SYDNEY DESALINATION PLANT

Review of prices for Sydney Desalination Plant Pty Ltd from 1 July 2023

SDP response to IPART Issues Paper

31 January 2023

Executive Summary

Introduction

The Sydney Desalination Plant **(Plant**) is Greater Sydney's only major source of non-rain dependent drinking water and plays a key role in securing Greater Sydney's water supply.

Our vision for the 2023-27 regulatory period is to deliver additional value to Sydney Water and customers from the Plant, assisting Government strategy by changing the way we operate to meet the growing challenges of water security and resilience in the most efficient way possible.

In September 2022, Sydney Desalination Plant Pty Limited (**SDP**) submitted its Pricing Proposal for the period 1 July 2023 to 30 June 2027 (**2023-27 regulatory period**) for review by the Independent Pricing and Regulatory Tribunal of NSW (**IPART**). Our objective for this Pricing Proposal is to promote the long-term interests of customers by increasing Greater Sydney's water supply resilience in the face of population growth, the unprecedented challenges caused by climate change, including worsening natural disaster events, and to deliver greater value from an important community asset. The proposal sets out the prices required to recover the costs of efficiently operating and maintaining the Plant and Pipeline to provide water services in accordance with **SDP's Network Operator's Licence**[1] and **Retail Supplier's Licence.**[2] These licences, issued under the Water Industry Competition Act 2006 (**WICA**), set out SDP's **Operating Rules** – which were developed in response to the NSW Government's Greater Sydney Water Strategy (**GSWS**).

In response to the Pricing Proposal, IPART published its Issues Paper titled *Review of prices for Sydney Desalination Plant Pty Ltd from 1 July 2023* (the **Issues Paper**), which was released 29 November 2022.

The Issues Paper outlines key issues identified by IPART for stakeholder consideration in setting prices for the 2023 determination period and reviewing the 2017 Methodology Paper on SDP's energy adjustment and efficiency carryover mechanisms.

This document forms SDP's response to the Issues Paper (**response**).

About this response

In developing this response, we have sought to address the issues raised by IPART in its Issues Paper.

However, this response does not replace the Pricing Proposal. SDP's Pricing Proposal provided extensive information and overall context to IPART and stakeholders on:

- our operational experience in the 2017-23 regulatory period
- the subsequent changes to SDP's policy, regulatory and commercial operating environments and the evolving regulatory settings across a range of infrastructure sectors; and
- our estimates of efficient costs and prices to provide our services based on an annual minimum production (23GL per year) and maximum production (91.25GL per year) that can be requested by Sydney Water in accordance with SDP's Network Operator's Licence and our overall levels of service expectations expressed in the GSWS.

[1] SDP's Network Operator's Licence (No.10_010) granted under the WIC Act on 9 August 2010, as varied on 10 August 2022.

[2] SDP's Retail Supplier's Licence (No.10_011R) granted under the WIC Act, as varied on 10 August 2022.

This response is designed to be read in conjunction with the Pricing Proposal and seeks to provide further clarity around the key issues raised in the Issues Paper – specifically where, on an exception basis, we consider there is additional value to IPART and stakeholders in:

- providing new information and/or insights that were not evident or available at the time of SDP's Pricing Proposal;
- clarifying SDP's policy, regulatory and commercial operating environment, and its Pricing Proposal; and
- highlighting where additional information is contained in SDP's Pricing Proposal that is relevant to the key issues raised in the Issues Paper.

SDP response to IPART Issues Paper

The Issues Paper correctly recognises that SDP's new operating framework represents "a shift from SDP's previous nature of operation"[3] such that "the next few years will be a learning phase for SDP"[4].

This shift in SDP's operations reflect its new role under the GSWS to provide additional flexibility and resilience to Greater Sydney's water supply. This change in SDP's role has significant implications on the costs and risks that SDP will face into the future, which should be a key consideration for IPART in making the 2023 Determination.

We welcome IPART's intention to review SDP's proposal holistically, considering the operating environment, the nature of the risks and how the 2023 Determination allocates these risks between SDP and customers, including the clear linkages between the cost allowances, incentive schemes and risk management mechanisms.

IPART's new regulatory framework includes sound principles consistent with the long-term interests of customers. We therefore suggest that IPART's approach to assessing SDP's proposal:

- **focuses on what is in the long-term interests of customers**, including ensuring that a focus on short-term cost minimisation does not come at the expense of the long-term interests of customers,
- **is consistent with key principles underpinning its new regulatory framework** – including:
  - being outcomes focused, suitably flexible and not unduly complex (e.g., in terms of SDP's price structure), and
  - recognising the unique role and circumstances of SDP, and the implications of this for the 2023 Determination – including that the Plant must be readily available to respond to Sydney's water needs in the face of climate change and uncertainty.

There are three key points that SDP would like to highlight for IPART and other stakeholders' consideration through the 2023 Determination process:

1. SDP's expected levels of service under its new Network Operator's Licence were agreed with Sydney Water and the Department of Planning and Environment (DPE) following extensive consultation. Our Pricing Proposal stated that the expenditure, incentive and risk management framework were informed by the unique features of our business and these expected levels of service. The expected levels of service include producing a "minimum baseload volume" to maintain the Plant in a state of readiness to respond to emergency requests (SDP's Pricing Proposal outlines why 23GL is the required and efficient level of baseline production). The expected levels of service provide Sydney Water with the option to call on SDP when required by issuing production requests, which provides customers with

[3] IPART Issues Paper, November 2022, p8.

[4] IPART Issues Paper, November 2022, p42.

enhanced levels of water supply. However, the higher level of service comes with additional costs for SDP.

2. The NSW Minister for Lands and Water, Hospitality and Racing has made material amendments to IPART's Terms of Reference for the regulation of SDP's prices, which are key to efficiently achieving the objectives of the GSWS and SDP's new Network Operator's Licence. These warrant a change to IPART's approach in relation to energy costs (for both consumed and surplus energy) in the 2023 Determination compared to previous determinations.

3. In making its determination, SDP submits that IPART consider the efficient allocation of risk:

   – between service providers and customers that is observed in **competitive markets** and in other **regulated infrastructure markets.** A well accepted pricing principle is that where service providers bear these risks, they should be compensated for the costs of managing these risks through prices.

   – having regard to the risk framework developed in IPART's 2017 Determination, including where Sydney Water submitted [5] and IPART accepted that as a single asset business subject to the abatement mechanism the costs of insurance to manage risk should be reflected in SDP's prices.[6] SDP notes that changes to SDP's service level incentive mechanism may impact the levels of insurance coverage deemed appropriate by IPART.

   – having regard to IPART's WACC framework, whereby the rate of return provides compensation for only the systematic risk borne by service providers and investors, such that changes in the allocation of business specific risk between service providers and customers does not impact the rate of return.

Consistent with the principles of due process, we also request that IPART and its consultants consider and respond to positions put forward by SDP in our Pricing Proposal and during the price review process. In particular, in relation to SDP's energy cost allowance IPART's Issues Paper appears to reach a position that IPART "will consider applying a similar approach as previous years", with very limited elaboration on the implications of SDP's legal and regulatory environment, amendments to the Terms of Reference and in this context SDP's proposal and key supporting information. SDP's Pricing Proposal includes extensive information (including expert reports) to support our position that IPART's determination should include an allowance that reflects the costs incurred under SDP's long-term energy contracts (GGRP contracts[7]) rather than an allowance reflecting a long-term estimate of the market price. The NSW Government's updated (16 June 2022) Terms of Reference requests IPART to specifically consider this issue.

We recognise that there is a considerable amount of information for IPART and its consultants to consider in reviewing SDP's Pricing Proposal and making the 2023 Determination. To avoid creating additional information for IPART to consider we have sought to comment on material issues only, and where possible provide guidance to where further information can be found, including in SDP's Pricing Proposal.

Structure of this response

The following sections focus on each of the above 3 key issues, with **Appendix A** providing a response to each of the 32 questions raised in the Issues Paper. **Appendix B** provides further information on minor amendments to SDP's Pricing Submission related to some amendments to an expert report from Ontoit. [redacted].

5 Sydney Water, *Response to IPART's review of prices for Sydney Desalination Pty Ltd from 1 July*, November 2016, p41.

6 IPART, Review of prices from 1 July 2017 to June 2022, Draft Report, March 2017, p31-32.

7 SDP's Pricing Proposal states that GGRP Contracts are defined as the Electricity Supply Agreement, REC Supply Agreement, and the Capital Wind Farm Project Deed.

1. SDP's expected levels of service

1.1 Changes to SDP's policy, regulatory and commercial operating environment

SDP has a unique policy, regulatory and commercial operating environment. Aspects of this environment have changed significantly since the 2017 Determination. This includes SDP's expected levels of service under its new Network Operator's Licence which were agreed with Sydney Water and DPE following extensive consultation. Our Pricing Proposal stated that the expenditure, incentive and risk management framework were informed by these unique features of our business and this evolving operating environment.

We welcome the Issues Paper's recognition that SDP's new operating framework that was developed in response to the GSWS represents "a shift from SDP's previous nature of operation."[8]. The Issues Paper notes:

> *Under the new GSWS, SDP's role is no longer solely drought-response, but to operate continuously and flexibly with the objective of maximising yield to Sydney's water supply network.* [9]

We also welcome the Issues Paper's recognition of the implications of this new operating framework for SDP and the 2023 Determination.

In terms of the implications for SDP, the Issues Paper notes:

> *Unlike previous years, SDP will now move to a new 'flexible and continuous' operating environment. This means that the costs associated with providing SDP's services have changed. Under the new operating environment, SDP will incur additional costs associated with continuously operating (potentially at levels below maximum production for extended periods), as well as for remaining 'ready' to quickly respond to requests for changes in production when required…* [10]
>
> *We understand that the next few years will be a learning phase for SDP.* [11]

In terms of the implications for the 2023 Determination, the Issues Paper acknowledges that in prior reviews IPART assessed SDP's costs and set incentive and risk management mechanisms "through the lens of its drought response role"[12] and there is a need to ensure key elements of IPART's framework "remains fit for purpose" [13]. For example, the Issues Paper notes:

> *This shift away from a drought-response role means that the existing abatement mechanism needs to be adjusted to provide the right incentives that align with the new operating environment.* [14]

However, SDP's policy, regulatory and commercial operating environment is complex and the implications for SDP and the 2023 Determination are not always clear.

8 IPART Issues Paper, November 2022, p8.

9 IPART Issues Paper, November 2022, p25.

10 IPART Issues Paper, November 2022, p13.

11 IPART Issues Paper, November 2022, p42.

12 IPART Issues Paper, November 2022, p8.

13 IPART Issues Paper, November 2022, p1.

14 IPART Issues Paper, November 2022, p25.

In this context, the Issues Paper may not provide stakeholders with a complete understanding of:

- SDP's operating environment and the expected levels of service which were agreed with Sydney Water and DPE following extensive consultation, such as how the policy intent of the GSWS interacts with the amendments to SDP's Network Operator's Licence and Terms of Reference[15] and in turn with the Water Supply Agreement (WSA) between Sydney Water and SDP[16]
- the implications for SDP, our Pricing Proposal and ultimately IPART's 2023 Determination.

Without a common understanding of SDP's unique policy, regulatory and commercial operating environment, of which some key elements have changed, there is a risk that the 2023 Determination does not:

- set cost allowances and ultimately prices and/or establish a set of incentive and risk management mechanisms that represents a "fair and efficient allocation of risk between SDP, Sydney Water and end-use customers"[17] (allocation of risk is discussed in Section 3 of this response), and
- provide the "right incentives to manage the business in interests of customers over the long term."[18]

The table below sets out the key changes in SDP's policy, regulatory and commercial operating environment, and the implications for SDP and the 2023 Determination.

Table 1.1 Overview of key changes in SDP's policy, regulatory and commercial operating environment

	No or minimal change	Significant change	Implication for SDP and the 2023 Determination
Policy environment			
Expected Level of Service under the GSWS		✓	• While the Issues Paper refers to the Annual Production Request as the "primary service obligation",[19] being available to respond 'to other production requests' including emergency response (i.e. system shocks) remains a critical element of the expected levels of service which were agreed with Sydney Water and DPE following extensive consultation and reflected in SDP's Network Operator's Licence, the Decision Framework and WSA. • The proposed level of service in which the Plant remains operational and responds to an APR between 23GL per year to 91.25GL per year is designed to align to the role envisaged in the GSWS. • This level of service including the min. 23 GL per year "minimum baseload volume" necessary to enable the Plant to respond to system shocks and network shocks determines the operating envelop and the costs of operating and maintaining the Plant in line with good industry practice, as required under SDP's Network Operator's Licence. • See further discussion below this table.

15 Such as the Pricing Principle 8iiithat clarify the EAM is to apply to all surplus energy, including when Plant is in operation and SDP is complying with its Network Operator's Licence, rather than only when the Plant is in shutdown or restart (as per 2012 Standing Terms of Reference).

16 The WSA is a 50-year agreement between SDP and Sydney Water which enables Sydney Water to request defined volumes of water for a defined period and provides further guidance on the detailed operating protocols between the two parties and other risk and dispute resolution mechanisms. SDP and Sydney Water are currently negotiating amendments to the WSA to reflect the Operating Rules.

17 IPART Issues Paper, November 2022, p11.

18 IPART Issues Paper, November 2022, p10.

19 IPART Issues Paper, November 2022, p8.

	No or minimal change	Significant change	Implication for SDP and the 2023 Determination
Regulatory environment			
Network Operator's Licence		✓	• SDP's Network Operator's Licence makes clear that the higher level of service associated with the Plant flexibly responding to Sydney Water's production request, including for system and network shocks is no longer ancillary, but a primary role of the Plant. • The higher level of service requires additional operating and capital expenditure in addition to SDP's enduring requirement to operate, maintain and invest in the Plant in line with good industry practice and cost efficiently, in the long-term interests of customers. • Recent actual expenditure is not reflective of the true cost of the service being delivered under our new operating arrangements. SDP has proposed a number of 'step changes' (i.e., expenditure above recent revealed costs) to ensure prices over the 2023-27 period reflect the efficient cost of operating and maintaining the Plant in line with good industry practice, as required under SDP's Network Operator's Licence. • See further discussion below this table.
Terms of Reference - operating principles		✓	• The covering letter to the amended Terms of Reference states that the principles under which SDP is expected to operate include: – providing a minimum baseload volume each year – responding to shocks in the network, and – that volumes of water produced will be varied in line with the Decision Framework. • Operating in a flexible manner including responding to system shocks is now a primary role for the Plant.
Terms of Reference - Pricing Principle 8iii (surplus energy)		✓	• The Terms of Reference amendment clarifies that the EAM is to apply to all surplus energy (including when Plant is in operation and SDP is complying with its Network Operator's Licence). • The covering letter to the amended Terms of Reference notes the intention is "to ensure the SDP customers receive the benefit of significant gains and bear significant losses incurred as a result of the different between the cost of electricity and RECs under SDP's contracts…and the market price for electricity and RECs arising from the sale of SDP's surplus electricity and RECs" [20]. • SDP may have surplus energy when remaining operational and meeting production requests as required under SDP's Network Operator's Licence given "the Plant will operate on a flexible basis (including with respect to the volume of water produced) rather than only at full capacity during periods of drought"[21].

20 Covering letter to the amended Terms of Reference, p1.

21 Covering letter to the amended Terms of Reference, p1.

	No or minimal change	Significant change	Implication for SDP and the 2023 Determination
Terms of Reference - Pricing Principle 7A (costs incurred under GGRP contracts)		✓	• The Terms of Reference amendment requires IPART to "consider SDP's ability to recover all costs it incurs in complying with the GGRP and GGRP Contracts other than costs related to surplus energy in relation to which the energy adjustment mechanism described in paragraph 8 (iii) applies". • The covering letter to the amended Terms of Reference notes "SDP is required by its Project Approval…to implement a greenhouse gas reduction plan, which incorporates the long term electricity and REC arrangements between SDP and Infigen (now Iberdrola Australia that were entered into at the time of developing the Plant." [22] • This pricing principle was added to explicitly recognise the importance of SDP being able to recover all costs it incurs under the GGRP contracts in order to efficiently achieve the objectives of the GSWS and SDP's new Network Operator's Licence. • The Issues Paper seeks stakeholder comment on the scope of matters IPART should take into account in considering Pricing Principle 7A (Q6);
GGRP legal obligations	✓		• SDP has a legal obligation to comply with GGRP. • SDP can't trade around or renegotiate these contracts • Setting an allowance based on a long-term market-based benchmark price doesn't reflect this obligation, nor change SDP's incentives to procure energy efficiently.
Commercial environment			
Water Supply Agreement (WSA)		✓	• Amendments to the WSA between Sydney Water and SDP are necessary to align the WSA with SDP's Network Operator's Licence and Sydney Water's Decision Framework. The WSA will set out how the objectives of the GSWS are to be achieved at an operational level between Sydney Water and SDP. • The 2023 Determination should consider the likely changes to the WSA to ensure both instruments provide a consistent set of incentives framed around customers' long-term interests. • SDP has provided the latest draft of the WSA to IPART and its expenditure review consultant, Atkins.

1.2 Responding to network shocks is a core component of SDP's expected level of service

The GSWS identifies a range of short-term policy responses to support growth and enhance resilience. These include changing the approach to operation of the Sydney Desalination Plant, so it can produce an additional 20GL per year immediately which would result in higher storage levels at the start of a drought and slow the rate of dam depletion during a drought[23].

22 Covering letter to the amended Terms of Reference, p2.

23 NSW Department of Planning, Industry and Environment, Greater Sydney Water Strategy, August 2022, p13.

In this context, IPART's Issues Paper notes that:

> *Further, the GSWS looks to maximise SDP's contribution to Sydney's water supply and slow dam depletion rates during droughts…*[24]
>
> *The primary service obligation under the new Network Operator's Licence for SDP will be to comply with an annual production request (APR or production requests) issued by Sydney Water.* [25]

However, being available to respond 'to other production requests' including emergency response is a key part of the expected level of service. The GSWS notes that increasing Greater Sydney's proportion of rainfall-independent supplies will enhance Greater Sydney's ability to respond to other shocks in the system such as challenges to water treatment or network outages [26]

The recently amended Terms of Reference issued by the Minister for Lands and Water, Hospitality and Racing notes that the principles under which SDP is expected to operate includes responding to shocks in the network as required by the agreements between SDP and Sydney Water (see Table 1.1).

Sydney Water's Decision Framework, reflects Sydney Water's responsibility for "operationalising the SDP new operating rule in the GSWS"[27] by determining and issuing production requests to SDP, The framework makes clear that the Plant is to be in a state of readiness (particularly when dam levels are above 75%) to quickly respond to production requests to assist Sydney Water in managing short-term emergencies such as raw water quality risks and/or network outages. Under the new framework, annual production requests can be changed throughout the year as circumstances change and even if an annual production request is not altered, the timing of when that water is provided may be changed unpredictably as short-term circumstances require.

1.3 Higher levels of service benefit customers

The new operating rules provide Sydney Water with the option to call on SDP when circumstances require. This option provides substantial additional value for Sydney Water and end-customers including:

- delaying, reducing the duration, or avoiding altogether the need to impose water restrictions on customers during a drought
- reducing the frequency or duration of water supply disruptions / network outages
- reducing the risk of water quality issues affecting customers

While a higher level of service provides additional value for end-customers, it also increases the costs for SDP.

However, the Issues Paper implies that investment to "reduce SDP's performance risk" [28] is a choice made by SDP (rather than NSW Government through the GSWS) that benefits SDP (rather than Sydney Water and end-use customers).

For example, the Issues Paper notes:

> *The proposed increases in capital expenditure, more frequent replacement of membranes and reduction in asset lives reduce SDP's performance risk. As part of our review, we will need to*

24 IPART Issues Paper, November 2022, p7.

25 IPART Issues Paper, November 2022, p8.

26 NSW Department of Planning, Industry and Environment, Greater Sydney Water Strategy, August 2022, p37.

27 Sydney Water, Decision Framework for SDP Operation, June 2022, p7

28 IPART Issues Paper, November 2022, p10.

> *consider whether this reflects an appropriate re-balancing of risk between SDP and its customers…* [29]
>
> *As part of our review, we will need to consider whether SDP's proposal meets the required policy intent or is in addition to what is required to meet the new operational environment. It is essential SDP has the appropriate incentives in place to efficiently manage its costs and risks.*[30]

Many regulatory frameworks explicitly acknowledge that improving service performance through improved reliability of supply is ultimately a benefit to customers. Extensive analysis is typically undertaken to balance the additional investments and costs with the customer benefit of higher levels of reliability.[31]

1.4 Higher levels of service increase the efficient costs of operating & maintaining the Plant

The expected level of service agreed with Sydney Water and the DPE following extensive consultation determines the operating envelop — including the estimated 23 GL per year "minimum baseload volume" that's required over the financial year to maintain the Plant in a state of readiness to respond to emergency requests. It also increases the costs of operating, maintaining and investing in the Plant in line with good industry practice, as required under SDP's Network Operator's Licence.

1.4.1 Relationship between levels of service and minimum baseload volumes

As noted in SDP's Pricing Proposal there is a direct relationship (or trade-off) between service levels (specifically response time) and the minimum baseload volumes:

> *For the Plant to be able to respond to production requests in line with the expected level of service it should remain operational in a state of readiness producing a minimum baseload volume, estimated to be 23GL per year. Higher (or lower) level of service that involve faster and more reliable production responses, involve higher (or lower) minimum production levels at higher (or lower) risks of dams spilling, at higher (or lower) costs to customers. That is, there is a direct trade-off between service levels and the costs of supply and price impacts on customers.*[32]

1.4.2 Relationship between levels of service and proposed expenditure

There is also a direct relationship between service levels and investment in the Plant, with the higher (or lower) the service levels (reliability) the greater (lower) the investment required.

SDP's Network Operator's Licence makes clear that the higher level of service associated with the Plant flexibly responding to Sydney Water's production request is no longer ancillary, but a primary role of the Plant. Delivering this higher level of service involves additional fixed operating and maintenance (O&M) costs as well as variable opex associated with producing the minimum baseload volumes.

Our recent O&M expenditure is not reflective of the true cost of the service expected under our new operating arrangements. Our O&M expenditure in 2022-23 is based on interim O&M contract arrangements with our Operator and preferentially running our most efficient reverse osmosis (RO) trains. We chose to run in this operating state as a necessity to manage overall opex as cost pressures increased without SDP having the ability to recover any additional costs. However, SDP's Network Operator's Licence confirms the

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29 IPART Issues Paper, November 2022, p10.

30 IPART Issues Paper, November 2022, p12.

31 For example, see: https://www.aer.gov.au/system/files/AER%20-%20Values%20of%20Customer%20Reliability%20Review%20-%20Factsheet%20-%20December%202019.pdf

32 SDP Pricing Proposal, September 2022, p55.

Plant will remain operational with ongoing but variable production. This will require us to operate more sustainably by targeting broadly equivalent run-hours for all our equipment. This results in additional costs, including energy and O&M-related costs, which are described in Appendix 9 of our Pricing Proposal.[33]

Similarly, the drivers of our forecast capital expenditure all relate to delivery of legislated or agreed levels of service and enabling the Plant to operate with the agreed level of confidence. For example, our proposed membrane replacement program provides a number of benefits, including maintaining availability for emergency response, and would apply regardless of the level of annual production from the Plant under the revised Operating Licence commencing 1 July 2023.[34]

[33] For example, see discussion of additional costs related to process water, SDP Appendix to Pricing Proposal 2022, p75-76.

[34] SDP Pricing Proposal, September 2022, p170.

2. SDP's energy costs

This section sets out elements of SDP's legal and regulatory environment including amendments to IPART's Terms of Reference for the regulation of SDP's prices, which are key to efficiently achieving the objectives for SDP contained within the GSWS and SDP's new Network Operator's Licence. These warrant a change to IPART's approach in relation to energy costs in the 2023 Determination compared to previous determinations.

As noted above, we ask that IPART and its consultants consider and respond to positions put forward by SDP in our Pricing Proposal and during the price review process.

2.1 GGRP legal obligations

IPART's Issues Paper seems to reach a position that IPART "will consider applying a similar approach as previous years" [35], without having considered SDP's legal obligations, the fundamental changes made to SDP's licence and mode of operation, the consequent changes made to the Terms of Reference or SDP's submission and supporting evidence.

The Issues Paper notes:

> *In the 2017 Determination, we set SDP's energy cost allowance using benchmark electricity prices. These prices reflected market-based forecasts of efficient energy costs over the 2017 determination period. Our approach provided SDP with an incentive to manage its energy procurement costs efficiently, and in line with the outcomes expected in a competitive market. It also reflected the potential for SDP to renegotiate its energy contracts and pass-through competitive energy costs to customers.*
>
> *In its submission, SDP has proposed setting its energy cost allowance based on prices from its existing Greenhouse Gas Reduction Plan (GGRP) energy contracts.*
>
> *In our review, we will consider applying a similar approach as previous years to setting efficient energy cost allowances. We will work with our expenditure review consultant to determine appropriate energy cost profiles and a benchmark unit cost of energy that provides an appropriate incentive for SDP to efficiently procure its energy. The benchmark unit cost of energy will account for SDP's legal requirement to purchase energy from 100% renewable sources, as done in the 2017 Determination.* [36]

SDP would like to raise several points with regard to this statement.

First, it appears that IPART has already reached a view that it should apply the same benchmark efficient cost approach adopted in previous decisions and has engaged a consultant to assist it apply that approach. SDP's submission is referred to in one line and there is no discussion of the substance of that submission, including in relation to SDP's legal obligations, the legal and commercial impracticality of SDP attempting to renegotiate its GGRP energy contracts, or the significance of the changes in the Terms of Reference in this regard. It appears that IPART has prejudged the matter without having taken into account the highly relevant considerations set out in SDP's submission. We request IPART set out how it has considered the information provided by SDP in its Pricing Proposal on this issue, alongside the Terms of Reference in reaching its decision.

35 IPART Issues Paper, November 2022, p15.

36 IPART Issues Paper, November 2022, p15-16.

Secondly, the Issues Paper refers to 'SDP's legal requirement to purchase energy from 100% renewable sources'. In fact, as demonstrated in SDP's submission, SDP is legally obliged to acquire electricity and LGC's from the GGRP contracts. [redacted]

[37] [redacted]

The Issues Paper suggests that IPART is acting under a fundamental misunderstanding of SDP's legal obligations and is basing its decision on a legal error.

Thirdly, SDP's Pricing Proposal provided information demonstrating that SDP does not have the option to renegotiate the GGRP contracts as a result of the legal obligations noted above. SDP's Pricing Proposal also demonstrated that even if SDP did have the legal option to renegotiate, doing so would not commercially deliver a better outcome. Again, the Issues Paper does not acknowledge this information provided by SDP nor its relevance to IPART's decision-making.

Fourthly, SDP's Pricing Proposal provided extensive information demonstrating that in SDP's circumstances, the GGRP contracts were the most efficient way to procure 100% renewable energy that was additional to existing renewable energy generation in NSW (a key criteria assessed in SDP's Project Approval). The GGRP contracts remain an efficient means of supplying SDP's renewable energy needs as and when needed (which could be highly unpredictable under SDP's new Network Operator's Licence) at a stable and efficient long-term price. The GGRP contracts enable SDP to avoid the risks of price shocks which have been a hallmark of the Australian wholesale energy market for many years. Again, the Issues Paper does not acknowledge this information provided by SDP nor its relevance to IPART's decision-making. In future, when the GGRP contracts expire, IPART can ensure SDP has incentives to contract efficiently by reviewing the prudency and efficiency of SDP's future contracting behaviour. IPART does not need to set the energy cost allowance today based on current, relatively short-term, market prices to deliver these incentives for efficiency, when the GGRP contracts embody SDP's prudent and efficient energy costs.

2.2 Amendments to the Terms of Reference

The Terms of Reference were recently amended by the Minister for Lands and Water, Hospitality and Racing in respect of price regulation of SDP's monopoly services.

There are several changes to align the Terms of Reference with the NSW Government vision for delivering sustainable and resilient water services to Greater Sydney including:

- Pricing principle #7A which requires the Determination to consider SDP's ability to recover all costs it incurs in complying with the GGRP and GGRP Contracts other than costs related to surplus energy.
- Pricing principle #8iii which requires the Determination to include a mechanism to allocate the costs or benefits to SDP customers of actual gains and losses beyond a core band that result from the difference between SDP's costs of electricity and RECs under its contracts with Iberdrola Australia and revenues from the sale of surplus electricity and RECs. The mechanism would only operate at times when SDP complied with its requirements to maintain and operate the desalination plant under clause A1 of SDP's Network Operator's Licence.

The Minister's covering letter to the Terms of Reference asks IPART to have regard to these points in making its price determination.

The importance of enabling SDP to recover all costs it incurs in complying with the GGRP has increased significantly as SDP moves to a new stage of flexible full-time operation. The covering letter to the Terms of Reference notes that "the Plant will operate on a flexible basis (including with respect to the volume of water produced) rather than only at full capacity during periods of drought"[38].

[38] Covering letter to the amended Terms of Reference, p1.

Because SDP will be operating more often, it will be exposed more often to any difference between the cost to SDP of complying with its Licence and other regulatory obligations—that is, SDP's costs under the GGRP Contracts—and its regulatory allowance for energy costs. This is why the Terms of Reference have been amended to include a new pricing principle 7A. The costs that SDP "incurs in complying with the GGRP and the GGRP Contracts" are the costs of procuring electricity and LGC's under the GGRP Contracts.

Similarly, the importance of enabling SDP to share the risks associated with selling surplus energy when operational under the GGRP contracts increases markedly as SDP moves to a new stage of flexible full-time operation. For this reason, the Terms of Reference were amended to clarify that the EAM should be expanded to apply at all times and include all of SDP's surplus energy when Plant is in operation and SDP is complying with its Network Operator's Licence. The covering letter to the amended Terms of Reference notes the intention is "to ensure the SDP customers receive the benefit of significant gains and bear significant losses incurred as a result of the different between the cost of electricity and RECs under SDP's contracts…and the market price for electricity and RECs arising from the sale of SDP's surplus electricity and RECs" [39].

We also refer IPART to section 9.6.1 of SDP's 2023-27 Pricing Proposal as well as appendices 9.7, 9.8, 9.9 and 9.10, which outline SDP's submission on the efficient price per unit of energy for the 2023 Regulatory Period. As summarised in SDP's Pricing Proposal, The Environmental Project Approval for construction of the Plant requires SDP to use 100% renewable energy procured through specific electricity and renewable energy contracts. SDP is legally required to comply with the energy procurement approach specified in the Plant's Project Approval. SDP has a legal obligation under the Environmental Planning and Protection Act to comply with the Project Approval. SDP is also obliged under its Network Operator's Licence, issued under the WICA, and administered by IPART, to comply with the EPA and thus with the Project Approval. SDP is also obliged under its lease and the water supply agreement to comply with the Project Approval. Under NSW law SDP is required to acquire electricity and LGC's from the GGRP contracts and so IPART should enable SDP to recover all costs it incurs in complying with the GGRP contracts through the prices set within the 2023 Determination. In short, the regulatory and contractual arrangements applying to SDP require it not only to be powered by 100% renewable energy, but that this be achieved through the GGRP Contracts.

There is a clear change from the Standing Terms of Reference that guided the 2017 Determination and IPART's decision in that Determination to apply EAM during shutdown and restart only.

The Issues Paper seeks stakeholder comment on:

- the scope of matters IPART should take into account in considering Pricing Principle 7A (Q6); However, it is not clear that IPART has considered the extensive information (including expert reports) on SDP's legal obligations nor how a market based benchmark would be consistent with Pricing Principle 7A requiring the Determination to "consider SDP's ability to recover all costs it incurs in complying with the GGRP and GGRP Contracts other than costs related to surplus energy".
- whether the scope of the EAM should be expanded to include all of SDP's surplus energy (Q18). However, the Issues Paper does not acknowledge the implications of the amendment to the Terms of Reference, provide a view as to why IPART considers it has discretion on the scope of the EAM, nor how it intends to use stakeholder feedback on this issue.

IPART is legally required to consider the terms of reference as amended. It appears from the Issues Paper that IPART has concluded it will apply the same benchmark efficient cost approach adopted in previous decisions without having given any meaningful consideration to the revised Terms of Reference.

[39] Covering letter to the amended Terms of Reference, p1.

We request IPART set out how it has considered this information, alongside the Terms of Reference in reaching its decision. For example, if IPART chooses a benchmark price approach to setting the energy cost allowance it must explain why the Determination will not enable SDP to recover all costs it incurs under the GGRP contracts,

Further information in response to questions 6 and 18 is provided in Appendix A.

3. Managing key risks in providing our services

The Sydney Desalination Plant (**Plant**) is Greater Sydney's only major source of non-rain dependent drinking water supply and plays a key role in securing Greater Sydney's water supply. While a critical element of Greater Sydney's overall water supply, SDP is different from many other water utilities that IPART regulates.

SDP faces a unique set of risks and challenges in providing our services, especially given the limited experience that Sydney Water, SDP and IPART have with this new operating environment, and being a single asset business there is limited opportunity to diversify many of these business-specific risks.

Our Pricing Proposal sought to describe the risks that SDP faces in providing our services, and "how these risks can be efficiently and holistically managed within the regulatory framework and appropriately allocated between our business and our customers" [40] such that "prices do not include compensation for risks shared with customers."[41]

We welcome IPART's intention to review SDP's proposal holistically considering the operating environment, the nature of the risks, whether risks are reasonably within SDP's control in the context of its operating environment and how the 2023 Determination can ensure a "fair and efficient allocation of risk between SDP, Sydney Water and end-use customers".[42] This includes holistically considering the linkages between the cost allowances (e.g. insurance allowance), incentive mechanisms (e.g. SLIS) and risk management mechanisms (e.g. insurance end-of period true-up and/or re-opener).

However, we consider that the Issues Paper may not reflect the allocation of risk between service providers and customers observed in **competitive markets** and other **regulated infrastructure markets**, including IPART's preliminary view that customers should not bear the cost of insurance for controllable risks.[43]

We also note IPART's suggestion that the allocation of business-specific risks between SDP and consumers might have implications for the rate of return that SDP is allowed to earn. This is inconsistent with IPART's longstanding approach (incl. 2018 WACC methodology reviews) and the standard approach taken by all other regulators in Australia. Business-specific risks are, by definition, not systematic risks and should have no effect on the rate of return that SDP is permitted to earn.

This section sets out further information on these points.

3.1 Allocation of risk in other markets

IPART states that it seeks to replicate the dynamics of competitive markets, as these markets enhance the long-term interests of customers:

> *Businesses should deliver customer services and outcomes at the lowest sustainable cost, in a manner that ensures the greatest long-term customer value over the lifetime of assets. Together, our four 'cost' principles encourage businesses to prefer innovations that lead to efficiency improvements over time (i.e. dynamic efficiency), which benefits society.*[44]
>
> *We consider the following tools and adjustments that could be used to appropriately reflect the outcomes of competitive markets.*[45]

[40] SDP Pricing Proposal, September 2022, p26.

[41] SDP Pricing Proposal, September 2022, p63.

[42] IPART Issues Paper, November 2022, p11

[43] IPART Issues Paper, November 2022, p16.

[44] IPART Delivering customer value – Our water regulatory framework, Technical Paper, November 2022, p 9.

[45] IPART, Water regulation – Draft Handbook, December 2022, p 59.

In competitive markets, service providers use a range of mechanisms to manage controllable and uncontrollable risks. These mechanisms include insurance, service exclusions, cost pass throughs / price resets etc). Many of these same mechanisms have been incorporated into regulatory frameworks across a range of jurisdictions to efficiently manage risks. This section provides further information on use of these mechanisms.

3.1.1 Use of insurance to manage risks in other markets

IPART notes that its preliminary view is that customers should not bear the cost of insurance for controllable risks as it might impact SDP's incentives to manage risks.

However, all businesses in competitive markets have insurance – including for controllable risks – as it can form part of an efficient and least-cost way of managing risk. Customers benefit from their supplier taking out insurance, for instance by protecting assets or recouping losses that would otherwise affect service. In SDP's context insurance ensures assets can be quickly and cost-effectively repaired following natural disasters, allowing the Plant to recommence operations to the benefit of customers.

In competitive markets, service providers will use insurance as a way of managing a range of controllable and uncontrollable risks with insurers (larger diversified parties). Insurance policies cover a range of controllable and uncontrollable risks. Customers cannot entirely 'pick and choose' elements of insurance cover for standard policies in well-developed insurance markets. For example, Industrial Special Risks (ISR) policies, and in particular the range of risks covered in the Business Interruption (BI) component of an ISR insurance policy, are standard – SDP did not choose which risks would be covered and which would not. The risk package that comes with the standard BI component of the ISR policy is available to SDP in the Insurance market on reasonable commercial terms. SDP was required by IPART to rely on its own BI cover following IPART's 2017 Determination (see Section 3.2).

Through scale, insurance companies are generally able to manage risk more efficiently than individual businesses (otherwise, insurance companies would not have a market). In the absence of purchasing insurance, even for controllable risks, businesses such as SDP (or other businesses operating in competitive markets) would be forced to engage in more costly risk mitigation measures (including potentially unduly conservative practices) – thus ultimately increasing costs for customers and potentially undermining service standards to customers over the long-term..

As outlined in Appendix 9.15.4, of our Pricing Proposal, SDP is unable to insure or can only partially insure for a range of plausible events. For example, SDP cannot insure against pandemics, terrorism events or other events that lead to the closure of the site or very limited staff available to operate the Plant. This is a challenge facing many service providers and this 'insurance gap' is acknowledged in many regulatory frameworks through an established process for assessing and approving cost pass through applications following specified external events.

Importantly insurance only partially covers SDP from the financial consequences of certain events (including in some cases fee abatement where standard business interruption insurance covers the financial impact of these events), generally for those events for which there are established, mature and commercially available insurance products available at a reasonable cost. Examples of these events are set out in Table 9.25 of Appendix 9.15 to SD''s submission. Examples include a tornado event or similar natural catastrophe.

Insurance plays an important role for service providers in regulated markets also, with this acknowledged by a range of regulators. For example, when balancing the use of insurance and other risks management mechanisms, the AER notes:

> *While a prudent service provider could take steps to reduce the likelihood and cost impacts of these events, and could insure or self-insure against them, expenditure beyond a certain level aimed at completely eliminating the risk is likely to be imprudent or inefficient. In such circumstances we consider a sharing of risk between the TNSP and its customers is appropriate and more likely to be in the long term interest of consumers with respect to price.* [46]

This was also noted by IPART in the 2017 Determination (see Section 3.2).

We further note that SDP's financing documents with its Banking Syndicate require it to take out a prudent level of business interruption insurance. SDP's banking documents are considered standard for the size of the business and type of industry in which it operates.

3.1.2 Use of other mechanisms to manage movements in costs in other markets

In competitive markets, service providers use a range of other mechanisms to manage controllable and uncontrollable risks. This includes service exclusions, cost pass throughs, and price resets. Many of these same mechanisms have been incorporated into regulatory frameworks across a range of jurisdictions to efficiently manage risks. This section provides further information on use of these mechanisms.

Retail electricity is a useful example of a competitive market where retailers compete over price and service offerings, but there is also a regulatory framework for setting some (regulated) prices. In many cases, regulators have sought to establish a package of incentives and risk management mechanisms to mimic outcomes in competitive markets and to avoid the regulatory framework distorting competitive market outcomes.

Many retailers have sought to either vertically integrate or contract with generators to manage wholesale market risks. These are often viewed as 'controllable costs' in that retailers can take steps to manage these costs over the short-term but over the longer term they are subject to many of the same wholesale market dynamics and risks. For this reason, retailers in competitive markets reset the prices they offer to customers, and regulators typically reset the wholesale component of regulated prices annually (including the 'green' component that is influenced by regulatory and market factors). In this regard, the ACCC recently noted:

> *Current policy settings limiting the Default Market Offer to annual price resets are resulting in insufficient flexibility. The AER should be able to reduce the Default Market Offer when costs significantly decrease and to increase the Default Market Offer when costs significantly rise. Doing so will give the AER the flexibility to protect standing offer customers and support retailers in periods of rapidly changing market conditions in order to maintain retail competition for the long-term benefit of consumers.* [47]

In retail electricity markets there are also other residual risks related to cost movements which retailers are not well placed to manage, particularly those supplying large customers, even if "managing these risks is not new"[48]. This includes movements in network charges and other AEMO imposed market charges such as Unaccounted for energy (UFE), Reliability and Emergency Reserve Trader (RERT) charges and generator compensation fees and charges. Retailers typically pass on movements in these 'uncontrollable costs' to their customers rather than seek to forecast and bear movements in these costs given that they are not well placed to manage this risk[49].

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46 AER, Attachment 13 – Pass Through Events, TransGrid transmission draft determination 2018-23, p11.

47 ACCC, Inquiry into the National Electricity Market, November 2022 Report, p7.

48 IPART Issues Paper, November 2022, p12.

49 SDP's Pricing Proposal stated that Iberdrola faces the same pressures as other electricity market participants, noting "Iberdrola Australia like other market participants is billed to recover the cost of UFE, and in turn passes these costs on to retail customers in a similar way to network losses. SDP has no ability to forecast nor influence the costs of UFE determined by AEMO".

[redacted]

These AEMO imposed market charges form part of the GGRP costs that SDP is required to pay Iberdrola Australia pursuant to the GGRP Contracts. For this reason, SDP's ability to share this risk with a third party and "potentially pass the risk through to them at a reasonable price" [51] is limited, and/or the risk premium required to compensate them for this business specific risk is likely to be material. In other words, it is efficient to share this risk with customers rather than third parties. Regulatory mechanisms like the proposed risk management mechanisms are in customers long-term interest.

3.2 The appropriate allocation of risk between SDP and consumers

3.2.1 Use of insurance to manage risks

In the context of SDP proposing an incentive and risk management framework that sought to efficiently allocate risk, the Issues Paper notes that IPART would consider the allocation of risk to ensure a "fair and efficient allocation of risk between SDP, Sydney Water and end-use customers."[52]

SDP's Pricing Proposal states that "prices do not include compensation for risks shared with customers."[53] This was underpinned by a clear risk management and allocation that drew on SDP's corporate risk framework, standard risk management principles and well-established regulatory precedent. This includes IPART's 2017 Determination where the insurance allowance was to reflect the costs of sharing some (but not all) business specific risks with insurers (incl. force majeure events), with the abatement mechanism recognising that some risks may not be insured and excluded from the mechanism including where SDP has limited control and/or it is not efficient to seek to eliminate this risk.

As part of considering SDP's proposed allocation of risk between SDP and consumers, the Issues Paper states that:

> *We agree with SDP in principle that it is entitled to insure itself against both controllable and uncontrollable business risks. However, in assessing the insurance costs that should be recovered through regulated prices, we will consider the appropriate governance arrangements whereby the costs of insurable risks are shared between SDP and customer– - especially for those risks that are within SDP's control…*[54]
>
> *… In particular, we will consider the allocation of risk between SDP and customers, as well as the distinction between risks that are within SDP's control, and those that are not. Our preliminary view is that customers should not bear cost of insurance for controllable risks.* [55]
>
> *…We consider SDP should seek to manage those risks which are within their control and use commercial (or self-insurance depending on the specific circumstances) for low probability, high severity events beyond their control.* [56]

50 Letter from Iberdola Australia to SDP, dated 24 Jan 2023.

51 IPART Issues Paper, November 2022, p12.

52 IPART Issues Paper, November 2022, p11

53 SDP Pricing Proposal, September 2022, p63.

54 IPART Issues Paper, November 2022, p17.

55 IPART Issues Paper, November 2022, p16.

56 IPART Issues Paper, November 2022, p18.

In reviewing SDP's proposal, the Issues Paper notes that IPART will consider several key issues including whether it is appropriate for SDP's prices to include an allowance for insurance for Director and Officer's liability coverage, and Business Interruption insurance, particularly related to abatement or SLIS penalties which could reduce SDP's revenues:

> *Director and Officer's liability coverage: SDP's proposed insurance costs include cover for Director and Officer's liability insurance. Director and Officer's liability insurance provides cover to Directors in relation to wrongful acts, including penalties from licence breaches. However, liabilities resulting from licence breaches are controllable risks, and as such, we will consider whether coverage for Director's personal liability is a cost that should in principle be paid for by customers.*[57]
>
> *We will also consider whether the sharing of insurance costs with customers creates the right incentives for SDP to make decisions in the long-term interest of customers, even under force majeure events*[58]

Efficiently managing risk is a legitimate cost of delivering services to customers, and insurance – even for controllable risks – is often the most efficient and lowest cost way of managing risk. Indeed, these two points are recognised through the insurance requirements imposed on WICA licensees such as SDP. In the absence of insurance, SDP would be compelled to incur higher costs in seeking to manage its risks and/or engage in unduly conservative production processes – thus increasing costs to customers and/or compromising service standards to them over the long-term. It would not be in the long-term interests of customers to not allow SDP to recover its efficient costs of managing risks.

Insurance policies cover a range of standard controllable and uncontrollable risks. Customers – including SDP–- cannot 'pick and choose' elements of standard policies. SDP is unable to take out insurance for uncontrollable risks only.

IPART's proposed approach to assessing Directors and Officer's liability coverage is at odds with what occurs in competitive markets, other regulated industries and the long-term interests of customers. Directors and Officer's liability coverage is an efficient cost incurred by many businesses in competitive markets and recovered from customers.

Aon – an insurance expert, the second largest insurance broker in the world, with extensive knowledge of insurance markets including the policies available – considers it a core insurance product for private enterprises that is required to attract competent and experienced directors and executives to run the business.

In its recent draft decision for ElectraNet Transmission[59], the AER approved insurance expenditure, including a step change, that specifically incorporated Directors and Officer's cover. While the AER's draft decision did not include the full amount of the insurance step change proposed by ElectraNet, the reduction was to avoid possible double-counting from the output growth trend factor – not to the scope of insurance classes covered.[60]

Given this, it is unclear how compromising the ability of utilities to attract competent and experienced directors and executives would be considered in the long-term interest of customers.

In addition, SDP's Directors and Officer's policy limit [redacted] is consistent with industry peers in the energy, utilities and industrial sectors. [redacted]

[57] IPART Issues Paper, November 2022, p16.

[58] IPART Issues Paper, November 2022, p17.

[59] AER, Draft Decision ElectraNet Transmission Determination 2023 to 2028 (1 July 2023 to 30 June 2028) Attachment 6 Operating expenditure September 2022, pp 19-20.

[60] Information about the insurance classes included in ElectraNet's proposal is contained in an expert report. See Marsh, ElectraNet Revenue Proposal Insurance Market Update and Premium Projections. January 2021, p 1, available at: https://www.aer.gov.au/system/files/ENET027%20-%20ElectraNet%20-%20Marsh%20-%20Insurance%20Cost%20Forecasts%202024-28%20-%2031%20January%202022.pdf

[redacted]

[redacted] We are unaware of any precedents where IPART or other regulators in Australia have sought to exclude the costs of Directors and Officer's liability coverage from the efficient costs to be recovered from customers. We further note that SDP's financing documents with its Banking Syndicate require it to take out Directors and Officer's insurance at a level which is prudent for a similar business to SDP. SDP's banking documents are considered standard for the size of the business and type of industry in which it operates.

IPART's proposed approach is also at odds with the allocation of risk under its 2017 Determination, including where Sydney Water submitted, and IPART accepted, that as a single asset business subject to the abatement mechanism, the costs of insurance to manage business specific risk should be reflected in SDP's prices.

In this context Sydney Water's submission to IPART noted:

> *A condition of SDP's licence is that they operate the plant in accordance with Good Industry Practice which includes SDP having adequate insurance in place, including business interruption insurance. The cost of these insurance premiums should be included in SDP's revenue requirement…SDP should procure, and be entitled to recover the cost of, appropriate insurance premiums to mitigate this risk.* [61]

IPART's 2017 Determination noted:

> *Where insurance is available on reasonable commercial terms, we consider it can be efficient for businesses to rely upon insurance to manage their risk. In the 2012 Determination, we included an allowance for SDP's Industrial and Special Risks insurance premiums, which was then incorporated into SDP's prices. Similarly, we have included an allowance in the 2017 determination period for*

[61] Sydney Water, *Response to IPART's review of prices for Sydney Desalination Pty Ltd from 1 July*, November 2016, p41.

> *SDP's insurance premiums to ensure that its coverage is sufficient given its operating environment (including our determination, and its abatement provisions).*[62]

This precedent makes clear that SDP prices should recover the efficient level of insurance coverage which is a function of SDP's operating environment.

3.2.2 Use of other mechanisms to manage risk

The Issues Paper notes:

> *When the right incentives are in place to manage risk, this can improve efficiencies, which may mean lower prices for customers in the longer term… In certain circumstances SDP may also have more control over changes or a greater ability to mitigate the consequences of a risk occurring*[63]

We agree, and our proposed adjustments to the incentive and risk management mechanisms provide SDP with greater accountability for those things in our control and of value to Sydney Water and customers, and less exposure to windfall gains and losses for those events outside our control. However, in those circumstances where SDP is not well placed to manage risks, a poorly designed regulatory framework can create inefficient incentives – potentially that don't align with the incentives of Sydney Water and end-customers – and lead to unnecessarily higher prices.

The Issues Paper may imply that SDP should be in a position to forecast these costs and bear the risk of movements in these costs:

> *Costs such as land tax, chemical costs and insurance differ from the type of costs where we currently apply pass throughs. These costs are not unexpected and can be influenced to some extent by the business*[64]

However, as noted in our Pricing Proposal, these costs are driven by market forces which are outside SDP's control and are difficult to forecast. For example, since submitting our Pricing Proposal in September 2022, the NSW Valuer General's land valuation used to calculate our land tax has increased by more than 20% (see Appendix D). This is higher than the rate of increase of 7.5% used to forecast land tax and council rates in our Pricing Proposal, which was informed by confidential expert advice [redacted] (see Appendix 9.12 of our Pricing Proposal). As part of its advice, the confidential independent expert [redacted] noted that the land value in each year is inherently uncertain and difficult to forecast. We consider that the most recent land valuation confirms this view and the need for an end-of-period true-up for the movement in uncontrollable costs.

In our view IPART is considering an allocation of risk that could be inconsistent with behaviour and precedents in other markets.

This risks the 2023 Determination resulting in:

- an allocation of risk that is not "fair and reasonable" and exposing SDP to windfall gains and losses for risks beyond its control,
- prices not reflecting the efficient cost of providing services (as per the Terms of Reference)
- compromising SDPs ability to provide services. As noted in Issues Paper "If prices are set too low, SDP may not be able to spend what is required to provide the services expected by customers"[65]

In Section 7.6 of the Appendix to SDP's Pricing Proposal, Table 7.7 summarises regulatory frameworks that generally all provide for taxation changes (amongst other events) as a trigger to reopen a price

62 IPART, Review of prices from 1 July 2017 to June 2022, Draft Report, March 2017, p31-32.

63 IPART Issues Paper, November 2022, p12.

64 IPART Issues Paper, November 2022, p35.

65 IPART Issues Paper, November 2022, p10.

determination. The trigger events in these regulatory frameworks extend beyond taxation changes to insurance events, natural disasters, differences between forecast and actual desalination costs, retailer insolvencies, regulatory changes and various other events. [redacted]

When discussing the risk allocation mechanisms proposed by SDP, the Issues Paper notes that IPART will consider whether it is appropriate to adjust other elements of the proposal, including the proposed rate of return, to reflect SDP's proposed risk allocation framework. For instance, the Issues Paper states that:

> *SDP proposed several mechanisms that would transfer residual risks (that is risks that have not been mitigated through operating and capital expenditure measures) to customers…It is important for SDP to have an incentive to manage this risk. Managing these risks is not new for SDP. Should the allocation of risk shift disproportionately from SDP to customers this may mean other elements of this proposal (e.g. the rate of return) may need to be revisited.* [66]

Such an approach would contradict the approach established by IPART over many years about what risks should be reflected in the allowed rate of return. Specifically, the Issues Paper does not appear to adhere to IPART's long-established treatment of systematic risk, or the understanding that IPART has developed over numerous regulatory periods and WACC Methodology Reviews of what risks should be compensated through the return on capital allowance.

For example, in the context of managing some business specific risks through insurance, IPART noted in the 2017 Determination that changes in the allocation of business specific risk do not impact the rate of return:

> *We consider SDP's coverage for business interruption insurance would be sufficient given the proposed changes to the abatement mechanism. As this increased risk is firm-specific in nature, it should also not lead to an increase in the permitted rate of return to SDP. Only systematic risk is reflected in the Capital Asset Pricing Model that underpins our estimate of the WACC.*[67]

Similarly in the 2018 WACC review IPART noted:

> *…only systematic risk affects the expected return required by the marginal equity investor (who determines the price of equity). This is because the marginal investor would hold a well-diversified portfolio of equities, and a diversification strategy can remove firm-specific risk.*[68]

This is in line with other regulatory frameworks. For example, SDP's Pricing Proposal noted that under the National Electricity Rules:

> *For systemic risks, service providers are compensated through the allowed rate of return. Service providers also face business-specific, or residual, risks. Service providers are compensated for the prudent and efficient management of these risks through the forecast opex and capex we include in our revenue determination for strategies such as:*
>
> - *prevention (avoiding the risk).*
> - *mitigation (reducing the probability and impact of the risk).*
> - *insurance (transferring the risk to another party).*

66 IPART Issues Paper, November 2022, p10-12.

67 IPART, Sydney Desalination Plant Pty Ltd, Review of prices from 1 July 2017 to June 2022, Draft Report, March 2017, p33.

68 IPART, Review of our WACC method, February 2018, p48.

- *self-insurance (putting aside funds to manage the likely costs associated with a risk event).*[69]

The Issues Paper itself recognises that the allowed rate of return (reflected in IPART's estimate of the WACC) reflects the compensation that regulated businesses require for bearing systematic risk:

> *The weighted average cost of capital (WACC) represents the return that utilities earn on their investments, and by extension, the systematic risk that they bear.*[70]

Systematic risks are by definition risks that are not business-specific risks. However, all of the mechanisms that SDP has proposed in order to alter the sharing of risks between consumers and SDP affect risks that are specific to SDP. These are by definition non-systematic risk and therefore should have no impact on the allowed rate of return.

The Issues Paper appears to signal a potential departure from long-established (and commonly agreed) principles about what the allowed rate of return represents and what risks it should compensate. This could result in regulatory inconsistency and unpredictability over time.

The Issues Paper appears to mischaracterise the concept of systematic risk and what should be reflected in the allowed rate of return:

> *IPART sets SDP's revenue allowance so that it can optimise the performance of the plant over its expected life. It is also in the long-term interests of customers that SDP be allowed to earn a reasonable return on its investment. Implicit in the return SDP receives on its investment is compensation for the 'systematic risk' it manages. It is important for SDP to have an incentive to manage this risk. Managing these risks is not new for SDP. Should the allocation of risk shift disproportionately from SDP to customers this may mean other elements of this proposal (e.g. the rate of return) may need to be revisited.* [71]

There is one key misconception in this statement that we consider ought to be corrected by IPART. Namely, the Issues Paper suggests that it is important for SDP to face incentives to "manage" the systematic risk that it bears. Systematic risk is (by definition) risk that cannot be diversified away or managed through actions by the firm. If the firm could manage those risks or eliminate them (e.g., through diversification, contracting, insurance or other means), those risks cannot be systematic. All the risks that could be managed through an allocation between the business and consumers are firm-specific risks that should not be reflected in the allowed rate of return. Once this point is understood, it becomes clear that some new allocation of risk between SDP and consumers would *not* be grounds for reconsideration of the allowed rate of return.

SDP has also proposed several pass throughs for costs that are beyond SDP's control, and which relate to changes in circumstances that could not be foreseen by SDP or IPART at the time regulated prices were determined. In response to this proposal, the Issues Paper notes that the risk that SDP's prudent and efficient costs turn out to be different from the allowances is a risk that is compensated through the WACC allowance applied to SDP:

> *Our preliminary view is this approach remains appropriate. At the next price review, cost changes are assessed and, if prudent would be passed through to customers and factored into prices going forward. While some costs may be higher than the allowance given, other costs may be less than that allowance. SDP is compensated for the risk of these differences (both positive and negative) through its WACC.*[72]

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69 SDP Pricing Proposal, September 2022, p57; Australian Energy Regulator 2020, Draft Decision Powercor Distribution Determination 2021 to 2026, Attachment 15: Pass through events, September, p. 15-11

70 IPART Issues Paper, November 2022, p21.

71 IPART Issues Paper, November 2022, p12.

72 IPART Issues Paper, November 2022, p34.

SDP disagrees with this contention because the reason why SDP's prudent and efficient costs might turn out to be different from the ex-ante regulatory allowances set by IPART is because IPART does not have perfect information or foresight with which to estimate all of SDP's prudent and efficient costs accurately. This is a risk that is specific to SDP, and therefore is not a systematic risk that is reflected in the allowed rate of return. Specifically, there is no reason to think that IPART's ability to estimate SDP's prudent and efficient costs accurately is related in any way to whether the stock market is 'up' or 'down'. This means that the risk of the regulator being unable to estimate SDP's prudent and efficient costs accurately is not compensated through the WACC allowance applied to SDP.

However, even if it were somehow the case that this risk is systematic in nature (which it is not), SDP cannot see how it would be reflected in the rate of return allowance set by IPART. There are only two WACC parameters that provide compensation for risk:

- Beta (which measures systematic risk); and
- The debt risk premium.

IPART's estimates of neither of these parameters is affected by the extent to which it can forecast prudent and efficient costs accurately:

- IPART estimates beta using a large sample of listed overseas water companies. None of these firms are regulated by IPART, so none of them are subject to the risk of IPART misestimating prudent and efficient costs; and
- The debt risk premium is estimated using a large sample of bonds (compiled by the Reserve Bank of Australia) issued by Australian corporates—none of which are regulated by IPART. SDP raises bank debt and TCorp raises government debt on behalf of the State Owned Corporations regulated by IPART. Once again, debt risk premium estimates derived by IPART when setting the WACC allowance does not reflect the risk of IPART misestimating prudent and efficient costs.

For these reasons, we disagree with IPART's suggestion in the Issues Paper that SDP is compensated through the WACC allowance for the risk that IPART may not estimate accurately SDP's prudent and efficient costs.

Appendix A

Response to IPART questions

A1. Response to IPART questions

This section sets out a response to each the 32 questions raised in the Issues Paper. We have sought to group the questions to avoid repetition.

The response is designed to be read in conjunction with the Pricing Proposal and seeks to provide further clarity around the key issues raised in the Issues Paper – specifically where, on an exceptions basis, we consider there is additional value to IPART and stakeholders by providing one or more of the following **three** responses to each of the questions:

1. Clarifying potential misunderstanding of SDP's policy, regulatory and commercial operating environment, and SDP's Pricing Proposal ('**clarification'**)
2. Highlighting where information is contained in SDP's Pricing Proposal that is relevant to the key issues raised in the Issues Paper ('**existing information**')
3. Providing new information and/or insights that were not evident or available at the time of SDP's Pricing Proposal ('**new information**')

Where the following **three** responses are not applicable, we have not provided a response to each of the questions ('**no further comment'**).

A1.1 SDP operating environment

A1.1.1 IPART questions

- Are the operating assumptions that underpin SDP's pricing proposal (i.e., a minimum production level of 23 GL per year with an ability to adjust production levels at short notice both inside and outside of drought) in line with SDP's role identified through the Greater Sydney Water Strategy? **(Q.1)**
- Does SDP's pricing proposal represent a reasonable and efficient balance of service levels and costs? **(Q.2)**
- Many of the costs in SDP's proposal assume it will be operating at full production for the next 5 years. Is this a reasonable expectation? **(Q.7)**

A1.1.2 SDP response

Q1 & 2

Clarification

It is critical that IPART and other stakeholders have a sound understanding of the NSW Government's policy intent for the Plant under the GSWS.

SDP's expected levels of service under its new Network Operator's Licence were agreed with Sydney Water and the Department of Planning and Environment (DPE) following extensive consultation. Our Pricing Proposal stated that the expenditure, incentive and risk management framework were informed by the unique features of our business and these expected levels of service.

The expected levels of service include producing a "minimum baseload volume" to maintain the Plant in a state of readiness to respond to emergency requests (Section 4.1.3 of SDP's Pricing Proposal outlines why 23GL is the required and efficient level of baseline production). The expected levels of service provide Sydney Water with the option to call on SDP when required by issuing production requests, which provides customers with enhanced levels of water supply. Being available to quickly respond to production requests and assist in managing short-term emergencies such as raw water quality risks, is a key element of this level of service.

This expected level of service determines the operating envelope — including the estimated 23 GL per year minimum baseload volume and the costs of operating, maintaining and investing in the Plant in line with good industry practice, as required under SDP's Network Operator's Licence.

Existing information

See Section 1 of this Response for more information.

Q7

Clarification

The Issues Paper notes that a key assumption underpinning SDP's Pricing Proposal is that the Plant would be operating at full production. As outlined in our response to Q1 &2, the Pricing Proposal is based on the expected level of service that was set by the NSW Government through the GSWS and operationalised through the Decision Framework.

Sydney Water is best placed to provide an estimate of likelihood of the Plant being in full production over the regulatory period as the Plant supports Greater Sydney's water security. However it is being available rather than producing water at full production that drives the increase in O&M and capital expenditure.

A1.2 Setting energy cost component of forecast opex

A1.2.1 IPART questions

- Should SDP's energy allowance continue to reflect a market-based benchmark unit cost, or should it be based on SDP's existing energy contracts? (Q5)
- The Terms of Reference require IPART to consider SDP's ability to recover all costs it incurs in complying with the Greenhouse Gas Reduction Plan (GGRP) and the GGRP Contracts other than costs related to surplus energy. What factors should IPART take into account as part of this consideration? (Q6)

A1.2.2 SDP response

Clarification

IPART's Issues Paper seems to reach a position that IPART "will consider applying a similar approach as previous years" [73], without having considered SDP's legal obligations, the fundamental changes made to SDP's licence and mode of operation, the commensurate changes made to the Terms of Reference or SDP's submission and supporting evidence..

We request that IPART provide further detail on how it has considered and responded to the extensive information SDP has provided regarding the legal and regulatory obligations SDP faces under the GGRP,

[73] IPART Issues Paper, November 2022, p15.

the background process to GGRP, the costs SDP incurs under the GGRP contracts, and the matters it should consider regarding the Terms of Reference (e.g., legal requirements, regulatory precedent & economic arguments relative to Q5 and Q6).

As outlined in section two of this submission, the GGRP does not just provide a legal obligation to purchase energy from 100% renewable sources (as noted in the Issues Paper) but a legal obligation for SDP to purchase through the GGRP contracts. The Issues Paper suggests that IPART is acting under a fundamental misunderstanding of SDP's legal obligations and is basing its decision on a legal error.

Please see Section 9.6.1 of the Pricing Proposal for further information on this legal obligation.

In the Issues Paper, IPART suggests that the Terms of Reference provides it with discretion to determine the energy cost allowance using benchmark electricity prices. However, pricing principle 7A of the Terms of Reference explicitly states that the price determination "should consider SDP's ability to recover all costs it incurs in complying with the GGRP and the GGRP Contracts other than costs related to surplus energy." This requires specific consideration of SDP's ability to recover its costs under the GGRP contracts if IPART were to set an allowance based on an estimate of benchmark energy prices derived from prevailing forward prices (which are relatively short-term compared to the length of a regulatory period). As noted in SDP's Pricing Proposal, prices under the GGRP Contracts are efficient, and therefore setting the energy cost allowance based on the GGRP Contracts is both consistent with the Terms of Reference and in the long-term interests of customers.[74]

IPART suggests that it is open for SDP to renegotiate its energy contracts and pass-through competitive energy costs to customers. As set out in Section 9.6.1 of the Pricing Proposal, SDP is under a legal obligation under its Project Approval, the EPA Act and the WICA to purchase energy through the GGRP Contracts. Even if SDP's regulatory and legal obligations did not require SDP to purchase 100% renewable energy through the GGRP, it would not be prudent, nor efficient for SDP to terminate the GGRP contracts.

[redacted]

IPART's Issues Paper characterises SDP's energy procurement practices as reflecting a choice between purchasing energy under the GGRP contracts or purchasing energy through other means. However, the

[74] SDP Pricing Proposal, September 2022, p139. Further information is also provided in Frontier Economics' expert report.

[redacted]

[76] Ibid, p17.

substantial supporting evidence provided by SDP indicates that there is only one realistic avenue available to SDP to purchase energy in the long-term interest of customers, and that is through the GGRP contracts.

In the Issues Paper, IPART also suggests that determining the energy cost allowance using benchmark electricity prices will provide an incentive for SDP to efficiently procure its energy. However, adopting a benchmark approach to determining the energy cost allowance would have no impact on SDP's energy procurement practices given its strong legal obligations to procure energy through the GGRP contracts, and so will not result in any efficiency gains (since SDP is unable to respond to any incentives created by using benchmark prices). We request IPART further respond to the information provided by SDP in its Pricing Proposal and set out how it has considered this information, alongside the Terms of Reference in reaching its decision. For example, if IPART chooses a benchmark price approach to setting the energy cost allowance it must explain why the Determination will not enable SDP to recover all costs it incurs under the GGRP contracts,

A1.3 Allocation of risk between SDP, Sydney Water and end-use water customers

A1.3.1 IPART questions

- Does SDP's pricing proposal represent a fair and efficient allocation of risk between SDP, Sydney Water and end-use water customers? (Q3)
- Is the scope and level of insurance coverage proposed by SDP reasonable and efficient? Should all of SDP's insurance related costs be reflected in prices? (Q4)
- Are SDP's proposed end-of-period true-ups reasonable and efficient? (Q21)
- Should we accept SDP's proposal to introduce a materiality threshold to determine when we will re-open the determination? Or should we maintain our current approach of using discretion when considering whether to re-open the determination? (Q22)
- If we do introduce a materiality threshold, what should the materiality threshold be based on and at what level should it be set? (Q23)

A1.3.2 SDP response

Q3

Existing information

Please refer to Section 5, and 7.3 to 7.6 of the Pricing Proposal for SDP's proposed risk management and allocation framework. Please also refer to Section 3 of this Response for further information on risk management in other markets, and compensation for systematic risk under the 2017 Determination and 2018 WACC methodology.

Q4

Clarification

SDP's insurance arrangements were developed using a detailed approach that carefully considered all key principles set out in IPART's insurance guidelines for WICA licensees and the additional principles IPART outlined in section 4.3 of the Issues Paper. Please refer to Appendix 9.15 of our Pricing Proposal for an overview of this approach. We also provided further information on the key steps in this approach in several expert reports from our insurance broker Aon. For example, Appendix 9.17 contains Aon's report describing the detailed risk profiling and insurance gap analysis we undertook. This analysis mapped our insurance program against our risk register to ensure that we select the most efficient option based on our operating environment.

We consider that it is efficient for SDP to obtain insurance on behalf of customers as a "custodian" of a valuable community asset. All businesses in competitive markets have insurance – including for controllable risks – as it is an efficient and low-cost way of managing risk. Through scale, insurance companies are generally able to manage risk more efficiently than individual businesses (otherwise, insurance companies would not have a market). In the absence of purchasing insurance, even for controllable risks, businesses such as SDP would be forced to engage in more costly risk mitigation measures (including potentially unduly conservative practices) – thus ultimately increasing costs for customers and potentially undermining service standards to customers over the long-term. For example, without BI insurance SDP would need to increase the redundancy and reliability of the Plant to manage the risks associated with loss of production and any regulatory financial penalties. This would involve SDP incurring substantial additional capital expenditure to ensure adequate reliability of several assets including additional RO trains and additional seawater intake pumps as well as ongoing opex.

Insurance policies cover a range of standard controllable and uncontrollable risks. Customers cannot easily 'pick and choose' elements of standard policies. SDP is unable to take out insurance for uncontrollable risks only. For our existing policies (including ISR and BI), the policy terms and risk profile have not changed from the 2017 determination period. These policies are consistent with IPART's decision to include an allowance for SDP's insurance premiums to ensure that its coverage is sufficient given its operating environment (including IPART's determination and its abatement provisions). Where insurance is available on reasonable commercial terms, IPART considered it can be efficient for businesses to rely upon insurance to manage their risk.[77]

IPART questioned SDP's Director and Officer's liability coverage and whether it is a cost that should in principle be paid for by customers. As noted above, Directors and Officer's liability coverage is an efficient cost incurred by many businesses in competitive markets and recovered from customers. It is a core insurance product that is required to attract competent and experienced directors and executives to run the business.

SDP's Directors and Officer's policy and its limit [redacted] is consistent with industry peers in the energy, utilities and industrial sectors. [redacted]

[77] IPART, Sydney Desalination Plant Pty Ltd, Review of prices from 1 July to June 2022, Draft Report, March 2017, p31.

Existing information

Please refer to Table 9.25 of the Appendix 9.15 of SDP's Pricing Proposal for several key examples of how insurance and BI covers SDP. Most of these examples demonstrate that BI and insurance more generally are there to cover for things outside the control of the business and this is a reasonable position for a business to take.

Q21

Existing information

Please refer to Section 7.5 of SDP's Pricing Proposal for an explanation of why SDP's proposed end-of-period true-ups are reasonable and efficient. This includes an explanation of why the cost items to which the true-up would apply are uncontrollable, and why the application of a true-up to these cost items (in the manner proposed by SDP) will result in an appropriate sharing of risk. SDP submits that its proposed end-of-period true-ups are consistent with IPART's new Water Regulatory Framework.

Q22 and Q23

No further comment

A1.4 Service Level Incentive Scheme

A1.4.1 IPART questions

- Is there a need for an explicit abatement mechanism, given the financial penalties for underproduction and overproduction under SDP's new Network Operator's Licence? (Q10)

- If the proposed SLIS is adopted, should it apply to emergency response notices (ERNs) as well as annual production requests? That is, should performance under ERNs be subject to penalties and rewards? (Q11)
- If the proposed SLIS is adopted, do you think it should provide financial rewards for overproduction? If so, do you think the 10% band is an appropriate bound? (Q12)

A1.4.2 SDP response

Q10 &11

Clarification

Section 7.1 of SDP's Pricing Proposal included a SLIS that sought to amend the existing abatement mechanism to provide a targeted, proportionate (incl. capped) and symmetric scheme which provides financial incentives to reliably meet or outperform annual production requests where this is of value to Sydney Water.

The Issues Paper recognises that the abatement mechanism needs to be modified in light of the changes to SDP's operating environment. It also notes that "SDP's licence may be sufficient in providing the right performance incentives, without the need for a SLIS or abatement mechanism at this stage."[78]

We understand IPART's interest in considering the value of 'holding off' putting in place a SLIS "given that SDP is yet to operate within the new environment, or be 'stress-tested' under the new flexible operating environment. Any incentive mechanism for the 2023 determination period must therefore be cognisant of these risks, and not pose exceedingly high penalties or rewards.".

SDP's Pricing Proposal was designed to be proportionate to minimise this (and other) risks. However, we are open to consultation with IPART, Sydney Water and other stakeholders on the appropriate set of mechanisms to encourage service performance in accordance with SDP's Operator's Licence, Decision Framework and the WSA, and how these are best 'phased in' over time as SDP gains experience with this new operating environment and IPART transitions towards its new Water Regulatory Framework.

SDP would support the option of trialling an incentive scheme design that captures data on key performance area which could be used to inform the design of an enduring future incentive mechanism that targets the services that are found to be most valuable to customers over the 2023-27 regulatory period.

Q12

Clarification

SDP's Pricing Proposal included a SLIS that had many consistent features to that consulted on by IPART in its new Water Regulatory Framework and in mechanisms in other jurisdictions – including a targeted, proportionate (incl. capped) and symmetric scheme which provides financial incentives to reliably meet or outperform annual production requests ***where this is of value to Sydney Wate***r and customers and mirrors incentives for service and cost efficiency performance.

The Issues Paper suggested that SDP may have financial incentives for 'over-production':

> *Fundamentally, SDP's proposed SLIS applies penalties for significant underproductions (i.e. when the annual production is <90% of the APR) and rewards SDP for significant overproductions (i.e. when the annual production is >110% of the APR). . This means that if*

[78] P26

SDP produced water in excess of 110% of the APR, it would be financially rewarded under the SLIS.[79]

However, any financial reward under the SLIS for such 'over-production would be outweighed by the financial 'penalty' of SDP not being able to levy the usage charge for water supplied for production above 10% above the APR ('nil price'). We have proposed removing the 'nil price' in the 2017 Determination for water supplied outside of drought or emergency response period up to 10% above the APR[80] but leaving the 'nil price' in place for water supplied for production that is 10% above the APR to reduce the incentive to produce water when is not valued. This is in line with the principle established by IPART in the 2012 and 2017 Determination that a nil price is sufficient to create "no financial incentive for SDP to supply Sydney Water" when water is not valued (noting that this was assumed to be outside drought in the 2012 Determination).[81]

Please see Section 12.1 of SDP's Pricing Proposal for further information on the proposed application of the usage price and 'nil price'.

For this reason, we are confident that the proposed symmetrical scheme – which offers targeted and proportionate incentives – aligns our incentives with customers' long-term interests.

A1.5 Efficiency Carryover Mechanism (ECM)

A1.5.1 IPART questions

- Is the ECM, with SDP's proposed changes, appropriate for the new operating regime? Are there any other changes that should be made to the ECM? (Q13)
- Are there any other issues we should consider when reviewing the ECM methodology? (Q14)
- Is there a case for the financial incentives cap to be set higher than the default cap of 1% of revenues set in the new Water Regulatory Framework? (Q15)
- If the abatement mechanism is removed from the package of SDP's incentives, should we set a cap that only applies to the ECM? If so, what is the appropriate size of such a cap? (Q16)

A1.5.2 SDP response

New information

SDP welcomes IPART's acknowledgement that the design and implementation of the ECM should reflect SDP's operating regime, and SDP therefore notes that a key consideration for the design of the ECM is that (consistent with its operating regime and the needs of its customer) SDP's supply volumes and hence its efficient level of operating expenditure can change significantly from year to year.

Other water utilities can experience year to year variations in supply and demand levels and hence efficient levels of operating expenditure, but not to the same extent as SDP under its new operating regime.

79 P25-26

80 P14.

81 IPART, Sydney Desalination Plant Pty Ltd: Review of prices from 1 July 2017 to 30 June 2022, Final Report, June 2017, p52

This means that, as per Section 7.2 of SDP's Pricing Proposal, efficiency gains realised under the ECM should be based on the operating expenditure allowance for the actual level of production in each year and carried forward for four years in addition to the year the efficiency gain is achieved. It also means that the efficiency gains to be carried forward should be measured as simply the difference between SDP's allowed expenditure and its actual expenditure ***for the supply volumes in that year***, rather than as the year-to-year marginal efficiency gain achieved in that year.

Any measure of year-to-year marginal efficiency gain to be carried forward would need to be adjusted for changes in year-to-year supply volumes – which would add significant (and likely unworkable) complexity to the ECM calculation. The potential for significant year-to-year changes in SDP's required output volumes (and hence its efficient level of operating expenditure) also indicates that a year-to-year marginal efficiency gain approach is not suitable for SDP.

Therefore, the difference between SDP's allowed expenditure and its actual expenditure for the supply volumes in a year is the most appropriate measure of efficiency to be carried forward under the ECM, rather than the year-to-year marginal efficiency gain. Notably, this approach would be akin to that applied for capital expenditure efficiency incentive schemes,[82] where changes in year-to-year efficient levels of expenditure can be more variable (like SDP's efficient levels of operating expenditure) and therefore the efficiency to be carried forward is simply the difference between allowed and actual expenditure (rather than any measure of year-to-year efficiency gain).

SDP proposed that financial rewards and penalties across the SLIS and ECM would be capped at 2.5% of SDP's plant service charges. In its Issues Paper, IPART notes that its preliminary view is to agree with SDP's proposal for a combined cap across the SLIS and ECM, but that SDP's proposed cap is higher than the default cap of 1% of revenues set in IPART's new Water Regulatory Framework. Given SDP is entering a new operating regime, and consistent with IPART's new Water Regulatory Framework, SDP would support a cap of 1% on incentive schemes.

SDP would be happy to engage further with IPART on the design of the ECM and the application of the cap on payments under the incentive schemes.

A1.6 Energy Adjustment Mechanism

A1.6.1 IPART questions

- Should we include 2020-21 in the application period when calculating the EAM gains or losses over the 2017 determination period? (Q17)
- Should the scope of the EAM be expanded to include all of SDP's surplus energy? (Q18)
- SDP has proposed changing the core band and sharing ratio of its EAM. Specifically, it proposed to reduce the core band from 5% to 2.5% and increase customers' share of gains and losses outside the core band from 80% to 95%. For these changes, SDP claims the new operating environment limits its ability to actively manage its surplus energy and therefore its share of gains and losses should be reduced. Do you agree with SDP's proposal to reduce the core band and SDP's share of gains and losses outside the core band? (Q19)
- What other issues should we consider when reviewing the EAM methodology? (Q20)

[82] Such as IPART's proposed Capital Expenditure Sharing Scheme (CESS) under its new Water Regulatory Framework.

A1.6.2 SDP response

Q18

Clarification

The scope of the EAM should be expanded to include all of SDP's surplus energy. This is because if the current EAM would apply to the new flexible mode of operation, SDP would bear a level of risk that is disproportionate to the control it has over gains and losses, as SDP:

- does not control when it operates, how much water it is required to produce, and for how long, making it impossible to accurately identify the size and timing of parcels of surplus energy in the future (this lack of visibility of the size and timing of surplus energy has been a feature of the period under which SDP has been subject to emergency response requests from Sydney Water since March 2020);
- has no control over the price of energy under the GGRP Contracts; and
- has very limited control over the price it receives for surplus energy in the market.

Please refer to Section 7.3 of the Pricing Proposal for detail on the challenges in managing surplus energy and why changes to the EAM are in the long-interest of customers.

This was recognised in pricing principle #8iii in the revised Terms of Reference. The revised Terms of Reference principle #8iii removed the restriction for the EAM to only apply when SDP is non-operational (water security mode) because SDP's new Network Operator's Licence envisages it operating at multiple different levels of production with varying levels of surplus energy. It is no longer the case that SDP will only have surplus energy under the GGRP contracts when it is not operational.

Thus to meet the Terms of Reference requirements, as well as to address the disproportionate level of risk faced by SDP in respect of surplus energy, the 2023 Determination EAM should apply at all times, so long as SDP maintains and operates the Plant consistent with the requirements set out is SDP's Network Operator's Licence.

Q19 & 20

No further comment

Please refer to Section 7.3 of the Pricing Submission for SDP's position.

A1.7 Asset lives

A1.7.1 IPART questions

- Do you support SDP's proposal to reduce the asset lives for its pipeline, membranes and proposed periodic maintenance asset categories? (Q8)

A1.7.2 SDP response

A1.7.2.1 Pipeline asset lives

Existing information

Section 11.4 of SDP's Pricing Proposal makes clear that the asset life assumption for the pipeline should be determined by reference to the physical and design characteristics of the actual pipeline—considering the environment in which it operates (and was designed to operate in).

The Issues Paper notes that IPART's previous assessment of the asset life assumption for SDP's pipeline was "based on experience with similar pipeline assets owned by Sydney Water."[83]

SDP submits that the asset life assumption should reflect the physical and design characteristics of the actual pipeline being operated by SDP, not the characteristics of a different pipeline (or portfolio of pipelines) being operated in a different context with different environmental conditions.

The Issues Paper notes that IPART's general approach is that:

> *asset lives should reflect the period over which an asset provides a service.*[84]

This approach in principle is consistent with SDP's Pricing Proposal. However, the period over which an asset is capable of providing a service is constrained by its physical characteristics and the environment in which the asset is operated. The best indication of "the period over which an asset provides a service" is the original design life of the asset.

As contained in Appendix 11-4 to SDP's Pricing Proposal, KBR considers the pipeline assets were designed to achieve a design life of 100 years and as such the asset life should be 100 years. KBR was the designer for the pipeline and pump station. KBR has since completed asset condition assessments and provided ongoing technical advisory services to SDP for the pipeline. It is therefore uniquely qualified to provide an opinion on the design life aspects of SDP's pipeline assets. KBR's key findings include that:

- the design basis of the pipeline assets was a 100-year design life and the sub-elements of the pipeline that sustain it were designed on the basis the pipeline was to achieve a 100 year design life and not more
- the pipeline is located in an aggressive marine environment and a 100-year asset life is an appropriate value
- the pipeline is a singular asset with no redundancy, and the concept of averaging design life between the land-based and under-sea sections pipeline is not appropriate.[85]

Setting the asset life assumption based on a hypothetical 'benchmark' pipeline is likely to result in an unrealistic recovery period. The actual pipeline was not designed to operate over 120 years and could not do so without significant additional investment beyond 100 years. Utilising a benchmark in this instance does not provide incentives for SDP to behave efficiently. Rather, the adoption of a 120-year asset life assumption simply imposes stranding risk on SDP and creates intergenerational equity problems by imposing higher costs than necessary on future customers.

Using an asset life assumption based on the actual asset design was recently applied by IPART in its decision for the Broken Hill Pipeline. IPART used an expected asset life of 100 years for the pipeline, with IPART's expenditure consultant, AECOM, noting that:

> *For the pipeline asset itself, IPART relied on the design parameters used for the pipeline rather than generic industry practice in determining an expected service life for the pipeline, and we agree with that position.*[86]

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83 IPART Issues Paper, November 2022, p20.

84 IPART Issues Paper, November 2022, p20.

85 SDP Appendix 11-4 – KBR, Technical memorandum on SDP's pipeline design life.

86 AECOM, Expenditure Review of WaterNSW Broken Hill Pipeline, 11 May 2022, p23.

SDP submits that IPART should adopt an approach to SDP's pipeline that is consistent with the approach it adopted in the Broken Hill Pipeline decision and adopt an expected asset life in line with "the design parameters used for the pipeline rather than generic industry practice."

A1.7.2.2 Membrane asset lives

New information

Following engagement with IPART and its consultants we propose to revert to 8-year standard membrane life.

A1.7.2.3 Periodic maintenance

Existing information

We maintain the periodic maintenance asset life assumptions discussed in Section 11.4.2.3 of SDP's Pricing Proposal and have provided detailed supporting information to IPART and its expenditure review consultant Atkins, justifying our proposal on the periodic maintenance asset life. Adjusting for 1-year deferral of the review

A1.7.3 IPART questions

- Should we make an adjustment in response to the one-year deferral? If so, should the adjustment be restricted to just the EAM or should it include all building block components as well as the EAM? (Q9)

A1.7.4 SDP response

No further comment.

Please refer to Section 11.6 of the Pricing Submission for SDP's position.

A1.8 Price structures and cost sharing

A1.8.1 IPART questions

- Should we accept SDP's proposal for a single 2-part tariff to cover all levels of production? If costs are not perfectly correlated with production, should we consider setting multiple service and/or usage charges to better reflect costs at different levels of production? (Q24)
- In 2017, we structured prices to enable third-party customers (in the event they emerged) to pay their fair share of SDP's costs. For this review, SDP proposed to set prices for only one customer (i.e. Sydney Water). Should we continue to facilitate third-party customer pricing through the determination? (Q30)

A1.8.2 SDP response

Q24

Existing information

Section 12.1 of SDP's Pricing Proposal noted that our costs can be translated into simple yet cost-reflective fixed and variable charges consistent with IPART's precedence in other decisions for utilities which have similar cost structures. Our proposed price structure aligns with the price structures in the 2017 Determination. As per the Terms of Reference, our proposed price structure also encourages SDP to be financially indifferent as to whether or not it supplies water.

It is commonly recognised that there is a trade-off between cost reflectivity and simplicity. The Issues Paper notes this trade-off, yet suggests greater weight be applied to cost reflectivity by setting multiple prices where costs "are not perfectly corelated with production" to ensure SDP is financially indifferent.

IPART's precedent in other decisions indicates IPART does not typically aim to achieve prices where costs are perfectly corelated with production, rather it seeks to send efficient and understandable (i.e., simple and transparent) price signals through fixed and usage charges that are broadly reflective of the fixed and variable costs of providing services over the long-term (i.e. cost reflective). For example, in IPART's review of WaterNSW's Greater Sydney prices it noted:

> *In setting prices, we aim to find a balance between the principle that customers should pay for the costs they create, thus sending appropriate price signals, and having a relatively simple and easy to understand framework.*[87]

Similarly, when setting the usage price for other metropolitan water utilities IPART notes that prices cannot be 'perfectly' correlated to costs given uncertainty relating to the relationship between supply volumes and costs. Ultimately it requires regulatory judgement balancing a number of factors and pricing principles including cost reflectivity, simplicity, transparency and equity.

It is 2020 Final Decision for Sydney Water IPART noted:

> *LRMC is inherently uncertain and imperfect, which is one of the reasons we are erring on the 'higher usage price side' and adding costs incurred during drought to the water usage price.*[88]

New information

IPART reaffirmed this approach in its recent WaterNSW Broken Hill Pipeline decision (deciding on a two-part tariff). IPART's pricing principles applied in this decision noted that prices should be cost-reflective, and when deciding on price structures IPART also considered customers' preferences and whether the resulting prices are transparent, easy for customers to understand and for the business to administer.[89]

In IPART's final report for the new regulatory framework for water, it noted that through the 3Cs framework, it is becoming less prescriptive on pricing structures, but businesses will need to show they are sending cost reflective price signals[90]. The draft handbook notes that IPART expects businesses to engage with their customers on price structure and can propose alternative pricing approaches that are supported by customers.

SDP submits that our proposed pricing structure is cost-reflective, ensures SDP is financially indifferent to production volumes and meets the Terms of Reference. There would be very limited benefit to customers from attempting to set 'perfectly' cost reflective prices in the form of multiple tariffs given there is no clear non-linear relationship. This would imply false precision. There are more material matters that would be needed to ensure that prices encourage SDP to be financially indifferent between different levels of production. For example, ensuring that SDP can recover all costs it incurs in relation to the GGRP contracts

87 IPART, Review of Prices for WaterNSW Greater Sydney from 1 July 2020, Final Report – June 2020, p103.

88 IPART, Review of Prices for Sydney Water from 1 July 2020, Final Report – June 2020, p82.

89 IPART, Review of WaterNSW's prices for the Murray River to Broken Hill Pipeline - Final Technical Report p78.

90 IPART, Delivering customer value, Our water regulatory framework - Technical Paper, November 2022, p9.

through regulated prices would far more conclusively encourage SDP to be financially indifferent to production levels.

Setting multiple usage and/or service charges would increase complexity for SDP and Sydney Water to implement, and likely create significant additional ongoing administrative costs. If multiple usage and/or service charges were in place, it is foreseeable that over a very short period of operation several different tariffs/charges could apply (potentially more than once). This would create much more complex invoicing arrangements and therefore potential for billing queries and issues to arise, particularly in a much more dynamic production environment under the new operating rules.

Q30

No further comment

Please refer to Section 12.1 of the Pricing Submission for SDP's position.

A1.9 Scope of services subject to regulation (unregulated agreements)

A1.9.1 IPART questions

- SDP proposed to set prices for services outside its level of service by negotiating directly with Sydney Water. This means IPART will not be involved in setting these prices. Do you think this is appropriate? (Q25)
- Should unregulated agreements between SDP and Sydney Water be allowed under the determination? (Q26)
- If allowed, should unregulated agreements between SDP and Sydney Water impact prices paid by end-use water customers? (Q27)
- If we accept SDP's proposal for unregulated agreements, how can we ensure these agreements deliver good outcomes for end-use water customers? (Q28)
- Are there specific events or services which would be more suitable for unregulated agreements? (Q29)

A1.9.2 SDP response

Q25, 27 & 28

Clarification

The Issues Paper raises several issues regarding SDP's proposal to introduce unregulated agreements. Many of these issues appear to reflect a misunderstanding of SDP's proposal. SDP has proposed negotiated agreements only for services that would be valuable to customers (potentially reducing costs for customers) but that were not foreseen or priced in the 2023 Determination. SDP has proposed that these agreements would need to meet pre-defined criteria and be subject to deferred regulation by IPART.

SDP's Pricing Proposal (Section 6) notes that:

- there is no automatic pass through of costs to end-customers, rather it is subject to review by IPART before enabling Sydney Water to recover some (or all) costs from end-customers;
- they would only apply in unusual circumstances and likely result in minor adjustments to prices (incl. potential savings), for example in the unlikely event Sydney Water requests the Plant enter an extended shutdown period;
- reviewing the proposal through the lens of cost pass-through (CPT) principles is inconsistent with other recent regulatory precedent supporting SDP's proposal (WaterNSW and Essential Water have many similar characteristics to SDP and Sydney Water);
- restricting SDP and Sydney Water's ability to agree terms for other services risks SDP not being able to respond to requests from Sydney Water, which could impede its ability to meet Sydney Water's Decision Framework, under which Sydney Water has responsibility for "operationalising the SDP new operating rule in the GSWS".

New information

SDP's proposal for unregulated agreements is consistent with the recent IPART Broken Hill Pipeline (BHP) Final Decision, and the new Water Regulatory Framework.

In these decisions, IPART did not review (or propose to review) the need for and merits of unregulated agreements through the lens of IPART's CPT criteria despite WterNSW's prices for the BHP being an input to Essential Water prices (akin to SDP's prices as an input to Sydney Water prices). The only difference relating to SDP besides its private ownership (which is not relevant) is the Terms of Reference 'financial indifference' principle which SDP's Pricing Proposal clarified does not prevent negotiated agreements.

A1.10 Annual price adjustments

A1.10.1 IPART questions

- Should we consider applying a materiality threshold when allowing for prices to be adjusted each year? If so, what are the factors we should consider when setting the appropriate threshold? (Q31)
- For the cost of debt, our framework allows for costs to either be adjusted each year or at the end of period. Is there a case to do annual adjustments as proposed by SDP or should we instead apply an end of period adjustment? (Q32)

A1.10.2 SDP response

A1.10.2.1 Materiality threshold for annual price adjustments

No further comment

A1.10.2.2 Please refer to Section 12.5 of the Pricing Submission for SDP's position. Annual cost of debt true-up

No further comment.

Please refer to Section 11.1 of the Pricing Submission for SDP's position.

Appendix B

Revised expert report

B1. Amendment to Ontoit report

This Appendix sets out amendments to SDP's Pricing Submission related to errors in an expert report from Ontoit.

The report contained inconsistencies in some of the data presented. Specifically:

- Table 5.1 "Summary of assessed potential impact events" which identified the average time to resolve an event column had calculation errors. The calculation should have taken the difference between the maximum and minimum times to resolve an event and divided that time difference by two i.e. [(Max-Min)/2]. This error resulted in the summation of the "Average case sequential event" consequentially being incorrect. In addition, "Supply chain for Bulk Chemicals" was added as a possible sequential event that could occur in an emergency ramp up situation.
- The above-mentioned summation was then transferred into Table 5.2 "Probability Assigned to worst case scenario" with a typo (579 to 559). The resulting effect is a reduction in the reasonable time to have the first module (50%) plant reliability operating down to five days from seven days.

The calculation and transfer errors were a result of copy and paste errors from incomplete draft versions of the tables from excel and assumed as correct in the final report.

These errors have been corrected in revision 4.1 of the report. The impact of the corrections and changes do not affect the overall conclusion of the report.

Noting that, reasonable sequential events could occur while increasing production from an unplanned request, the assessment of time to resolve an event or several events and the probability of occurrence, could reasonably impact achieving the requested production by several consecutive days.

The updated report is attached to this response to IPART's Issues Paper.

Ontoit.

2 December 2022

Service Standards **Sydney Desalination Plant**

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Document Control

Rev.	Date	Author	Reviewer	Signed Approval	Notes
1.0	27.06.2022	Richard Mueller	Zach Phillipps	RM	First Draft Submission
2.0	12.07.2022	Richard Mueller	Zach Phillipps	RM	Second Draft Submission
3.0	3.08.2022	Richard Mueller	Zach Phillipps	RM	Third Draft Submission
4.0	16.08,2022	Richard Mueller	Zach Phillipps	RM	Final Submission
4.1	2.12.2022	Richard Mueller	Zach Phillipps	RM	Table 5.1 & 5.2 transformation error minor corrections

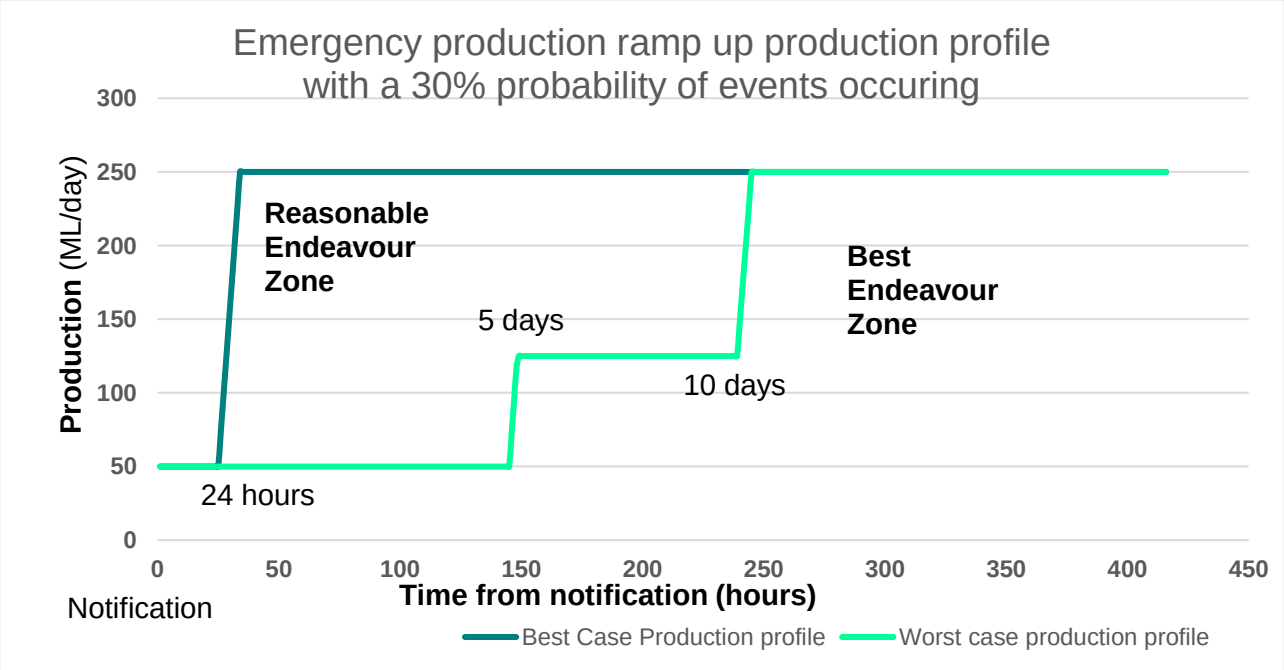
1. Executive Summary

Sydney Desalination Plant Pty Limited (SDP) are currently preparing a pricing submission to the Independent Pricing & Regulatory Tribunal (IPART) for Prices from 1 July 2023. The pricing submission is being made in the context of the new Greater Sydney Water Strategy (GSWS) and SDP's revised Network Operator's Licence. This report details the operating challenges, risks, and technical limitations of the desalination infrastructure in meeting the new production requirements. It recommends a revised equitable set of Service Standards, transition conditions and verifies the proposed minimum production rate of 23GL/year ensures the Sydney Desalination Plant (Plant) is operated in a way that is prudent, efficient and under guidelines of "Good Industry Practice" as per the obligation in the SDP Network Operator's Licence and referenced by numerous Practice Guidelines published by Water Services Association of Australia and the Australian Drinking Water Guidelines.

Desalination plants are designed as continuous base load water production facilities. For SDP, the new operating environment has been set, to have the facility operate with variable production rates, with an ability to respond to emergency events. The Plant was originally designed for production rates of zero, 46 and 91.25GL/year at 94% availability with extended periods to transition to each production mode. It was not designed operate at minimum production rate of 23GL/year for extended periods with short ramp up time to full production. The Operator has diligently trialled various operating scenarios to provide a solution to achieve the NSW Government's new requirements while maintaining Good Industry Practice. However, in operating in High Availability/Low Production, it does increase and introduce additional operational and asset risks.

The key recommendation from this report is to articulate the time that SDP will reasonably require, to respond to an emergency request from Sydney Water, to ramp the Plant up from its minimum baseline production (50MLD) to full production (250MLD), whilst maintaining all its obligations, including the production of compliant drinking water at the Sydney Water Delivery point at Erskineville. In addition, the time impact of environmental factors (inclement weather, seawater quality etc) that may hamper and or delay the transition from High Availability (50ML/day) to Full Production (250ML/day) have also been considered. The following table graphically represent the key recommendation.

Figure 1,1 Ramp-up from High Availability to Full Production Mode



This ramp up time is supported by two other Australian desalination plants operational context. One at the Gold Coast which is half the capacity and does not take any commercial risk (it falls under a cost-plus arrangement); and the other Adelaide Desalination plant which was built some years later with more purpose-built flexibility to support variable production rates with only a 'reasonable endeavours' obligation. The four other desalination plants in Australia are base-load plants and do not have such requirements to transition relatively instantaneous for an emergency response. Benchmarking the Australian desalination demonstrates that the new operating environment for the Plant, particularly the function to respond to emergencies, presents some of the most onerous production requirements and conditions in the industry.

High Availability at the lowest possible production rate.

The report confirms that it is prudent and efficient to operate the Plant at a minimum annual production rate of 23GL/year. This ensures the Plant is regularly operated at full production at a minimum of four times per year for an extended period. The benefits to Sydney Water, customers, SDP and the Operator are:

- Timely and efficient ramp up times (i.e. the ability to ramp up the Plant in an emergency as quickly as possible)
- Minimise blockages and degradation of Plant assets that are notably the remineralisation and reverse osmosis systems.
- Ensure the operational resilience ability of the Operator to maintain skills and continuously learn how best to ramp up and ramp down the assets quickly and efficiently.
- Provide full production testing periods directly after major Plant overhauls and membrane replacements to test and verify critical equipment and systems.
- Learn new solutions and implement improvements to the asset to minimise future costs at low production rates.

The overall benefit to Sydney Water and customers is high availability at the lowest annual production rate and the ability to ramp up relatively instantaneously. This ensures the Plant is operated safely, minimises the additional risks on the operations and assets while operating at the extreme limitation of the Plant. This recommendation balances the risk and cost and provides Sydney's Water supply system with highest level of flexibility, reliability, and operational resilience.

2. Objective

This report proposes the Service Standards to meet the new role for the Plant under the Greater Sydney Water Strategy 2022 (GSWS) and SDP's Network Operator's Licence. It takes into consideration the technical capacity, impacts and risks associated with the Plant, drinking water pumpstation and delivery pipeline. This report is written to align with the new GSWS, SDP's Network Operator's Licence and "Good Industry Practice", to provide Sydney with long term water security. The desired result is to maintain and protect the asset, and to ensure reliable and consistent delivery of the desalinated water to the Sydney Water interface delivery point at Erskineville. In addition, the report comments on the proposed 23GL/year baseline production equating to about 25% of full annual production when operating at lowest possible production rate. The Low Production rate is defined as the lowest possible production of drinking water from the Plant delivered to Sydney Water's delivery point at Erskineville called "shaft 11c".

3. Background

3.1. Context of this report

SDP are currently preparing a pricing submission to the Independent Pricing & Regulatory Tribunal (IPART) for its prices from 1 July 2023. The pricing submission is being made in the context of the GSWS and SDP's revised Network Operator's Licence which has seen a significant transition in the role of the Plant from a long term 'on or off' base load plant to one that provides greater flexibility and resilience for Sydney. The key functions of the revised Network Operator's Licence are as follows:

1. SDP needs to respond to Annual Production Requests from SWC issued in line with a Decision Framework
2. SDP must use best endeavours to respond to other production request such as emergencies that are in line with the Decision Framework

The Decision Framework provides Sydney Water with guidance on what they should request.

To align the SDP Service Standards with "Good Industry Practice", it is critical to understand the limitations and key operating risks of the desalination system (marine intake outfall tunnels, desalination plant, drinking water pump station and delivery pipeline). This report aims to highlight these limitations and key risks to protect the facility and not to introduce new and excessive operating and compliance risks. In highlighting these elements, it is intended to generate a fair and reasonable set of Service Standards to satisfy the main stakeholders (Sydney Water, customers, SDP and the Operator). The methodology employed here is as follows:

- Review the proposed services from the Plant under the new GSWS and SDP Network Operator's Licence
- Assess the appropriateness of the proposed default or 'high availability' state that the Plant would remain in until called on to ramp up production (i.e. 23 GL/a)
- Assess the key risks for the Plant to provide the proposed services, given the Plant's design and technical capabilities
- Quantify the impact that key risks could have on the time for the Plant to ramp up to full production from the 'High Availability' state
- Recommend reasonable, and equitable set of service standards and transition conditions for the Plant when operated in line with 'Good Industry Practice'

3.2. Facility Background

It should be noted that the Plant was originally contracted by the NSW Government under two separate contracting models. The first contract model was a design build operate and maintain (DBOM) for the seawater intake and brine outlet tunnels, desalination plant and drinking water storage. The second was an Alliance to construct the drinking water pump station and delivery pipeline to Sydney Water's Shaft 11 at Erskineville.

The desalination asset's primary purpose was designed as drought response to shore up water supplies in response to the millennium drought. The Plant was originally conceived and designed to produce 45GL/year with a 94% availability, this was later upgraded to 91.25 GL/year at the same nominal availability. The drinking water pump station and delivery pipeline were designed to transfer the water at two rates 125 and 250ML/day, the final design included transfer rates between 90 ML/d and 375 ML/d in a duty/duty arrangement at a nominal availability of 85%.

The original design was in the context of a base load desalination plant with a high-quality seawater source, based on similar plants built in the Middle East. The need for quick ramp up and response was not included in the basis of design and therefore was not a focus in the design of the Plant i.e.the Plant was not designed as a daily stop-start facility.

The Plant is a seawater reverse osmosis membrane desalination facility with the following key features.

- Seawater is drawn from the ocean under gravity, via four intakes that are approximately 300 metres offshore
- As the seawater enters the plant, two rotating drum screens then filter out material to 3 millimetres in diameter, such as kelp from the seawater
- The screened seawater is then pumped into the 24 dual media filtration tanks, which utilise a layered sand and coal product, to further clean the seawater in preparation for the salt removal
- Filtered seawater is pushed through the reverse osmosis membranes under high pressure (50-60bar), with approx. 36,000 reverse osmosis membranes in use
- There is a 2 pass reverse osmosis system, with 13 first pass trains and 7 second pass trains
- The Plant utilises a Dual Work Exchange Energy Recovery (DWEER) system at the end of each first pass train, which reduces the plant's energy needs by up to 60%
- Following the reverse osmosis process, the purified water (permeate) is then remineralised with carbon dioxide, lime, chlorine and fluoride to comply with the Australian Drinking Water Guidelines (ADWG)
- The drinking water enters the 40ML drinking water tank before being pumped 18km via the SDP pipeline, which is 1.8m diameter, until the final handover point to Sydney Water, located at Shaft 11C in Erskineville
- The Plant is separated into two distinct modules, each comprising the process steps above, and each with a nominal capacity of 125ML/day

Sydney Water required additional flexibility under the desalination O&M Contract to incorporate times when they required reduced volumes of water e.g. when Sydney's water storages are full. This came at additional operating cost to account for additional energy and process (or non-revenue) water to meet all possible operating configurations and environmental conditions. In general, desalination plants are best operated with continuous production profiles with allocation for times of major, minor, breakdown maintenance periods, so the addition of production flexibility also introduced 'rules' around the degree to which that flexibility could be utilised.

This led to the following concepts:

- each module being considered as 'operational' or 'in shutdown' independently,
- lump sum costs for the shutdown and/or restart of each module,
- grace periods to achieve restart of any module that was in shutdown, and
- the length of the restart grace period being dependent on the duration of the shutdown e.g. if a module was in shutdown for 11 -90 days it would require 5 days to be restarted, whereas if it were in shutdown for 2-5 years it would require 8 months to be restarted.

3.3. Report Author's Background

The author Richard Mueller is a civil engineer with a master's degree in business management. He has over 28 years' experience in the Australian and International Water industry. He has designed and constructed over 30 water treatment plants. In addition, he has operated some of Australia's most complex water treatment facilities. He has been an Operations Director in the Design and Construction phase for the Gold Coast and Sydney desalination plants and heavily involved in designs for the Adelaide and Victorian Desalination Plants during the proposals phase. Richard is a member of the Australian Water Association and the International Desalination Association. He is currently the National Manger for Asset Management and Operations at Ontoit.

4. Proposed Service Envelope

4.1. Proposed Service Envelope

It is understood that the proposed service standards envelope as it currently stands is detailed in Table 3-1. This report will review the context of this table with the detailed understanding of the Plant design capability and Operators current capability and capacity.

Table 3-1 below summarises the current proposed Service Standards.

Flow Request	Notice Period	Volume of Water requested	Duration of Water supply
High Availability	N.A.	Sufficient supply (minimum of 23GL/year) to ensure the Plant remains available to meet reasonable flow requests. Plant running at 'Low Production'.	Ongoing – baseline production of at least 23GL/year
Emergency response	Agreed volume and response time (likely to be 24-48 hours)	To be specified and agreed in request (cap of 250 ML/day or 'available capacity')	Indefinite – but assumed duration of emergency will be 'short-term'.
Annual Production Request	1 May each year for the following financial year Can be changed every six months or other times through agreement	23GL to 91.25GL/year	One year
Monthly sequencing requests	Monthly	Proposed monthly sequencing of the Annual Production Request	For a month
Fixed production day sequencing requests	Through monthly requests	Proposed specific daily sequencing of the Annual Production Request	For a day

Table 3-1 Current Proposed Service Standards

5. Key risks and limitations in meeting the Service Standard

5.1. Introduction

Section 5 details some of the critical elements that potentially impact the proposed GSWS Service of High Availability and the transition from High Availability to Emergency Response. The High Availability service standard provides Sydney Water and customers with the lowest possible overall cost solution to ensure the Plant is readily available for emergency situations on request. However, there are trade-offs in operating the Plant inefficiently when compared to operating at full capacity. It is operating the Plant at the absolute limits of its' capabilities. When the Plant is operating at this extremity of High Availability i.e. at 50ML/day or 20% of normal capacity; there are a significant number of mechanical and electrical equipment items not in use. Equipment that is not use for extended periods of time has a higher potential for start-up failure. Continuously operating equipment tend to have less breakdown failures. The Operator mitigates this risk by employing an asset rotation strategy whereby each train and duty standby equipment is given similar hours run-time.

The rotation strategy routinely exercises the majority of the equipment; however, with 80% of the equipment not in continuous operation it is inevitable that some equipment items will stick, seat, dry up, harden, corrode, not connect or not trigger; and as result equipment faults, alarms or 'trips" will typically be experienced particularly on start up. Furthermore, static chemicals, fluids and powders can change viscosity, adhere to pipe walls, or harden, resulting in restrictions and/or blockages. The Operator can flush and circulate chemical where possible, however not all chemical systems have this option. A very simple analogy is a boat that is not operated for a year is generally difficult to start versus a boat that is operated everyday basis. Eventually the boat should start with recharging of the batteries, priming of the fuel line and other miscellaneous tasks, provided more serious damage has not occurred such as seawater ingress corroding some of the electrical contacts. But it may take more than just turning the key.

The Plant was designed to predominately (and efficiently) operate in three modes: full rate, half rate or zero production, with zero, one or two modules in preservation i.e. mothball. It was not designed to operate long-term in at 20% production rate. Over the last two years operating the Plant in a low flow arrangement, the Operator has experienced many events and challenges that have caused the Plant to run at reduced capacity or delay the operation of some equipment or processes. The following discussion details some of the areas that have an impact on production and ramp-up from High Availability.

5.2. Original basis of the design

The SDP planning approval states *"the Government has adopted a policy that the proposed desalination plant and associated infrastructure will only proceed to implementation as a contingency in the event of extreme drought conditions"*.

The basis of design "TS06: Basis For Design, Construction and Operations" of the Plant included the following

> "*The Plant will generally be designed to produce 125 ML/day of drinking water*." This was later increased to 250 ML/day capacity.
>
> "*For the avoidance of doubt, references in this document and elsewhere to production capacities in terms of ML/day, shall be understood to refer an average output of the quantity stated over every day in a calendar year (unless specifically stated otherwise); hence, the actual daily production of drinking water required to be produced will be greater than the nominal output so as to take account of periods of non or reduced production due to repairs, membrane exchange, or maintenance."* This provides context that the Plant was to provide an average production over a long period, was not to be relied on for specific volumes over a shorter period and should be able to cope with repairs and maintenance but not capital works or renewals.

The Plant was thus originally specified and designed to produce 91.25GL/year with a 94% availability as a drought response asset. The Plant was initially designed primarily to produce drinking water most efficiently 125ML/day and subsequently later increased to 250ML/day. The basis of design also states "*but shall also be capable of*

effective operation at reduced rates down to 50 ML/day" The Drinking water pump station designed with 85% availability with a duty-duty pump arrangement without any standby with a minimum 90ML/day.

The original Plant design was based on similar plants built in the Middle East as a base-load desalination plant with high energy efficiency using a high-quality seawater source. While the reference to providing turn-down capabilities to lower output, quick ramp up and response was not included in the basis of design and therefore was not a focus in the design of the Plant. The basis of design was clear that volume should be measured over a year.

Over recent times, Sydney Water has required additional flexibility within the Plant operations, when Sydney's water storages reached various trigger points (as detailed in previous Metropolitan Water Plan, now replaced by the GSWS). This flexibility has come at additional operating complexity compared to a mothball state to meet all the new operating environment's production requests. The Plant was not designed as a daily, weekly, or monthly stop-start facility.

5.3. Extreme Weather Events

High rainfall events tend to have impacts on seawater quality, which have potential to downrate capacity/reliability of the pre-treatment. The Operator notes that they are most likely to get an emergency request during periods of bad weather. These events tend to be the root cause for issues in the Sydney Water network.

The Plant is not completely immune to impacts of poor weather and can experience other types of issues such as flooding preventing access to the site, electrical faults, poor inlet water quality due to rainfall runoff or rough seas and other issues that come with significant bad weather.

Whilst the Plant is much less weather dependent than other, conventional water sources, this does not mean it is immune to impacts from extreme weather events.

The assessed implications of extreme weather events are:

- If the Plant is asked to ramp up production during extreme weather, there may be delays due to rapidly changing inlet water quality that requires adjustment to dosing before water is suitable for feed to reverse osmosis, or may require reduction in capacity due to excessive backwashing of pre-treatment. This could delay or reduce capacity for 24-72 hours depending on the extent and duration of the challenge.
- Excessive rainfall could cause trips to sensitive electrical equipment due to moisture ingress. Such trips could cause some or all of the plant to 'trip' which would require trains to be restarted and essentially start the 'ramp-up' process from scratch.

5.4. Marine Intake and Brine Outfall tunnels

The Seawater intake tunnel supplies water into the Plant. The system has a shock chlorination system inside the tunnel to inhibit marine growth along the length of the tunnel. Shock Chlorination is required on an intermittent frequency at varying duration and concentrations to ensure it inhibits the varying species of marine growth. During shock chlorination, it may be necessary to cease production. Some Marine growth (namely barnacles) are resilient to shock chlorination; and from time-to-time extended periods of shock chlorination may be required. It is critical to minimise the marine growth in the intake tunnels to avoid additional hydraulic head loss (and thus additional energy consumption) in the tunnel – effectively the diameter of the tunnel reduces over time due to excessive marine growth. It is good industry practice to keep the intake structure clear of excessive marine growth.

It should be noted that the increase in overall seawater temperature will increase the risk of higher marine growth. Therefore, seasonal shock chlorination frequency and duration may need to increase from time to time. Prior to the Plant starting, the residual chlorine must be removed and dechlorinated. The time for this event to be resolve can take up 8 hours.

The brine discharge nozzle requires a minimum velocity to achieve the brine dispersion requirements under the current environmental licence seawater discharge conditions. The brine discharge velocity is achieved when the Plant is operating at full production rate. At High Availability the production rate is about 50ML/D, there is insufficient brine volume to satisfy the nozzle velocity in the environmental licence seawater

discharge condition. The Plant design relied on deployment of marine divers to physically remove discharge nozzles and diffuser caps and replace with a 'low production' nozzles. Nozzle change-out takes considerable notification time to secure the contractors and align with suitable weather and allow significant time to cap the discharge nozzles. The alternative to meet the service standards is to supplement nozzle velocity with process (non-revenue) water from filtered water tank overflow and make-up water tank. The make-up flow was introduced into the Plant design to allow for short term flow variations. This bypass system avoids marine divers having to cap the brine discharge nozzles every-time the Plant flow rate is materially altered. Therefore operating in High Availability and Low Production mode, less than the full capacity requires additional pumping (energy) and additional treatment (chemical cost) to achieve the compliance discharge velocities. The additional energy and treatment cost is a trade-off for the Plant production flexibility and relatively significantly shorter ramp-up time.

The assessed implications of an issue with the marine intake and brine outfall tunnels are:

- If the Plant is asked to ramp up production when a shock chlorine vent is occurring, it may take up to eight hours for the resolve
- Increased cost allowance required to run in Low Production/High Availability Mode

5.5. Inlet Pumping station and course screens

The inlet pumping station duty-standby inlet screens arrangements permit the screens to be available at all times at all flow rates. Divers are used for preventative maintenance and conduct inspections approximately every two years which takes the system out of operations for over two days.

Seawater quality is one of the critical events that can impact on the performance of the pump station and course screens and/or impact downstream treatment processes. Typical seawater events that can impact Plant operations include:

- High rainfall event causing high turbidity that challenge the capacity of the pre-treatment system (out-of-envelope Plant design seawater quality) – see also Section 5.3.
- A swarm of jellyfish that derate the Plant capacity by blocking screens (based on previous events)
- False hydrocarbon seawater quality analyser alarm that shuts down operations to avoid RO membrane damage risks (usually occur in high rainfall events)

The assessed implications of an issue with the inlet pumping station and course screens are:

- In the event the Plant is in transition from High Availability to Emergency Response, the Plant may take considerable time to get back on-line or flush the intake tunnel to clear the poor-quality water

The duration is dependent of the situation and can range from hours to several days.

5.6. Pre-treatment Dual Media Filter

High seawater solids load events (high Total Dissolved Solids, high turbid events) may require the Plant to operate at reduced capacity until the water quality event clears. While these events have been relatively infrequent in the past, they are becoming more commonplace with high intensity rainfall events and have occurred three times in 2022 by August. The Plant was designed and constructed under the assumption of a high-quality seawater envelope. In most instances, the Plant can continue to operate at a reduced production rate to achieve the required pre-treatment water quality on a best-endeavours basis. However, poor seawater quality events will require adjustment of the pre-treatment dual media filters coagulation mixing time as well a decrease in the filtration rate. The impact may be 20-40% reduction in filtration rate resulting in a subsequent 20 to 40% reduction to production rate. High seawater solid load events may take several days to clear depending on seawater currents to return to the water quality envelope in the original Plant design and O&M Contract, and relief is given to production expectations in the case of quality outside the envelope.

Gold Coast Desalination versus Sydney Desalination Plant Pre-Treatment

The Gold Coast Desalination plant has a more robust pre-treatment filtration system to deal with poor seawater quality events with flocculation mixing tanks and a decreased filtration rate (velocity of water through the filter bed) is 7.5m/hr at full capacity. The Sydney Desalination Plant does not have flocculation mixing tanks and has a design filtration rate of 10.0m/hr. Flocculation tanks allow for more efficient mixing of pre-treatment chemical to product larger flocs to be captured by the dual media filters. Slower filtration rate provides more time for the flocs to be captured in the filter media and avoid break through i.e. the floc particle passing through the filter. The conclusion is Sydney Desalination Plant is more sensitive to changes in seawater quality. To manage this situation the Operator may slow down the seawater flowrate into the filter i.e. reducing filtration rate. This will ensure the Plant can continue to meet the reverse osmosis membrane feed water quality requirements, however the impact will be a lower drinking water production rate.

The assessed implications of a pre-treatment dual media filter system being impacted by changes in seawater quality are:

- A minor change to seawater quality may take 12 hours to adjust to achieve the required water quality
- In very poor seawater situations, it may take 48 days for the Operator to adjust the system and monitor changes to achieve the required pre-treatment water quality

5.7. Reverse Osmosis

Reverse Osmosis is the process of removing or separating salts from the seawater using a membrane to produce desalinated water termed permeate. It is energy intensive and runs at very high pressures (in the order of 65-70 bar). It is a complex process that is fully automated for safety and asset protection reasons. The system has a significant number of process interlocks and control loops, including multiple individual instruments, that all must be ‘healthy’ or within limits for successful start-up of the system (and to a lesser extent, ongoing operation). These apply to high pressure and sensitive electrical equipment running under high electrical loads (significantly higher pressures and loads than a conventional water treatment plant). This complexity introduces multiple sources of operational “trips” or unavoidable failures, and these can increase as assets age. It is normal to expect such trips and they are difficult to predict. Trips should be investigated and with some taking several days. It is unreasonable to expect all trips to be prevented and avoided, regardless of operational and maintenance practices.

The Plant was designed as a bulk water supply, as are most desalination facilities. Frequent stopping and starting of the RO units is not good operating practice, particularly with direct on-line (DOL) high pressure pumping system. Frequent starting and stopping increases the risk of damage to the membrane (spiralling) and void their warranties. These issues may cause considerable time and cost disruptions to Plant operations. It is good operating practice to limit the number of stops and start of the membrane system where possible to protect the membrane units, however there should be a trade-off between asset rotation practices and the number of starts/stops.

Reverse Osmosis Trips

Common trips on the reverse osmosis (RO) trains can be related to high pressure or over pressure. These also extend to peripheral equipment which may lead to a pressure related risk, such as momentary loss of communication from an instrument or valve which the system interprets as a threat to safety or asset protection. The RO system consists of 13 first pass and 7 second pass membrane trains. Each RO train has six pumps and an energy recovery device (to achieve the 65-70 bar) and over 30 valves with the largest pump a 2.3MW direct on-line (DOL) motor which instantaneously apply pressure into the system (pressure shock). When the Plant is in High Availability only two first pass and one second pass trains are operating, leaving 11 first pass and 6 second pass trains shut down. In the transition from High Availability to Full Production individual trains can trip frequently due to pressure related protections integral to many control sequence loops. To minimise these trips when starting an RO module, the Operator regularly cycles routinely through operation of each RO train, which creates inefficiencies but is necessary to minimise trips on ramp-up. In addition, each RO train is regularly flushed with permeate water to protect the asset e.g. to avoid the potential of membranes from drying out or irreversibly fouling when not in operation.

Other RO systems incorporate variable speed drives (VSD's) on the high pressure pumping systems both protecting the membrane from damage and the RO train equipment. A VSD allows for slower pressure increase (gradient). The result is less high-pressure trips, reduced power consumptions and flexible production rates. In addition, the new generation energy recovery devices (ERD) provide more stable operations. The Plant does not have these features. To incorporate these features, it would involve a significant redesign, capital expense and considerable time to implement. In the event a future expansion, these types of features could be considered in the design to provide high level of production flexibility.

The RO membranes are sensitive to exposure to chlorine and exposure to air. Chlorinated seawater can enter the RO system following a shock chlorination of the intake tunnel. In the instance when this occurs, the chlorine will be detect through online water quality analysers and the Plant will be shut down to either flush or dechlorinate the seawater.

The previous operating mode of zero production required the Plant to be "mothballed". The benefit of the Plant operating at High Availability is to avoid the Plant being mothballed. When in zero production (mothball) the membranes are protected in a preserving solution. This solution must be drained from and flushed from the RO vessels prior to operating, and the preservative solution neutralised and disposed of. This takes approximately one week per train to bring a single train on-line and into production mode. The system has 13 reverse osmosis units, thus taking approximately 13 weeks just to prepare the RO units from zero production to a operational state.

When the Plant is operating in High Availability mode, the majority of the RO trains are not in operation. This potentially exposes the membrane to air, or to increase risk of fouling or damage. To counteract the risk of damage, the Operator will regularly flush the membranes with permeate water (Reverse Osmosis Water). The Plant is required to produce additional permeate water (at additional energy and treatment cost) to enable flushing and the Operator will have to transition the system from flushing the RO system to an operational state to enable Plant production.

The Safety of the Operator is paramount, when working in RO process areas, due to the pressures and high electrical loads. This creates limitations in working adjacent to operating equipment. If an issue arises, or there is a trip on start-up or during operations, it may not be possible to investigate or rectify the issue without serious risk of harm to personnel, or conversely, without shutting down adjacent equipment. To ensure safety of operating and maintenance staff, some RO units will need to be stopped and depressurised.

This will restrict the total number of first pass and second pass RO modules that are available for operations. Typically, three out of the 13 units may be out of operations leaving 10 units available at certain times during the “low production period” restricting the Plant production by approximately 12%. This would be allowed for in the long-term operating context, but could reduce short-term available volume.

The assessed implications of an RO system issue are:

- RO trips can generally be resolved with 24 hours however it is possible to have numerous issues as noted above with the system potentially taking up to six days (144 hours) to resolve.
- High pressure systems pose safety risks, and thus a fault in one train may lead to multiple trains being unavailable while the issue is rectified.

5.8. Remineralisation system (Lime and CO_2 dosing)

The lime dosing system is a complex array of equipment and is best operated at a continuous constant flow rate. Typically, a lime dosing system does not respond well to large fluctuation in dose rates associated with sudden flow rate changes. The system is required to produce a high-quality saturated “milk of lime” to ensure pH and turbidity compliance at the Drinking Water Storage. In essence, the milk of lime is dosed directly into the finished product water so it is very important that the dosed product is of the highest quality. The lime system is different to other chemical dosing systems as it is not just a matter of increasing a dosing pump speed to increase the dose. The system, instead, is a treatment process in itself. It takes powered lime, mixes it with permeate to create a slurry of varying concentration dependent on the production capacity of the plant, transfers the slurry to a saturator where it is mixed with further permeate, facilitates settling of any impurities in the solution within the saturator, and then separates out a pure ‘milk of lime’ or limewater for dosing into the final drinking water. The system relies on a steady state lime ‘sludge blanket’ in the saturator and it takes time to perfect this steady state.

In the case of the Plant, a production rate increasing from 20% to 80% is a significant transition from High Availability to Full Production. A Full Production ramp-up requires the lime saturator to produce the correct consistency of “milk of lime” from the lime saturator. This can take several days and sometimes up to a week or longer to perfect. The following points expand on the complexity and limitations of the current lime dosing design.

In High Availability mode, one lime storage silo may be emptied to avoid the lime in the silo and surrounding the lime feeder (incline screw) absorbing moisture from the atmosphere. This is most likely to occur when equipment is static and not operating. Hydrated lime when exposed to moisture in the atmosphere will harden. Once hardened, it requires significant time to clean out the screw feeder, as the hydrated lime hardens over time when exposed to long term moisture. In addition, lime arching/bridging in the lime silo may occur resulting in no lime being able to be feed to the feeder equipment. It is good operating practice to minimise the lime volume in storage to ensure a reasonable turn-over of the hydrated lime in the lime storage silo and feed equipment. This minimises the time lime is exposed to moisture in the atmosphere i.e., absorbing moisture and setting hard within the silo and the feeder equipment.

In the High Availability mode, only one lime saturator unit operates, and two units are shut down (there is not sufficient throughput to operate more than one saturator). These two units must be brought online from a complete shut-down situation. As discussed above, it takes time to develop the sludge blanket and have the system operating in a reliable steady state.

The start up the of the two lime saturators takes considerable time to produce good quality saturated lime. In the interim, it is required to bypass much of the permeate to the outfall as non-revenue water until the water quality is stable. To produce drinking water quality with a turbidity of less than 0.5NTU consistently, it can take several days before the lime is at full reliability to meet water quality. Overall, a fully operating lime system is less problematic than a stop-start operating lime system.

The assessed implications of a lime system issue are:

- Lime dosing issues can reasonably resolved in 24 hours but have been known to take up to seven days to work effectively from a complete restart.

- Starting a lime system or increasing its throughput requires a long period where permeate is diverted away from the treated water tank. During this period, the water is not generating revenue and thus there is additional treatment and energy cost which is not compensated through the volumetric water charge

5.9. Drinking Water Storage and Drinking Water Pipeline

There are a number of parameters to ensure drinking water compliance at Sydney Water's Erskineville Shaft 11 delivery point. Each parameter impacts on each other, and it is good operating practice to modify one parameter at a time to ensure the safety and stability in the system. While there is water quality measurement at the drinking water pump outlet, there is a resultant travel time of water within the pipeline before the effects of any dosing changes can be measured at the delivery point. The key parameters that have an impact are:

- Drinking water storage tank level set-point
- Chlorine residual set-point in the drinking water tank
- Water temperature
- Drinking water pump station flow rate
- Drinking water storage tank inlet flow from the Plant
- Detention time in the drinking water storage tank and delivery pipeline
- Chlorine and ammonia dose rates

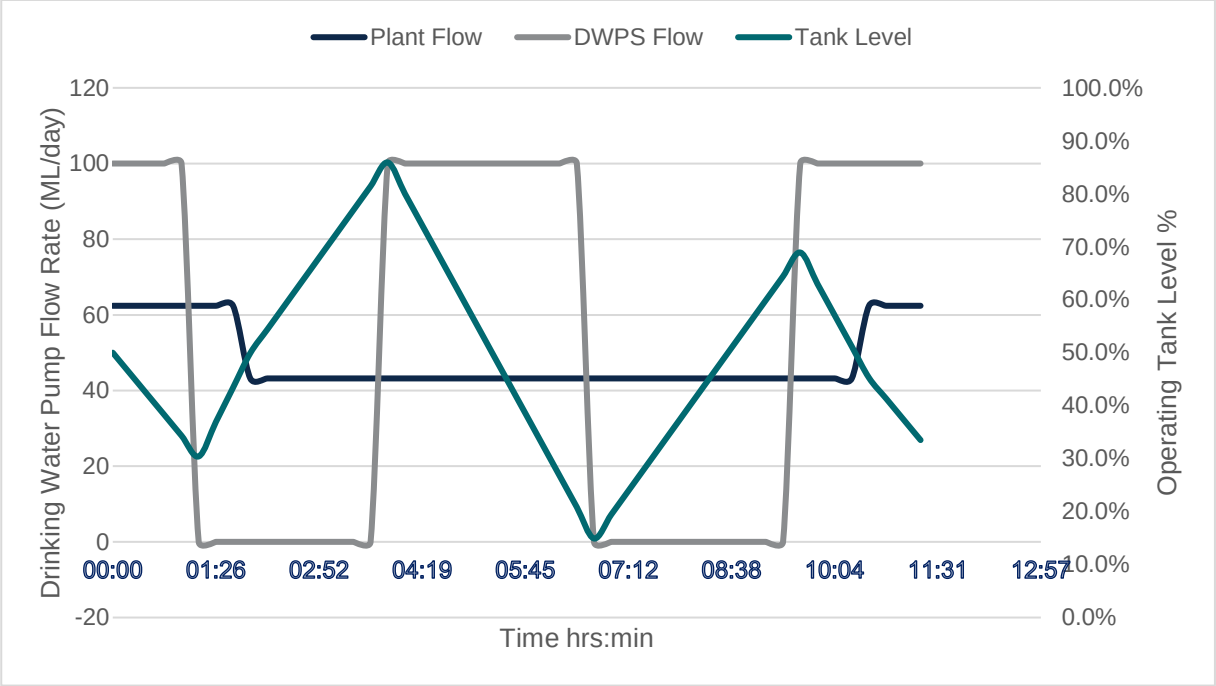
The assessed implications of transitioning the drinking water storage tank and drinking water pipeline to a to full production are:

- For the transition from High Availability to Full production, the operator will typically take four hours to make the necessary adjustments to manage this process and it could take up to eight hours to get the treatment process to into steady state compliant drinking water.

5.10. Drinking Water Pump Station

As noted in Section 2, the Plant and the drinking water pump station were designed and constructed under two separate contracts. While the Plant has some flexibility in drinking water production, the drinking water pump station has a limited operating delivery profile. The minimum flow is 90 ML/D. It is good operating practice to match the production profile of the Plant to the pump station operating flow to minimise the number of stops and starts of the drinking water pumps and resultant stop and start of chemical dosing dependent on the pump station running. Chart 5.9-1 details the typical frequency of stopping and starting of the drinking water pumps while at low production rate and varying tanks levels.

Chart 5.9-1 Drinking Water Pump station level, Plant flow and Drinking Water Pump station flow vs Time



At High Availability (23GL/year) it is not ideal to have drinking water pumps operating in a frequent stop start sequence. This has potential to cause faults and trips with the chlorine and ammonia chemical dosing systems (together termed Chloramination[1]). The chloramination system must be carefully monitored to ensure suitable disinfection and chlorine residual compliance at Erskineville. In the event of instability in the chloramination of the pipeline, a critical control point (CCP – an important check and balance to ensure the safety and quality of the final product water) would be triggered that would likely automatically shut the Plant down. The water in the pipeline may also need to be purged with water from Sydney Water's network. This is both very time consuming (hours to days) and can cause the wastage of the entire pipeline volume (about 46ML) due to the non-compliance.

Note also that, while unrelated to start and stop of the drinking water pump station, if the lime system is not stable and low quality limewater is dosed into the drinking water tank, it may also trigger a CCP transfer pump trip and lead to a required pipeline (and drinking water tank) purge.

It is good operating practice to operate the Plant production rate to match the minimum drinking water pump flow rate of 90ML/day to minimise the stopping and starting of the drinking water pumps and the associated stop start of the chloramination dosing system. This ensures water quality compliance and avoids excessive wear and tear on the drinking water pumps. However, operating in this minimum production mode would produce a minimum of 34GL/year The trade-off for this additional significant operational risk is the lowest annual production volume. Operating at 23 GL/year saves customers the cost of approximately 11GL per annum i.e. 23GL/year versus 34GL, but does introduce some process and asset risk.

Increasing production rates requires additional drinking water pumps, which like the RO high pressure pumps, can sometimes trigger a fault/trip and shut the drinking water pump station down. It takes over 40 minutes to reset the pumping station and this, in-turn, can induce a daisy chain of events on the Plant and shut down the whole desalination process, which will significantly delay production.

The assessed implications of a drinking water pump station outage are:

- Whole of Plant restart due to drinking water pump station failure can reasonably take four to 12 hours to reset the plant depending on the situation.

[1] Chloramination is **the process of adding chloramine to drinking water to disinfect it and kill germs**. It is sometimes used as an alternative to chlorination. Chloramines are a group of chemical compounds that contain chlorine and ammonia

5.11. Electrical, Instrumentation and Control Equipment

The Plant is a fully automated and was not designed to operate in manual with hands on operator intervention. In-order for the Plant to operate in automatic, several conditions (too exhaustive to list) must be met for both safety and process reasons. The Operator must ensure all of these conditions are fully met prior to starting the Plant. In the event one of these conditions fail the Plant will shut down. With every shut down event, the reason for the fault must be investigated and rectified to enable the Plant to start again. The following section details the key issues that could occur in normal operations that can impact on the availability of the Plant.

5.11.1. Variable Speed Drives

When the Plant is operating in High Availability mode, a number of equipment items (typically pumps) will not be in an operational state i.e. switched off. A high portion of these equipment items have variable speed drives (VSDs), which sit between the electrical supply and the motor to regulate the power that is fed to the motor and control the speed or the torque of the pump. It is not ideal to leave VSDs non-operational for extended periods of time due to the fact they lose what is known as capacitance due to their sensitive electrical nature. When the VSD unit re-starts from a period of non-operational performance, it may fault. Sometimes, it can be a simple reset of the VSD to clear its faults or it may require a service by a specialist contractor. In the worst case, a capacitor may need to be replaced. This exact situation occurred after the mothball period when the majority of the VSD capacitors had to be replaced as a periodic maintenance task. It is good operating practice to electrically exercise all VSDs on a quarterly basis (four times per year) to ensure they are readily available and minimise potential start up faults. The impact of VSD faults is significant as the equipment item is usually part of a control sequence and must be available for key pumps to operate.

The assessed implications of a VSD failure are:

- Depending on the size and location of the VSD it would typically take at least 12 hours and up to a maximum of three days to replace a capacitor

5.11.2. Lightning storms

In storm events, lightning can cause significant disruption to the Plant. While the Plant electrical and control system has lighting protection, these types of storm events can cause issues with sensitive electrical instruments and often result in equipment faults and trips, resulting in either resetting, reprogramming and/or even replacement of these instruments.

The assessed implications of a lightning storm/strike are:

- A typical instrument replacement would reasonably take eight hours
- Depending on the type and location of the instrument, the impact on the control of the Plant may take 12 hours before the relevant qualified team member is available to rectify replace an instrument.

5.11.3. High Voltage 132KV Switchyard

The Plant has redundancy available on the majority of its 132kV infrastructure, the exception to this being the 132kV incomer itself. There remains only one cable and circuit breaker that bring the incoming 132kV feed into the Plant, before it is then transformed down to 11kV and distributed through the Plant.

Faults on the incomer are uncommon but have occurred in the past and present a significant recovery risk should they occur.

A further complexity with the high voltage equipment is the interaction with Ausgrid, who operates the local electrical distribution network. As SDP is a significant energy user, any trips, repairs, tests and works conducted on the 132kV infrastructure typically involve Ausgrid via an exchange of operating protocols, however Ausgrid has the final say on timing of outages. Whilst the Operator makes all efforts to work with Ausgrid and maximise efficiencies between parties, ultimately, there remains significant potential risk to the operation of the Plant should Ausgrid be unable to provide the 132kV power supply.

The assessed implications of a high voltage outage are:

- The majority of high voltage events can generally be resolved in in two days.
- These events can vary depending on the type of event, however a major event can take up to 14 days to rectify as the Operator has experienced in the past.

5.11.4. Instrumentation and Profibus

All of the Plant signalling and messaging infrastructure relies on instrumentation that is connected to the programmable logic controllers (PLCs) via the Profibus network. The network can be sensitive to connection issues. This control instrumentation is critical to successfully operating the Plant. On a complex automated water production facility operating in a moderately aggressive seawater airborne environment, sensitive electrical, instrumentation and control equipment will be impacted and there from time-to-time corrosion will occur on the PLC connections.

In general, electrical, instrumentation and control equipment do suffer breakdown and faults from time to time and are sometimes only discovered on start-up of equipment when the PLC is activated. Issues can be time consuming to fault find and requires specialist electricians or high voltage technicians.

The assessed implications of a communication/instrumentation fault are:

- It is reasonable to expect instrumentation and control events to be resolve 24 hours
- Instrument and Profibus events can reasonably take up to three days (36 hours) to identify and rectify

5.12. Sydney Water Delivery point at Erskineville (Shaft 11)

Shaft 11 at Erskineville is the final compliance point before the water is delivered to Sydney Water. The following issues may impact on the Plant when transitioning from High Availability to Full Production:

- Sydney Water's ability to accept the water due to issues in the network when ramping up from High Availability to Full Production.
- When the second drinking water pump is introduced for higher production rate, the delivery pipeline may show a temporary spike in turbidity. This is due to the high velocity in the pipeline disturbing the settled sediment. It can take up to five days to have water quality samples within required limits as well as the potential to block the sample line needle valves (fine aperture valves for the sampling line). Non-compliant water can also be rejected by Sydney Water and this has a major impact with respect to Plant downtime (i.e. having to purge the pipeline)
- A non-compliant water quality event can be resolved by a purge. A purge is an event where the pipeline is replaced with drinking water from Sydney Water's network (i.e. reverse flow). Purging the pipeline, utilises the drinking water storage tank by-pass and sends the non-compliant water to the brine outfall. Typically, such an event will reasonably delay Plant operations by 12 hours.
- If non-compliant water is produced during the ramp up of production due to remineralisation system or changes in chlorine dosing it could take up to 36 hours to rectify. In this case the treated water tank may need to be manually drained in addition to the purge of the delivery pipeline. In this instance and in the above case, the EPA must be notified 72 hours prior to release of the drinking water.

5.13. Seawater Water Quality

Poor seawater quality issues typically coincide with heavy rainfall events which exceed the seawater total suspended solids (TSS) envelope of the Plant design. This occurred in February 2021 and March 2022. These events require considerable change in the operation of the pre-treatment system, notably chemical dose rates and potential filtration rates to achieve the required water quality for the Reverse Osmosis membrane system. It can take several days for the pre-treatment dual media filters to achieve the required water quality before the water is in compliance with the membrane warranty requirements (i.e. Silt Density Index (SDI) limit less than 3, 90% of the time with a maximum of SDI of 4). The pre-treatment system will waste filtered water via the filtered water overflow until the required RO water quality is met.

Jellyfish events can reduce the filtered water production due to heavy loading of the Dual Media Filters and the Plant may need to stop or reduce capacity when in full production. Jellyfish events have occurred previously at the Plant and can last for several days.

The assessed implications of a jellyfish event are as follows:

- A minimum impact of 0 hours to production, based on best case scenario that minor jellyfish intrusion is removed via the existing screening system without impact.
- A reasonable impact of 12 hours to production, based on a likely scenario whereby the jellyfish intrusion results in the inability to bring seawater into the Plant and direction of resources to clear the blockage over a typical shift.
- A maximum impact of 72 hours to production, based on a worst-case scenario where jellyfish completely overwhelm the intake system, resulting in multiple days of cleaning and/or specialist equipment (e.g. cranes/excavators) to remove debris.

5.14. Supply chain and access to the site

In recent times, supply chains have dramatically changed due to availability of various critical supplier inputs including but not limited to:

- Bulk treatment chemical
- Instruments and PLC cards
- Laboratory supplies
- Pump seals and consumables

5.14.1. Bulk Chemical Stock levels

Transition from High Availability to Full Production will require higher bulk chemical storage stock levels. While ramp-up in a short-term duration will be possible, long duration Emergency production durations may be impacted by the chemical supply chain. (i.e., a 70% to 80% increase in chemical inventory will be required to be called on within days of a Plant ramp up). A reasonable duration of months will be required to provide chemical suppliers sufficient time to secure raw material to meet new supply requirements.

During high rainfall events, access to the site has been limited due to localised flooding. This can result in restriction on chemical deliveries. Such events may typically coincide with Emergency response requests from Sydney Water to ramp-up and consideration should be given to the ramp up time from High Availability to Full Capacity. It is worth noting that it is not reasonable for the Plant to maintain full bulk chemical storage stocks to meet a potential emergency request. Various chemicals have short shelf lives and storing excess chemicals may lead to wastage.

The assessed implications of a chemical supply issue are:

- A reasonable impact of 12 hours to production, based on disruption to planned chemical deliveries
- A maximum impact of 5 days to production, based on a worst-case scenario where chemicals cannot be sourced quickly and the event to transition to higher levels of continuous production does not provide suitable lead time.

5.14.2. Critical Spares and plant consumables

It will be important for the Operator to regularly review and assess the critical spares inventory in light of the slow supply chain issues. What once was a stock standard spare on a stockist shelf in Australia may not be readily available, and hence may become a critical spare. This is particularly important when the Plant is required to be in Full Production mode. Delay to critical control instrumentation replacement could take up to 48 hours assuming express international air freight.

5.14.3. Electrical components and instrument consumables

Instrument probes/sensors for control instrumentation are essential to operate the Plant. Instruments that are not operating while 80% of the Plant is not in production can deteriorate or foul prematurely. On ramp-up the probes/sensors may require replacement and then recalibration. If higher than expected probe/sensor replacement and spares are not available on site; the Operator could first seek replacement from either the supplier and then from its' network of other operational water and wastewater plants across Australia. These types of parts are generally able to be express freighted overnight and can delay the ramp-up or limit to full production depending on the time for delivery.

5.15. Resource Management and Maintenance

Timing of an emergency notice could impact the ability of the Operator to respond appropriately. Notification during normal business hours can be responded to immediately. After-hours response may be impacted by the limited resources that are actively onsite. The Plant is fully staffed during the normal business days (nominally 7am to 3pm Monday to Friday), and then has a skeleton staff of two outside these hours. A higher level of skilled staff can be made available after hours however this is a trade-off of the additional cost and productivity. High level of nightshift staff is not prudent and efficient.

When transitioning from a High Availability to Full Production, a series of checks and setpoints must be reviewed to prepare the Plant for the new production mode. This is to minimise trips, faults, and ultimately time-consuming restarts. The checklist is comprehensive and onerous. While some parts of the Plant operations are automatic, for example the reverse osmosis trains, it still requires some skilled field work to prepare.

Attempting to ramp-up production outside normal business hours can be achieved when staff levels are low. However, this adds additional risk to the asset and operations staff. In the event of a high voltage electrical and/or high-pressure system fault trip, the issue can be investigated or rectified by the on-call maintenance technicians. In many cases, it may require specialised external contractors or complex isolations and permit to work processes which cannot be achieved out-of-hours.

In addition to planned maintenance tasks that require the Plant to be fully and partially offline for long periods (assets sent off site, works requiring time-consuming dismantling of assets or preparatory works such as scaffolding), there are regular (almost constant) requirements to isolate and work on assets which limit the ability of the Plant to operate to full capacity.

The two most recent emergency response ramp-up requests have been notified at a time when the Plant is least ready, on a weekend afternoon and late on a weeknight. These emergency response ramp-ups were a result of unprecedented rainfall, and resultant challenges in the Sydney Water network. It is important to note that the Operator is most likely to have the similar issues at this time and difficulty in securing expert contractors as they are responding to similar issues for other critical parts of the network.

Safety of Operator

For example, each reverse osmosis train requires ongoing routine maintenance, due to its high-pressure operational requirements, need to be expertly isolated under permit, and then restarted under an exclusion zone to prevent potential injury. The loss of one reverse osmosis train will reduce Plant capacity by approximately 10%. While these assets can be put back into service at short notice, it may still require up to 24 hours before it is available to start a ramp-up, let alone be available for consistent production. This task also requires valuable resources at a time when resources are inherently scarce as they are preparing other assets for quick restart

5.16. High Availability and Emergency Response

The High Availability service standard provides Sydney Water and customers with the lowest possible overall cost solution to ensure the Plant is readily available for emergency response. The benefits are:

- Lowest possible operating cost
- Routine, regular, high-quality, consistent supply keeps the Sydney Water network stable
- Ability to ramp up at best in 24 hours and at worst in 10 days to full production

However, there are some trade-offs and limitations in operating at High Availability as follows:

- Inefficiencies with respect to power, chemicals, maintenance and labour (losing economies of scale)
- Operating at the limits of the Plant's capabilities to meet both water quality and environmental compliance (the Plant is more sensitive to minor changes, making it more difficult for the Operator to change)
- Exposure of portions of the Plant to additional risk, wear and tear
- Exposure of non-operating and static equipment to trips, faults and blockages

In determining the ramp up period, consideration needs to be given to the variable of the numerous circumstances noted in Section 5 of this report that could impact on the Operator and Plant's ability to achieve full production. Table 7.1 Represents the total time delay assuming minimum, average and maximum impact of the event. Sequential events have been assessed as average and worst cases assuming some events can occur concurrently. Table 7.2 calculates an overall probability range of all events occurring.

Table 5.1 Summary of assessed potential impact events

Report Reference	Event	Type	Minimum time to resolve event (hours)	Average time to resolve event (hours)	Maximum time to resolve event (hours)	Average Case Sequential events (hours)	Worst case sequential events (hours)
5.1	High Rainfall event	Restricted Access to site	2	11	24	11	24
5.3	Intake Tunnel	Shock Chlorination	0	4	8		
5.4	Seawater Quality	Jellyfish or red tide event	0	36	72	36	72
5.13.1	Supply Chain	Bulk Chemicals	6	57	120	57	120
5.13.2	Supply Chain	Instrumentation replacement	6	15	36		
5.5	Pre-treatment Dual Media Filter	Change in seawater quality	12	30	48	30	48
5.6	Reverse Osmosis	Over Pressure and/or ERD Faults one module	1	2	4		
	Reverse Osmosis	Over Pressure and/or ERD Faults all modules	1	72	144	72	144
5.7	Lime System	Dry side blockages	4	22	48		
		Lime saturator start-up	12	78	168	78	168
5.8	Drinking Water	Chemical dosing set points and control steady state	2	3	8	3	8
5.9	Drinking Water	Drinking Water Pumps station	2	5	12	5	12
5.10.1	Lightning Strike	Profibus PLC Card replacement	4	10	24		
5.10.2		VSD restart or replacement	6	15	36	15	36
5.10.3	Ausgrid	HV Switchyard	12	78	168	78	168
5.10.4	Controls	Instrumentation and profibus Control system issues	6	15	36		
5.11	Delivery Pipeline	Water quality issue and reverse flow the pipeline	6	15	36	12	36
		Total Hours	**82**	**474**	**992**	**397**	**836**

To estimate a maximum reasonable period for the Operator to ramp up the plant from 50ML/day to 250ML/day, the total delay time is summed using the total of sequential events. The calculation in Table 5.2 is the probability multiplied by the total sequential hours of all events. It is highly unlikely that all events will occur at once. It is responsible to assume at worst case, a 30% probability has been recommended as fair and reasonable periods for half and full rate production rates.

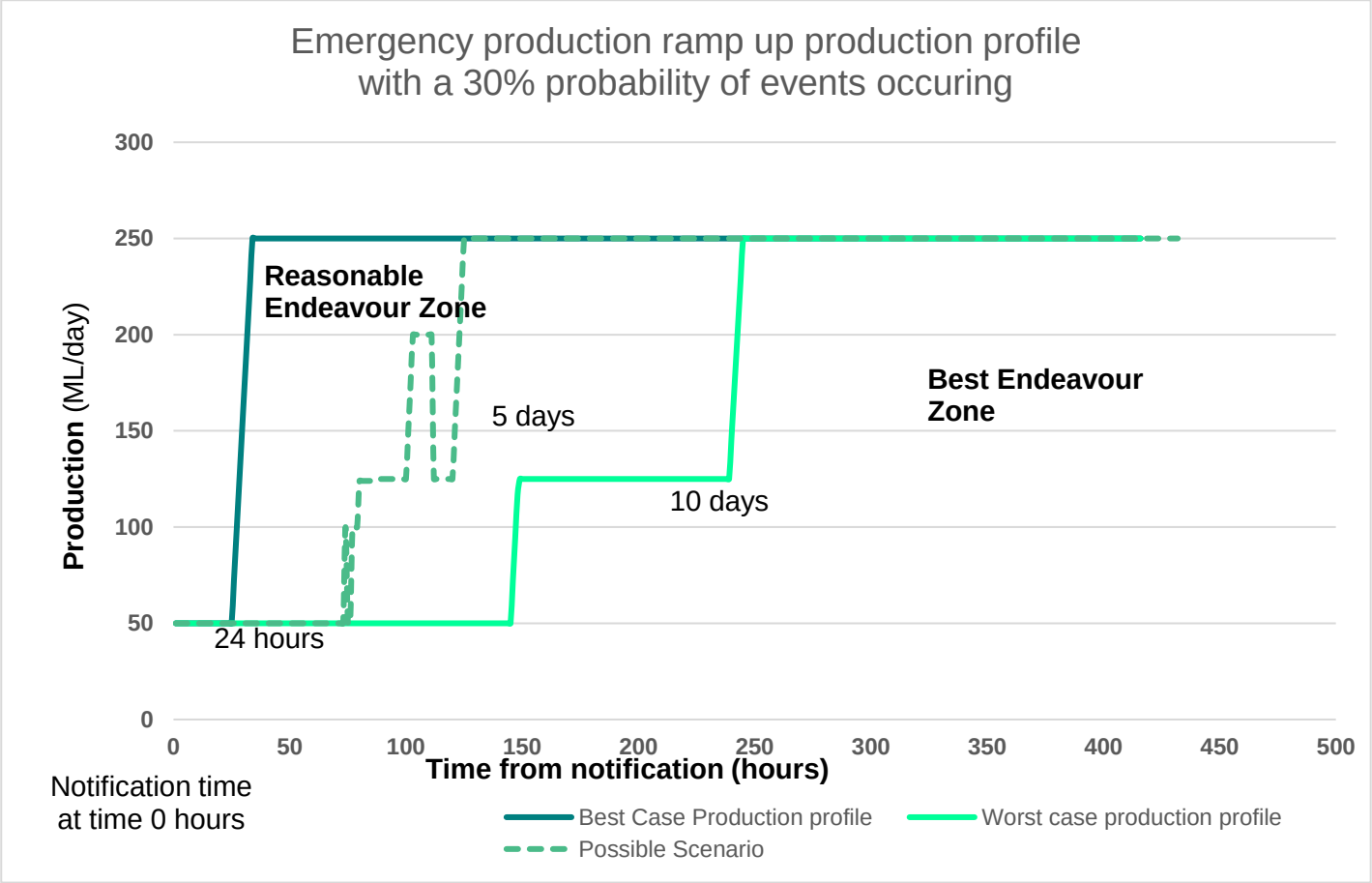
Table 5.2 Probability Assigned to worst case scenario

	Average case	Worst case
Probability	total hours x probability (hours)	total hours x probability (hours)
10%	40	84
20%	81	167
30%	121	251
40%	161	334
50%	202	418
60%	242	502
70%	282	585
80%	322	669
90%	363	752
100%	403	836

While it is theoretical possible to start production within 24 hours, taking the events above in to consideration and assuming a 30% as a reasonable probability of the above sequential events occurring at any one ramp up time, it has been assessed and evaluated that no more than 121 hours (5 days) would be reasonable for an operator to ramp up facility to produce fully compliant water from the first 125ML/day module and 252 hours (10 days) from the second module. This would be a reasonable worst case to reach stable continuous production based on an Operator being diligent and having suitable capable resources at hand.

Chart 5.1 represents a time zone whereby it is fair and reasonable for the Operator to ramp up from High Availability to Full Production requirements.

Chart 5-1 Ramp-up profile (High Availability to Emergency Response)



5.17. Planned flow request (specific event) and or Annual production.

A one- and two-month allowance to transition from High Availability to Planned flow request (specific event or annual production request respectively) is sufficient to achieve the desired production. The ramp up time from date of the water production request is likely to be up to 174 hours to achieve the required production level with stability of operation, noting all of the same issues in Section 4, with the exception that the Operator will be able to plan around essential maintenance interventions.

5.18. Planned flow request full rate.

A two-month allowance to transition from High Availability to Planned flow request is sufficient to achieve the desired production level. The ramp-up time from date of start of water production request is likely to be 10 days to achieve the required production level, noting all the same issues noted in the above section 4 with the exception that the Operator will be able to plan around essential maintenance interventions.

5.19. Mothball

The author notes that there is no provision for Mothball in the Service Standards. Mothball is not a recommended operating mode due to the time and effort it takes to restart the Plant, i.e. in the order of 9 to 10 months and considerable cost in the millions of dollars and the significant cost to restart the Plant.

6. High Availability mode - Baseline Production

A High Availability operating mode is unusual for large scale water treatment and desalination plants. Desalination plants are generally designed as bulk water production facilities and are best operated a constant continuous rate. They are not designed to ramp up and down on a frequent basis.

The new GSWS and SDP's Network Operator's Licence requires the Plant to be operated in a high-level flexible environment that includes the following key elements:

- That the Plant provides a minimum baseload volume each year to achieve the desired performance as set out below
- That the Plant can respond to shocks in the network, as required by the agreements between SDP and Sydney Water
- That the volume of water produced by the Plant can be varied as needed (in line with the Decision Framework) to support the resilience of the system, including to slow down dam depletion during droughts and keep dam levels higher when needed, but also to be decreased when dam levels are high in order to minimise the risk of spills and maintain cost effectiveness.

To provide these requirements with the current configuration of the Plant, the Plant will need to be operated at its extreme limits. The Plant has been designed as a continuously operated base load Plant. It should be noted that this flexibility comes at some additional cost, both fixed and variable.

This section considers the minimum production volume needed for the Plant to remain available, to provide both the level of service required under the GSWS and SDP's Network Operator's Licence and providing the lowest cost to customers. When assessing the minimum operational downturn of the Plant to achieve these outcomes, there are several key constraints that limit the extent by which the Plant can be reduced (in terms of output) while always providing the operational availability required. These include:

- The minimum hydraulic limit of the RO process to produce permeate, which requires two first pass trains, and one second pass train to be operating, is no less than 50ML/day to achieve stable operation t
- The volume of the delivery water Pipeline, which is approx. 46ML to enable regular turnover of this volume to prevent water quality issues.

Whilst the Plant does feature a 40MLD drinking water storage tank, which can be used for storage of treated water, the need to displace the pipeline volume regularly also becomes a limiting factor. The delivery pipeline remains full, even when the drinking water pumps are not operating, and this presents a water quality risk, whereby the pipeline volume will age, and deteriorate, leading to a potential breach of licence and/or drinking water specifications.

> ***On this basis it is reasonable and efficient to assume the Plant should endeavour to transfer at least 50 ML each day (being slightly greater than the approximate pipeline volume), and produce at least this much daily also.***

In addition, stop start approach to water production is not good operating practice for the RO systems, stability of the remineralisation system (lime and carbon dioxide chemical dosing systems), stability of the pre-treatment system to maintain RO feedwater quality and for various other reasons, particularly as outlined in Section 5 of this report.

> ***On this basis it is reasonable and efficient to assume that the Plant should, where possible, be kept continuously producing desalinated water and in an operational state***.

To keep the Plant operating in a continuous manner and always available to ramp up quickly in response to a production request, which will also reduce the likelihood of trips/ faults on RO system start-up, the minimum configuration of the RO process will result in around 50ML of permeate being produced each day. However, in the two first pass and one second pass train configuration (being the minimum stable configuration) there is inherent variation in the daily production output as follows:

- Each first pass RO train minimum design production rate is about 22.5 ML per day in order to meet the minimum annual production of 91.25 GL at 94% availability, however this production assumes the outer boundary of the design operating envelope (i.e., salinity, temperature and membrane performance will materially affect permeate quality, the proportion of water required to be treated through a second pass, and therefore the final permeate production rate).

- However, when operating the Plant at good/best practice, with well managed membrane performance and average seawater salinity and temperature conditions, it is possible to produce at a higher rate.
- It would be inefficient to artificially cap production by turning off RO trains, so it is prudent to make an assumption that the daily output could be assumed as ~10% higher giving a limit of 55 ML/day.

(Assumption 6.1) *55 ML/day is a reasonable basis of calculating an efficient annual baseline production.*

It should be noted that the lowest possible operating cost to meet the level of service requirements is when the Plant is operating at approximately 50-55 ML/day. However, running at this low rate continuously puts the Plant and the operations at considerable additional risk. Furthermore, only operating at a low flow rate without operating at full production from time to time puts the Plant at additional unnecessary risk of further trips/ faults and water quality issues. Recent operational experience has provided the Operator with plenty of learnings about many aspects of the Plant operations that include operating at low flow and full production rates to ensure it continuously meets environmental compliance and contractual compliance requirements. It understood that this new operating environment of High Availability will likely lead to multiple different operating and production levels over a typical year.

Further to the minimum downturn of the Plant to produce 50-55 ML/day and to best ensure the ability of the Plant and operations personnel to respond to an emergency request and test equipment after a major overhaul, it is good operating practice to operate at full production at least four times per year for a reasonable extended period (up to a full week). The key benefits in operating periodically at full production are:

- The Operators are well rehearsed in ramp-up from High Availability to Full Production and are better equipped to meet the emergency ramp requirements and understand the issues as noted in this report i.e. understand what can go wrong when in transition.
- Allows SDP and the Operator to better understand the key issues and develop and test improvements in the current Plant design to minimise risk and cost.
- Better understand Plant operating mode issues for future expansion to ensure these are feed into the design criteria for the expansion.
- Ensures that all Operators have been involved in at least one or two ramp ups per year. Shift rotations do not always allow for everyone to experience a ramp-up and go through the additional checks required to be conducted when ramping up from High Availability to Full production
- The Operators can understand the seasonal impacts and water chemistry when operating in Full production mode (i.e., as previously explained, there can be material differences in permeate quality and output quantity depending on the feed seawater conditions and it is important that these effects are understood over time, particularly as membranes age)
- Good turnover of chemicals at high production rate to avoid blockages and build-up at lower pumping rates and pipe velocities
- Gives the Drinking Water pumps an extended period to operate noting the daily stop start nature when operating at High Availability.

(Assumption 6.2) *Quarterly ramp-ups to full production, comprising 12 days at 250 ML/d in total is reasonable and efficient to allow the above considerations to be met. It would be expected that such ramp-ups durations and frequencies could be flexible such that longer or shorter periods of full production could be chosen (i.e. a 7 day and a 5 day ramp-up, a single 12 day ramp-up)*

Other considerations also need to be taken into account when operating a desalination Plant as per Good Industry Practice. These include the following maintenance considerations:

- Testing of equipment that has been overhauled/repaired to ensure is working correctly when the Original Equipment Manufacturer is on site
- Keep the transfer pipeline clear of any accumulated sediment. Consistent high flow to flush out any sediment that may accumulate at lower transfer rates/pipeline velocities. Ensure that when drinking water is needed by customers upon a ramp-up request, that the quality that leaves the Plant is reflected in the water at the delivery point.
- Keep the intake pipeline clear of any accumulated sediment. Draw through any sediment that may accumulate at lower transfer rates/pipeline velocities. Ensure that upon a ramp-up request, poor inlet

quality due to stirred up sediment does not challenge the pre-treatment (although this could also be achieved without operating the RO).

- Allow the Operator to test Reverse Osmosis membrane following a replacement event and or proving of equipment after a major overhaul

(Assumption 6.3) *An assumption of a monthly run up to full production over a day is reasonable and efficient to allow the above considerations to be met. Given a quarterly ramp-up is assumed above, and that a ramp-up over 24 hours would include periods of increasing and decreasing production, and assumption of 8 days at 190 ML/d has been assumed for the calculation. Maintenance and replacement of equipment on whole plant systems, such as post chemical dosing systems, instruments, control systems; or module level systems such as pre-treatment filters, will need to be put back into operations to confirm, check and in some instances re-commission. It is prudent and efficient to conduct these tests checks and commissioning activities at either full or half capacity and directly after the works has been completed. Furthermore, it is essential that key personnel and maintenance providers are present onsite during these tests, checks and commissioning activities.*

Further considerations have been made as follows:

(Assumption 6.4) *It is expected that Sydney Water will request increases in production at various times over a year. In order to meet the production request over the period requested, the Plant will need to ramp-up prior to achieve stable operation. No allowance has been added for this – it is assumed that any ramp-up will then lead to a reduction in the volumes estimated under 6.2 and 6.3.*

(Assumption 6.5) *The Operator will need to cease production from time to time for planned maintenance. Based on recent practice, 12 days of shutdown per year has been assumed for this purpose.*

Table 6.1: Baseline production estimate

Index	Assumption Basis	Days	Production (ML/day)	Total (GL/a)
6.1	Minimum production	333	55	18.3
6.2	Operational readiness and performance assessment	12	250	3.0
6.3	Prudent Maintenance	8	190	1.5
6.4	Production Requests	*	-	-
6.5	Maintenance shutdowns	12	0	0
	TOTAL Baseline Production	**365**		**22.8**

* Addressed by reductions in assumptions 6.2 and 6.3

The trade-off for good operating practice is the additional production of water. The benefit to Sydney Water and customers is lowest possible production volume with high flexibility and reliability. Based on the operational experience at the Plant, the limitations of the original design, and the requirements the Plant needs to satisfy, a minimum volume of 23GL is considered both prudent and efficient.

7. References

7.1. Documents supplied

1. Memo – Basis of 23 GL per annum
2. Ramp up Wednesday 2nd March 2022.
3. Final Draft Decision Framework for SDP Operating
4. O&M Deed Schedule 23 Basis of Design Construction (existing plant).
5. Water Delivery Alliance Basis of Design
6. Draft – SDP Network Operator Licence August 2022

Ontoit.

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Appendix C

CONFIDENTIAL [redacted]

[redacted]

Appendix D

Land Tax Assessment Notice

Land Tax Assessment Notice

Land Tax in this notice has been assessed for the:
2023 Tax Year

Issue date 10 January 2023
Enquiries 1300 139 816 (8.30 am - 5.00 pm)
Website www.revenue.nsw.gov.au

NSW GOVERNMENT

⊢ 003641
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SDP AUST NO 4 PTY LTD ATF SDP ASSETS TRUST
C/ SYDNEY DESALINATION
SUITE 19, LEVEL 17, AUSTRALIA SQUARE
264 GEORGE ST
SYDNEY NSW 2000

Client ID	**123876709**
Correspondence ID	**1756721922**
Due date	**20/2/2023**
Assessment Amount	**$1 210 300.00**

Assessment details (please refer to the enclosed supporting information)

Payment Options

Pay in full to receive a discount	Due date	Amount due
You must pay by the due date to receive a discount of $6 051.50	**20/2/2023**	**$1 204 248.50**

Pay in interest-free instalments

Pay in 3 instalments	Due date	Amount due
Total amount due is $1 210 300.00		
First instalment	**20/2/2023**	**$403 433.40**
Second instalment	22/3/2023	$403 433.30
Third instalment	21/4/2023	$403 433.30

Pay within a 6-month period

Go to www.revenue.nsw.gov.au/landtax prior to the 20/2/2023 to set up your payment plan. Any overdue amounts from prior years will be included in the first instalment.

You can schedule a direct debit to make repayments against your payment plan.

If your circumstances change, resulting in a reassessment, your payment plan will be cancelled.

Payment plans that extend beyond 6 months may accrue interest daily until paid in full.

Scott Johnston
Chief Commissioner of State Revenue

Payment Methods

Set up direct debit, or make online credit card* payments at **www.revenue.nsw.gov.au** or phone **1300 363 291**.
Biller code: 3384 Ref: 1756 7219 22

BPAY: Internet or phone banking.
Biller code: 3384 Ref: 1756 7219 22

***Note:** We accept MasterCard and Visa.
A card payment fee may apply. This fee is not subject to GST.
Credit card payments will only be accepted online and by phone. Credit cards are not accepted for payments made by BPAY, mail, at Australia Post, or electronic payments.

+00001756721922> +001508+ <0000000000> <0000000000> +444+

Important information

It is easy to manage your land tax online. For more information, please visit www.revenue.nsw.gov.au/landtax

You can:

- update contact details & lodge a return
- update your notification preference to receive notices digitally
- update your foreign status and submit supporting documents
- request, or update an exemption
- update details when you sell or purchase land
- provide bank details for an EFT refund

You can also:

- view your current outstanding balance
- print your past 5 years of assessments
- track the status of an application

<u>If you are a registered business</u>

Please ensure your Australian Business Number (ABN) details are up to date on the Australian Business Register (ABR).

Keep your data safe

Your ID numbers give access to your personal information. Only share with authorised people.

Paying by instalments

If you pay by Instalments and miss a payment, or make a late payment, the payment plan will be cancelled.
Daily interest will be calculated and applied from the first due date.

If you are selling land

All outstanding land tax needs to be paid before a clear land tax certificate can be issued.

If you believe your assessment is incorrect

If you have additional information that we haven't previously considered, you should lodge a return. You should do this through www.revenue.nsw.gov.au/landtax on or before the first due date of this notice.

If you believe we have applied the legislation incorrectly, you can lodge a formal objection at www.revenue.nsw.gov.au/objections
You must lodge the objection together with your reasons and supporting evidence within 60 days of the issue date of this notice.
You must still pay by the due date even if you have lodged an objection as interest will be imposed on any overdue amounts.
A refund will be issued to you if your objection is successful.

Land Tax contact details

Read more about land tax and use our online service at www.revenue.nsw.gov.au

1300 139 816*

Phone enquiries
8.30 am – 5.00 pm, Mon. to Fri.

* Overseas customers call +61 2 7808 6906
Help in community languages is available.

Land value

The Valuer General determines land values as at 1 July in the year prior to the land tax assessment year as shown on your assessment. Revenue NSW use these values to calculate land tax.

If you disagree with your land value you can go to **www.valuergeneral.nsw.gov.au** for more information about land values and the review process. You have **60 days from the issue date on your assessment notice** to lodge an objection to the land value.

Note: if you object to your land value you must still pay your land tax assessment by the due date as interest will apply to any overdue amounts.

1800 110 038 or
+61 2 6332 8188 (international callers)

Phone enquiries
9.00 am – 5.00 pm, Mon. to Fri.

For more information about land values or to contact Valuer General NSW, please scan the QR code below to visit **www.valuergeneral.nsw.gov.au**

NSW State Budget 2022-23

For information about how the 2022-23 NSW State Budget Announcement impacts your land tax, please visit https://www.revenue.nsw.gov.au/news-media-releases

Land Tax revenue helps fund essential community services, such as health care, education, public transport, infrastructure, and policing.

Other ways to pay

Service NSW

Pay at any Service NSW Centre by cash, cheque* or EFTPOS. Write your Client ID and name on the back of the cheque.

***Note:** payment made by cheque must be received by the due date

Post Billpay

Pay in-store at Australia Post by cash, cheque or EFTPOS. Write your Client ID and name on the back of the cheque.

*298 1509 0000001756721922 06

Supporting information

Name: SDP AUST NO 4 PTY LTD ATF SDP ASSETS TRUST
Client ID: 123876709
Correspondence ID: 1756721922
Issue date: 10 January 2023

A land tax year is based on land owned between 1 January to 31 December of the preceding year.

Land tax is applied for the full calendar year following the taxing date of 31 December.

Total balance of this assessment

Tax Year	Description	Debit $	Credit $	Balance $
2023	Assessment	1 210 300.00		1 210 300.00
2023 tax year total		**1 210 300.00**		**1 210 300.00**
Total				**$1 210 300.00**
Total amount payable				**$1 210 300.00**

Supporting information (cont.)

Name: SDP AUST NO 4 PTY LTD ATF SDP ASSETS TRUST
Client ID: 123876709
Correspondence ID: 1756721922
Issue date: 10 January 2023

A land tax year is based on land owned between 1 January to 31 December of the preceding year.

Land tax is applied for the full calendar year following the taxing date of 31 December.

The assessment for the 2023 tax year is based on the following land owned as at 31 December 2022

SDP AUST NO 4 PTY LTD ATF SDP ASSETS TRUST has been assessed under section 3 of the *Land Tax Management Act, 1956* as a Special Trust.

Aggregated land

Average land value - calculated from the land value(s)

Land item no.	Land item and property ID	Notes	% Owned	Land Tax Taxable Value $	Surcharge Taxable Value $	LAND VALUE(S) 2021 $	LAND VALUE(S) 2022 $	LAND VALUE(S) 2023 $	Average land value $
1	21 SIR JOSEPH BANKS DRVE KURNELL PID - 3464673		100	61 700 000	Not applicable	50 500 000	60 600 000	74 000 000	61 700 000
Total aggregated land value				**$61 700 000**	**Nil**				

Assessment calculation: Land Tax

Aggregated taxable land value	61 700 000		
Less threshold	0		
Land tax @ 1.6% on 5 925 000		94 800.00	
Land tax @ 2.0% on 55 775 000 (61 700 000 - 5 925 000)		1 115 500.00	
Subtotal			**$1 210 300.00**
Total tax payable			**$1 210 300.00**