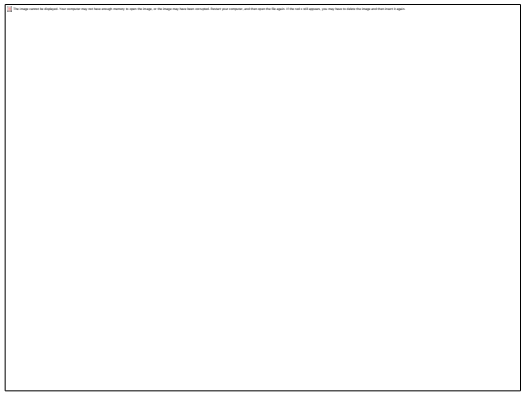
WSTG Lead Remediation Workshop

Irish Water - High-risk locations, sampling, analysis, orthophosphate treatment and other possible remedial actions

John Hynes
Capital Programmes Manager
28th February 2017

Contents

Item No.	Item Description
1	Irish Water Lead Mitigation Plan Update - high risk locations, samples, analysis, orthophosphate treatment
2	Overview of Limerick City Priority Project
3	Possible other Remedial Actions for private side lead services



How to identify Lead?

- Lead is dull grey in colour
- If you scrape the surface you will see the shiny silver coloured metal beneath

Introduction

Key Irish Water Objective:

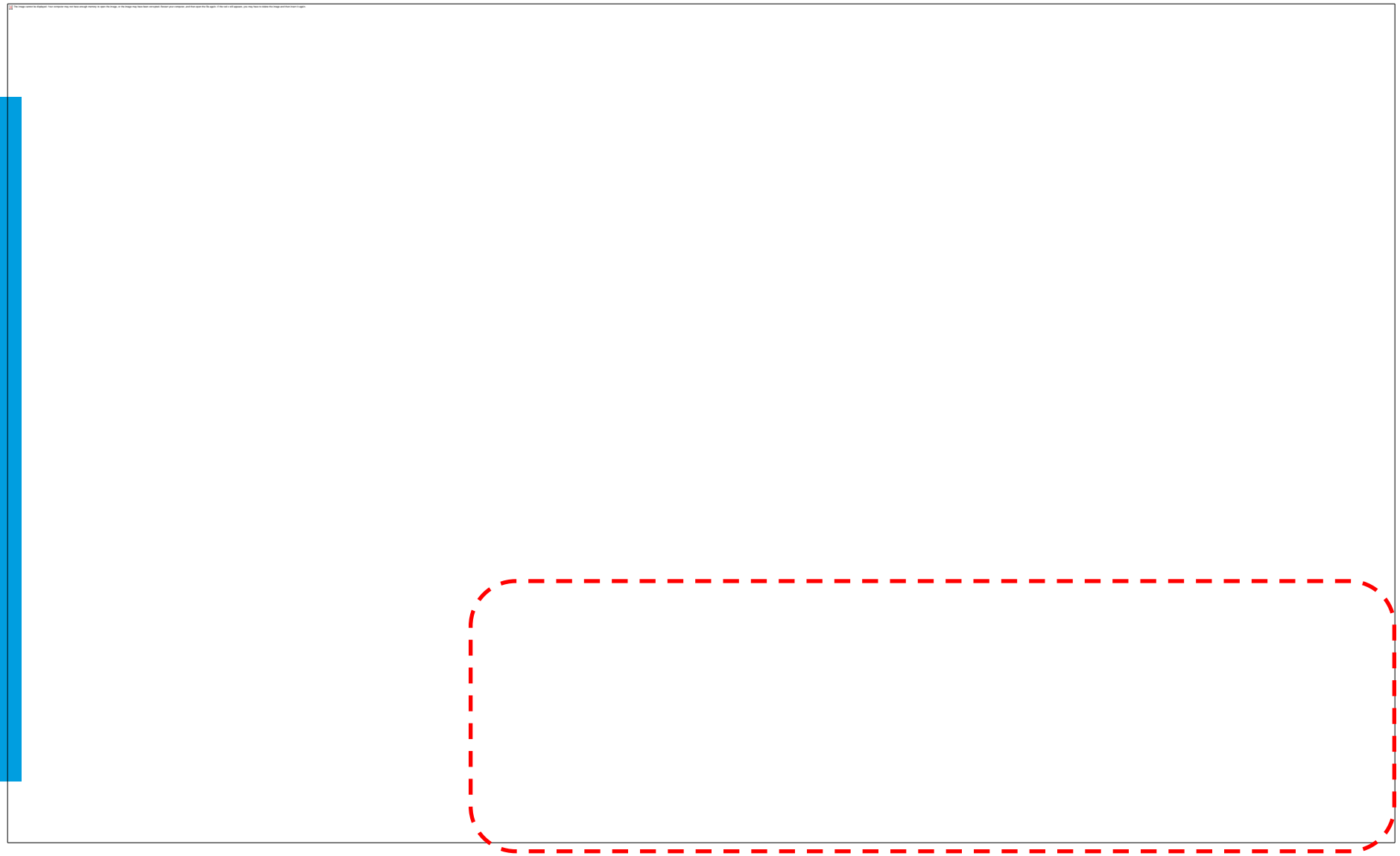
Protection of public health through limiting exposure to lead in drinking water

What is Irish Water's Responsibility?

<u>The Drinking Water Regulations specifically state that:</u>

1. the water supplier will **not** be in breach of its obligations where the non-compliance is due to the domestic distribution system;
2. Nevertheless, Irish Water shall ensure that appropriate measures are taken **including advising premises' owners affected**, **<u>or</u>** other measures such as application of **appropriate treatment techniques**

Roadmap – Where are we now?



We are here

Irish Water Lead Mitigation Plan

Lead Mitigation Plan Framework

UISCE ÉIREANN : IRISH WATER

A Plumbosolvency Risk Assessment

- 1 Treated water quality risk analysis
- 2 Plumbosolvency Map
- 3 Prioritisation of WTP

B Sampling and Monitoring

- 4 Inventory Monitoring
- 5 Operational Monitoring

C Corrective Water Treatment

- 6 Plumbosolvency Control Plan
- 7 Orthophosphate Treatment &/or pH Adjustment

D Lead Service Replacement

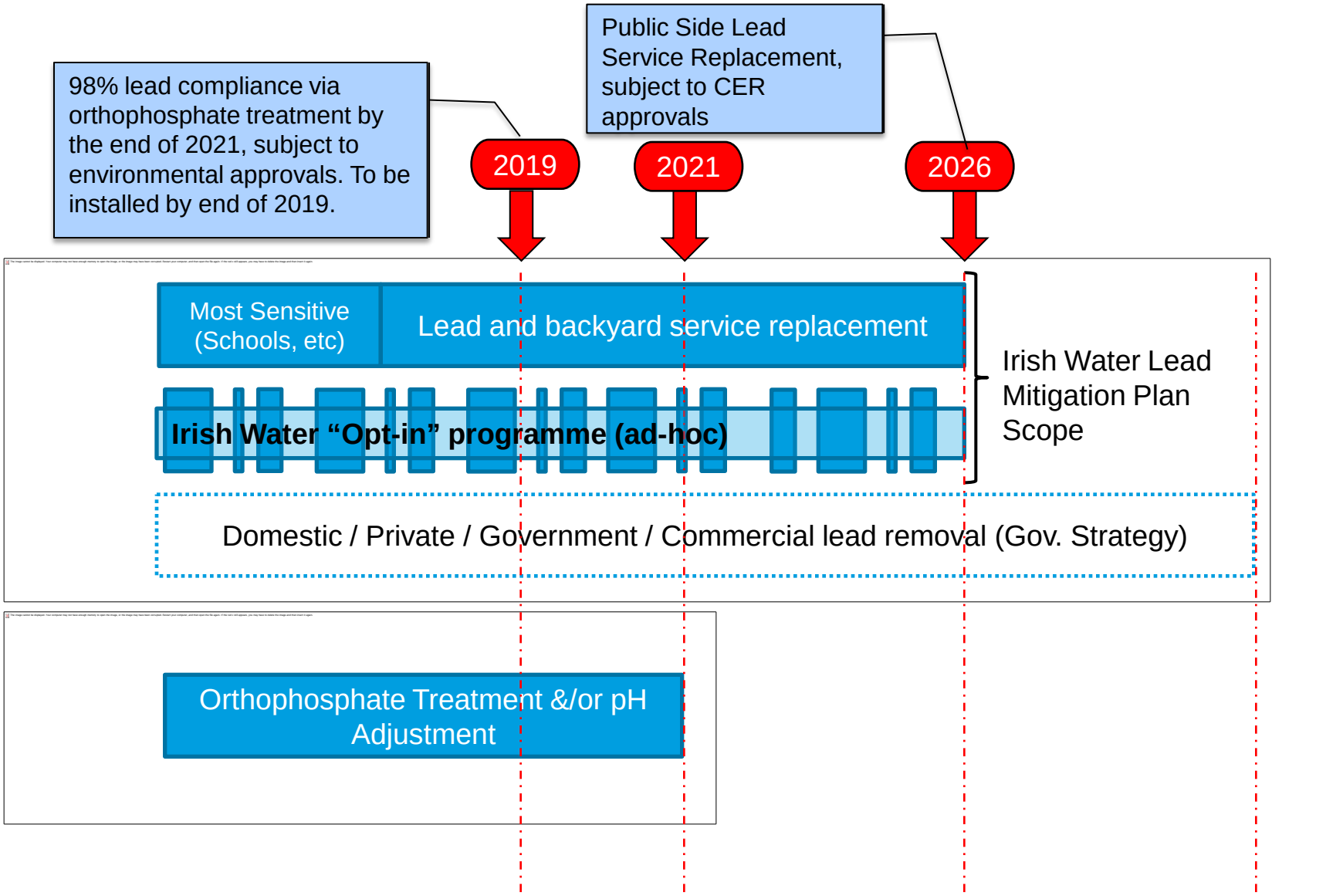
- 8 Targeted Public Side Service Replacement
- 9 Private Lead Supply Pipes – Targeted Communications
- 10 Customer Opt-in Lead Service Replacement

Customer

Ultimate Aim: Lead Replacement

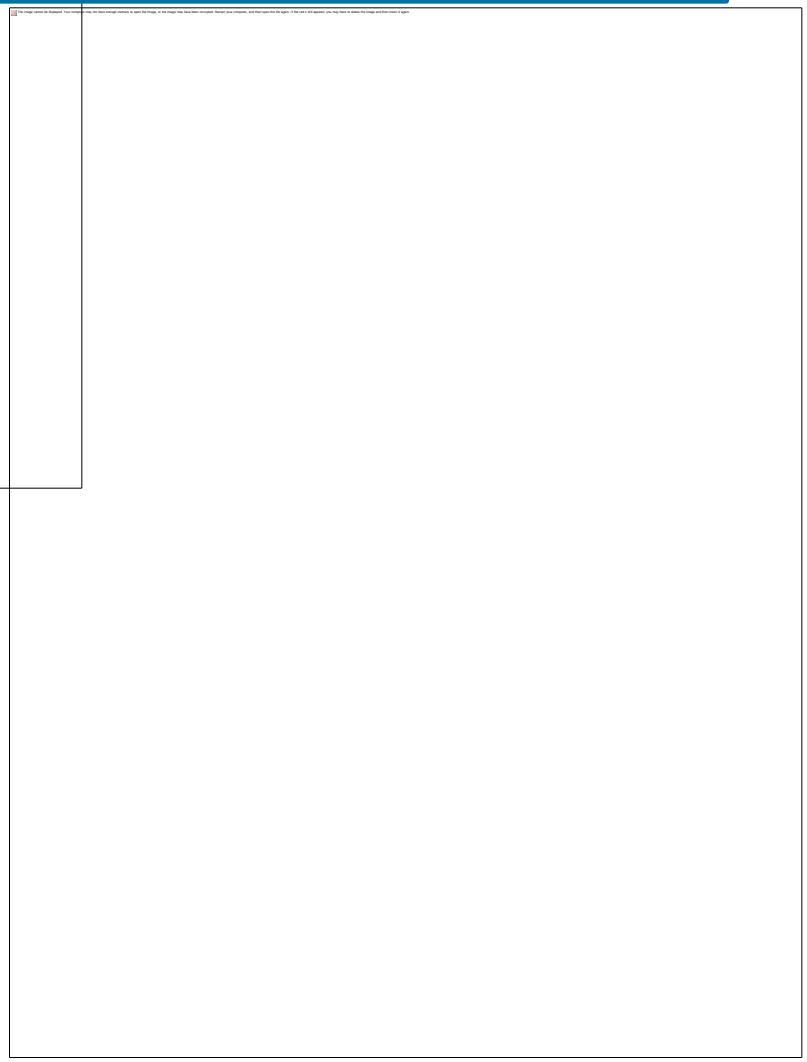
- both private and public side need to be replaced at same time (longer term proposal)
- Replacement plumbing fittings to be of suitable quality e.g. issue with use of new brass fittings

Our Preferred Approach: Treatment & Removal in parallel

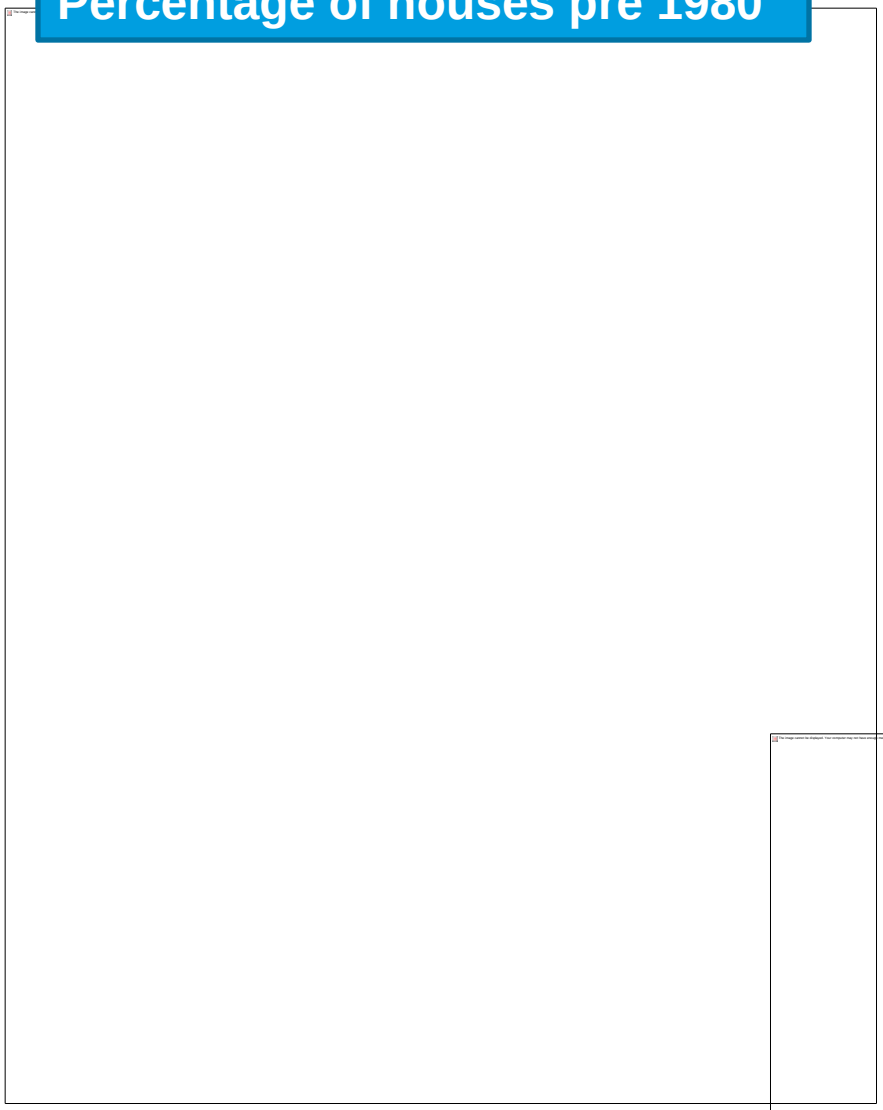


High Risk Locations based on CSO Small Areas?

Number of houses pre 1980



Percentage of houses pre 1980



Limitations: CSO Individual house age not available to Irish Water

Lead Service Replacement – Map of individual lead services

2 Plumbosolvency Map

Legend:

Current Estimate No. of Lead Services	180,000
Identifed to date:	
Individual Lead Services through Metering	36,000
Pre-metering surveys - Backyards	40,000
Yet to be identified	104,000

Data gap – Need to identify unknown lead?

1. Via National Sampling Programme, Watermain rehab programmes, LA knowledge on the ground.
2. **Over next 6 months, request for LAs to submit GIS maps identifying suspected lead in areas not metered via GIS Digitisation Process. Workshops with LA have commenced**
3. Data will be used for risk prioritisation of individual water supplies and lead replacement programmes
4. Identify Most Sensitive Customers e.g. schools, crèches, in conjunction with Dept. Bodies

Sampling and Analysis

4 Inventory Monitoring

Objective: To establish a baseline lead compliance level in Water Supply Zones

- 36,000 Random Daytime (RDT) Samples at randomly selected properties; previously 2,000 to 3,000 lead samples per year
- Up to 300 samples taken in a WSZ over a 12 month period
- Commenced June 2016; Progress ongoing

Lead Investigative Surveys

For **Specific Investigative Lead Sampling** at properties, Local Authorities/ Government Departments should refer to EPA Drinking Water Advice Note No. 1: Lead Compliance Monitoring and Surveys

- 30 minute Stagnation Sampling – to determine if lead pipes are present (i.e. lead results <5 µg/l indicate no lead pipes present)
- If lead result >10 µg/l detected (regardless of the sampling method used), or where lead pipes have been detected in the local authority's own pipework or pipework serving public buildings such as schools or hospitals, the local authority should promptly consult with the HSE to determine whether there is, or could be, a potential danger to human health arising from the detection of lead.

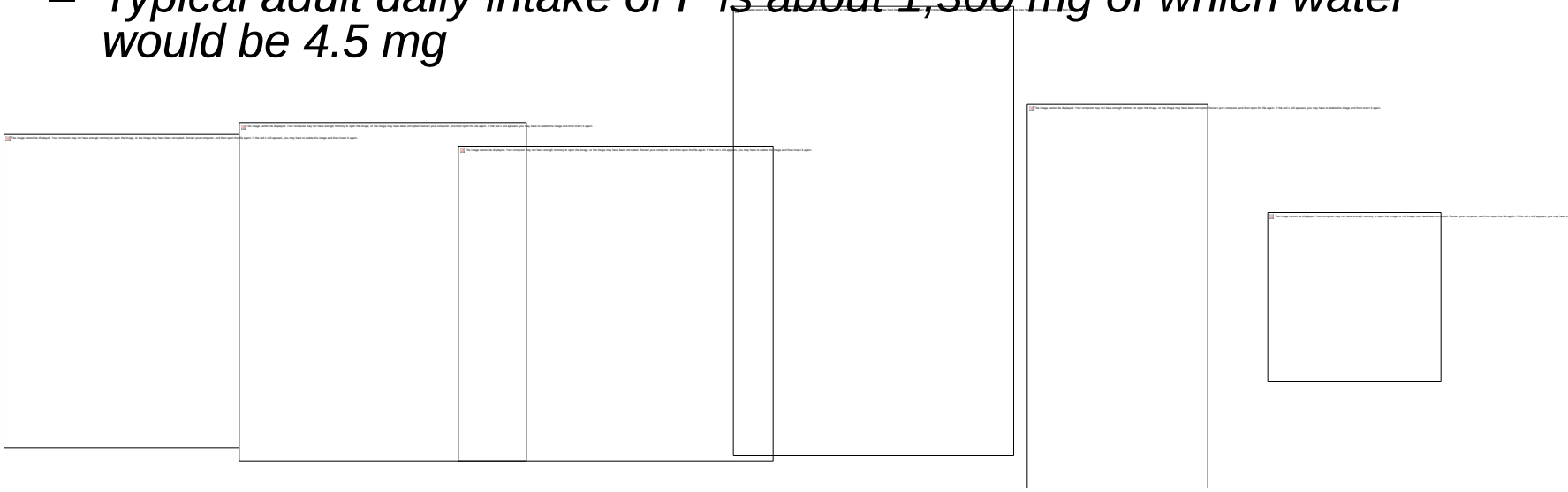
Ortho-Phosphate in Drinking Water

7 **Orthophosphate Treatment**

Ortho-Phosphate is:

- *a food grade additive approved for use in food products*
- *a Clear, Odourless liquid*
- *Naturally occurring in milk, cheese, apples, potatoes, fish, poultry*

  - *Addition to Water is 0.5 -1.5 parts per million*
  - *Levels in Soft Drinks is 150 parts per milllion (100 + times)*
  - *Levels in Beer is 250 parts per million (200 + times)*
  - *Levels in Milk is 830 parts per million (500+ times)*
  - *Typical adult daily intake of P is about 1,300 mg of which water would be 4.5 mg*



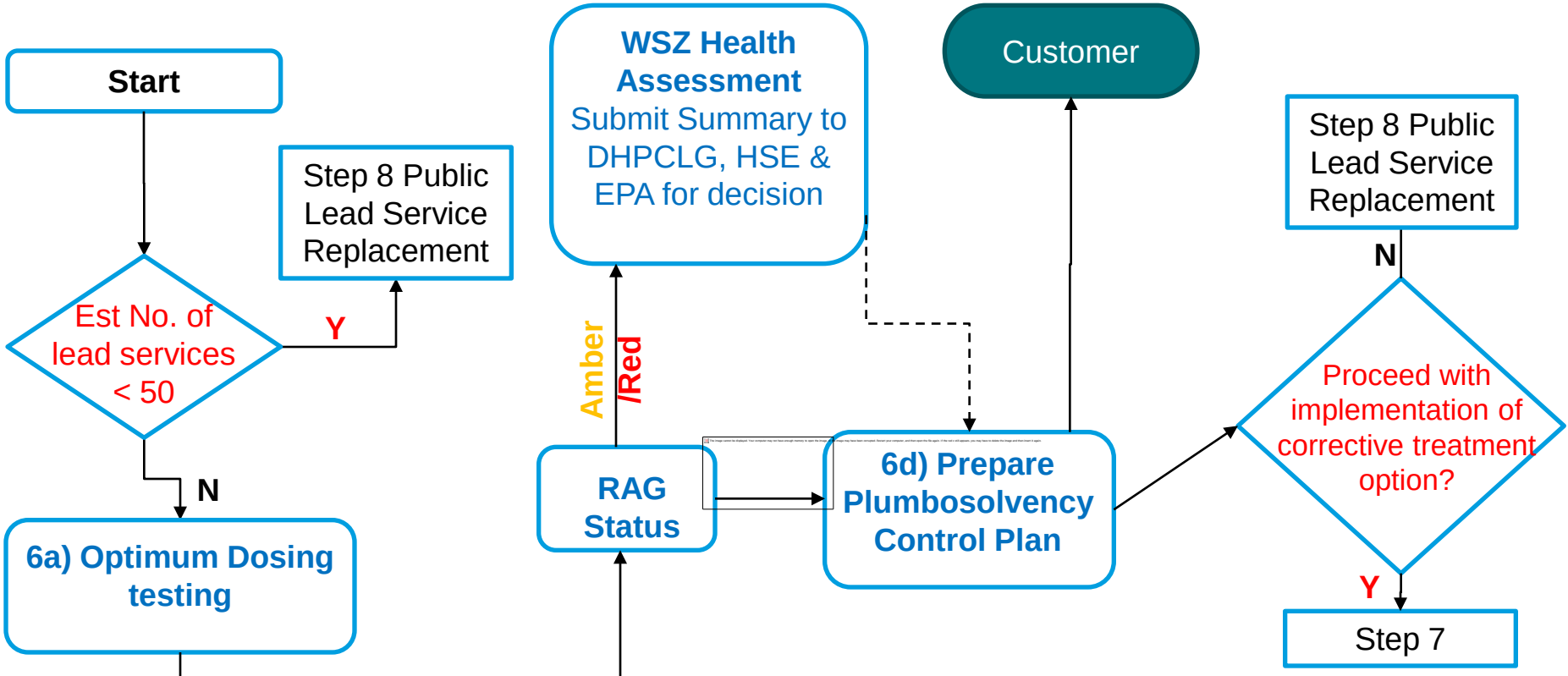
Ortho-Phosphate in other Countries

The United States Environmental Protection Agency (USEPA) has identified orthophosphate treatment as the most effective treatment method for reducing the presence of lead in drinking water.

- World Health Organisation (WHO) have recognised that dosing with orthophosphate may be necessary to reduce plumbosolvency
- Over 90% of Water Supplies in Britain (61 Million people) for last 20 years
- All public Water supplies in Northern Ireland
- Widely used in Canada & United States
- Ortho-Phosphate delivering 99% compliance with lead limit
  - *Compliance data for 2015 for England and Wales (DWI, 2016), based on random daytime sampling from consumers' taps, is summarised below:*

Parameter	Standard (µg/l)	Number of samples	No. of exceedances	Percentage compliance
Lead	10	12,323	65	99.47%

Roll-out of Corrective Water Treatment - WSZ Plumbosolvency Control Plan



Next 12 months:

1. Continue with WTP Optimum pH & OP testing
2. Undertake EAMs, health assessments at up to 400 WTPs
3. Development of Plumbosolvency Control Plans in consultation with Local Authorities.

Irish Water Lead Mitigation Plan - Next Steps

1. Finalise and adopt as policy the Lead in Drinking Water Mitigation Plan - **Q1 2017**
2. **Risk Assessment** - Complete 12 month baseline sampling and water Supply zone plumbosolvency categorisation – **Q3 2017**
3. **Lead Replacement** – Workshops with LAs to identify unknown lead services through updating GIS; and prioritise lead service replacement - **Q3 2017**
4. **Corrective Water Treatment** – Commence WSZ Environmental Assessment & Health Assessments at up to 400 WTPs – **Q1 2017**
5. Commence installation of corrective water treatment (orthophosphate treatment/pH adjustment) – at priority locations **– Q4 2017**

Overview of Limerick Priority Project

Limerick Priority Project

Estimated Population Exposure in Limerick City?

Clareville Water Treatment Plant serves 100,000 people

- Enhanced Lead Monitoring underway at customer's properties in Limerick since August 2015
- **6%** of Samples taken have exceeded allowable lead limit
- potentially **6,000** people exposed to elevated levels of lead due to presence of lead pipework in properties – (Most Vulnerable: Children, pregnant women)
- European Guidance on sampling and monitoring for lead in drinking water recommends that **system-wide measures should be adopted**

Percentage of samples exceeding 10 µg/l	Priority for attention
< 2.0	Low priority
2.0 to < 5.0	Investigate any localised clusters
5.0 to < 10	System-wide measures may be required in addition to resolving localised clusters
10 to < 20	System-wide measures required
20 to < 50	Significant problems require attention
>50	Very significant problems require urgent attention

Limerick Priority Project

Targeted Public Lead Service Replacement

Focus on Risk:

- Irish Water has replaced public side lead in Ballynanty & Killealy and will replace balance of 4,000 connections in city in 2016 in €6.5M investment
- LC&CC estimate that there may be another 4,000 lead service connections remaining
- Replacement is a longer term solution

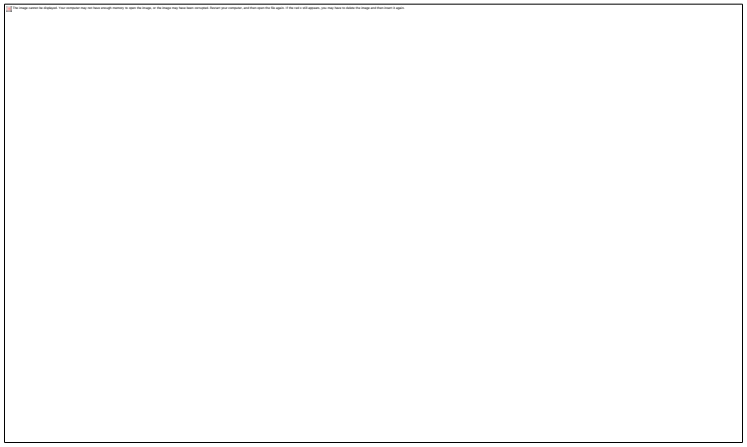
- Until all lead pipework is replaced, the introduction of **orthophosphate treatment** in Limerick as a short term mitigation measure has the potential to protect customers and reduce lead concentrations below the drinking water regulation limit.
- There are no adverse affects of orthophosphate for households without lead

Limerick Priority Project

Orthophosphate Treatment for the protection of Public Health

Review and Report by Dr. Colin Hayes (International Lead Expert and Author of IWA 'Best Practice Guide on the Control of Lead in Drinking Water') in March 2016 concluded that:

- For Limerick, the decision to dose orthophosphate is correct and should achieve a significant risk reduction.
- For Limerick, pH elevation alone will not sufficiently reduce risk.
- For Limerick, partial lead pipe replacement alone will not sufficiently reduce risk.
- By introducing Orthophosphate Treatment in Limerick
  - Aiming for at least 70% reduction in plumbosolvency,
  - Aiming for 99% compliance with allowable lead limit in water
  - Reducing risk by 6 fold



A lead pipe, a corroded pipe, and a pipe with protective orthophosphate coating. Photo: USEPA

Limerick Priority Project

Orthophosphate Treatment

Timetable;

- Consult with Industrial Customers – completed
- Finalise plan for Limerick with EPA & HSE – completed
- Inventory Monitoring – commenced August 2015
- Natura Impact Statement – completed
- Consult with Local Authority Councillors – August 2015, September 2016, Nov. 2016
- Treatment for the protection of human health commenced **30th November 2016**

Water Quality Monitoring Post commencement :

- Extensive monitoring of water quality at customer's taps and Phosphorus levels in wastewater, surface water and ground water (Results reported to EPA and HSE on a quarterly basis)
- International experience indicates that takes 6-24 months to form protective coating on the lead service pipes throughout the network

Possible Other Remedial Actions for private side lead services

Possible Other Remedial Actions for Private Side lead Services

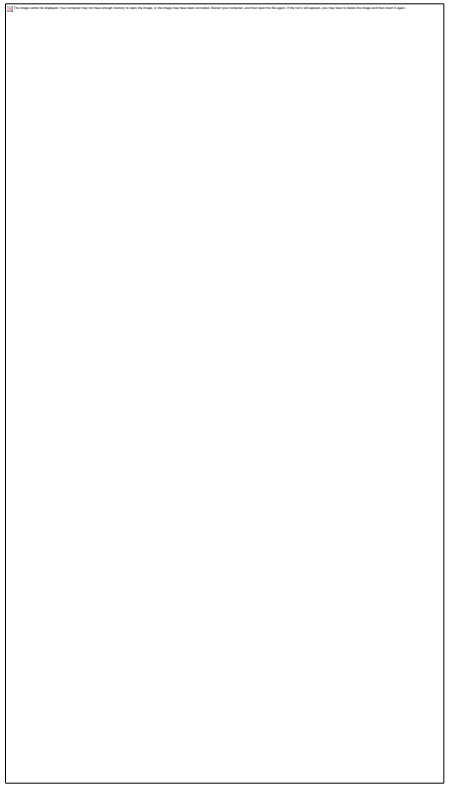
Options assessed within mitigation plan to achieve compliance and public health benefits e.g. complexity, compliance achieved, cost, delivery time….

- Lead service replacement;
- Lining of lead services;
- Point of use filters;
- Corrective Water Treatment for the protection of public health.

Lining of Lead Services

- **Overview - 2 main options:**
  1. *Epoxy lining (DWI approved)*
  2. *Insertion of PE tubing*

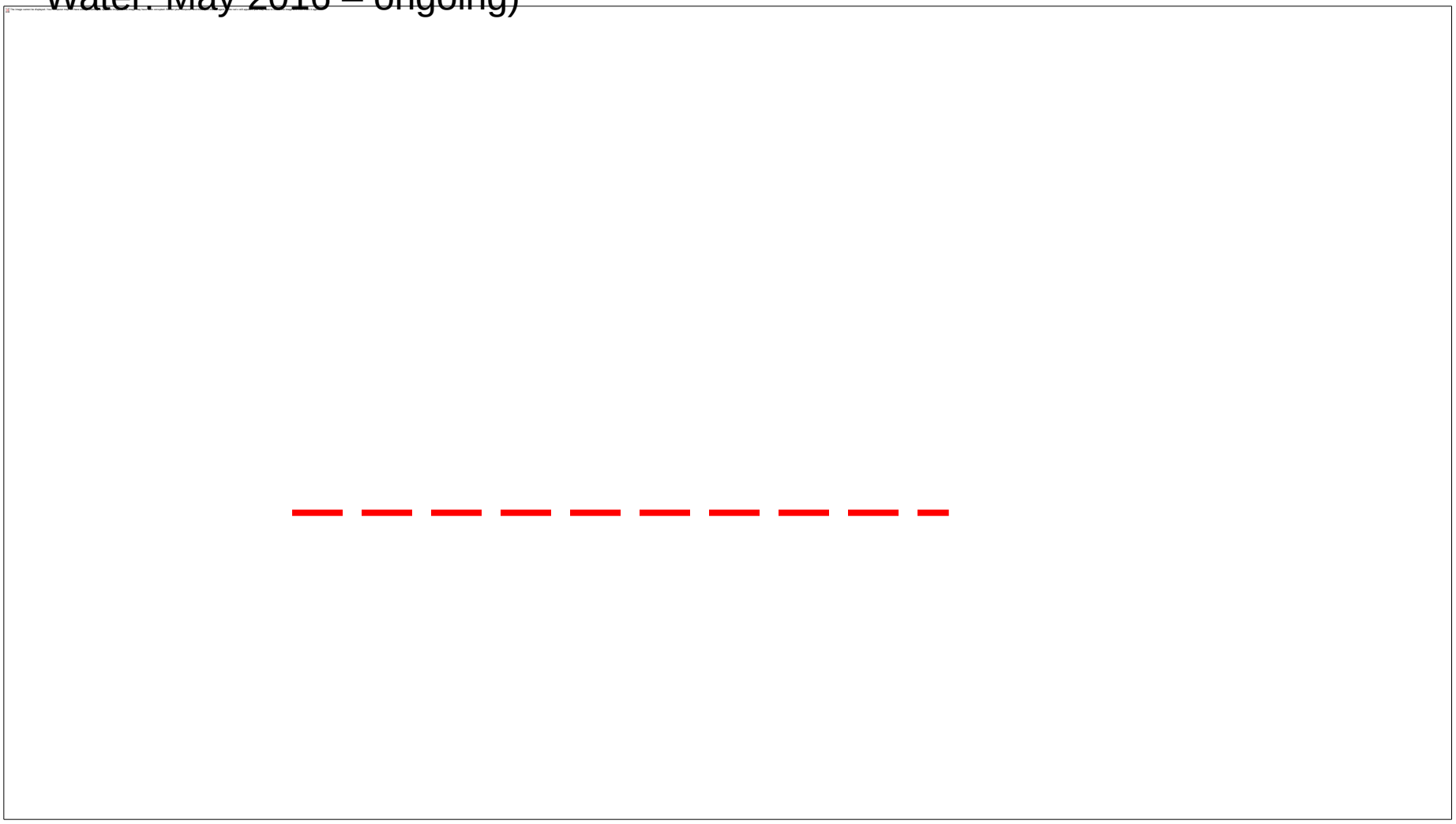
- January 2016 – IW undertook a trial of lining technologies at greenfield site to investigate lining of service from ferrule to meter box
  - *4 no. test beds in greenfields site (6 no. lead supply pipes in each trench)*
  - *Further trials / testing carried out on live scenarios*



- Lining of lead services is a new and evolving technology in Ireland but does not address IW or WHO objective of lead service removal
- This could be an attractive option for private side lead pipe remediation as disruption is minimised depending on further studies

Lining of Lead Services – Initial Pilot

Epoxy Resin lining (DCC Housing Maintenance Pilot in conjunction with Irish Water: May 2016 – ongoing)



Point of Use Filters (Private Side Option)

2 Main Point of Use (PoU) Filters - treated at point of consumption (i.e. under kitchen sink)

1. Activated Carbon (Adsorption/Filtration)
2. Reverse Osmosis

	Activated Carbon	Reverse Osmosis
How it does it works?	Contaminants adhere to adsorbent media	Contaminants collect in semi-permeable layer under reverse pressure
Advantages	Smaller, more compact	Suggested lead reductions of 95-99%
Disadvantages	Performance claims vary	Unsuitable due to size/cost Water Wastage Fluoride Removal
Standard	NSF 53 (150 ug/l to 10ug/l Lead concentration) only	NSF 58 (150 ug/l to 10ug/l Lead concentration) only
Limitations	Does not address the WHO and IW objectives of long term supply pipe removal	
	Private side maintenance issues – Irish Water can't stand over level of compliance achieved	
	Additional risks relating to growth of bacteria in filters should they not be correctly maintained	
Conclusion	Unsuitable as a control measure that may be rolled out on a large scale by Irish Water in order to mitigate the risk of lead in drinking water.	

Customer Opt-in Lead Pipe Replacement Scheme

Irish Water will prioritise the replacement of the public side lead property service connection when the customer replaces the private side

Updated process as of February 2017:

- Prior to completing the private side lead replacement the customer completes the Irish Water application form and posts/emails to Irish Water
- Irish Water process the form and generate an investigative work order for the Local Authority via Maximo
- Local Authority, acting as Irish Water agent, liaises with the customer to sequence the works, inspects when completed and completes the public side replacement works

More information:

- Visit www.water.ie/lead for more info and to download the guide and application form
- **Irish Water are available to work with Local Authority Housing / Government**

Note:
Government Grant for householders since February 2016, administered by LAs. Visit www.housing.gov.ie/water/water-quality/lead-drinking-water for the DHPCLG information on lead pipe replacement and the grant to replace lead pipes

Lead Remediation in LA Housing and Public Buildings – FOR DISCUSSION

1. **Desktop survey of housing/public building age**

   Need to prioritise most sensitive consumers – schools, crèches, etc.

2. **Investigation Programme** – visual survey and stagnated water samples

   e.g. Limerick C&CC rolling out survey programme in Limerick City

3. **Mitigation Programme** – Identify appropriate mitigation measure (note: issue reported in new public building in Dublin due to brass fittings)

   e.g. DCC Housing planning to go to tender for the remediation of the lead services pipes in Cabra for 125 houses in early 2017. Tenderers will be allowed to use the most appropriate method deemed feasible in each location

4. **Contact Irish Water** to plan public side lead service replacement in tandem with private side works – Customer Opt In Scheme and share data.

Irish Water can provide advice and assistance. Find out more information?

- Visit: www.water.ie/lead for infographics, videos and other additional information
- Email: lead@water.ie