APPENDIX H

PUMP SIZE ANALYSIS

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Zone 3 Roadside Lake and Waverly Lake Wetland Management Areas Pumping Analysis

The initial project scope suggested that the existing pump station located within Zone 2 and feeding the Waverly Lake unit within Zone 3 be increased in size from its current 11,000 gpm capacity to 15,000 gpm. In addition, a new pump station, 20,000 gpm in size would be developed in Zone 4 to provide water to re-supply the wetlands during dry periods. The design parameter normally utilized by IDNR is that they would like the capability of flooding any specific migratory wildlife unit within a 10 day, 24 hour per day operation. This gives IDNR the maximum flexibility to delay flooding the wetlands until after vegetation has matured but insures flooding the area before the first migratory wildlife flights.

An analysis of historical pumping records at RRL indicates that increasing the water supply to Waverly Lake from 11,000 gpm to 15,000 gpm would have little benefit. Because of the variables associated with reviewing historical pumping records at RRL, pumping success was deemed valid if increasing the pump size provided 90% or more of calculated capacity for any given year. As the second to last column in Table 4.2 indicates, increasing the pump size from 11,000 to 15,000 gpm would have allowed the site to reach the desired capacity with a 10-day, 24 hour per day pumping period in 4 of the 10 years of record instead of the 3 years of success the existing 11,000 gpm pump provided. If the pumping capacity is increased to 35,000 gpm the last column indicates, the 10-day, 24 hour per day pumping success rate is increased to approximately 7 out of the 10 years (Table R1).

In addition to increasing the number of years the desired filling rate can be achieved within the Waverly Lake from three years to seven years by going from an 11,000 to 35,000 gpm pump, the cost savings of increasing the existing pump station capacity versus developing a second pump station is substantial.

Table R1 - Historical Pumping Analysis

YEAR	START DATE	ENDING DATE	TOTAL HRS.	GPM	TOTAL GAL.	TOTAL ACRE FT. PUMPED	Required Pump Capacity to Fill the Area in 10 Days, in GPM	Years in Which a 15,000 GPM Pump Would Supply Demand	Years in Which a 35,000 GPM Pump Would Supply Demand
1999	RIP RAP	2/29/1904	2,601	11,000	1,716,660,000	5,268	119,220	No	No
2000	9/26/2000	11/29/2000	505	11,000	333,300,000	1,023	23,147	No	Yes
2001	10/9/2001	12/5/2001	248	11,000	163,680,000	502	11,367	Yes	Yes
2002	9/25/2002	12/11/2002	352	11,000	232,320,000	713	16,134	Yes	Yes
2003			553	11,000	364,980,000	1,120	25,347	No	Yes
2004	10/18/2004	11/5/2004	78	11,000	51,480,000	158	3,575	Yes	Yes
2005	8/24/2005	11/24/2005	880	11,000	580,800,000	1,782	40,336	No	No
2006	8/22/2006	11/29/2006	810	11,000	534,600,000	1,641	37,127	No	Yes
2007	NO PUMPING		0	11,000	0	0	0		
2008	10/23/2008	12/9/2008	173	11,000	114,180,000	350	7,930	Yes	Yes

In the early stages of the analysis, it was determined that it was much more cost effective and functional to utilize the current pump structure and place a new 35,000 gpm pump on the existing pump structure than to build a totally new pump station for Zone 4 and increase the existing pump station capacity that fed Zone 3. This modification was accomplished by verifying with the pump supplier that a 35,000 gpm pump would indeed fit on the existing sheet pile structure. The analysis then reviewed whether the pump supply channel located within Zone 2 that fed the wetland units within Zone 3 could be increased in size for the new flow capacity desired in Zone 3 and whether this flow could be partially or totally diverted to feed the wetlands within Zone 4. As indicated on the Plates 5-7, the channel can be increased in size to accommodate 35,000 gpm instead of 11,000 gpm and this flow can be diverted into Zone 4 as desired or required by manipulation of gates. This eliminated the need for developing a new major pump station to service Zone 4 and significantly reduced the cost of the project.

Increasing the existing channel capacity east of the Sny Sand Levee is also proposed. This channel is the main water supply for the Waverly Lake wetlands and had to be increased to accommodate the new flow capacity of up to 35,000 gpm. Several years ago additional moist soil units were created west of Waverly Lake and they were fed using water from the main supply channel. This was done by erecting a water control structure across the pump channel and "backing" water up and through water control structures into the north and south moist soil units. This structure would need to be expanded. Because the main pump channel would be widened, the water control structures to feed the north moist soil units will have to be moved and replaced.

The cost of expanding the existing pump station from 11,000 gpm to 35,000 gpm and widening the pump channel from the pump station to the Sny sand levee was divided between Zones 3 and 4 based upon a percentage using the original concept of 15,000 gpm for Zone 3 and 20,000 gpm for Zone 4. Having the ability to divert up to 35,000 gpm to either Zone would increase the management flexibility of the site and allow them to "move" water based upon the wetland conditions in either Zone.

As part of the pump and channel analysis required in expanding the pump capacity, the pump supply pipe increased in size. In order to maintain existing water elevation, thus protecting the pump station and boat access road, it would be necessary to reduce the amount of earthen cover over the pump supply pipe. While this might be an issue only if heavy equipment were to utilize the existing access road going along the river into Zone 2, it was determined that a concrete entrance slab should be placed along the roadway where it crossed the pump water supply pipe.

The increased water supply from the pump station would terminate in a backwater slough just to the west of the Sny Sand Levee extension. At this location, water can then either be directed under the Sny Sand levee though a water control structure or it could be directed under the pump station and boat access road south to fill Zone 4. Water within this slough could also be directed north into the backwater slough areas in Zone 2. The slough would be used as a water conveyance for Zones 2, 3 and 4.

The analysis for the pump determined that the minimum size needed to maintain water level management capabilities and have similar controls over the newly acquired tract was 35,000 gpm. Smaller pump sizes would not allow the two areas to be managed at the same time. Two

pumps would be able to accomplish the goals, but the cost for installing the infrastructure for a new additional pump to supplement the existing one would be greater than putting a new larger pump on the existing infrastructure. Larger pump sizes were not evaluated because it would not have any greater benefits than the 35,000 gpm pump, but a larger cost. Larger pumps would only affect the time required to fill the area and not affect the benefits. In addition, the PDT looked at wells, using the river through structures through the natural levee, and supplementing an existing pump with a smaller gpm pump. In this case, initial investigations and cost estimates showed that the larger pump was the most feasible and cost effective. Thus it was the only water supply feature carried forward for more detailed analysis.