risk to human health.
- 2.2 The various water companies across the UK therefore have a statutory duty to treat all sewage or waste water. Planning permission is usually required for new sites to treat, pump or dispose of sewage and waste water but many of the buildings, structures and plant installations may be 'permitted development' and do not therefore require separate planning permission. This is common with other utilities such as electricity and gas, which form part of our basic infrastructure.

How do we treat sewage?

- 2.3 Sewage treatment relies on biological or chemical treatment to make the water/effluent safe for discharge back into the natural environment. Although the exact process may vary, there are three main stages of treatment.

Primary Treatment

- 2.4 The first stage involves the mechanical separation of solids. Wastewater entering the works is screened to remove plastics, paper or other large debris. The screened solids are normally landfilled or incinerated. The next stage is to remove sand and other heavy particles in a grit chamber. This sediment is usually landfilled. Finer particles are then removed in a settling or sedimentation tank. The wastewater from this initial treatment process passes to the secondary treatment stage. The heavier sludge is separated out for further treatment (see paragraph 2.8).

Secondary Treatment

- 2.5 The second stage relies on biological processes to stabilise and clean up the wastewater. There are two main processes for most sewage works. In one case the wastewater from the primary stage enters an aeration chamber where it is mixed with 'activated sludge'. The bacteria in this sludge consume the organic substances in the wastewater. The wastewater and sludge are then separated in a second sedimentation tank and the activated sludge is returned to the process.

- 2.6 An alternative process is to use a 'trickling filter' where the wastewater passes slowly through a biological filter. This filter is made up of a bed of material such as granite or slag which trap bacteria on their surface. As the wastewater trickles over this filter, the bacteria consume the organic substances in the same way as in the activated sludge process. The wastewater is separated from any excess bacterial 'sludge' in a sedimentation tank. Sludge from this tank is not returned to the process but treated prior to reuse or disposal.

Tertiary Treatment

- 2.7 Sand filters, reed beds or beds of grass are used as a final stage of cleaning and filtration before the treated water is discharged back into a natural watercourse.

Sludge treatment

- 2.8 A separate part of the process is to treat the excess sludge that is produced. The sludge is first thickened and dewatered to reduce its volume. It is then stabilised either through a chemical process, or biologically through anaerobic digestion. Once the sludge has been stabilised it can then be spread to land as a soil conditioner. Methane from the process can be used to generate electricity for internal use or export to the national grid. In some cases it may be possible to burn the treated sludge residue in cement kilns, incinerators or power stations.

Site Requirements

- 2.9 Practical considerations mean that sites need to be close to the area they serve and close to a suitable watercourse into which the treated water can be discharged. Where possible the water companies look for sites with a natural gradient that avoids the need for pumping.
- 2.10 Some sites can be entirely open air but other, larger sites are likely to require buildings to house some of the plant and equipment. The volume of water to be treated and the type of process being used will determine the size of the site and the type of buildings and/or structures required but most sewage treatment works will need some combination of the following:

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| • Vehicle access | • Pumping equipment |
| • Turning area | • Chemical treatment plant |
| • Filter Beds | • Pipework |
| • Building(s) etc. | • Settlement tanks |
| • Control Kiosks | • Storage tanks (above or below ground) |

Environmental Impacts

- 2.11 The potential environmental impacts of sewage treatment will vary according to where it is located and the size of the site. Small rural treatment facilities for example may be very low key whereas the types of major treatment works needed for large urban areas can include substantial built development over a large site area with control buildings and lagoons for example. The main impacts considered here are those caused by the operation itself e.g. odour and visual impact. There are other important concerns such as the impact on wildlife, habitats and heritage but these are issues relating to the choice of site rather than the impact of a particular type of facility. These issues will therefore be covered under specific development control policies and are addressed as part of the ongoing sustainability appraisal of each of the plan documents.
- 2.12 Panel 1 is therefore intended to illustrate the possible impacts that sewage treatment may have on those living or working nearby. It summarises the typical issues that need to be considered but does not mean that they will apply in every case:
- 2.13 The key issue is whether these impacts are acceptable i.e. is there a risk of harm or disturbance? In many cases, environmental impacts can be minimised through careful site design and layout but there may be times where the potential impacts of a development mean that it should not be permitted at a particular location.

Panel 1: Environmental Impacts

- **Odour** – is usually the most significant concern, especially in terms of its affect on residential amenity. Control measures can include enclosing parts of the operation, the use of biofilters such as fibrous peat or heather, or chemical scrubbing to deodorize the material. Odour masking sprays can be used as a temporary measure but these do not address the source of the odour problem. Odour management plans can be put in to ensure a robust regime of control, maintenance, monitoring and emergency response where required. In most cases sites can be located far enough away from other development to ensure that odour is not a nuisance.
- **Visual impact** - although much of the treatment plant is generally low level, larger sites can require substantial control buildings and storage tanks. In some cases it may be possible to partially bury some of the plant to reduce the visual impact. Smaller rural sites will have less of a visual impact and careful landscaping can help them to blend in. Where sites are needed in very flat, open landscapes, they should be located as close to other built development, roads or hedge lines as possible to minimise their effect.
- **Noise** – should not be significant as most plant is contained within a building or kiosk and any noise generated should not be audible beyond the site boundary

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Panel 1: Environmental Impacts (Cont'd)

- **Traffic** – impacts should be negligible as most facilities can be managed remotely with no need for on-site personnel other than routine maintenance. Sewage sludge is removed by tanker but at many sites this is only required quarterly.
- **Water** – there is a risk that peak flows or storms could overload the capacity of the treatment works. All sites therefore have overflow storage systems to prevent untreated sewage from harming the natural water supply.

What types of site are suitable?

- 2.14 The need to locate treatment facilities close to the areas they serve means there is often a limited choice of sites. The further water has to be pumped, the more expensive this is and it is often necessary to balance environmental and practical constraints.
- 2.15 Large sites will require more buildings, control equipment and storage/treatment lagoons than smaller, often more rural, sites. Although vehicle usage tends to be less than for other types of waste management site, there will still be a need for tanker access and to carry out emergency repairs and maintenance work. Existing sites are typically in industrial areas and around the edges of urban areas. The physical appearance of large sites and the need for physical infrastructure can make industrial land or derelict sites potentially suitable. This is likely to be determined by whether there is a suitable way of discharging the treated water into a nearby river for example.
- 2.16 Smaller sites may only be a small enclosure with a control kiosk, low-level pipework and access covers. Again their location is likely to be dependent on being close to the village or development they serve and a suitable gradient. In most cases sites can be screened off in the corner of a field for example but they will still need a suitable access and turning area for sludge tankers.
- 2.17 As well as visual impact, the potential risk of odour means that sites should not be located close to sensitive uses such as housing. Most water treatment companies therefore operate a 'cordon sanitaire' principle to keep treatment works a set distance from housing. The exact distance will vary according to factors such as topography, wind direction.

3. Current Provision and future needs

What is the current situation?

- 3.1 There are currently 64 sewage treatment works within Nottinghamshire. These vary from major sites to minor rural pumping stations and treat an average daily flow of 316 million litres of effluent.

How much do we need in future?

- 3.2 It is not possible to say exactly how much treatment capacity, or how many new sites, will be needed in future. The water companies plan their future investment on the basis of ongoing maintenance work; improvements needed to meet new water quality standards; and new or expanded infrastructure to cope with major housing or industrial development for example.
- 3.3 There will therefore be a continuing programme of maintenance and upgrading to replace old and worn out equipment at existing sites. This can vary from minor renewal schemes to major rebuilding work to replace storage tanks, filter beds and control equipment.
- 3.4 The need to maintain and improve water quality is driven by European requirements. Directives on urban wastewater treatment and bathing water quality, for example, have prompted significant investment in new or upgraded treatment plant. The Environment Agency also enforces a series of river quality objectives to limit the effect of phosphates, nitrates and other chemicals in our water. The water industry is therefore likely to have to programme more works to meet expected requirements.
- 3.5 Much will also depend on the level of future housing, industrial and commercial development. Major regeneration proposals or large-scale housing development for example may require existing sewage treatment works to be expanded or possibly even the development of new sites. The Regional Spatial Plan for the East Midlands promotes economic development and regeneration for north Nottinghamshire and a strengthening of the role of Nottingham itself. These are therefore likely to be the major focus of sewerage infrastructure renewal/provision in Nottinghamshire.
- 3.6 The role of the Waste Core Strategy and development control policies is to ensure that there is adequate provision for future sewage treatment needs whilst maintaining appropriate environmental safeguards. Choices over the location of new sewage treatment works will be more limited than for other types of waste site but there are likely to be two basic options that can be considered:

i) Extend existing sites

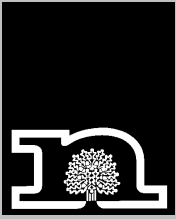
Upgrading or extending existing works is likely to have less environmental impact than building new sites. This would normally be the industry's preferred option as it is less expensive and allows the use of existing infrastructure.

ii) Build new sites

The development of new sites and associated infrastructure is likely to have a greater environmental impact but this may be necessary where an existing site cannot be enlarged. However, the need to relocate existing infrastructure can make this a very expensive option.

4. Conclusions

- 4.1 Forward planning options for new sewage treatment facilities are likely to be limited but it is still important to ensure that there is an appropriate balance between the basic need for infrastructure and the level of environmental impact that this may involve. To minimise the effects of future development there should be close liaison with the water companies in order to understand where there is likely to be a need for new development and to look at all available site options as early in the planning process as possible.



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