



February 28, 2014
Stantec File: 111440070
Conservation File: 5577.00

Attention: Peter Crocker, District Supervisor
Manitoba Conservation and Water Stewardship
Environmental Compliance and Enforcement Branch
Box 13, 1129 Queens Avenue
Brandon, MB R7A 1L9

Dear Mr. Crocker,

Reference: Daly Irrigation Project – 2013 Final Monitoring Report – Licence No. 3010

Stantec Consulting Ltd. (Stantec) submits the following 2013 Final Monitoring Report for the Daly Irrigation Project, on behalf of the Daly Irrigation Development Group (DIDG; the Licencee). This letter provides a summary and status of monitoring data collected in 2013, as required by *Environment Act* Licence No. 3010 (the Licence), issued on July 5, 2012.

The following information is presented:

- Upstream and downstream flows, volumes and rates of water pumped, and durations of pumping as prescribed by Clause 21 of the Licence.
- Findings of the Dissolved Oxygen Monitoring Plan as prescribed by Clause 22 of the Licence.
- Photographs of the Little Saskatchewan River riffle bed exposure immediately downstream of the diversion point of the Development as prescribed by Clause 23 of the Licence.

MEASUREMENT OF UPSTREAM AND DOWNSTREAM FLOW RATES

In accordance with Clause 21 of the Licence flow rates were recorded daily on a continual basis. For purposes of this report, daily flow rates were recorded at two monitoring sites, upstream and downstream from the Development diversion point, as described below:

- The upstream flow gauging station (ID: 05F018), operated by Water Survey of Canada, is in operation close to the crossing of Highway 25 over the Little Saskatchewan River, just downstream of the reservoir outlet.
- A stream flow monitoring station was installed downstream of the pump intake on July 20, 2012. This monitoring station consists of two data loggers: one (ID: DIVER M4391) was installed at the bottom of the river to measure total water pressure and water temperature,



Reference: Daly Irrigation Project – 2013 Final Monitoring Report – Licence No. 3010

and the other (ID: DIVER L6518) was installed at the surface, adjacent to the pumping station to measure atmospheric pressure and air temperature.

Two manual stream flow measurements were collected downstream of the diversion point in 2013, on May 9 and September 19 in order to calibrate the installed downstream monitoring station. An additional two measurements were attempted during the year however these were unsuccessful due to unsafe conditions. The flow rates measured for the two calibration dates are as follows:

- May 9 – 25.1 m³/sec
- September 19 – 1.62 m³/sec

For purposes of this report, flow rates upstream and downstream of the diversion point were compared during the irrigation season from July 3 to September 19, 2013. The Water Survey of Canada website was used to retrieve measured flows at the upstream gauging station (05F018). Figure 1 shows estimated flow rates (m³/sec) recorded daily at the upstream (black) and downstream (red) monitoring stations in 2013.



Reference: Daly Irrigation Project – 2013 Final Monitoring Report – Licence No. 3010

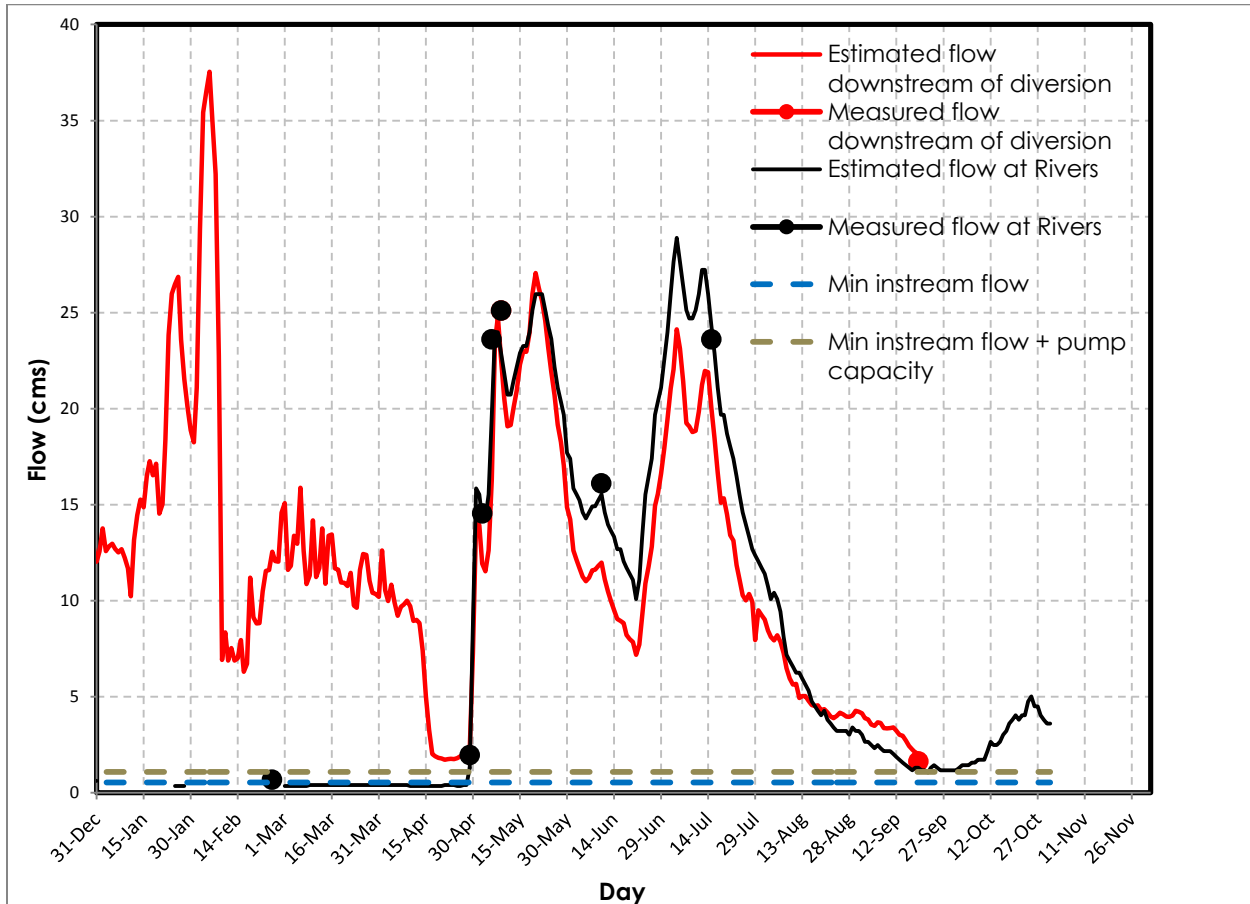


Figure 1 - Daily Average Streamflow Upstream and Downstream from Diversion

At the beginning of Spring 2013, the two estimated stream flows show similar patterns and upstream-downstream correlation. During the irrigation season, downstream flow was generally lower than upstream, indicating withdrawals at the diversion. Towards the end of the irrigation season we see flow rates higher downstream of the diversion point than upstream, suggesting localized flows between the two stations.

The estimated flow downstream of the diversion was above the minimum instream flow requirement of 0.524 m³/sec throughout the 2013 recording period required by the Licence. These flow rates exceed the minimum instream flow requirement in the Little Saskatchewan River (0.524 m³/sec) and minimum instream flow rate plus the maximum allowable pumping rate (0.524 m³/sec + 0.555 m³/sec = 1.079 m³/sec). This suggests that operation of the Daly Irrigation Project did not cause the flow immediately downstream of the diversion point to drop below the minimum instream flow in 2013. The minimum flow rate recorded downstream of the diversion point in 2013 occurred on the final day of irrigation on September 19 at 2.03 m³/sec. The upstream recorded



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flow rate shows a similar drop in flow rate near the end of the irrigation season, suggesting that seasonal conditions contributed to the reduction of these flow rates.

VOLUMES AND RATES OF WATER PUMPED AND DURATION OF PUMPING

The Development withdrew water from the Little Saskatchewan River during the period of July 3 to September 19, 2013. A total of approximately 1,820 acres of land were irrigated (910 acres of potatoes, 585 acres of wheat, 130 acres of barley, and 195 acres of soybean). In accordance with Clause 21 of the Licence, pump intake volumes and rates are summarized in Table 1 in Appendix A.

The total volume of water pumped during the irrigation season was 216,557,585 US gallons (819,759 m³). The daily average total volume of water pumped was 1,488,791 US gallons (204,940 m³).

DISSOLVED OXYGEN CONCENTRATION

In accordance with Clause 22 of the Licence, a Dissolved Oxygen (DO) Monitoring Plan was implemented in spring of 2013 with deployment of the HOB0® U26-001 DO Logger.

The purpose of the DO Monitoring Plan was to determine if the Development had an impact on DO concentration and fish habitat within the Little Saskatchewan River downstream from the diversion point. Impacts to fish habitat are conceivable when DO concentration drops to 2-4 mg/L. Fish kills occur at DO concentration of <2 mg/L. Optimal habitat conditions within the river are achieved at a DO concentration of 5-8 mg/L.

The DO logger was deployed on May 7, 2013 and recorded DO and temperature values on an hourly basis until July 31, 2013. Daily average, minimum and maximum DO concentration and temperature were recorded and are summarized in Figure 2.



Reference: Daly Irrigation Project – 2013 Final Monitoring Report – Licence No. 3010

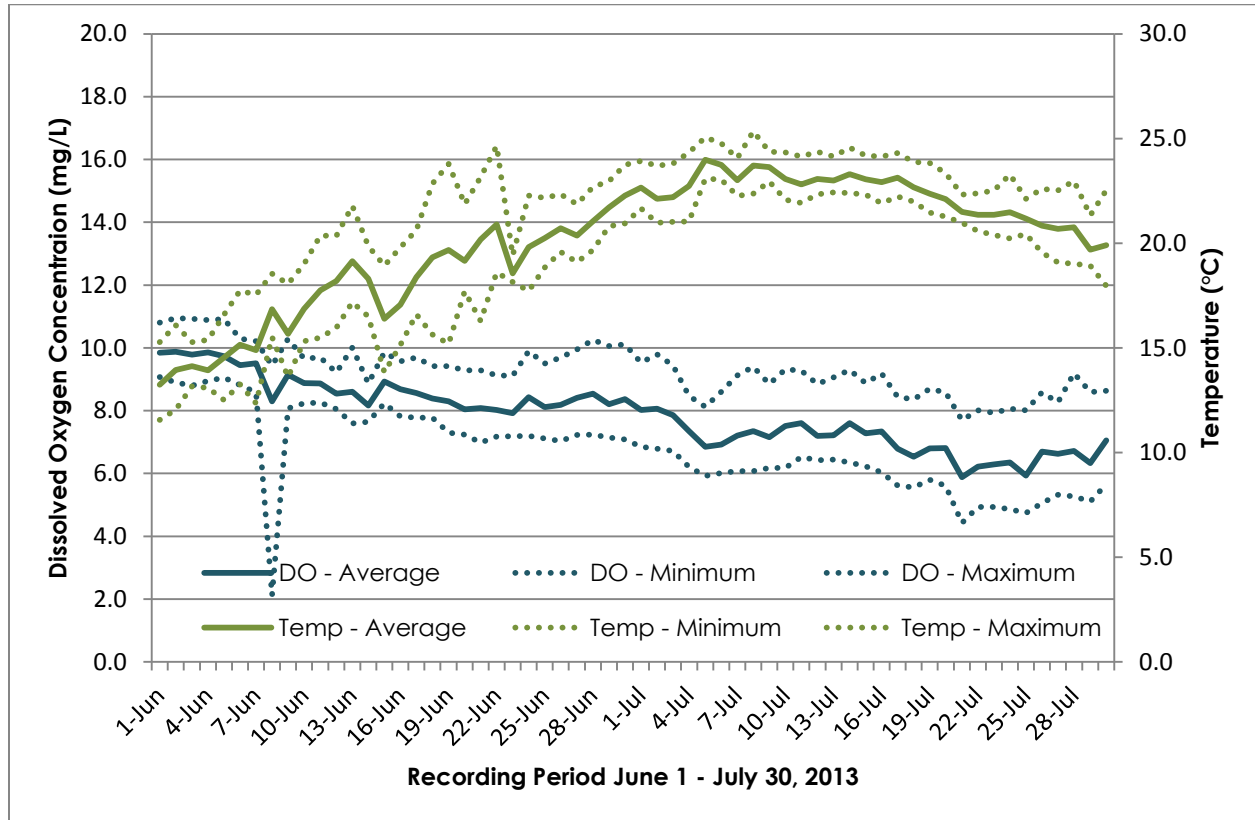


Figure 2: Dissolved Oxygen Concentration, June 1 – July 30, 2013

Following the beginning of the 2013 irrigation season on July 3, average daily DO concentration has been between approximately 5-10 mg/L. Daily minimum values fall slightly below 5 during the latter part of July. Levels have not dropped below the 2 mg/L required for fish survival during recording dates. The lowest DO concentration reported in Figure 2 was 2.1 mg/L on June 8, prior to commencement of the irrigation season. The overall daily average DO concentration during the recording period was 7.9 mg/L.

DO concentration data for the period of July 31, 2013 to September 19, 2013 was not recorded due to equipment malfunction. Methods to prevent future equipment malfunction are discussed under Monitoring Activities Planned for 2014.

RIFFLE MONITORING

Under Clause 23 of the Licence, the Licencee is required to capture photographs of the riffle bed exposure in the Little Saskatchewan River downstream from the Development's diversion point



February 28, 2014
Peter Crocker, District Supervisor
Page 6 of 7

Reference: Daly Irrigation Project – 2013 Final Monitoring Report – Licence No. 3010

during the irrigation season. A trail camera was used to record daily photographs of the riffle from May 22, 2013 to October 20, 2013.

Photographs were not recorded between August 13, 2013 and September 19, 2013 due to equipment malfunction. Methods to prevent future equipment malfunction are discussed under Monitoring Activities Planned for 2014.

Appendix B includes photographs which show the riffle during active irrigation dates on July 7, July 29, and August 13, 2013. Photographs in Appendix B which show the riffle on non-active irrigation dates include July 5, July 30, and August 30, 2013. A complete set of photographs taken by the trail camera are included on CD-ROM (enclosed).

MONITORING ACTIVITIES PLANNED FOR 2014

During the 2013 irrigation season, equipment malfunctions occurred which resulted in incomplete data sets available for the annual report. To provide complete information in future annual reports, below are suggested methods to improve data collection from equipment.

Additional equipment checks along with re-calibration should be made to retrieve DO concentration data consistently and avoid possible malfunctions.

The trail camera which is positioned to record photographs of the riffle during active and non-active irrigation dates should be inspected periodically. Electronic files should be downloaded from the camera on a frequent basis to avoid data loss.

STATUS OF DALY IRRIGATION PROJECT CONSTRUCTION

Several irrigation components, including pivots and irrigation lines, which were proposed in the DIDG Environmental Impact Assessment (Stantec, 2012) were constructed in 2013. Figure 3 in Appendix C shows an updated Project Footprint of these components. Future construction of proposed pivots and irrigation lines are being considered for construction by DIDG in 2014 to provide additional irrigation service to more fields.

Regards,

STANTEC CONSULTING LTD.

Terry Duddridge, B.Env.St.
Environmental Planner
Phone: 204-944-3790
terry.duddridge@stantec.com

Carmen Anseeuw, M.Env.
Environmental Planner
Phone: 204-942-2505
carmen.anseeuw@stantec.com



February 28, 2014

Peter Crocker, District Supervisor

Page 7 of 7

Reference: Daly Irrigation Project – 2013 Final Monitoring Report – Licence No. 3010

Attachment: Appendix A (Water Use)
Appendix B (Riffle Monitoring Photographs)
Appendix C (Updated Project Footprint)
CD ROM Riffle Monitoring Photographs 2013

c. Whetter, David (Stantec); Webb, Bruce (MCWS); Waldner, Ed (DIDG)

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APPENDIX A

Table 1: Daly Irrigation Development Project Licence No. 3010, Annual Water Use Report, 2013 Year

Date (2013)	Redfern (Pump 2)					Keywest (Pump 2)					Sundance (Pump 2)					Sundance (Pump 1)				
	Intake Location: NW10-12-21W					Intake Location: NW10-12-21W					Intake Location: NW10-12-21W					Intake Location: NW10-12-21W				
	Pump Capacity: 2400 US gpm (0.1514 m³/s)					Pump Capacity: 2400 US gpm (0.1514 m³/s)					Pump Capacity: 2400 US gpm (0.1514 m³/s)					Pump Capacity: 1600 US gpm (0.1001 m³/s)				
	Max Pumping Rate (gpm)	Volume Pumped (gallons)	Max Pumping Rate (m³/s)	Volume Pumped (m³)	Parcel(s) Irrigated	Max Pumping Rate (gpm)	Volume Pumped (gallons)	Max Pumping Rate (m³/s)	Volume Pumped (m³)	Parcel(s) Irrigated	Max Pumping Rate (gpm)	Volume Pumped (gallons)	Max Pumping Rate (m³/s)	Volume Pumped (m³)	Parcel(s) Irrigated	Max Pumping Rate (gpm)	Volume Pumped (gallons)	Max Pumping Rate (m³/s)	Volume Pumped (m³)	Parcel(s) Irrigated
July 3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1339.12	749770.75	0.08436456	2838.19	NW 8-12-21 SW 8-12-21
July 4	0.14	1.13	0.00001	0.004278	Line Test	0.14	1.13	0.00000882	0.004278	Line Test	0.14	1.13	0.00000882	0.004278	Line Test	1335.31	550408.25	0.08412453	2083.52	NW 8-12-21 SW 8-12-21
July 7	2414.17	1903797	0.15209	7206.65	NE 32-11-21 SW 6-12-21 SE 6-12-21	1311.30	1108412	0.0826119	4195.79	NW 22-12-21 SE 21-12-21	2498.77	2075284	0.15742251	7855.80	SE 36-11-22 NW 5-12-21 NE 5-12-21	1624.76	1141181	0.10235988	4319.84	NW 8-12-21 SW 8-12-21
July 8	2249.34	3159910	0.14171	11961.55	NE 32-11-21 SW 6-12-21 SE 6-12-21	1350.82	1880871	0.08510166	7119.87	NW 22-12-21 SE 21-12-21	2499.75	3503457	0.15748425	13262.02	SE 36-11-22 NW 5-12-21 E 1/2 8-12-21	1445.19	1868723.38	0.09104697	7073.88	NW 8-12-21 SW 8-12-21
July 9	2394.90	3190299	0.15088	12076.59	NE 32-11-21 SW 6-12-21 SE 6-12-21	1394.98	1735539	0.08788374	6569.73	NW 22-12-21 SE 21-12-21	2561.77	3500071	0.16139151	13249.20	SE 36-11-22 NE 5-12-21	1478.59	1900416.50	0.09315117	7193.86	NW 8-12-21 SW 8-12-21
July 10	2294.77	3099152	0.14457	11731.56	NE 32-11-21 SW 6-12-21 SW 5-12-21	1388.23	1940667	0.08745849	7346.22	NW 22-12-21 SE 21-12-21	2478.09	3128457	0.15611967	11842.49	SE 36-11-22 NE 5-12-21	1406.02	1953001.25	0.08857926	7392.91	NW 8-12-21 SW 8-12-21
July 11	2448.20	3159281	0.15424	11959.17	NE 32-11-21 SW 6-12-21 SW 5-12-21	1362.91	1920506	0.08586333	7269.90	NW 22-12-21 SE 21-12-21	2655.01	2245528	0.16726563	8500.24	SE 36-11-22 NW 5-12-21 E 1/2 8-12-21	1359.43	1918753.88	0.08564409	7263.27	NW 8-12-21 SW 8-12-21

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July 12	2358.62	3112440	0.14859	11781.86	SE 5-12-21 SE 6-12-21 SW 5-12-21	1384.57	1745995	0.08722791	6609.31	NW 22-12-21 SE 21-12-21	--	--	--	--	--	1339.54	1898927	0.08439102	7188.22	NW 8-12-21 SW 8-12-21
July 13	2478.16	2431173	0.15612	9202.99	SE 5-12-21 SE 6-12-21 SW 5-12-21	1358.27	607314.80	0.08557101	2298.94	NW 22-12-21 SE 21-12-21	--	--	--	--	--	1317.79	1022350.56	0.08302077	3870.02	NW 8-12-21 SW 8-12-21
July 17	2445.39	1902178	0.15406	7200.53	NE 32-11-21 SW 6-12-21 NW 6-12-21	1343.79	899152.80	0.08465877	3403.66	NW 22-12-21 SE 21-12-21	2289.08	657227.60	0.14421204	2487.88	SE 36-11-22 NW 5-12-21 NE 5-12-21	1554.97	1102814.88	0.09796311	4174.61	NW 8-12-21 SW 8-12-21
July 18	2260.17	2384691	0.14239	9027.03	NE 32-11-21 SW 6-12-21 NW 6-12-21	1358.27	1452384	0.08557101	5497.87	NW 22-12-21 SE 21-12-21	--	--	--	--	--	1447.05	1548306	0.09116415	5860.97	NW 8-12-21 SW 8-12-21
July 21	0.14	1.13	0.00001	0.004278	Line Test	0.28	3.38	0.00001764	0.012795	Line Test	0.14	1.13	0.00000882	0.004278	Line Test	0.10	0.82	0.0000063	0.0000063	Line Test
July 23	1907.74	692899	0.12019	2622.91	NE 32-11-21 SW 6-12-21 SE 1-12-22	--	--	--	--	--	1913.31	913444.70	0.12053853	3457.76	SE 36-11-22 E 1/2 8-12 21	--	--	--	--	--
July 24	2344.83	2737093	0.14772	10361.02	NE 32-11-21 SW 6-12-21 SE 1-12-22	1402.57	1263207	0.08836191	4781.76	NW 22-12-21 SE 21-12-21	997.23	1398805	0.06282549	5295.05	SE 36-11-22 E 1/2 8-12 21	1422.72	1186749.75	0.08963136	4492.33	NW 8-12-21 SW 8-12-21
July 25	2273.39	3087142	0.14322	11686.10	NE 32-11-21 SW 6-12-21 SE 1-12-22	1380.91	1937177	0.08699733	7333.01	NW 22-12-21 SE 21-12-21	1578.89	1803410	0.09947007	6826.65	SE 36-11-22 NW 5-12-21	1384.99	1947132.38	0.08725437	7370.69	NW 8-12-21 SW 8-12-21

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	Pump Capacity: 2400 US gpm (0.1514 m ³ /s)					Pump Capacity: 2400 US gpm (0.1514 m ³ /s)					Pump Capacity: 2400 US gpm (0.1514 m ³ /s)					Pump Capacity: 1600 US gpm (0.1001 m ³ /s)				
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Sept 14	2121.50	1338991	0.13365	5068.629	NE 32-11-21 SW 6-12-21 SE 5-12-21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sept 15	1560.36	710662.10	0.09830	2690.148	NE 32-11-21 SW 6-12-21 SE 1-12-22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sept 19	--	--	--	--	--	0.14	1.13	0.00000882	0.004278	Line Test	--	--	--	--	--	--	--	--	--	--
Total (US gallons)	96,741,100					42,861,898					37,375,045					39,579,541.27				
Total (m ³)	366,204.70					162,249.94					141,479.88					149,824.78				
Total (ac-ft)	296.89					131.54					114.70					121.46				

APPENDIX B

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RIFFLE MONITORING PHOTOGRAPHS



Bushnell

07-07-2013 13:02:44

Photo 1: July 7, 2013 Pumping Active



Bushnell

07-05-2013 12:43:29

Photo 2: July 5, 2013 Pumping Not Active

APPENDIX B

Reference: Daly Irrigation Project – 2013 Final Monitoring Report – Licence No. 3010

RIFFLE MONITORING PHOTOGRAPHS



Bushnell

07-29-2013 19:59:59

Photo 3: July 29, 2013 Pumping Active



Bushnell

07-30-2013 15:00:54

Photo 4: July 30, 2013 Pumping Not Active

APPENDIX B

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RIFFLE MONITORING PHOTOGRAPHS



Bushnell

08-13-2013 08:00:39

Photo 5: August 13, 2013 Pumping Active



Bushnell

08-10-2013 08:00:56

Photo 6: August 10, 2013 Pumping Not Active

APPENDIX B

Reference: Daly Irrigation Project – 2013 Final Monitoring Report – Licence No. 3010

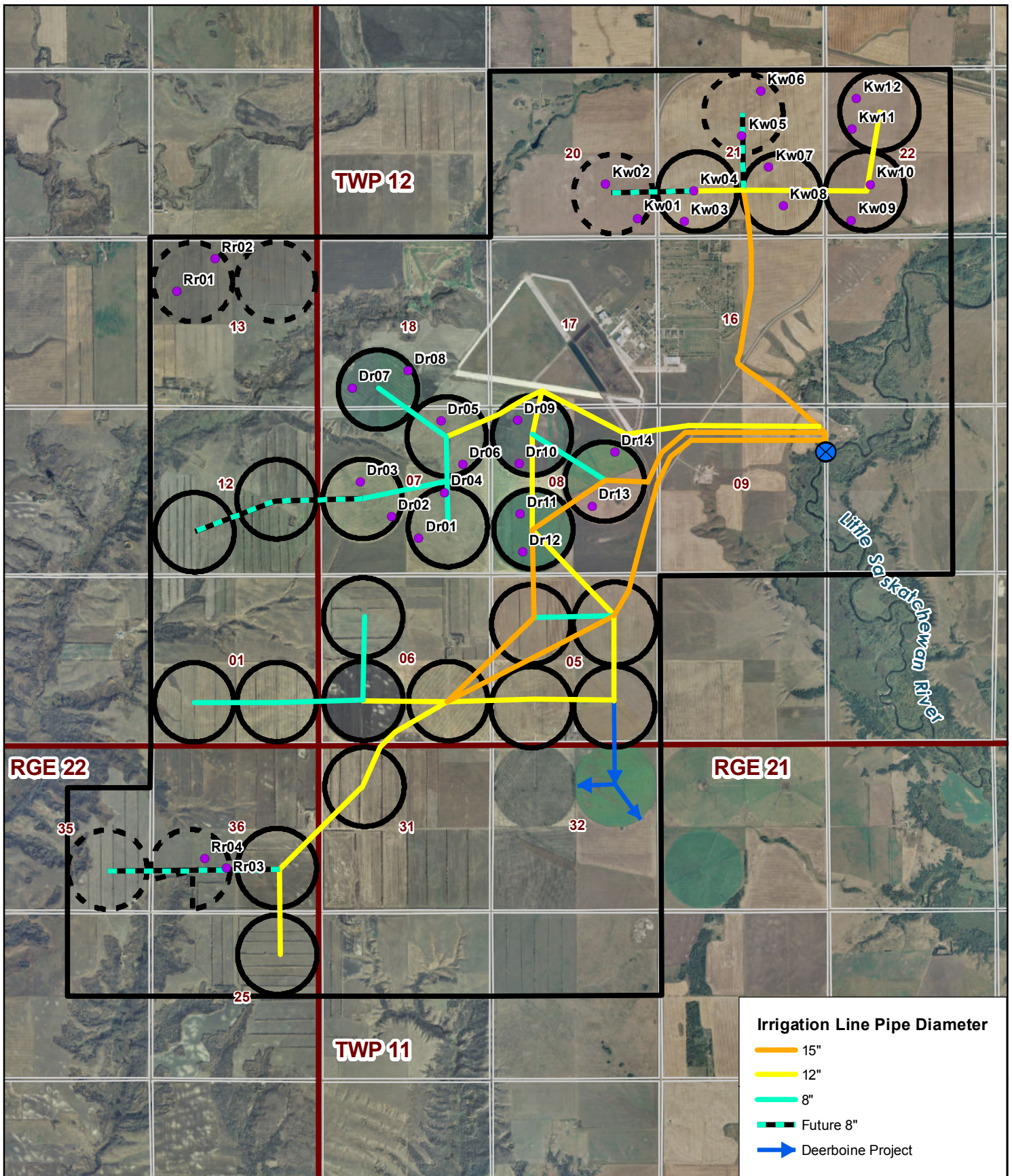
RIFFLE MONITORING PHOTOGRAPHS



Bushnell

09-19-2013 14:53:19

Photo 7: September 19, 2013 Irrigation Season Completed



Project Footprint

- LEGEND**
- Local Study Area
 - Phase 1 Pivots/Project Footprint
 - Phase 2 Proposed Pivots
 - Pump Station
 - Soil Inspection Points

DATA SOURCE:
 ORTHOPHOTO IMAGERY AND
 SOIL RESOURCE INFORMATION
 PROVIDED BY MANITOBA
 LAND INITIATIVE,
 PROVINCE OF MANITOBA.

0 395 790 Metres
 0 1,500 3,000 Feet

Stantec

COORDINATE SYSTEM: NAD 1983 UTM Zone 14N

DATE: Feb 28, 2014	PROJECT: 1114 40070	FIGURE: 4-1
DRAWN: AC	QA/QC: JH	APPROVED: JH