

WINNIPEG SEWAGE TREATMENT PROGRAM

SEWPCC

**Process Selection Report presentation
Additional information**



January 27th 2011 - Winnipeg

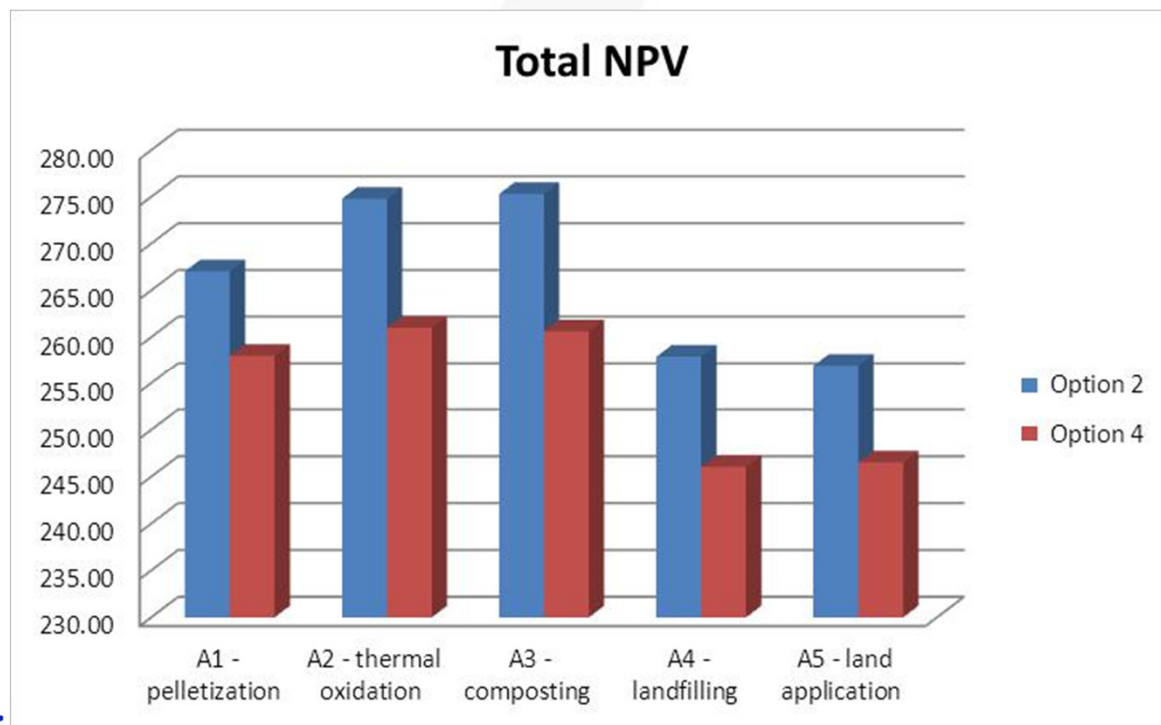


AGENDA

- ▶ Following the meeting of Jan 24th 2011 :
 - Details on the assessment of the sludge treatment impact on SEWPCC process selection
 - Complement of information
 - Issues to be addressed after the process selection

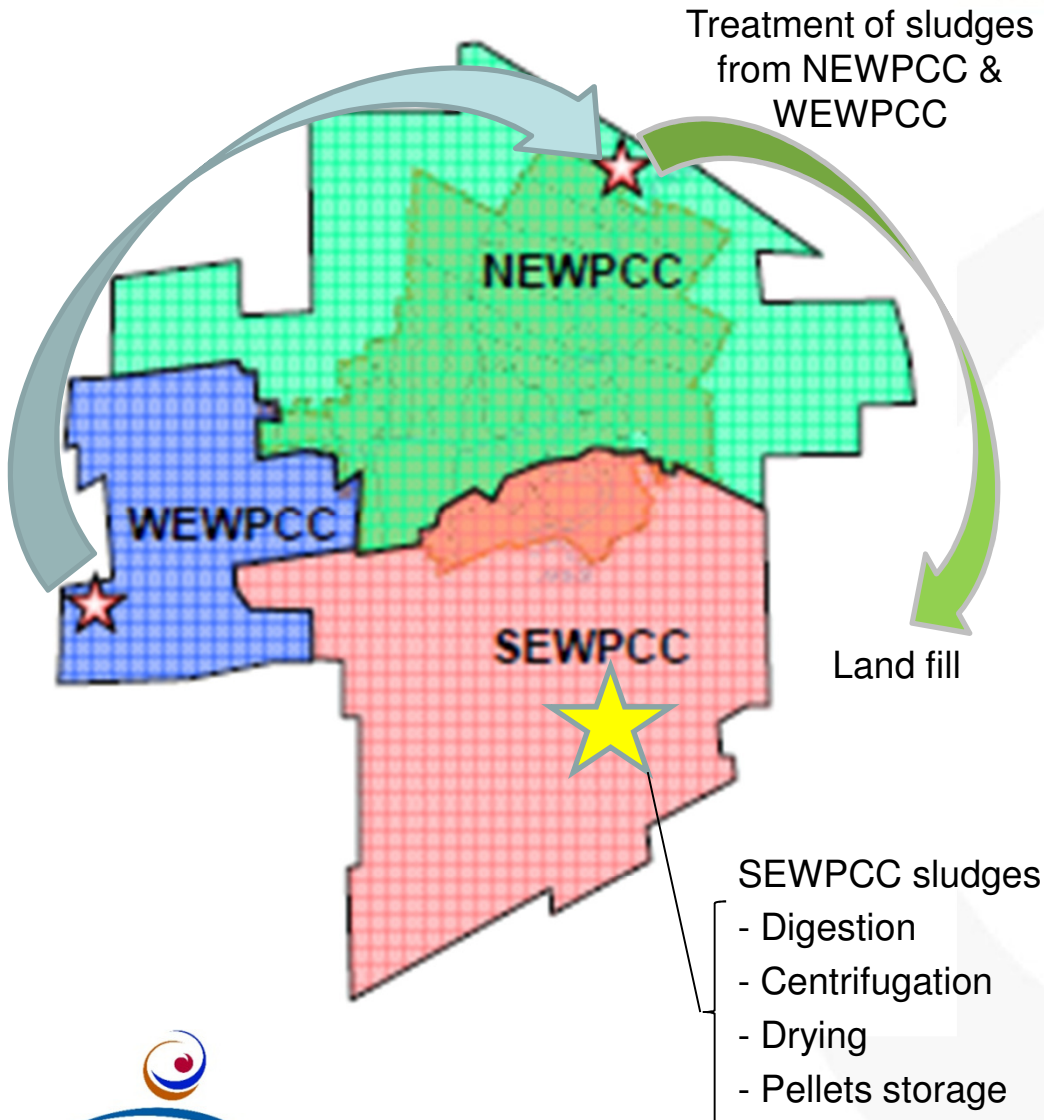
Assessment of the sludge treatment impact

	Sludge alternative	Water process option		Difference 4-2
		Option 2	Option 4	
NPV Total (w ater + sludge treatment)	A1 - pelletization	267.03	257.99	-CAD 9.04
	A2 - thermal oxidation	274.80	261.01	-CAD 13.79
	A3 - composting	275.31	260.62	-CAD 14.69
	A4 - landfilling	257.90	246.04	-CAD 11.85
	A5 - land application	256.93	246.50	-CAD 10.43



Assessment of the sludge treatment impact

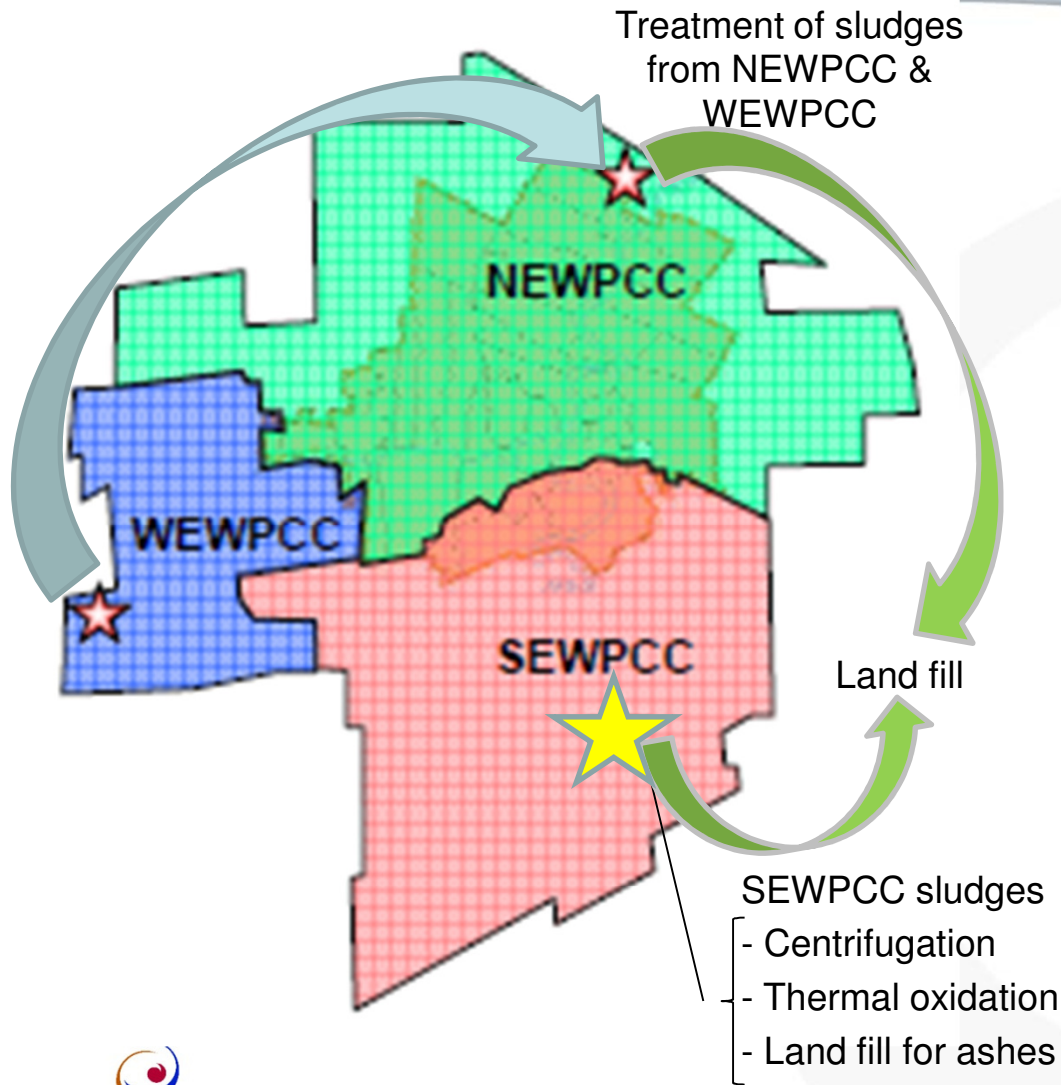
Alternative A1 : PELLETIZATION



	SEWPCC	NEWPCC
Included	<ul style="list-style-type: none"> • CAPEX for new facilities • OPEX for SE sludges (no pellets hauling) 	Provision for upgrade works for NE & WE sludges (as per PDR)
Excluded	Hauling of pellets	<ul style="list-style-type: none"> • OPEX of NE facilities • WE raw sludges hauling • WE & NE sludges hauling

Assessment of the sludge treatment impact

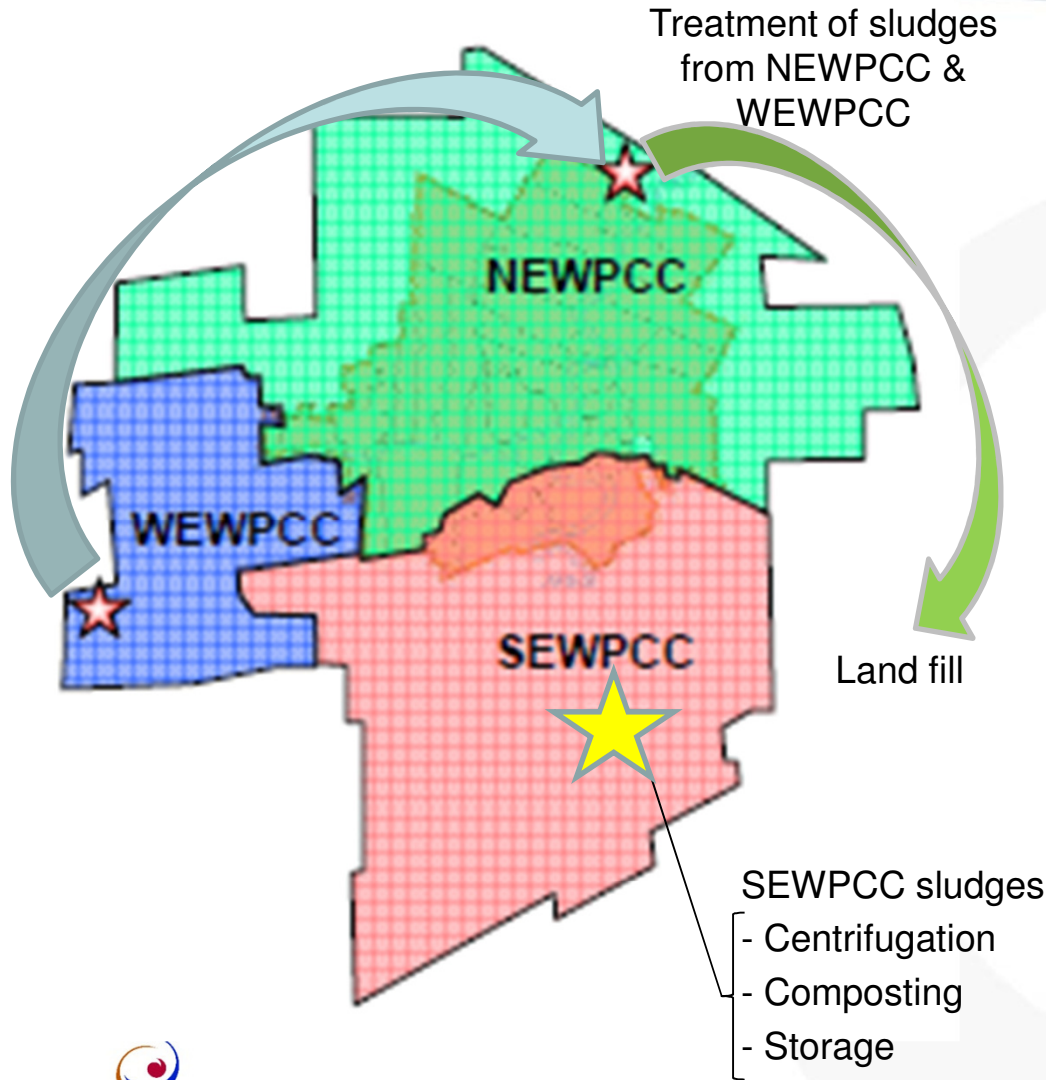
Alternative A2 : THERMAL OXIDATION



	SEWPCC	NEWPCC
Included	<ul style="list-style-type: none"> • CAPEX for new facilities • OPEX for SE sludges • Ashes hauling to land-fill 	Provision for upgrade works for NE & WE sludges (as per PDR)
Excluded		<ul style="list-style-type: none"> • OPEX of NE facilities • WE raw sludges hauling • WE & NE treated sludges hauling

Assessment of the sludge treatment impact

Alternative A3 : COMPOSTING



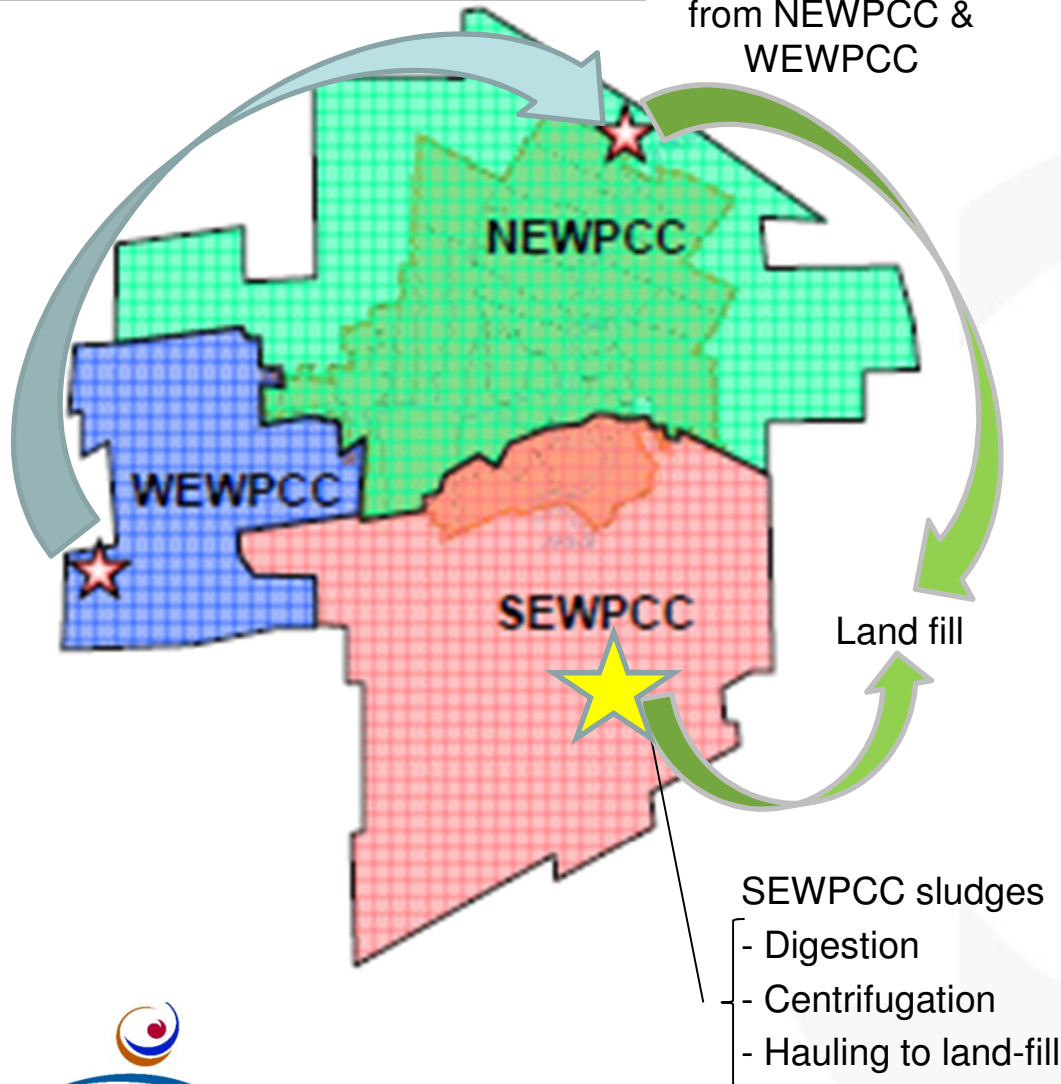
	SEWPCC	NEWPCC
Included	<ul style="list-style-type: none"> • CAPEX for new facilities • OPEX for SE sludges (no compost hauling) 	Provision for upgrade works for NE & WE sludges (as per PDR)
Excluded		<ul style="list-style-type: none"> • OPEX of NE facilities • WE raw sludges hauling • WE & NE treated sludges hauling

Assessment of the sludge treatment impact

Alternative A4 : LAND FILLING

Capex in SEWPCC

Treatment of sludges
from NEWPCC &
WEWPCC



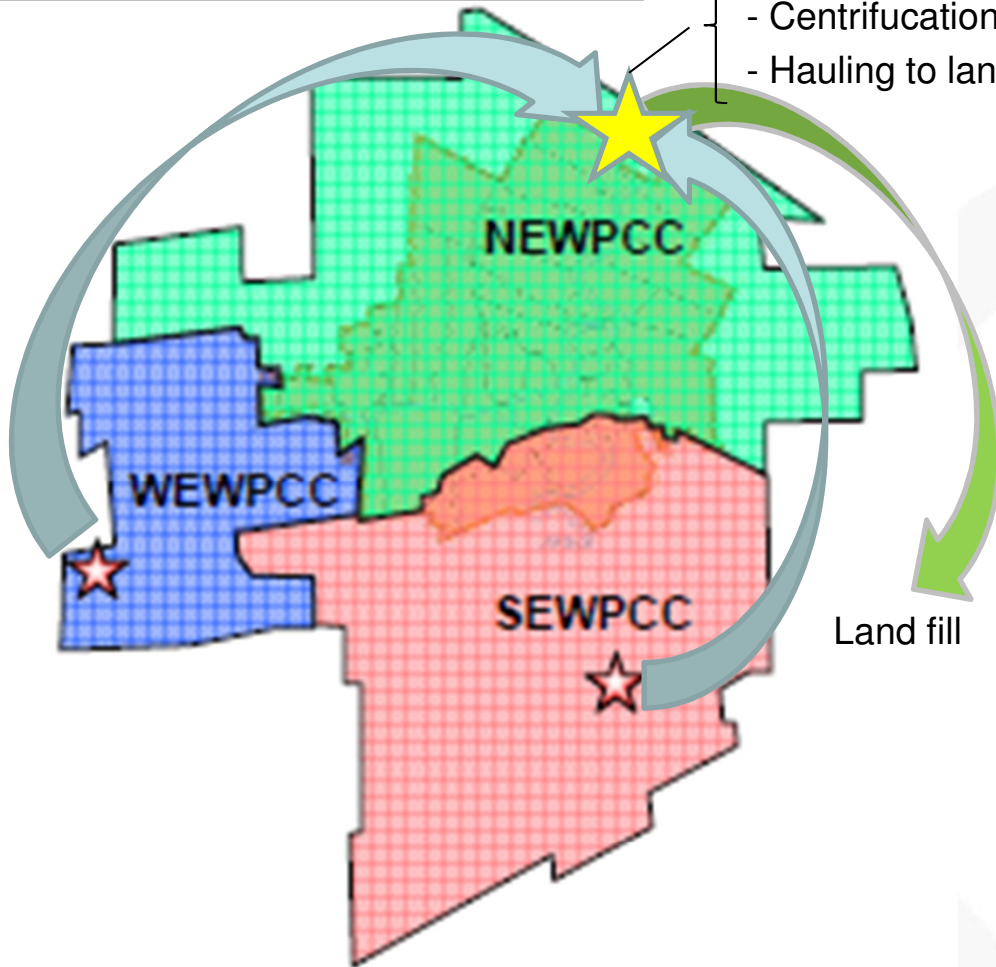
	SEWPCC	NEWPCC
Included	<ul style="list-style-type: none"> • CAPEX for new facilities • OPEX for SE sludges • SE treated sludges hauling to land-fill 	Provision for upgrade works for NE & WE sludges (as per PDR)
Excluded		<ul style="list-style-type: none"> • OPEX of NE facilities • WE raw sludge hauling • WE & NE treated sludge hauling

Assessment of the sludge treatment impact

Alternative A5: LAND FILLING
Capex in NEWPCC

All sludges

- Digestion
- Centrifucation
- Hauling to land-fill



	SEWPCC	NEWPCC
Included	<ul style="list-style-type: none"> • CAPEX for upgrade & extension of NE facilities • OPEX for SE sludges • SE raw sludges hauling SE treated sludges hauling 	Provision for upgrade works for NE & WE sludges (as per PDR)
Excluded		<ul style="list-style-type: none"> • OPEX for WE & NE sludges • WE raw sludge hauling • WE & NE treated sludges hauling

Assessment of the sludge treatment impact

► Assumptions

	Current situation	Stantec PDR	Program option 2	Program option 4
Population in 2031	-	230,000	250,000	
SEWPCC sludge production in 2031	12.9 DryT/d	27.57 DryT/d	20.14 DryT/d	24.45 DryT/d f
	117,500 m3/y		178,000 m3/y	278,000 m3/y
Contingencies	-	20%	15%	
Phasing of the works	-	No integration benefit	5% discount for intregation (except for A5)	
CPI	-	-	2 years @ 2% CPI	

➡ These difference are the basis of the Capex and Opex update for the treatment of SEWPCC sludges

➡ 2 more assumptions :

1. Stantec -> option 2 -> option 4
2. Current Opex for Stantec's A4 & A5

50% prop to volume
 50% prop to DS
 100% prop to DS for A2, A3
 For A1, A4 & A5



Assessment of the sludge treatment impact

- ▶ Stantec's PDR estimates :

		CAPEX	OPEX
A1	Pelletization	35.9	1.8
A2	Thermal oxidation	46.9	2.0
A3	Composting	29.3	3.1
A4	Landfilling	27.7	1.6
A5	Land application	10.4	2.1

- ▶ Updated values :

COSTS UPDATED FROM STANTEC'S PDR - MARCH 2008		
Option 2	CAPEX	OPEX
A1	30.1 M	1.4 M
A2	37.7 M	1.5 M
A3	25.5 M	2.4 M
A4	24.4 M	1.0 M
A5	7.6 M	1.9 M
Option 4	CAPEX	OPEX
A1	39.7 M	1.9 M
A2	44.6 M	1.8 M
A3	29.8 M	2.8 M
A4	31.8 M	1.5 M
A5	10.6 M	2.9 M

Assessment of the sludge treatment impact

► Illustration :

Stantec Capex estimate for A1

Updated Capex for A1 / option 2

$$35.9 \times \left(\frac{1.15}{1.2}\right) \times 0.95 \times (1+2\%)^2 \times \left(\frac{20.14}{27.57}\right) + 5.12 = 30.1$$

Estimation ratio
 Economy of scale
 CPI
 Qty ratio
 Provision for NE upgrade

$$\left(\frac{30.1}{2}\right) \times R_{DS} + \left(\frac{30.1}{2}\right) \times R_V = 39.7$$

50% of option 2 Capex
 Dry Solid ratio
 Volume ratio
 Updated Capex for A1 / option 4

Assessment of the sludge treatment impact

COSTS UPDATED FROM STANTEC'S PDR - MARCH 2008		
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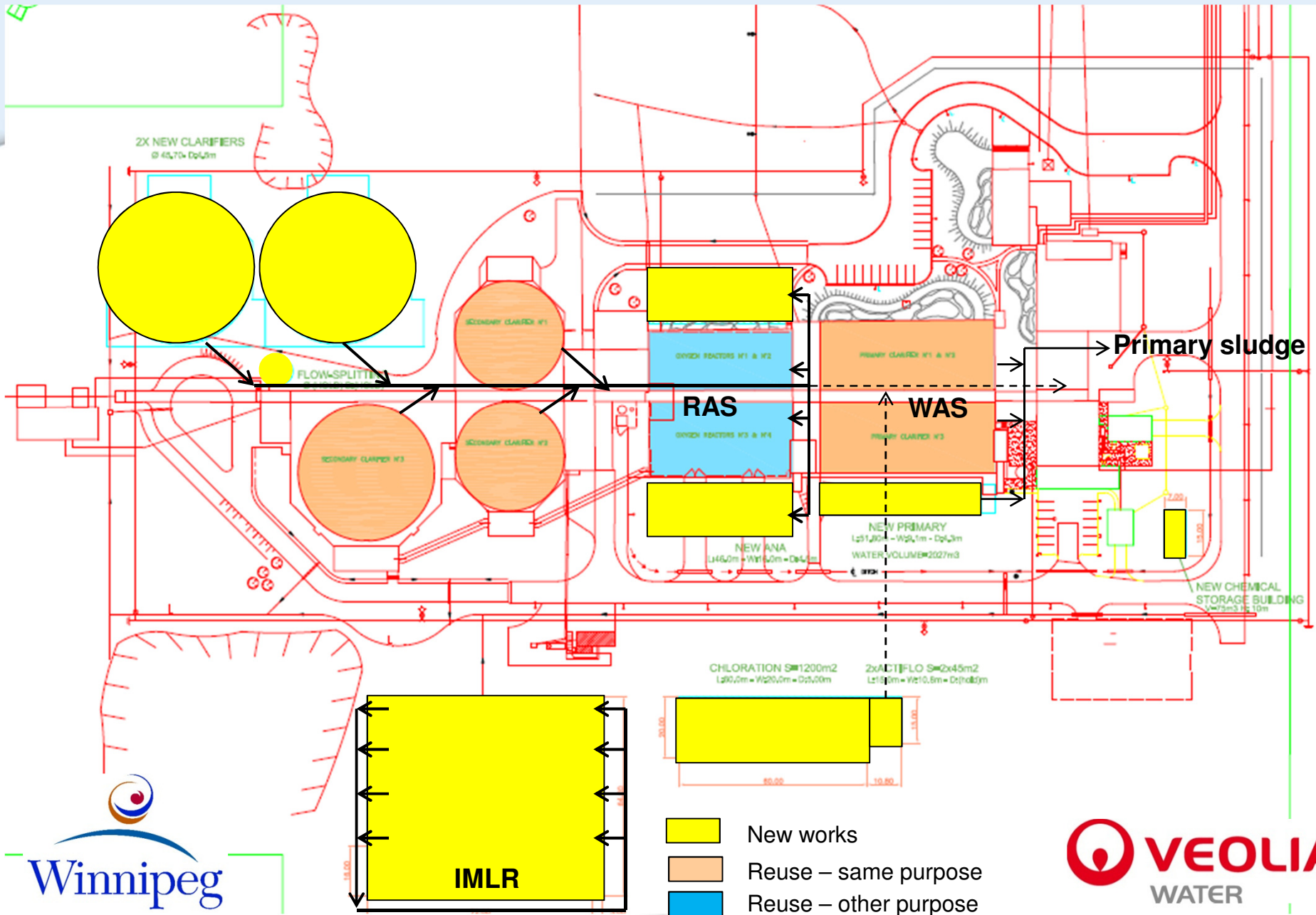
	A1- Pelletization	A2- Thermal oxidation	A3- Composting	A4- Landfilling Capex in SE	A5- Landfilling Capex in NE
Capex & Opex including	<ul style="list-style-type: none"> - Digestion - Centrifugation - Drying - Storage - Prov for NE upgr 	<ul style="list-style-type: none"> - Centrifugation - Thermal oxidation - Hauling of ashes to landfill - Prov for NE upgr 	<ul style="list-style-type: none"> - Centrifugation - Composting - Storage - Prov for NE upgrade 	<ul style="list-style-type: none"> - Digestion - Centrifugation - Hauling to landfill - Prov for NE upgr 	<ul style="list-style-type: none"> - Digestion - Centrifugation - Hauling SE-NE - Hauling of SE dried sludges from NE to land fill

Complement of information

- ▶ Following the previous PSR presentation meeting and in addition to it :
 - ❑ Filamentous bacteria issue for option 4 :
 - Very rare
 - No impact because physical filtration and no settling
 - Possible impact on backwash water settling mitigated by the use of coagulant
 - ❑ Sludge bulking issue for option 3 :
 - Less probable than for option 2
 - ❑ Nitrification loss in cold water for option 2 :
 - No loss. To be corrected
 - ❑ Additional advantage for option 4 : ability to run N/DN or nitrification only (Opex savings)
 - ❑ Biosolids connections

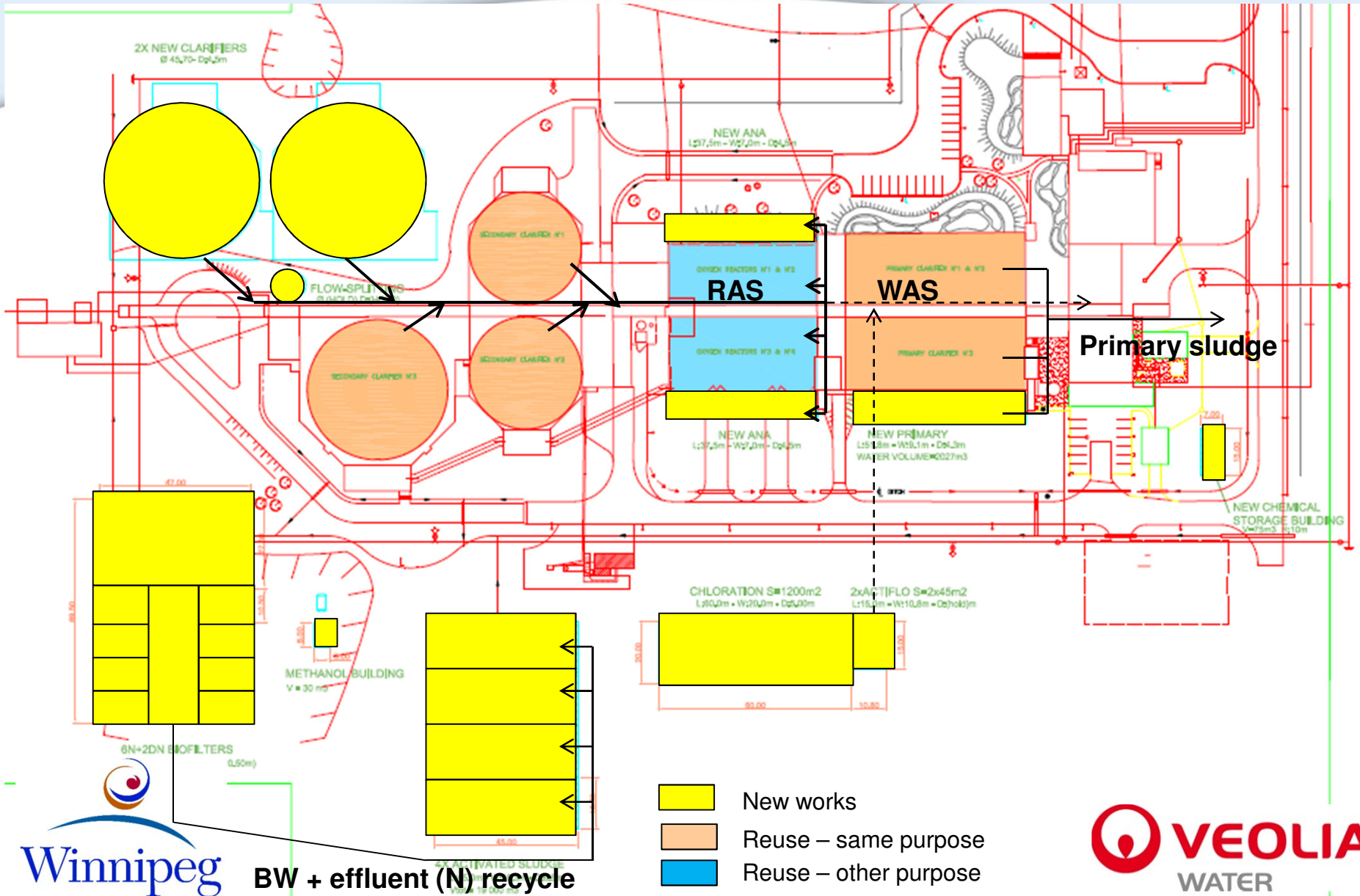
Complement of information

OPTION 2 : IFAS



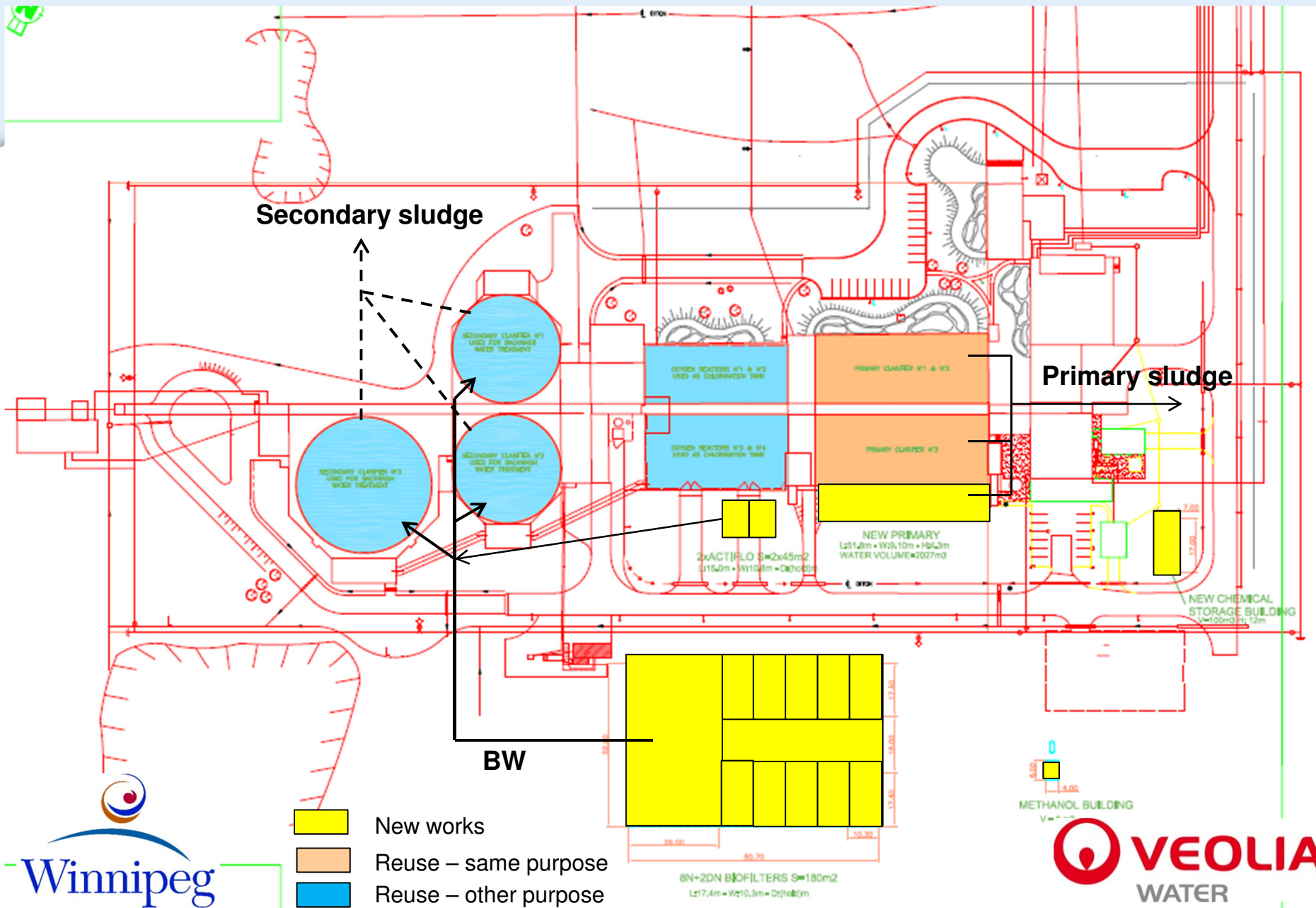
Complement of information

OPTION 3 : AS/BAF



Complement of information

OPTION 4 : BAF



Issues to be addressed after the process selection

- ▶ Design population : 270,000 inhabitants
- ▶ Chlorination / dechlorination
- ▶ Septage and leachate issues
- ▶ Sludge master plan : global strategy to be defined
- ▶ Optimization of carbon footprint assessment considering the carbon released by the process
- ▶ Design optimization with the instantaneous design flow of the main stream