

UKWIR 2018-19 Research Programme Summary

Project Reference	Project Title	Background	Objectives
CL 1168	UKWIR Greenhouse Gas Emissions Workbook update	<p>The UKWIR greenhouse gas (GHG) emissions workbook has underpinned operational carbon reporting for companies for more than 10 years and has enabled the sector to be recognised as taking a lead on carbon and providing credible and consistent reporting on carbon in company and regulatory reports. The workbook requires annual updates to ensure the latest DEFRA etc. guidance on emission factors and boundaries are accommodated and there may also be updates according to company wishes for levels of reporting and use.</p> <p>These updates are critical to ensure the continued utility of the workbook.</p>	A fully revised and updated tool covering emission factors, boundaries and addressing user comments and agreed improvements from the companies, expressed via the steering group.
CU 1217	Using Smart Metering to deliver savings for customers	<p>The recent publication of Waterwise's Water Efficiency Strategy for the UK and WaterUK's Long-term Water Resources Planning Framework both promote and suggest a drive to push water efficiency forward. A key strand of the national water efficiency strategy highlights the potential benefits of a joint approach to delivering water and energy efficiency programmes.</p> <p>Energy companies have a remit from OFGEM to deliver energy efficiency projects. Defra's Water for Life (precursor to the Water White Paper) and its Statement of Obligations for PR14 set out the Government's expectation that water companies will deliver overall demand reductions via demand management measures, including water efficiency. This therefore provides several opportunities and potential important benefits of including water efficiency into current and future energy efficiency programmes (and vice-versa) for added benefit to customers. Water efficiency should not be an add-on as the best water efficiency option often offers the best energy efficiency.</p> <p>However, the Energy Industry is spending £6bn on Smart Metering the cost of which includes establishing a Data Communications Company (DCC) which constitutes a Communications Service Provider (CSP) and Data Service Provider (DSP), both of which are services required in Water Smart Metering Implementation. Water Companies would like to avoid costly solutions that deliver minimal benefit by finding an optimum route to implement a cost effective smart water metering solution that delivers savings to customers by potentially allowing customers to understand combined savings for water and energy.</p>	<p>Understand the links and benefits of any work carried out to date looking at schemes where water & energy efficiency retrofit programmes are delivered in parallel, both in the UK & abroad. In particular:</p> <ul style="list-style-type: none"> - How has marketing a joint approach on water and energy on the uptake of water conservation programmes (particularly by unmetered domestic customers) compared to marketing water conservation only; - Evaluate the water, energy and financial savings from water-energy audits that incorporate innovative products such as the combismart, combisave, etc. - Have customers changed their behaviour as a result? - Highlight approaches / drives that will allow the role out of water efficiency on a larger scale and how water companies and energy companies can work together to access funding to increase the scale of retrofit programmes. - How can the water industry make use of the Energy Sector smart metering infrastructure for a smart water future?
DW 1180	Catchment Management for Water Quality & Quantity	<p>The industry's regulators have stated that they see the main effort to improve water quality / quantity to be based at a catchment level. This will aid the minimisation of algae, pesticides and colour in the raw water sources which in turn will minimise issues water companies face from taste & odour contacts.</p> <p>The previous UKWIR project, 'Quantifying the benefits of Catchment Management' was over 5 years ago and the project 'Catchment Management - how do we know its worked' was started in 2015/16 but put on hold indefinitely. Catchment management has gained traction since then with some companies making great progress. The time is right for a review of the evidence, for or against, catchment management.</p>	<p>To carry out a best practice review to understand:</p> <ul style="list-style-type: none"> - Where catchment management can or cannot make a difference to raw water quality? - What are the most effective controls? - What influence can catchment management have in the short, medium and long term? - What are the payback periods for different approaches?
DW 1187	Sustainability of Phosphate Dosing for Water Quality	Phosphate is currently used by Water Companies to provide a barrier between lead supply pipes and the drinking water provided to customers. This benefit only lasts while dosing continues. As soon as dosing ceases the barrier is removed and lead comes into contact with the drinking water. However, phosphate is a finite, non-renewable resource so there will be a point when the dosing of this is unsustainable.	<p>To understand the economics of phosphate dosing for plumbosolvency control. As phosphate is a finite resource:-</p> <ul style="list-style-type: none"> - At what point does its use by Water Companies become unsustainable? - What are the alternatives available, if any, to do the same job? - How do the economics of phosphate dosing change over time and at what point do alternatives (lead communication pipe and supply pipe replacement) become more cost effective?
DW 1188	Development of a Novel Detection Technique for Metaldehyde	<p>Metaldehyde is a major challenge for many water companies, and has the potential to drive the installation of expensive and energy intensive treatment processes aimed at its removal. The desire of the Industry and its Regulators is to manage metaldehyde and achieve compliance by other means.</p> <p>The lack of a simple, robust, on-line method for the measurement of metaldehyde hampers the application of:-</p> <ul style="list-style-type: none"> - Catchment Management, - Abstraction Management, and - Blending <p>as potential lower cost and more appropriate solutions</p>	<p>Investigate the potential of a candidate biochemical technique to deliver a low cost, robust monitoring technology which is field/intake deployable and with sensitivity to detect concentrations, in real time, of the target at 0.1ug/l and below.</p> <p>Identify a route to production of what is a niche instrument.</p>
DW 1189	Adoption of novel quantification techniques for microbial and viral microorganisms for water quality assurance	<p>UKWIR supported the EU Aquavalens project -the aims of which were to challenge and develop new techniques for the detection, quantification and identification of a range of microorganisms. This project will complete in early 2018, but is already showing the potential of some techniques to improve our understanding of the microbiological safety of water and give better knowledge of the raw water challenge.</p> <p>The revisions to the EU Drinking Water Directive currently being discussed may broaden the range of microorganisms regulated in future.</p>	<p>The current Aquavalens project includes limited possibilities for field trials of technologies and methodologies. This project will:</p> <ul style="list-style-type: none"> - Widen the range of water types on which these technologies have been tested - Provide an Industry guide to identify the cost-benefits of these techniques alongside current methodologies - Assess whether such techniques allow an approach which supports risk assessment and management approaches such as QMRA and DWSPs

DW 1216	Developing management strategies for increasingly frequent algal blooms in drinking water source waters	<p>The development of phytoplankton in water supply reservoirs across the UK can cause severe treatment problems at water treatment works, resulting in a loss of output, increased treatment cost and, in extreme cases, threatening the continuity/resilience of water supply. Events of this nature are, however, relatively infrequent and may not occur for many years. This makes it difficult to plan for them and/or to maintain continuity in the measures required to reduce their risk and react to problems when they occur. In addition, continuity in monitoring and maintenance of records to assess the risk of these events is difficult to maintain. As a result, water companies need to be prepared for extreme phytoplankton blooms and to deal with them in the most effective way.</p> <p>Furthermore, the risk of these extreme events is likely to increase as there is an increasing body of evidence that suggests that algal blooms are occurring at times of the year when they have never or rarely been seen before and they are lasting longer, a possible result of climate change. If our changing climate is a driver for what we are seeing we need to establish clarity about the mechanisms involved in driving the change, so that we might understand just how bad a problem it might become.</p>	<p>The overall aim of the proposed work is to develop improved knowledge of the risk to water treatment from phytoplankton and to develop better planning procedures to reduce the risk of treatment threatening events and manage them better if they occur.</p> <p>The approaches should be tested using actual reservoir data on a selected number of sites. The approach should take into account differences in the quality of data.</p> <p>Develop predictive algorithms that will allow us to estimate the likely duration of the bloom.</p> <p>Make recommendations on monitoring of phytoplankton and how this information should be recorded, stored and shared between the water companies and with the regulators. The monitoring strategy should take into account the requirements to assess risk and support operational actions to deal with phytoplankton blooms when they occur.</p> <p>Develop procedures on how to respond to severe phytoplankton blooms that threaten treatment. This will include the options for operational management in the reservoirs and in the treatment stream.</p>
L 1002	The impact of reductions in leakage levels on reported and detected burst frequencies	<p>We have little knowledge of the impact of reducing leakage levels on the numbers of repairs needed to be carried out each year, nor on the relative proportions of visible and invisible leaks. Introduction of performance commitments and changes in SIM, with associated rewards and penalties, has increased focus on the customer service aspects of burst and leak repairs, whether it is unwanted contacts, interruptions to supply or associated discolouration contacts. Customer Service impact mitigation costs will add to the opex costs for repair and consequential damage.</p> <p>Historic leakage strategy has focused on Sustainable Economic Level of Leakage (SELL). Leakage strategy now must consider the customer acceptability aspects of leakage. Most customer views are based on the impacts of visible or reported leaks and the impact of repairs on customer service.</p> <p>Single company data is insufficient to discern any impact due to leakage level as it is masked by weather and relatively static targets. Pooled company data, combined with planned AMP6 reductions should provide a data set to understand any increases in repair frequency, changes in proportions of visible leaks and the time period for change.</p>	<p>Many leakage models assume that equilibrium burst frequencies are the same at all leakage levels. If a company reduces its leakage from one level to a lower level by increasing the intensity of active leakage control (ALC), there will be a short term increase in repair numbers as the backlog is reduced. However once leakage reaches equilibrium at the new lower level, the average frequency of repairs will be the same as at the higher level. However other SELL models assume that the number of repairs will be higher at the lower leakage level.</p> <p>We need greater regulatory confidence in the robustness and consistency of our SELL calculations. In particular we need to understand and be able to demonstrate the impact of different levels of leakage activity on other performance measures, such as bursts, contacts, interruptions and SIM.</p>
L 1192	Active Leakage Control efficiency in the Sustainable Economic Level of Leakage (SELL) calculation	<p>Both Ofwat and the Environment Agency (EA) have said recently that they have some concerns with the current Sustainable Economic level of Leakage (SELL) process for the setting of leakage targets.</p> <p>The recent EA guidance on leakage for Water Resource Management Planning (WRMP19) says: 'There is increased realisation that SELL may not be the most effective way to plan leakage levels. WRMP19 will be the final time that a leakage figure is derived from SELL. We expect water companies to evolve and move away from SELL for WRMP24 and to innovate to reduce leakage beyond the current levels'.</p> <p>The Ofwat consultation doc on outcomes for PR19 (February 2017) expresses a different view: 'Companies should report their SELL in business plans, explain their assumptions on future improvements in leakage reduction efficiency in the SELL, and explain how its Performance Commitment for leakage is appropriate in relation to SELL:</p> <p>There is a strong feeling amongst companies that leakage targets should continue to be based on a sound economic analysis. However, the cost of leakage management relationship for SELL modelling is derived from analysis of the company's own historical leakage management performance data. It is a valid criticism of this process that if a company has been historically inefficient, then this inefficiency becomes built into the SELL.</p>	<p>Active Leakage Control (ALC) is defined as the processes by which companies identify, detect, locate and eliminate water losses caused by leaks which are not visible on the ground surface. Very little work has been done on the efficiency of ALC. It is very unclear how this should be defined or how it can be quantified. Nor is it clear what levels of efficiency should be achievable within water company operations.</p> <p>This project would investigate alternative definitions for ALC efficiency, and alternative parameters for measuring it. It would establish which are the most useful definitions and measures, and then gather data from companies to establish what levels of efficiency should be achievable within water company operations. Finally it would consider the most practical way to incorporate this into SELL calculations, allowing for companies' future aspirations for ALC efficiency.</p>
RG 1194	Transfer of Surface Water Assets	<p>There is an emergent debate about whether surface water drainage, and perhaps highways drainage should be transferred to sewerage undertakers in a similar way that private sewers were a few years ago. There are arguments for and against such a transfer, but the scale and consequence of what might be involved is largely unknown.</p>	<p>This research would inform debate on a potential transfer. We would want to know:</p> <p>On scale: How much surface water drainage is there? Do we know where it is or what condition it is in? What is the current maintenance spend by Local Authorities and Highways Agencies?</p> <p>On consequence: What would be the potential trade-off between council tax and water charges for customers? What risks would we be taking on? What benefits might we realise, e.g. removal of surface water from sewers?</p> <p>Generally - what lessons would we take from the transfer of private sewers and apply to this potential scenario?</p>

SW 1220	Energy from sewers	<p>There have been numerous studies, both in the UK and Worldwide, on the benefits of using sewage flow to recover usable heat via heat exchangers and heat pumps. There a number of technologies already developed to recover heat from sewers and there are a growing number of installations in Europe & North America.</p> <p>There is already one example of sewer heat recovery in the UK which uses Scottish Water sewers to provide heat to Borders College in Galashiels. A number of other water companies have been approached about similar projects. With the continued support for decarbonised renewable heat through of the Renewable Heat Incentive scheme it is likely that this market for sewer heat is going to continue to grow.</p> <p>Currently every water company will be approaching this differently leading to possible duplication of effort and inconsistency of approach which could eventually lead to a challenge being made to Ofwat or the Government. A level of consistency across all water companies would be welcome and provide a clear indication what we expect to the companies looking to exploit the opportunity of sewer heat recovery.</p>	<p>The objective is to answer the following three questions:</p> <ol style="list-style-type: none"> 1) What are the risks to our sewerage system or waste water treatment works from these heat recovery systems/technologies? Will some types of systems cause blockages or reduce sewer capacity? What will be the impact of reduced temperature of sewage on our treatment processes? 2) What are the legal implications for sewer heat recovery? In systems where flow leaves the sewer whose responsibility is it and are any additional permits required? 3) What is the overall scale of the opportunity for heat recovery and other forms of energy generation from sewers, both in terms of renewable generation capacity and additional income. <p>In answering these we will have to complete a review of the technologies available to recover heat from sewage so we can understand the risks they might pose to our system. We will need to understand at what point sewage could be classified as leaving the waste water treatment flow and therefore could be considered as a waste or a resource and what the legal implications of this could be.</p>
TX 01	Toxicity advisory service, toxicity datasheets and microsheets	<p>The provision of information and advisory services on the toxicity and health implications of contaminants in drinking water, as required by UKWIR members and sponsors.</p>	<p>Continuation of the following services.</p> <p>Toxicity advisory service - Toxicity datasheets: The following key objectives have been set for this project:</p> <ol style="list-style-type: none"> 1. To provide an information service from the National Centre for Environmental Toxicology (NCET) 2. To provide quarterly Current Awareness (Update) Reports to update UKWIR's members and sponsors on issues relating to the potential contaminants to water. 3. To maintain, update and develop the Toxicity Datasheets database on chemical contaminants for operators to use as an authoritative source reference. <p>Toxicity advisory service – Microsheets: The following objectives have been set for this project:</p> <ol style="list-style-type: none"> 1. To monitor and report on UK and international microbiological research of relevance to drinking water and the epidemiology that relates to the health of customers served by the Water Industry. 2. To maintain and develop the UKWIR database on waterborne microorganisms for operators to use as an authoritative source reference. 3. To promote the use of scientifically based standards that reassure customers and are practical by making this information available through the UKWIR database. 4. To prepare an independent "one-voice" response for the industry to issues emerging in the public arena. 5. To produce independent and credible reports for the purpose of the water industry communications and regulatory negotiations.
WW 1212	Ecological impact of other (non soluble reactive) phosphorus fractions	<p>This would be a follow on from the 'P speciation does it matter?' UKWIR project. Feedback through the project from the Environment Agency has been that there would need to be evidence that the river ecology is not impacted by other species of phosphorus for them to consider an alternative method of permitting wastewater discharges based on Soluble Reactive Phosphorus (SRP) rather than Total Phosphorus (Total P) for rivers.</p> <p>The objective would be to provide the evidence that there is/is not an ecological impact from the non soluble reactive species of phosphorus (non SRP).</p> <p>The industry is concerned as the Water Framework Directive is driving lower wastewater discharge phosphorus permit limits potentially down to 0.1 mg/l total phosphorus. The treatment options are often not sustainable. If it can be proven that the other species (non SRP) do not impact the river ecology then the permitting of SRP instead of Total P may become an option.</p> <p>There is an indication from lab experiments that organisms have the ability to utilise normally 'non-bioavailable' forms of P under 'extreme' conditions, however further research into the impacts in rivers systems is required.</p>	<p>To prove or disprove whether other non-SRP fractions of phosphorus have an ecological impact on rivers.</p>
WW 1213	Research, planning and management with UKWIR's Source Apportionment modelling system – from data to evidence and wisdom	<p>Water quality modelling underpins Water Industry decisions on securing investment to improve the aquatic environment. The SAGIS-SIMCAT modelling system is currently used by Water Companies to support decision making as part of the Asset Management Planning (AMP) cycle process, and by Regulators for River Basin Management Planning, and will continue to support these planning requirements until at least 2027.</p> <p>This new project should therefore:</p> <ul style="list-style-type: none"> - Incorporate findings from the latest research, for example from Chemicals Investigation Programme Phase 2 (in particular). - Expand the frontiers of science by using SAGIS to support novel (relevant) research. <p>This project will be aimed at ensuring that the modelling system utilises the most up-to-date data, knowledge and information, thereby supporting both current and future AMP cycle and River Basin Management planning requirements, as well as cost benefit analyses. The benefits of this work will be realised through improved investment decision making and through the level of cooperation afforded by water companies and regulators using a common platform.</p>	<p>The overall aim of the proposed work is to ensure SAGIS-SIMCAT continues to remain useful as a tool to support planning and decision making for AMP7 and AMP8 and their equivalents in other countries of the UK.</p>

WW 1215	Sink to River - River to Tap - A review of potential risks from nano-particles & microplastics	<p>There is significant interest in the prevalence of nano-particles and microplastics entering the environment.</p> <p>There is a lack of understanding for the Industry wrt fate and behaviour during transport and Waste Water Treatment; once discharged to the river system there is limited understanding of how these particles behave; if river water is abstracted down-stream there is a lack of knowledge around the behaviour and degree of removal of these particles through water treatment processes.</p>	<p>The objectives of the project are:-</p> <ul style="list-style-type: none"> - Assess the quantity, type and potential source of nanoparticles and microplastics being received at wastewater treatment plants and in sources of drinking water - Assess the numbers of such particles being generated by homes & business - Assess changes during transport through sewerage systems - Assess changes/removal during waste-water treatment - where do they partition - sludge or effluent? - Assess changes/attenuation within river systems - Assess removal by water treatment processes
WW 15	Wastewater Briefings and Alerts	<p>International developments and in particular European developments have a major influence on the activities of the UK Water Industry.</p> <p>The contractor will be required to report on:</p> <ul style="list-style-type: none"> - Changes in European Union policy and legislation which could have a major influence on the regulatory environment within which the UK water industry operates; - Research that can identify novel ways in which to operate that may lead to efficiency savings; - Major events affecting public attitudes which might be picked up by the media and used to influence the publics' reaction to issues in the UK. 	Continuation of a bi-monthly Briefing Note and a weekly 'Alert' to significant news.