Water Measurement, Storage Pond Control Systems and Water Use Efficiency Policy

Date approved by Board: 6 April 2019
Commencement date: 6 April 2019
Review date: 3 years after commencement date

Purpose

This Policy is issued in relation to Environmental Management in terms of the Water Supply Agreements with Shareholders.

The purpose of this Policy is to support the meeting of reporting requirements for consents held by Waimakariri Irrigation Limited (WIL) on behalf of its Shareholders, and to support WIL in giving effect to the management and operation of the Scheme. It will also help drive water efficiency.

The Policy will ensure that water use within the Scheme can be accurately accounted for through water metering. It ensures WIL will have timely access to water meter data for operational, water accounting and reporting purposes. The Policy provides the parameters within which WIL Shareholders need to meter water takes, the thresholds and situations requiring metering, the levels of accuracy and the acceptable standards of equipment and operational integrity.

1. Water Measurement at Offtake

1.1. Water metering requirements (offtake point)

1.1.1. Water meters with telemetered data loggers are required in any of the following situations:
1.1.1.1. All takes on properties with a Farm Environment Plan (FEP), or
1.1.1.2. All Shareholders taking at a rate equal to or greater than 20lps, or
1.1.1.3. Any other circumstance at the discretion of the WIL Board.

1.2. Offtake structures

1.2.1. Where a Shareholder proposes a new offtake structure or to modify an existing offtake structure, the Shareholder must make a formal application in writing to the CEO of WIL showing the proposed offtake structure, including headworks configuration and intended flows for WIL approval. Such application is to be prepared by a registered engineer and/or a certified installer, as appropriate.

1.2.2. Before a Shareholder may draw water through a new or modified offtake it must be fitted with a WIL approved flowmeter, datalogger and telemetry device which must be installed, verified and certified to meet all current industry Codes of Practice. The Shareholder will meet all the costs associated with the above.

2. Storage Pond Control System

2.1. Water metering and control systems requirements

2.1.1. A water meter must be installed on the offtake side of the storage pond. The water meter can either be an inline device fitted to a pipe or open channel.

2.1.2. If the take is 20lps or more, a second water meter and telemetry device is required on the outlet side of the pump.

2.1.3. If the take is less than 20lps, a second water meter and telemetry device is not required on the outlet side of the pump.

2.1.4. All takes of 45lps or greater are required to have a WIL approved automated gate fitted on the offtake side of the storage pond.

3. Water Use Efficiency (NEWMS)

3.1. Water Use Efficiency measurements and actions

3.1.1. All Shareholders with an FEP will immediately establish on at least one irrigation block, a one on one relationship of a telemetered water meter at the irrigation system (e.g. a pivot) and at least one telemetered soil moisture monitoring sensor installed under the irrigation system that the one on one relationship has been installed on.

3.1.2. The telemetered data from the water meter and soil moisture monitoring sensor established in accordance with clause 3.1.1 must be compatible with the receiving Core Systems used or operated by WIL.

3.1.3. The Shareholder will generally follow the recommendations for efficient water irrigation generated by the Sensor Data System/Service.

4. Generic Requirements and Conditions

4.1. Ownership, responsibilities and costs

4.1.1. All water meters, soil moisture monitoring sensors and their telemetered dataloggers are the property of the Shareholder.

4.1.2. The Shareholder is responsible for ensuring, at its cost, that the telemetered dataloggers established in accordance with clause 3.1.1 transmit data collected to the receiving Core Systems used or operated by WIL.

4.1.3. The data collected from each take is owned by the Shareholder, but the Shareholder must grant WIL all rights to access, use, copy and store the data required by WIL, including authorising the data to be provided to, and used by, the provider of the Sensor Data System/Services for the purposes of WIL's use of the Sensor Data System/Services. WIL is permitted to provide such data to any regional council, local authority or governmental agency to the extent necessary to comply with the consents held.

4.1.4. The Shareholder is responsible for the maintenance and support of the water meters, soil moisture monitoring sensors and telemetered dataloggers.

4.1.5. The Shareholder is responsible for the purchase and installation costs of their water meter, soil moisture monitoring sensors and telemetry installation and for the on-going operations, maintenance, support and verification costs.

4.1.6. The Shareholder is responsible for obtaining, at its cost, access to the Sensor Data System/Service.

4.2. Data and telemetry requirements

4.2.1. Telemetered dataloggers must be capable of collecting and transmitting data in the time frames and format compatible with the receiving Core Systems used or operated by WIL.

4.2.2. The telemetered dataloggers shall provide:

4.2.2.1. Data collection at no less than 15-minute increments

4.2.2.2. Data transmission every 2 hours or less

4.2.3. Collection of annual water usage data is a condition of resource consents held by WIL on behalf of the Shareholders. If there are gaps in the data, such gaps can be interpreted as noncompliance with the consent conditions.

4.3. Water meter hardware requirements

4.3.1. The water meter hardware will be within the following parameters:

4.3.1.1. for closed pipe: in-line electromagnetic or insertion meter

4.3.1.2. for open channel: (NIWA Starflow, flume or rated channel)

4.3.2. If the Shareholder chooses to install hardware and/or telemetry that has not been ratified as compatible by the providers of the Core Systems used or operated by WIL, the Shareholder is responsible for all costs associated with ensuring compatibility.

4.4. Water meter verification programme

4.4.1. Every water meter must have independent certification of accuracy meeting national standards:
4.4.1.1. Upon installation, and
4.4.1.2. maximum of five yearly intervals.
4.4.2. To meet these requirements, a verification programme is coordinated and administered by WIL whereby:
4.4.2.1. 20% of water meters are verified each year
4.4.2.2. New and repaired water meters are verified
4.4.3. Where errors are identified that imply issues with water meters and/or telemetered dataloggers, WIL, either directly or through the providers of the Core Systems will inform the Shareholder. Shareholders must also notify WIL of such issues that the Shareholder discovers. Where there is an issue with a water meter and/or telemetered datalogger the Shareholder is responsible for the repair or replacement of the equipment concerned.
4.4.4. All water meters must meet accuracy standards equal to the National regulation's standards (closed pipe +/-5%, open channel +/- 10%) (NPS 2011).

5. Positioning of Water Meters, Storage Pond Control Systems and NEWMS Equipment (Figure 1)

5.1. Refer to Table 1 for Storage Pond Volumes

5.2. Water Race (diagram a)

5.2.1. A farm draws water directly from the water race . All takes 20lps or greater, or any property with an FEP, are required to have a flow meter and telemetry device fitted to the outlet side of the pump.
5.2.2. Any property with an FEP will establish on at least one irrigation block a one on one relationship of a telemetered water meter at the irrigation system (e.g. a pivot) and at least one telemetered soil moisture monitoring sensor installed under the irrigation system the one on one relationship has been installed on.

5.3. Small Storage Pond < 25,000m3 Lined (diagram b)

5.3.1. A farm draws water from a lined buffer pond. All takes 20lps or greater, or any property with an FEP, is required to have a flow meter and telemetry device fitted to the outlet side of the pump.
5.3.2. Any property with an FEP will establish on at least one irrigation block a one on one relationship of a telemetered water meter at the irrigation system (e.g. a pivot) and at least one telemetered soil moisture monitoring sensor installed under the irrigation system the one on one relationship has been installed on.

5.4. Small Storage Pond < 25,000m3 Un-lined (diagram c)

5.4.1. A farm draws water from an unlined storage pond. Irrespective of flow, a water meter must be installed on the offtake side of the buffer pond. The water meter can either be an inline device fitted to a pipe, or to an open channel.
5.4.2. If the take is less than 20lps, a second water meter and telemetry device is not required on the outlet side of the pump.
5.4.3. All takes 20lps or greater, or any property with an FEP, is required to have a flow meter and telemetry device fitted to the outlet side of the pump.

5.4.4. Any property with an FEP will establish on at least one irrigation block a one on one relationship of a telemetered water meter at the irrigation system (e.g. a pivot) and at least one telemetered soil moisture monitoring sensor installed under the irrigation system the one on one relationship has been installed on.

5.5. Note: WIL strongly recommends that any existing small storage pond < 25,000m3 is lined to avoid the requirement and need to have a water meter fitted to the offtake side of the pond.

5.6. Large Storage Pond > 25,000m3 (diagram d)

5.6.1. A water meter must be installed on the upstream side of the storage pond. The water meter can either be an inline device fitted to a pipe or open channel.

5.6.2. If the take is 20lps or more, a second water meter and telemetry device is required on the outlet side of the pump.

5.6.3. If the take is less than 20lps, a second water meter and telemetry device is not required to fitted to the outlet side of the pump.

5.6.4. All takes 45lps or greater are required to have an automated gate fitted on the upstream side of the storage pond.

5.6.5. All Storage Ponds must comply with the NZSOLD Dam Safety Guidelines 2015 and be signed off by a WIL appointed Engineer before filling (refer to WIL On-Farm Pond Requirements).

5.6.6. Any property with an FEP will establish on at least one irrigation block a one on one relationship of a telemetered water meter at the irrigation system (e.g. a pivot) and at least one telemetered soil moisture monitoring sensor installed under the irrigation system the one on one relationship has been installed on.

5.7. Note: All existing On-farm Storage Ponds a take 45lps or greater will be required to install an automated gate by 1 September 2021

6. Compliance Reference Documents

The relevant consent and policy sections:

- Water Take and Use Consent (CRC166677 Section 8)
- Discharge Consent (CRC184861 Section 13)
- Environmental Management Strategy (EMS Section 7)
- Water Supply Agreement (WSA Sections 1.3, 13.1, 13.3, 16 and 17)

These reference documents can be found on the WIL website.

https://www.wil.co.nz/environment/company-policies/

Supporting Policies:

- WIL On-Farm Storage Requirements

Definitions

Terms defined in the Water Supply Agreement that are used in this Policy have the meaning given to them in the Water Supply Agreement.

Other terms have the following meanings:

Automated Gate: Electrical or hydraulically controlled gates linked to and managed by the NIWA Core System. This provides precise water-level control, the ability of changing the set points, and can be managed remotely.

Core Systems: The Core Systems linked to water use efficiency, water metering, telemetered dataloggers and storage pond flow monitoring and controls are the Regen, Watermetrics and NIWA systems.

Flow meter: Electronic/digital and must be clamp-on or inline. All water meters must meet accuracy standards equal to the National regulation's standards (closed pipe +/-5%, open channel +/- 10%) (NPS 2011).

Inlet: Closed pipe immediately upstream of pumping infrastructure.

Irrigation System: Typically, either a pivot, linear, rotary, traveller, K-line, fixed grid.

Lined Pond: Typically, a synthetic liner (HDPE) or packed clay (signed off by a qualified engineer).

NEWMS (Nitrogen and environmental water management system)**:** WIL program to measure water use efficiency which requires any property with an FEP will establish on at least one irrigation block a one on one relationship of a telemetered water meter and the irrigation system (e.g. a pivot) and at least one telemetered soil moisture monitoring sensor installed under the irrigation system the one on one relationship has been installed on.

NIWA: National Institute of Water and Atmospheric Research.

Offtake: Position of take on WIL supply race.

Open Channel Meter: Measures flow through a rated channel, typical use is measuring flow into storage ponds.

Outlet: Closed pipe immediately downstream of pumping infrastructure but before all irrigator/stockwater/other use.

Regen: Regen Limited.

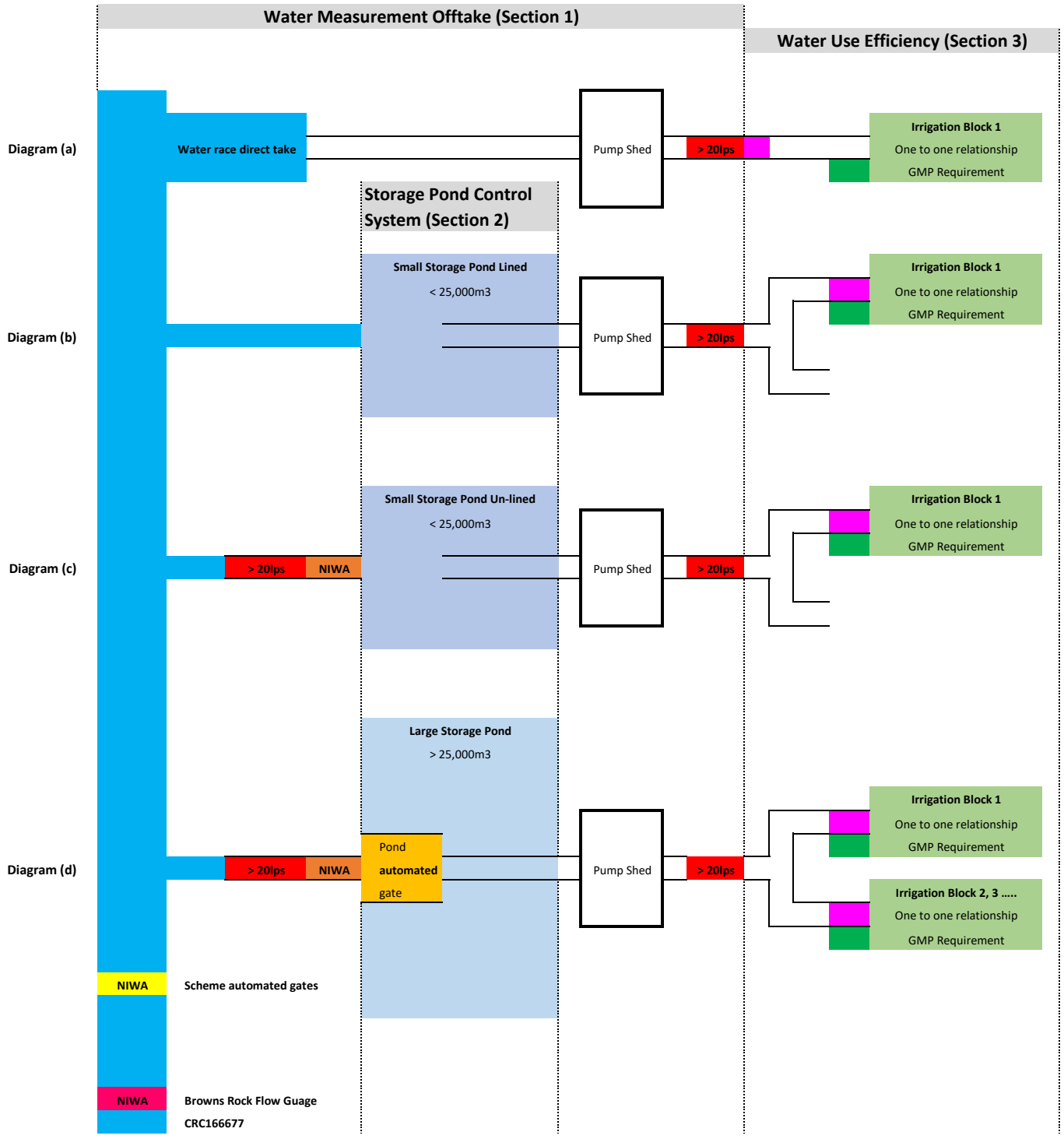
Sensor Data System/Service: The third-party system/service approved by WIL that provides water management, environmental monitoring and reporting services, including daily irrigation scheduling recommendations, currently being the system/service provided by Regen.

Storage Pond Small: Under 25,000m3.

Storage Pond Large: Equal to or over 25,000m3.

Watermetrics: Arthur D. Riley and Company Limited trading as Watermetrics.

FIGURE 1



	Location	Type
NIWA	Browns Rock	Stilling Well
NIWA	Across race network (x20)	Automated gate via stilling well
NIWA	On-farm	Flume (NIWA Starflow or flume or rated channel)
NIWA	On-farm storage pond	Pond automated gate via stilling well or in-pipe flowmeter
> 20lps	On-farm	Electromagnetic Flowmeter (clamp-on, inline or insertion)
Regen	Paddock	In-pipe Electromagnetic flowmeter (Inline or insertion)
Regen	Paddock	Telemetered soil moisture monitoring sensor

TABLE 1 - Storage Volumes

Shares	Flow lps	Hectares Irrigated @ 7/ha		Number of Days Storage 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
100	7.50	14.29		648	1296	1944	2592	3240	3888	4536	5184	5832	6480	7128	7776	8424	9072	9720
200	15.00	28.57		1296	2592	3888	5184	6480	7776	9072	10368	11664	12960	14256	15552	16848	18144	19440
300	22.50	42.86		1944	3888	5832	7776	9720	11664	13608	15552	17496	19440	21384	23328	25272	27216	29160
400	30.00	57.14		2592	5184	7776	10368	12960	15552	18144	20736	23328	25920	28512	31104	33696	36288	38880
500	37.50	71.43		3240	6480	9720	12960	16200	19440	22680	25920	29160	32400	35640	38880	42120	45360	48600
600	45.00	85.71		3888	7776	11664	15552	19440	23328	27216	31104	34992	38880	42768	46656	50544	54432	58320
700	52.50	100.00		4536	9072	13608	18144	22680	27216	31752	36288	40824	45360	49896	54432	58968	63504	68040
800	60.00	114.29		5184	10368	15552	20736	25920	31104	36288	41472	46656	51840	57024	62208	67392	72576	77760
900	67.50	128.57		5832	11664	17496	23328	29160	34992	40824	46656	52488	58320	64152	69984	75816	81648	87480
1000	75.00	142.86		6480	12960	19440	25920	32400	38880	45360	51840	58320	64800	71280	77760	84240	90720	97200
1100	82.50	157.14		7128	14256	21384	28512	35640	42768	49896	57024	64152	71280	78408	85536	92664	99792	106920
1200	90.00	171.43		7776	15552	23328	31104	38880	46656	54432	62208	69984	77760	85536	93312	101088	108864	116640
1300	97.50	185.71		8424	16848	25272	33696	42120	50544	58968	67392	75816	84240	92664	101088	109512	117936	126360
1400	105.00	200.00		9072	18144	27216	36288	45360	54432	63504	72576	81648	90720	99792	108864	117936	127008	136080
1500	112.50	214.29		9720	19440	29160	38880	48600	58320	68040	77760	87480	97200	106920	116640	126360	136080	145800
1600	120.00	228.57		10368	20736	31104	41472	51840	62208	72576	82944	93312	103680	114048	124416	134784	145152	155520
1700	127.50	242.86		11016	22032	33048	44064	55080	66096	77112	88128	99144	110160	121176	132192	143208	154224	165240
1800	135.00	257.14	Small Storage Pond	11664	23328	34992	46656	58320	69984	81648	93312	104976	116640	128304	139968	151632	163296	174960
1900	142.50	271.43		12312	24624	36936	49248	61560	73872	86184	98496	110808	123120	135432	147744	160056	172368	184680
2000	150.00	285.71		12960	25920	38880	51840	64800	77760	90720	103680	116640	129600	142560	155520	168480	181440	194400
2100	157.50	300.00		13608	27216	40824	54432	68040	81648	95256	108864	122472	136080	149688	163296	176904	190512	204120
2200	165.00	314.29		14256	28512	42768	57024	71280	85536	99792	114048	128304	142560	156816	171072	185328	199584	213840
2261	169.58	323.00		14651	29303	43954	58605	73256	87908	102559	117210	131862	146513	161164	175815	190467	205118	219769
2300	172.50	328.57		14904	29808	44712	59616	74520	89424	104328	119232	134136	149040	163944	178848	193752	208656	223560
2400	180.00	342.86		15552	31104	46656	62208	77760	93312	108864	124416	139968	155520	171072	186624	202176	217728	233280
2500	187.50	357.14		16200	32400	48600	64800	81000	97200	113400	129600	145800	162000	178200	194400	210600	226800	243000
2600	195.00	371.43		16848	33696	50544	67392	84240	101088	117936	134784	151632	168480	185328	202176	219024	235872	252720
2700	202.50	385.71		17496	34992	52488	69984	87480	104976	122472	139968	157464	174960	192456	209952	227448	244944	262440
2800	210.00	400.00		18144	36288	54432	72576	90720	108864	127008	145152	163296	181440	199584	217728	235872	254016	272160
2900	217.50	414.29		18792	37584	56376	75168	93960	112752	131544	150336	169128	187920	206712	225504	244296	263088	281880
3000	225.00	428.57		19440	38880	58320	77760	97200	116640	136080	155520	174960	194400	213840	233280	252720	272160	291600
3255	244.13	465.00		21092	42185	63277	84370	105462	126554	147647	168739	189832	210924	232016	253109	274201	295294	316386
3283	246.23	469.00		21274	42548	63822	85095	106369	127643	148917	170191	191465	212738	234012	255286	276560	297834	319108
3446	258.45	492.29		22330	44660	66990	89320	111650	133980	156311	178641	200971	223301	245631	267961	290291	312621	334951
3639	272.93	519.86		23581	47161	70742	94323	117904	141484	165065	188646	212226	235807	259388	282969	306549	330130	353711
5285	396.38	755.00	Large S/Pond	34247	68494	102740	136987	171234	205481	239728	273974	308221	342468	376715	410962	445208	479455	513702
5286	396.45	755.14		34253	68507	102760	137013	171266	205520	239773	274026	308280	342533	376786	411039	445293	479546	513799
7252	543.90	1036.00		46993	93986	140979	187972	234965	281958	328951	375944	422937	469930	516923	563916	610908	657901	704894
8400	630.00	1200.00		54432	108864	163296	217728	272160	326592	381024	435456	489888	544320	598752	653184	707616	762048	816480

Volume of Storage Required m3