Nereda®: enhancing society

Royal HaskoningDHV

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Where we are in the world

Consultancy, Engineering &
Project Management

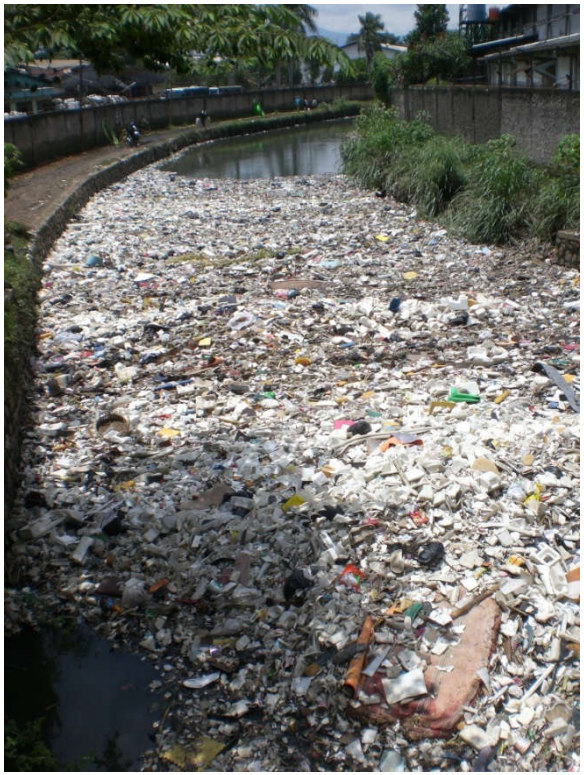
Workforce of
almost **6,000** in
more than **150**
countries

One of the **top independently owned**
engineering companies

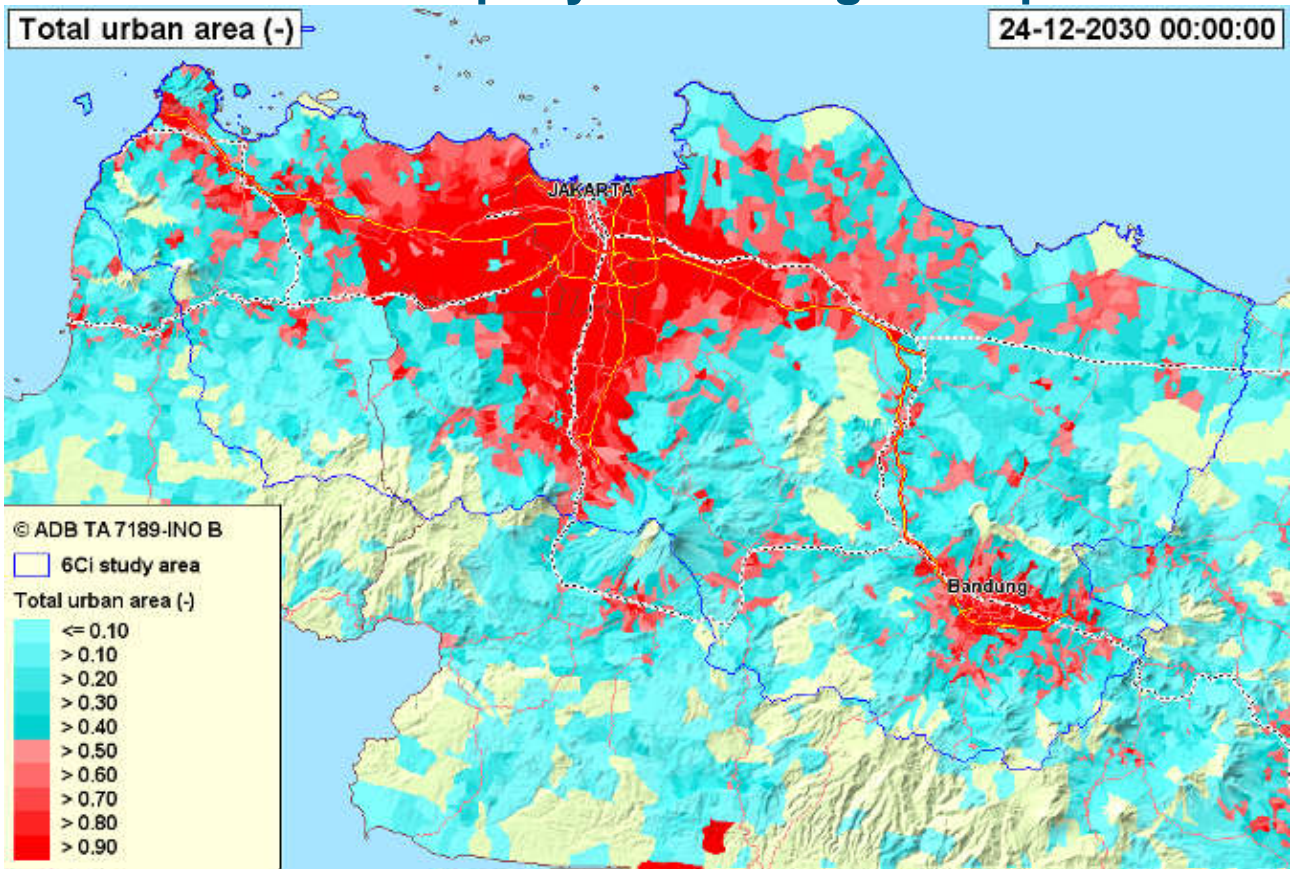
World class water solutions

- Innovative and sustainable solutions
- In partnership with research centres, universities and clients

How does it translate to the challenges in Asia?



How does it fit in rapidly urbanizing metropolitans: West Java



Urban area will increase 100% in 20 years

TA7189-INO: Institutional Strengthening for Integrated Water Resources Management (IWRM) in the 6 Ci's River Basin Territory - Package B

Citarum: “most polluted river in the world”

livescience

TECH HEALTH PLANET EARTH SPACE STRANGE

TRENDING: Military & Spy Tech // Global Warming // 3D Printing // OurAmazingPlanet // Best Fitness

World's 10 Worst Polluted Places Named

By Megan Gannon, News Editor | November 06, 2013 12:00pm ET

4 Reportage

Jakarta Post

Citarum shoulders the burden of ignorance

Traces of past civilizations along the river banks

WATER AND SANITATION PROGRAM: TECHNICAL PAPER

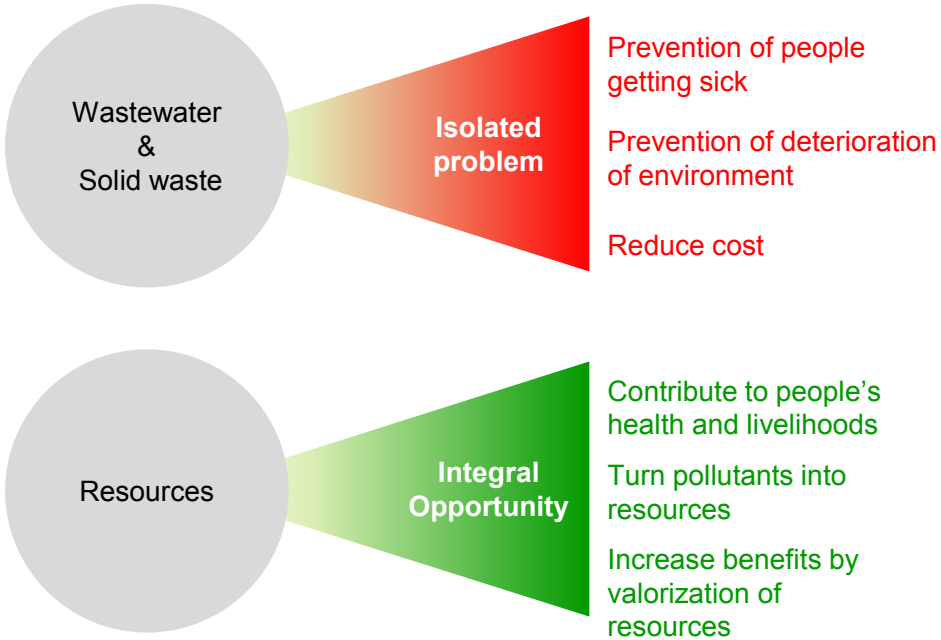
Downstream Impacts of Water Pollution in the Upper Citarum River, West Java, Indonesia

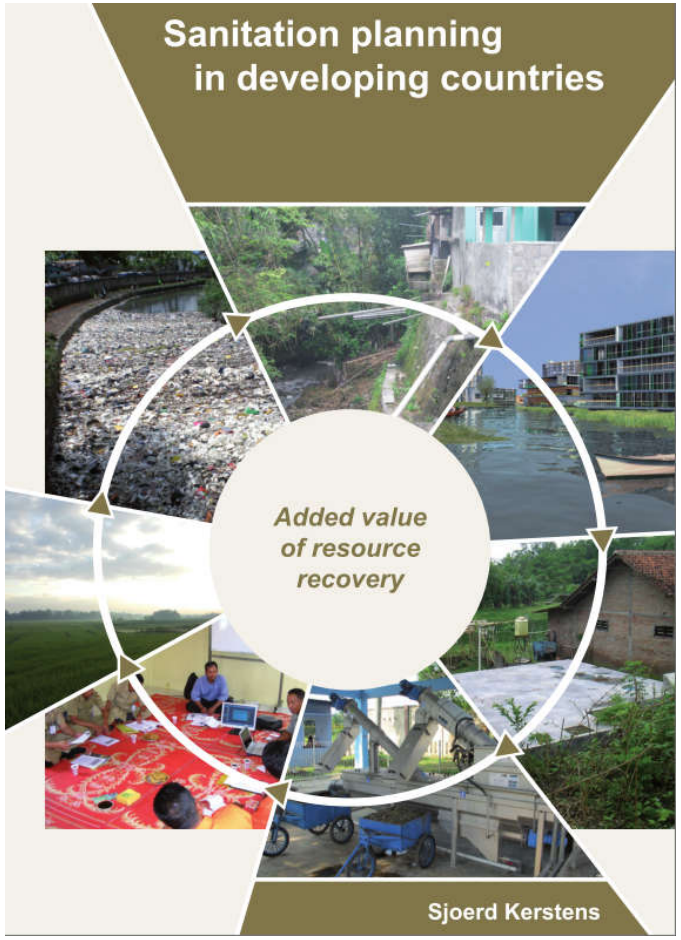
Economic Assessment of Interventions to Improve Water Quality

October 2013

wsp | ADB | Royal HaskoningDHV | THE WORLD BANK

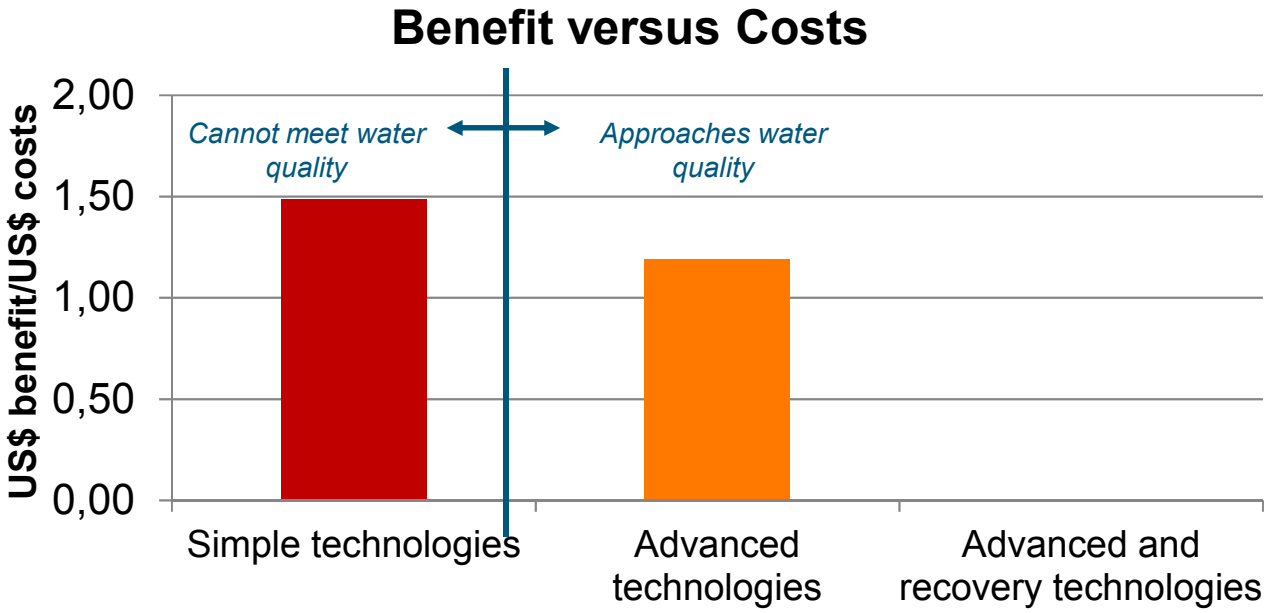
Challenge in Sanitation planning





https://www.proefschriftmaken.nl/ebooks/sjoerd_kerstens/

Accelerating access to sanitation



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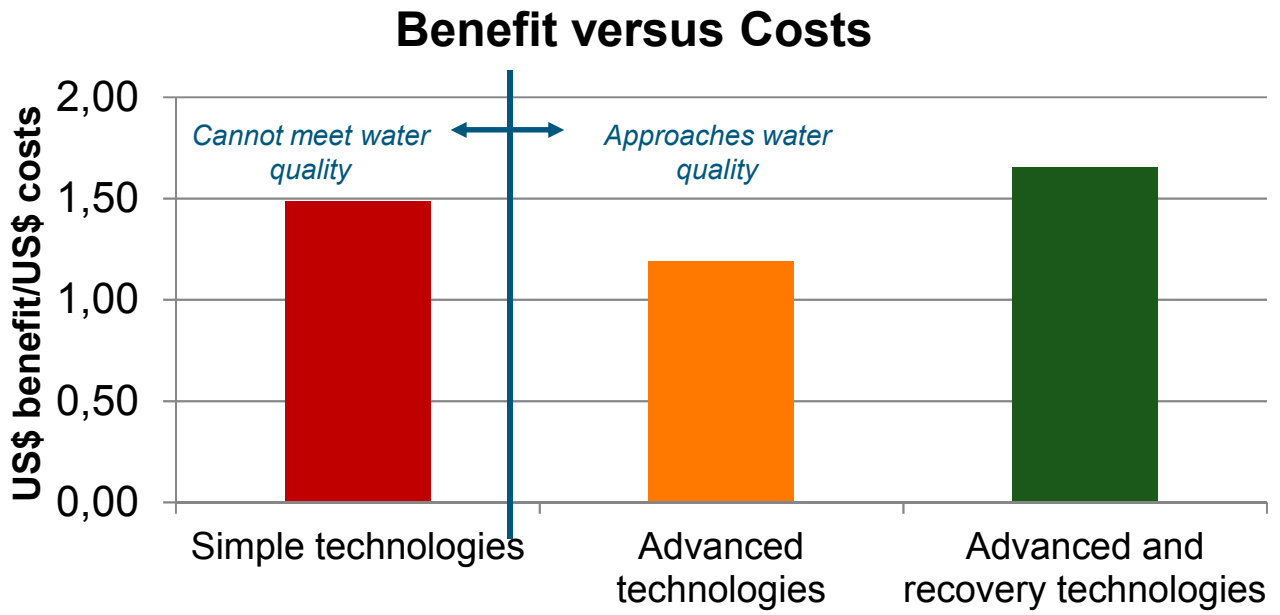


Resource recovery results in higher BCR, while improving the water quality

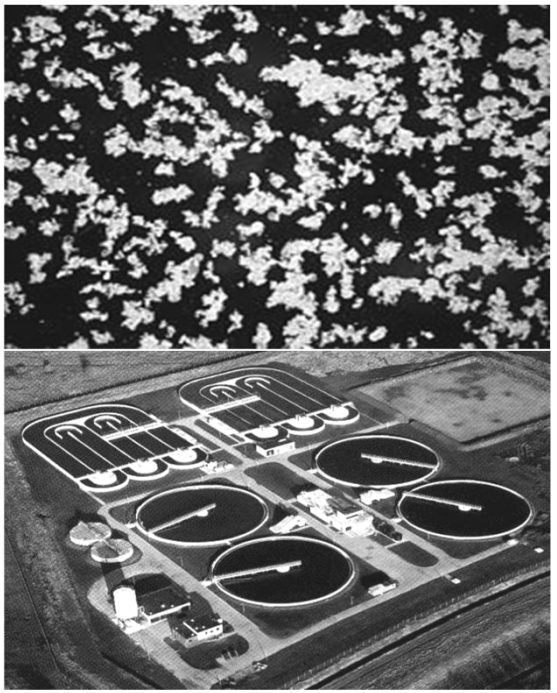
How bugs enhance society

Conventional wastewater treatment

- Activated sludge principles
- Over 100 years experience
- Reasonable good effluent quality

BUT

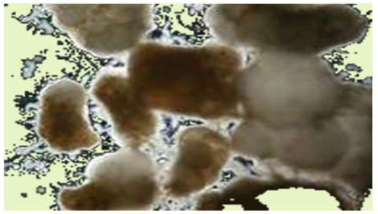
- Large footprint
- High energy consumption
- High chemical consumption
- Complex design & operation



Aerobic Granular Biomass

Activated Sludge

Aerobic Granules

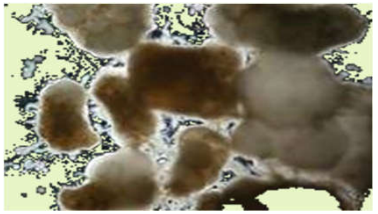


- Excellent settling properties
- Pure biomass
- No support media
- High biomass levels (2-3 times of conventional)
- Reliable and stable operation

Aerobic Granular Biomass

Activated Sludge

Aerobic Granules



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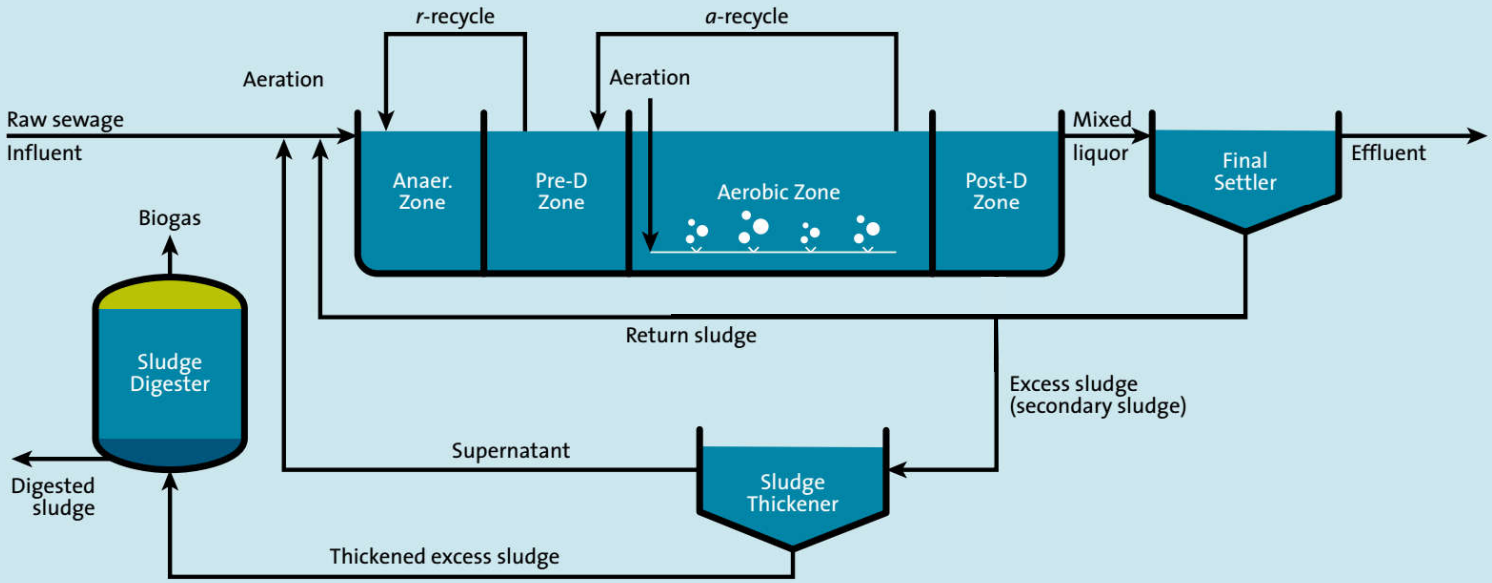
Nereda® compared to Conventional Activated Sludge

Biological nutrient removal in activated sludge requires many compartments and circulation flows

Carbon, Nitrogen and Phosphorus removal in UCT configuration



Nereda® compared to Conventional Activated Sludge

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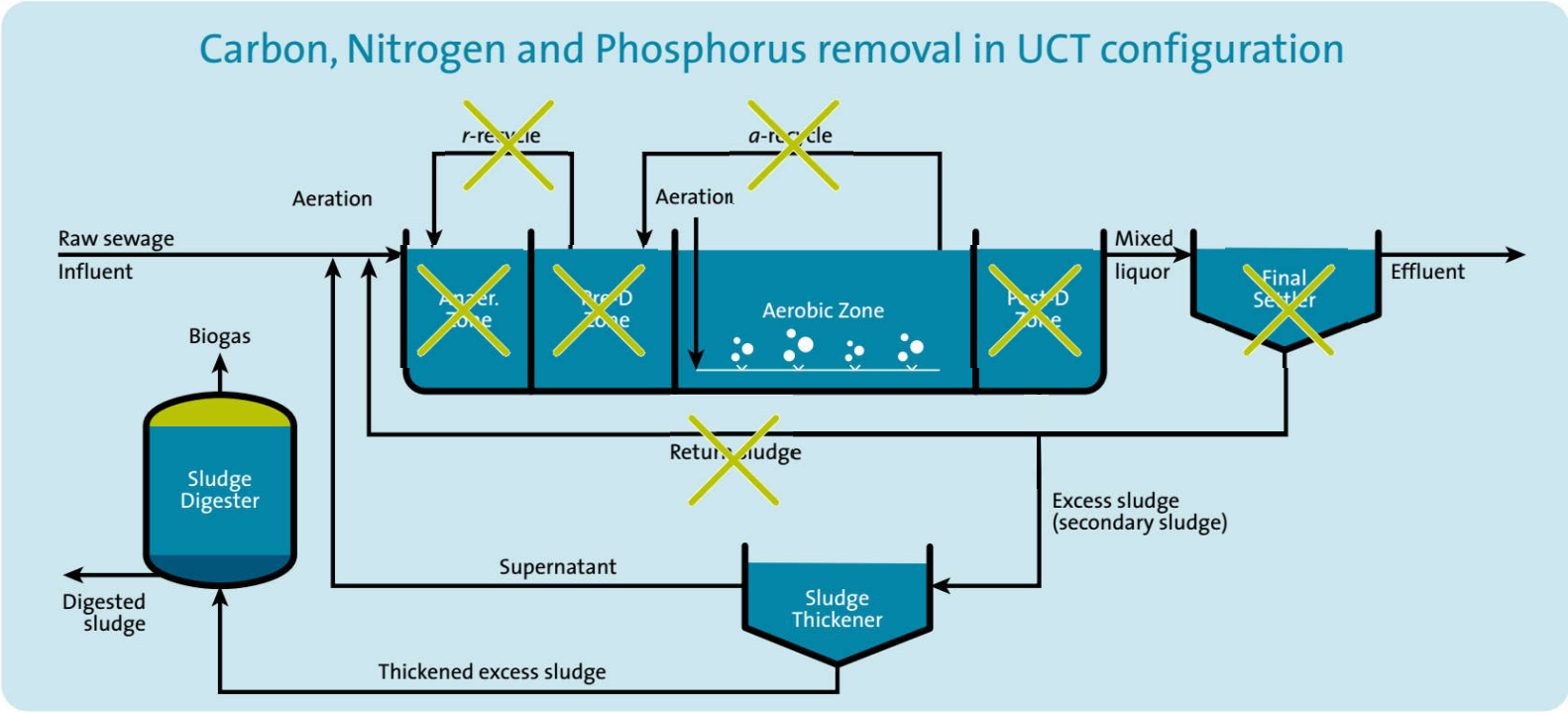
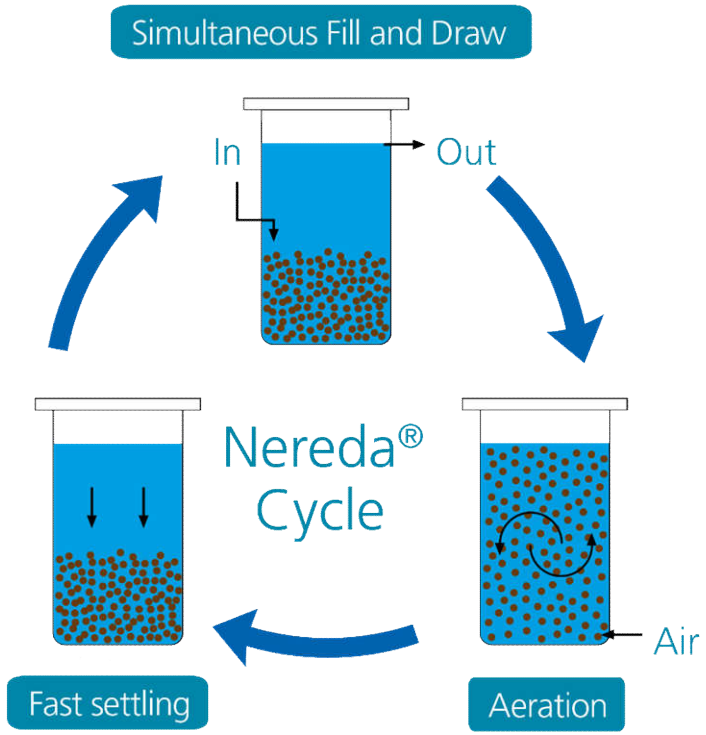


Nereda® process cycle

- Simple one-tank concept
- No clarifiers
- No moving decanter
- No mixers
- Extensive biological COD, N- and P-removal



Advantages

SMALL FOOTPRINT
Up to a factor 4 smaller

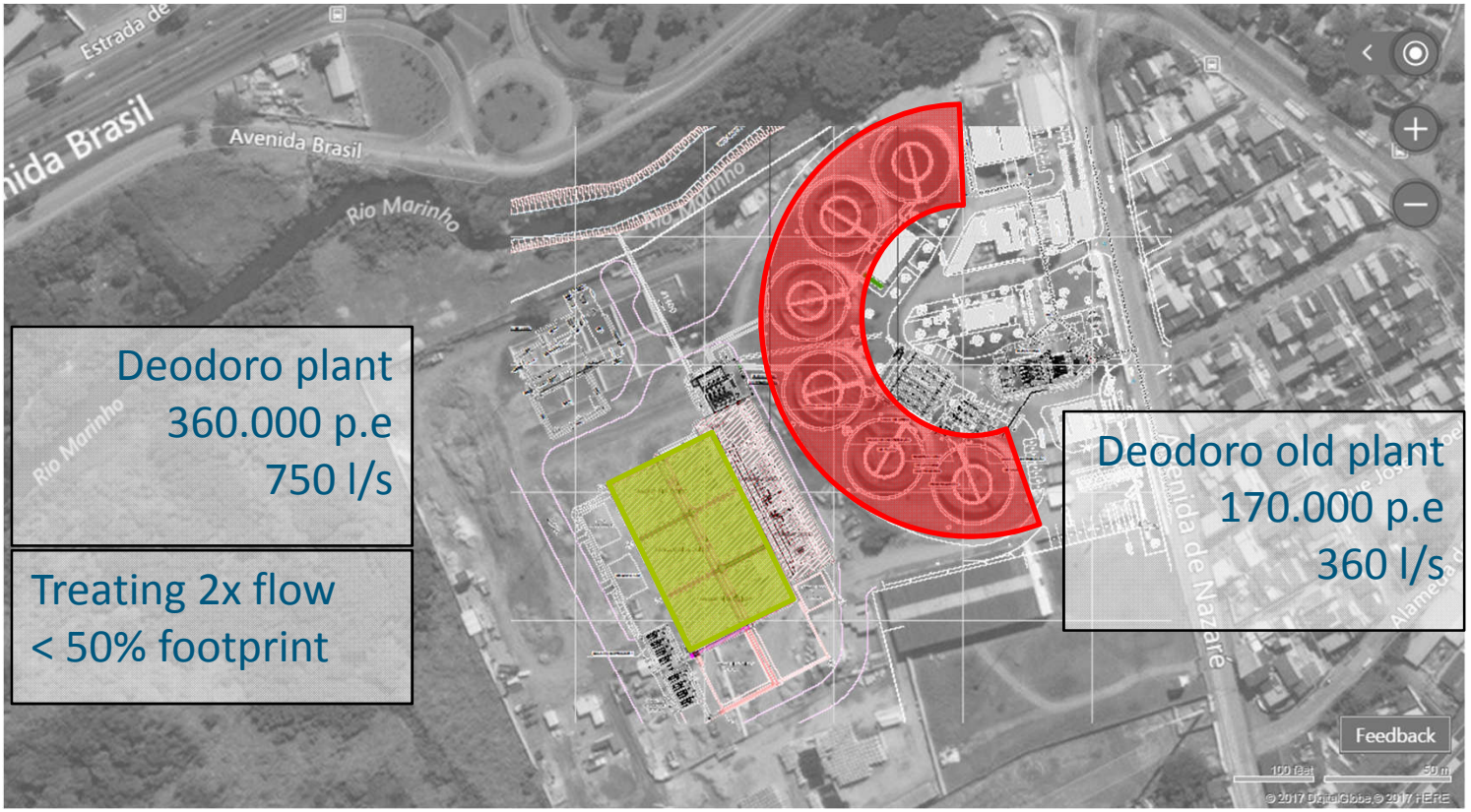
SUSTAINABLE
30-50% energy savings
No/minimal chemicals

EXCELLENT EFFLUENT QUALITY
Including biological nutrient removal
N/P

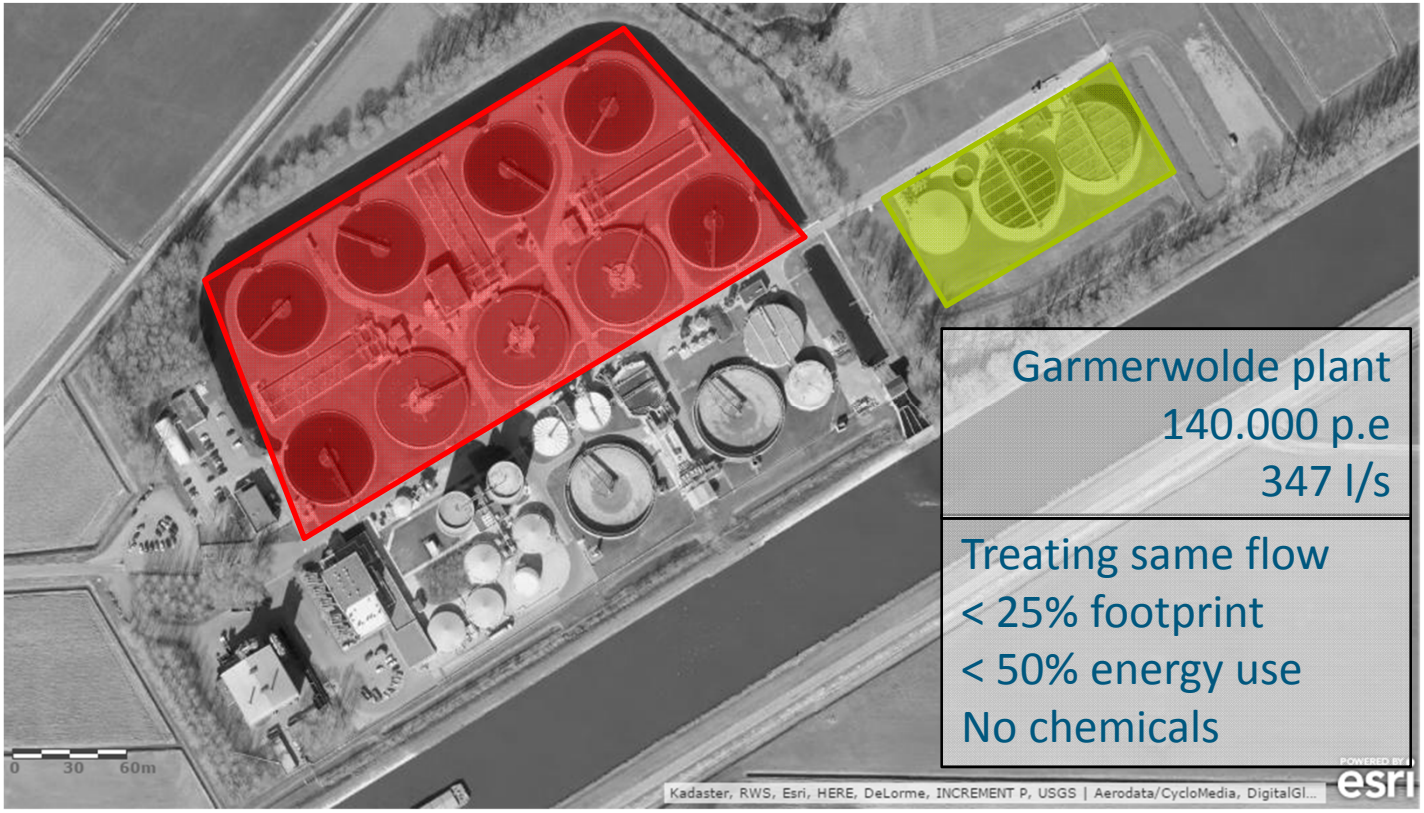
COST EFFECTIVE
Lower CAPEX & OPEX

EASY TO OPERATE
Automated & robust

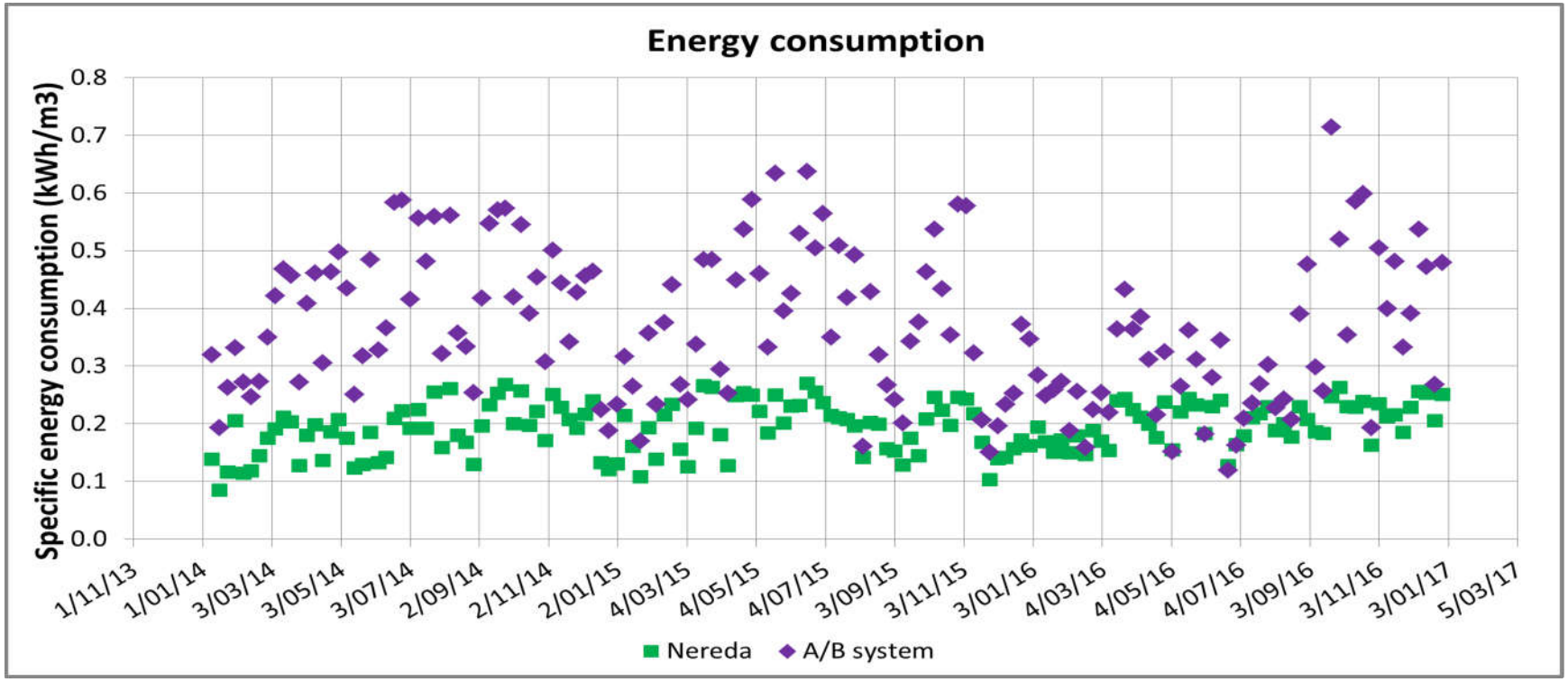
Footprint – Deodoro- Rio de Janeiro



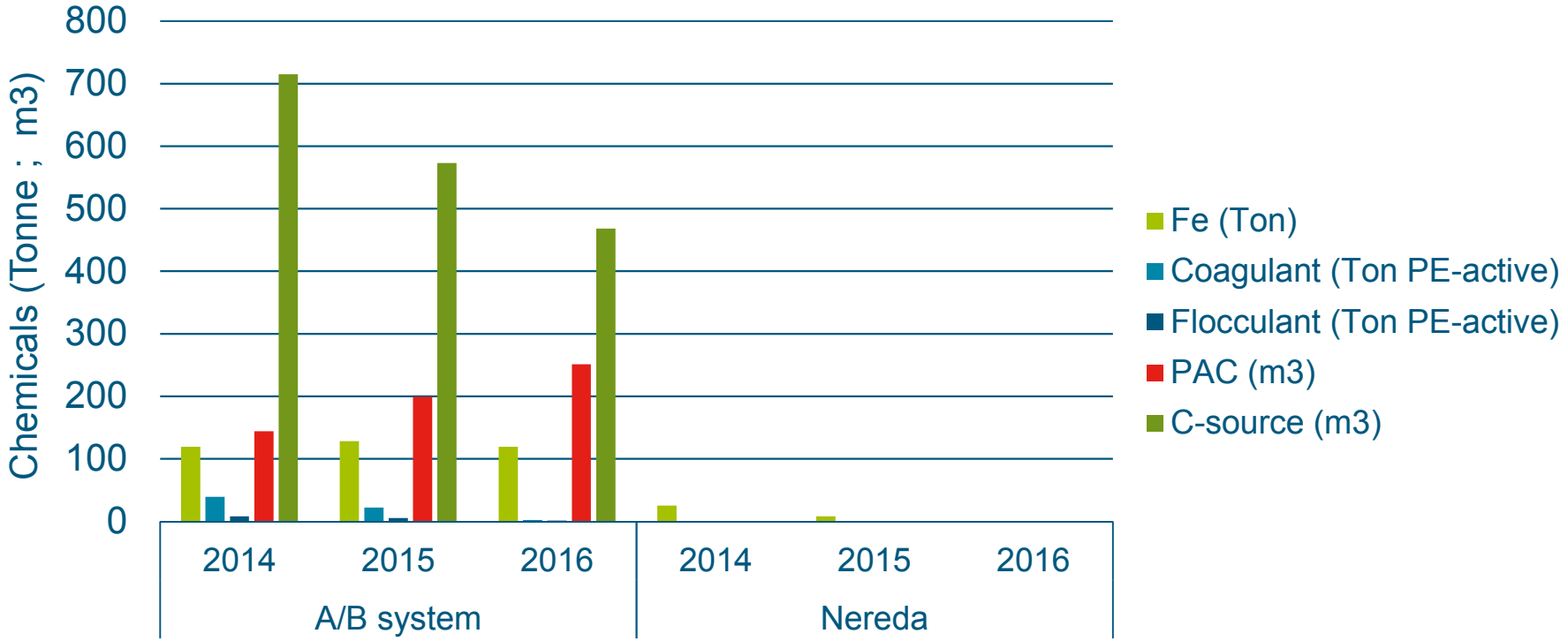
Footprint - Garmerwolde



Energy – Garmerwolde

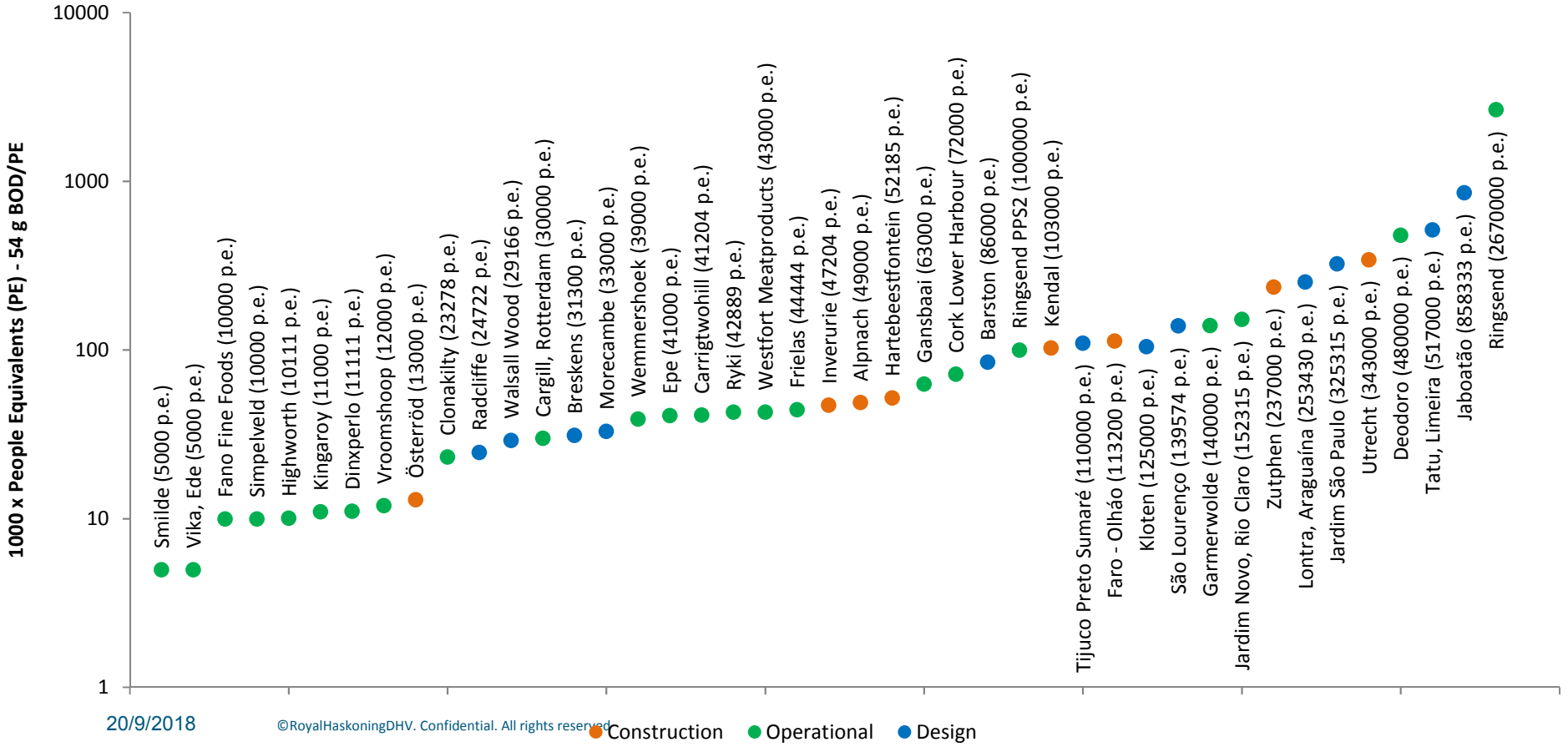


Chemical consumption - Garmerwolde



Global Nereda® roll-out

Current status of Nereda®



Nereda® plants

Operational plants:

Vika, Ede	NL
Cargill, Rotterdam	NL
Smilde, Oosterwolde	NL
STP Gansbaai	RSA
STP Epe	NL
STP Garmerwolde	NL
STP Vroomshoop	NL
STP Dinxperlo	NL
STP Wemmershoek	RSA
STP Frielas, Lisbon	PT
STP Ryki	PL
Westfort , IJsselstein	NL
STP Clonakilty	IRL
STP Carrigtwohill	IRL
STP Deodoro, Rio de Janeiro	BR
STP Kingaroy	AUS
STP Simpelveld	NL
STP Cork Lower Harbour	IRL

Operational plants:

STP Highworth	UK
STP Ringsend	IRL
STP Jardim Novo, Rio Claro	BR

Plants under construction:

STP Hartebeestfontein	RSA
STP Alpnach	CH
STP Faro, Olhão	PT
STP Zutphen	NL
STP Utrecht	NL
STP Österröd, Strömstad	S
STP Inverurie	UK
STP Kendal	UK
STP Great Dunmow	UK
STP Morecambe	UK
STP Barston	UK
STP Breskens	NL
STP Kloten	CH

Plants under design:

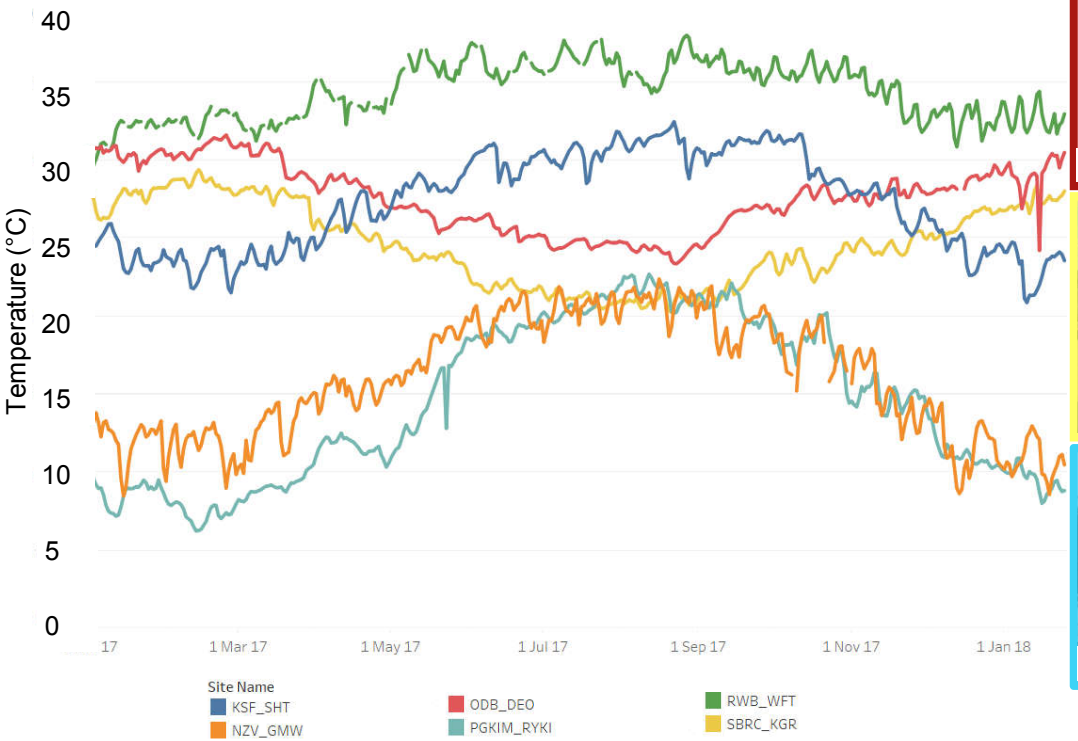
STP Tatu, Limeira	BR
STP São Lourenço, Recife	BR
STP Jaboatão, Recife	BR
STP Jardim São Paulo, Recife	BR
STP Tijuco Preto, Sumaré	BR
STP Lontra, Araguaína	BR
STP Região Sul de Palmas	BR
STP Radcliffe	UK
STP Walsall Wood	UK
STP Failsworth	UK
STP Newham	UK
STP Dungannon	UK
STP Blackburn	UK
Sappi, Lanaken	BE
STP Vriezenveen	NL
STP Altena	GE
STP Stonewater Creek	US
STP Wolf Creek	US
STP Fleury	FR

Nereda® covering all climates


Westfort, NL, 43,000 PE


Hong Kong, demo unit


Garmerwolde, NL, 140,000 PE

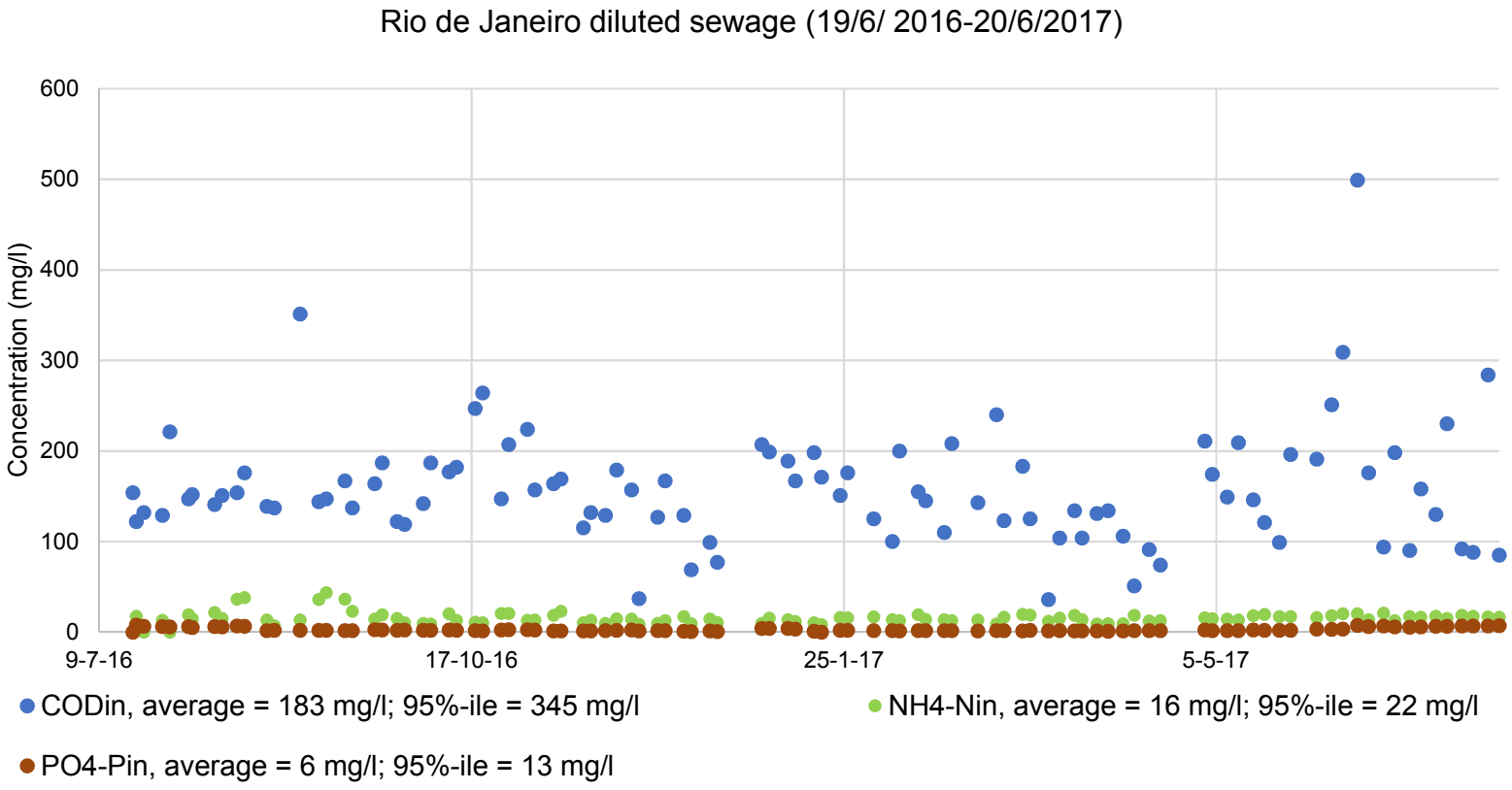



DEO Rio d Jn; Brazil, 480,000 PE


Kingaroy, Australia, 11,000 PE


Ryki, Poland, 43,000 PE

Applicability for diluted water



Royal HaskoningDHV
Enhancing Society Together

References full data

Nereda® Epe – The Netherlands, 2011

CLIENT

Water Authority Veluwe

WASTEWATER TYPE

Municipal & Industrial

CAPACITY

8,000 m^3/day (41,000 p.e. inclusive 13,750 p.e. from industrial discharges)

PEAK FLOW

1,500 m^3/hour

PRE & POST TREATMENT

screening, sand trap and oil & grease removal (slaughterhouse emissions) & sand filtration

Nereda® Wemmershoek – South Africa, 2013

CLIENT

Stellenbosch Municipality

WASTEWATER TYPE

Municipal

CAPACITY

5,000 m^3/day | 39,000 p.e.

PEAK FLOW

468 m^3/hour

Nereda® Deodoro, Rio de Janeiro – Brazil, 2016

CLIENT
BRK Ambiental / Foz Aguas 5

WASTEWATER TYPE
Municipal

CAPACITY
86,400 m^3/day | 480,000 p.e.

PEAK FLOW
6,120 m^3/hour

PRE TREATMENT
Grease & grit removal, screening

Nereda® Kingaroy – Australia, 2016

CLIENT
Aquatec Maxcon

WASTEWATER TYPE
Municipal

CAPACITY
2,625 m^3/day | 11,000 p.e.

PEAK FLOW
450 m^3/hour

Nereda® Pilot Sha Tin – Hong Kong, 2016-2017

CLIENT
Drainage Services Department / Kingsford Environmental Limited

WASTEWATER TYPE
Municipal

CAPACITY
1,000 m^3/day | 4,630 p.e.

Future capacity relocated works: 340,000 m^3/day

Demonstration plant treating high salinity sewage

Nereda® Blackburn – United Kingdom, 2018

CLIENT

United Utilities

WASTEWATER TYPE

Municipal

CAPACITY

70,000 m^3/day | 430,000 p.e.

PEAK FLOW

12,090 m^3/hour

PRE-TREATMENT

Existing pre-treatment plant at Nabs Head – screening and grit removal, storm water storage

POST-TREATMENT

Tertiary solids removal and UV disinfection

Nereda® Ringsend – Ireland, 2021

CLIENT
Irish Water

WASTEWATER TYPE
Municipal

CAPACITY
600,000 m^3/day | 2,670,000 p.e.

PEAK FLOW
50,000 m^3/hour

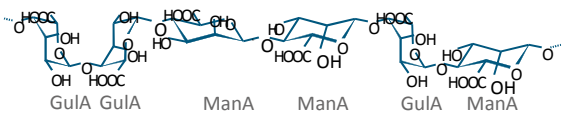
Significantly more biological treatment capacity by retrofit existing ICEAS SBR

Biopolymer in granules

Granules contain **15-25% of structural gel**, mainly alginate like polysaccharides

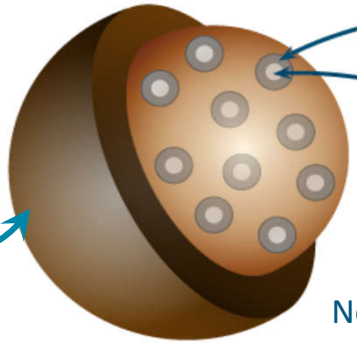
High market value

Easy to harvest



Resource Recovery from Nereda® Sludge

ALE =
Alginate-Like
Exopolymers

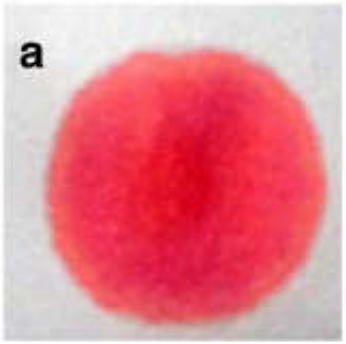


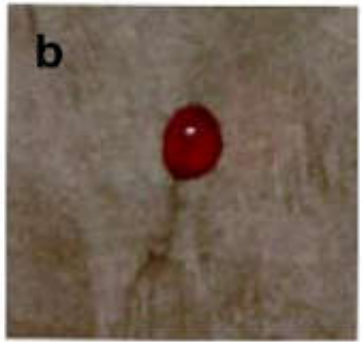
EPS

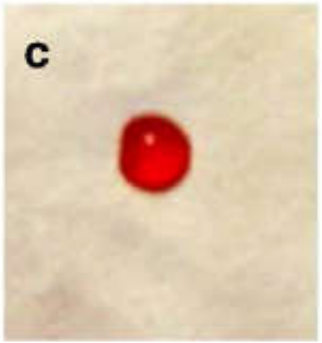
Bacterial cell

Nereda® granule

Characteristics and functions of ALE







Nereda® Re-use Factory – The Netherlands, 2018

CLIENT

Water Authority Rijn en IJssel

WASTEWATER TYPE

Dairy (Friesland Campina)

CAPACITY

10,128 m^3/day | 237,000 p.e.

PEAK FLOW

550 m^3/hour

Dairy industry to treat wastewater and re-use Nereda Granular Sludge

Traditional Urban Design

Sustainable Urban Development

Nereda®

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- www.nereda.net
- nereda@rhdhv.com