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Your Ref: D61112
Our Ref: CEO1252013

27 June 2013

Mr P Kelly
Executive Director Licensing, Monitoring and Customer Protection
Economic Regulation Authority
Level 4 Albert Facey House
469-489 Wellington Street
PERTH WA 6000

Dear Mr Kelly

FARMLANDS SCHEME PERFORMANCE MEASURES

In June 2011, the Water Corporation (Corporation) sent a request to the Economic Regulation Authority (ERA) to change the Minimum Flow measurement criteria for Farmlands and Rural Water Supply Schemes (Farmlands). This request resulted from a Business Improvement Recommendation in the 2008/09 Operational Audit of the Corporation's Operating Licence.

The Operating Licence specifies minimum flows of:

- ***Farmlands services*** - Over a 24 hour period, 11.2 L/ha/day and 3kL/day per occupied house.

- ***Rural Water Supply Schemes*** - Over a 24 hour period, 5.6 L/ha/day and 1.8kL/day per occupied house.
-

The 2008/09 audit found that the Corporation was unable to report practically on the performance of Farmlands schemes, as these flow measurement criteria did not accurately represent the service being delivered and did not match the original design criteria of the schemes.

Therefore, the June 2011 application suggested the following approach to measuring Minimum Flow for Farmlands schemes (in track changes) which is more compatible with the service being delivered:

Area	Minimum ~~Static~~ Pressure (metres of water)	Maximum ~~Static~~ Pressure (metres of water)	Minimum Flow
Farmland services supplied from the Goldfields and Agriculture Water Supply, the Great Southern Town Water Supply Scheme and Mid West Region	Not Applicable	200	~~Over a 24 hour period 11.2 L/ha/day and 3kL/day per occupied house~~. 3kL/day per service
Rural Water Supply Schemes	Not Applicable	200	~~Over a 24 hour period 5.6 L/ha/day and 1.8kL/day per occupied house.~~ 1.8kL/day per service

With the following target:

Service Standard	How Is It Measured	Performance Indicator / Targets
Farmlands area water systems – pressure and flows are kept within the acceptable range	~~Number of connected properties with confirmed water pressure/flow faults divided by total number of potable water connected properties expressed as a % and then subtracted from 100.~~ ~~Flow is measured free to air with downstream pipe work disconnected at the meter. Pressure is measured as static pressure (no flow) at the same point~~ From complaints received, the number of services with confirmed water pressure/flow faults divided by total number of water service connections expressed as a % and then subtracted from 100. The flow rate and dynamic pressure is measured at the meter over a period, so as to confirm the available flow meets the minimum standard. Does not include poor pressure due to bursts or planned activities.	In the preceding 12 month period 99.8% of farmlands water systems customers have, at the outlet of the water meter to their property, a water pressure and flow as listed above.

The requested change to the Operating Licence generated a significant number of responses from the public, primarily based on the following issues:

- The perception of a diminished level of services.
- Concern that the 'land size' component of the measure was being removed.
- No consideration being given when additional water supply was needed.
- A lack of consultation.

Other issues raised included pricing and improvement in infrastructure.

To address these concerns, the Water Corporation engaged an Independent Expert, Deloitte Australia, to determine:

- If any customers would be worse off as a result of the proposed change.
- Whether the change would have any impact on supply agreements between the Corporation and its customers.
- If the Corporation has adequate processes to identify the nature and number of services provided under the Farmlands and Rural Water Supply Schemes.

Deloitte conducted a rigorous and thorough investigative analysis of the Water Corporation proposal and its supporting systems and procedures. The review confirmed the appropriateness and accuracy of the methodologies, assumptions and mathematical calculations used by the Corporation to develop the proposed measurements.

No adverse conclusions were made or detrimental findings uncovered, and the Deloitte Report supports the Water Corporation proposal. The Report also provides an assurance that the introduction of these metrics should have no impact at all on farmers or customers.

The Deloitte Report and an Executive Summary is attached.

In an effort to ease concerns and to better explain the proposed changes, Water Corporation staff and the independent expert from Deloitte undertook discussions with various stakeholder groups including the WA Farmer's Federation (WAFF) and the Western Australian Local Government Association (WALGA).

At the request of these stakeholders, the Water Corporation and Deloitte also delivered a joint presentation of the proposed changes at two WALGA Country Zone meetings and the Rural Water Council. Key messages were:

- The changes are administrative only and will have no impact on the amount or pressure of water delivered to customers serviced by Farmlands schemes.

- The proposed changes have been independently reviewed by Deloitte Australia, and that review confirmed that the changes should have no adverse impact on customers.

- The changes are simply a more straightforward way to measure the Corporation's customer service obligations to the ERA as the current measurement is not a true representation of the service being delivered.

These presentations were well received and also provided an opportunity for the Water Corporation to answer more specific questions in a forum where customers could express their individual concerns.

Based on the findings in the Deloitte Report, the Water Corporation requests the ERA accept the request to amend the Corporation's Operating Licence to reflect the following:

Area	Minimum Pressure (metres of water)	Maximum Pressure (metres of water)	Minimum Flow
Farmland services supplied from the Goldfields and Agriculture Water Supply, the Great Southern Town Water Supply Scheme and Mid-West Region	Not Applicable	200	3kL/day per service
Rural Water Supply Schemes	Not Applicable	200	1.8kL/day per service

With the following target:

Service Standard	How Is It Measured	Performance Indicator / Targets
Farmlands area water systems – pressure and flows are kept within the acceptable range	From complaints received, the number of services with confirmed water pressure/flow faults divided by total number of water service connections expressed as a % and then subtracted from 100. The flow rate and dynamic pressure is measured at the meter over a period, so as to confirm the available flow meets the minimum standard. Does not include poor pressure due to bursts or planned activities.	In the preceding 12 month period 99.8% of farmlands water systems customers have, at the outlet of the water meter to their property, a water pressure and flow as listed above.

If you have any questions on this matter, please contact Andrew Pascoe, Water Corporation Manager Regulation and Compliance on telephone 9420 2025.

Yours sincerely

[redacted]

Peter D Moore
ACTING CHIEF EXECUTIVE OFFICER

Att

Water Corporation

Principal Finding

Assessment of proposed changes to the measurement of water flow in Farmlands and Rural Water Supply

21 June 2013

Deloitte Touche Tohmatsu
ABN 74 490 121 060

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Wayne Kearney
Manager, Risk & Audit Assurance
Water Corporation
629 Newcastle Street
Leederville WA 6007

21 June 2013

Dear Wayne

Re: Principal Finding - Assessment of proposed changes to the measurement of water flow in Farmlands and Rural Water Supply Schemes

Please find attached the summary report, Principal Finding, relating to the assessment of the proposed amendment to Operating Licence of the Water Corporation. We would like to thank you for giving Deloitte the opportunity to assist.

Should you have any questions or comments, please do not hesitate to contact me on (08) 9365 7024 or Duy Vo on (08) 9365 7209.

Yours sincerely

Richard Thomas
Partner
Deloitte Touche Tohmatsu

Inherent Limitations

The Services provided are advisory in nature and have not been conducted in accordance with the standards issued by the Australian Auditing and Assurance Standards Board and consequently no opinions or conclusions under these standards are expressed.

Because of the inherent limitations of any internal control structure, it is possible that errors or irregularities may occur and not be detected. The matters raised in this report are only those which came to our attention during the course of performing our procedures and are not necessarily a comprehensive statement of all the weaknesses that exist or improvements that might be made.

Our work is performed on a sample basis; we cannot, in practice, examine every activity and procedure, nor can we be a substitute for management's responsibility to maintain adequate controls over all levels of operations and their responsibility to prevent and detect irregularities, including fraud.

Any projection of the evaluation of the control procedures to future periods is subject to the risk that the systems may become inadequate because of changes in conditions, or that the degree of compliance with them may deteriorate.

Recommendations and suggestions for improvement should be assessed by management for their full commercial impact before they are implemented.

We believe that the statements made in this report are accurate, but no warranty of completeness, accuracy, or reliability is given in relation to the statements and representations made by, and the information and documentation provided by the Water Corporation personnel. We have not attempted to verify these sources independently unless otherwise noted within the report.

Limitation of Use

This report is intended solely for use by the Water Corporation in accordance with our letter of engagement of 20 December 2011, and is not intended to be and should not be relied upon by any other person or entity. We acknowledge that this report will be published on the Economic Regulation Authority's website, however we do not accept responsibility to anyone other than the Water Corporation for our work, for this report, or for any reliance which may be placed on this report by any party other than the Water Corporation.

Principal Finding

Please note that this summary is an extract of the detailed report. It needs to, and should, be read in conjunction with the full report that sets out the objectives, scope and terms of reference of this assessment.

Purpose

The primary purpose of the engagement is to assess whether any customers will or may be adversely impacted by the proposed changes to the minimum flow measures and service standard measures for Farmland services and Rural Water Supply Scheme services in the Corporation's Water Operating Licence no. 32, as detailed in the Corporation's letter to the Authority, dated 10 June 2011.

Summary finding

Customers should not be adversely impacted by the proposed changes to the minimum flow measures and service standard measures for Farmland services and Rural Water Supply Schemes in the Corporation's Water Operating Licence no. 32, as detailed in the Water Corporation's letter to the Authority, dated 10 June 2011.

Detailed analysis

The suggested change:

- 3 kℓ/day per service for Farmlands; and
- 1.8 kℓ/day per service for Rural Water Supply Schemes

from:

- 11.2 ℓ/ha/day and 3 kℓ/day per occupied house for Farmlands; and
- 5.6 ℓ/ha/day and 1.8 kℓ/day per occupied house for Rural Water Supply Schemes

seeks to remedy an anomaly that exists in the wording of the Corporation's *Water Operating Licence no. 32* where only some elements of the design criteria for Farmlands service and Rural Water Supply Schemes have been stated. The proposed change re-aligns the existing measurement with the hydraulic principles within the Corporation's design criteria to enable a more practical basis for measuring service standard.

It appears that the misconception of a linear relationship between land size and service levels has been predicated on the belief of an entitlement to a certain volume of water based on land size holding. As a result, the removal of reference to land in the proposed change to the performance metric has been surmised to cause a diminished service delivery.

The information we examined did not indicate a connection between property dimension and entitlement to a volume of water. Indeed the commercial relationship between the Corporation and its customers is simply a user-pays system, similar to other utility services such as gas and electricity, where customers pay for the amount of water they drawdown from the networks. There is no guaranteed volume or allocation of water.

An inherently difficult concept which has been a subject of significant disagreement has been the question:

"*How can (the proposed) 3 kℓ/day per service be the same as 11.2 ℓ/ha/day and 3 kℓ/day per occupied house (for Farmlands)*?"

To address this question, it is important to consider each element of the design criteria in detail.

Within the water infrastructure capital works funding submissions by the State parliament to the Commonwealth government in*1946 and 1963*, "*Comprehensive Agricultural Areas and Goldfields Water Supply Scheme*", it was identified that the "*11.2 ℓ/ha/day*" is a hydration requirement for livestock and originates from the design of distribution pipeline sizes. Put simply, the *11.2 ℓ/ha/day* constant is a design criterion and not a function for determining an allocation of a volume of water.

In terms of land size, the actual land area of a property is only relevant to the extent of the rated area (800m by 2.5 km), which describes a serviceable area within the property that can have a water service in accordance with the Corporation's hydraulic principles for network design.

The flow rate of 2.24 kℓ/day per service for Farmlands is the result of combining the hydration constant, *11.2 ℓ/ha/day*, with the hydraulic principles, 800m by 2.5km [11.2ℓ/ha/day x ((0.8km x 2.5km) x 100 ha)/ 1,000 ℓ]. So, by adhering to the design calculation, regardless of property size, each service on a Farmlands property will have a flow rate of 2.24 kℓ/day or 1.56 L/min.

Under the suggested change, the Corporation's Operating Licence will prescribe that the Corporation will provide an assured minimum level of service for:

- Farmlands based on the roundup figure of 3kℓ/day per service; and
- Rural Water Supply Schemes based on the roundup figure of 1.8 kℓ/day per service.

The reference to an addition of "…*plus 3kℓ per day for each occupied house (for Farmlands)*" and "… *1.8 kℓ/day per occupied house (for Rural Water Supply Schemes)"* is an assumption in the design criteria that each property has an occupied house. It is important to emphasise the obvious point that, in order for a house to receive water, it must be connected to a service. As previously noted, the design criteria prescribed that each service has a flow rate of 3kℓ/day to Farmlands areas and 1.8 kℓ/day per service for the Rural Water Supply Schemes. Of course, in practice, it is not mandatory for a property to have an occupied house, however where it does, the design criteria for the service is a flow rate of 3kℓ/day for Farmlands and 1.8 kℓ/day per service for the Rural Water Supply Schemes.

Much confusion and misunderstanding from the metric "…*plus 3kℓ per day for each occupied house (for Farmlands)*" and "… *1.8 kℓ/day per occupied house (for Rural Water Supply Schemes)"* has revolved around the view of an entitlement to a volume of water. However, as explained, the reference to the house is designed for the purpose of ascribing a service flow rate (3 kℓ per day for the service) where an occupied house exists on a property and not a pre-determined allocation of a volume of water to a given property.

Prima facie, when viewed in the absence of an understanding of how water is delivered to a property, the metrics "*11.2 ℓ/ha/day and 3 kℓ/day per occupied house for Farmlands*" and "*5.6 ℓ/ha/day and 1.8 kℓ/day per occupied house for Rural Water Supply Schemes*" appear to designate an allocation of water. It follows that any reform to the way the current metric is written will unintentionally cause apprehension in the community. As described earlier, written in the current form, the metrics have articulated only partially the design criteria of how water is transported to a property. However, unless all factors of the design criteria are included in the performance measure, they result in a different obligation than that intended.

Rather, a more appropriate construction for the performance measures would be the Corporation's suggested wording change, 3 kℓ/day per service for Farmlands and 1.8 kℓ/day per service for Rural Water Supply Schemes, which incorporates the hydraulic principles (800m x 2.5km) and the design criteria factors, 11.2 ℓ/ha/day for Farmlands; and 5.6 ℓ/ha/day for Rural Water Supply Schemes.

Water Corporation

Assessment of proposed changes to the measurement of water flow in Farmlands and Rural Water Supply Schemes

21 June 2013

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Mr Wayne Kearney
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21 June 2013

Dear Wayne,

Re: Assessment of proposed changes to the measurement of water flow in Farmlands and Rural Water Supply Schemes

Please find attached the report relating to the assessment of the proposed amendment to Operating Licence of the Water Corporation. We would like to thank you for giving Deloitte the opportunity to assist.

Should you have any questions or comments, please do not hesitate to contact me on (08) 9365 7024 or Duy Vo on (08) 9365 7209.

Yours sincerely,

Richard Thomas
Partner
Deloitte Touche Tohmatsu

Contents

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1.1 Context

The 2009 Operational Audit of the Water Corporation (Corporation)'s licence performed by Grant Thornton identified the Corporation's inability to practically measure the performance of services under the Farmlands and Rural Water Supply Schemes.

Pursuant to the recommendation of the Auditor, the Corporation had engaged with the Economic Regulation Authority (Authority) to suggest an alternative approach of measuring Farmlands and Rural Water Supply Schemes' performance.

In summary, the suggested change is for a flat:

- 3 kℓ/day per service for Farmlands
- 1.8 kℓ/day per service for Rural Water Supply Schemes.

from:

- 11.2 ℓ/ha/day and 3 kℓ /day per occupied house for Farmlands
- 5.6 ℓ/ha/day and 1.8 kℓ /day per occupied house for Rural Water Supply Schemes.

In addition, the Corporation proposed to change the manner in which pressure and flow is measured by attaching a data recorder device to the connection.

Under an agreement between the Corporation and the Authority, Deloitte was appointed by the Corporation on 20 December 2011 to independently conduct an assessment of the suggested change to the measurement of water flow under the Farmlands and Rural Water Supply Schemes for the Corporation.

Essentially, the aim of the assessment is to determine whether any customers would be adversely impacted by the suggested changes to the Operating Licence.

1.2 Purpose and scope

The purpose of the engagement is to assess whether:

- Any customers will or may be adversely impacted by the proposed changes to the minimum flow measures and service standard measures for Farmland services and Rural Water Supply Scheme services in the Corporation's Water Operating Licence no. 32, as detailed in the Corporation's letter to the Authority, dated 10 June 2011
- The proposed changes to the flow standards in the licence recommended by the Corporation will have any impact on the existing supply agreements between the Corporation and customers in the Rural Water Supply and Farmlands Schemes, and, if so, the extent of that impact
- The Corporation's "Community Agreements" provide for a minimum delivery of flow rate, and whether the proposed changes to the minimum flow measures will result in a diminished flow to the customers under that agreement
- The Corporation has adequate mapping systems and appropriate supporting processes to identify the nature of services and the number of services within the Farmland and Rural Water Supply Schemes
- The current supply contracts/agreements with customers in the Farmlands and Rural Water Supply Schemes include a minimum delivery of water supply. A sample of 40 of the Services By Agreements (SBA) was adopted for this purpose
- The current supply connection policy for the Farmlands and Rural Water Supply Schemes includes a requirement by the Corporation to provide a minimum delivery of water to customers.

1.3 Work performed

We have undertaken the following approach:

- Read the stakeholders' submissions registered with the Economic Regulation Authority
- Summarised the submissions into themes
- Discussed with the relevant Corporation staff to understand the proposed changes
- Documented existing and 'future' processes
- Analysed a sample of SBAs
- Considered the Corporation's management of the mapping of services in the Farmlands and Rural Water Supply Schemes
- Assessed the expected impact and compared to the perceptions contained in the submissions
- Confirmed observations with management
- Consulted with key stakeholders such as WA Farmers Federation, WA Local Government Association and local government representatives in Kulin, Hyden and Northam.

1.4 Analysis of submissions received

1.4.1 Overview

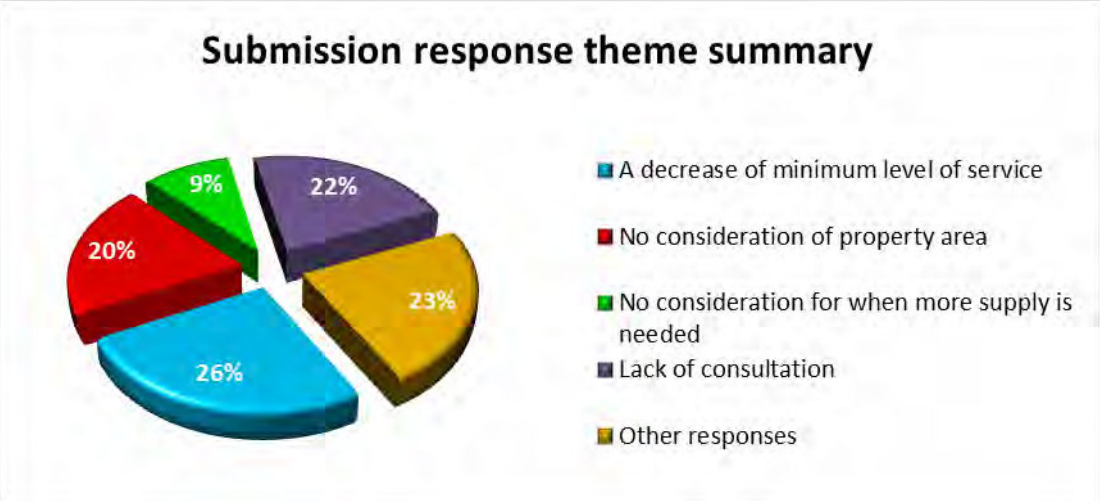
Criticisms have been levelled at the Corporation that the suggested approach to changing the performance standard will degrade the level of service delivery to Farmlands and Rural Water Supply Schemes.

The Authority advertised the Corporation's suggested change for public consultation. 52 submissions were received, including responses from the Department of Water, public, local government, businesses and industry associations. The prevailing perception is that the proposed change will diminish existing service levels to the Farmlands and Rural Water Supply Schemes.

As each submission contains several issues, the analysis documented the issues raised in all of the submissions, aggregated them and then summarised into themes.

Figure 1.1 below provides a summary of the issues contained in the submissions.

Figure 1.1



In approximately 26% of the issues submitted, landholders expressed concerns that their overall level of services would be reduced by the proposed change, while 20% of the issues related to a fear that the

proposal removes the existing reference to property size from service standards. 9% of the submissions identified a potential lack of water for livestock and reduction in capacity to combat bushfires because the proposed change would cause a reduction of water supply.

Further, 22% of the issues related to the administration of the amendment process, whereby the public conveyed that more consultation with the wider community was required and further assessment of the amendment's impact was necessary.

The balance of the submissions, 23%, raised a variety of issues:

- Rural water pricing is already too high
- Additional costs incurred to import water or build storage
- The Corporation ignores its obligation to improve existing pipeline infrastructure
- Landowners need to decrease livestock levels to match the proposed amended licence condition
- The Corporation breached current contracts
- Lack of alternative source of water supply when the service standard diminished under the proposed change
- Possible economic effect on the farming industry
- Greater need for water quantity due to excess consumption by large industries such as mining
- Negative effect on the livestock industry.

The assessment focuses on the two primary issues relating to the perception of diminished level of service and the notion of entitlement to a volume of water based on the size of land holding, as the other concerns are effectively corollaries of these two matters.

To enable a comparison of the existing state and the proposed change by the Corporation and assess its impact, it is imperative to gain an understanding of the regulatory intent and identify the driver of the current performance metric for Farmlands and Rural Water Supply Schemes. We have set out in Appendix 2 an overview of the relevant policy frameworks and their interaction with the proposed change by the Corporation.

1.4.2 Detailed analysis

The next sections provide a detailed analysis of the components of the performance metric and attempt to explain how this metric was created:

- 11.2 ℓ/ha/day and 3 kℓ/day per occupied house for Farmlands
- 5.6 ℓ/ha/day and 1.8 kℓ/day per occupied house for Rural Water Supply Schemes.

1.4.2.1 From where did the "11.2 ℓ/ha/day" figure originate?

The "11.2 ℓ/ha/day" reference was derived from a submission paper to the Commonwealth Government in the 1960s (refer to Appendix 1) applying for funding to construct infrastructures supplying water to the agricultural areas.

The design of the distribution pipeline sizes were based on the "11.2 ℓ/ha/day" (refer to Appendix 2), which was the hydration requirement for different types of stock and domestic consumption expressed over *1000 acres of land*. The calculation is as follows:

• 450 sheep @ 1 gallon per head per day	450 gallons
• 4 cattle @ 10 gallons per head per day	40 gallons
• 5 pigs @ 2 gallons per head per day	10 gallons
• 3 persons @ 100 gallons per head per day	300 gallons
• Total per summer day	800 gallons

Experience on previous agricultural extensions indicated that on very hot days, stock required water at a rate approximately 1.3 times the consumption of the average summer day. Within the submission paper, it was noted that the 800 gallons was escalated by a factor of 1.3 to yield 1040 gallons, providing a buffer for a notional maximum consumption. The 1040 gallons was then rounded down to 1000 gallons expressed over 1000 acres of land.

The conversion to metric unit is thus:

- 1000 acres = 405 ha
- 1000 gallons = 4.546 kℓ
- 4,546 ℓ /405 ha/day = 11.22469 ℓ/ha/day (rounded to 11.22 ℓ/ha/day).

Through discussions with the Corporation's staff, it was identified that the 5.6 ℓ/ha/day hydration constant for the Rural Water Supply Scheme is derived from a notional 50% of the 11.2 ℓ/ha/day.

1.4.2.2 Why can you not substitute your actual land size into the metric?

A theme that resonates throughout the submissions has been the perception of an entitlement to a volume of water based on land size holding and the removal of reference to land area in the suggested change to the Operating Licence will result in a reduction in service levels and disadvantage particularly owners with large land areas.

This concern is addressed below.

The hydration constants, 11.22 ℓ/ha/day for Farmlands and 5.6 ℓ/ha/day for the Rural Water Supply Schemes, ascribed notionally the amount of water needed to sustain livestock in the respective schemes. The nature of a "constant/factor" is such that the parameters, ℓ/ha/day, are not capable of being varied in value – they are always fixed and permanent.

Furthermore, it is important to emphasise that the 11.22 ℓ/ha/day hydration constant was used to provide the design of distribution pipe-line sizes in the farmland areas. To this regard, the design criterion, 11.22 ℓ/ha/day, is not a function for determining an allocation of a volume of water to a farmland property.

1.4.2.3 What is the purpose of the 11.2 ℓ/ha/day and 5.6 ℓ/ha/day?

This section considers how the hydration factors, 11.2 ℓ/ha/day and 5.6 ℓ/ha/day are used in determining the flow rate to a property.

The Corporation's design criteria identify a notional rated area or serviceable area that has a minimum *800m between each service* and a *hydraulic push of 2.5km into the property*. (Refer to Appendix 2).

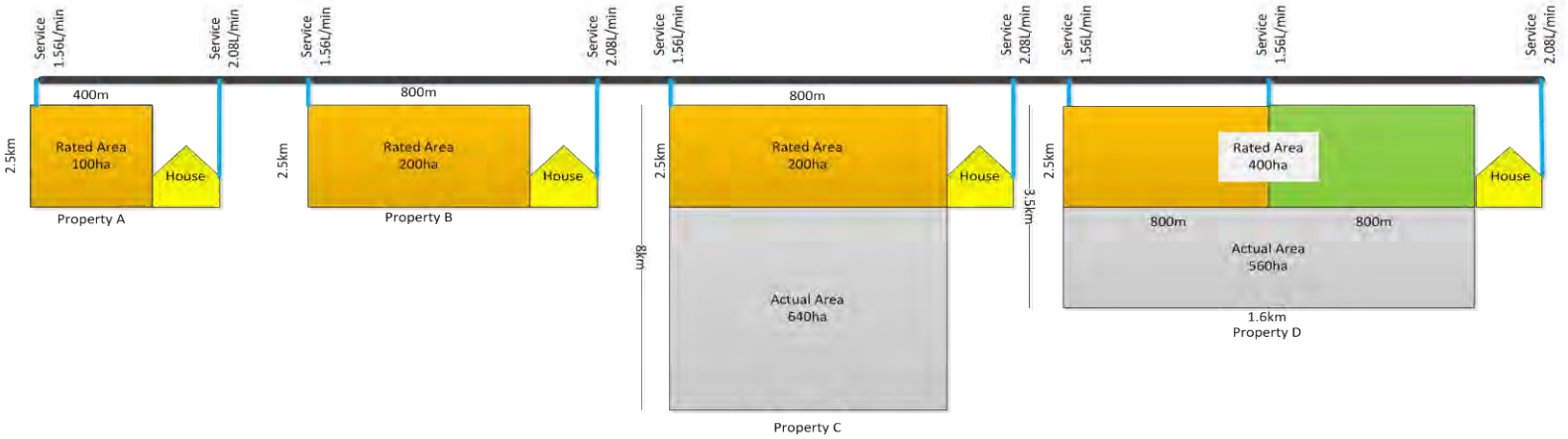
Together with the hydraulic principles prescribed in the design criteria, the 11.2 ℓ/ha/day and 5.6 ℓ/ha/day constants are used to calculate the rate of water flow for a service to a property.

In addition, the design criteria have an assumption that each property in the Farmlands Scheme has a single dwelling (house,) which has one service with a flow rate of 3kℓ/day. The reference to 3 kℓ/day per occupied house for Farmlands is therefore derived from the assumption embedded within the Corporation's design criteria. Similarly, the 1.8 kℓ/day per occupied house for the Rural Water Supply Scheme is based on a rounded up figure of the notional 50% of the metric for Farmlands.

1.4.2.4 Rated area

The illustration below captures the fundamental principle that the rate of water flow for a service of a property does not have a linear relationship with the property dimension.

The example below involves four different scenarios with various property sizes subject to the Farmland performance standards. Adhering to the design criteria, each property is assumed to have an occupied house.



Property A:-

Property A has an *actual* and a *rated area* of 100 ha (2.5km x 0.4km). To determine the total flow rate for the property:

1. It is necessary to apply the hydraulic principles of 800m by 2.5km to the hydration factor, 11.2 ℓ/ha/day:

   0.8km x 2.5km x 11.2 ℓ/ha/day = 2.24 kℓ/day per service

2. Convert 2.24 kℓ/day per service to a flow rate per minute:

   2.24 kℓ per day per service x 1000/24/60 = **1.56 ℓ/min***

3. The design criteria assumed that each property has an occupied house that has a flow rate of 3kℓ/day per service. The rate of flow expressed in terms of ℓ/min is as follows:

   3 kℓ per day per service x 1000/24/60 = **2.08 ℓ/min***

Property B:

Property B has an *actual* and a *rated area* of 200 ha. To determine the flow rate for the property:

1. It is necessary to apply the hydraulic principles of 800m by 2.5km to the hydration factor, 11.2 ℓ/ha/day:

   0.8km x 2.5km x 11.2 ℓ/ha/day = 2.24 kℓ/day per service

2. Convert 2.24 kℓ/day per service to a flow rate per minute:

   2.24 kℓ/day per service x 1000/24/60 = **1.56 ℓ/min***

3. The design criteria assumed that each property has an occupied house that has a flow rate of 3 kℓ/day. The rate of flow expressed in terms of ℓ/min is as follows:

   3 kℓ/day x 1000/24/60 = **2.08 ℓ/min***

Thus Property B has the same number of services and flow rates as Property A, even though Property B covers twice the area of Property A.

(*Please note, the Corporation does not measure flow rate in terms of litres per minute. The calculation above is for demonstration/illustration purposes only)

Property C:

Property C has an *actual area* of 640ha and a *rated area* of 200ha. The area of land that is serviceable is only the rated area of 200ha. Property C would therefore have the same number of services and flow rates as property B.

Property D:

Property D has an *actual area* of 560ha and a *rated area* of 400ha. Although this property is smaller than property C, it has a larger rated area due to a greater frontage (1.6 km), which provides an opportunity for Property D to have two services.

In summary, each service in the serviceable area has a flow rate of 1.56 ℓ/min based on the design criteria of 800m by 2.5km and applying the hydration constant, 11.2 ℓ/ha/day. As demonstrated in the illustration above, under the present metric, the notional service delivery standard (1.56 ℓ/min) does not change for properties with varying sizes and configuration.

As can be seen, there is no linear correlation between land size holding and service delivery standards.

1.5 Summary of key findings

Based on the work performed:

1. Customers should not be adversely impacted by the proposed changes to the minimum flow measures and service standard measures for Farmland services and Rural Water Supply Schemes in the Corporation's Water Operating Licence no. 32, as detailed in the Water Corporation's letter to the Authority, dated 10 June 2011
2. The proposed changes to the flow standards in the licence recommended by the Corporation will have no impact on the existing supply agreements between the Corporation and customers in the Farmlands and Rural Water Supply Schemes
3. The proposed changes to the flow standards in the licence recommended by the Corporation will have no impact on the "Community Agreements" between the Corporation and customers in the Farmlands and Rural Water Supply Schemes
4. We observed that the Corporation has undertaken initiatives and is in the process of developing a mapping system to enable the identification of the nature and number of services within the Farmland and Rural Water Supply Schemes. Prior to this reconciliation project, the Corporation was unable to identify separately the nature and number of services in the Rural Water Supply Schemes and Farmlands Schemes. As is, there is no consolidated pictorial depiction that clearly identifies farmland and rural services
5. The current supply contracts/agreements with customers (SBAs) in the Farmlands and Rural Water Supply Schemes may include a minimum delivery of water supply in the sense of a flow rate, but not a volume of water
6. The current supply connection policy for the Farmlands and Rural Water Supply Schemes includes a requirement by the Water Corporation to provide a minimum delivery of water to customers in the sense of a flow rate driven by combining the relevant hydration constant with the hydraulic principles.

1.6 Detailed findings

1. *Whether any customers will or may be adversely impacted by the proposed changes to the minimum flow measures and service standard measures for Farmland services and Rural Water Supply Schemes in the Corporation's Water Operating Licence no. 32, as detailed in the Water Corporation's letter to the Authority, dated 10 June 2011.*

Based on the work performed, we found that no customers are adversely impacted by the proposed changes to the minimum flow measures and service standard measures for Farmland services and Rural Water Supply Schemes. The suggested approach by the Corporation re-aligns the existing measurement with the hydraulic principles within the Corporation's design criteria to enable a more practical basis for measuring service standard.

It appears that the misconception of a linear relationship between land size and service levels has been predicated on the belief of an entitlement to a certain volume of water based on land size holding. As a result, the removal of reference to land in the proposed change to the performance metric has been surmised to cause a diminished service delivery.

The information we examined did not indicate a connection between property dimension and entitlement to a volume of water. It is possible that some confusion may have arisen with an arrangement under the Department of Water where the property owner has a licence to take a certain quantity of water from a registered catchment annually. The relationship between the Corporation and its customers is simply a user-pays system, similar to other utility services, such as gas and electricity, in that customers pay for the amount of water they drawdown from the networks. There is no guaranteed volume or allocation of water.

An inherently difficult concept, which has been a subject of significant discontent, has been the question:

"*How can (the proposed) 3 kℓ/day per service be the same as 11.2 ℓ/ha/day and 3 kℓ/day per occupied house (for Farmlands)?*"

To address this question, it is important to consider each element of the design criteria in detail.

From Appendix 2, it was identified that the 11.2 ℓ/ha/day is a hydration requirement for livestock and has origination in the design of distribution pipeline sizes; in other words, it is a design criterion and not a function for determining an allocation of a volume of water.

As demonstrated in section 1.4.3.1, the actual land area of a property is only relevant to the extent of the serviceable area (800m by 2.5 km), which, when combined with the design criterion constant (11.2 ℓ/ha/day) yields the notional flow rate to an area within the property that water can be "transported to". In the examples given, despite Property A, B, C and D, having a different dimension, each property has a service with the same flow rate when the design criteria are applied.

The reason for the difference between the flow rates for a farmland service – 1.56ℓ/min, and a house – 2.08L/min, is because the flow rates have different bases:

- 1.56 ℓ/min was based on 2.24 kℓ/day per farmland service; and
- 2.08 ℓ/min was based on 3 kℓ/day per house service.

The suggested change to the Operating Licence seeks to standardise the flow rates by rounding up the flow rate, 2.24 kℓ/day per service, for Farmlands to 3kℓ/day per service. Similarly, for the Rural Water Supply Services, the flow rate metric is rounded up from 1.12 kℓ/day per service to 1.8 kℓ/day per service.

The reference to an addition of "…*3kℓ per day for each occupied house*" is an assumption in the design criteria that each property has an occupied house. It is important here to note that, in order for a house to receive water, there must be a service, and as previously discussed, the design criteria

prescribed that each service has a flow rate of 3kℓ/day to Farmlands areas and 1.8 kℓ/day for the Rural Water Supply Schemes. Of course, in practice, it is not mandatory for a Farmlands property to have an occupied house, however where it does, the design criteria for the service will be a flow rate of 3kℓ/day.

Much confusion and misunderstanding from the precept "*…plus 3kℓ per day for each occupied house*" has revolved around the view of an entitlement to a volume of water. However, as explained, the reference to the house is designed for the purpose of ascribing a service flow rate (3 kℓ per day for the service) where an occupied house exists on a property and not a pre-determined allocation of a volume of water to a given property.

In summary then, the metric "11.2 ℓ/ha/day and 3 kℓ /day per occupied house for Farmlands" needs to be understood from the perspective of the mechanic of how water is delivered to the property. An understanding of this difficult concept is not aided by the manner in which the performance metric had been written in the Operating Licence. Rather, a more appropriate construction would be the Corporation's suggested wording change, 3 kℓ/day per service, which incorporates the hydraulic principles (800m x 2.5km) with the design criterion factor, 11.2 ℓ/ha/day. As annotated above, the reference to "…and 3 kℓ per day for each occupied house" is not an allocation of a volume of water for each occupied house on Farmlands but describes a flow rate to a service to which the house connects.

Customers under the Farmlands and Rural Water Supply Schemes can be classified into three groups:

- Customers who have validly executed a Services By Agreement (SBA). These customers have specified the flow rate and signed the SBA. Their services are based on the terms and conditions stipulated in the SBA
- Customers who have signed the SBA but did not specify the flow rate. The performance standards in the Operating Licence would be applicable
- Customers who did not enter into a SBA with the Corporation. These customers rely on the performance standards in the Operating Licence.

Therefore, it is the customers who did not enter into a SBA or execute a valid SBA with the Corporation that would be subject to the proposed change as their service levels are referrable to the conditions in the Operating Licence.

The second component of the proposed change in the letter to the Authority, dated 10 June 2011, involves a suggestion to change the way pressure is measured.

The current measure of pressure and flow in the Farmlands and Rural Water Supply scheme requires the flow to be measured free to air with *downstream pipe work disconnected at the meter*, over a 24 hour period. The practice would involve free flowing water over a period of 24 hours leaving the property being tested with no water (because of the disconnection at the meter) and potentially, negatively impacting properties downstream from the testing.

Under the Corporation's suggested approach, a data recorder (pulse meter) device would be attached at the meter to measure the dynamic pressure and flows over a period to confirm that the available flow meets the minimum standard. The proposed approach appears to be more practical in the way that pressure and flow is measured.

2. *Whether the proposed changes to the flow standards in the licence recommended by the Corporation will have any impact on the existing supply agreements between the Corporation and customers in the Farmlands and Rural Water Supply Schemes, and, if so, the extent of that impact.*

Customers that have entered into an agreement with the Corporation in order to secure a specific level of service operate under the conditions agreed upon in the SBA. The conditions in the licence are effectively contracted out. The customers receive the level of services for which they have contracted under the SBA.

The impact (if any) of the proposed change to the Operating Licence by the Corporation therefore has no consequence on the existing supply agreements between the Corporation and customers in the Farmlands and Rural Water Supply Schemes.

3. *Whether the Corporation's "Community Agreements" provide for a minimum delivery of flow rate, and whether the proposed changes to the minimum flow measures will result in a diminished flow to the customers under that agreement.*

Customer engagement with the Corporation is initiated by the "application for service form", followed by regional office checking for service availability. If service is available, then a SBA is sent to the customers. Customers then receive the level of service pursuant to the terms of the SBA.

Where water delivery to a service is not available, customers may collectively approach the Corporation and apply for a rural extension. A funding source list is then created setting out the total estimated cost of the extension and the levels of contribution between the parties. The customers' portion is one-third, which may be in cash or "in-kind". The in-kind component may involve customers contributing to some physical construction elements or engaging a third party contractor to build the asset (which the Corporation takes over subsequently). Community Agreement thus, in this sense, is the funding arrangement between the community and the Corporation to construct the rural extension.

After the funding arrangement has been agreed, the Corporation creates a business case to construct the asset. Construction of the asset commences after the business case is approved (by the Corporation's management). Once construction of the asset is completed, service is applied at the individual customer level. A SBA is then sent to each applicant.

As noted, Community Agreements or construction agreements are funding instruments and, as such, do not specify a minimum delivery flow rate. Customers who sign a SBA after the completion of the construction of the asset receive the level of service pursuant to the terms of the SBA. The proposed change to the Operating Licence by the Corporation therefore has no impact for customers under the SBA.

Where an SBA is not validly executed or entered into, the service delivery levels default to the performance standards contained in the Operating Licence. As covered in point (1) above, the proposed change would offer similar performance standards to the present Operating Licence.

4. *Whether the Corporation has adequate mapping systems and appropriate supporting processes to identify the nature of services and the number of services within the Farmland and Rural Water Supply Schemes.*

It has only been recently that the Corporation commenced a reconciliation project through the Development Services Branch (DSB) to identify the nature and number of customers within the Rural Water Supply and Farmland Schemes. The objective of the project is to develop a mapping system that establishes a pictorial delineation between the two schemes and identifies individual customer accounts.

The activities undertaken by the DSB have involved:

a. Reconciliation and cross-referencing of the Corporation's RWSIP (Rural Water Supply Improvement Program) records with external third party records (Department of Water)

b. Consultation with regional offices in order to gain further information on local RWSIP extensions

c. Obtaining the "as constructed" drawings for RWSIP extensions from the Drawing Management System

d. Comparing the RWSIP extensions agreement's "water mains design" drawings with the "as constructed" drawings in SIMS (Spatial Information Mapping System) and running analyses around the mains to identify RWSIP customers to extract the relevant accounts from Grange. Grange is the Corporation's primary customer information services system

e. Coding customer accounts identified with the letters “RWSS” to denote a Rural Water Supply Scheme user

f. Production of maps from the SIMS system that detailed customers’ accounts and their corresponding locations and connection points. Customer Centre then undertook further checks to validate RWSIP data

g. Obtaining from regional offices scanned copies of RWSIP SBAs, where they exist, to append to the Grange account.

At present, all services are classified as farmlands in Grange with the indicator, “FLSC”. Although the Corporation has micro maps of the various Rural Water Supply Schemes (RWSS), it has not yet completed the process of manually identifying the rural services and assigning them with the code, RWSS, in Grange. However, if required, through manual efforts, the Corporation can identify a rural service from the micro maps.

From the point of view of completeness in capturing services for Farmlands, management stakeholders have advised that, given the passage of time, it is not clear what transpired during the original process of identifying farmland services, however, through business-as-usual routines, the majority of farmland services would have been captured. The Corporation was able to produce a report that identifies approximately 11,000 services in Farmlands.

As is, there is no consolidated pictorial depiction that clearly identifies farmland and rural services. Until the implementation of the first Operating Licence (dated 28 January 1996), the Corporation simply focussed on providing the service it could using the capacity of the mains and perceived no real need to physically identify or separate the different type of services.

5. *Whether the current supply contracts/agreements with customers in the Farmlands and Rural Water Supply Schemes include a minimum delivery of water supply.*

In summary, the SBAs outline the land use categories as well as the conditions that apply to the agreement. These conditions relate to the water services standards and include:

- Water quality
- Water pressure
- Flow rate
- Continuity
- Meter on property
- Other standards as agreed.

Customers are not required to subscribe to all of the conditions in the SBA and only the selected conditions would be applicable to the agreement. Where the conditions have not been specified in the agreement, then the level of service will default to the conditions specified in the Operating Licence.

In the sample of 40 SBAs that we examined, we found that the validly executed SBAs provide for a minimum delivery of water supply in the sense of a flow rate. There is no reference to a condition for a volume of water that customer could enter into a contract with the Corporation.

In the SBA, the standards of flow rate may be greater or lesser than the performance standards in the Operating Licence. As noted above, where the SBA does not provide a minimum level of service because the SBA has not been signed or properly executed, the standard of service is referrable to those conditions in the Operating Licence.

6. *Whether the current supply connection policy for the Farmlands and Rural Water Supply Schemes includes a requirement by the Water Corporation to provide a minimum delivery of water to customers.*

The Corporation's supply connection policy indicates a service based approach where the design criteria prescribed a minimum flow rate to customers. The design criteria identify a notional rated area or serviceable area that has a minimum 800m between each service and a hydraulic push of 2.5km into the property. Appendix 2 provides detailed calculations of how a flow rate is established for Farmlands and Rural Water Supply Schemes when combining the relevant hydration constant with the hydraulic principles.

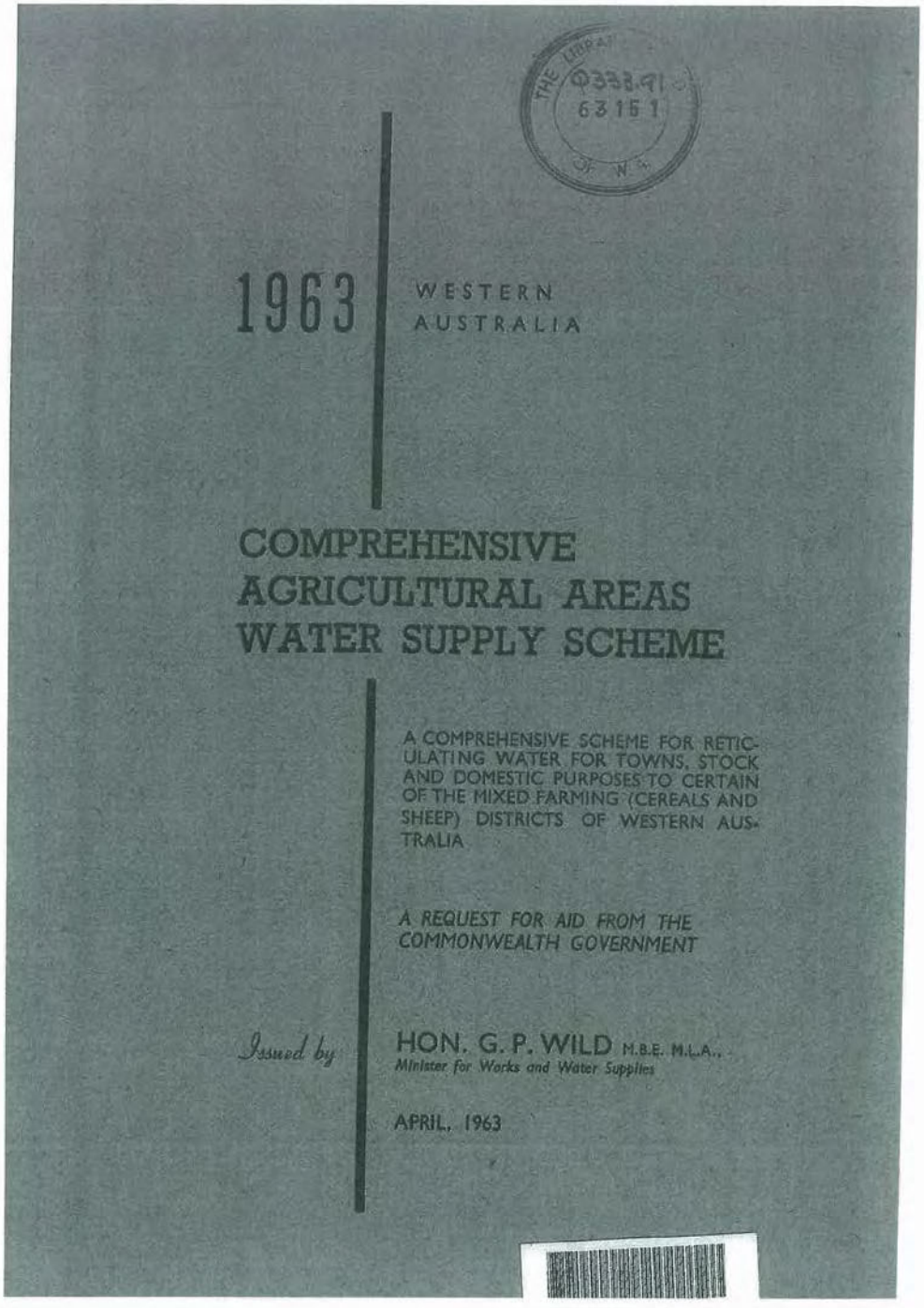
In the documents that we examined, we did not find reference to an allocation of a volume of water designated to a property. The provision of water service to customers by the Corporation is based on a user-pays system, in that customers draw down the amount of water when they access the service and receive a charge for it similar to that of electricity and gas.

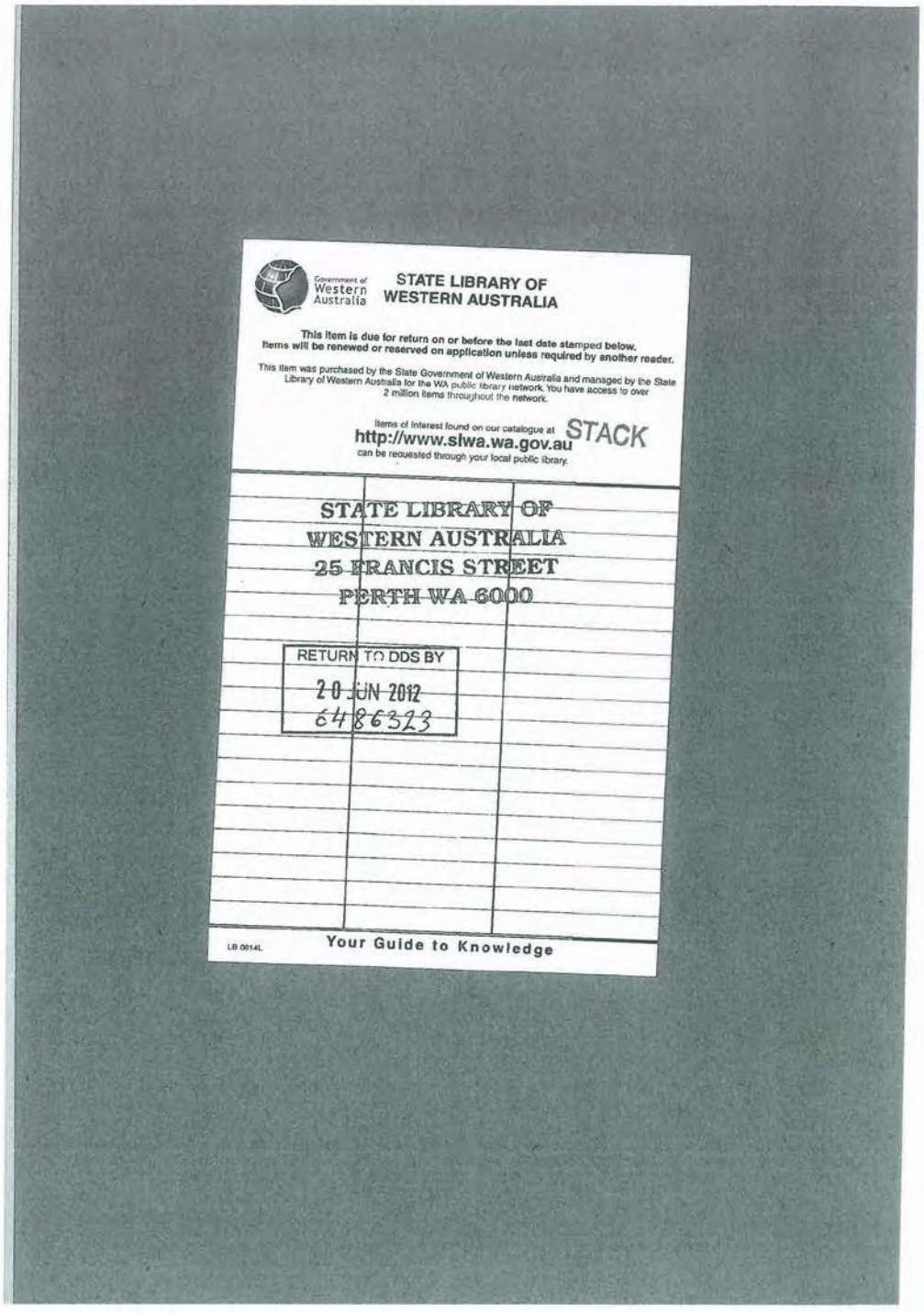
One of the purposes for the proposed change to the Operating Licence is to alleviate the confusion created by the wording in the current metric where there appears to be a prescribed allocation of water based on the size of land holding. The Corporation's supply connection policy and design criteria do not support a volumetric approach to the provision of water service, but identify the key principles for the rate at which water can be conveyed to the property.

1.7 Acknowledgement

We wish to thank the Corporation's management and staff for their cooperation during the conduct of our work.

Appendix 1: Comprehensive Agricultural Areas Water Supply Scheme

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PART TWO

DESCRIPTION OF THE PROPOSED COMPREHENSIVE RETICULATION SCHEME

This section deals with the projected scheme for remedying the limitations and disabilities noted in previous pages.

16. SCOPE OF PROJECT.

The project is to provide from reliable storages west of the Darling Ranges (Mundaring Reservoir on the Helena River; Wellington Dam on the Collie River) an assured reticulated water supply to farms and towns in an area of approximately 3,700,000 acres. The Scheme Area is shown coloured pink on the Plan.

17. AREA OF LAND AND TOWN POPULATION TO BE SERVED.

The total area of land is divided into two zones according to the source of supply, namely, the Northern Zone supplied from Mundaring Weir, and the Southern Zone supplied from Wellington Dam.

The following is a classified summary of the area of land to be reticulated:—

	Acres. (Approx.)
Northern (or Mundaring) Zone—	
Gross Area of Land not at present reticulated	2,300,000
Southern (or Wellington) Zone—	
Gross Area of Land not at present reticulated	1,400,000
Total	3,700,000

The following is a classified list of towns to be served by the Scheme:—

Northern (Mundaring) Zone.

Towns.	Estimated Population.	Remarks
Ballidu	150	Existing reticulated supply.
Dalwallinu	410	Existing reticulated supply.
Goomalling	930	Existing reticulated supply which will need augmenting in the near future.
Kalannie	200	No reticulated supply.
Pithara	100	Existing reticulated supply.
Quairading	730	Existing reticulated supply which is near the limit of its resources.
Wongan Hills	650	Existing reticulated supply.
Total	3,170	

Southern (Wellington) Zone.

Towns.	Estimated Population.	Remarks.
Broomehill	180	No reticulated supply.
Dumbleyung	400	Existing "Fairly Reliable" reticulated supply.
Gnowangerup	760	Existing reticulated supply which is near the limit of its resources.
Kulin	250	Existing "Not Reliable" reticulated supply.
Wickepin	350	No reticulated supply.
Yealering	120	No reticulated supply.
Total	2,060	
Grand Total	5,230	

BASIS OF DESIGN, AND WATER REQUIREMENT.

18. BASIS OF DESIGN—FARMLANDS.

(a) The design is based on a unit area of 1,000 acres, there being 2,300 such units in the Northern Zone and 1,400 in the Southern Zone.

(b) The water allowances for the Scheme, fully developed, are assessed as follows per 1,000 acre unit:—

Northern Zone—Summer Day.

	Gallons.
450 sheep at 1 gallon per head per day	450
4 cattle at 10 gallons per head per day	40
5 pigs at 2 gallons per head per day	10
3 persons at 100 gallons per head per day	300
Total per Summer Day	800

Northern Zone—Per Annum.

Close examination of experience on existing agricultural extensions indicates that winter water demand is approximately one-half that of summer.

Annual demand will vary from year to year depending on seasonal fluctuations.

For the purpose of the Scheme, the following estimate is made of the annual demand:—

	Gallons.
Summer demand	140,000
Winter demand	70,000
Total Annual Demand	210,000

Northern Zone—Maximum Day.

Experience on existing agricultural extensions indicates that on very hot days stock require water at a rate approximately 1.3 times the average summer day rate, whereas domestic requirements do not vary greatly. Consequently the maximum summer day requirement, upon which the distribution pipe-line sizes depend, is assessed at 1,000 gallons per day per 1,000 acre unit.

(c) The corresponding figures for the Southern Zone are set out as follows:—

Summer Day.	Gallons.
500 sheep at 1 gallon per head per day	500
4 cattle at 10 gallons per head per day	40
4 pigs at 2 gallons per head per day	8
3 persons at 100 gallons per head per day	300
	848

Per Annum.	Gallons.
Summer	146,500
Winter	72,000
Total	218,500

Maximum Day, assessed as 1,000 gallons per day per 1,000 acre unit.

Appendix 2: Policy frameworks

Policy Frameworks	Key design criteria	Calculations	Explanation
1946 Comprehensive Agricultural Areas and Goldfields Water Supply Scheme	Hydration requirements for a *1000 acre* block of land: • 300 sheep @ 1 gallon per head per day – 300 gallons • 10 cattle @ 10 gallons per head per day – 100 gallons • 3 persons @ 100 gallons per head – 300 gallons **Total per summer day 700 gallons** *"From a study of the performances of existing agricultural reticulation systems,* ***the maximum daily rate of supply is assessed at 900 gallons per day****. It is on the former figure (700 gallons per day) that the total quantity to be supplies is calculated,* ***and on the latter figure (900 gallons per day) that the diameters of the distribution pipe lines depend.****"*	1000 acres = 405 ha 900 gallons = 4.091 kℓ *10.1012 ℓ/ha/day = 4,091 ℓ/405 ha]/day (*rounded to 10.1 ℓ/ha/day)	Post war period construction work to provide an assured reticulated water supply to farm lands, towns, and railways in an area west of the Darling Ranges (Mundaring Reservoir, on the Helena River; Wellington Reservoir, on the Collie River), which covers an area of approximately 11,607,000 acres. The hydration constant, 10.1ℓ/ha/day, was based on the uplifted estimation of 900 gallons per day, provides the design for the diameters of the distribution pipe lines.
1963 Comprehensive Agricultural Areas Water Supply Scheme (refer to Appendix 1)	Hydration requirements for a 1000 acre block of land: • 450 sheep @ 1 gallon per head per day – 450 gallons • 4 cattle @ 10 gallons per head per day – 40 gallons • 5 pigs @ 2 gallons per head per day – 10 gallons • 3 persons @ 100 gallons per head – 300 gallons **Total per summer day - 800 gallons** *"….the maximum summer day requirement, upon which the distribution pipe-line sizes depend, is assessed at 1,000 gallons per day per 1,000 acre unit."*	Experience on existing agricultural extensions indicates that on very hot days, stock require water at a rate approximately 1.3 times the consumption of an average summer day: 1040 gallons = 800 gallons x 1.3 The 1040 gallons was then rounded down to 1000 gallons expressed over 1000 acres of land: • 1000 acres = 405 ha • 1000 gallons = 4.546 kℓ *11.2247 ℓ/ha/day = [4,546 ℓ /405 ha]/day (*rounded to 11.22 ℓ/ha/day)	The original hydration factor, 10.1ℓ/ha/day, was recalibrated to reflect an increase in livestock numbers. **The revised hydration requirement, 11.22 ℓ/ha/day, provides the design criterion for the distribution pipe-line sizes as contained in the current Operating Licence.** **As can be seen, on its own, the 11.22 ℓ/ha/day is <u>not</u> a performance metric. Further below, the calculation demonstrates that a flow rate is created when combining the design criterion, 11.22 ℓ/ha/day, with the hydraulic principles, 800m by 2km.**
West Bowgada Rural Water Supply Scheme	• **Each parcel of land is assumed to have one occupied farmhouse** • An occupied farmhouse (a service) has a flow rate of 1.8kℓ/day based on the hydration constant of		A key design criterion principle drawn from this scheme is that each property is assumed to have one occupied house.

Policy Frameworks	Key design criteria	Calculations	Explanation
	5.6ℓ/ha/day.		
Farmland Water Services within Goldfields & Agricultural Areas Water Supply Scheme (PCY 143)	**Farmlands:** 11.2ℓ/ha for all area within 2.5km of each side of a main plus 3kℓ per day for each occupied house. The minimum distance between Farmland services to landholding is 800m. **Rural Water Supply Scheme:** 5.6L/ha/day for all area within 2.5km of each side of the main plus 1.8kℓ per day for each occupied house. The minimum distance between Farmland services to landholding is 800m.	This policy introduced the hydraulic principles of the Corporation's networks design criteria, which describe how far water can be "pushed" into a property (2.5km) and the theoretical minimum distance between each service (800m). The resultant product between these two factors, 800m x 2.5km or a 200ha, is known as the *serviceable area*. Thus the: • Flow rate **for every service** in the farmland areas is **2.24 kℓ/day** = [11.2ℓ/ha/day x ((0.8 km x 2.5km) x 100 ha)/ 1,000 ℓ] The proposed change by the Corporation seeks to round up the flow rate, 2.24 kℓ/day, to **3 kℓ/day.** • Flow rate **for every service** in the rural areas is **1.12 kℓ/day** = [5.6 L/ha/day x ((0.8 km x 2.5km) x 100 ha)/ 1,000 ℓ] The proposed change by the Corporation seeks to round up the flow rate, 1.12 kℓ/day, to **1.8 kℓ/day.**	The 11.2 ℓ/ha/day is a hydration requirement for livestock and has origination in the design of distribution pipeline sizes. The reference to an addition of 3 kℓ per day for each occupied house is an assumption in the design criteria (refer to "*West Bowgada RWSIP*") that each property has an occupied house. The metric "*11.2 ℓ/ha/day and 3 kℓ/day per occupied house for Farmlands*" needs to be understood from the perspective of the ***mechanic*** of how water is conveyed to the property. A flow rate (for example, Farmlands) is created when combining the design criterion, *11.2 ℓ/ha/day*, with the hydraulic principles, 800m by 2.5km.
Land Servicing Policy Program Manual (PCY222)	Minimum daily flow rate supplied over 24 hours to a farmland property: • 11.2ℓ/ha/day plus 3kℓ/day per occupied house. Minimum daily flow rate supplied over 24 hours to a Rural Water Supply Improvement Program: • 5.6ℓ/ha/day plus 1.8kℓ/day per occupied house.		The criteria for drinking water supply were based on the principles in PCY 143. **This policy introduced the requirement that all services to landholdings must accompany a signed SBA.**