

Southern Water

Project Partner 7

Nutrient Recovery Case Study – Work Pack 3

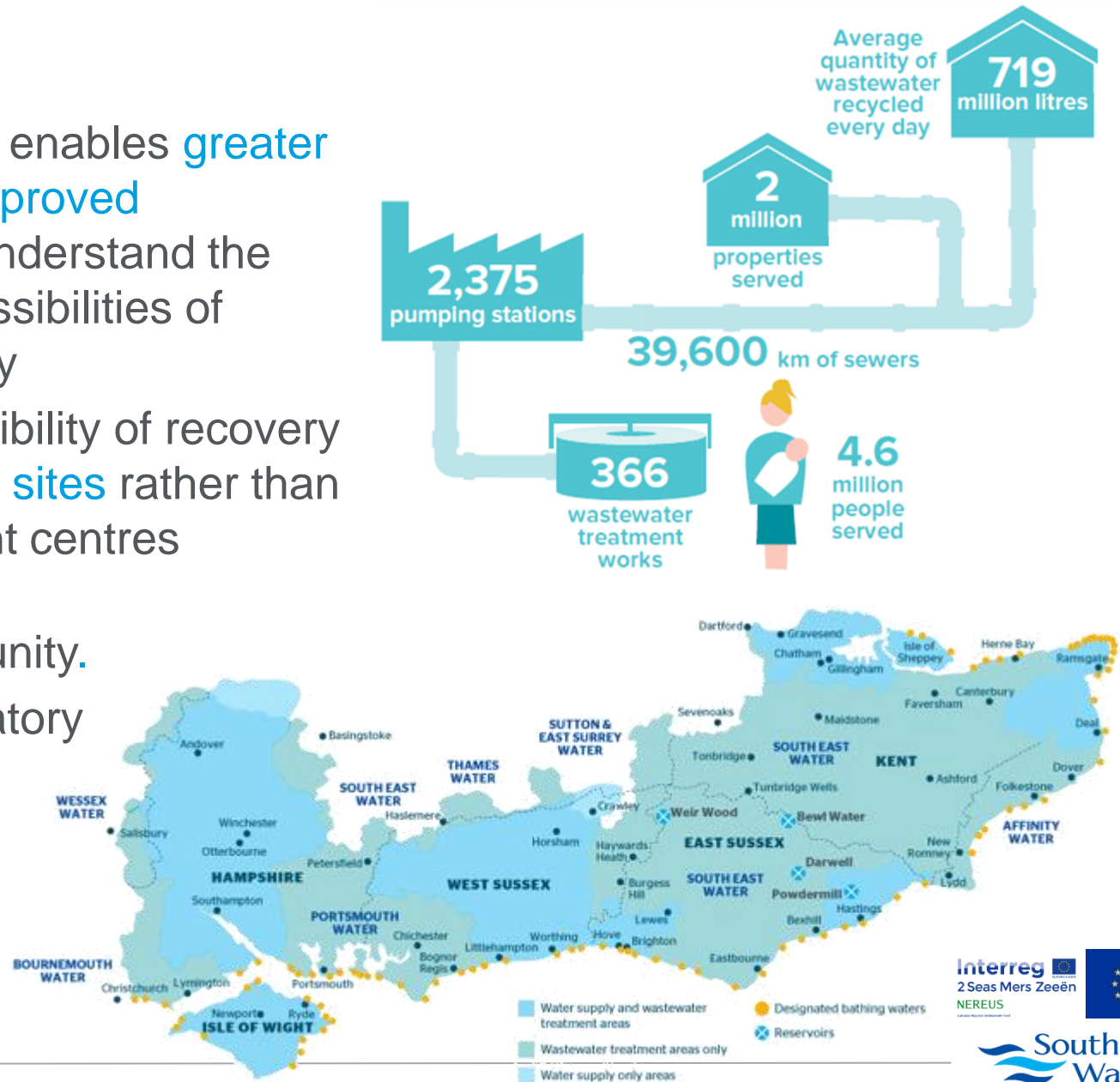
Interreg 
2 Seas Mers Zeeën
NEREUS
European Regional Development Fund



 **Southern
Water**

Why Southern Water are Involved in NEREUS

- Interreg funding enables **greater ambition and improved opportunity** to understand the process and possibilities of nutrient recovery
- Assess the feasibility of recovery at **decentralised sites** rather than sludge treatment centres
- Collaborative **learning** opportunity.
- Improved regulatory relations



Southern Water Cooperation and Benefits

Cooperation

- Cooperation and collaboration is inherent in our day-to-day activity
- Southern Water will **trial plant for removal and recovery of nutrients** from decentralised urban wastewater treatment processes in the South of England.



Looking
after the
environment

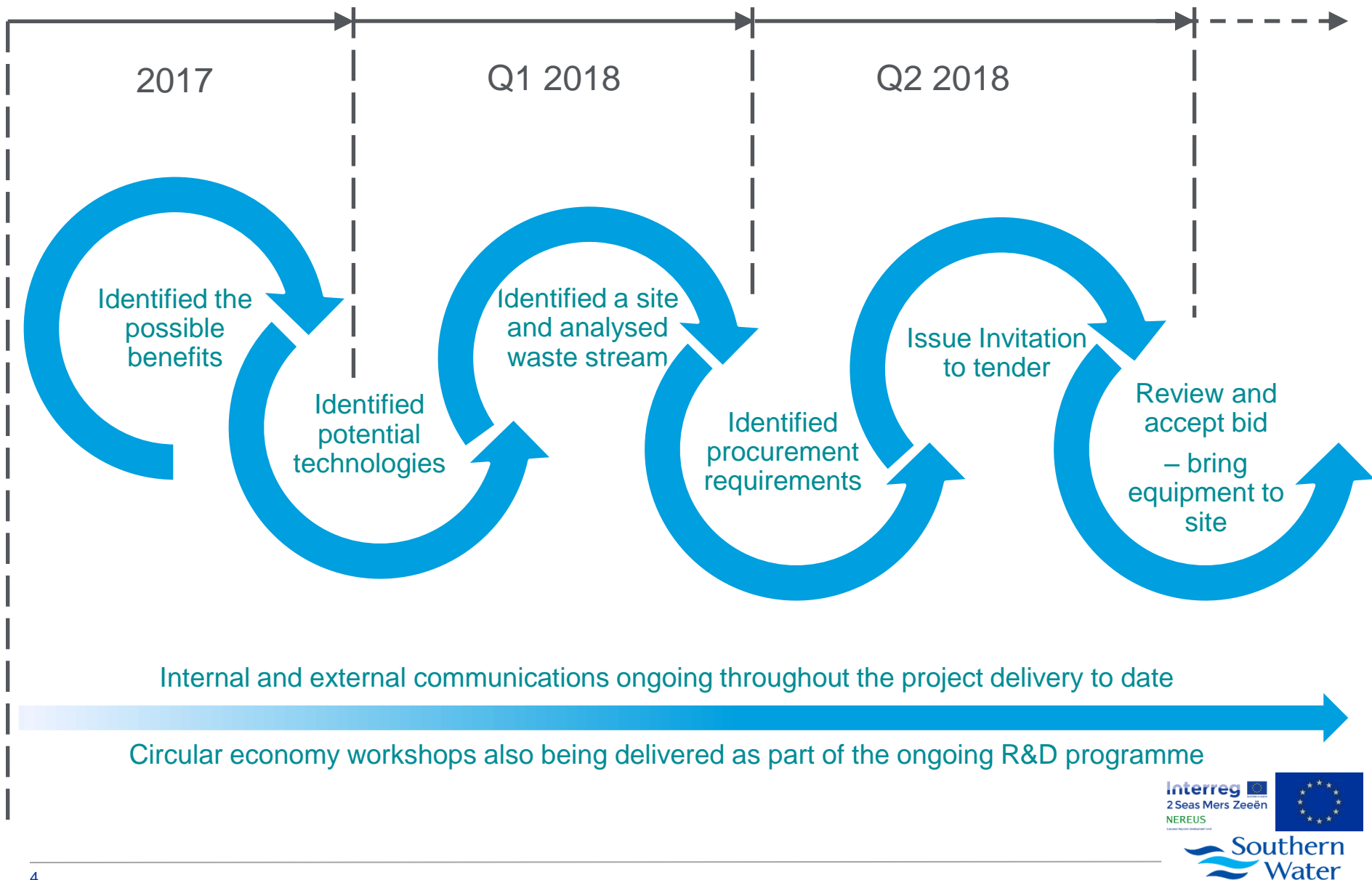
Benefits

- Southern Water strategy includes introduction of **circular economy** practices. Driven from leadership team
- We hope to gain market leading insights and International **Industry recognition as a thought leader** in this area of the water industry
- Recognition of **Customer Promises**

Aim for 100 per cent compliance by our wastewater treatment works with required standards.

At least maintain performance at 98.6 per cent.

Progress to Date



Lessons Learned & Planned Progress

- **Audit requirement is very stringent** when working under Interreg and thus procurement, despite likely being below OJEU value needs to go to market.
 - This also facilitates much of the FLC requirement in the future (e.g. having 3 quotes, having a record of bid entries and acceptance/rejection).
- Feasibility study was to be completed by end Q1 but delayed mainly due to procurement
- Expectation is that **we will still be at site in October 2018** to begin trial.
 - The hope is we will now trial 3 technologies as opposed to 1 for a full year because the risk of non commercial / economic recovery is high

Recovery Projects & Community Acceptance

- **Community:** *a social group of any size whose members reside in a specific locality, share government, and often have a common cultural and historical heritage.*

Water Re-Use	Nutrient Recovery	Energy Recovery
Toilet to tap: “the yuck factor”	Negative perception if supplied directly to land	Expensive – additional cost to bills
Recognition water scarcity is a real issue	Regulatory and political barriers because of environmental concerns	Barriers from a technical perspective limit economic recovery if on a small scale
Depends on community culture	Cost of mined nutrients limits demand for recovered nutrients	Planning restrictions – eye sore from process plant
Few local examples of prior water re-use	Public unaware of environmental impact of excess nutrients	less publicised – recovery from wastewater compared to renewables
Emotional responses quicker than rational response	Emotional responses quicker than rational response	Emotional responses quicker than rational response



The Demonstration Case

Dr Rashmi Crouch
Wastewater Project Design Lead
Southern Water

interreg 
2 Seas Mers Zeeën
NEREUS
Co-funded by the European Union



 Southern
Water

Feasibility Questionnaire – Industry Expert

Would it be feasible to recover phosphorus from a site with a Consent?

- ✓ Only, at a site that has a high phosphate concentration in the sludge liquor to make recovery feasible.

PHOSTRIP

PO4
Filtermedia

ABNR

PHOSIEDI

What are the pre-requisites for recovering phosphorus from sewage works?

- ✓ For P recovery to be feasible sites need to have a high P concentration. Typically, some cases a **severe** consent is required.
- ✓ Phosphorus recovery is technically feasible as this increases the phosphorus concentration in the sludge liquor. This is the fraction that reacts with lime; to be economically feasible the concentration in the dewatering centrate needs to be **>55 mg PO4-P/l but typically need to be at least 100-150 mg PO4-P/l** to make it economically viable (the latter is easily achieved by bioP systems).
- ✓ Sites need to have anaerobic digestion and a high phosphate concentration in the liquor to make the reaction.

Phospaq

Profinutrients /
Multiform
Harvest

PEARL

AirPrex

Membrane

NutriTec

Sorbulite
/ Polonite

Crystalactor

NuReSys

Would it be possible to recover phosphorus from a site with a review based on existing operating plant?

- ✓ To assess feasibility we require the **PO4-P and NH4-N** concentration, **DS content, TSS, alkalinity and conductivity** and a **phosphate recovery** consent.
- ✓ We also require SAS flows, DS content and TP content in order to assess the potential for phosphorus release.

Struvia

PROPHOS

Grundfos/
Norconsults

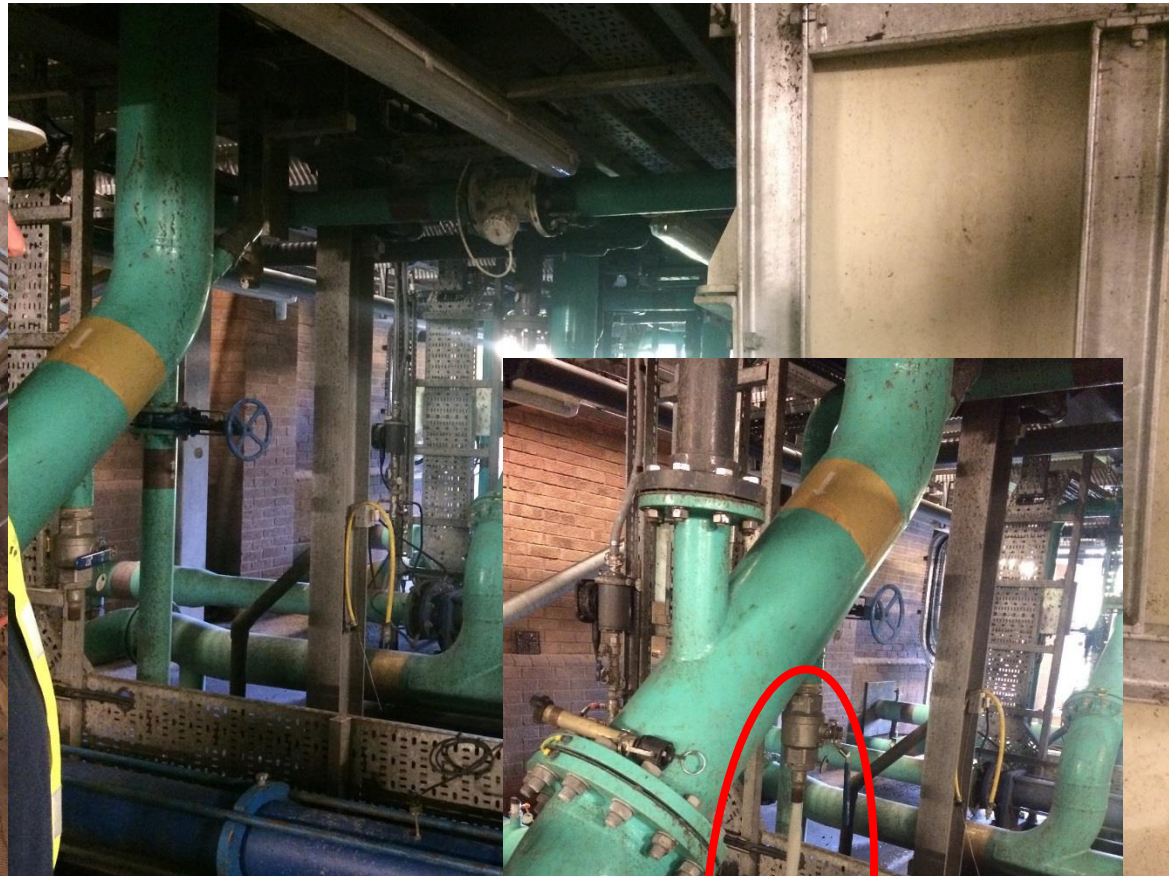
RECYPHOS

NEREUS Feasibility Study – Technical Plan

1. Site Selection to comply with de-centralised site brief and work with our academic partners.
2. Basis of Design
3. Engage Procurement & Suppliers.
4. R&D Phases: Design and Optimisation.



Feasibility Start-up



Basis of Design – Results

	Units	Average	Min	Max	95%ile	Count
Ammoniacal Nitrogen as N	mg/l	167	133	237	214	10
Conductivity @ 20 deg.C	mS/cm	4.01	2.66	14.20	9.24	10
pH	pH Units	5.56	5.31	5.97	5.93	10
Phosphate (Ortho as P)	mg/l	122	94	151	145	10
Alkalinity, Total as CaCO ₃	mg/l	946	792	1160	1138	10
Suspended solids, Total	mg/l	928	278	2050	1965	10
Magnesium (Tot. Unfilt.)	mg/l	39	33	48	47	10
Calcium (Tot. Unfilt.)	mg/l	284	227	348	343	10
o-P:TP Ratio		85%	77%	96%	94%	10
Flow to Works (FFT)	m ³ /d	100338	84251	122310	119301	10
Works Return Flow (Liquor)	m ³ /d	746	484	1139	1064	10
Total Centrifuge Feed	m ³ /d	640	254	924	910	10
Centrifuge Feed Solids	%DS	2.8	2.4	3.5	3.3	8
Centrifuge 3 Cake DS	%DS	25	23	26	26	6

Contact Details

- Southern Water point of contact: Drew Brown
e: drew.brown@southernwater.co.uk
t: +44 (0) 7818 078043