Annex J

Habitat Management Units Modification Plan

Annex J: Habitat Management Units Modification Plan

J.1 General

Habitat Management Units (HMUs) were established to compensate for lost wildlife habitat due to reservoir impoundments behind the Snake River dams. Under the Lower Snake River Fish and Wildlife Compensation Plan, 30 areas were purchased and set aside for wildlife habitat mitigation. Most of the HMUs are non-irrigated; however, 10 HMUs have irrigation systems that are either supplied by surface water intakes in the river or by ground water wells.

After reservoir drawdown, the river corridor would begin to develop a natural habitat system. However, the system cannot be expected to rebound and stabilize immediately. Ultimately, fish and wildlife habitat and riparian zones would develop to a level that is self sustaining and renewing. Until riparian habitat can be re-established in the corridor, however, HMUs would continue to be maintained.

The location of the HMUs relative to the river would not be ideal after drawdown. In many cases, the HMUs would be significantly higher than the active water surface, and, in some cases, would be located a significant distance from the new river. The major impact of drawdown on the HMUs would be the disruption of the existing irrigation systems. The lower river water surface would render the river intake pumping systems inoperable and would significantly affect the water wells.

This annex presents the modifications needed to maintain water supplies for the irrigated HMUs. The information is presented primarily in tabular form for organization and ease of reference.

J.2 Methods

HMUs are classified as irrigated and nonirrigated. The irrigated HMUs include one or more wells or pumping stations for water supply. There are currently eight HMUs being irrigated by 11 surface-water pumping plants and two HMUs being irrigated by well-supplied water. Table J1 identifies which HMUs are presently irrigated and require water supply modifications.

Table J1. Irrigated HMUs Along the Snake River

HMU	Water Supply Source
Big Flat	River Intake, Pump Stations
Lost Island	River Intake, Pump Stations
Hollebeke	River Intake, Pump Station
Skookum	River Intake, Pump Station
Fifty-five Mile	River Intake, Pump Station
Ridpath	Ground Water Well
New York Bar	River Intake, Pump Station
Swift Bar	River Intake, Pump Station
John Henley	Ground Water Well
Chief Timothy	River Intake, Pump Stations

To determine the elevation and distance change of the HMUs relative to the river, they were all located on U.S. Geological Survey topographic maps, 7.5 minute, 1:24,000 scale. The resulting head differential after drawdown and the distance from the existing pump to the new river location were determined from the topographic maps. This information is summarized in Table J2.

Each pumping station would have to be modified to accommodate the lower and more fluctuating water surface levels. Figure J1 shows a typical existing water intake system. Table J3 summarizes the required piping and increased pump requirements for each pump station. Each new surface water pump intake would consist of a precast concrete headwall structure. The structure contains the intake and fish screen and provides a platform on which to set the pump motor and support for the pump and pipe column. Rock fill would be placed from shore to the intake in order to maintain permanent access to the pump and intake.

Since installation of new headwall structures cannot be done prior to drawdown, temporary measures must be implemented for the irrigation period of 1 August to approximately early October. Temporary measures include utilization of trailer-mounted pumps and flexible piping.

Depending on subsurface stratigraphy and the water surface change due to drawdown, the depth of each ground water well and the pump capacity may have to be increased to maintain a constant water supply. Table J4 presents all pertinent data on each of the water wells and summarizes well modification requirements. Table J5 shows the new pump requirements at each well.

J.3 Construction Schedule

It would not be practical to perform any of the HMU water supply construction modifications prior to drawdown. However, arrangements for electrical power extensions should be completed, and the surface water intake pumps and associated equipment could be purchased prior to drawdown. The two water wells would not be modified until drawdown is complete and the groundwater has had an opportunity to stabilize. It is possible that the wells might need to be drilled deeper than anticipated or additional wells might have to be drilled.

The drawdown period is scheduled to occur between August and December. It may be possible to begin construction of the permanent water intakes during the winter following drawdown. Considering the extent of sediment transport in the river during the first spring freshet, it is more prudent to continue use of the temporary irrigation equipment and begin construction during the summer following high river flows.

Table J2. Pump Station Modification Data

HMU	Feature	Type	Existing Pump Data			Relocation Data		Pumps Required	Notes
			HP	Capacity (liters/sec)	Head (m)	Added Head (m)	Distance (m)		
Big Flat	Pump Sta.	split case centrifugal		132.5	102.1	30.5	121.9	132.5 liters/sec @ 132.6 m	Two pumps are drawing from a single intake. Water rights data show that 336 acres are being irrigated with up to 8.6 cfs or 672 acre-feet per year. The reservoir would be lowered about 30 meters at the site and laterally about 122 meters.
		split case centrifugal		111 liters/sec	93.0	30.5	121.9	111 liters/sec @ 123.4 m	The intake is a rectangular pattern with 30.48-millimeter (12-inch) slotted PVC with 50.8-millimeter (20-inch) galvanized steel pipe from intake to the pump.
Lost Island	Pump Sta.	split case centrifugal		132.5 liters/sec	102.1	21.3	91.4	50.5 liters/sec @ 85.3 m	Two pumps draw from a single intake. Water rights data show that 81 acres are irrigated with up to 1.8 cfs or 162 acre-feet per year. The reservoir will be lowered about 21 meters at the site and receded about 300 feet.
		split case centrifugal		111 liters/sec	93.0	21.3	91.4	50.5 liters/sec @ 85.3 m	The intake is a rectangular pattern with 30.48-millimeter (12-inch) slotted PVC with 50.8-millimeter (20-inch) galvanized steel pipe from intake to the pump.
Hollebeke	Pump Sta.	centrifugal		40.4 liters/sec	88.4	21.3	457.2	38.1 liters/sec @ 109.7 m	Single electric centrifugal pump irrigates 150 acres at a rate of 3.2 cfs and up to 244 acre feet per year.
Skookum	Pump Sta.	diesel		50.5 liters/sec	105.2	25.9	335.3	50.5 liters/sec @ 131.1 m	Single diesel engine driven pump supplies 75 acres at a rate of 1.8 cfs or 150 acre-feet per year.
Fifty-five Mile	Pump Sta.	turbine?		20.2 liters/sec	150.9	25.9	304.8	20.2 liters/sec @ 176.8 m	Single electric turbine pump supplies water to 29 acres at a rate of 0.71 cfs or up to 58 acre-feet per year.
New York Bar	Pump Sta.	centrifugal	125	60.6 liters/sec	99.1	25.9	457.2	60.6 liters/sec @ 99.1 m	Single electric centrifugal pump irrigates 98 acres at a rate of 2.13 cfs and up to 163 acre feet per year.
Swift Bar	Pump Sta.	turbine		70.6 liters/sec	85.3	12.2	182.9	70.6 liters/sec @ 85.3 m	Single electric turbine pump irrigates 104 acres at rate of 2.49 cfs up to 208 acre-feet per year.
Chief Timothy	Pump Sta., Pump #6	diesel	60	30.3 liters/sec	76.2	9.1	213.4	30.3 liters/sec @ 85.3 m	Single 60 hp 7.62- by 10.16-millimeter (3 inch by 4 inch) horizontal split case centrifugal pump irrigates 41.8 acres with up to 1.07 cfs.
	Pump Sta., Intake #1	turbine	40	31.5 liters/sec	73.2	12.2	609.6	31.5 liters/sec @ 85.3 m	Single 25.4-millimeter (10 inch) submersible vertical turbine with 40 hp electric motor irrigates 14.5 acres with up to 1.1 cfs.

Table J3. Surface Water Intake Pump and Piping Modifications

HMU	Flow (gallons per minute)	Added Head (m)	Added Horizontal Length (m)	Assumed Pump Effectiveness	Calculated New Pipe Size (mm)	Nominal New Pipe Size (mm)	New Pipe Length (m)	Pressure in New Pipe (psi)	Calculated HP Required New Pump	Nominal HP Required New Pump
Big Flat	2,100	30.5	122	0.75	30.5	30.5	126	55	89	100
Big Flat	1,760	30.5	122	0.75	10.9	30.5	126	55	75	75
Lost Island	800	21	91	0.75	18.8	8.0	94	41	25	25
Lost Island	800	21	91	0.75	18.8	20.3	94	41	25	25
Hollebeke	640	21	457	0.75	18.8	20.3	458	49	24	25
Skookum	800	26	335	0.75	18.8	20.3	336	53	33	40
Fifty-five Mile	320	26	305	0.75	11.9	15.2	306	52	13	15
New York Bar	960	26	457	0.75	20.5	20.3	458	55	41	50
Swift Bar	1,120	12	183	0.75	22.2	25.4	183	30	26	30
Chief Timothy	480	9	213	0.75	14.6	15.2	214	26	10	10
Chief Timothy	500	12	610	0.75	14.4	15.2	610	39	15	15

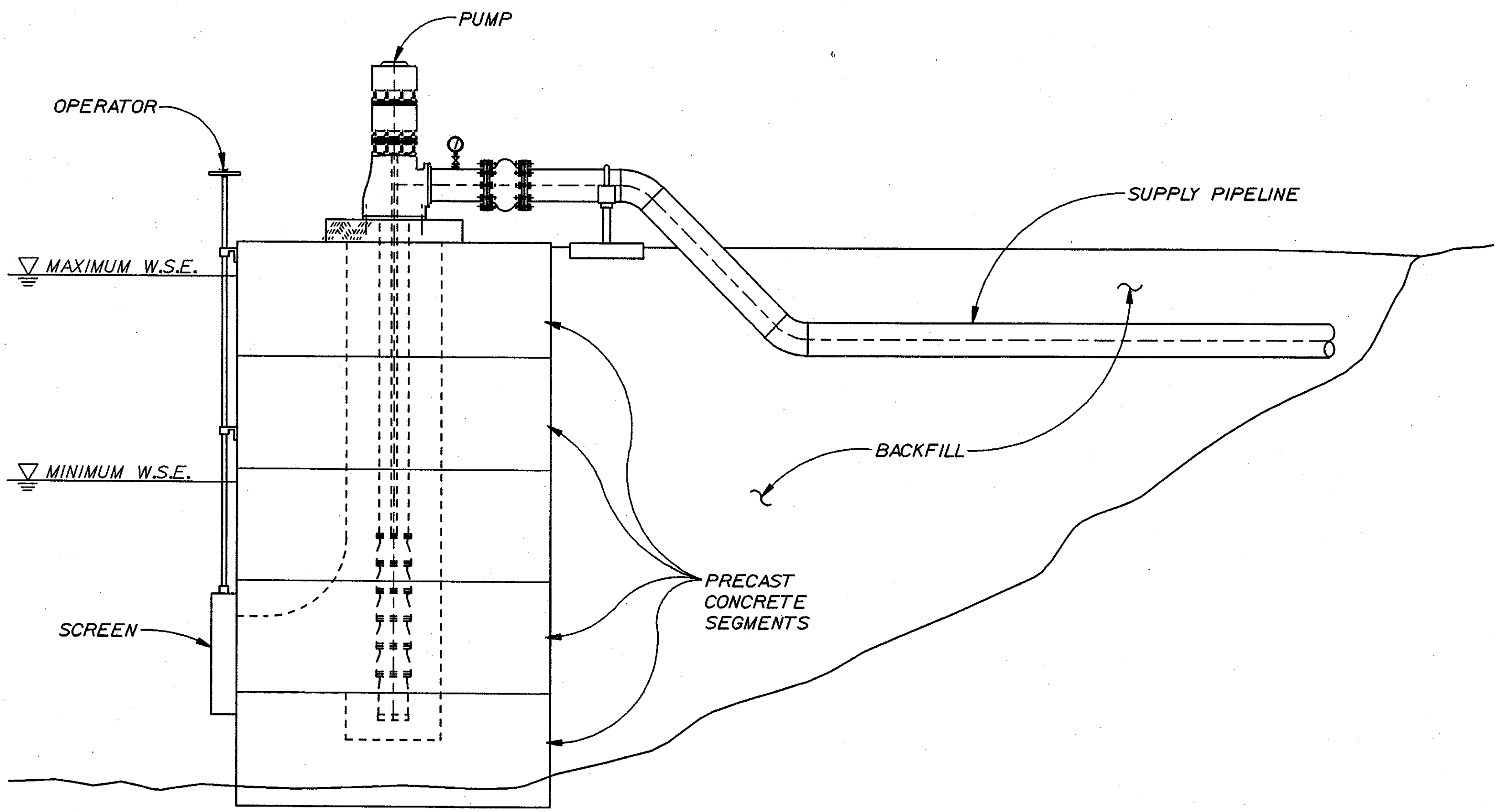
1. Assumed in-line vertical turbine pumps to be used to pump the indicated flow volume from the lowered pool to the existing pumps.
2. Assumed 6 feet per second velocity in new pipe from new pump to existing pump.
3. Would need electrical modifications also—power supply, cable, and controls (may require complete replacement of existing electrical, additional generator, etc.).
4. Would need new intake screens and will need to plumb new pipe from lowered pool into existing pump (may require building/slab modifications).
5. Assumed one new pump for each case shown below.
6. Assumed 1.5 feet head loss per 100 linear feet of pipe.
7. Assumed that the flow data in the table was collected data using the associated measurement. The units were not converted to metric since the data is collected data.

Table J4. HMU Water Well Modifications

Item	Well No. 1	Well No. 3
Well Information		
Location	Ridpath HMU	John Henley HMU
Surface Elevation	198 meters	180 meters
Depth Elevation (BOH)	169 meters	145 meters
Current River Water Elevation	195 meters	165 meters
Static Water Elevation	195 meters	158 meters
Stratigraphy		
Stratigraphy Description	0.0 meter to 29.3 meters alluvial silt, sand, and gravel underlain by basalt bedrock	0.0 meter to 4.6 meters silt; 4.6 meters to 32.9 meters sand and gravel; 32.9 meters to 35.0 meters basalt bedrock
Bedrock Elevation	167 meters	147 meters
Pump Test Information		
Pump Size	30 hp turbine	80 hp
Length of Test	48 hours	4 hours
Quantity	Up to 800 gpm	600 gpm
Drawdown	0.3 meter	0.9 meter
Well Development Information		
River Drawdown Elevation	165 meters	149 meters
RDWE-BOH	4.3 meters	4.6 meters
Available Water Column	0.0 meter	2.4 meters
Hole Diameter	0.3 meter	0.2 meter
Additional Drilling	91.4 meters	91.4 meters
Quantity Required	340 gpm	450 gpm
Total Head	122 meters	126.5 meters
Notes	214.5 liters/sec is needed. The current water column is 25.9 meters thick and is entirely in alluvial material. Project drawdown would reduce the water column to 4.3 meters below the bottom of the hole.	Up to 294 liters/sec is needed. The current water column is 13.7 meters with about 11.6 meters in alluvium. Drawdown would reduce the amount of water column in alluvium to about 2.4 meters.

Table J5. Water Well Pump Modifications

HMU	Flow (gpm)	TDH (ft)	Assumed Pump Efficiency	Calculated HP Required New Pump	Nominal HP Required New Pump
Ridpath	340	561	0.75	64	75
John Henley	450	830	0.75	126	150



PRECAST CONCRETE WATER INTAKE

NOT TO SCALE

US Army Corps
of Engineers
Walla Walla District

LOWER SNAKE RIVER JUVENILE SALMON MIGRATION FEASIBILITY STUDY

TYPICAL INTAKE SYSTEM

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Figure: J1