



Solent Forum- Water Industry and EA Chemical Investigations Programme (CIP)

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With thanks to:

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- The Water Industry Research (UKWIR) Chemical Investigations Programme (CIP) is an ongoing research programme looks to:
 - gain a better understanding of the occurrence, behaviour and management of trace contaminants in the wastewater treatment processes and their fate & impact on the environment (both land and water)
 - address the likely implications of environmental legislation for the UK water industry for trace contaminants such as metals, pharmaceuticals and forever chemical (e.g. PFAS, PFOA).
- It's a joint project with a steering group compromised of representatives from Defra, EA, Water Companies, UK Water Industry Research and the lead consultants – Atkins Realis
- We don't put these chemicals into our processes – they are in domestic sewage
- Who are UKWIR and how are they funded?



CIP - History

Kate asked me: members what to know if the water industry is doing anything on emerging chemicals



Answer: working since 2010 with regulators – **the CIP programme**

CIP1 AMP 5 2010 to 2015: Mapped initial chemical sources, pathways and concentrations across more than 600 sewage treatment works. What levels can we treat to already? Will these levels result in EQS (environmental quality standards) compliance?

CIP2 AMP 6 2015 to 2020: Expanded monitoring to over 74 substances and trialled new wastewater treatment removal technologies (Phosphate TAL)

We can often remove high %s but not enough to meet EQS which are often at ug/l and ng/l levels. Some 'no deterioration' limits introduced at STWs for things like metals

CIP3 AMP 7 2020 to 2025: expanded to look at coastal and catchment concentrations, microplastics and anti microbial resistance (AMR). Some 'no deterioration' limits introduced at STWs for things like cypermethrin

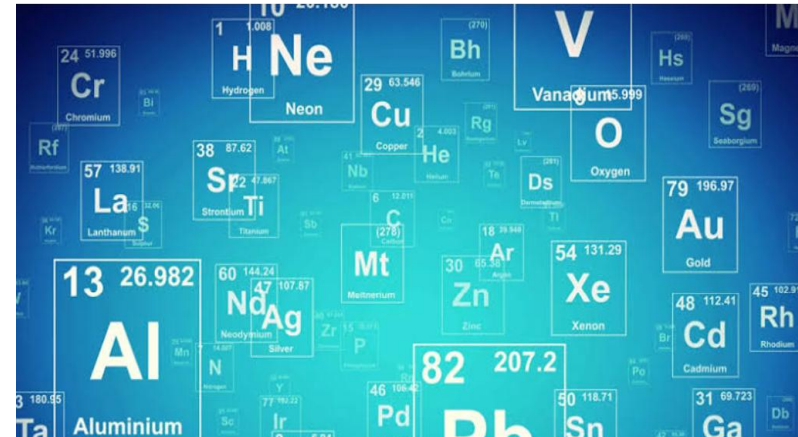
CIP4 AMP 8 & 9 2025 to 2035 – see next slides, focus on tracking chemical compounds in the environment



CIP4 - summary

The main aims of Chemical Investigations Programme Phase 4 (CIP4) are to:

- Elucidate some of the findings of CIP3 with respect to contaminant sources, including a further look at trends;
- Further investigate emerging concerns including antimicrobial resistance, endocrine disruptors and microplastics;
- Extend the scope of monitoring to include sediment, fish, plants and integrated constructed wetlands (ICW); and
- Provide better understanding of the impact of biosolids on the receiving environment.



CIP4 - summary



- The majority of the programme of research is due to complete in 2027 to inform the:
 - **PR29 process** (Periodic review – process for water bill prices setting what water companies will deliver in:
 - next AMP 5 year investment period (**Asset Management Period**).
- There are 13 different investigations forming the programme, which are summarised on the following slides. **Southern Water sites / study areas in red**, total number of sites across all water companies in England & Wales in black
- See list on next slide for summary including where we are sampling, duration and dates we have to complete work by (reg dates) plus Microplastics (separate slide)



Driver	Number of sites	Duration	Reg date	Influent	Effluent	Sewer	Surface water (Upstream and Downstream)	Sediment (Upstream and Downstream)	Sludge / Biosolids	Groundwater (upgradient and Downgradient)	Fish	Plant
WFD_INV_Chem 4a: Proposed permitting approach and investigations PFOS	65 Horsham WTW	2 years	31/04/2027	Monthly	Monthly	Monthly	Monthly		5 sites; monthly sampling (UU only)			
WFD_INV_Chem 4a: TraC waters	To be determined (TBD) during phase 3 Thames Estuary and Southampton Waters	TBD	31/04/2027									
WFD_INV_Chem 4a: Integrated constructed wetlands	3 None	2 years	31/04/2027	Monthly	Monthly			Quarterly (3 sampling points) To be confirmed by FERA				One off, TBC
WFD_INV_Chem 4a: Groundwater, soils and biosolids	4 field test sites None 6 boreholes for groundwater + sediment pore water None	2 years	31/04/2027					Sediment pore water every 2 meters (30 samples) over 1 year	One off (4 field sites) over 1 year	Monthly		
WFD_INV_Chem 4b: Sludge	6 None	1 year	31/04/2027						Monthly or quarterly			
WFD_INV_Chem 4c: Groundwater (chemicals monitoring)	29 Ludgershall WTW, Lydd WTW, Morestead Road WTW, New Alresford WTW, Overton WTW, Shipton Bellinger WTW, Whitchurch WTW	1 year	31/04/2027		Monthly					Monthly		
WFD_INV_CHEM 4d: AMR	10 Aylesford WTW	1 year	31/04/2027	Bi-monthly	Bi-monthly		Bi-monthly	Bi-monthly	Bi-monthly			
WFD_INV_Chem 4e: ES - surface water	20 surface water and sediment sites West Hoathly WTW, Uckfield WTW 10 sludge sites TBC, 1x for SWS	2 years	31/03/2030	Monthly	Monthly		Monthly	Quarterly	Monthly			
WFD_INV_Chem 4e: ES - groundwater	10 Morestead Road WTW	2 years	31/03/2030		Quarterly					Quarterly		
WFD_INV_Chem 4e: ES - non-target screening	20 TBC, 1x for SWS	1 year	31/03/2030	Quarterly	Quarterly		Quarterly		Quarterly	Quarterly		
WFD_INV_Chem 4e: ES - impacts on the environment (Trend)	50 Uckfield WTW, Chichester WTW, Thornham WTW, south Ambersham WTW, Millbrook WTW	5 years	31/03/2030	Monthly	Monthly							
WFD_INV_Chem 4e: ES - endocrine disruptors	20 Horsham WTW, Ashford WTW	1 year	31/03/2030	One off	One off		One off				One off	

WFD_INV_Chem 4a: Proposed permitting approach and investigations PFOS / PFAS

- Objectives:
 - To gather evidence to inform next steps to prevent further deterioration by:
 - identifying significant sources of PFOS in the sewerage catchment;
 - assessing impact of process changes made since CIP2 data was collected;
 - optimising treatment processes.
- 65 sites in total - **SWS - Horsham WTW**



Estuarine and Marine Focus

WFD_INV_Chem 4a: TraC Waters

- Objectives:
- CIP/EA and NE – determine parameter specific permit limits for the WwTW
- Nutrients/NE - establish permit limits for the WwTW
- Thames – Anglian, Thames, **Southern** – chemicals only
- Southampton Water – **Southern** – chemicals only
- **Solent Maritime SAC** (Langstone Harbour) – NE chemicals only
- Poole Harbour (**SWS interest in**)
- **Solent – SWS** – nutrients only



WFD_INV_Chem 4a: Integrated Constructed Wetlands

Objectives:

- To improve our understanding of treatment capability;
 - To bring our understanding of surface flow ICW performance for chemicals in line with other treatment technologies; and
 - To improve our understanding of fate and behaviour of chemicals within surface flow ICW
- 4 sites – 3 continuous, 1 intermittent.
Wessex, Anglian, Yorkshire and Dwr Cymru.
No SWS sites.



WFD_INV_Chem 4a: Groundwater, Soils and Biosolids Spreading

- Objective:
 - to understand if biosolid spreading on agricultural land impacts soil and groundwater quality, including possible implications for human health and the environment.
- 4 sites – 2 different types of aquifers. Sampling in soil zone, unsaturated and saturated zones, sediment sampling up and downstream. **No SWS sites.**



WFD_INV_Chem 4b – Sludge

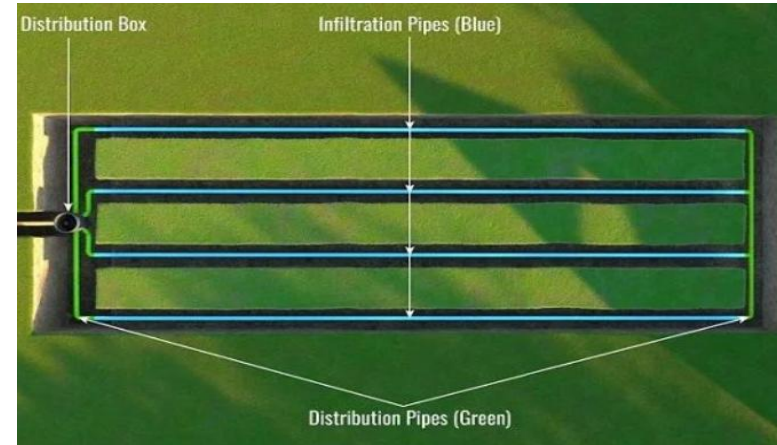
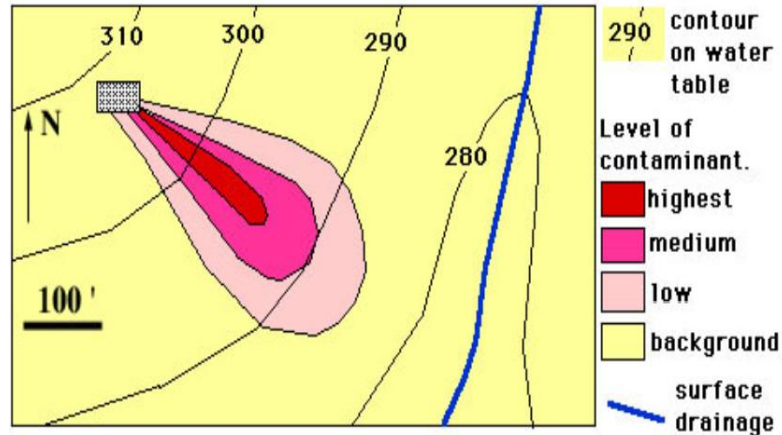
- Objective:
 - develop an understanding of biosolids product quality throughout the different sludge generating and treatment processes and in the context of varying inputs and across different catchments.
- 6 sites, **no SWS sites.**



What are the Agricultural Uses of a Sewage Sludge

WFD_INV_Chem 4c – Groundwater (Chemicals Monitoring)

- Objectives:
 - Understand the risk to groundwater from treated effluent discharges
 - Make decisions on the need for future permit conditions on effluent discharges to groundwater.
- 29 sites – **7 x SWS - Ludgershall WTW, Lydd WTW, Morestead Road WTW, New Alresford WTW, Overton WTW, Shipton Bellinger WTW, Whitchurch WTW**



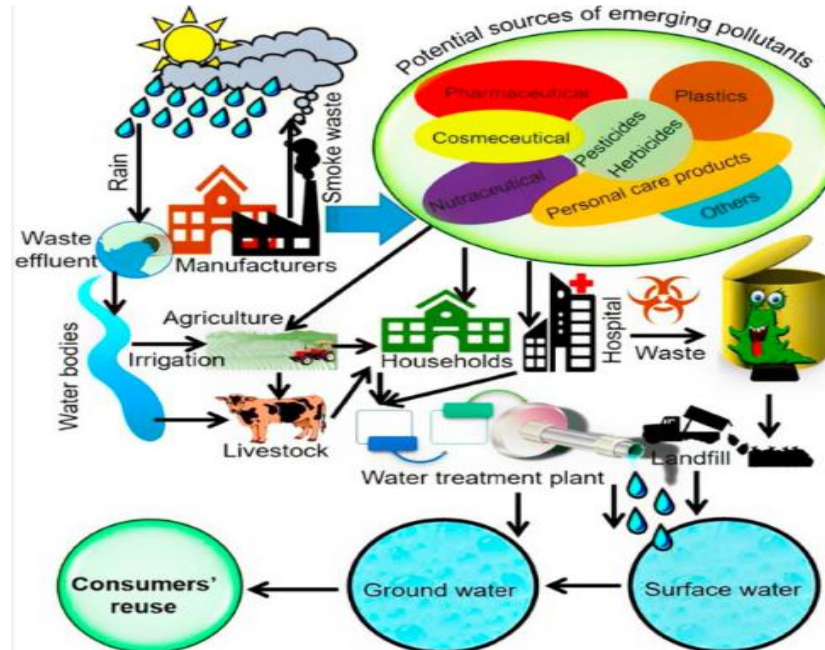
WFD_INV_CHEM 4d – AMR

- Objectives:
 - develop and deliver an investigation into the prevalence, sources, and variation of selected antimicrobial resistant organisms and genes in effluent and sludge and the receiving environment.
 - assess abundance of 10 pathogenic bacterial species of concern in river and sewage effluent samples and the prevalence of ARG (antimicrobial resistance gene) within these populations.
 - 10 sites - **SWS Aylesford WTW**



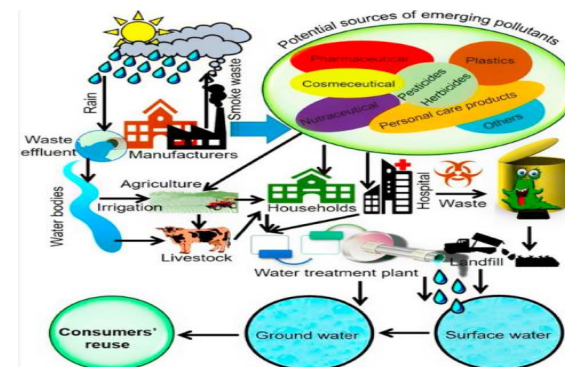
WFD_INV_Chem 4e – Emerging substances 1

- Aim: explore the impacts identified by various sources, including PEWS (EA Prioritisation & Early Warning System) including PFAS substances and CIP3 substances of concern such cypermethrin (pesticide)



WFD_INV_Chem 4e – Emerging substances 2

- Split into several sub WFD (Water Framework Directive) investigations:
 - Surface water and sediment, 20 sites **West Hoathly WTW and Uckfield WTW**
 - Groundwater 10 sites – **SWS Morestead Road WTW (Winchester)**
 - Non-target screening 20 sites – **SWS West Hoathly WTW, Uckfield WTW, Morestead Road WTW, Aylesford WTW.**
 - impacts on the environment (Trend) 50 sites- **SWS Uckfield WTW, Chichester WTW, Thornham WTW, South Ambersham WTW, Millbrook WTW**
 - Endocrine Disruptors 20 sites – **SWS West Hoathly WTW, Uckfield WTW, Morestead Road WTW, Aylesford WTW.**
 - Sludge 10 sites, **Aylesford WTW.**



Microplastics

- Microplastics in biosolids, soils, and groundwater (Yorkshire Water)
- Microplastics generated within WwTW (Severn Trent)
- Microplastics and advanced thermal conversion (Yorkshire Water)
- **Microplastics in final effluent discharged to ground (Southern Water) Morestead Road WTW (Winchester)**
- Microplastics from biologically aerated flooded filters (South West Water)





Thank you and questions