INVESTOR IN PEOPLE

TONBRIDGE & MALLING BOROUGH COUNCIL

ENVIRONMENTAL MONITORING REPORT 2011

Contents

Foreword

The annual Environmental Monitoring Report describes the routine environmental monitoring carried out by the Environmental Protection Team, a section of Environmental Health and Housing Services, Tonbridge and Malling Borough Council.

Its aim is to inform all those who have an interest in the environment about the state of water, land and air quality in the borough.

The report presents 2011 monitoring data and illustrates trends in data collected over several years. Where appropriate, comparisons have been made with current National and European standards.

All of the Council's internal reports are available on request, in paper or digital format.

I hope you find this report both interesting and informative. Your comments on its format and any questions on the information it contains are invited. Our address is on the back cover.

John Batty BA MSocSc MCIEH MCMI
Director of Health and Housing
May 2012

Executive Summary

During 2011 Tonbridge and Malling Borough Council completed monitoring for the following environmental sections:

Recreational Lakes

Three sets of samples were taken during the Bathing Season, two from Leybourne Lakes and one from Haysden Country Park. These were tested for the parameters E.Coli and Intestinal Enterococci. All of the samples taken fell within the 'excellent quality' category of The Bathing Water Directive.

Private Water Supplies (PWS)

2011 signalled the start of the first full year of initiating the 2009 Regulations after they were gradually phased in during 2010. One risk assessment of a PWS and one of a PDS (Private Distribution System) were completed and both achieved a 'High Risk' rating. Both were required to complete remedial works, which are on-going into 2012.

Sampling was also completed for one PWS and one PDS. The PWS failed to meet the standards set out by the Regulations and an investigation process was begun, which concluded that the treatment unit was in need of up-dating. The PDS samples met the required standards.

Extensive historical and local research was conducted to add to the risk assessment process of PWS supplies and to check for existence of other supplies not monitored by the Council.

Statutory Nuisance

In total for 2011 the team logged 438 calls regarding statutory nuisance. The largest proportion (70%) of this figure related to calls concerning noise disturbances.

Most of these complaints were addressed through the initial stages of the statutory nuisance response sequence. On 41 occasions, noise monitoring equipment was installed into complainants' properties. Overall, 8 abatement notices were served under the Environment Protection Act, 1990.

Environmental Permitting

Throughout Tonbridge and Malling, 31 premises were inspected under the Environmental Permitting Regime. Petrol stations accounted for the largest proportion of this number. In total 38 visits (either full inspections, check visits or extra visits) were made.

Air Quality

During 2011, 37 diffusion tubes were put out each month at a total of 26 sites, six of which were triplicate sites (sites with three tubes).

Monitoring within the borough, using diffusion tubes, has not identified any new exceedences outside existing AQMA's, except for Borough Green, which was already identified in the Annual Progress Reports 2010 and 2011. The Council has already proceeded to a Detailed Assessment for Borough Green towards the end of 2011 into 2012 to further analyse the exceedence observed.

Monitoring has also identified a potential exceedence of the 1-hour mean nitrogen dioxide objective at locations within the existing Wateringbury AQMA. This AQMA will need to be amended to include the 1-hour mean objective.

The Ditton AQMA has not experienced any exceedences of the annual mean objective since 2006 at locations with relevant exposure.

Monitoring using the continuous analyser in Tonbridge High Street, showed that the annual mean objective for nitrogen dioxide was not achieved but the hourly objective was met.

Landfill Gas

During August of 2011, the pump system at Priory Wood landfill experienced a mechanical failure. This failure was logged as an emergency call-out with a landfill gas contractor and was attended to within 24 hours. The fault had occurred due to an electrical surge, which had short circuited the pump system. Levels were monitored immediately after the pump was made operational, which showed levels quickly return to the norm. The cut-off voltage was adjusted to avoid recurrence of the problem. Immediately after the fault an extensive monitoring period was enacted until the end of September to ensure levels remained constant. No further problems were experienced. An intensive site investigation of the old landfill site was completed, which identified certain actions that needed to be completed. As a result, an on-going programme of works was brought forward into 2012 and a site investigation will now be completed annually as a way of maintaining the site.

Quarterly monitoring at Joco Pit in September 2011 showed a minor increase of gas levels. Although this change did not constitute a threat to human health and safety, monitoring was increased to monthly following the variation. An in-depth site review of the area was also

conducted to increase monitoring points and review the current status of the site, which is on-going in 2012.
The levels of gas production at Paris Farm (Goose Green) indicated that there has been no significant change in the condition of the former landfill site and therefore monitoring continues quarterly.

Review of the Environmental Monitoring Programme, 2011 onwards

Recreational Lakes

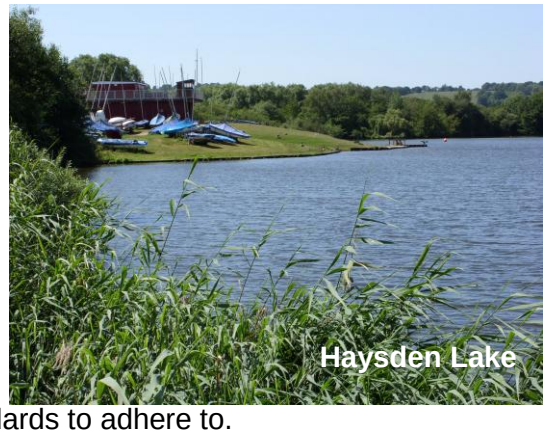
Following the successful trial of lake monitoring in 2011 using the EC Bathing Water Directive as guidance, the programme will be extended to 2012 but with a gradual focus towards Leisure Services who operate the sites.

Landfill Gas

Monitoring at Joco Pit will continue to take place monthly over 2012 as a precautionary measure to observe landfill gas trends from the site.

Recreational Lakes

Introduction


Haysden Lake

Whilst there is no statutory obligation for the Council to monitor lake water quality it was decided that the Council would undertake a trial monitoring programme to investigate potential designation as an Inland Bathing Water and in the interest of public health and safety. This was re-started in 2011 using the EC Bathing Water Directive, 2008 as a guideline for monitoring standards to adhere to.

Risk to Human Health

The main risks are associated with waterborne infections from direct inhalation or swallowing of faecal polluted water. Direct contact with algal blooms, particularly of blue-green algae, also presents a risk during warmer weather.

Faecal Pollution

Faecal pollution encompasses bacteria found in the guts of humans and other warm-blooded animals. The presence of these bacteria in lakes arises predominantly from the presence of wildlife and via agricultural run-off. Ingestion of such polluted water can cause a wide range of illnesses mainly of the gastrointestinal tract but ear, eye and skin infections can also occur, as can respiratory illnesses.

Blue-green Algae

Blue-green algae (cyanobacteria) are natural inhabitants of inland waters, estuaries and the sea. They are found in suspension, attached to rocks and other surfaces, at the bottom of shallow water-bodies, and along the edges of lakes and rivers. Individual cells or filaments

are not visible to the naked eye but it is possible to see some species when they are concentrated into clumps.

Blue-green algae need nutrients to grow, which exist in various forms in freshwater. Where high levels of nutrients exist, and other requirements for growth are met, then the numbers of blue-green algae can increase creating algal blooms. During a bloom, the water becomes less clear and it may become green, blue-green or greenish-brown. Several species can produce musty, earthy or grassy odours. Blooms can also cause foaming on the shoreline - sometimes confused with sewage pollution. During calm weather several bloom-forming species can rise to the water surface creating scums. This can look like paint or jelly or form small clumps. Scums may be blue-green, grey-green, greenish-brown or occasionally reddish-brown.

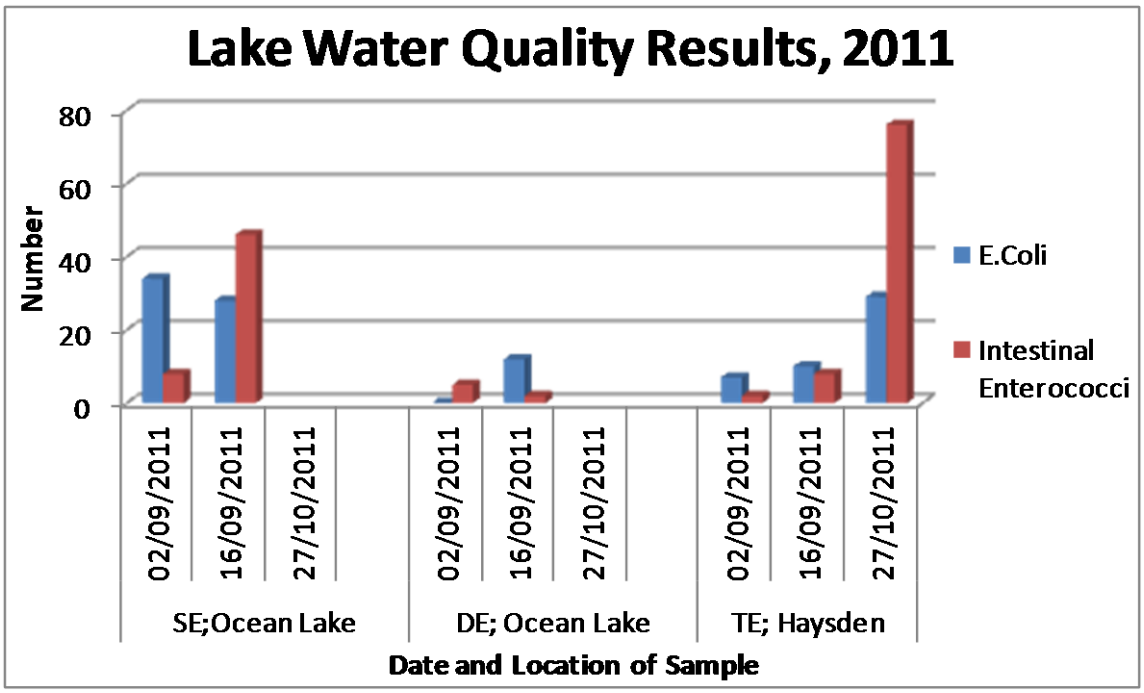
Algal bloom and scum forming blue-green algae can produce toxins. If these toxins are ingested by humans; symptoms such as fever, dizziness, stomach cramps, vomiting and sore throat may persist for several days. The toxins are also poisonous to wild animals, farm livestock and domestic pets, causing severe illness and death.

Recreational Lake Monitoring, 2011

Three sets of samples were to be taken during the Bathing Season[1], two from Leybourne Lakes and one from Haysden Country Park. These were tested for the parameters E.Coli and Intestinal Enterococci as those set out by the Bathing Water Regulations. One of the samples was taken just outside of the official Bathing Season as it was necessary to take a reading after heavy rain to represent the worst pollution case scenario. The pH of the water samples were also taken. Samples were taken where the largest proportion of human contact with the water occurred i.e. the divers' and swimmers' entrances of the Ocean and the triathlon entrance at Haysden Lake.

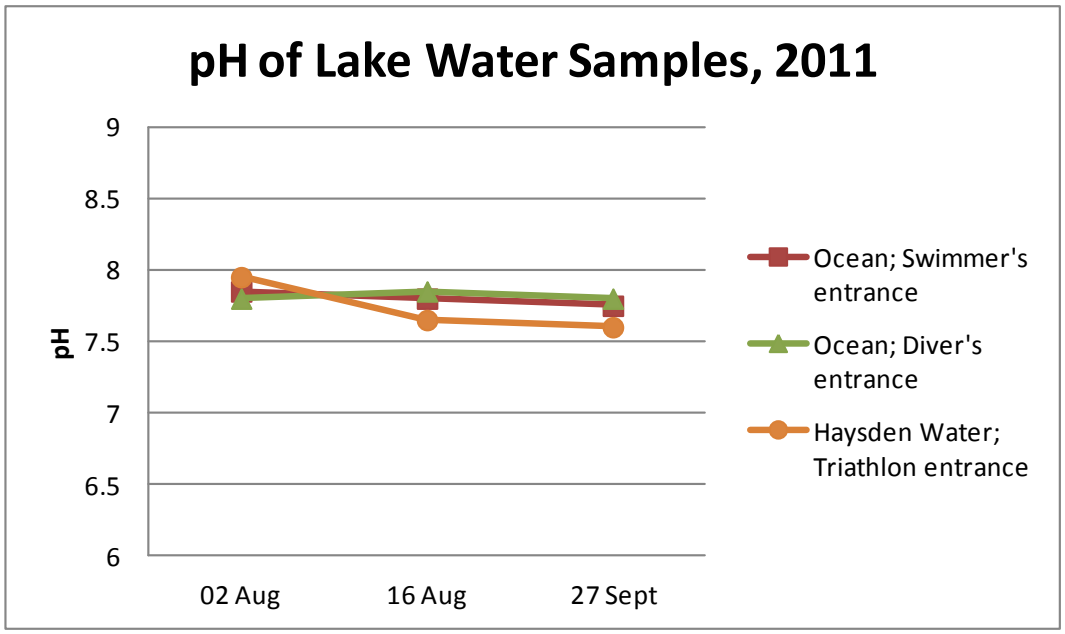
All the samples taken fell within the 'excellent quality' bracket of the new Bathing Water Regulations standards (Graph 1).

[1] The official Bathing Season starts on the 15th of May and runs through till the 30th of September as defined by The Bathing Water Regulations, 2008.



Graph 1
SE: Swimmers' Entrance
DE; Divers' Entrance
TE; Triathlon Entrance

The pH results also fell within the 6-9 pH limit set out by the Directive shown by Graph 2 (y-axis reflects limits).



Graph 2

Private Water Supplies

Introduction

The Private Water Supplies Regulations 2009 came into effect on the 1st of January 2010 with a 5-year role-out phase. These new regulations replaced the Private Water Regulations 1991 and called for changes in the way private water supplies are monitored and understood. The main changes include; the classification of what is termed 'Private Distribution Systems' and alterations to monitoring procedures, including Risk Assessments and greater analysis parameters.

Fact Box: What is a Private Water Supply (PWS)?

A PWS is a supply of water that is not provided by a statutory water undertaker* e.g. South East Water or Southern Water. These supplies may come direct from boreholes, wells, rivers or lakes for example. The Regulations apply to private water supplies where the water is intended for human consumption**.

*As defined in Section 93 of the Water Industry Act, 1991
** As classified in The Private Water Supplies Regulations, 2009

Under the 2009 Regulations supplies are classified as small or large/ commercial supplies; see Table 1 for a breakdown of classifications.

Small Supplies	Large/ Commercial Supplies
< $10m^3$/day	≥ $10m^3$/day
Or supplies < 50 people	Or supplies ≥ 50 people
Any private supply that provides water to one or more dwellings/ premises which is a premises where employees come to work and the water is only used for **domestic purposes**. This does not include supplies where the premises are Public Buildings or where the dwelling/s contains peripatetic workers	Water used for a **commercial activity** irrespective of the volume of water provided or the number of persons supplied
	Any private water supply that supplies water to **Public Buildings** irrespective of the volume of water provided or the number of persons supplied

Table 1

Private water supplies to single dwellings are not required to be monitored under the Regulations. However the Council must monitor the supply if they deem there to be a potential risk to human health or if asked to by the owner/ occupier.

Small Supplies

For small supplies the following measurements are taken:

- **Conductivity,**
- **Enterococci**
- ***Escherichia coli* (*E.coli*)**
- **Hydrogen ion (pH value)**
- **Turbidity**
- **Any others identified through the risk assessment**
- **Any parameters from Schedule 1** of the Regulations **identified through the risk assessment** of the supply

Monitoring of these parameters must be completed at least once every five years and more frequently if required by the risk assessment.

Large Supplies

For large/ commercial supplies two levels of monitoring are carried out:

- Check monitoring
- Audit monitoring

Check monitoring is carried out frequently for only a few important parameters and audit monitoring is carried out infrequently for the remaining parameters (both frequencies are dependent on the size of the source/ numbers supplied).

Check monitoring

The parameters,

- **Ammonium,**
- **coliform bacteria,**
- **colony counts,**
- **and turbidity**,
- ***E.coli*,**
- **pH value,**
- **colour,**
- **conductivity,**
- **odour,**
- **taste,**

must be monitored in **all large supplies** under check monitoring. Additional parameters must be monitored if certain circumstances are met[2].

[2] See Private Water Supplies Regulations 2009, Schedule 2, Part 1, Table 1

Audit Monitoring

This type of monitoring includes a large number of suggested parameters as outlined in Table 3 of the Private Water Supplies: Technical Manual 2010. However, the Council may exclude parameters if certain conditions are met.

Fact Box

About 1% of the population in England and Wales are served by a private water supply. The Other 99% are served by mains water provided by a statutory water undertaker.

Risk Assessments

Monitoring only provides a snap-shot of the safety and quality of a PWS, which notoriously varies especially with regards to different weather patterns. Therefore monitoring alone cannot provide assurances about the safety of a private water supply and hence the need for risk assessments.

The World Health Organisation (WHO) Guidelines for Drinking-water Quality, 2008 state that:

"*the most effective means of consistently assuring the safety of a drinking water supply is through the use of a comprehensive risk assessment and risk management approach that encompasses all steps in water supply from catchment to consumer*".

Risk assessments are also used to indentify potential hazards that do not have standards in the Regulations, but their presence at certain concentrations may constitute a potential danger to human health. These include such parameters as ***Cryptosporidium,*** **Giardia, chlorite, chlorate, molybdenum and toluene**.

Risk assessments will be completed by the EPT (Environmental Protection Team) for our existing supplies over the 5-year time period specified in the Regulations.

Private Distribution System (PDS)

A Private Distribution System exists when water from a statutory undertaker is supplied to the boundary of a premises (to an owner/ manager or other person responsible for the premises) and is then further distributed around the site to buildings/ properties that are not owned or occupied by the same company/ organisation/ person.
The Council is required to carry out a risk assessment on the private distribution system including; **pipes, storage tanks, stand pipes, etc** which joins the building/ properties owned by the site to those owned or occupied by another company, organisation or person. This will then determine parameters that should be monitored for, along with certain DWI recommended parameters.

Examples of PDSs include (this list is illustrative and not exhaustive):

- Caravan and camp sites where the water is distributed to individual caravans/ camping plots or a number of points (such as standpipes) where consumers can collect water in containers;

- Military establishments where the water is distributed to offices, workshops, domestic dwellings (houses/ flats etc) and other buildings for domestic purposes even if they are not owned by the establishments;

- College and university campuses where water is distributed to other buildings not occupied by the university.

Risk to Human Health

All private supplies can pose a threat to human health unless they are properly protected and treated. They may become contaminated with microorganisms or chemical substances and often the PWS source is not fit for drinking in its raw state. Many of these microorganisms or chemical substances may be harmless but some can cause serious illness, especially if they are present in large quantities. Often it is not possible to tell whether or not a water supply is safe as contamination does not always show by smell, taste or colour of the water.

Certain groups of people are much more susceptible to PWS risks. These include children under 10 years old[3], pregnant women, the elderly and people with a weakened immune system. Visitors to properties with PWS, who normally drink mains water at home, are also more susceptible.

Microorganisms

The most likely source of microbial contamination of water will originate from animal droppings, resulting in faecal polluted water. Water supplies drawn from farmland where animals graze or where manure is spread are most at risk.

Some microorganisms, such as coliforms, just indicate that contamination is present. Others such as Cryptosporidium, Giardia, *Camplyobacter* and *E.coli O157* can cause vomiting and diarrhoea or more severe illnesses.

Risk is particularly high at times of heavy rainfall, especially after warm weather, when water will run directly off the land, carrying microorganisms into the water supply.

Chemical Substances

The effect of chemical substances depends upon the type and amount of chemicals present. One common concern relates to lead, which can dissolve from lead piping especially with soft water sources. High concentrations can impair childhood development. Children with higher levels of lead in their bodies tend to have difficulties with learning and behaviour.

Private Water Supply (PWS) Monitoring, 2011

2011 signalled the start of the first full year of initiating the 2009 Regulations after they were gradually phased in during 2010. This meant that risk assessments were now begun, in order of risk prioritisation, for all the PWSs within Tonbridge and Malling (to be completed before 31 December 2014).

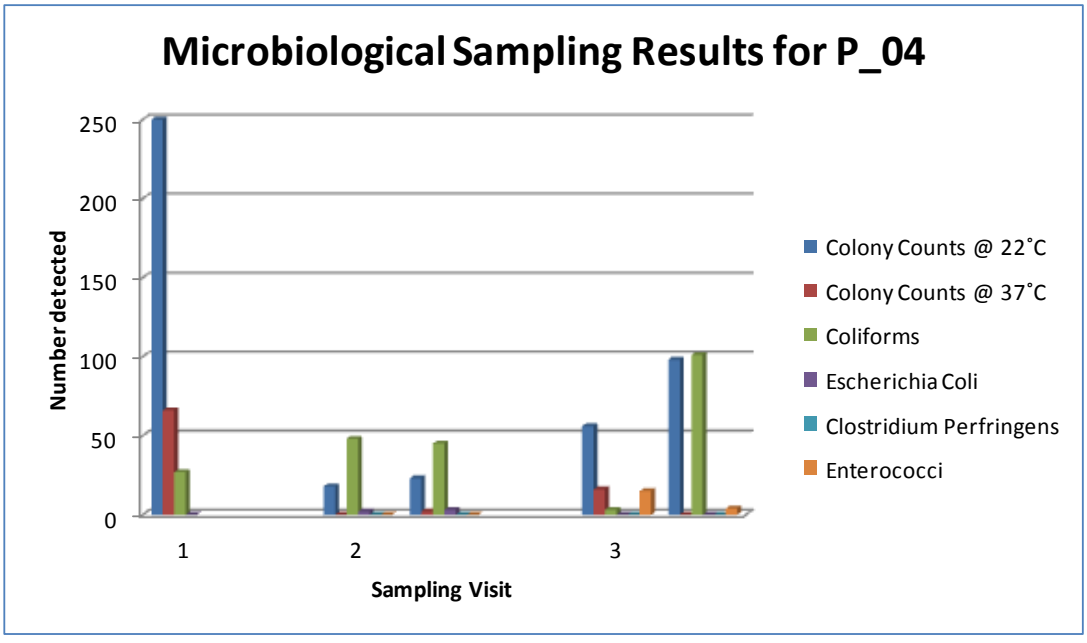
The risk assessment of PWS P_04 was completed, with a resulting rating of 'High Risk'. As a commercial supply, check monitoring parameters were sampled for. The microbiological

[3] Studies have shown that children under 10 years old, whose home have a PWS, are nearly four times more likely to suffer from diarrhoea than other children. DWI & DEFRA Leaflet on the New Private Water Regulations.

sampling results of the check monitoring category failed to meet the prescribed standards (Graph 3 and Table 2) and thereby supported the risk assessment findings. P_04 failed to meet the standards for E.coli, Enterococci and Coliforms. *Escherichia coli (E.coli)* and Enterococci are bacteria present in the gut of warm-blooded animals. These bacterium should not be present in potable drinking water and if found, immediate action is required to identify and remove any source of faecal contamination that is found. Coliform bacteria are widely distributed in the environment often as a result of human or animal activity, but some grow on plant matter. Their presence in a water supply indicates a need to investigate the integrity of the water supply system.

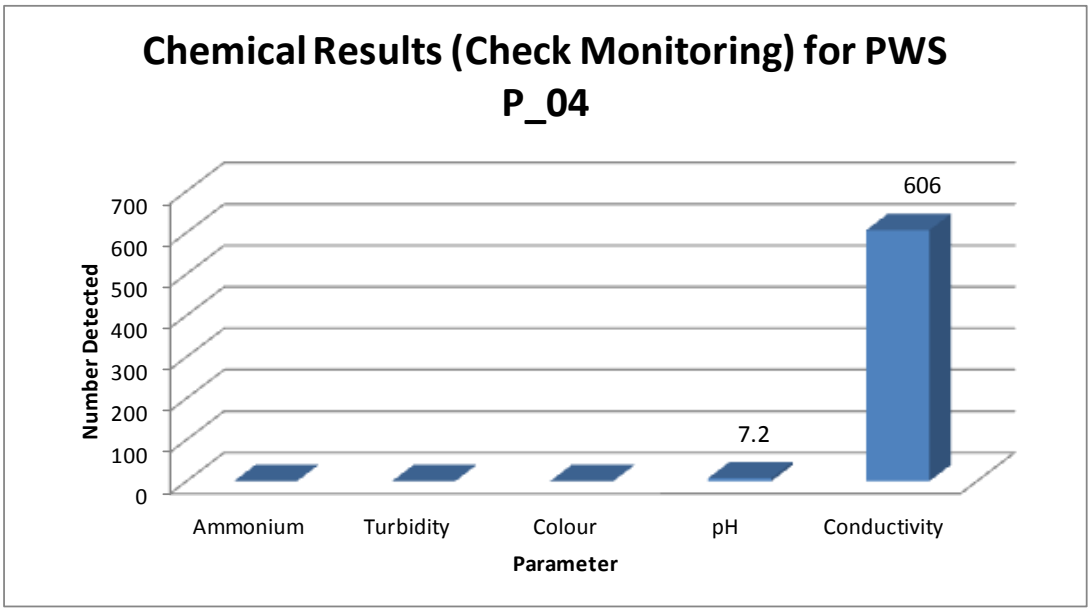
The chemical parameters of the check category met the prescribed standards (Graph 4 and Table 3).

An investigation process was initiated, after the microbiological sample failures, to establish the route of contamination into the drinking supply. During this time the supply was issued with a boil water notice. The investigation process concluded that the water treatment unit should be updated along with other measures highlighted in the risk assessment. These measures are being progressed in 2012.



Parameter	***Maximum concentration or value***	***Units of Measurement***
Colony Counts 22°C	no abnormal change	Number/ ml
Colony Counts 37 °C	no abnormal change	Number/ ml
Coliforms	0	Number/100ml
Esch. coli	0	Number/100ml
Clostridium Perfringens	0	Number/100ml
Enterococci	0	Number/100ml

Graph 3 and Table 2



Parameter	Maximum concentration or value	Units of Measurement
Ammonium	0.5	mg/l
Colour	20	mg/l Pt/ Co
Conductivity	2500	µS/cm at 20°C
Turbidity	4 NTU (or 1 NTU in the water leaving treatment works)	NTU

Graph 4 and Table 3

Assessment of the PWSs listed in 2010, concluded that two supplies could be categorised as ‘single domestic dwellings’, which makes them exempt from the PWS Regulations. The Council is no longer statutorily required to monitor these supplies unless a danger to human health is suspected or requested to do so by the owners. Consequently there are now six PWS within T&M.

Intensive research was completed to investigate the presence of any unknown PWSs within T&M. This included using BGS (British Geological Survey) borehole information as well as requesting local knowledge via the Parish Councils. This research found one PWS but this supply however, can be classified as a ‘single domestic dwelling’ bringing the total of these types of PWSs in T&M up to 4. A number of other supplies were indicated but these were not used for domestic purposes (mainly used for garden water) so are also exempt from the Regulations.

Research was completed to check the current situation of historic PWSs; the conclusion being that all are no longer used for purposes that are listed in the 2009 Regulations as classification of a PWS.

As part of the risk assessment process, local information around PWSs' locations were collated including information on geology, land-use (including pesticide information for agricultural land-use), livestock presence and local groundwater quality (through consultation with the Environment Agency and South East Water).

Private Distribution System (PDS) Monitoring, 2011

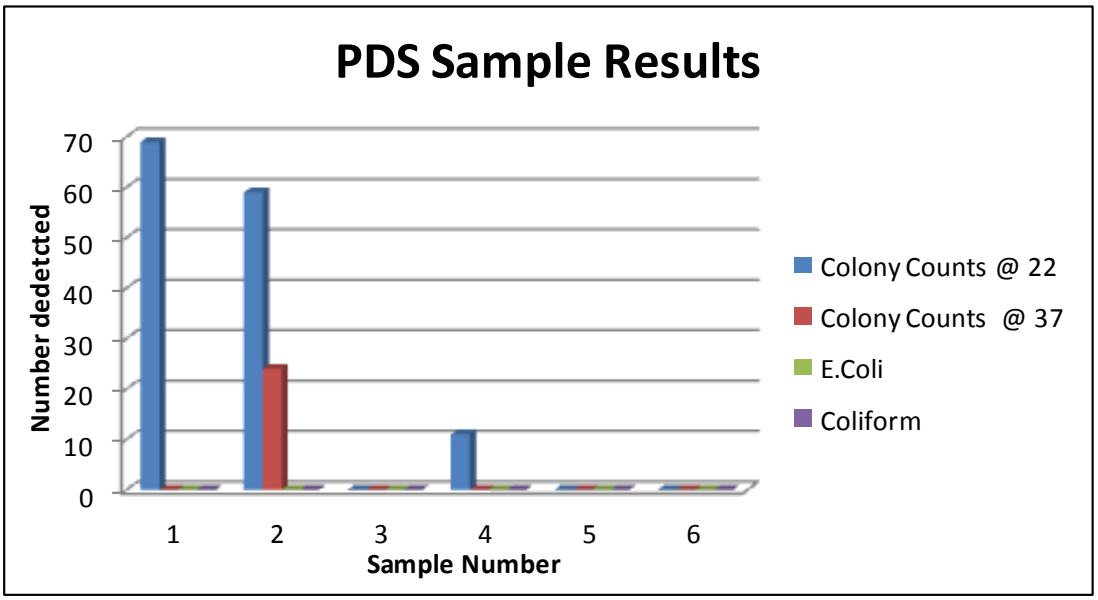
The Environmental Protection team had already identified one large PDS in 2010 with a further one being designated in 2011. Additionally two sites were ruled-out of being PDSs under the Regulations in 2011. A list of other potential PDSs within the borough has been compiled, which is to be reviewed and risk assessed (where designation is applicable) during the 5 year role-out period of the Regulations.

Six samples were taken from PDS D_01 (results are shown Graph 5) for the microbiological parameters shown in Table 4. These samples met the required standards.

A risk assessment was also completed for site D_01 with a resulting rating of 'High Risk'. This highlights the statement from the WHO (pg 13) that sampling only takes a snap-shot of the water quality and therefore the need for risk assessments brought in by the 2009 Regulations. Although the samples taken met the required standards, the risk assessment concluded that immediate remedial work was necessary. Remedial works are being progressed during 2012 in-line with the Environmental Protection Team's recommendations.

All Local Authorities were statutorily required to include PWS charging information on their website as of the 31st of December 2011. This was complied with and TMBC's charging information along with other helpful PWS information can be found on the Council's website.

All Local Authorities are also statutorily required to provide the Drinking Water Inspectorate (DWI) with annual PWS returns including water quality results and PWS information.



Parameter	***Maximum concentration or value***	***Units of Measurement***
Colony Counts 22°C	no abnormal change	Number/ ml
Colony Counts 37 °C	no abnormal change	Number/ ml
Coliforms	0	Number/100ml
Esch. Coli	0	Number/100ml

Graph 5 and Table 4

Statutory Nuisances

Introduction

The Environmental Protection Team also monitors for what are called statutory nuisances. Statutory nuisance originates from the Environmental Protection Act, 1990, which states that any person who occupies a house or land is entitled to a right to enjoy their property without interference or nuisance from others. A statutory nuisance itself can be defined as:

> *Something of sufficient nature, extend and degree so as to materially interfere with the average persons reasonable use or enjoyment of their land or property.*

It is assessed from the average person's perspective, so matters such as shift work patterns, medical conditions, sensitivities, etc cannot be considered in any assessment.

Statutory Nuisance includes[4]:

- Noise from premises
- Noise from vehicles, machinery or equipment on the highway - but not traffic, aircraft or railway noise
- Smoke, fumes and gases from premises
- Dust, steam and smells from industrial, trade or business premises
- Animals kept in unhygienic/ unsatisfactory conditions
- An accumulation of rubbish or offensive material
- Insects from relevant industrial, trade or business premises
- Artificial lighting from premises

Statutory Nuisance Monitoring Process

The initial action by the team is to see whether the mater can be resolved through communication between the complainant and the person they are complaining about. If this route does not yield results then a formal complaint is sent to the subject raising their

[4] As laid out in Section 79 of the Environmental Protection Act 1990

attention to the fact that a complaint has been logged against them (the complainant remains anonymous). At the same time a diary sheet (for one month) is sent out to the complainant to fill in should the disturbance re-occur.

For noise complaints; once diary sheets have been completed and if the disturbance is still occurring, the EPT will use monitoring equipment to further assess the situation. A 'noise box' is installed into the complainant's house for a week. Then the team will play back the results, looking for any signs of a statutory nuisance.

For the other statutory nuisance categories the team will monitor on a case by case basis, including monitoring from the complainant's property during times of disturbance (24 hour assignment, once a case is substantiated).

Logging a formal complaint against the subject is usually enough to resolve the disturbance. Additionally many of the completed diary sheets will not show enough disturbances or of a high enough concentration to warrant the monitoring stage of the investigation. As a result it is also very unusual that the final stage of the statutory nuisance process (i.e. serving of a statutory nuisance notice) will be reached.

The most frequent noise complaints received by the Council concern:

- Domestic Premises
- Barking Dogs
- Burglar Alarms
- Vehicle Alarms
- Construction/ Demolition Sites

Other frequent complaints received by the Council include:

- Bonfires
- Artificial lights (e.g. security lights)
- Insects
- Odours
- Keeping of Animals

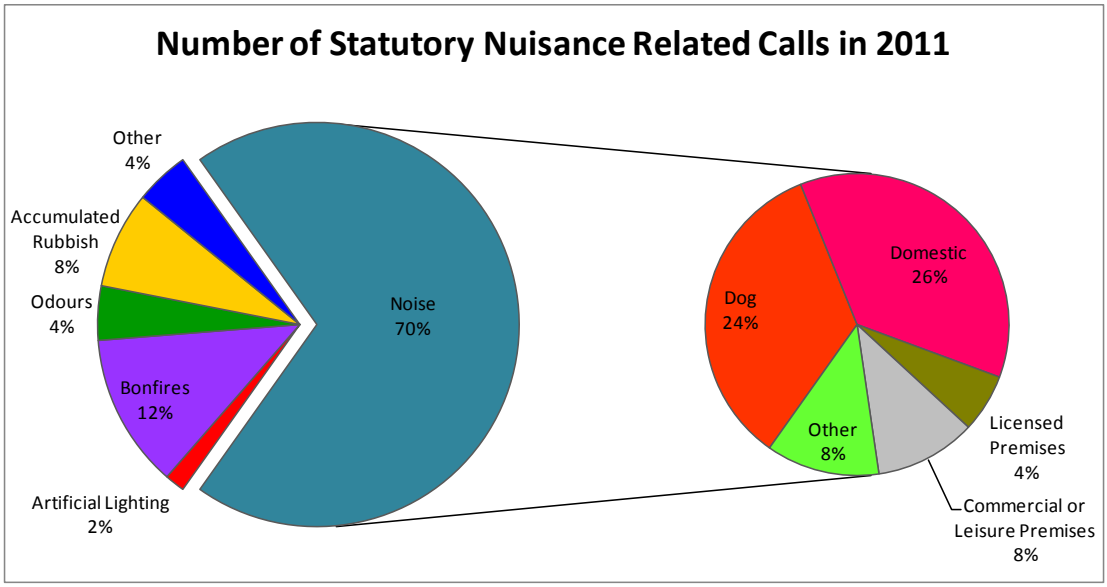
Statutory Nuisance Monitoring, 2011

During 2011, EPT logged 438 calls relating to statutory nuisance, as broken down in Table 5. Table 5 and Graph 6 demonstrate that the majority of complaints were noise related (in particular domestic and dog noise).

Statutory Nuisance Related Calls	
Artificial Lighting	7
Bonfires	54
Odours	19
Noise related	305
Accumulated Rubbish	34
Other	19
Total	438

Noise related complaints	
Dog	104
Domestic	112
Licensed Premises	19
Commercial or Leisure Premises	33
Other	37

Table 5



Graph 6

On 41 occasions noise monitoring equipment (noise-boxes) were installed into complainants' properties to record the levels of noise related nuisance.

Overall eight Notices were served for statutory nuisance; seven relating to noise nuisance and one relating to the keeping of animals.

Industrial Air Pollution Control

Introduction

Certain industries have to be regulated under the Environmental Permitting Regime, which requires operators to obtain an environmental permit for specified activities they carry out. The regime was introduced by the Environmental Permitting (England and Wales) Regulations 2007; these have been superseded by the Environmental Permitting (England and Wales) Regulations 2010.

The aim of the regime is to:

- Protect the environment and achieve statutory and Government environmental policies and targets.
- Increase clarity of permits and what is involved to comply with these.
- Minimises the administrative burden on both the regulator and the operators
- Encourage regulators to promote best practice in the operation of facilities
- Continue to fully implement European legislation.

This regime seeks to apply a more integrated environmental approach to the regulation of a wide range of specified industries. Regulators must set conditions which aim to achieve a high level of protection for the environment as a whole, based on the concept of Best Available Technique (BAT), which balances the costs to the operator against the benefits to the environment.
Process guidance notes are produced by DEFRA for each type of process and these are regularly reviewed to take account of advances in technology.

The specified industrial processes are categorised into those which discharge to air, water and land, known as Part A1 and Part A2 processes, and those which discharge only to air - Part B processes.

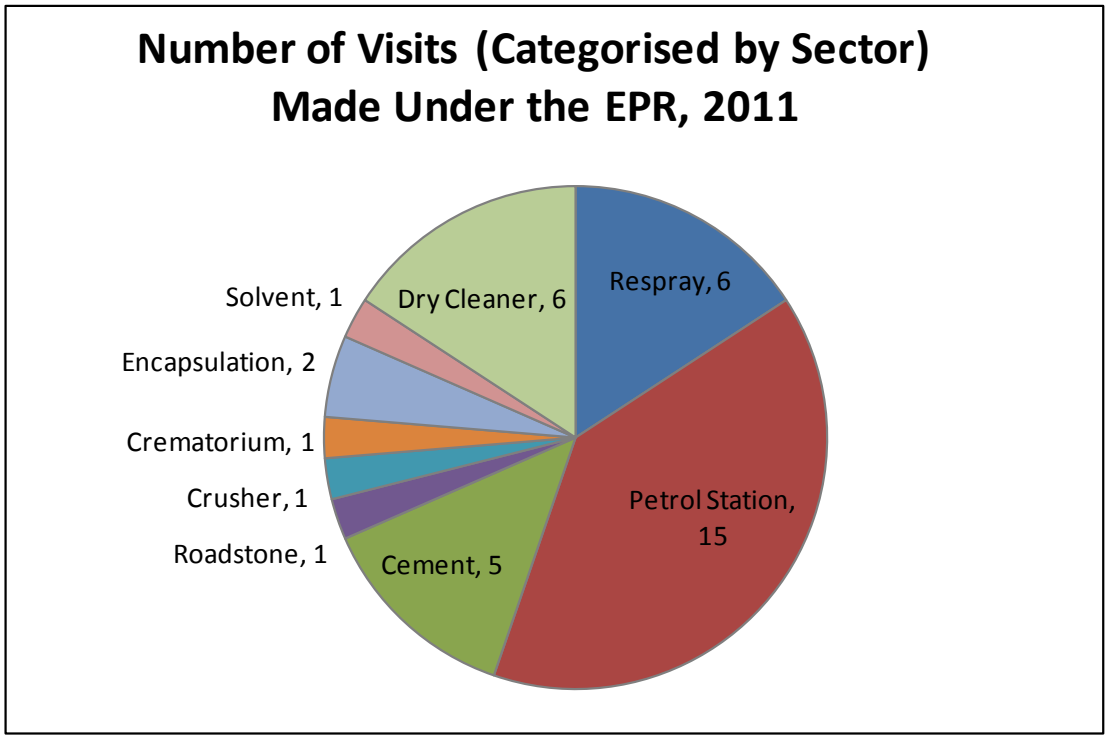
The Part A1 processes are regulated by the Environment Agency (EA); all Part A2 and Part B processes within T&M are monitored by the EPT.

Within Tonbridge & Malling there are:

- Four Part A1 processes monitored by the EA.
- One Part A2 process monitored by TMBC.
- Fifty-four Part B processes monitored by TMBC.

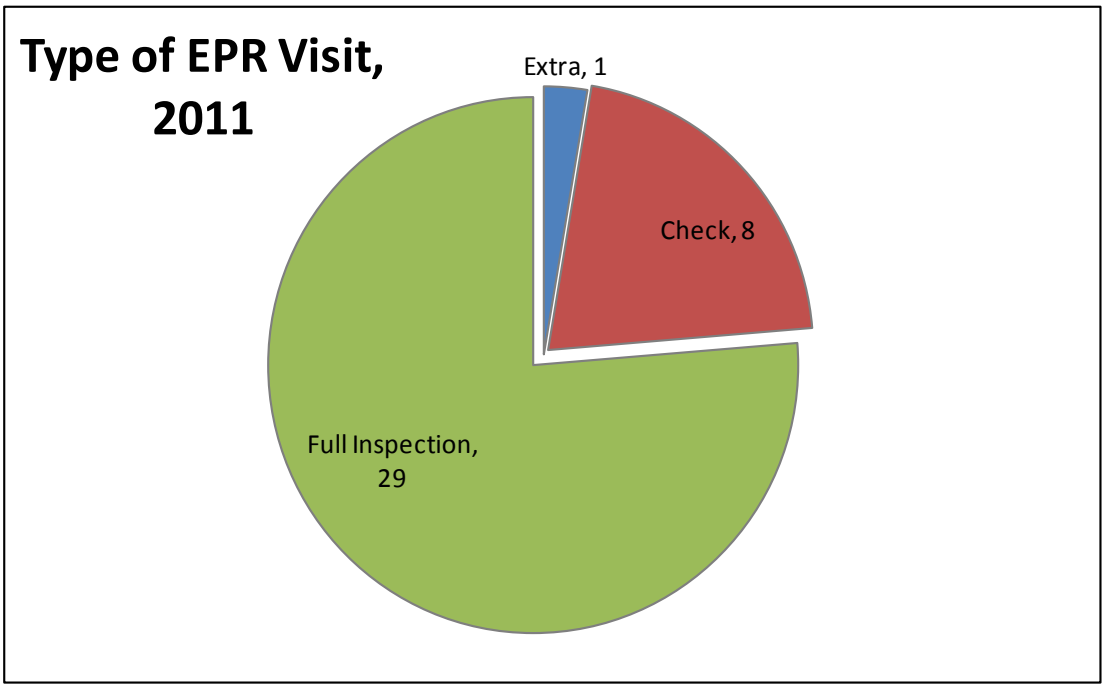
Environmental Permitting Monitoring, 2011

During 2011, 31 premises were inspected under the Environmental Permitting Regime (EPR). These were broken down into different types of processes, with petrol stations encompassing the largest proportion (See Graph 7).



Graph 7

In total, 38 visits were made (either full inspections, check visits or extra visits) as shown in Graph 8. This entailed around 180 hours of officer time.



Graph 8

Air Quality

Introduction

Local authorities in the UK have been required to carry out Review and Assessment of air quality in their areas since 1997. This Review and Assessment process forms the basis of the system of Local Air Quality Management (LAQM). LAQM plays a key role in the Government's National Air Quality Strategy (NAQS) to work towards achieving the air quality objectives for the seven main pollutants, in relation to human health, as set out in the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002.

The seven main pollutants, for which limits have been set, are:

- Nitrogen dioxide
- Sulphur dioxide
- Carbon monoxide
- Particles (PM_{10})
- Benzene
- 1,3-Butadiene
- Lead

National short and long term objectives have been set, for the air quality pollutants listed above, to safeguard human health on the basis of known health effects. The main air quality pollutant that affects T&M is Nitrogen Dioxide. An hourly and annual objective for Nitrogen dioxide (NO_2) has been set at a national level. The hourly objective is relevant to members of the public at locations where regular short term exposure is experienced, for example busy shopping streets. The annual mean applies to locations where the public are present over the long term for example residential properties. The objectives are based on cumulative assessments however in practice, pollution levels will vary over time, especially depending on the time of year or time of day. Annual pollution levels are generally higher during the winter time due to atmospheric conditions and increased car usage in adverse weather

conditions. On a daily basis pollution levels are higher during rush-hour periods when the greatest numbers of cars are on the road.

Risk to Human Health[5]

Estimates indicate that air pollution reduces life expectancy in the UK by an average of six months. The most important air pollutant in terms of health effects is PM – particles emitted from vehicle exhausts, chimneys or formed in the air from reactions between other pollutants. The World Health Organization (WHO) advises there is no safe exposure level to PM. For people with lung and heart conditions, elevations in particulate air pollution can worsen their symptoms.

The short term health effects of nitrogen dioxide (NO_2) are also well established. At higher concentrations it can cause irritation of the lungs and can exacerbate existing lung conditions including asthma. However it is unlikely that such high levels of NO_2 will be reached in the UK. Ground level ozone (O_3) is formed when other pollutants react in sunlight and can cause breathing problems and reduced lung function.

Air Quality Management Areas (AQMA) in Tonbridge and Malling

Completion of annual reports[6] under the Review and Assessment process has identified local air quality issues, within T&M, which require addressing. This has resulted in the Council formally declaring six Air Quality Management Areas in the borough as detailed in Table 5. Maps of the AQMAs listed in Table 5 can be viewed on our website[7].

	Area of AQMA	Date of Declaration
1	M20 - The M20 motorway that runs between New Hythe Lane, Larkfield and Hall Road, Aylesford	1st May 2001
2	A20 Ditton - Station Road/London Road (A20) junction (Ditton corner)	10th May 2005
3	Tonbridge High Street - The south end of Tonbridge High Street between Botany and the High Street/ Vale Road roundabout	10th May 2005
4	Wateringbury - The Red Hill/ Tonbridge Road (A26) crossroads in Wateringbury	10th May 2005
5	A20 Aylesford -London Road/ Hall Road junction and London Road (A20)	22nd September 2008
6	A20 Larkfield - London Road/New Hythe Lane junction and London Road (A20) towards Ditton	22nd September 2008

Table 6: Air Quality Management Areas (AQMA)

[5] Information from DEFRA's website (last updated February 2011); 'Sources and Impacts of Air Pollution'
[6] All previous reports are available on www.kentair.org.uk or on TMBC's website.
[7] TMBC's website.

The Kent and Medway Air Quality Monitoring Network (KMAQMN)

Tonbridge and Malling Borough Council are part of the Kent and Medway Air Quality Monitoring Network (KMAQMN), which provides a Kent wide platform for tackling air quality issues within the region. The KMAQMN is funded by the districts and boroughs within the county with an additional contribution from Kent County Council. The aims of the network are to promote the improvement of air quality within the region, to assist local authorities to meet their AQ obligations and maintain an accessible database of robust measurements for public reporting, research and development. The network manages the Kent Air website that details all of Kent's air quality monitoring results and air quality reports. This information is available at: www.kentair.org.uk

Air Quality Reports

The Council is statutory obliged to complete certain reports on air quality, within the borough, throughout the year. During 2011 both the Annual Progress Report, 2011 (based on 2010 data) and an Air Quality Action Plan were required. The air quality monitoring network that the EPT operates (through diffusion tubes and a continuous analyser) is vital to the completion of these reports and analysis of air quality trends within the borough.

Air Quality Action Plan

The Council produced an Air Quality Action Plan in February 2003, which identified the existing and proposed measures to improve air quality along the M20 in the medium term, by endeavouring to reduce traffic emissions. Many of the measures within the M20 Action Plan have now been successfully completed.

In the Annual Progress Report 2010 the Council committed to the preparation of a new action plan in respect of the five AQMAs, for which Action Plans have not previously been compiled and to include an update on the M20 Action Plan within the new Action Plan.

The preparation of an Air Quality Action Plan for all 6 of the existing Air Quality Management Areas within the borough was continued during 2011 through consultation with other stakeholders and is being redrafted in 2012 to give more focus on achievable solutions.

Nitrogen Dioxide Monitoring Using Diffusion Tubes

The main source of nitrogen dioxide (NO_2) pollution in Tonbridge & Malling is traffic-related, hence the highest concentrations are found at busy road junctions, roundabouts and adjacent to major roads. These locations are known as 'hot spots'.

Passive monitoring of nitrogen dioxide is carried out using diffusion tubes (see picture). Diffusion tubes allow atmospheric gases to passively diffuse from the open end of the tube to the closed end (blue capped end), which contains a pre-prepared absorbent material that retains the pollutant. The diffusion tubes are exposed for approximately one month and returned to an approved laboratory for analysis. Diffusion tubes are sited (most often in AQMAs) in triplicates (three tubes at one site) to ensure greater accuracy of results.


Diffusion tube

Monitoring for nitrogen dioxide using diffusion tubes is carried out at multiple locations throughout the borough. Monitoring locations are classified as urban background, urban centre, rural, suburban, industrial, kerbside, roadside or other depending on their location.

At all roadside monitoring locations diffusion tubes are placed on or close to the façade of residential (or other) property, to represent relevant public exposure, at the site.

Air Quality Monitoring Sites Using Diffusion Tubes in 2011

During 2011, 37 diffusion tubes were put out each month, six of which were at triplicate sites. In total over the year, 26 sites were monitored using diffusion tubes. One additional site, which used to be monitored by the Highways Agency (HA), was continued by TMBC after the HA removed funding for their air quality monitoring network in May 2011.

Monitoring within the borough has not identified any new exceedences outside existing AQMA's except for Borough Green, which was already identified in the Annual Progress Report 2010 (inconclusive as based on limited data) and 2011. The Council has already proceeded to a Detailed Assessment towards the end of 2011 into 2012 to further analyse the exceedence observed.

Monitoring has also identified a potential exceedence of the 1-hour mean nitrogen dioxide objective at locations within the existing Wateringbury AQMA. This AQMA will need to be amended to include the 1-hour mean objective.

The Ditton AQMA has not experienced any exceedences of the annual mean objective since 2006 at locations with relevant exposure.

Nitrogen Dioxide Monitoring Using a Continuous Analyser

Tonbridge and Malling Borough Council operate a continuous monitoring analyser within the AQMA at the south end of Tonbridge High Street, which measures nitrogen dioxide concentrations. The automatic analyser supplies digital data, via an internet connection, to AEA Technology who are contracted by the KMAQMN to manage and ratify the data collected.

Nitrogen Dioxide Concentrations Measured by the Continuous Analyser, 2011

The data for 2009-2011 from the continuous analyser is summarised in Table 7 below and compared to the national objectives for nitrogen dioxide.
In 2011 the annual mean objective for nitrogen dioxide was not achieved but the hourly objective was met.

	2009		2010		2011	
Objective for nitrogen dioxide:	**Result**	**Objective achieved**	**Result**	**Objective achieved**	**Result**	**Objective achieved**
Annual mean < 40µg/m^3	47 µg/m^3	No	49 µg/m^3	No	44.5 µg/m^3	No
Hourly mean < 200µg/m^3 more than 18 times per year.	None	Yes	3 occasions	Yes	None	Yes

Table 7

Landfill Gas

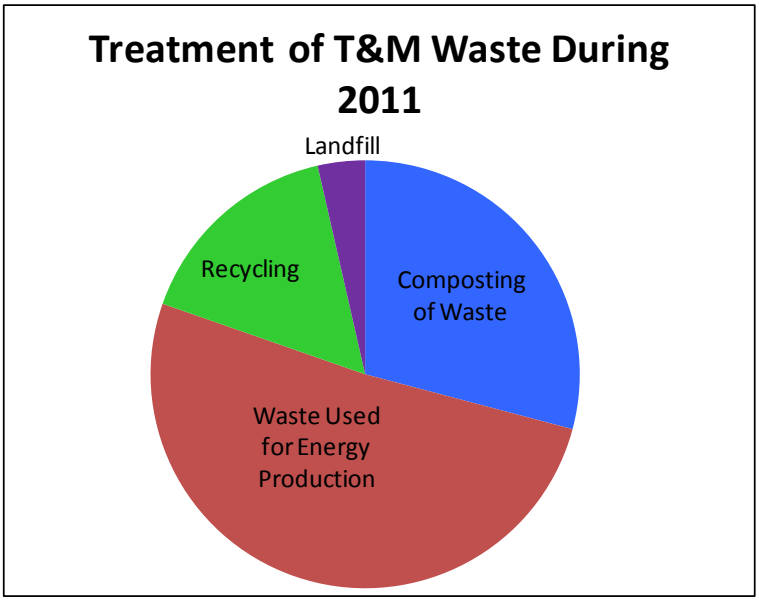
Introduction

There are a number of historic closed waste disposal sites across Tonbridge and Malling owing to UK reliance on landfill practices. We produce around 170 million tones of waste from homes and businesses in England and Wales each year[8]. Some of this is reused or recycled, but much of it sent to landfill. This high dependency on landfill has meant that the UK ranks as one of the highest contributors to landfill throughout the EU.

Despite this, efforts have been maintained by Tonbridge and Malling Borough Council[9] and central government to produce alternative waste solutions.

During 2011, Tonbridge and Malling's waste production was treated in the following ways (Graph 9):

- **Recycling: 16.09%**
- **Composting of waste: 29.13%**
- **Waste used for energy production: 51.22%**
- **Landfill: 3.56%**



Graph 9

Additionally, approximately 82% of this waste was treated within the Tonbridge and Malling area.

[8] Environment Agency website; Guidance on Monitoring of Landfill Leachate, Groundwater and Surface Water, 2003
[9] For alternative waste operations run by Tonbridge and Malling Borough Council please refer to our website or contact Waste Services directly.

When planning permission is granted for a landfill site, the future land use is sometimes agreed as part of the planning application and may involve building or another use. If not, the land will usually be restored for either recreational purposes or for agriculture use, such as grazing.

Much of the waste put into landfill sites will be inert, however, a significant proportion will consist of organic matter, for example, paper, cardboard, wood and food. Landfill gas is produced by natural microbial action on this buried organic waste.

The percolation of water through the waste produces landfill leachate, which can potentially be a polluting liquid. The composition of any leachate is totally dependent upon on-site landfill conditions and the nature of the deposited waste-types. Consequently, although broad generalities can be made for common waste and leachate types, every leachate should be viewed as being potentially unique.

Gas production generally reaches a peak 5 to 7 years after the waste has been placed in the landfill, though this will depend on the type of waste deposited.

Landfill gas characteristically contains methane (64%), carbon dioxide (34%) and a number of other gases. The proportion of these gas components depends on the phase of breakdown and other factors such as the type of waste present and how densely packed the material is. External factors such as temperature and the amount of water present also determine how quickly the material breaks down.

Fact Box

Methane emissions from (biodegradable waste in) landfill account for 40% of all UK methane emissions and **3% of all UK greenhouse gas emissions**. Methane is 23 times more damaging as a greenhouse gas than carbon dioxide.

Source: Defra

When gas levels from landfills receiving biodegradable waste is of high enough concentrations it is advised[10] that landfill gas should be controlled, preferably by collection and burning in flares or energy recovery plant. The purpose of flaring is to dispose of the

[10] Environment Agency and SEPA; Guidance on Landfill Gas Flaring (2002)

flammable constituents, particularly methane, safely and to control odour nuisance, health risks and adverse environmental impacts. However consideration needs to be given to the environmental and health impacts associated with the combustion products resulting from flaring.

Risks to Human Health

The main risk to human health is from the production of methane gas and to a lesser degree, carbon dioxide. Methane is a colourless, odourless gas, which can act as an asphyxiant. It is flammable when mixed with air in specific proportions and is therefore potentially explosive. When gas is formed in a landfill, the vapours do not stay where they are formed. They move around taking the path of least resistance. Methane and carbon dioxide are particularly hazardous if allowed to enter a building.

Building Regulations require that 'precautions shall be taken to avoid danger to health and safety caused by substances found on or in the ground to be covered by a building.' Providing all necessary control procedures and extraction processes are in place and maintained correctly, the risk to human health is small.

Landfill Gas Monitoring, 2011

The Environment Agency (EA) licenses and regulates landfill sites to ensure that their impact on the environment is minimised. TMBC works in conjunction with the EA to monitor the closed landfill sites within the borough.
Each landfill site must be treated on an individual basis and therefore must be monitored according to that site's specifications. This includes variances in the number of sampling points and the frequency thereof. Weather conditions will also affect landfill gas release; for example, monitoring is often done on low pressure days as this is when more gas escapes. Monitoring may continue for many years until the site is considered to no longer be producing landfill gas and will cease only after consultation and agreement with the EA.

The EPT currently reviews and monitors gas readings from 3 closed-landfill sites within the borough. One of these sites is owned by TMBC and therefore is the responsibility of TMBC to maintain and review. The other two sites are reviewed by TMBC in order to safeguard public health.

During 2011 the following parameters were measured using a landfill gas analyser:

- Oxygen (O_2)
- Carbon Dioxide (CO_2)
- Methane (CH_4)

From January to July, 2011 a GA45+ analyser was used to take landfill gas readings. From July onwards a GA2000 was used. The GA2000 has now replaced the GA45+ as the latter can no longer be calibrated. The GA2000 is able to read flow reading, which will help aid monitoring work done on the three sites.

A review of the monitoring programme (in consultation with the EA) was conducted during the end of 2010, which concluded that the 2011 monitoring frequencies for Joco Pits could be reduced based on historic landfill gas results. As a result, during 2011 the scheduled monitoring frequency for the individual sites was; monthly at **Priory Wood** and tri-monthly at both **Joco Pits** and **Paris Farm** (also known previously as Goose Green). Results thereof have been collated in graphs 10 to 15. The graphs have been given the same scales (along the y-axis) so that cross comparison is possible. Gaps in the graphs indicate where data was not recorded, usually the result of lack of access to a monitoring point (e.g. borehole submerged in water).

Priory Wood

There are currently four active borehole points at Priory Wood from which the EPT takes landfill gas readings. An additional monitoring point, borehole 2, was added to the 2010 regime.

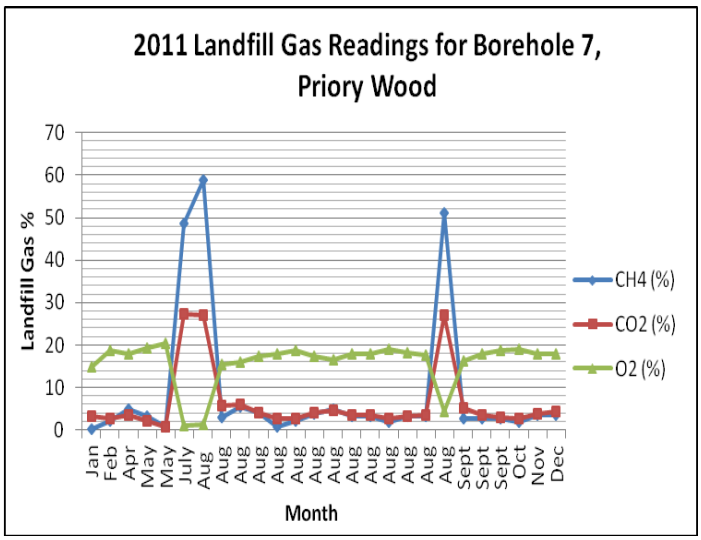
At the very end of July 2011, the pump system at Priory Wood landfill experienced a mechanical failure. The failure was logged as an emergency call-out with a landfill gas contractor and was attended to within 24 hours. The fault had occurred due to an electrical surge, which had short circuited the pump system. Levels were monitored immediately after the pump was made operational, which showed levels quickly return to the norm (see Graphs 10 to 13). Borehole 1 and Borehole 2 showed no increases in methane levels whilst the pump was off-line, demonstrating that the cut-off trench in place between the main waste-filled area and these points, at the edge of the site, is passively effective (Graphs 12 and 13). The other two borehole points take readings from within the main fill area; Borehole

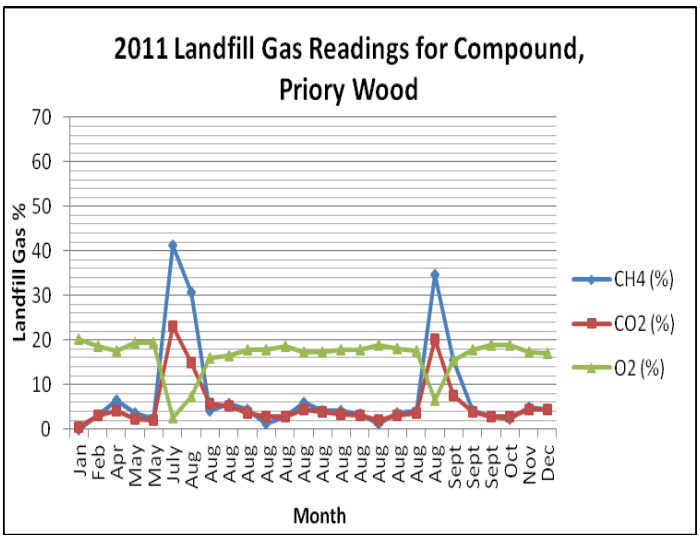
7 is within the centre of the fill whereas the Compound is on the edge of the fill. Whilst levels in Borehole 7 and the Compound monitoring point (Graphs 10 and 11) showed a steep increase in methane levels at this time (more so in Borehole 7 due to its location), they were not accompanied by an increase in the flow rate, which significantly reduced the risk to human health as did the high atmospheric pressure of that time.

The cut-off voltage was adjusted to avoid recurrence of the problem. Immediately after the fault an extensive monitoring period was enacted until the end of September to ensure levels remained constant. No further problems were experienced.

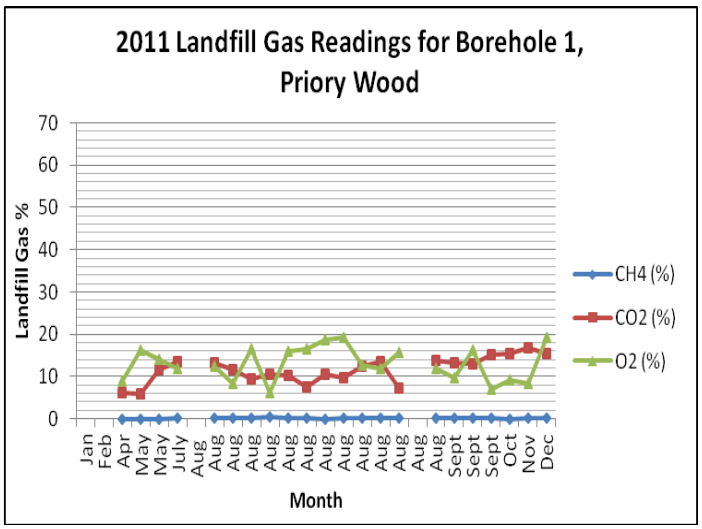
The other spikes of methane and carbon dioxide shown in Graphs 10 and 11 in late August were taken during an automated down-time of the pump to observe efficiency and time functions.

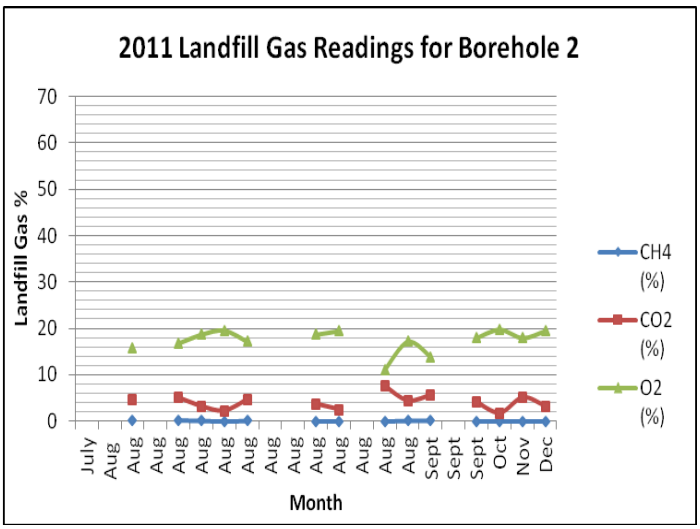
An intensive site investigation of the old landfill site was completed, which identified certain actions that needed to be completed. As a result, an on-going programme of works was brought forward into 2012 and a site investigation will now be completed annually as a way of maintaining the site.





Graphs 10 and 11

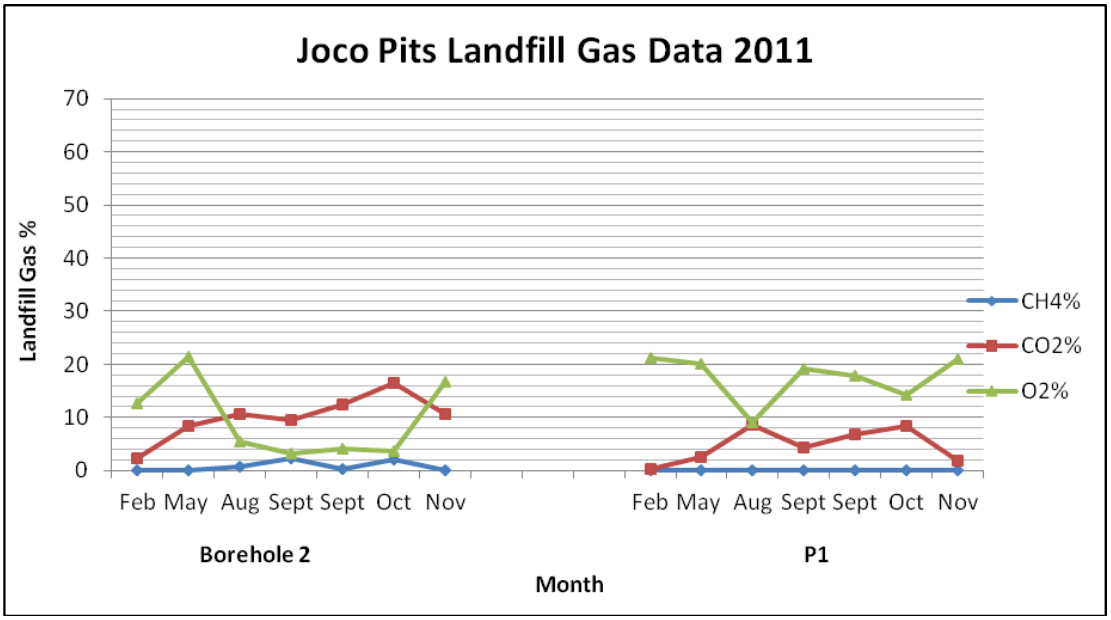




Graphs 12 and 13

Joco Pit

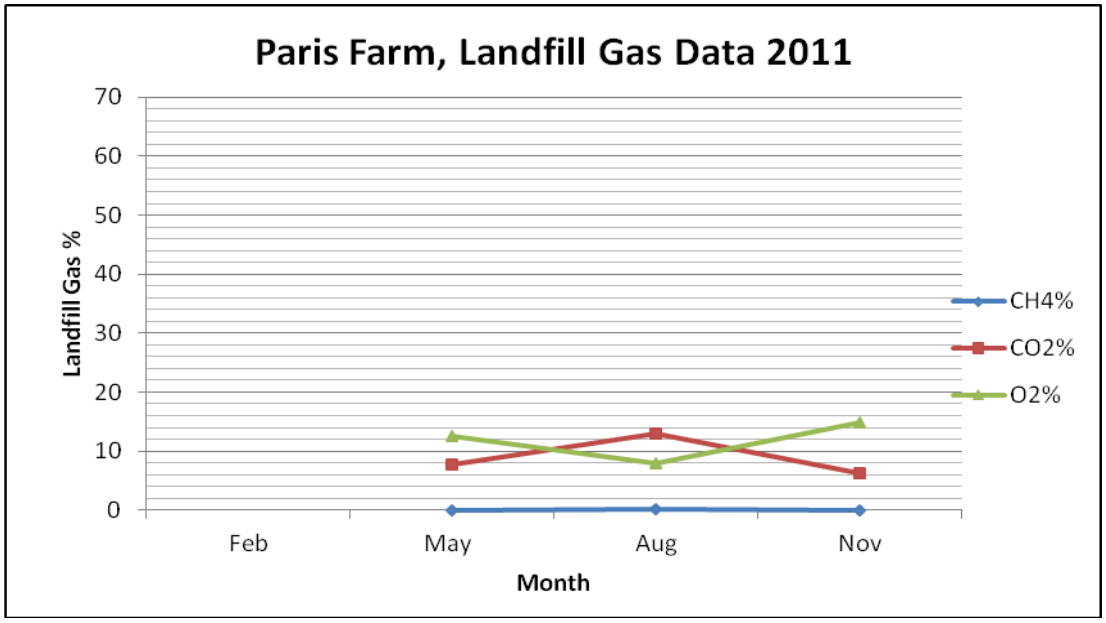
Quarterly monitoring at Joco Pit in August 2011 detected a very minor increase of methane levels (Graph 14). Although this change did not constitute a threat to human health and safety, monitoring was increased to monthly following the variation. An in depth site review of the area was also conducted to increase monitoring points and review the current status of the site, which is on-going in 2012.



Graph 14

Paris Farm

One of the Borehole points was lost at Paris Farm between 2010 and 2011 due to the removal of trees from the area. The levels of landfill gases produced at the site continue to remain stable and present no risk to human health (Graph 15).



Graph 15

Review of the Environmental Monitoring Programme, 2012 onwards.

Monitoring status

Below are listed any deviances intended for the 2012 environmental monitoring programme from that completed in 2011.

Radiation

It was noted in the 2010 Environmental Monitoring Report that radiation monitoring would cease as of the 1st of January 2011 due to a lack of statutory obligation. It was noted however that in light of the Fukushima nuclear power plant incident in Japan following the earthquake and Tsunami of the 11th of March 2011, that the status of the monitoring programme would be kept under review. The last press release update from the Health Protection Agency (HPA) stated that; "levels being detected mean there is no risk to public health in the United Kingdom from the environmental concentrations resulting from the release of radioactive material at the Fukushima nuclear power plant" [11]. Subsequently it was not necessary for monitoring to be re-started neither during 2011 nor in 2012. As always, should matters or statutory obligations change, the monitoring programme will be reviewed.

Recreational Lakes

Following the successful trial of lake monitoring in 2011 using the EC Bathing Water Directive as guidance, the programme will be extended to 2012. As described in Chapter 1, the Council is not statutorily obliged to monitor lake water quality but does so to safeguard public health and safety. During 2012, sampling will start from the 1st of May and run throughout the Bathing Season[12] until the 30th of September[13]. Two samples will be taken from Leybourne Lakes and one from Haysden Country Park for the parameters E.Coli and Intestinal Enterococci as those set out by the Bathing Water Regulations even though the lakes will not be designated as Inland Bathing Waters. The sampling programme will be

[11] Health Protection Agency (HPA), Statement on the Fukushima Incident, 19 May 2011
[12] The official Bathing Season starts on the 15th of May and runs through till the 30th of September as defined by The Bathing Water Regulations, 2008.
[13] As specified by the Bathing Water (Classification) Regulations, 1991 Schedule 2.

jointly undertaken between the EPT and Leisure Services, with a gradual focus towards Leisure Services who operate the sites.

Landfill Gas

Monitoring at Joco Pit will continue to take place monthly over 2012 as a precautionary measure to observe landfill gas trends from the site. Should the trend be shown to be stable over a period of time, then a reduction in monitoring back to tri-monthly or even bi-monthly will be enacted.

If you are having difficulty reading this report and would like the information in another format, please contact:

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