

Input - Forcing Data

Reservoir Operation Model	Dataset	Minimum Spatial Extent	Minimum Spatial Resolution	Minimum Temporal Resolution	Anticipated source	Desired level of precision (optional)	Comments
HEC-ResSim	Reservoir inflows	At the reservoir	N/A	1 day	Developed from USGS streamflow records extension: Scientific Investigations Report 2012-5210		61 water years from 1950 through 2010
	Local inflows between Watana Dam and Gold Creek or other instream flow control point	Between Watana Dam and the downstream control Point	N/A	1 day	Developed from USGS streamflow records extension: Scientific Investigations Report 2012-5210		61 water years from 1950 through 2010
	Electricity loads assigned to Susitna-Watana Project	N/A	N/A	1 hour	Based on Railbelt Integrated Resource Plan 2010, or provided by Slater Consulting		For each hour of the year - 8,760 values
	Minimum instream flow requirements at Gold Creek or other instream flow control point	At the instream flow control point	N/A	1 day	AEA		For each day of the year - 365 values
MWH-ROM	Reservoir inflows	At the reservoir	N/A	1 day	Developed from USGS streamflow records extension: Scientific Investigations Report 2012-5210		61 water years from 1950 through 2010
	Local inflows between Watana Dam and Gold Creek or other instream flow control point	Between Watana Dam and the downstream control Point	N/A	1 day	Developed from USGS streamflow records extension: Scientific Investigations Report 2012-5210		61 water years from 1950 through 2010
	Electricity loads assigned to Susitna-Watana Project	N/A	N/A	1 hour	Based on Railbelt Integrated Resource Plan 2010, or provided by Slater Consulting		For each hour of the year - 8,760 values
	Minimum instream flow requirements at Gold Creek or other instream flow control point	At the instream flow control point	N/A	1 day	AEA		For each day of the year - 365 values

Input - Parameters

Reservoir Operation Model	Parameter	Minimum spatial extent	Minimum spatial resolution	Minimum Temporal Resolution	Anticipated source	Desired level of precision (optional)	Comments
HEC-ResSim	Turbine and generator efficiencies	N/A	N/A	N/A	Preliminary design		
	Head losses	N/A	N/A	N/A	Preliminary design		
	Tailwater rating curve	N/A	N/A	N/A	1980s data - to be updated		
	Maximum and minimum reservoir operating levels	N/A	N/A	N/A	Preliminary design		
	Reservoir storage data	N/A	N/A	N/A	GIS		
	Operating rules above the normal maximum operating level	N/A	N/A	N/A	Preliminary design		
	Powerhouse capacity	N/A	N/A	N/A	Preliminary design		Nominal capacity is 600 MW
	Valve and spillway capacity	N/A	N/A	N/A	Preliminary design		
	Specific operating rules	N/A	N/A	Varies	Preliminary design		Optional - used to modify operation for specific conditions
	Channel cross-sections	Watana Dam to Gold Creek	8 points per cross-section, about 1 mile between sections, none in Devils Canyon	N/A	1980s cross-sections		8 point resolution does not require updates
MWH-ROM	Turbine and generator efficiencies	N/A	N/A	N/A	Preliminary design		
	Head losses	N/A	N/A	N/A	Preliminary design		
	Tailwater rating curve	N/A	N/A	N/A	1980s data - to be updated		
	Power generation reliability criterion	N/A	N/A	N/A	AEA		
	Maximum and minimum reservoir operating levels	N/A	N/A	N/A	Preliminary design		
	Reservoir storage data	N/A	N/A	N/A	GIS		
	Operating rules above the normal maximum operating level	N/A	N/A	N/A	Preliminary design		
	Powerhouse capacity	N/A	N/A	N/A	Preliminary design		Nominal capacity is 600 MW
	Valve and spillway capacity	N/A	N/A	N/A	Preliminary design		
	Specific operating rules	N/A	N/A	Varies	Preliminary design		Optional - used to modify operation for specific conditions

Input - Calibration Data

Reservoir Operation Model	Dataset	Minimum spatial extent	Minimum spatial resolution	Minimum Temporal Resolution	Anticipated source	Desired level of precision (optional)	Comments
HEC-ResSim	None	N/A	N/A	N/A	N/A		Because the reservoir does not exist, there is no calibration data
MWH-ROM	None	N/A	N/A	N/A	N/A		Because the reservoir does not exist, there is no calibration data

Output - Predicted Quantities

Reservoir Operation Model	Predicted/Simulated Quantity	Spatial extent	Spatial resolution	Temporal resolution	Level of precision	Anticipated user	Comments
HEC-ResSim	Total reservoir outflow	At Watana Dam	N/A	1 hour	N/A	Downstream hydraulic models	Available for 61 water years
	Hydroelectric energy generation	At Watana Dam	N/A	1 hour	N/A	AEA	Aggregated and averaged for various time periods
	Reservoir elevations	The reservoir	Point data	1 hour	N/A	Reservoir water quality model	The reservoir is a control point (not 2-dimensional)
MWH-ROM	Total reservoir outflow	At Watana Dam	N/A	1 hour	N/A	Downstream hydraulic models	Available for 61 water years
	Hydroelectric energy generation	At Watana Dam	N/A	1 hour	N/A	AEA	Aggregated and averaged for various time periods
	Reservoir elevations	The reservoir	Point data	1 hour	N/A	Reservoir water quality model	The reservoir is a control point (not 2-dimensional)

Model Assumptions

Reservoir Operation Model	Assumption	Comment
HEC-ResSim	All potential generation is usable	The usability of potential generation is a function of the total Railbelt electricity load that is assumed to increase in the future, the other generating resources that are available in the Railbelt, the economics of using generation from other resources and transmission capabilities. Because of substantial uncertainty in these parameters, all potential generation is initially assumed to be usable.
	Net evaporation from the reservoir is negligible.	Total runoff is increased due to direct precipitation on the reservoir and the elimination of transpiration in the reservoir. Studies in the 1980s showed that the increase in evaporation from the reservoir over the prior evaporation from the land is essentially balanced by the increases in runoff so that the net change in evapotranspiration from the reservoir area is negligible.
	Historic hydrology is adequate to use to represent future conditions.	This is the standard assumption for reservoir operation models. When the glacial study produces alternative future inflow data sets, these will be used as sensitivity runs.
MWH-ROM	All potential generation is usable	The usability of potential generation is a function of the total Railbelt electricity load that is assumed to increase in the future, the other generating resources that are available in the Railbelt, the economics of using generation from other resources and transmission capabilities. Because of substantial uncertainty in these parameters, all potential generation is initially assumed to be usable.
	Net evaporation from the reservoir is negligible.	Total runoff is increased due to direct precipitation on the reservoir and the elimination of transpiration in the reservoir. Studies in the 1980s showed that the increase in evaporation from the reservoir over the prior evaporation from the land is essentially balanced by the increases in runoff so that the net change in evapotranspiration from the reservoir area is negligible.
	Historic hydrology is adequate to use to represent future conditions.	This is the standard assumption for reservoir operation models. When the glacial study produces alternative future inflow data sets, these will be used as sensitivity runs.