



EPA Research - 2016 Call

EPA Research – Water Research Call 2016

Technical Description

The EPA Research Programme is funded by the Irish Government.

Environmental Protection Agency Research Call 2016: Water

This document provides the **Technical Description** for the Environmental Protection Agency (EPA) **Water** Research Call 2016. Applicants should read the following carefully and also consult the other documentation provided (i.e. Guide for Applicants, Guide for Grantees, EPA Terms and Conditions for support of grant awards).

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1. Introduction

The EPA's Research Programme 2014-2020 is designed to identify pressures, inform policy and develop solutions to environmental challenges through the provision of strong evidence-based scientific knowledge:

- **Identifying Pressures:** Providing assessments of current environmental status and future trends to identify pressures on our environment.
- **Informing Policy:** Generating evidence, reviewing practices and building models to inform policy development and implementation.
- **Developing Solutions:** Using novel technologies and methods that address environmental challenges and provide green economy opportunities.

EPA Water Research

The EPA Research Programme has been allocated funding of approximately € 2.91m for new commitments in Water research. The overall aim of the water pillar is to support relevant water policy and to protect our water environment, contributing to achieving excellent water quality in Ireland.

The EPA Research Water Pillar deals with groundwater, surface water, transitional and coastal water; as well as wastewater, drinking, bathing and shellfish waters. The EPA Research Water Pillar is structured into five thematic areas of research, as follows:

- Theme-1.** Safe Water;
- Theme-2.** Ecosystem Services and Sustainability;
- Theme-3.** Innovative Water Technologies;
- Theme-4.** Understanding, Managing and Conserving our Water Resources; and
- Theme-5.** Emerging and Cross-cutting Issues.

Multi- and inter-disciplinary research is required on these themes, with expected social, economic, technological, environmental and policy impacts.

Funding Structure

The EPA invites research proposals under the specific topics listed in the table below. These proposals will be Desk-Studies, Medium-Scale or Large-Scale Projects:

- **Desk-Study** will typically last from 6 to 12 months with an indicative cost range of €50,000 to €100,000;
- **Medium-Scale Project** will typically last from 24 to 36 months with an indicative cost range of €100,000 to €350,000;
- **Large-Scale Project** will typically last from 36-48 months with an indicative costs range of €350,000 to €500,000.

Depending on the scope and quality of research proposals received, **a maximum of one** project will be funded under the proposed topics detailed in this document, unless otherwise stated.

As part of the 2016 EPA Water Research Call, two topics will be cofunded on a 50:50 basis with the Geological Survey of Ireland (GSI).



The [Geological Survey of Ireland \(GSI\)](#) is Ireland's National Earth Science Agency. It is responsible for providing geological advice and information, and for the acquisition of data for this purpose. GSI produces a range of products including maps, reports and databases. The Griffith Geoscience Research Award Programme provides funding towards water-related research activities and also towards marine and coastal, petroleum, geophysics related research. It is mainly driven by the Water

Framework Directive and aims at developing models for the behaviour of groundwater, including the impacts of climate change and intensifying infrastructure on future groundwater supplies. It provides funding for research projects to Universities & Research Institutions.

Open Topics

For these topics, applicants can choose to apply for a Desk-Study, Medium-Scale project or a Large-Scale project (see definition above) responding to the scope of the particular topic. It is expected that **a maximum of one** Large-Scale project or a **combination** of Medium-Scale / Desk-Studies will be funded. For these topics, proposals will be selected based on their scientific merit, their value for money, relevance to the scope and based on the budget available. In the cases where more than one project is funded, the scope covered by each proposal will also be taken into account (i.e. to avoid duplication) when selecting projects for funding. Applicants selecting a Desk-Study or Medium-Scale project are expected to build synergies and linkages with other projects funded under the same topic, in the event, where more than one project would be funded.

Value for Money

All research proposals must **build on findings and recommendations** from past and current research¹ projects (where relevant) and **demonstrate value for money**.

Open Access and Open Data

All projects must comply with the EPA's **Open Data** and **Open Access** rules, which are aligned with Horizon 2020 for the 2014-2020 EPA Research Programme.

Where project outputs include data and/or technical solutions (websites, developed software, database solutions etc.), the format of same **must be agreed with the EPA** to ensure that they are compatible with EPA IT infrastructure and can be maintained by the EPA after the completion of the project.

¹ including EPA-funded, other Irish and EU and international research projects and initiatives/activities

List of Topics

Call Topic Ref.	Thematic Areas and Project Titles	Max. Budget (€) per project
Safe Water		
Water 2016 Call - Project 1	Sources Pathways and Environmental Fate of Microplastics (Open Topic)	€500,000
Ecosystem Services and Sustainability		
Water 2016 Call - Project 2	Development of potential environmental supporting conditions for Groundwater Dependent Terrestrial Ecosystems (GWDTE)	€500,000
Water 2016 Call - Project 3 <i>This topic will be cofunded with GSI</i>	EPA/GSI Topic: Compilation of subsoil properties and characteristics considering relevance for lag time estimation and groundwater resource estimation	€75,000
Water 2016 Call - Project 4 <i>This topic will be cofunded with GSI</i>	EPA/GSI Topic: Update of the national average PE and AE maps by modelling existing synoptic and other meteorological data	€75,000
Innovative Water Technologies		
<i>Water JPI 2015 Joint Call</i>	<i>Award made following the 2015 Water JPI Joint Call</i>	€150,000
Water 2016 Call - Project 5	De-sludging rates and mechanisms for domestic wastewater treatment system sludges in Ireland	€75,000
Water 2016 Call - Project 6	Water Re-use in the Context of the Circular Economy (Open Topic)	€650,000
Understanding, Managing and Conserving our Water Resources		
Water 2016 Call - Project 7	Catchment Models and Management Tools for Diffuse Contaminants (Sediment, Phosphorus and Pesticides)	€350,000
Water 2016 Call - Project 8	An operational framework for the implementation of targeted approaches to effective catchment management and Water Framework Directive Implementation in rural areas	€350,000
Water 2016 Call - Project 9	A Roadmap for a National Water Stewardship Plan for Ireland	€75,000
<i>Water JPI 2016 Joint Call</i>	<i>Joint Call on Water Quality & Agriculture EPA indicative budget: €300,000 DAFM indicative budget: €250,000</i>	<i>No commitment for 2016</i>
Emerging and Cross-cutting Issues		
Water 2016 Call - Project 10	Mapping of Water Research Infrastructure in Ireland	€75,000

Application Process

Making an application online:

Applications must ONLY be made online at <https://epa.smartsimple.ie> .

Guide to the EPA online application system:

The guide to the EPA online application system, '2016 Quick guide to the EPA online portal (making an application)', is available for download at:

<http://www.epa.ie/pubs/reports/research/opencalls/currentcalldocuments/>

What to include in the application form:

To make the best application possible, it is recommended that you read the '2016 EPA Research guide for applicants' before drafting and submitting an application, available at:

<http://www.epa.ie/pubs/reports/research/opencalls/currentcalldocuments/>

To make an application under any of the topic areas:

Applicants must use the correct **Call Topic Reference**, as indicated in this document, from the drop down menu on the EPA online system e.g. *Water 2016 Call Project 1*

It is the responsibility of the **Applicants** to ensure that proposals are submitted before the **call deadline**, and of the relevant **Grant Authoriser** (i.e. Research Offices / Managing Directors for companies) to ensure that the proposals are authorised before the **organisation approval deadline**.

FAILURE TO MEET EITHER OF THE ABOVE DEADLINES MEANS YOUR PROPOSAL WILL NOT BE CONSIDERED FOR FUNDING

2. Call Content

Theme 1: Safe Water

Water quality and human health may be threatened by emerging pollutants, priority substances, endocrine disruptors and emerging risks, such as pathogens (including antibiotic resistant bacteria and viruses), cyanotoxins and nanomaterials. Key knowledge gaps remain concerning their environmental behaviour in surface water, treated waters and groundwater, and their impact on human health through the irrigation of crops, water supply, distribution and storage in rural or urban environments. In addition, water quality and supply can be threatened by climate change, natural hazards and extreme events, such as droughts and floods.

This thematic area will:

- Provide a better understanding of the fate and behaviour of new or poorly understood contaminants and their impacts on water quality with a particular emphasis on drinking and bathing waters, and on ecosystems and human health.
- Improve our resilience to climate change, extreme events and natural hazards. It will support the implementation and refinement of the relevant policies and also develop new tools and best practices in relation to water infrastructure and the prediction & management of natural hazards to ensure that economic investments in this area will result in the on-going availability and delivery of high quality water.
- Develop a better understanding of the socio-economic aspects, governance and behavioural changes associated with this area, including impact of water charges on water consumption, as well as behavioural changes.

One topic is included in this 2016 EPA Water Call under *Theme 1: Safe Water*:

2016 Water Call Project 1. Sources Pathways and Environmental Fate of Microplastics

Project Title: *Sources, Pathways and Environmental fate of Microplastics*

Project Type: **Open Topic**

To make an application under this topic area, you must use the following Call Topic Reference:
Water 2016 Call - Project 1

Background:

The worldwide production of plastics has increased considerably in the last 30 years (Plastics Europe, 2012²). Microplastics are small fragments of plastics (< 5mm) in diameter, which are of particular concern as their bioavailability and potential to bioaccumulate organic contaminants increases with decreasing size. Upon entrance to aquatic systems, they may be ingested by a range of organisms and accumulate through the food web, causing harm to humans and the environment. Whilst most studies in the past 10 years have focused on determining microplastics distribution in marine environments, there has been a recent shift in focus to determine the sources and to investigate how freshwater environments may be impacted.

Potential sources of microplastic pollution include:

- Manufacturing industry;
- Landfill wastewater;
- Urban Waste Water Treatment Plants (UWWTPs); and
- Sewage sludge (biosolids).

Exposure of freshwater systems to microplastic pollution is likely to increase as world plastics production and European plastics demand grows (Plastics Europe, 2012).

The Water Framework Directive (WFD) mainly focuses on the quality of receiving waters, which should be “good”, both in terms of ecological status and chemical quality. In view of this legislation, management practices must take into account concentrations of specific parameters (i.e. the concentrations in the river) to ensure compliance with requirements of the WFD. The characteristics of both the receiving waters and effluent of WWTPs change continually, being affected by weather, seasonality, time of day, etc...

There is also a need for good and accurate measurement of flow at a specific moment in time. An efficient information management system and the ability to anticipate problems, or to plan operations in an efficient way, are critical aspects to wastewater utilities, both because of more demanding environmental regulations, and the need to increase systems exploitation efficiency and safety, as well as improve the information provided to the consumer and to the general public.

Objectives & Expected Outputs:

Proposals submitted under this topic could consider generating:

- More in-depth knowledge, which would further define the specifics of the pathways and the impacts of microplastics on humans, species and habitats.
- Outputs to further inform political decisions regarding the possible requirement for inclusion of microplastics in temporal monitoring programme under the framework of the WFD and to provide guidance regarding the regulation of microplastics from various sources.

It is also expected that project(s) funded under this topic would link up with on-going EPA and other research projects (national/international) (e.g. TELLUS³, PATHWAYS⁴, SILTFLUX⁵, JPI Oceans⁶).

² http://www.plasticseurope.org/documents/document/20121120170458-final_plasticsthefacts_nov2012_en_web_resolution.pdf

³ <http://www.tellus.ie/>

⁴ <http://www.epa.ie/pubs/reports/research/water/researchreport165.html>

⁵ <http://77.74.50.157/siltflux/>

⁶ <http://www.jpi-oceans.eu/>

Project Structure and Funding:

It is expected to fund a **combination of** Large Scale/Medium-Scale/Desk-Study projects under this topic. The maximum budget allocated per project is **€500,000** (which includes a 5% provision for communication costs⁷). Please refer to the **2016 Guide for Applicants** for further details.

⁷ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Theme 2: Ecosystem Services and Sustainability

Water demand and availability pressures, amplified by climate change (including the apparent changing frequency and severity of extreme events, such as floods and droughts) have increased the stress on water bodies and associated ecosystems. The environment does not exist in isolation; it both affects and is affected by many aspects of our lives.

Environmental resources and ecosystem services are direct inputs into the economy. The concept of ecosystem services is based upon the assumption that there is a connection between good ecological status and the provision of several benefits, such as water supply, food supply, biodiversity, landscape value, and others. It is already used by some managers and decision makers as a powerful tool for building and implementing programs of measures. Approaches using ecosystem services could therefore support the Water Framework Directive (WFD) objectives.

This thematic area will:

- Further our understanding of ecosystems context, functions and processes, and safeguard natural resources for future generations by identifying measures to help the adaptation and reaction to current and future pressures on the aquatic environment.
- Develop new tools in the field of ecological engineering and early warning systems.
- Develop a better understanding of the socio-economic aspects, governance and behavioural changes associated with this area, including issues of preservation vs. Restoration costs and the demonstration of the economic value and social benefits of aquatic ecosystem services.

Three topics are included in this 2016 EPA Water Call, under Theme 2: *Ecosystem Services and Sustainability*:

2016 Water Call Project 2.	Development of potential environmental supporting conditions for Groundwater Dependent Terrestrial Ecosystems (GWDTE)
2016 Water Call Project 3.	EPA/GSI Topic: Compilation of subsoil properties and characteristics considering relevance for lag time estimation and groundwater resource estimation
2016 Water Call Project 4.	EPA/GSI Topic: Update of the national average PE and AE maps by modelling existing synoptic and other meteorological data

Project Title: *Development of potential environmental supporting conditions for Groundwater Dependent Terrestrial Ecosystems (GWDTE)*

Project Type: Large scale

To make an application under this topic area, you must use the following Call Topic Reference:

Water 2016 Call - Project 2

Background:

To date the focus of the Groundwater Dependent Terrestrial Ecosystems (GWDTE) assessments under the Water Framework Directive (WFD) have been on GWDTE that are at risk of failing WFD objectives. As such the GWDTE included for assessment under the WFD are those designated wetlands where the quality and/or quantity of groundwater from the supporting groundwater body has been impacted such that the key ecological species that depend on this groundwater have been damaged. Whilst further characterisation of these GWDTE can be considered in the context of the WFD “restore” objective, there may be a number of other designated GWDTE that should be considered in terms of the WFD “no deterioration in status” objective. Additionally, the current ecological condition of some of these designated GWDTE may not be known.

Separately, there appears to be a “disconnect” between the WFD and Habitats Directive objectives, and there is a clear need to align the WFD protected area objective requirement in relation to designated habitats. Development of environmental supporting condition metrics for the water bodies that support the GWDTE is a prerequisite for consideration under the WFD characterisation process. These environmental supporting condition metrics can relate to the quality or quantity of groundwater on which the GWDTE ecology depends and are applied in the underlying groundwater body. The metrics can also be used as a mechanism to screen the groundwater body supporting these GWDTE, to determine if there is a risk of the groundwater body failing WFD objectives.

Objectives & Expected Outputs:

Proposals submitted under this topic could consider:

- Development of a “potential” GWDTE register, using existing National Parks and Wildlife GIS datasets.
- Development of potential environmental supporting condition metrics for a small subset of GWDTE, focusing on Turloughs, Fens and raised Bogs, as these are the best mapped at present. These metrics should be developed to facilitate their use as a screening tool to determine potential impact at other GWDTE.
- Trialling these environmental supporting condition metrics at 10-20 GWDTE in each GWDTE type across the full spectrum of good to damaged ecology. The aim of this trial is to provide clear evidence of impact on GWDTE ecology for each metric, i.e. it should be able to demonstrate that concentrations, flows or levels above or below a certain value are causing ecological damage in the GWDTE. As a minimum, the trialling should identify those concentrations, flows or levels above or below which do and/or do not cause ecological damage, recognising that the actual threshold for causing damage is often site specific.
- As the proposed metrics are to be used as a screening mechanism for GWDTE, the trialling should aim to use existing datasets (updated, as required, by field visits) for each GWDTE type, i.e. the intention is not to undertake a detailed field programme for these GWDTE.
- The trialling should also propose how surrogate information, such as existing nutrient pressure and hydrogeological pathway information, can be used in the absence of actual water quality monitoring data, e.g. by comparing nutrient pressure and pathway data in each of the 10-20 GWDTE catchments and establishing an equivalent environmental supporting condition metric for the nutrient load in the groundwater body.

The proposed environmental supporting conditions should be generic, i.e. applicable to a GWDTE type, and should be verified using existing data, such that concentrations above the environmental supporting

condition value (and application of the associated loads to the GWDTE) should result in evidence of ecological damage to the GWDTE and vice versa.

Project Structure and Funding:

It is expected that this project will be a **36-48-month Large-Scale** project, with an **indicative** budget of up to **€500,000** (which includes a 5% provision for communication costs⁸). Please refer to the **2016 Guide for Applicants** for further details.

There will be a **maximum of one** project funded under this topic.

⁸ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Project Title: *Compilation of subsoil properties and characteristics considering relevance for lag time estimation and groundwater resource estimation*

Project Type: Desk-Study

To make an application under this topic area, you must use the following **Call Topic Reference:**

Water 2016 Call - Project 3

This topic is co-funded with the GSI

Background:

Subsoils provide a protective and filtering layer over groundwater in bedrock aquifers, and can also host groundwater resources if there is sufficient permeability, porosity and volume. A comprehensive literature review of subsoil property parameter estimates in Ireland and relevant countries internationally, together with an outline of methodologies available to establish these parameters and those most appropriate for Irish subsoils, is required.

Objectives & Expected Outputs:

Proposals submitted under this topic could consider:

- Collation of the existing data on Irish subsoil permeability and porosity and heterogeneity (and other flow and transport parameters), and augmenting it with relevant international data. This will provide a context in which to evaluate existing results, and identify gaps in the knowledge base.
- Evaluation of contaminant transport lag times (including agricultural nutrients and industrial contaminants) from point of application/discharge to the base of the subsoil or other receptors.
- Relating database point/locality data to the GSI subsoil permeability mapping and sand/gravel aquifer mapping, with the aim of enabling regionalisation of the results to a certain extent.

It is expected that the report and associated database arising from this project would collate existing studies and data and allow an assessment to be made of (i) data sufficiency; (ii) average values and variabilities for different subsoils; (iii) establishing the applicability of regionalisation of the point data. The report and database will provide a context in which to assess other studies, particularly decisions or assertions based on the results of those studies.

Project Structure and Funding:

It is expected that this project will be a **12-month Desk-Study** project, with an **indicative** budget of up to **€75,000** (which includes a 5% provision for communication costs⁹). Please refer to the **2016 Guide for Applicants** for further details.

There will be a **maximum of one** project funded under this topic.

⁹ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Project Title: *Update of the national average PE and AE maps by modelling existing synoptic and other meteorological data*

Project Type: Desk-Study

To make an application under this topic area, you must use the following **Call Topic Reference:**

Water 2016 Call - Project 4

This topic is co-funded with the GSI

Currently available national Potential and Actual Evapotranspiration (PE and AE respectively) maps were derived based on 1971-2000 average synoptic data. They were an update from the 1961-1990 maps produced by Collins and Cummins (1996)¹⁰, and differed in a number of respects, including the AE/PE ratio across the country. The current 30-year average meteorological period is 1981-2010. There are no AE and PE maps produced for this period. Average rainfall maps available for this period are on a finer grid than the previous 30-year average. Rainfall and climatic patterns appear to be changing over the last 20-30 years, and, in particular, the last 10-15 years. The data are used in groundwater resource estimation and catchment-scale nutrient transport modelling, amongst other applications. There is therefore a need to develop a robust methodology for deriving and modelling national distributed AE and PE values in order that reliable results can be developed for water budgeting and contaminant transport modelling.

Objectives & Expected Outputs:

Proposals submitted under this topic could consider:

- Generation of new PE and AE maps, which would allow for the use of the most up to date and reliable average climate data in groundwater recharge and nutrient transport models.
- Developing a methodology for the generation of national PE and AE maps (monthly and annual averages for the reference period) based on existing synoptic and other data (as appropriate), as well as on the PE and AE maps for the period 1981-2010.

The generation of national rainfall intensity maps would be of additional benefit (monthly and annual 30-year averages, or other relevant time-periods).

Outputs arising from this project would include a GIS database of input data (rainfall) and losses (AE-PE), and a robust methodology for their generation that can be used to generate updated time-averaged values. The maps would be used in conjunction with average rainfall to generate average effective rainfall. These values can be used in recharge/runoff modelling for groundwater resource estimation, and partitioned contaminant fate and transport estimates (e.g. in the EPA Catchment Management Support tool¹¹).

Project Structure and Funding:

It is expected that this project will be a **12-month Desk-Study** project, with an **indicative** budget of up to **€75,000** (which includes a 5% provision for communication costs¹²). Please refer to the **2016 Guide for Applicants** for further details.

There will be a **maximum of one** project funded under this topic.

¹⁰ James F. Collins and Thomas Cummins (Ed.). (1996) *Agroclimatic Atlas of Ireland*. Dublin: AgMet Group: Joint Working Group on Applied Agricultural Meteorology.

¹¹ For more details - Contact Marie Archbold m.archbold@epa.ie

¹² For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Theme 3: Innovative Water Technologies

Innovative technologies are required by the water industry to create products and services. This thematic area will contribute to improving the quantity and quality of water bodies, so that our resources will be used in a more efficient way; and to gaining a better understanding of the socio-economic aspects, governance and behavioural changes associated with this area.

The objectives of this research area are aligned with the aims of the European “[Resource Efficiency Roadmap](#)”.

This thematic area will:

- Develop novel treatment & distribution options, and improve water systems efficiency, focusing on aspects, such as new materials and processes, new management tools, Information and Communication Technology (ICT), energy efficiency, and small scale water storage.
- Develop problem-solving research leading to the development of market-orientated solutions, such as the development of sensor networks & real-time information systems in the water cycle, and improved water treatment technologies.
- Improve the quantity and quality of water bodies and developing ways to use these resources more efficiently. Gain a better understanding of the socio-economic aspects, governance and behavioural changes associated within this area, including social acceptance of reused waste and assessing costs against beneficial outcomes to avoid disproportionate costs.

Two topics are included in this 2016 EPA Water Call, under Theme 3: *Innovative Water Technologies*:

2016 Water Call Project 5.	De-sludging rates and mechanisms for domestic wastewater treatment system sludges in Ireland
2016 Water Call Project 6.	Water Re-use in the Context of the Circular Economy

Project Title: *De-sludging rates and mechanisms for domestic wastewater treatment system sludges in Ireland*

Project Type: Desk Study

To make an application under this topic area, you must use the following Call Topic Reference:

Water 2016 Call - Project 5

Background:

Treatment system owners are required to comply with the Water Services Acts 2007 and 2012 (Domestic Wastewater Treatment Systems) Regulations 2012. It places an obligation on them to ensure that their treatment system is operated and maintained properly, so that it does not pose a risk to human health or the environment.

Inspections under the National Inspection Plan for domestic wastewater treatment systems have found that 25% of all systems inspected failed to de-sludge their system. Findings from the [Relay Risk project \(2013-W-DS-12\)](#)¹³ show that the capacity for householders to, first, recognise and be alerted to the risks of a poorly operating Domestic Wastewater Treatment Systems (DWWTS), and second, manage these risks, is undermined and limited by a range of factors, which include:

- Householder beliefs as to what constitutes a functioning DWWTS, and their approach to maintenance (i.e. problem-oriented aimed at removing an inconvenience);
- A reliance on sensory perception to detect a problem (i.e. a reliance on environmental cues, such as ponding, and odour, to suggest a malfunctioning system);
- Risk perception, and the perceived severity and likelihood of the risk occurring; and
- Gaps in knowledge and information.

Analysis of existing wastewater infrastructural capacity and operational practices by [Joyce and Carney \(2012-W-DS-9\)](#)¹⁴ indicates a current lack of sludge screening facilities at Wastewater Treatment Plants (WWTPs). The current spare available capacity of existing sludge reception facilities to receive DWWTS sludge is approximately 234,676m³, indicating a volume deficit for receipt of 238,705m³, i.e. 50% of evacuated DWWTS sludge generated annually.

Objectives & Expected Outputs:

Proposals submitted under this topic could consider:

- Providing independent evidence of the necessity to operate and manage systems, which includes de-sludging; the appropriate de-sludging frequency; the proper de-sludging mechanisms; as well as associated costs of proper operation and maintenance of systems.
- Providing advice to homeowners on how to comply with the Water Services Acts 2007 and 2012 (Domestic Wastewater Treatment Systems) Regulations 2012

The expected outputs include:

- Literature review of best practice in terms of operation and maintenance of DWWTS;
- Clear guidelines on proper operation and maintenance requirements;
- Guidelines for de-sludging frequency;
- Procedure mechanism for de-sludging and disposal treatment options; and
- Associated costs for proper operation and de-sludging.

It is expected that the research will provide independent advice on how to properly operate a DWWTS, which will feed into the implementation of the engagement strand of the National Inspection Plan. The independent nature of this work and short duration will assist in changing householder behaviour on a

¹³ <http://www.epa.ie/pubs/reports/research/water/eparesearchreport167.html> and <http://www.epa.ie/pubs/reports/research/water/researchreport167guidelines.html>

¹⁴ <http://erc.epa.ie/smartsimple/displayFullProjectDetails.php?internalID=694>

national level. A NIECE¹⁵ Engagement Strategy Working Group has been established to develop a national engagement strategy in 2016, and this work will need to feed into its delivery, as soon as possible.

Project Structure and Funding:

It is expected that this project will be a **6-month Desk-Study** project, with an **indicative** budget of up to **€75,000** (which includes a 5% provision for communication costs¹⁶). Please refer to the **2016 Guide for Applicants** for further details.

There will be **a maximum of one** project funded under this topic.

¹⁵ Network for Ireland's Environmental Compliance and Enforcement (NIECE)

¹⁶ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Project Title: Water Re-use in the Context of the Circular Economy

Project Type: Open Topic

*To make an application under this topic area, you must use the following **Call Topic Reference:***
Water 2016 Call - Project 6

Background:

The shift to a circular water economy holds much promise. The reuse of water & (treated) wastewater in safe and cost-effective conditions is a valuable but under-used means of increasing water supply and alleviating pressure on over-exploited water resources. The water sector's advanced technologies and record of multi-stakeholder agreements lend themselves to circular solutions.

For the industrial sector, reuse water can be used in the production chain, which lowering the environmental footprint of the products, as well as cutting production costs. Additionally, often there are valuable resources to be found on industrial and municipal effluents.

For the urban sector, reusing wastewater means less water consumption, as reclaimed water can be used for different purposes (agricultural irrigation, parks and public gardens, cleaning...).

Water reuse in agriculture also contributes to nutrients recycling by substitution of solid fertilisers.

Objectives & Expected Outputs:

Proposals are invited for potential research and innovative water re-use solutions, which may also examine the potential environmental impacts of these practices. Innovative solutions should focus on water re-use and may also contribute to the objectives of the circular economy, (e.g. resource recovery, resource efficiency, energy harvesting). Projects should be demonstrated at pilot scale as a minimum. The proposals should demonstrate relevance in an Irish context and should outline a clear transfer of knowledge to (with) the key stakeholder(s).

Proposals that demonstrate potential to leverage Horizon 2020 funding are encouraged.

Project Structure and Funding:

It is expected to fund **a combination of** Large-Scale/Medium-Scale/Desk-Study projects under this topic – The maximum budget allocated per project is **€650,000** (which includes a 5% provision for communication costs¹⁷). Please refer to the **2016 Guide for Applicants** for further details.

¹⁷ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Theme 4: Understanding, Managing and Conserving our Water Resources

This thematic area will contribute to better use and protection of water resources, by gaining a better understanding of (i) the potential impacts of human activities, such as abstractions, discharges and land-use on groundwater, rivers, lakes, estuaries and coastal waters; (ii) the views of local communities and the ways of encouraging behavioural change; and (iii) the means of minimising these impacts. Particular attention will be given to pressures on water arising from agricultural activities. Regulatory measures are essential tools to ensure compliance with environmental standards of water quality and quantity. Understanding the mechanisms leading to improved water management will lead to better policy design, implementation and adaptation.

This thematic area will:

- Further an integrated approach to water management by improving our understanding of the impact of pressures on water quality and quantity, looking at adaptive water management approaches, as well as socio-economic issues.
- Promote the concept of water foot-printing while increasing water resource efficiency and reducing water pollution.
- Strengthen socio-economic approaches to conserve our water resources, covering governance issues, such as public participation and decision-support systems (DSS), as critical tools to integrate scientific knowledge into decision-making and facilitating buy-in/ policy acceptance from the public.
- Deal with socio-economic considerations and practical measures for mitigating the impacts of pressures.

Three topics are included in this 2016 EPA Water Call, under *Theme 4: Understanding, Managing and Conserving our Water Resources*:

2016 Water Call Project 7.	Catchment Models and Management Tools for Diffuse Contaminants (Sediment, Phosphorus and Pesticides)
2016 Water Call Project 8.	An operational framework for the implementation of targeted approaches to effective catchment management and Water Framework Directive Implementation in rural areas
2016 Water Call Project 9.	A Roadmap for a National Water Stewardship Plan for Ireland

Project Title: Catchment Models and Management Tools for Diffuse Contaminants (Sediment, Phosphorus and Pesticides)

Project Type: Medium-Scale Project

To make an application under this topic area, you must use the following Call Topic Reference:

Water 2016 Call - Project 7

Background:

For Ireland to meet its obligations under the Water Framework Directive (WFD), it is important to understand the transport and delivery mechanism of waterborne pollutants impacting on water bodies. The completed EPA Research PATHWAYS Project¹⁸ and on-going EPA Research Catchments Tools Project¹⁹ developed the Catchment Management Support Tools (CMSTs)²⁰ Framework which includes, for example, a Catchment Characterisation Tool (CCT) for delineating critical source areas for diffuse nutrients (Nitrogen in surface and groundwater, and Dissolved P in surface water) from agriculture and a Source load Apportionment Tool. Each of these tools comprise of a series of models.

This proposed research will initially develop models for Sediment and P (Sediment and Particulate P in surface water, and for Dissolved P in groundwater). Research will assess the suitability of the model structure already completed for Nitrogen in the EPA's Catchment Characterisation Tool and determine if models for Sediment and P can be incorporated into the existing EPA's Catchment Characterisation Tool or if additional tools should be developed under the umbrella of the overall EPA's Catchment Management Support Tool Framework. In addition, the existing N and P models will also be adapted to produce susceptibility maps for pesticides.

These proposed models will essentially add to the existing toolbox under the EPA's Catchment Management Support Tool Framework for assessing the impacts of land use on water quality and a foundation for identifying critical source areas. This will inform the appropriate mitigation measures required to maintain and/or improve WFD status which forms a vital component of the work required under the WFD Characterisation. The models will require validation using data collected during field investigations, from research projects, such as the PATHWAYS Project²¹, Small Catchments²² project and the on-going and extended monitoring been undertaken as part of the SILTFLUX²³ project. Direct collaboration with the Teagasc Agriculture Catchments Programme²⁴ should also be supported.

Objectives & Expected Outputs:

Proposals submitted under this topic could consider the following points:

- Review all existing relevant information on sediment and P dynamics and related hydrological/hydrogeological models and CMSTs. The data collected as part of the ongoing EPA Research SILTFLUX Project and monitoring extension will be an important component of this review.
- Assess the suitability of using existing models for N and P in the CCT to generate surrogate susceptibility maps for pesticides that will assist catchment managers in delineating critical source areas for pesticides.

¹⁸ <http://www.epa.ie/pubs/reports/research/water/researchreport165.html>

¹⁹ <http://erc.epa.ie/smartsimple/displayFullProjectDetails.php?internalID=723>

²⁰ For more details - Contact Marie Archbold m.archbold@epa.ie

²¹ <http://www.epa.ie/pubs/reports/research/water/researchreport165.html>

²² <http://erc.epa.ie/smartsimple/displayFullProjectDetails.php?internalID=736>

²³ <http://77.74.50.157/siltflux/>

²⁴ <http://www.teagasc.ie/aqcatchments/>

- Obtain relevant field data, undertake fieldwork to fill in any gaps identified and develop the conceptual understanding from land-use to water body along the source-pathways-receptor continuum.
- Develop a connectivity map for sediment and particulate P.
- Develop hydrological/hydrogeological models to model attenuation and/or transport dynamics for Sediment and P.
- Incorporate models into the existing EPA’s CMSTs Framework.
- Develop the models for mitigation measures scenario analysis within the EPA’s CMSTs Framework.

It is expected that the research outputs will inform the WFD Characterisation for the 3rd River Basin Management Plan due in draft in 2020.

Project Structure and Funding:

It is expected that this project will be a **Medium-Scale** project, which will last **24-36** months, with an **indicative** budget up to **€350,000** (which includes a 5% provision for communication costs²⁵). To ensure that this research builds on existing knowledge, tools and approaches in use within the EPA and provides an output that can be used in WFD Characterisation, **it is envisaged that researchers will be based part-time within the EPA Catchments Unit²⁶. Therefore, the overheads rate for this project will be fixed at 20%.** – the overheads rate applicable to Research Fellowships, which is based on number of days worked at host institution, are listed in the table below **for information / comparison purposes.**

Project type:	Research Fellowships		
Days per working week at Host Institution	0-1	2-3	4-5
Applicable overhead rate	10%	20%	30%

Applicants are asked to complete the normal budget template available from the Application Form on the online EPA Grant Application & Management system, keeping in mind that the overheads will be revised accordingly during the Negotiation process, if the proposal is successful. Please refer to the **2016 Guide for Applicants** for further details. There will be a **maximum of one** project funded under this topic.

²⁵ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

²⁶ For more details - Contact Marie Archbold m.archbold@epa.ie

Project Title: *An operational framework for the implementation of targeted approaches to effective catchment management and Water Framework Directive Implementation in rural areas*

Project Type: Medium-Scale Project

To make an application under this topic area, you must use the following Call Topic Reference:

Water 2016 Call - Project 8

Background

Mitigation measures to control water pollution by agricultural activities are largely implemented at farm-scale in Ireland. The existing ‘one size fits all’ national measures, such as those in the Good Agricultural Practices Regulations, are mainly applied and commonly seen by farmers as a compliance issue. This “push” approach to farmer adoption of the measures can often generate negative perceptions. Farmers are aware of the within and between farm variations that exist because of the bio-physical (e.g. soil/subsoil/bedrock drainage capacity, sensitivity of ecosystems), socio-economic and farming system characteristics. More recently, research and demonstration projects are providing evidence that farmers actively engage in the implementation of measures (“pull” approach) because they understand the benefits of implementation in terms of increased production efficiency leading to profitability and improving the quality of their natural capital.

A sense of urgency for a change in approach to the current knowledge exchange process to ensure the implementation of best practice on farms has been recently added by the Government’s new strategy for the agri-food and bioeconomy sector, Food Wise 2025²⁷. It clearly states that its ambitious targets for primary production in agriculture must be built on the twin pillars of economic competitiveness and environmental sustainability. This is commonly referred to as sustainable intensification (SI). Indeed, the achievement of environmental sustainability is set against a background of national legally binding and time limited obligations, including those of the Water Framework Directive (WFD).

Significant research has been conducted over the last two decades leading to the development of the measures required to reduce contaminant losses from agriculture to water. However, the research has identified the need to target their implementation to reflect the bio-physical setting. This research includes the EPA-funded PATHWAYS project²⁸, the Teagasc Agriculture Catchment Programme (ACP)²⁹, the EPA Catchment Characterisation Tool³⁰, source apportionment models and the Teagasc Heavy Soils programme³¹.

The new EPA Pollution Impact Potential maps can now be used to locate and focus investigative assessments on critical source areas (CSAs) within the areas of catchments where the water quality is unsatisfactory³². The implementation of customised measures in these areas is likely to be essential as a means of achieving the WFD objectives. The application of existing measures within the remaining catchment area is currently considered to be sufficient to meet water quality targets and is being evaluated by the ACP. However, the implementation and operation of this “new” approach (targeting measures to potential CSAs) will create a significant challenge for researchers, policy makers, advisers and farmers.

There has been no incentive or policy driver in Ireland to delineate CSAs and use them to focus measures. The challenge and urgency of the WFD requires **research into the development and establishment of an**

²⁷ <https://www.agriculture.gov.ie/foodwise2025/>

²⁸ <http://www.epa.ie/pubs/reports/research/water/researchreport165.html>

²⁹ <http://www.teagasc.ie/aqcatchments/>

³⁰ <http://erc.epa.ie/safer/iso19115/displayISO19115.jsp?isoID=196>

³¹ <http://www.teagasc.ie/heavysoils/>

³² For more details - Contact Marie Archbold m.archbold@epa.ie

operational framework for the implementation of targeted measures in CSAs that is preferably community-based, and will involve all catchment stakeholders, national institutional structures and policy makers with the objective of achieving Food Wise 2025 SI targets, with a particular focus on the WFD objectives.

Objectives & Expected Outputs:

Proposals submitted under this topic could consider the following questions:

- What **operational framework and associated approaches** can be employed that take account of farmer viewpoints, the potential of incentives and the administration and advisory support, as a means of ensuring effective mitigation measures (national and targeted), both in terms of environmental protection and costs.
- What are the administrative, operational, practical and **behavioral barriers to implementation** of both national and CSA-based measures at farm- and catchment-scale, and **how can they be overcome?**
- What is the role of **knowledge exchange (KE)** and what are the approaches needed to ensure that it takes place and is effectively monitored?
- How can existing tools/methods that enable targeted approaches be used to **cost effectively target mitigation measures** at agricultural diffuse and small-point sources in catchments across a wide geographical area?
- What administrative, operational and practical **costs need to be taken into consideration when implementing** these tools/methods?
- What mechanisms exist nationally that would enhance the establishment of an operational framework and how would this project be linked to such mechanisms?

In considering the role of knowledge exchange (KE), the information in the report entitled: *AgImpact Project: Identifying Approaches to Improving Knowledge Exchange (KE) in the Irish AgriFood Sector using Expert Opinion*³³ should be evaluated.

The outputs of this work would be the establishment of a demonstration framework, with operational guidelines and a five-year roadmap based on using targeted measures as a means of successful integrated catchment management³⁴. While the emphasis is on considering targeted measures, this framework and approaches should take account of the need to make the existing measures more effective. The involvement of key stakeholder representatives will be critical. This project will require, at a minimum, an integrated team of socio-economic and bio-physical scientists, to successfully carry out the research.

Project Structure and Funding:

It is expected that this project will be a **Medium-Scale** project, which will last **24-36** months, with an **indicative** budget up to **€350,000** (which includes a 5% provision for communication costs³⁵). Please refer to the **2016 Guide for Applicants** for further details. There will be a **maximum of one** project funded under this topic

³³ Pre-editing/formatting report: http://epa.smartsimple.ie/files/347278/105472/2016_EPA_Water_Call_Documents/

³⁴ Daly, D., Archbold, M. and Deakin, J. 2014. *Water Framework Directive implementation and integrated catchment management. Where are we now? Where are we going? An EPA view. Proceedings of National Hydrology Conference, 2014. Proceedings available at: <http://www.opw.ie/hydrology/>.*

³⁵ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Project Title: A Roadmap for a National Water Stewardship Plan for Ireland
Project Type: Desk-Study Project
To make an application under this topic area, you must use the following Call Topic Reference:
Water 2016 Call - Project 9

Background:

In 2013, the Green Enterprise EPA-funded project, *Roadmap for a National Resource Efficiency Plan for Ireland*³⁶, led to strong interest from the large Water Users nationally (Dairies, Pharmaceuticals), and the largest industrial water users in Ireland came together to form a national Large Water Users Community of Practice. The group was formed in response to the growing recognition of the importance of Water to the competitiveness of industry globally, and the need for mechanisms to respond to escalating water costs, increasingly stringent compliance requirements and high profile water contamination incidents, while ensuring the availability and efficient use of water resources in line with corporate sustainability objectives. The group identified the European Water Stewardship Standard³⁷ as offering a mechanism to help address these key issues, while also achieving improved compliance with regulatory measures developed by the EU, as set out in the Water Framework Directive.

In this context, a small-scale study was completed with the following objectives:

- The completion of a stakeholder consultation on the opportunities, challenges and potential scope of a national water stewardship programme for industry;
- The identification an assessment of possible funding mechanisms for associated actions; and
- The development of recommendations for next steps.

Water Stewardship by its nature bridges both National Competitiveness and National Environmental performance domains. The development of a roadmap for National Water Stewardship would offer a mechanism to engage stakeholders (departments, agencies and industry) from each domain and ensure alignment of aims and resources. The small-scale study on European Water Stewardship³⁸ presented the findings from a short desk review and initial stakeholder consultations on the issue of Water Stewardship Standards in Ireland.

While the exercise has been successful in identifying key issues and opportunities, the report did not pertain to be comprehensive enough to result in a detailed roadmap for National Water Stewardship in Ireland. Hence, there is a need to build on the initial work of this study to complete a more comprehensive engagement and analysis with stakeholders and potential project collaborators over an extended period of time with a view to the development of a thorough roadmap for National Water Stewardship in Ireland.

Objectives and Expected Outputs:

Proposals submitted under this topic could consider building on the consultations to-date and developing a holistic roadmap for a National Water Stewardship Plan in Ireland, including large water-users, such as industries (e.g. dairies, pharmaceuticals, etc.), as well as agriculture, SMEs and Public Bodies in particular. Such a plan would be a valuable contribution to water-related discussions, at both national and European levels, illustrating Ireland's credentials in this area.

The development of such a plan would offer key stakeholders the opportunity to engage in a collaborative manner on key topics highlighted herein where they have a common goal and related challenges.

³⁶

<https://www.epa.ie/pubs/reports/waste/prevention/prevention/CTC%20Tadhq%20Coakley%20Resource%20Efficiency%20Roadmap%20ppt.pdf>

³⁷ <http://www.ewp.eu/activities/ews/>

³⁸ http://epa.smartsimple.ie/files/347278/105472/2016_EPA_Water_Call_Documents/

Such an action would need to encompass a review of demand management supports and incentive schemes internationally, and how they could be applied to water stewardship in Ireland taking full account of the relevant legislation, policy and organisational structures in Ireland.

Project Structure and Funding:

It is expected that this project will be a **12-month Desk-Study** project, with an **indicative** budget of up to **€75,000** (which includes a 5% provision for communication costs³⁹). Please refer to the **2016 Guide for Applicants** for further details.

There will be **a maximum of one** project funded under this topic.

³⁹ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Theme 5: Emerging and Cross-cutting Issues

This thematic area will cover the emerging policy and implementation research needs in relation to the implementation of the [Water Framework Directive \(WFD\)](#), as well as marine research considerations in support to the formulation and implementation of policies over the period 2014-2020.

One topic is included in this 2016 EPA Water Call, under *Theme 4: Understanding, Managing and Conserving our Water Resources*:

2016 Water Call Project 10. Mapping of Water Research Infrastructure in Ireland

Project Title: Mapping of Water Research Infrastructure in Ireland

Project Type: Desk-Study Project

*To make an application under this topic area, you must use the following **Call Topic Reference:***
Water 2016 Call - Project 10

Background:

As we move towards the Internet of things model, it is becoming increasingly clear that much of the water-related research and monitoring facilities around Ireland are operated on the stand-alone model, neither connected to other pieces of infrastructure, nor available to other research activity.

Objectives and Expected Outputs:

Proposals submitted under this topic could consider:

- Identifying the location of water-research infrastructure around Ireland, for example, experimental catchments and field labs, test basis for new integrated hydrological models or for new sensors, remote observation systems, and also the related database and big data processing applications, etc..
- Establishing an inventory of their purpose, equipment being used, ownership, conditions of access and connectivity.
- Producing an online interactive comprehensive catalogue, which could also be used as a model for other research areas (either via the EPA [DROPLET⁴⁰](#) interface or another web-based platform).
- A solution for sustainable maintenance of the database.
- Making recommendations on how best to further develop the infrastructure in the water research & innovation sector in Ireland.

Infrastructure associated with, but not limited to, the following could be considered:

- 3rd level institutes – Universities, Institutes of Technology
- Research centers associated with 3rd level
- Agency and Institutional – EPA, Sustainable Energy Authority of Ireland, Office of Public Works, Inland Waterways, Inland Fisheries Ireland, Waterways Ireland etc.

Project Structure and Funding:

It is expected that this project will be a **12-month Desk-Study** project, with an **indicative** budget of up to **€75,000** (which includes a 5% provision for communication costs⁴¹). Please refer to the **2016 Guide for Applicants** for further details.

There will be a **maximum of one** project funded under this topic.

⁴⁰ <http://erc.epa.ie/droplet/>

⁴¹ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

3. Expected Outputs

For **all** projects submitted under the 2016 Water Call, **expected outputs include, but are not limited to:**

- **Final Report**, which should provide a clear and detailed account of all the steps and methodologies used during the project and ensure that the objectives, set out above, are met – including recommendations.
- **Synthesis Report** (20-30pp), which provide a clear non-technical summary of the research and of the recommendations.
- **Dissemination 2-pager**, which will be used to disseminate the findings of the research to the key stakeholders.
- **Workshop/Dissemination event(s)** to all stakeholders in the relevant arena (e.g. Policy, monitoring, regulatory, NGOs, media, public, etc.).

The list provided above is indicative and relevant alternatives will be considered. Please consult the **2016 Guide for Applicants, 2016 Guide for Grantees** and the **EPA Terms and Conditions of award** for the **full list** of interim and final reporting requirements.

In addition for the topics cofunded with the GSI, the successful project(s) will be required to fully acknowledge the sources of funding, as well as clearly use the funders logos on all outputs.

A **dedicated website/webpage/Twitter account** should be created and maintained, presenting the project and work carried to-date.

It is also expected that a number of **dissemination outputs**, such as posters, leaflets, newsletters, policy briefs, peer-reviewed publications and presentations, will arise from the projects.

It is essential that applicants clearly demonstrate, in their proposal, the **policy-relevance** of the outputs of their proposed research; the **applicability** of their findings; and how these outputs address a knowledge-gap and can be **efficiently transferred/applied to the implementation** of water-related policies and the protection of our water resources.

4. Indicative Timeframe

20th May 2016:	Call Opening
24th June 2016 (5pm):	Deadline for queries relating to the technical contents of this call
1st July 2016 (5pm):	Deadline for submission of applications by applicants
15th July 2016 (5pm):	Organisation Approval Deadline for authorisation by Research Offices
July/September 2016:	Evaluation Process
September/October 2016:	Negotiation ⁴²
November 2016:	Grant Award of Successful Projects

5. Further Information

Information on current research projects being supported by the programme is available in the Research Section of the EPA web site (www.epa.ie/researchandeducation/research).

Alternatively, for further information on this call, please contact research@epa.ie

Follow us on Twitter [@eparesearchnews](https://twitter.com/eparesearchnews) to keep up-to-date with all of our activities

Additional Documents available from the EPA website: www.epa.ie

- *2016 EPA Research Guide for Applicants*
- *2016 EPA Research Guide for Grantees*
- *2016 EPA Research Terms & Conditions for Support of Grant Awards*
- *2016 Quick guide to the EPA on-line portal (How to make an application)*
- *EPA's Open Data and Open Access Rules*

ALL QUERIES, OTHER THAN ON THE SUBMISSION PROCESS, SHOULD BE SUBMITTED BY THE 24TH JUNE 2016, 5PM AT THE LATEST. Research@epa.ie MUST BE COPIED IN ALL EMAILS. NO QUERIES WILL BE ENTERTAINED AFTERWARDS.

⁴² The EPA may consider calling the shortlisted applicants for interview at this stage.