

April 25, 2022

Manitoba Sustainable Development Client File No: 5577.00

Manitoba Sustainable Development EAL No: 3010

**Attention: Kristy Forrestall, Environment Officer**  
Manitoba Environment, Climate and Parks  
Environmental Compliance and Enforcement Branch  
Box 13, 1129 Queens Avenue  
Brandon, MB R7A 1L9

Dear Kristy Forrestall,

**Reference: Daly Irrigation Development Project – 2021 Monitoring Report**

On behalf of Daly Irrigation Development Group (DIDG; the Licencee), AgriEarth Consulting Ltd. (AgriEarth) submits the following 2021 monitoring report for the Daly Irrigation Development Project (the Project). This letter provides a summary and status of monitoring data collected in 2021, to meet the requirements of *Environment Act* Licence No. 3010 (the Licence), issued on July 5, 2012, and modifications to the monitoring requirements provided in a letter from Manitoba Conservation and Climate (formerly Manitoba Conservation and Water Stewardship) dated April 16, 2015.

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.
- Results of the Dissolved Oxygen Monitoring Program 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 Project 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 are to be recorded upstream and downstream of the diversion point on a daily basis while irrigation is occurring when upstream flows are less than 6.0 m<sup>3</sup>/s.

The upstream monitoring point is located at the Water Survey of Canada (WSC) Little Saskatchewan River near Rivers (05MF018) hydrometric station, close to the crossing of Highway 25 over Little Saskatchewan River. WSC flow and level data recorded at this station is used to monitor the river condition upstream of the diversion point.

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Flows downstream of the diversion point were estimated by subtracting the maximum daily pumping discharge from the average daily upstream flow rate. These rates were calculated on a daily basis throughout the irrigation period (May 12 to October 7, 2021).

Figure 1 shows the average daily upstream flow rates and the estimated downstream flow rates relative to the minimum in-stream flow of 0.524 m<sup>3</sup>/sec prescribed in the Licence. Throughout the irrigation period the estimated average daily flows downstream of the diversion point were above the minimum instream flow requirement of 0.524 m<sup>3</sup>/sec.

**VOLUMES AND RATES OF WATER PUMPED**

A summary of daily pump volumes and rates recorded at the diversion point are provided in Table 1. Flow meters on the pumps measure instantaneous flow rate, total daily volume and accumulated volumes over the season. As such, duration of pumping is not required to determine volume and rates.

The daily maximum pumping rate did not exceed the maximum pumping rate of 0.555 m<sup>3</sup>/s specified by the Licence. The daily maximum pumping rate was 0.482 m<sup>3</sup>/s and occurred on July 13, 2022.

A total volume of 524,721,779 US gallons, 1,986,287 m<sup>3</sup>/sec, or 1,610 ac-ft were pumped for irrigation in 2021.

**DISSOLVED OXYGEN CONCENTRATION**

In accordance with Clause 22 of the Licence, a Dissolved Oxygen (DO) Monitoring Program was implemented in spring of 2017 with deployment of the HOB0® U26-001 DO Logger. The purpose of the DO Monitoring Program is to determine if the Project is having 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 may occur at DO concentrations of <2 mg/L. Optimal habitat conditions within the river are achieved at a DO concentration of 5-8 mg/L. DO concentrations are to be monitoring when flow rates in the Little Saskatchewan River fall below 6 m<sup>3</sup>/s.

The DO logger installed in the 2020 irrigation season could not be located during a Spring 2021 survey so a replacement logger was purchased and deployed on July 2, 2021. Measurements were recorded between July 3 and October 19, 2021.

Daily average, minimum, and maximum DO concentration and daily average temperature were calculated from the logger data and are summarized in Figure 2. The daily average DO concentration did not fall below the lower limit of the optimum range of 5 mg/L during the irrigation period. The recorded minimum DO concentration was below 4 mg/L on 32 days during the 100 days within the irrigation period during which DO was monitored. The lowest DO concentrations recorded was 3.4 mg/L on September 7, 2021. The average DO concentration over the portion of the irrigation period when DO was monitored was 9.4 mg/L.

**Reference: Daly Irrigation Development Project – 2021 Monitoring Report**

**RIFFLE MONITORING**

Under Clause 23 of the Licence, the Licensee is required to provide photographs of the riffle bed exposure in the Little Saskatchewan River downstream from the Project's diversion point during the irrigation season.

A trail camera was not installed for the 2021 monitoring season. However, an extensive record of photos across a wide range of flows has been inventoried over previous monitoring seasons since the commencement of the project in 2012.

The lowest estimated flow downstream of the diversion during the irrigation period occurred on July 29, 2021, when flow upstream of the diversion was 1.284 m<sup>3</sup>/sec, an average of 0.461 m<sup>3</sup>/sec was used for the Project, resulting in an estimated flow downstream of the diversion of 0.824 m<sup>3</sup>/sec. This is an estimated 0.300 m<sup>3</sup>/sec above the minimum instream flow rate of 0.524 m<sup>3</sup>/sec. A photo from the 2017 monitoring season taken during a comparable flow rate is provided in Photo 1 (Attachment C).

The highest estimated flow downstream of the diversion during the irrigation period occurred on June 15, 2021, when flow upstream of the diversion was 9.570m<sup>3</sup>/sec, an average of 0.300 m<sup>3</sup>/sec was used for the Project, resulting in an estimated flow downstream of the diversion of 0.927 m<sup>3</sup>/sec. A photo from the 2017 monitoring season taken during a comparable flow rate is provided in Photo 2 (Attachment C).

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**CLOSURE**

This letter report was prepared by AgriEarth Consulting Ltd. The letter, including all contents and attachments, reflects the professional judgment of AgriEarth Consulting Ltd., and was developed based on existing and available information at the time it was published. Information provided by other parties was not verified by AgriEarth Consulting Ltd. Use of information in this report by a third party is done so at the sole responsibility and risk of the third party. AgriEarth Consulting Ltd. cannot be held responsible whatsoever for uses by the third party, including any costs or damages of any kind, if any, suffered by it or any other third party, as a result of decisions made or actions taken based on information in this document.

We trust the information presented satisfies the annual monitoring report requirements under the Licence. Should you have any questions on the information presented, please contact the undersigned.

Regards,



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e: david.whetter@agriearth.ca

Attachment: Attachment A – Figures  
Attachment B – Water Use Summary  
Attachment C – Riffle Photos

c. Paul Adriaansen – Spud Plains Farms Ltd., Ray Redfern – Redfern Family Farms, Steve Saunderson – Choice Agri Ltd.; Bruce Webb – Manitoba Environment, Climate and Parks

dw /projects/didg\_rivers/3\_reports/reports/2021/let\_didg\_eal3010\_monitoring\_2021\_20220414 docx

**Attachments**

**Reference: Daly Irrigation Development Project – 2021 Monitoring Report**

**Attachment A**  
**Figures**

Attachments

Reference: Daly Irrigation Development Project – 2021 Monitoring Report

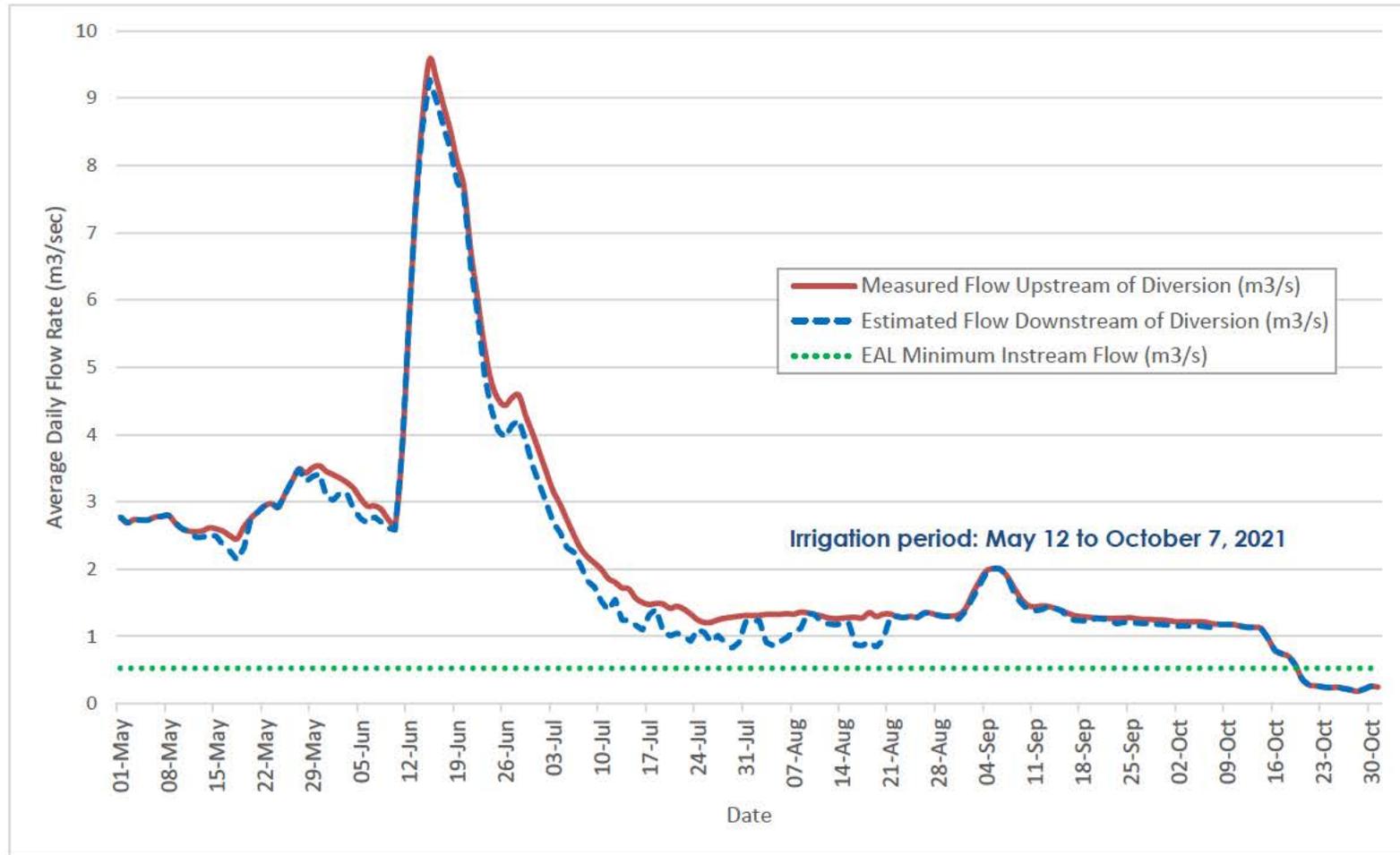
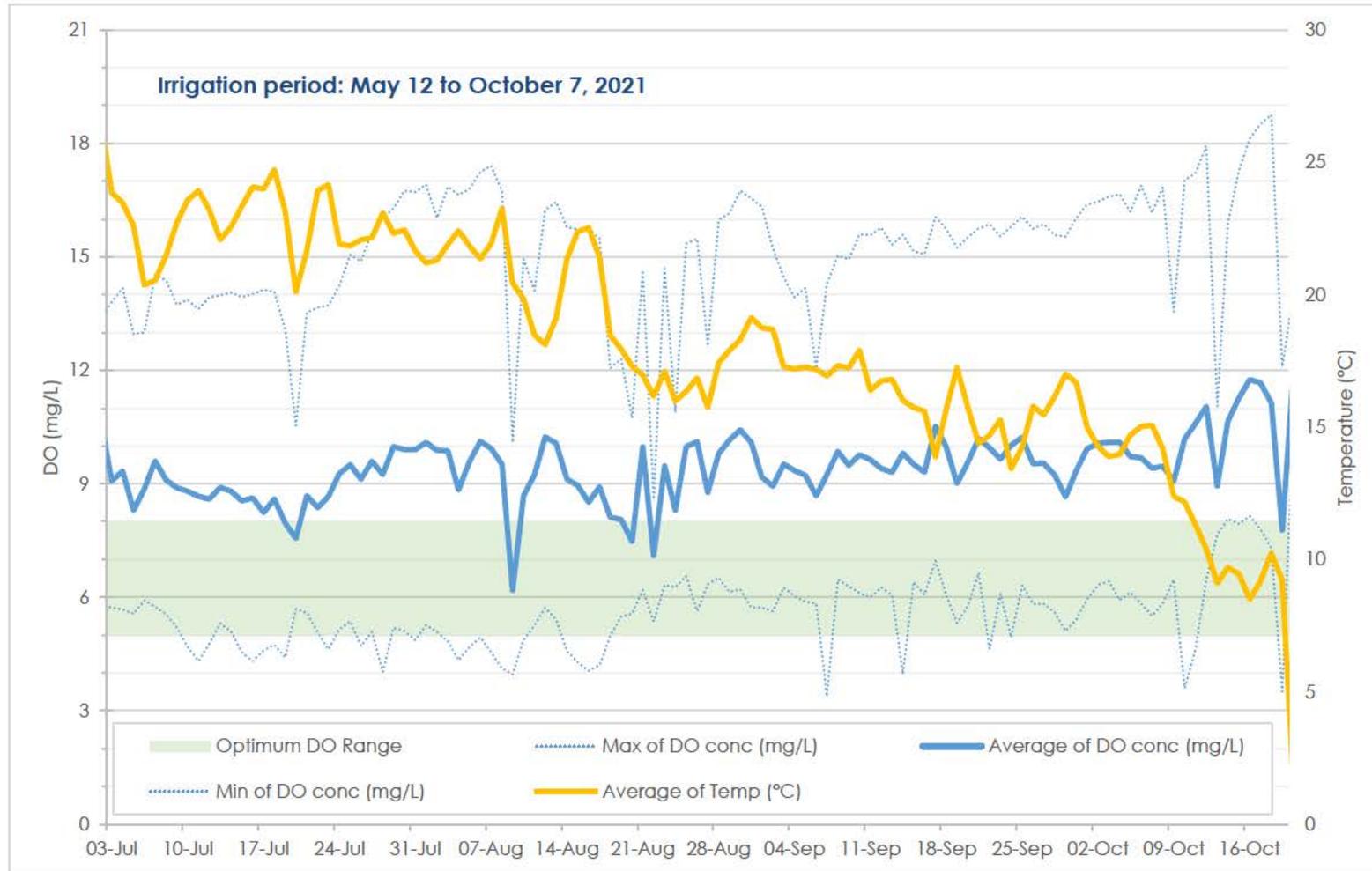


Figure 1: Average daily discharge upstream and downstream of diversion between May and October 2021

**Attachments**

**Reference: Daly Irrigation Development Project – 2021 Monitoring Report**



**Figure 2: Daily dissolved oxygen concentration and temperature downstream of the diversion**

**Attachments**

**Reference: Daly Irrigation Development Project – 2021 Monitoring Report**

**Attachment B**  
**Water Use Summary**

**Attachments**

**Reference: Daly Irrigation Development Project – 2021 Monitoring Report**

| Date       | Spud Plains (Keyriver)                   |                            | Redfern                                  |                            | Spud Plains                              |                            | Total Volume Pumped (gal) | Total Volume Pumped (ac-ft) | Total Volume Pumped (m³) | Max Pumping Rate (gal/min) | Max Pumping Rate (m³/s) |
|------------|--|----------------------------|--|----------------------------|--|----------------------------|---------------------------|-----------------------------|--------------------------|----------------------------|-------------------------|
|            | Intake Location: NW 10-12-21W            |                            | Intake Location: NW10-12-21W             |                            | Intake Location: NW10-12-21W             |                            |                           |                             |                          |                            |                         |
|            | Pump Capacity: 2000 US gpm (0.1262 m³/s) |                            | Pump Capacity: 2400 US gpm (0.1514 m³/s) |                            | Pump Capacity: 4000 US gpm (0.2542 m³/s) |                            |                           |                             |                          |                            |                         |
|            | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) |                           |                             |                          |                            |                         |
| 2021-05-11 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-05-12 | 0  | 0                          | 777,434                                  | 1,386                      | 0  | 0                          | 777,434                   | 2.4                         | 2,943                    | 1,386                      | 0.087                   |
| 2021-05-13 | 0  | 0                          | 2,018,020                                | 1,485                      | 0  | 0                          | 2,018,020                 | 6.2                         | 7,639                    | 1,485                      | 0.094                   |
| 2021-05-14 | 0  | 0                          | 2,048,929                                | 1,664                      | 0  | 0                          | 2,048,929                 | 6.3                         | 7,756                    | 1,664                      | 0.105                   |
| 2021-05-15 | 0  | 0                          | 2,147,859                                | 1,750                      | 0  | 0                          | 2,147,859                 | 6.6                         | 8,131                    | 1,750                      | 0.110                   |
| 2021-05-16 | 1,440,000                                | 1,000                      | 2,123,091                                | 1,497                      | 576,000                                  | 800                        | 4,139,091                 | 12.7                        | 15,668                   | 3,297                      | 0.208                   |
| 2021-05-17 | 1,440,000                                | 1,000                      | 2,072,101                                | 1,833                      | 1,152,000                                | 800                        | 4,664,101                 | 14.3                        | 17,656                   | 3,633                      | 0.229                   |
| 2021-05-18 | 1,440,000                                | 1,000                      | 1,938,424                                | 1,591                      | 3,456,000                                | 2,400                      | 6,834,424                 | 21.0                        | 25,871                   | 4,991                      | 0.315                   |
| 2021-05-19 | 1,440,000                                | 1,000                      | 568,141                                  | 1,394                      | 3,456,000                                | 2,400                      | 5,464,141                 | 16.8                        | 20,684                   | 4,794                      | 0.302                   |
| 2021-05-20 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-05-21 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-05-22 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-05-23 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-05-24 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-05-25 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-05-26 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-05-27 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-05-28 | 0  | 0                          | 1,214,768                                | 2,050                      | 0  | 0                          | 1,214,768                 | 3.7                         | 4,598                    | 2,050                      | 0.129                   |
| 2021-05-29 | 0  | 0                          | 1,144,384                                | 2,065                      | 0  | 0                          | 1,144,384                 | 3.5                         | 4,332                    | 2,065                      | 0.130                   |
| 2021-05-30 | 0  | 0                          | 2,289,717                                | 1,866                      | 0  | 0                          | 2,289,717                 | 7.0                         | 8,668                    | 1,866                      | 0.118                   |
| 2021-05-31 | 720,000                                  | 1,000                      | 2,275,899                                | 1,785                      | 2,304,000                                | 3,200                      | 5,299,899                 | 16.3                        | 20,062                   | 5,985                      | 0.378                   |
| 2021-06-01 | 1,440,000                                | 1,000                      | 2,022,344                                | 1,755                      | 4,608,000                                | 3,200                      | 8,070,344                 | 24.8                        | 30,550                   | 5,955                      | 0.376                   |
| 2021-06-02 | 1,440,000                                | 1,000                      | 1,930,687                                | 1,573                      | 672,000                                  | 800                        | 4,042,687                 | 12.4                        | 15,303                   | 3,373                      | 0.213                   |

**Attachments**

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| Date       | Spud Plains (Keyriver)                   |                            | Redfern                                  |                            | Spud Plains                              |                            | Total Volume Pumped (gal) | Total Volume Pumped (ac-ft) | Total Volume Pumped (m³) | Max Pumping Rate (gal/min) | Max Pumping Rate (m³/s) |
|------------|--|----------------------------|--|----------------------------|--|----------------------------|---------------------------|-----------------------------|--------------------------|----------------------------|-------------------------|
|            | Intake Location: NW 10-12-21W            |                            | Intake Location: NW10-12-21W             |                            | Intake Location: NW10-12-21W             |                            |                           |                             |                          |                            |                         |
|            | Pump Capacity: 2000 US gpm (0.1262 m³/s) |                            | Pump Capacity: 2400 US gpm (0.1514 m³/s) |                            | Pump Capacity: 4000 US gpm (0.2542 m³/s) |                            |                           |                             |                          |                            |                         |
|            | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) |                           |                             |                          |                            |                         |
| 2021-06-03 | 1,440,000                                | 1,000                      | 1,803,939                                | 1,492                      | 0  |                            | 3,243,939                 | 10.0                        | 12,280                   | 2,492                      | 0.157                   |
| 2021-06-04 | 1,440,000                                | 1,000                      | 1,818,162                                | 1,495                      | 1,728,000                                | 2,400                      | 4,986,162                 | 15.3                        | 18,875                   | 4,895                      | 0.309                   |
| 2021-06-05 | 1,440,000                                | 1,000                      | 1,841,414                                | 1,308                      | 3,456,000                                | 2,400                      | 6,737,414                 | 20.7                        | 25,504                   | 4,708                      | 0.297                   |
| 2021-06-06 | 0  | 0                          | 1,866,101                                | 1,624                      | 1,728,000                                | 2,400                      | 3,594,101                 | 11.0                        | 13,605                   | 4,024                      | 0.254                   |
| 2021-06-07 | 1,140,000                                | 1,000                      | 1,037,717                                | 1,573                      | 0  | 0                          | 2,177,717                 | 6.7                         | 8,244                    | 2,573                      | 0.162                   |
| 2021-06-08 | 1,440,000                                | 1,000                      | 56,343                                   | 1,980                      | 0  | 0                          | 1,496,343                 | 4.6                         | 5,664                    | 2,980                      | 0.188                   |
| 2021-06-09 | 0  | 0                          | 1,086,869                                | 2,022                      | 0  | 0                          | 1,086,869                 | 3.3                         | 4,114                    | 2,022                      | 0.128                   |
| 2021-06-10 | 0  | 0                          | 522,889                                  | 1,300                      | 0  | 0                          | 522,889                   | 1.6                         | 1,979                    | 1,300                      | 0.082                   |
| 2021-06-11 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-06-12 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-06-13 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-06-14 | 0  | 0                          | 1,147,394                                | 2,063                      | 0  | 0                          | 1,147,394                 | 3.5                         | 4,343                    | 2,063                      | 0.130                   |
| 2021-06-15 | 0  | 0                          | 2,176,748                                | 1,553                      | 2,304,000                                | 3,200                      | 4,480,748                 | 13.8                        | 16,961                   | 4,753                      | 0.300                   |
| 2021-06-16 | 0  | 0                          | 2,099,697                                | 1,851                      | 4,608,000                                | 3,200                      | 6,707,697                 | 20.6                        | 25,391                   | 5,051                      | 0.319                   |
| 2021-06-17 | 0  | 0                          | 2,056,242                                | 1,709                      | 2,304,000                                | 3,200                      | 4,360,242                 | 13.4                        | 16,505                   | 4,909                      | 0.310                   |
| 2021-06-18 | 0  | 0                          | 1,821,354                                | 1,328                      | 4,608,000                                | 3,200                      | 6,429,354                 | 19.7                        | 24,338                   | 4,528                      | 0.286                   |
| 2021-06-19 | 0  | 0                          | 1,930,505                                | 1,586                      | 4,608,000                                | 3,200                      | 6,538,505                 | 20.1                        | 24,751                   | 4,786                      | 0.302                   |
| 2021-06-20 | 0  | 0                          | 1,774,869                                | 1,437                      | 0  | 0                          | 1,774,869                 | 5.4                         | 6,719                    | 1,437                      | 0.091                   |
| 2021-06-21 | 2,880,000                                | 2,000                      | 1,694,263                                | 1,502                      | 0  | 0                          | 4,574,263                 | 14.0                        | 17,315                   | 3,502                      | 0.221                   |
| 2021-06-22 | 2,880,000                                | 2,000                      | 2,055,737                                | 1,583                      | 0  | 0                          | 4,935,737                 | 15.1                        | 18,684                   | 3,583                      | 0.226                   |
| 2021-06-23 | 1,440,000                                | 1,000                      | 2,031,313                                | 1,616                      | 2,880,000                                | 4,000                      | 6,351,313                 | 19.5                        | 24,042                   | 6,616                      | 0.417                   |
| 2021-06-24 | 1,440,000                                | 1,000                      | 2,077,879                                | 1,644                      | 5,760,000                                | 4,000                      | 9,277,879                 | 28.5                        | 35,121                   | 6,644                      | 0.419                   |
| 2021-06-25 | 2,880,000                                | 2,000                      | 1,923,677                                | 1,477                      | 5,760,000                                | 4,000                      | 10,563,677                | 32.4                        | 39,988                   | 7,477                      | 0.472                   |

**Attachments**

**Reference: Daly Irrigation Development Project – 2021 Monitoring Report**

| Date       | Spud Plains (Keyriver)                                |                            | Redfern   |                            | Spud Plains   |                            | Total Volume Pumped (gal) | Total Volume Pumped (ac-ft) | Total Volume Pumped (m <sup>3</sup> ) | Max Pumping Rate (gal/min) | Max Pumping Rate (m <sup>3</sup> /s) |
|------------|---|----------------------------|---|----------------------------|---|----------------------------|---------------------------|-----------------------------|---------------------------------------|----------------------------|--------------------------------------|
|            | Intake Location: NW 10-12-21W                         |                            | Intake Location: NW10-12-21W                          |                            | Intake Location: NW10-12-21W                          |                            |                           |                             |                                       |                            |                                      |
|            | Pump Capacity: 2000 US gpm (0.1262 m <sup>3</sup> /s) |                            | Pump Capacity: 2400 US gpm (0.1514 m <sup>3</sup> /s) |                            | Pump Capacity: 4000 US gpm (0.2542 m <sup>3</sup> /s) |                            |                           |                             |                                       |                            |                                      |
|            | Volume Pumped (gal)                                   | Max Pumping Rate (gal/min) | Volume Pumped (gal)                                   | Max Pumping Rate (gal/min) | Volume Pumped (gal)                                   | Max Pumping Rate (gal/min) |                           |                             |                                       |                            |                                      |
| 2021-06-26 | 2,880,000   | 2,000                      | 1,888,364   | 1,565                      | 5,760,000   | 4,000                      | 10,528,364                | 32.3                        | 39,854                                | 7,565                      | 0.477                                |
| 2021-06-27 | 1,200,000   | 1,000                      | 1,980,465   | 1,464                      | 5,760,000   | 4,000                      | 8,940,465                 | 27.4                        | 33,843                                | 6,464                      | 0.408                                |
| 2021-06-28 | 1,440,000   | 1,000                      | 1,903,313   | 1,598                      | 4,608,000   | 3,200                      | 7,951,313                 | 24.4                        | 30,099                                | 5,798                      | 0.366                                |
| 2021-06-29 | 1,440,000   | 1,000                      | 1,964,970   | 1,613                      | 4,608,000   | 3,200                      | 8,012,970                 | 24.6                        | 30,332                                | 5,813                      | 0.367                                |
| 2021-06-30 | 2,880,000   | 2,000                      | 1,887,232   | 1,545                      | 5,760,000   | 4,000                      | 10,527,232                | 32.3                        | 39,850                                | 7,545                      | 0.476                                |
| 2021-07-01 | 2,880,000   | 2,000                      | 1,817,354   | 1,459                      | 5,760,000   | 4,000                      | 10,457,354                | 32.1                        | 39,585                                | 7,459                      | 0.471                                |
| 2021-07-02 | 2,880,000   | 2,000                      | 1,788,586   | 1,346                      | 5,760,000   | 4,000                      | 10,428,586                | 32.0                        | 39,476                                | 7,346                      | 0.463                                |
| 2021-07-03 | 2,880,000   | 2,000                      | 1,869,232   | 1,454                      | 5,760,000   | 4,000                      | 10,509,232                | 32.3                        | 39,782                                | 7,454                      | 0.470                                |
| 2021-07-04 | 2,880,000   | 2,000                      | 1,753,535   | 1,429                      | 4,608,000   | 3,200                      | 9,241,535                 | 28.4                        | 34,983                                | 6,629                      | 0.418                                |
| 2021-07-05 | 2,880,000   | 2,000                      | 1,830,970   | 1,381                      | 4,608,000   | 3,200                      | 9,318,970                 | 28.6                        | 35,276                                | 6,581                      | 0.415                                |
| 2021-07-06 | 1,440,000   | 1,000                      | 1,871,333   | 1,530                      | 2,304,000   | 1,600                      | 5,615,333                 | 17.2                        | 21,256                                | 4,130                      | 0.261                                |
| 2021-07-07 | 1,440,000   | 1,000                      | 1,926,384   | 1,429                      | 2,304,000   | 1,600                      | 5,670,384                 | 17.4                        | 21,465                                | 4,029                      | 0.254                                |
| 2021-07-08 | 1,440,000   | 1,000                      | 1,818,323   | 1,467                      | 4,608,000   | 3,200                      | 7,866,323                 | 24.1                        | 29,777                                | 5,667                      | 0.358                                |
| 2021-07-09 | 1,440,000   | 1,000                      | 1,758,748   | 1,374                      | 4,608,000   | 3,200                      | 7,806,748                 | 24.0                        | 29,552                                | 5,574                      | 0.352                                |
| 2021-07-10 | 2,880,000   | 2,000                      | 1,926,546   | 1,477                      | 5,760,000   | 4,000                      | 10,566,546                | 32.4                        | 39,999                                | 7,477                      | 0.472                                |
| 2021-07-11 | 2,880,000   | 2,000                      | 1,846,606   | 1,558                      | 5,760,000   | 4,000                      | 10,486,606                | 32.2                        | 39,696                                | 7,558                      | 0.477                                |
| 2021-07-12 | 720,000   | 1,000                      | 1,705,051   | 1,396                      | 1,152,000   | 1,600                      | 3,577,051                 | 11.0                        | 13,541                                | 3,996                      | 0.252                                |
| 2021-07-13 | 2,880,000   | 2,000                      | 1,112,687   | 1,639                      | 5,760,000   | 4,000                      | 9,752,687                 | 29.9                        | 36,918                                | 7,639                      | 0.482                                |
| 2021-07-14 | 2,880,000   | 2,000                      | 1,792,990   | 1,346                      | 5,760,000   | 4,000                      | 10,432,990                | 32.0                        | 39,493                                | 7,346                      | 0.463                                |
| 2021-07-15 | 1,440,000   | 1,000                      | 1,634,929   | 1,432                      | 5,760,000   | 4,000                      | 8,834,929                 | 27.1                        | 33,444                                | 6,432                      | 0.406                                |
| 2021-07-16 | 1,440,000   | 1,000                      | 1,762,283   | 1,439                      | 5,760,000   | 4,000                      | 8,962,283                 | 27.5                        | 33,926                                | 6,439                      | 0.406                                |
| 2021-07-17 | 240,000   | 1,000                      | 1,773,798   | 1,414                      | 0   | 0                          | 2,013,798                 | 6.2                         | 7,623                                 | 2,414                      | 0.152                                |
| 2021-07-18 | 0   | 0                          | 1,712,202   | 1,308                      | 0   | 0                          | 1,712,202                 | 5.3                         | 6,481                                 | 1,308                      | 0.083                                |



**Attachments**

**Reference: Daly Irrigation Development Project – 2021 Monitoring Report**

| Date       | Spud Plains (Keyriver)                   |                            | Redfern                                  |                            | Spud Plains                              |                            | Total Volume Pumped (gal) | Total Volume Pumped (ac-ft) | Total Volume Pumped (m³) | Max Pumping Rate (gal/min) | Max Pumping Rate (m³/s) |
|------------|--|----------------------------|--|----------------------------|--|----------------------------|---------------------------|-----------------------------|--------------------------|----------------------------|-------------------------|
|            | Intake Location: NW 10-12-21W            |                            | Intake Location: NW10-12-21W             |                            | Intake Location: NW10-12-21W             |                            |                           |                             |                          |                            |                         |
|            | Pump Capacity: 2000 US gpm (0.1262 m³/s) |                            | Pump Capacity: 2400 US gpm (0.1514 m³/s) |                            | Pump Capacity: 4000 US gpm (0.2542 m³/s) |                            |                           |                             |                          |                            |                         |
|            | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) |                           |                             |                          |                            |                         |
| 2021-07-19 | 720,000                                  | 1,000                      | 1,845,455                                | 1,417                      | 2,880,000                                | 4,000                      | 5,445,455                 | 16.7                        | 20,613                   | 6,417                      | 0.405                   |
| 2021-07-20 | 1,440,000                                | 1,000                      | 1,841,414                                | 1,497                      | 5,760,000                                | 4,000                      | 9,041,414                 | 27.7                        | 34,225                   | 6,497                      | 0.410                   |
| 2021-07-21 | 720,000                                  | 1,000                      | 1,671,939                                | 1,361                      | 2,880,000                                | 4,000                      | 5,271,939                 | 16.2                        | 19,956                   | 6,361                      | 0.401                   |
| 2021-07-22 | 1,440,000                                | 1,000                      | 1,726,566                                | 1,326                      | 5,760,000                                | 4,000                      | 8,926,566                 | 27.4                        | 33,791                   | 6,326                      | 0.399                   |
| 2021-07-23 | 1,440,000                                | 1,000                      | 1,862,000                                | 1,396                      | 5,760,000                                | 4,000                      | 9,062,000                 | 27.8                        | 34,303                   | 6,396                      | 0.404                   |
| 2021-07-24 | 1,440,000                                | 1,000                      | 1,782,202                                | 1,381                      | 0  | 0                          | 3,222,202                 | 9.9                         | 12,197                   | 2,381                      | 0.150                   |
| 2021-07-25 | 1,440,000                                | 1,000                      | 1,790,141                                | 1,353                      | 0  | 0                          | 3,230,141                 | 9.9                         | 12,227                   | 2,353                      | 0.148                   |
| 2021-07-26 | 120,000                                  | 1,000                      | 1,799,899                                | 1,363                      | 1,728,000                                | 2,400                      | 3,647,899                 | 11.2                        | 13,809                   | 4,763                      | 0.301                   |
| 2021-07-27 | 0  | 0                          | 1,776,667                                | 1,316                      | 3,456,000                                | 2,400                      | 5,232,667                 | 16.1                        | 19,808                   | 3,716                      | 0.234                   |
| 2021-07-28 | 1,440,000                                | 2,000                      | 1,696,303                                | 1,290                      | 1,728,000                                | 2,400                      | 4,864,303                 | 14.9                        | 18,413                   | 5,690                      | 0.359                   |
| 2021-07-29 | 2,880,000                                | 2,000                      | 1,718,505                                | 1,300                      | 5,760,000                                | 4,000                      | 10,358,505                | 31.8                        | 39,211                   | 7,300                      | 0.461                   |
| 2021-07-30 | 840,000                                  | 1,000                      | 1,682,222                                | 1,235                      | 5,760,000                                | 4,000                      | 8,282,222                 | 25.4                        | 31,352                   | 6,235                      | 0.393                   |
| 2021-07-31 | 0  | 0                          | 1,727,374                                | 1,482                      | 0  | 0                          | 1,727,374                 | 5.3                         | 6,539                    | 1,482                      | 0.094                   |
| 2021-08-01 | 0  | 0                          | 1,812,687                                | 1,343                      | 0  | 0                          | 1,812,687                 | 5.6                         | 6,862                    | 1,343                      | 0.085                   |
| 2021-08-02 | 0  | 0                          | 1,709,980                                | 1,265                      | 0  | 0                          | 1,709,980                 | 5.2                         | 6,473                    | 1,265                      | 0.080                   |
| 2021-08-03 | 2,400,000                                | 2,000                      | 1,826,626                                | 1,406                      | 2,304,000                                | 3,200                      | 6,530,626                 | 20.0                        | 24,721                   | 6,606                      | 0.417                   |
| 2021-08-04 | 2,880,000                                | 2,000                      | 1,826,101                                | 1,369                      | 5,760,000                                | 4,000                      | 10,466,101                | 32.1                        | 39,618                   | 7,369                      | 0.465                   |
| 2021-08-05 | 1,440,000                                | 1,000                      | 1,798,000                                | 1,495                      | 2,880,000                                | 4,000                      | 6,118,000                 | 18.8                        | 23,159                   | 6,495                      | 0.410                   |
| 2021-08-06 | 1,440,000                                | 1,000                      | 1,770,445                                | 1,396                      | 2,304,000                                | 3,200                      | 5,514,445                 | 16.9                        | 20,874                   | 5,596                      | 0.353                   |
| 2021-08-07 | 0  | 0                          | 1,819,010                                | 1,452                      | 3,456,000                                | 2,400                      | 5,275,010                 | 16.2                        | 19,968                   | 3,852                      | 0.243                   |
| 2021-08-08 | 0  | 0                          | 1,198,687                                | 1,454                      | 1,728,000                                | 2,400                      | 2,926,687                 | 9.0                         | 11,079                   | 3,854                      | 0.243                   |
| 2021-08-09 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-08-10 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |

**Attachments**

**Reference: Daly Irrigation Development Project – 2021 Monitoring Report**

| Date       | Spud Plains (Keyriver)                   |                            | Redfern                                  |                            | Spud Plains                              |                            | Total Volume Pumped (gal) | Total Volume Pumped (ac-ft) | Total Volume Pumped (m³) | Max Pumping Rate (gal/min) | Max Pumping Rate (m³/s) |
|------------|--|----------------------------|--|----------------------------|--|----------------------------|---------------------------|-----------------------------|--------------------------|----------------------------|-------------------------|
|            | Intake Location: NW 10-12-21W            |                            | Intake Location: NW10-12-21W             |                            | Intake Location: NW10-12-21W             |                            |                           |                             |                          |                            |                         |
|            | Pump Capacity: 2000 US gpm (0.1262 m³/s) |                            | Pump Capacity: 2400 US gpm (0.1514 m³/s) |                            | Pump Capacity: 4000 US gpm (0.2542 m³/s) |                            |                           |                             |                          |                            |                         |
|            | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) |                           |                             |                          |                            |                         |
| 2021-08-11 | 0  | 0                          | 657,758                                  | 1,321                      | 0  | 0                          | 657,758                   | 2.0                         | 2,490                    | 1,321                      | 0.083                   |
| 2021-08-12 | 0  | 0                          | 1,821,010                                | 1,429                      | 0  | 0                          | 1,821,010                 | 5.6                         | 6,893                    | 1,429                      | 0.090                   |
| 2021-08-13 | 0  | 0                          | 1,829,758                                | 1,414                      | 0  | 0                          | 1,829,758                 | 5.6                         | 6,926                    | 1,414                      | 0.089                   |
| 2021-08-14 | 0  | 0                          | 1,797,414                                | 1,419                      | 0  | 0                          | 1,797,414                 | 5.5                         | 6,804                    | 1,419                      | 0.090                   |
| 2021-08-15 | 0  | 0                          | 1,789,556                                | 1,371                      | 0  | 0                          | 1,789,556                 | 5.5                         | 6,774                    | 1,371                      | 0.086                   |
| 2021-08-16 | 1,440,000                                | 2,000                      | 1,781,636                                | 1,361                      | 2,304,000                                | 3,200                      | 5,525,636                 | 17.0                        | 20,917                   | 6,561                      | 0.414                   |
| 2021-08-17 | 2,880,000                                | 2,000                      | 491,313                                  | 1,255                      | 4,608,000                                | 3,200                      | 7,979,313                 | 24.5                        | 30,205                   | 6,455                      | 0.407                   |
| 2021-08-18 | 1,680,000                                | 2,000                      | 1,108,909                                | 1,576                      | 2,304,000                                | 3,200                      | 5,092,909                 | 15.6                        | 19,279                   | 6,776                      | 0.427                   |
| 2021-08-19 | 2,880,000                                | 2,000                      | 656,081                                  | 1,222                      | 5,760,000                                | 4,000                      | 9,296,081                 | 28.5                        | 35,189                   | 7,222                      | 0.456                   |
| 2021-08-20 | 2,880,000                                | 2,000                      | 0  | 0                          | 5,760,000                                | 4,000                      | 8,640,000                 | 26.5                        | 32,706                   | 6,000                      | 0.379                   |
| 2021-08-21 | 120,000                                  | 1,000                      | 0  | 0                          | 0  | 0                          | 120,000                   | 0.4                         | 454                      | 1,000                      | 0.063                   |
| 2021-08-22 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-08-23 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-08-24 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-08-25 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-08-26 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-08-27 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-08-28 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-08-29 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-08-30 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-08-31 | 0  | 0                          | 358,121                                  | 1,068                      | 0  | 0                          | 358,121                   | 1.1                         | 1,356                    | 1,068                      | 0.067                   |
| 2021-09-01 | 0  | 0                          | 610,101                                  | 626                        | 0  | 0                          | 610,101                   | 1.9                         | 2,309                    | 626                        | 0.040                   |
| 2021-09-02 | 0  | 0                          | 728,364                                  | 992                        | 0  | 0                          | 728,364                   | 2.2                         | 2,757                    | 992                        | 0.063                   |

**Attachments**

**Reference: Daly Irrigation Development Project – 2021 Monitoring Report**

| Date       | Spud Plains (Keyriver)                   |                            | Redfern                                  |                            | Spud Plains                              |                            | Total Volume Pumped (gal) | Total Volume Pumped (ac-ft) | Total Volume Pumped (m³) | Max Pumping Rate (gal/min) | Max Pumping Rate (m³/s) |
|------------|--|----------------------------|--|----------------------------|--|----------------------------|---------------------------|-----------------------------|--------------------------|----------------------------|-------------------------|
|            | Intake Location: NW 10-12-21W            |                            | Intake Location: NW10-12-21W             |                            | Intake Location: NW10-12-21W             |                            |                           |                             |                          |                            |                         |
|            | Pump Capacity: 2000 US gpm (0.1262 m³/s) |                            | Pump Capacity: 2400 US gpm (0.1514 m³/s) |                            | Pump Capacity: 4000 US gpm (0.2542 m³/s) |                            |                           |                             |                          |                            |                         |
|            | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) |                           |                             |                          |                            |                         |
| 2021-09-03 | 0  | 0                          | 1,075,313                                | 952                        | 0  | 0                          | 1,075,313                 | 3.3                         | 4,071                    | 952                        | 0.060                   |
| 2021-09-04 | 0  | 0                          | 204,748                                  | 447                        | 0  | 0                          | 204,748                   | 0.6                         | 775                      | 447                        | 0.028                   |
| 2021-09-05 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-09-06 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-09-07 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-09-08 | 0  | 0                          | 451,495                                  | 1,066                      | 0  | 0                          | 451,495                   | 1.4                         | 1,709                    | 1,066                      | 0.067                   |
| 2021-09-09 | 0  | 0                          | 1,315,434                                | 1,013                      | 0  | 0                          | 1,315,434                 | 4.0                         | 4,979                    | 1,013                      | 0.064                   |
| 2021-09-10 | 0  | 0                          | 1,272,707                                | 952                        | 0  | 0                          | 1,272,707                 | 3.9                         | 4,818                    | 952                        | 0.060                   |
| 2021-09-11 | 0  | 0                          | 1,248,788                                | 904                        | 0  | 0                          | 1,248,788                 | 3.8                         | 4,727                    | 904                        | 0.057                   |
| 2021-09-12 | 0  | 0                          | 349,980                                  | 901                        | 0  | 0                          | 349,980                   | 1.1                         | 1,325                    | 901                        | 0.057                   |
| 2021-09-13 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-09-14 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-09-15 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-09-16 | 0  | 0                          | 479,758                                  | 1,247                      | 0  | 0                          | 479,758                   | 1.5                         | 1,816                    | 1,247                      | 0.079                   |
| 2021-09-17 | 0  | 0                          | 1,352,242                                | 1,108                      | 0  | 0                          | 1,352,242                 | 4.1                         | 5,119                    | 1,108                      | 0.070                   |
| 2021-09-18 | 0  | 0                          | 1,369,051                                | 997                        | 0  | 0                          | 1,369,051                 | 4.2                         | 5,182                    | 997                        | 0.063                   |
| 2021-09-19 | 0  | 0                          | 899,232                                  | 967                        | 0  | 0                          | 899,232                   | 2.8                         | 3,404                    | 967                        | 0.061                   |
| 2021-09-20 | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| 2021-09-21 | 0  | 0                          | 4,667                                    | 232                        | 0  | 0                          | 4,667                     | 0.0                         | 18                       | 232                        | 0.015                   |
| 2021-09-22 | 0  | 0                          | 23,192                                   | 401                        | 0  | 0                          | 23,192                    | 0.1                         | 88                       | 401                        | 0.025                   |
| 2021-09-23 | 0  | 0                          | 733,192                                  | 1,285                      | 0  | 0                          | 733,192                   | 2.3                         | 2,775                    | 1,285                      | 0.081                   |
| 2021-09-24 | 0  | 0                          | 1,342,141                                | 987                        | 0  | 0                          | 1,342,141                 | 4.1                         | 5,081                    | 987                        | 0.062                   |
| 2021-09-25 | 0  | 0                          | 1,356,283                                | 1,023                      | 0  | 0                          | 1,356,283                 | 4.2                         | 5,134                    | 1,023                      | 0.065                   |

**Attachments**

**Reference: Daly Irrigation Development Project – 2021 Monitoring Report**

| Date         | Spud Plains (Keyriver)                   |                            | Redfern                                  |                            | Spud Plains                              |                            | Total Volume Pumped (gal) | Total Volume Pumped (ac-ft) | Total Volume Pumped (m³) | Max Pumping Rate (gal/min) | Max Pumping Rate (m³/s) |
|--------------|--|----------------------------|--|----------------------------|--|----------------------------|---------------------------|-----------------------------|--------------------------|----------------------------|-------------------------|
|              | Intake Location: NW 10-12-21W            |                            | Intake Location: NW10-12-21W             |                            | Intake Location: NW10-12-21W             |                            |                           |                             |                          |                            |                         |
|              | Pump Capacity: 2000 US gpm (0.1262 m³/s) |                            | Pump Capacity: 2400 US gpm (0.1514 m³/s) |                            | Pump Capacity: 4000 US gpm (0.2542 m³/s) |                            |                           |                             |                          |                            |                         |
|              | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) | Volume Pumped (gal)                      | Max Pumping Rate (gal/min) |                           |                             |                          |                            |                         |
| 2021-09-26   | 0  | 0                          | 1,364,020                                | 1,030                      | 0  | 0                          | 1,364,020                 | 4.2                         | 5,163                    | 1,030                      | 0.065                   |
| 2021-09-27   | 0  | 0                          | 1,368,040                                | 985                        | 0  | 0                          | 1,368,040                 | 4.2                         | 5,179                    | 985                        | 0.062                   |
| 2021-09-28   | 0  | 0                          | 1,403,576                                | 1,038                      | 0  | 0                          | 1,403,576                 | 4.3                         | 5,313                    | 1,038                      | 0.065                   |
| 2021-09-29   | 0  | 0                          | 1,390,323                                | 1,043                      | 0  | 0                          | 1,390,323                 | 4.3                         | 5,263                    | 1,043                      | 0.066                   |
| 2021-09-30   | 0  | 0                          | 1,390,788                                | 1,028                      | 0  | 0                          | 1,390,788                 | 4.3                         | 5,265                    | 1,028                      | 0.065                   |
| 2021-10-01   | 0  | 0                          | 1,343,152                                | 997                        | 0  | 0                          | 1,343,152                 | 4.1                         | 5,084                    | 997                        | 0.063                   |
| 2021-10-02   | 0  | 0                          | 1,288,586                                | 992                        | 0  | 0                          | 1,288,586                 | 4.0                         | 4,878                    | 992                        | 0.063                   |
| 2021-10-03   | 0  | 0                          | 1,339,778                                | 1,015                      | 0  | 0                          | 1,339,778                 | 4.1                         | 5,072                    | 1,015                      | 0.064                   |
| 2021-10-04   | 0  | 0                          | 1,309,737                                | 1,023                      | 0  | 0                          | 1,309,737                 | 4.0                         | 4,958                    | 1,023                      | 0.065                   |
| 2021-10-05   | 0  | 0                          | 1,366,242                                | 975                        | 0  | 0                          | 1,366,242                 | 4.2                         | 5,172                    | 975                        | 0.061                   |
| 2021-10-06   | 0  | 0                          | 1,360,202                                | 1,015                      | 0  | 0                          | 1,360,202                 | 4.2                         | 5,149                    | 1,015                      | 0.064                   |
| 2021-10-07   | 0  | 0                          | 1,050,061                                | 937                        | 0  | 0                          | 1,050,061                 | 3.2                         | 3,975                    | 937                        | 0.059                   |
| 2021-10-08   | 0  | 0                          | 0  | 0                          | 0  | 0                          | 0                         | 0.0                         | 0                        | 0                          | 0.000                   |
| <b>Total</b> | <b>107,100,000</b>                       | <b>-</b>                   | <b>178,485,779</b>                       | <b>-</b>                   | <b>239,136,000</b>                       | <b>-</b>                   | <b>524,721,779</b>        | <b>1,610</b>                | <b>1,986,287</b>         | <b>7,639</b>               | <b>0.482</b>            |

**Attachments**

**Reference: Daly Irrigation Development Project – 2021 Monitoring Report**

**Attachment C**  
**Riffle Photos**

## Attachments

Reference: Daly Irrigation Development Project – 2021 Monitoring Report



Photo 1: Photo from August 24, 2017 (0.824 m<sup>3</sup>/sec estimated flow downstream of diversion) to provide a visual reference (approximation) of the lowest estimated flow rate downstream of the diversion in 2021 (June 15, 2021; 0.824 m<sup>3</sup>/sec) during the irrigation period.

## Attachments

Reference: Daly Irrigation Development Project – 2021 Monitoring Report



Photo 2: Photo from June 11, 2017 (9.34 m<sup>3</sup>/sec estimated flow downstream of diversion) to provide a visual reference (approximation) of the highest flow rate downstream of the diversion in 2021 (June 15, 2021; 9.27 m<sup>3</sup>/sec) during the irrigation period.