

# **R. M. of Strathclair – Salt Lake(s) Water Level Modification Project**

## **South Salt Lake Outlet Planning**

Oct15th, 2012

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### **Project Description**

The entire project is intended to prevent excessive water levels on North Salt Lake (north of PTH 16), Centre Salt Lake (south of PTH 16), and South Salt Lake (also known as Salt Lake). The project would provide a controlled outlet from the south end of Centre Salt Lake to the north end of South Salt Lake, and a controlled outlet from the south end of South Salt Lake to Riley's Marsh, a tributary of the Oak River System and, by extension, the Little Saskatchewan River system.

Proponents of the South Salt Lake Cottage owners/renters have approached and expressed their desire that South Salt Lake be lowered to its historical levels, to a time when cottagers enjoyed beach activities without having to go to the public beach at the south end of the lake. Such an alteration would also yield more flood control possibilities during snowpack melt and other periods of excessive precipitation such as occurred between 2009-2012. By employing 2 60 cm. gated culverts, water levels could be adjusted seasonally to accommodate all types of water sports, increase emergency capacity and mitigate shoreline erosion from wave/wind action.

### **Project Component Overview**

- Centre Salt Lake Outlet Approach Channel – SW 27-16-22W: a flat bottomed trapezoidal approach channel 224 m long extending from Road 94 N into Centre Salt Lake.
- Centre Salt Lake Control Structure – Road 94 N south of SW 27-16-22W: a 900 mm gated culvert with an upstream invert elevation of 542.59 HAE meters.
- Centre Salt Lake Outlet Channel – NW 22-16-22W and S 22-16-22W: a channel from the Centre Salt Lake Control Structure to the north end of South Salt Lake, passing through the natural overflow route. The north end of the channel would be constructed through NW 22-16-22W and would be trapezoidal in shape and 980 m in length. The south end of the channel in S 22-16-22W would follow an existing natural drainage route. An access trail would be constructed along the east side of the outlet channel.
- South Salt Lake Control Structure - SE 9-16-22 W at Road 129 W: two 600 mm culverts with an upstream invert elevation of 533.125 meters HAE, both culverts to be gated. Short level approach and exit channels a few meters long would be excavated and armored with stone immediately upstream and downstream of this structure.
- The drainage from the South Salt Lake culverts would be improved by improving one of the multiple channels from the present culvert exits for an initial depth to accommodate the

lowered upstream invert of the culverts (proposed to be lowered 60cm from the present invert level) for a distance of 263 meters to zero (which occurs presently at 230 meters), allowing for a slight slope of less than .25%.

### **Erosion Control and Re-vegetation**

During 2010 to spring 2012 uncontrolled flows allowed considerable amounts of alkaline soil and debris to flow from South Salt Lake to Riley's Marsh. Flows stopped in Mid-August 2012 but not before cutting multiple channels in many different locations throughout the length of the watercourse. This proposal suggests cutting a discrete channel of a trapezoidal shape, with the flat bottom to be 1.5 meters in width and the flanks tapered at a three to one ratio or 37 degrees (or less if a road grader can be utilized for excavation). The longitudinal measurements of the trench would have a slope of less than .25 % or .60 meters spread over 263 meters in length (point zero is at 230 m presently). The spoil from the trench would be spread thinly along either flank to allow natural re-vegetation of species best suited to saline environments, as is already in progress by Oct 15th, 2012. At present said natural vegetation captured almost all of the silt prior to its arrival at Riley's Marsh and all within the boundaries of the RM of Strathclair. The new excavation would offer an excellent bed for re-rooting and spread, since almost all species present propagate by spreading, through rhizomes already present.

The areas surrounding the culvert system will be armored with 100mm+ stone upstream, to mitigate wave action, and downstream for distance of 25 meters to prevent the reformation of the present hydraulic jump and associated scouring/erosion. The trench would be laid out in a long sweeping curve (see illustrations) to eliminate sharp turns, which in the past created the multiple channels.

First choice of excavation of the main trench would be with a road grader since the amounts removed are relatively small and very shallow in nature. The method would be the most cost effective, if conditions were similar to the late autumn, early winter of 2012. Under moist conditions a track hoe would be employed. The culvert beds would be prepared and set with a back or track hoe since some excavation must be carried out into South Salt Lake to accommodate the new level for the culvert installation. The present scour and hydraulic jump would be prepared and protected at that time by emplacing the stone armor after excavation is completed. Excavated areas would be covered with stone.

Water flows over the past three years have cut multiple channels through the intended excavation zone. The proposed excavation should be directed to choose the largest radius possible around the curve (see illustrations) by utilizing the optimum choice of present channels, thus mitigating turbulence and cutting which could cause continuing erosion.

## Rules of Operation

1. No controlled outflows from either South or Centre Salt Lakes would occur when levels in Riley's Marsh are within 30 cm of the top of the culverts under Road 130 W in SW 33-15-22W. Controlled outflow from the South Salt Lake Control Structure's could continue to occur through one culvert.
2. Controlled outflows from South Salt Lake would occur subject to Rule 1 when the level of South Salt Lake exceeds the upper target level of 533.125. m. HAE. Controlled outflows would be adjusted to ensure compliance with Rule 1.
3. Controlled outflows from Centre Salt Lake would occur when levels on Centre and North Salt Lake(s) exceed 542.590m HAE and levels on South Salt Lake were less than 533.425 m.
4. When levels on South Salt Lake are between 533.125 HAE and 533.725 HAE, controlled outflows from the Centre Salt Lake Control Structure must not exceed discharge from the South Salt Lake Control Structure.
5. Water levels on South Salt Lake and Centre Salt Lake will be measured by staff gauges located not less than 5 m and not more than 10 m from the upstream side of the respective control structures. When gauge readings are affected by waves, the reading will be the average of high and low readings. Gauges will be re-established as necessary if damage occurs.
6. Water levels will be monitored daily at each of the three reference locations (Riley's Marsh, South Salt Lake and Centre Salt Lake) when controlled releases are being made from South or Centre Salt lakes. Flows at the South Salt Lake and Centre Salt Lake control structures will be adjusted daily based on observed water levels. Water levels will be monitored weekly at each of the three reference locations during the open water season when controlled releases are not being made.
7. The gates on the Centre and South Salt Lakes control structures will be designed to resist vandalism and unauthorized operation. In the event that damage to the control structures occurs or unauthorized operation is discovered, the RM will immediately restore the authorized setting or adjust the setting to comply with the rules of operation, as necessary.
8. All water levels and gate settings will be recorded and provided in an annual report on the operation of the project. This report will be forwarded annually to Manitoba Conservation and Water Stewardship, and made available to the public at the RM office.

Culvert  
Location

South  
Salt  
Lake

# Trench Improvement Location

## Re-Vegetation and Erosion Control



Successful Green vegetation species for alkaline soil - flow ended Aug 15th, 2012



Successful vegetation species for alkaline soil - flow ended Aug 15th, 2012



Most of the channels are covered with alkaline soil that was trapped by former vegetation. White arrows show where spongy mass was cut by shovel. Nearby sedge grasses are reinstating in left of pic and in lower east corner. These native plants are best suited to rapid "re-grassing" of excavated channels.

| Chart Distance Label | Distance from Proposed Culverts(m) | Elevation(M-HAE) | Proposed | 0.0254 |
|----------------------|------------------------------------|------------------|----------|--------|
| 1                    | 0                                  | 533.727          | 533.127  |        |
| 2                    | 52.4                               | 533.487          | 533.1016 |        |
| 3                    | 96.6                               | 533.287          | 533.0762 |        |
| 4                    | 143                                | 533.287          | 533.0508 |        |
| 5                    | 230                                | 533.127          | 533.0254 |        |
| 6                    | 263                                | 532.972          | 533      |        |

Present Upstream Culvert Invert Level at 533.727m HAE  
Proposed Culvert Upstream Invert Level at 533.127m HAE  
Proposed Culvert Modifications to utilize 2 60cm gated units

