

## Introduction

This is a summary guide to the current water allocation method for the Upper and Lower Namoi regulated river water sources. It is a concise document aiming to provide public information on the priorities for water sharing and how water is allocated to competing interests.

The Department of Planning, Industry and Environment periodically assesses water resources to see whether there has been any improvement since the last assessment and therefore; whether more water can be allocated.

This resource assessment distributes volumes of available water to the different categories of water access license (WAL) in accordance with the relevant water sharing plan. The process is formally known as an Available Water Determination (AWD)<sup>1</sup>. The results of the resource assessment and allocation process are advised through water allocation statements published on the department's website.

The water allocation statement sets out the percentage of entitlement each category of WAL has been allocated and therefore, the volume of water credited to their respective water accounts. The water allocation statements are normally published monthly until full allocation is made to all WAL categories. This summary guide presents key components of the resource assessment and water allocation process, followed by an example of a past allocations.

## Water users

There are various types of water users including the environmental, basic rights and WAL holders. The principles and hierarchy of allocating available water to the different categories of licences are prescribed in the *Water Management Act 2000* and the Water Sharing Plan for the Upper and Lower Namoi Regulated River Water Sources 2016. The Act states<sup>2</sup> sharing of water from a water source must protect the water source, its dependent ecosystems and basic landholder rights.

The maximum annual volumes assigned to rights and licence categories in megalitres (ML) per water year are listed below. Volumes are based on 1ML/share and are mostly in the Lower Namoi:

- Basic land holder rights<sup>3</sup> 1,936 ML
- Domestic and stock WAL<sup>4</sup> 2,013 ML
- Local water utility WAL<sup>5</sup> 2,421 ML
- High security WAL<sup>6</sup> 3,498 ML
- Lower Namoi general security WAL 245,081 ML
- Upper Namoi general security WAL 11,609 ML

In the Lower Namoi there are also supplementary WALs with full entitlement of 115,460 ML.

Supplementary water users can only access water in periods of announced supplementary flow, typically from surplus tributary inflow and/or dam spills. Supplementary water is not supplied from

<sup>1</sup> *Water Management Act (2000)*, Clause 59

<sup>2</sup> The Act, Clause 60(3)

<sup>3</sup> Water sharing plan, Clause 17

<sup>4</sup> Water sharing plan, Clause 21

<sup>5</sup> Water sharing plan, Clause 22

<sup>6</sup> Water sharing plan, Clause 23

the regulated water source (storages), but from an unregulated supply, therefore there is no adverse impact on regulated river water users.

Supplementary WAL usually receives full 100% allocation<sup>7</sup> at the beginning of each year, unless reduction is necessary to comply with long-term average annual extraction limits.

## Opening allocation

Allocations are made at the beginning of each water year (1 July) for the following users: domestic and stock, local water utility and high security, as their balance from the outgoing year is forfeited.

At the beginning of each water year, the full 100% allocation, as directed by the water sharing plan<sup>8</sup> for the higher priority users, is made whenever possible: domestic and stock, utilities, high security.

An allocation to general security licences cannot be made until the AWDs for all higher priority users listed above reaches its maximum 100% allocation<sup>9</sup>. Opening allocation also considers allocation to general security users on the Upper Namoi as explained below.

### Upper Namoi general security allocation

The river section from Keepit Dam, up to and including Split Rock Dam, is referred to as the Upper Namoi regulated river water source. Allocations to general security users in the Upper Namoi is directly linked to the volume of water in Split Rock Dam. Their allocation is not subject to any explicit assessment, except for the higher priority licences receiving their maximum allocation first.

Upper Namoi general security allocation commences when Split Rock Dam volume exceeds 5% based on the following table<sup>10</sup>. The security of high priority requirement is implicit within the Split Rock Dam level shown in the table.

**Table 1. Allocation table for Upper Namoi general security users**

Split Rock volume	Less than 5%	5% to 8%	8% to 10%	More than 10%
Allocation	Nil	50%	60%	100%

## Major steps in water allocation process

The major steps in the resource assessment resulting water allocation include:

- 1) Identifying the water in storages.
- 2) Accounting for future minimum inflow.
- 3) Deducting all existing commitments, inclusive of reserves for the following year's higher priority commitments.
- 4) Setting aside water for system operation and minimum releases.

<sup>7</sup> Water sharing plan, Clause 38(1)

<sup>8</sup> Water sharing plan, Clauses 34(3), 35(3), 36(3)

<sup>9</sup> Water sharing plan, Clause 37(1)

<sup>10</sup> Water sharing plan, Clause 37(2)

This can be further illustrated using Equation (1) below.

$$\text{Water for Allocation} = \text{Available Resource} + \text{Future Inflow} - \text{Commitments} - \text{System Overheads (1)}$$

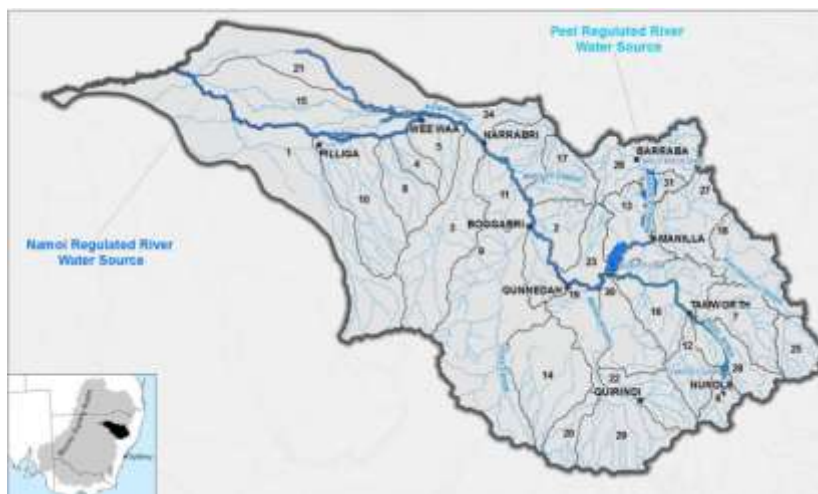
In this system, available water is allocated to Lower Namoi general security users once the higher priority users attained its maximum allocation.

Every river system has its own way of arranging the line items of its balance sheet (see

**Table 4**). However, in broad terms the balance sheet conforms with Equation (1). Accordingly, the four items shown on the right hand side in Equation (1) are explained next.

### Available resource

The river system has two headwater reservoirs in series; they are Split Rock and Keepit dams. The two storages have a maximum combined capacity of 817,000 ML. The available active operating volume above the dead storage is used as the available resource in the allocation process.



### Future inflow

The resource assessment secures water through a repeat of the driest observed inflow period<sup>11</sup> to 1 July 2004 (the commencement of the inaugural water sharing plan). This is the agreed level of risk, specified in the water sharing plan, balancing water allocation for productive use, versus water security for drought.

The two objectives are mutually exclusive. The department observes through analysing the 124 years<sup>12</sup> of inflow that it is adequate to plan for 24 months ahead, after which the system is statistically expected to recover. The inflow volume is the lowest 24-month combined inflow observed within 1892 to 2004.

The combined inflow includes inflow into Split Rock Dam and net inflow to Keepit Dam. Inflow from Halls Creek (419005) and the unregulated Namoi River (419005), are considered as net inflow into Keepit Dam. This avoids double counting Split Rock Dam releases arriving at Keepit Dam as new inflow.

The inflow time series is constructed by the hydrologic model - Namoi Integrated Quality Quantity Model (IQQM) version, as of 2017. The same Namoi IQQM was used in developing the water sharing plan. As shown in table below, the minimum inflow volume is 67.8 gigalitres (GL), experienced from June 1918 to May 1920.

<sup>11</sup> Water sharing plan Clauses 34(1), 35(1), 36(1)

<sup>12</sup> 1892 to 2016, available at the time of the study

**Table 2. Minimum inflow volume within 1890 to 2004 period<sup>13</sup>**

Months	Historical Period	Minimum Inflow (ML)
6 months	Feb 1902 to Jul 1902	2,600
12 months	Jan 1994 to Dec 1994	12,600
24 months	Jun 1918 to May 1920	67,800

The resource assessment anticipates 67.8 GL of expected future minimum inflow to secure higher priority need for next 24 months.

### Commitments

Each monthly resource assessment allows for all commitments over the next 24 months. This includes a reserve for higher priority requirements, evaporation loss, the balance of already allocated water to general security users and the associated delivery loss. The section below explains how the higher priority requirements for the next 24-month period is determined.

### Higher priority requirements

The higher priority requirements<sup>14</sup> are first secured before allocating to general security users on Lower Namoi. The items shown in **Table 3** include higher priority WALs, rights, replenishments, Walgett (end of system) demand and associated delivery loss, as well as the bulk transfer loss from Split Rock Dam to Keepit Dam. The budgeted volumes are suitably rounded for simplicity.

**Table 3. Higher priority requirement budget in ML for a 12-month period**

Items	Water sharing plan Ref*	Budget <sup>#</sup>
Keepit minimum release <sup>15</sup>		2,000
Split Rock minimum release		2,000
Domestic and stock rights	1,936	2,000
Domestic and stock licence	2,013	2,100
Local water utility licence	2,421	2,800
High security licence	3,498	4,000
Pian replenishment flows <sup>16</sup>	14,000	14,000

<sup>13</sup> Used available time series from 1890 to 2016, instead of 1890 to 2004, with no change in dry spell.

<sup>14</sup> Clause 37(10), 59, 62

<sup>15</sup> River continuity, basic rights immediate downstream

<sup>16</sup> Clause 59

Items	Water sharing plan Ref*	Budget#
Delivery loss for above items (80% ) <sup>17</sup>		23,120
Split Rock to Keepit transfer <sup>18</sup> loss		6,000
Walgett target <sup>19</sup> plus delivery loss		5,000
<b>Total ML per year</b>		<b>63,020</b>

Notes: \* These amounts are estimated commitments at the start of the water sharing plan – refer footnotes.

# These amounts are from the latest licensing data, rounded up and used in the current resource assessment.

The reserve for next 24 months higher priority requirement is determined after budgeting for the minimum inflow of 67,800 ML arriving over the same period.

$$\text{Storage reserve} = 63,020 \times 2 - 67,800 (\text{min inflow}) = 58,240 \quad (2)$$

Therefore, every monthly assessment ensures that a reserve of 58,200 ML is maintained. The reserve is depleted by the volume supplied to the higher priority demands and actual associated delivery loss.

This depletion is topped up first if new resource is identified prior to any further allocation to other entitlements being made. Note: the reserve may be temporarily reduced for a season immediately after making the Pian Creek replenish delivery.

### System overheads

System overheads include water that is required to operate the regulated river. This includes water evaporated from the storage and water lost during delivery.

### Evaporation loss

Storage evaporation loss is a direct function of the storage's surface area, which changes with storage level and the drawdown pattern. The department uses Equation (3) to budget for evaporation from the water surface behind Split Rock and Keepit dams for the next 24 months.

The empirical equation assumes that the climate and future demands<sup>20</sup> will deplete the current volume of the combined storages to 50 GL<sup>21</sup> at the 24<sup>th</sup> month. The future climate is assumed to be a repetition of evaporation and rainfall of June 1918 to May 1920, the matching period of minimum inflows. These assumptions returned the following empirical equation:

<sup>17</sup> Operator's estimate to deliver solely critical needs during dry time.

<sup>18</sup> About 6.5 GL was lost during transfers of 2002/03, 2013/14 and 2014/15

<sup>19</sup> WSP Clause 14. Namoi Water Supply Works Approval (2008) Condition 7, June 21 ML/d, July 24 ML/d, August 17ML/d, a total 1900 ML plus budgeted loss of 3100 ML.

<sup>20</sup> Monthly demand pattern is based on 4/2009 to 8/2017 data.

<sup>21</sup> A volume reached in May 2015, also a volume that secures one more year of critical need.

$$E = 16.0 + 0.13 S - 50 \times 10^{-6} S^2 \quad (3)$$

Where:

**E** = Total evaporation from Split Rock and Keepit dams in GL over the next 24 months.

**S** = Combined storage volume in GL at the assessment date.

### Delivery loss

Delivery loss is defined as additional water released to meet transmission and operational loss through the river system. It is often described as ‘water to run the river system’. Resource managers must assure that sufficient water is set aside in the assessment to meet whatever the losses will be.

The volume is net of water losses through seepage along with any support from tributary inflows. The resource assessment budgets and tracks delivery loss in two groups; the delivery losses for higher priority requirements and delivery losses for general security users.

The delivery loss to higher priority requirement is set at 80%, reflecting the need to deliver low volumes of water in potentially dry years. No separate account is kept for this item. This delivery loss budget is included in the reserve for higher priority requirement (see **Table 3**). Using a single account for higher priority requirements, inclusive of losses, provides some flexibility for operation.

The Namoi resource assessment budgets for a 30% delivery loss for general security water, meaning that for every 10 ML delivered at the pump, the combined storages deplete by 13 ML on average. This is a practice that is simple and has long endured wide-ranging seasonal conditions and matches resource assessments of the neighbouring Gwydir and Border Rivers systems.

The department evaluated the budget against a rolling two water year basis from 2001 to 2016, the period available during the evaluation. There is a general linear trend of increasing losses with increasing water deliveries. The work confirmed the suitability of the 30% budget for 24-months.

Every month, the department first estimates the monthly delivery loss by proportioning the month’s loss to:

- 1) Higher priority deliveries.
- 2) General security orders.

Accordingly, the loss reserve for general security accounts depletes as per the actual loss. This depletion of loss budget is topped up after the replenishment of higher priority requirements (discussed earlier, 58.240 GL).

## Water allocation example of 6 August 2021

An example of an AWD behind the statement published on 6 August 2021 (Annexure) is provided in **Table 4**. The assessment returned 27.8% allocation to general security users in the Lower Namoi.

Available water was distributed among eligible shares based on the formula shown at the bottom of the table. Eligible shares are the general security shares associated with accounts that have not reached their limit<sup>22</sup> of 200%. A more detailed assessment is provided in **Table 5**.

<sup>22</sup> Water sharing plan Clause 44(4).

**Table 4. Namoi assessment summary for 6 August 2021.**

Resource distribution	Volume (GL)
Keepit and Split Rock active volumes	552.07
<i>minus</i>	<i>minus</i>
Storage evaporation loss (Equation 3)	73.25
Higher priorities (Equation 2)	58.24
Lower Namoi general security balance	241.36
Upper Namoi general security balance	14.19
Delivery loss to general security (30%)	76.67
<i>equals</i>	<i>equals</i>
Available for Allocation (or deficit)	88.36

**Lower Namoi general security allocation** = Available volume ÷ (Eligible GS shares x 130% Loss)  
=  $88.36 \div (243.87 \times 1.3) = 27.8\%$



**Table 5. Detailed allocation computation for 6 August 2021.**

Assessment items as of 31/07/21	Item volume (GL)	Balance (GL)
<b>Available resources</b>		
Split Rock Dam (31/7/21)	149.46	149.46
Keepit Dam (31/7/21)	412.31	561.77
Dead storage (both dams)	-9.7	<b>552.07</b>
Evaporation brought forward 1/7/21	-64.99	487.07
<b>Higher priority supplies</b>		
Brought forward from 1/7/21	58.24	
Supplied inclusive of loss during 1/7/21 to 31/7/21	-8.21	
Allocation assignments OUT from HS to GS	-0.00	
Transfer of HS loss to GS delivery loss account	-0.00	
Current balance (31/7/21)	50.03	437.04
<b>General security, Upper Namoi/Manilla rivers</b>		
Brought forward from 1/7/21	11.50	
Ordered during 1/7/21 to 31/7/21	-0.03	
Allocation assignments from UN to LN	-0.02	
Allocation assignments from LN to UN	2.74	
Current balance (31/7/21)	14.19	422.85
<b>General security, d/s Keepit or Lower Namoi</b>		
Brought forward from 1/7/21	238.02	
Ordered during 1/7/21 to 31/7/21	-0.48	
Allocation assignments into LN (from HS, UN)	0.02	
Allocation assignments out to UN (from LN GS)	-2.74	
Account reconciliation	6.54	
Current balance (31/7/21)	241.36	181.49
<b>GS Delivery Loss</b>		



Assessment items as of 31/07/21	Item volume (GL)	Balance (GL)
Brought forward from 1/7/21	74.86	
Apparent losses during 1/7/21 to 31/7/21	-16.79	
Credit from HS Loss to GS Loss from assignments IN	0.00	
Current balance (31/7/21)	58.07	123.42
<b>Top ups</b>		
Evaporation 1/7/ to 31/7 (73.25GL – 64.99GL)	-8.26	
Higher Priority (58.24GL – 50.3GL)	-8.21	
GS delivery loss (241.36GL + 14.19GL) x 0.30 – 58.07GL	-18.6	<b>88.36</b>

### Summary balance sheet of the key items (volumes in GL).

Assessment items	Budget	Balance 31/7/21	Top ups	Balance 1/8/21
Storage evaporation loss	73.25	64.99	8.26	73.25
Higher priorities for next 24 months	58.24	50.03	8.21	58.24
General Security Delivery Loss	97.06	58.07	38.99	97.06
Upper Namoi General Security		14.19	0.00	14.19
Lower Namoi General Security		241.37	67.96*	309.33
Additional Resources for sharing		123.42	-123.42	0.00
Total		552.07	0.00	552.07

\*Note: 67.96 GL for general security equates to 27.8% of allocation.

### Disclaimer

Allocations are based on a very conservative future inflow budget. However, during an extended dry period, inflows may be less than the budget and, coupled with higher delivery losses may create a shortfall in allocated resources. The management of allocation deficit during extreme drought is beyond the scope of this summary guide. Readers are referred to the [NSW Extreme Events Policy](#) for details.

For example, in the unlikely event of a shortfall, and if it is in the public interest to do so, temporary water restrictions have been imposed in the past to prevent access to account water, akin to a negative water allocation, to protect remaining water supplies for high priority and critical needs.

The routine water allocation computation, while broadly following this guideline, may be subject to wider hydrological considerations not covered in this summary document. This is a guide only and subject to improvements and changes over time. Water users should use this information with caution and are encouraged to seek their own expert advice as needed.

### Version history

First edition	May 2020	S Chowdhury, P Jayakody
This edition	September 2021	M Kawun, S Chowdhury
Reviewed	October 2021	B Graham

© State of New South Wales through Department of Planning, Industry and Environment 2021. The information contained in this publication is based on knowledge and understanding at the time of writing (November 2021). However, because of advances in knowledge, users should ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate departmental officer or the user's independent adviser.

## Annexure

### Example: Water Allocation Statement - 6 August 2021

6 August 2021

## Namoi Regulated River Water Sources

### Water allocation update

There has been an improvement in resources in the Namoi catchment headwater storages to allow for the following allocation:

- **Lower Namoi general security** allocation to **increase by 27.8%** resulting in a total allocation of 37.6% to date for the current 2021-22 water year.

All other categories of licence in the Upper and Lower Namoi Regulated River Water Source were assigned full allocations on 1 July and remain unchanged.

2021-22	High Security	General Security
Upper Namoi Regulated River	100%	100%
Lower Namoi Regulated River	100%	37.6%

### Storage levels (as at 6 August 2021)

- Split Rock Dam is 38 per cent full – holding approximately 154 GL.
- Keepit Dam is 96 per cent full – holding approximately 408 GL.

### Key facts

- During July, the catchment experienced above average to very much above average rainfall, receiving approximately 50 to 200 mm of rain.
- Inflows into headwater storages included 81.9 GL for Keepit and 24.6 GL for Split Rock Dam.
- Critical requirements for Manilla and Barraba townships are secure for the next 24 months and beyond, based on assumed minimum future inflows to Split Rock Dam.
- Downstream tributary inflows continue providing water for supplementary access water users.

### Seasonal climate and streamflow outlooks

The Bureau of Meteorology's seasonal outlook for next three months indicates that rainfall is likely to be above average across the catchment. Both daytime and overnight temperatures are also likely to be above average.

For further details: [www.bom.gov.au/climate/outlooks/#/overview/summary](http://www.bom.gov.au/climate/outlooks/#/overview/summary)

The Bureau of Meteorology issues a seasonal flow forecast for the unregulated Namoi River at North Cuerindi. This may provide an indication of potential inflows into Keepit Dam. The forecast quantiles of total streamflow volume from July to September are higher than the historical quantile references, indicating higher runoff than historical streamflow conditions for the next few months.

Details can be found in: <http://www.bom.gov.au/water/ssf/>

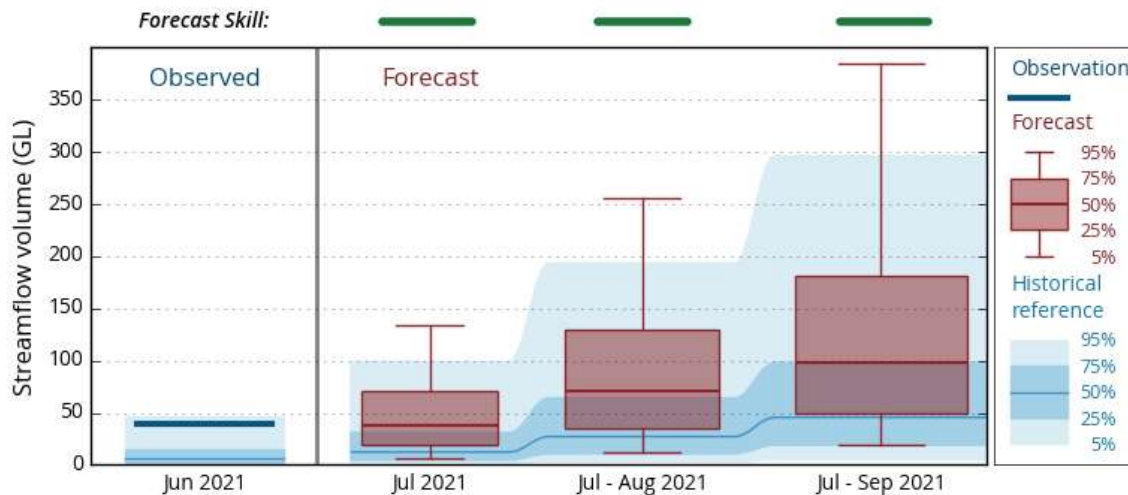
# Water Allocation Statement

Water availability and allocation update



## Namoi River at North Cuerindi (ID: 419005)

Forecast for Jul 2021 – Sep 2021



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### Resource assessment data sheet

#### Resource distribution (as at 31 July 2021)

GL

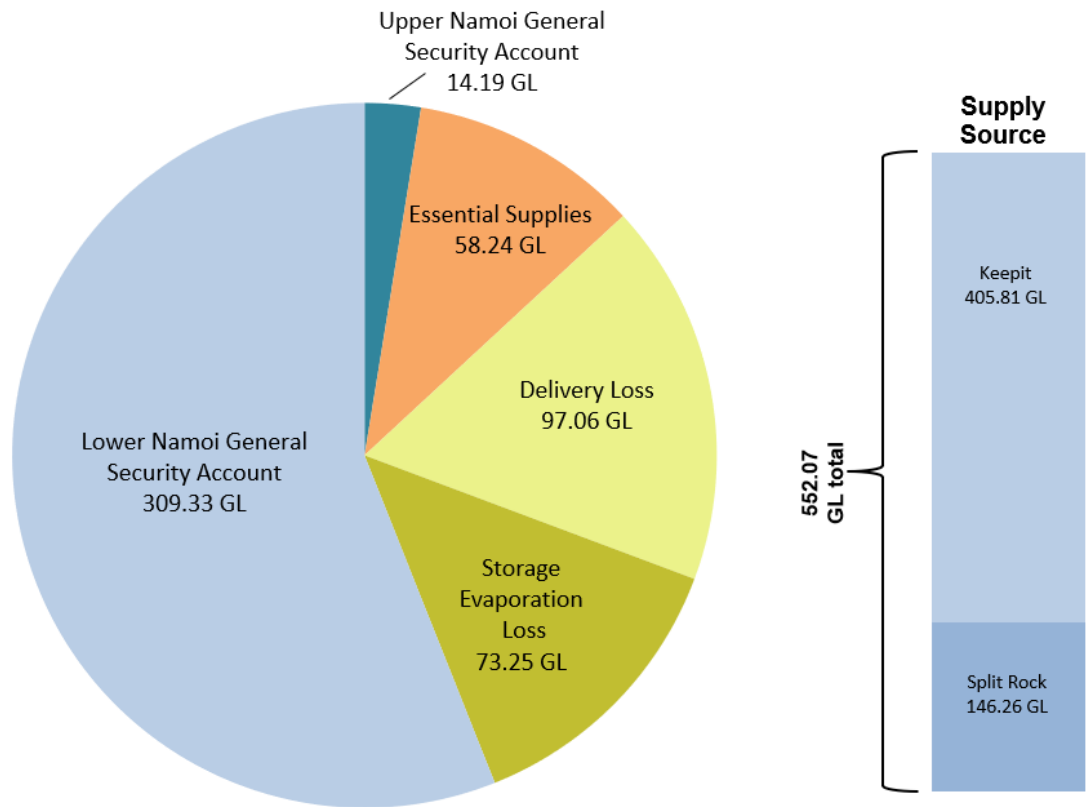
Keepit and Split Rock Active Volumes	552.07
<i>less</i>	
Storage Evaporation Loss <sup>(1)</sup>	73.25
Essential Supplies <sup>(2)</sup>	58.24
Lower Namoi General Security Account	309.33
Upper Namoi General Security Account	14.19
Delivery Loss <sup>(3)</sup>	97.06
Surplus (deficit) <sup>(4)</sup>	0.0

#### Notes:

- <sup>(1)</sup> Storage Evaporation Loss: evaporation loss based on forecast storage behaviour and maximum historical evaporation rates over 2 years.
- <sup>(2)</sup> Essential Supplies: water required to be set aside under water sharing plans to provide for Stock & Domestic, Towns, High Security and riverine environments. Includes Gunidgera/Pian stock and domestic replenishments, delivery loss allowance and end-of-system flow requirements. This commitment is offset by minimum forecast inflows into the storages.
- <sup>(3)</sup> Delivery Loss: This account reflects the water needed to deliver general security water. Traditionally, a 30% delivery loss has been budgeted for this river system.
- <sup>(4)</sup> All available water resources have been fully allocated with no surplus left. The system is secure for next 24 months and beyond with no deficit.

# Water Allocation Statement

Water availability and allocation update



**Total = 552.07 GL**

## Resource assessment data sheet as at 31 July 2021

Volumes in GL	Budget	Current	Additional	Balance
Storage Evaporation Loss	73.25	64.99	8.26	73.25
Essential Supplies for next 24 months (58.2 GL max)	58.24	50.03	8.21	58.24
General Security Delivery Loss	97.06	58.07	38.99	97.06
Upper Namoi General Security (11.4 GL max)		14.19	0.00	14.19
Lower Namoi General Security (491.8 GL max)		241.37	67.96	309.33
Additional Resource for Sharing		123.42	-123.42	0.00
<b>Total</b>		<b>552.07</b>	<b>0.00</b>	<b>552.07</b>

Upper Namoi (General Security)	Value	Unit
Incremental Increase CREDITED	0.00	GL
Available Water Determination	0.00	ML per unit share

# Water Allocation Statement

Water availability and allocation update



Lower Namoi (General Security)	Value	Unit
Incremental Increase CREDITED	67.96	GL
Available Water Determination	0.278	ML per unit share

## Further information

The next monthly water allocation statement for the Namoi Regulated River Water Source will be available on **Tuesday 7 September 2021**.

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