FINAL

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WASTEWATER TREATMENT RELOCATION STUDY

Dillingham, Alaska

prepared for:

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ACRONYMS AND ABBREVIATIONS

'	minutes
°	degrees
°F	degrees Fahrenheit
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
APDES	Alaska Pollutant Discharge Elimination System
APE	Area of Potential Effects
BBHAC	Bristol Bay Health Corporation
BOD_5	Five-day Biological Oxygen Demand
Bristol	Bristol Engineering Services Company, LLC
City	City of Dillingham
CRW	CRW Engineering Group, LLC
DCCED	State of Alaska Department of Commerce, Community and Economic Development
DI	ductile iron
DO	dissolved oxygen
EPA	U.S. Environmental Protection Agency
FC	Fecal Coliform
Golder	Golder Associates, Inc.
HDD	horizontal directional drilling
HMS	HMS, Inc.
IPaC	Information for Planning and Consultation
MBBR	moving bed bio-film reactor
MBR	membrane bio-reactor
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
pH	potential hydrogen
POTW	public owned treatment works
SOI	Secretary of Interior
Study	Wastewater Treatment Relocation Study
TRC	total residual chlorine

True North	True North Sustainable Development Solutions
TSS	total suspended solids
USACE	US Army Corps of Engineers
UV	ultraviolet
WHMP	Wildlife Hazard Management Plan

EXECUTIVE SUMMARY

The City of Dillingham operates a wastewater treatment system that serves the core community area. The treatment system consists of a two-cell, partially aerated wastewater lagoon located on the north east side of Dillingham, adjacent to the bluff at the confluence of the Nushagak and Wood Rivers, and Nushagak Bay.

The Nushagak estuary shoreline is highly erosive, with an average erosion rate of 11-12 feet per year and continued erosion along the Nushagak River places the lagoon system, effluent outfall, and associated site infrastructure at risk of failure.

A failure of the lagoon system could have serious, long-term consequences, putting the community's health at risk from untreated sewage, as well as the salmon fisheries that the Bristol Bay region relies on for subsistence and economic survivability.

This Study evaluated three treatment types (lagoon, MBR, and MBBR) and three potential sites within Dillingham (existing/defend in-place, City Shop, and Kanakanak Road) for a total of total of eight alternatives to meet the City's long-term wastewater treatment objectives:

- Site 1/Alt. 1 – Defend In-Place with Sheetpile Wall Revetment
- Site 1/Alt. 2 – Defend In-Place with Armor Rock Revetment
- Site 2/Alt. 1 – City Shop with New Wastewater Lagoon
- Site 2/Alt. 2A – City Shop with New MBR Packaged Treatment Plant
- Site 2/Alt. 2B – City Shop with New MBBR Packaged Treatment Plant
- Site 3/Alt. 1 – Kanakanak Road with New Wastewater Lagoon
- Site 3/Alt. 2A – Kanakanak Road with New MBR Packaged Treatment Plant
- Site 3/Alt. 2B – Kanakanak Road with New MBBR Packaged Treatment Plant

The following table summarizes life-cycle costs for each site and treatment alternative combination as presented in Section 6.

Cost Estimate Summary

DESCRIPTION	CAPITAL COST	SALVAGE VALUE	O&M COSTS		SHORT LIVED ASSETS		TOTAL
			ANNUAL	PRESENT WORTH	ANNUAL	PRESENT WORTH	LIFE-CYCLE COST
Site 1/Alt. 1	$ 27,902,017	$ 20,000	$ 475,000	$ 9,007,132	$ 4,225	$ 80,116	**$ 36,969,265**
Site 1/Alt. 2	$ 33,440,552	$ 20,000	$ 495,000	$ 9,386,379	$ 4,225	$ 80,116	**$ 42,887,047**
Site 2/Alt. 1	$ 52,342,263	$ 80,000	$ 375,000	$ 7,110,893	$ 4,225	$ 80,116	**$ 59,453,273**
Site 2/Alt. 2A	$ 19,860,418	$ 250,000	$ 866,900	$ 16,438,490	$ 20,000	$ 379,248	**$ 36,428,155**
Site 2/Alt. 2B	$ 24,548,648	$ 200,000	$ 600,575	$ 11,388,333	$ 4,800	$ 91,019	**$ 35,828,000**
Site 3/Alt. 1	$ 29,583,440	$ 80,000	$ 399,000	$ 7,565,991	$ 4,225	$ 80,116	**$ 37,149,547**
Site 3/Alt. 2A	$ 25,414,528	$ 250,000	$ 890,900	$ 16,893,587	$ 20,000	$ 379,248	**$ 42,437,362**
Site 3/Alt. 2B	$ 29,868,847	$ 200,000	$ 624,575	$ 11,843,430	$ 4,800	$ 91,019	**$ 41,603,297**

The following Alternatives Analysis Matrix summarizes and qualifies the considerations discussed in Sections 4, 5, and 6. Each of the treatment and site alternative combinations were evaluated against a set of analysis criteria and ranked on a scale of 1 to 5, with 5 being the most favorable alternative. In addition, the matrix includes weight factors for each of the analysis criteria which are based on Bristol and CRW experience in Dillingham and engineering judgement.

Alternatives Analysis Matrix

ALTERNATIVE	LIFE-CYCLE COSTS	OPERATIONAL COMPLEXITY	EXISTING INFRASTRUCTURE	CULTURAL RESOURCES	CONSTRUCT ABILITY	LAND USE	COMMUNITY PREFERENCE	SCORE
WEIGHT FACTOR	**0.30**	**0.20**	**0.10**	**0.05**	**0.10**	**0.10**	**0.15**	**1.00**
Site 1/Alt. 1	4	5	5	3	5	5	5	
	1.20	**1.00**	**0.50**	**0.15**	**0.50**	**0.50**	**0.75**	**4.60**
Site 1/Alt. 2	2	5	5	3	5	5	4	
	0.60	**1.00**	**0.50**	**0.15**	**0.50**	**0.50**	**0.60**	**3.85**
Site 2/Alt. 1	1	4	2	5	1	4	2	
	0.30	**0.80**	**0.20**	**0.25**	**0.10**	**0.40**	**0.30**	**2.35**
Site 2/Alt. 2A	5	1	2	5	3	4	1	
	1.50	**0.20**	**0.20**	**0.25**	**0.30**	**0.40**	**0.15**	**3.00**
Site 2/Alt. 2B	5	2	2	5	3	4	3	
	1.50	**0.40**	**0.20**	**0.25**	**0.30**	**0.40**	**0.45**	**3.50**
Site 3/Alt. 1	5	4	1	2	3	3	3	
	1.50	**0.80**	**0.10**	**0.10**	**0.30**	**0.30**	**0.45**	**3.55**
Site 3/Alt. 2A	3	1	1	2	3	3	1	
	0.90	**0.20**	**0.10**	**0.10**	**0.30**	**0.30**	**0.15**	**2.05**
Site 3/Alt. 2B	3	2	1	2	3	3	2	
	0.90	**0.40**	**0.10**	**0.10**	**0.30**	**0.30**	**0.30**	**2.40**