

Benefits of Wastewater Regionalization for the Red Deer River

The Central Alberta Regional Wastewater System (CARWW) was established to accommodate increasing sewage treatment needs for growing municipalities in Central Alberta. All three legs (North, South and West) of the CARWW have now been commissioned.

What is Regionalization?

- Seven wastewater treatment lagoons systems in the region were decommissioned
- These flows are now sent to the City of Red Deer's WWTP for advanced treatment

Wastewater from four municipalities and two Counties to the south of Red Deer (South Leg-2015), two municipalities and one County to the north (North Leg-2018) and the Town of Sylvan Lake, five Summer Villages and two Counties (West Leg-2019) were previously treated by lagoons and discharged to the Red Deer River or Battle River.

Population of Major Served Municipalities

Leg	Community	Population 2006	Population 2030
South	Olds	7,384	11,890
	Bowden	1,955	2,977
	Innisfail	7,438	12,203
	Penhold	1,961	3,217
North	Blackfalds	4,741	25,886
	Lacombe	11,562	23,221
West	Sylvan Lake	14,943	51,773

Note: Population projection data are from Stantec (2008).

The sewage is now treated centrally at the Red Deer Wastewater Treatment Plant (WWTP) using more advanced technology and discharged to the Red Deer River downstream of the City.

How does wastewater impact river health?

Biochemical oxygen demand (**BOD**) reduces oxygen for aquatic life
 Total suspended solids (**TSS**) are particles that can affect fish habitat
 Ammonia (**NH₄-N**) is toxic to aquatic life at high concentrations, especially in summer
 Total Phosphorus (**TP**) is a nutrient that promotes plant and algae growth

Concentrations of biochemical oxygen demand, total phosphorus, total suspended solids and ammonia are higher in lagoon effluent than in WWTP effluent and so enhanced treatment at Red Deer provides lower pollutant concentrations in effluent..

	Effluent Concentration (mg/L)				
	BOD	TSS	NH ₄ -N Winter	NH ₄ -N Summer	TP
Lagoon ¹	25	25	13-20	10-13	2.5-3.7
WWTP ²	20	20	5	1	1

Diverting wastewater from municipalities using lagoon treatment therefore reduces total pollutant load to the Red Deer and Battle Rivers while increasing effluent volumes for treatment at the Red Deer WWTP³.

¹ Prince, D.S., D.W. Smith, and S.J. Stanley 1994. Evaluation of Lagoon Treatment in Alberta. Department of Civil Engineering at the University of Alberta. Environmental Engineering Technical Report 94-1.

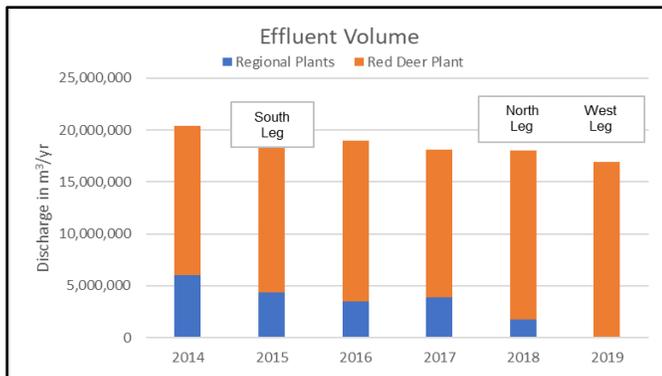
² City of Red Deer WWTP Approval to Operate No. 1091-02-00.

³ Stantec Consulting Ltd. 2008. Central Alberta Regional Wastewater System – Overall Concept Summary/Master Plan.

Overall, regionalization will improve the quality and reduce the pollutant loadings from wastewater discharged to the Red Deer River and will eliminate the current discharges to the Battle River from Lacombe. Short term impacts from individual lagoon discharges will be reduced as the improved effluent is discharged year round at one location instead of from seven locations during shorter periods at higher concentrations.

Current Status

The South, North and West Legs of the CARWS were brought on line in 2015, 2018 and 2019 respectively. As a result, there has been a substantial decrease in measured loadings of oxygen demand, solids, ammonia and phosphorus to the Red Deer River from upstream lagoons and slight increases in discharge from the City of Red Deer WWTP as effluent is piped to Red Deer for enhanced treatment⁴.



Results from The City's water quality and biological monitoring indicate that current discharges from the City of Red Deer WWTP have had limited effects on a short reach of the river downstream of the City and aquatic life has not been affected significantly. Continued monitoring is underway to show that the increased discharge from the Red Deer WWTP after regionalization will not change this.

Reduced Pollutant Loads After Regionalization

By 2019, annual loads to the Red Deer River from the connected municipalities were reduced by three quarters for total phosphorus, more than half for ammonia and just under a quarter for biological oxygen demand and total suspended solids – based on elimination of the lagoon discharges and measured loadings at Red Deer. Loads to the Battle River from Lacombe were eliminated. Monitoring programs will confirm these improvements as population in the seven connected municipalities grows to ~130,000 by 2030.



Benefits of Regionalization

Decommissioning of upstream lagoon discharges and diverting waste water to Red Deer for improved treatment has reduced loadings of:

- oxygen demand and solids by 34%
- ammonia by 53%
- phosphorus by 72%

This will result in improved water quality both upstream and downstream of the City of Red Deer.

Future improvements in wastewater treatment can now be applied at the Red Deer WWTP, instead of at seven smaller facilities, with resulting cost efficiencies.

Prepared by: Hutchinson Environmental Sciences Ltd
 For: City of Red Deer, April 2020

⁴ All loadings data are compiled from effluent volumes and concentrations measured at the lagoons and the Red Deer WWTP from 2014 – 2019.