VEOLIA

Resourcing the world

Planta de elaboración de ensaladas, lavadas con agua reciclada, en el Reino Unido

ASERSA Webinar

November 2020

WATER REUSE IN THE FOOD & BEVERAGE INDUSTRY

REUTILIZACIÓN DE AGUA EN LA INDUSTRIA DE ALIMENTOS Y BEBIDAS

SUSTAINABILITY

- Sustainable water cycle management and carbon reduction

Financial

- Saving on sewer discharge costs and bought in water
  - Replace municipal supply potable water, cost £ 1.46 /m3
  - Trade effluent charge: £ 1.61 /m3

MANUFACTURING SITE LOCATION LIMITATIONS

- Geographical area water scarcity
- Limited discharge options to sewer connections

WATER REUSE IN THE FOOD & BEVERAGE INDUSTRY

REUTILIZACIÓN DE AGUA EN LA INDUSTRIA DE ALIMENTOS Y BEBIDAS

CURRENT APPLICATIONS

- Salad leaf washing
- Boiler water supply
- Clean in place CIP wash water
- Cooking water supply

WATER REUSE IN FOOD REGULATORY CONTEXT IN UK

REUTILIZACIÓN DE AGUA EN CONTEXTO REGULATORIO ALIMENTARIO EN EL REINO UNIDO

REGULATORY REQUIREMENTS

- Agreed specification with Customer to meets their requirements
- The Water Recycle Plant is a highly specialised water treatment process, specifically tailored to meet the high water quality requirements of both the customer and those stipulated at the time in The Drinking Water (Undertakings) (England and Wales) Regulations 2000, which are enforced in the UK by the Drinking Water Inspectorate
- These regulations have since been replaced by The Water Supply (Water Quality) Regulations 2016 (England) (with 2018 amendments consolidated), and while the Water Recycle Plant is not bound to these regulations the water is still tested against the parameters detailed within them
- A list of parameters can be at http://dwi.defra.gov.uk/consumers/advice-leaflets/standards.pdf

SALAD PRODUCTION PLANT

PLANTA DE ELABORACIÓN DE ENSALADAS

CUSTOMER

- Produces pre-packed salads for a large UK supermarket, as well as pre cooked meals
- Includes effluent from
  - Pasteurised mayonnaise, vinegars and oils
  - Washing of leafy salads and other vegetables
  - Defrosting of pre-cooked proteins such as chicken, fish and prawns
  - Cooking of various pasta

SALAD PRODUCTION PLANT

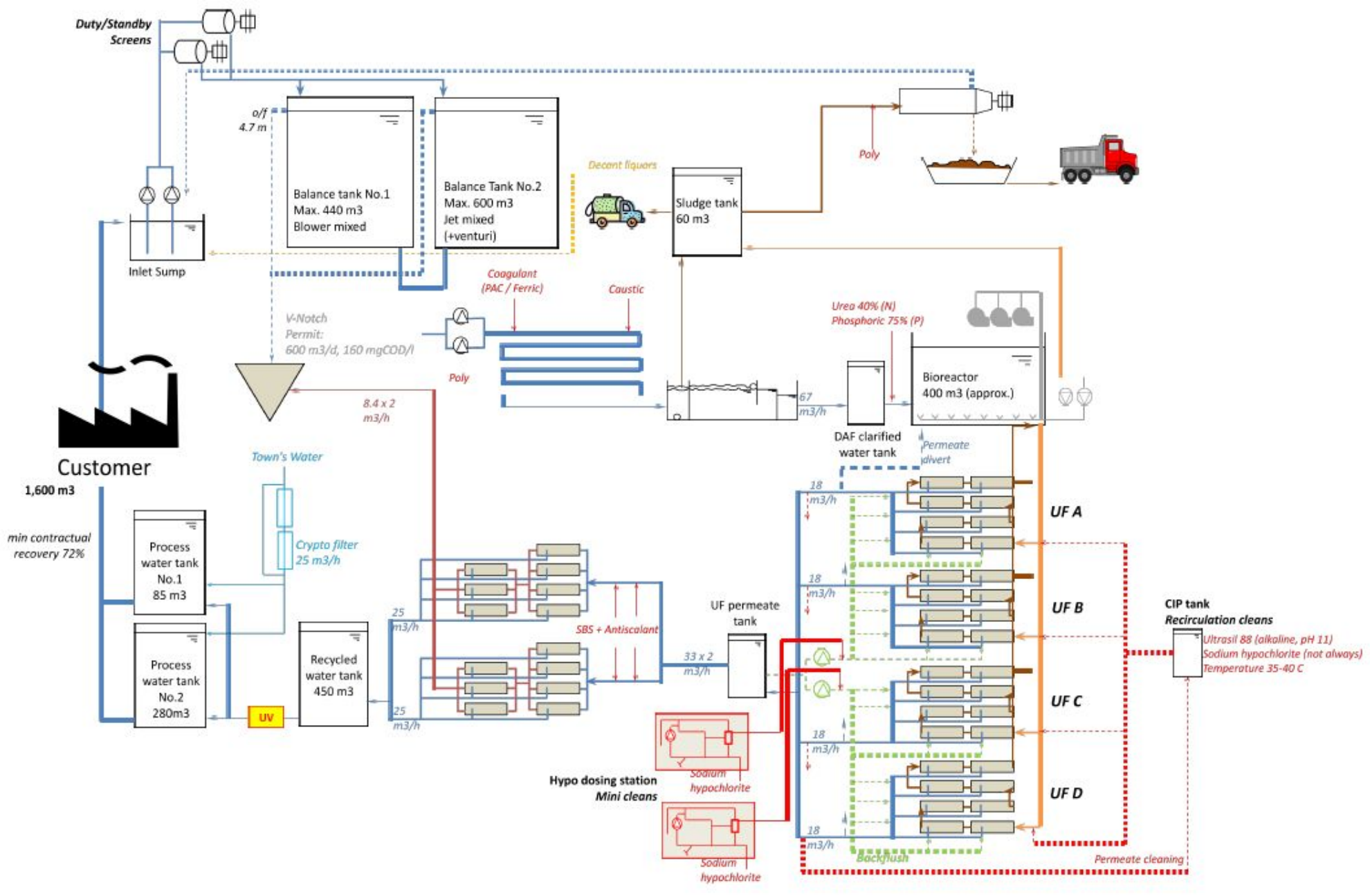
PLANTA DE ELABORACIÓN DE ENSALADAS

PROJECT OBJECTIVES

- Provide a sustainable solution to the site's water usage and trade effluent disposal
- Significantly reduce the site's water footprint, as well as aligning the site with its major customers environmental objectives
- Saving upto 1200 m3 per day of potable water for domestic supply (8,000 population equivalent)
- Provide protection in a 'water stressed' area whilst reducing dependency on the local wastewater facilities
- Releasing capacity in the sewer network and in the municipal wastewater treatment plant for domestic purposes
- Transfer the operational risk to an experienced water cycle operator

EFFLUENT TREATMENT PLANT PROCESS

PROCESO DE LA PLANTA DE TRATAMIENTO DE EFLUENTES



EFFLUENT TREATMENT PLANT PROCESS

PROCESO DE LA PLANTA DE TRATAMIENTO DE EFLUENTES

Parameter	Min	Design	Max	Units
Screen				
Hourly flow rate to screen	-	-	95	m^3/hr
DAF				
Daily flow rate to DAF from balancing tank(s)	-	1400	1600	m^3/day
Instantaneous flow rate to DAF	-	-	67	m^3/hr
Daily COD_{Total} load to DAF	-	1210	2100	kg/day
Suspended solids TSS load range to DAF	-	318	1472	kg/day
MBR				
Daily flow rate to MBR	-	1400	1600	m^3/day
Instantaneous flow rate to MBR	-	-	67	m^3/hr
COD_{Total} load (for Bioreactor design)	227	786	1365	kg/day
COD_{Total} load (for Aeration design)	-	56.88	56.88	kg/hr
NF/UV				
Daily flow rate from MBR to NF		1400	1600	m^3/day
Daily flow rate from NF and to UV		1050	1200	m^3/day
Recovery rate; Recycled Water to NF Feed		75	75	%
Crypto Barrier				
Daily flow to 'crypto' barrier for towns water 'top up'		25 (600)	25 (600)	m^3/hr (m^3/day)
Process Water Screen				
Instantaneous flow rate to Process Water Screen	-	135	135	m^3/hr

EFFLUENT TREATMENT PLANT TECHNOLOGY

TECNOLOGÍA DE PLANTA DE TRATAMIENTO DE EFLUENTES

MBR BIOREACTOR

- Bioreactor tank, aerated and mixed 400 m3 volume
- High MLSS concentration offering compact footprint & efficiency of oxygen transfer
- Medium flow and medium strength industrial wastewaters
- Long sludge retention time for full carbon removal
- Air blowers, slot aeration with externally mounted aeration pumps
- Dissolved oxygen, pH and temperature monitoring in the aeration tank
- Ease of maintenance, mechanical and electrical outside tank at ground level

EFFLUENT TREATMENT PLANT TECHNOLOGY

TECNOLOGÍA DE PLANTA DE TRATAMIENTO DE EFLUENTES

MBR - UF SYSTEM

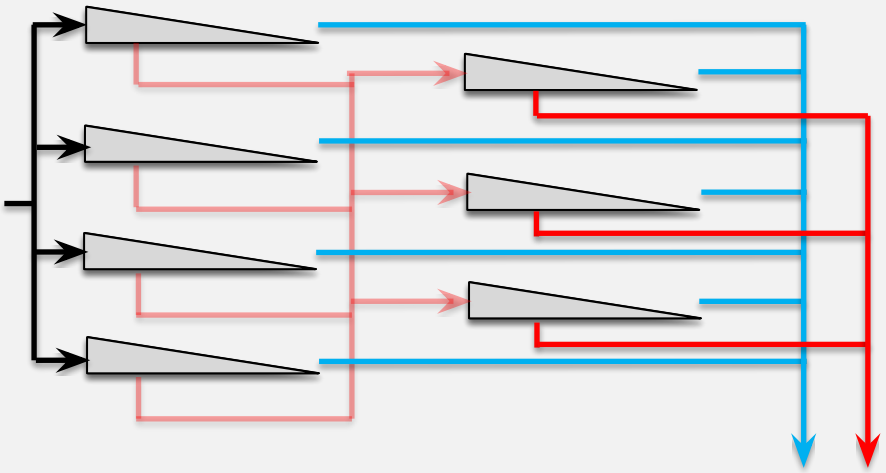
- Cross flow system ultrafiltration (UF) membranes for biomass separation
- 4 Banks x 8 Berghof membrane modules
- sequences: Filtration; Backwash; CIP
- High flux rates
- High quality effluent: Complete barrier to Total Suspended Solids
- Low energy: Variable speed recirculation pump and permeate pump
- System ramps flow up and down to match demand ⇒ high process flexibility
- Automated membranes backwashing system and CIP operated in 3
- Maintenance clean (typically 1/week)
- Recovery clean (typically 2/year)

EFFLUENT TREATMENT PLANT TECHNOLOGY

TECNOLOGÍA DE PLANTA DE TRATAMIENTO DE EFLUENTES

MBR - NF SYSTEM

- NF membranes rely on a combination of size exclusion and solution/diffusion permeation for separation
- The spiral wound membranes consist of permeate spacers placed between two flat membrane sheets
- NF configuration comprising 2 stages to achieve > 70% water recovery
- The concentrate of the first stage becomes the feed of the second stage and the permeate of both is combined as final product



EFFLUENT TREATMENT PLANT TECHNOLOGY

TECNOLOGÍA DE PLANTA DE TRATAMIENTO DE EFLUENTES

MBR - NF SYSTEM

- 50% duty / duty basis
- 2 Banks, 4+3 - Hydranautics modules
- Fully automated operation, cleaning and flushing
- Cartridge filtration provides protection for the NF membranes
- A variable speed high pressure pump, feeds water through the NF array
- Low conductivity permeate forced through the NF membranes, leaving a salt rich reject stream to pass along the module
- The reject from the first stage is used to feed the second stage to achieve greater recovery
- The reject from the second stage is discharged to the sewer
- Antiscalant dosing to control salt scaling
- Automatic sodium bisulphite dosing to control REDOX in the NF feed water
- A dedicated heated NF CIP for periodic cleaning

EFFLUENT TREATMENT PLANT TECHNOLOGY

TECNOLOGÍA DE PLANTA DE TRATAMIENTO DE EFLUENTES

THREE LEVELS OF PROTECTION

- UF – Ultrafiltration membranes (0.03 micron pore size) provide barrier to solids, parasites and bacteria
- NF Nanofiltration membranes – next step up from reverse osmosis membranes provides barrier to solids, bacteria, viruses, organics and partial removal of ions
- UV – Disinfection by Ultraviolet light, 99.99% of all pathogens (parasites, bacteria and viruses) rendered harmless, certified to DWI standard

MONITORING / CONTROL

- Critical parameters monitored continuously, with alarm and automated shutdown

ANALYSIS

- Regular on-site and external bacterial analysis to confirm water quality against the customers specification

EFFLUENT TREATMENT PLANT - PERFORMANCE

PLANTA DE TRATAMIENTO DE EFLUENTES - RENDIMIENTO

PERFORMANCE GUARANTEES AND KPIS

- Recovery 72% - Recycled Water:Raw Effluent
- Guaranteed Quality
- Power Consumption - Fixed kWh/day and Variable kWh/m3 of Recycled Water produced
- Availability 97%

FUTURE OF WATER REUSE - UK

EL FUTURO DE LA REUTILIZACIÓN DEL AGUA - REINO UNIDO

OPPORTUNITIES

- Pressure on resources - sustainability, resource recovery and carbon reduction
- Customer - sustainability capital funds
- Legislation - more stringent discharge regulations, tightening of consents
- Water reuse regulations are not currently an issue with the available technologies and protections

CHALLENGES

- Economics - cost of water in the UK is not too expensive - Capex / Opex
- Customer and consumer confidence with the direct contact of recycled water into the foods manufacturing process
- Product consistency
- Kosher foods

PLANTA DE ELABORACIÓN DE ENSALADAS, LAVADAS CON AGUA RECICLADA, EN EL REINO UNIDO

QUESTIONS PLEASE

PREGUNTAS POR FAVOR