

Upper Namoi Alluvium (GS47)

INITIAL SDL ASSESSMENT RESULT

The Authority has **identified a risk** that environmental outcomes for this Unit are not being met, specifically *surface water – groundwater connectivity* and the *productive base*.

Groundwater take is the leading driver, impacting groundwater levels in this Unit. Further work is needed to resolve whether the SDL reflects an environmentally sustainable level of take.

The Authority will continue to consider changes to the SDL. This consideration will be informed by engagement with **New South Wales** to seek confidence and confirmation that the appropriate rules and management arrangements are in place to manage localised and Unit-scale issues.



Figure 1: Upper Namoi SDL Resource Unit

The Authority is assessing whether the Sustainable Diversion Limit (SDL) for the Upper Namoi SDL Resource Unit (the **Unit**) continues to support environmental outcomes and reflect an environmentally sustainable level of take (ESLT).

This Assessment Summary provides an overview of the factors which are relevant to that work and the Authority's initial view. The summary draws on three 'Lines of Enquiry', engaging with the likelihood that trends in groundwater levels and salinity support environmental outcomes, the Authority's confidence in that assessment, and the consequence of an 'at risk' finding.

Information on the Lines of Enquiry and methodology used in this assessment is available in the *Summary of Assessment Approach* and the *SDL Assessment and Response Framework*. Information on the *Basin Plan Review Discussion Paper* and the process for making a submission are available on the MDBA website.

About this Unit (as at June 2024)

Aquifer Storage/size (GL)	32,022
SDL as at June 2025 (GL/y)	123.4
Entitlement volume (GL/y)	116.08
Recharge estimate range (GL/y)¹	37-91
Average annual take (2012/13–2022/23, GL/y)	82.71
Significant surface connections	Namoi (SS21)

While an accredited Water Resource Plan (WRP) relating to this Unit is not yet in place, the SDL has applied since 1 July 2019. Water resource management is currently governed by existing rules and arrangements made under NSW state legislation, with SDL accounting undertaken through transitional Blan Plan arrangements.

¹ Recharge estimate range is derived from three estimates of recharge: Modelled 91 GL/y, SY2 (diffuse) 72 GL/y and Chloride Mass Balance (CMB) 37 GL/y.

Utilisation at the time of the review

The Upper Namoi Alluvium includes two main aquifer systems, a shallow (~40m) unconfined aquifer and a deeper (<170m) confined or semi-confined aquifer. The assessment reflects that there is one significant connection to surface water resources in this Unit (Namoi SS21).

The SDL for this Unit was originally based on the Achieving Sustainable Groundwater Entitlements (ASGE) program limit (122.1 GL/y) plus an estimate of stock and domestic (1.30 GL/y).

At the time of setting the SDL, the ASGE program was still being implemented. The MDBA noted that the aquifers were large and had low risk of material depletion within the first 10 years of the Basin Plan and therefore decided to allow the ASGE to complete before considering the need for further reductions. This would also allow time for further monitoring and data to be collected and the response to the ongoing ASGE program to be assessed.

NSW manage the Upper Namoi Alluvium as 12 separate zones and has identified long-term declines in water levels with use as a driver. NSW assessed management zones 8 and 12 as having the highest rates of decline over the monitoring period (NSW DPIE 2022) but has since reported that zone 12 has stabilised. Zone 8 is the area identified through MDBA's analysis as having the most bores showing decline in the short-term.

Annual take shows a slightly decreasing trend for the period 2012-2023 (Figure 2), noting that the ASGE program was being progressively rolled out until June 2017. Figure 2 also shows that with wetter conditions, water take has been substantially less in response to high rainfall. Average annual take for the period 2012/13 to 2022/23 was 67% of the SDL.

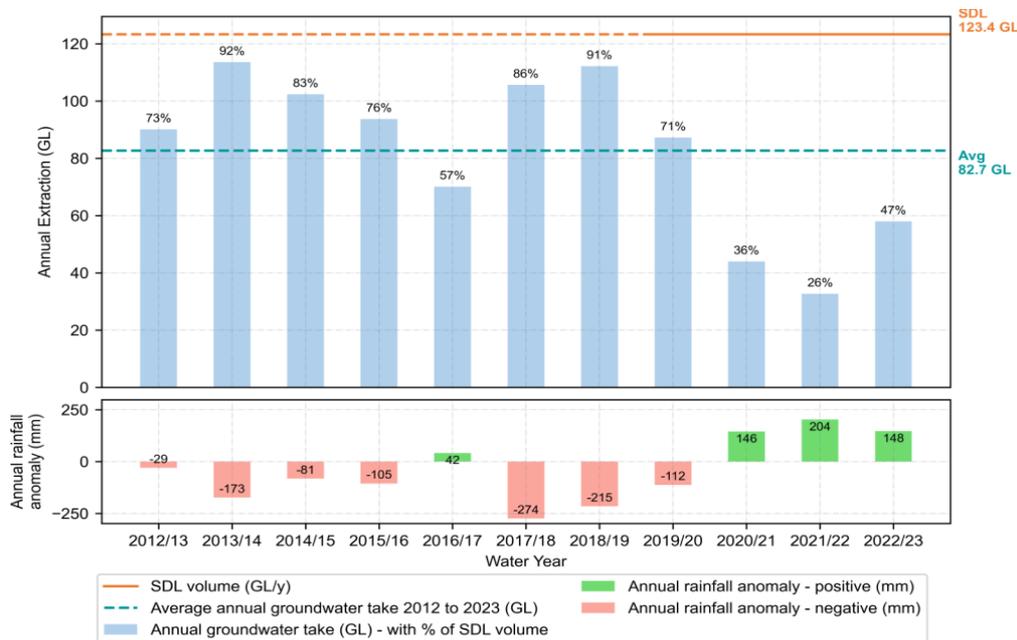


Figure 2: Average annual take (2012/13 – 2022/23)

Environmental outcomes at time of the Review

Likelihood and confidence

Groundwater level and water quality (salinity) trends

Table 1 presents a compilation of the groundwater level and salinity trends for this Unit, and the Authority's *confidence* in that assessment (i.e. low (L), medium (M) or high (H) surety of the finding).

Understanding the groundwater level and salinity trend assessment (Table 1)

For those characteristics informed by groundwater level: The table lists the *percentage of monitoring bores* that are exhibiting either a rising or declining trend in water levels (the remainder refer to bores for which a statistically significant trend could not be detected). A percentage of 30% or greater in the *declining* category indicates a risk to groundwater levels supporting the relevant assessment characteristic.

For those characteristics assessed by reference to water quality: The table lists the *percentage of monitoring bores* that are exhibiting either a rising or declining trend in water quality (the remainder refer to bores for which a statistically significant trend could not be detected). A rising/stable trend means that water quality (salinity) is improving.

Regarding confidence: a single dot indicates low confidence in the trend data, two dots indicate moderate confidence, and three dots indicate high confidence.

The percentages are based on number of monitoring bores providing data over the short and long-term periods. In some Units the number of monitoring bores has decreased over time, and this is accounted for in the percentages. Also, when necessary, a Unit assessment will further explore the detailed data under the assessments to determine if localised declining trends persist.

Productive base is defined as the capacity of an aquifer to provide a sustainable supply of water for environmental and consumptive uses (domestic, agricultural, and industrial) without compromising the long-term health and function of the resource and dependent ecosystems.

Assessment characteristic	Short term trend (last 12 years)			Long term trend (last 40 years)		
	Rising/stable	Declining	Confidence	Rising/stable	Declining	Confidence
Groundwater Dependent Ecosystems (GDEs)	51%	21%	● ● ●	16%	57%	● ● ●
Surface water – groundwater connectivity	58%	19%	● ● ●	15%	63%	● ● ●
Productive base	50%	23%	● ● ●	15%	58%	● ● ●
Water quality	0%	0%	● ○ ○	31%	2%	● ● ○

Table 1: Groundwater level and salinity trend assessment over the past 12 and 40 years.

The long-term monitoring data indicates a potential risk for the following characteristics. This risk is not expressed in the short-term data, which shows fewer bores (less than 30%) with a **declining trend**, however the long-term trend warrants a consequence assessment for these characteristics:

- *The productive base* (high confidence)
- *Surface water-groundwater connectivity* (high confidence)
- *GDEs* (high confidence)

The long-term data shows rates of decline in water levels for many of the monitoring bores are in the range of 0.1 to 0.5 metres per year. The short-term data shows stabilisation in many areas, but declines have persisted in the 0.1 to 0.5 metres per year range in some areas, particularly around Quirindi Creek, the upper Mooki River, upstream of Narrabri and near Box Creek. This decline is despite the ASGE program, the higher rainfall since 2020, and the associated decrease in groundwater take.

Long term trends do not indicate a risk to *water quality* (moderate confidence). In the short-term data, 100% of the Unit area is now classified as having insufficient data to inform trends in water quality.

Recharge and utilisation information

Tables 2 and 3 below provide a summary of recharge information, and an assessment of the likelihood of full utilisation of the SDL. This information is relevant because it informs an assessment of how sensitive the Unit is to changes in recharge and increases in actual take.

Understanding modelled recharge information (Table 2)

The ‘proportions’ presented below can also be interpreted as a percentage. For example, a proportion of 1.29 indicates that the SDL is 129% of (or 29% above) the recharge rate.

If the SDL as a proportion of recharge is 1:1 they are equal, and if it is **more than 0.9**, risk is indicated because take is approaching the level of recharge.

‘Buffering’ relates to how big total aquifer storage is compared to recharge. An aquifer with a very large total storage will offer high buffering because it will take a long time for changes in recharge to affect overall groundwater levels. In that scenario, the aquifer is described as having ‘low’ sensitivity to changes in recharge. The reverse applies where total aquifer storage is relatively small. In that case it would have ‘high’ sensitivity to changes in recharge.

Buffering has been categorised using the *proportion of aquifer storage to recharge estimate* as follows: Low buffering = 29 to 111, moderate buffering = >111 to 333, and high buffering = >333.

Recharge information					
Status of recharge knowledge base (modelled)	Proportion of SDL to recharge (modelled)	Proportion of aquifer storage to recharge estimate (modelled)			Proportion of average annual take to recharge (modelled)
		Modelled	Buffering	Sensitivity	
Best available	1.36 Risk indicated	352	High	Low	0.91

Table 2: Modelled recharge estimates as a proportion of the SDL, total aquifer storage and average annual actual take.

Potential likelihood of full utilisation of the SDL						Current % Average annual take
Very unlikely	Unlikely	About as likely as not	More likely than not	Likely	Very likely	
				●		67

Table 3: Likelihood of take increasing to the SDL

As can be seen in Table 2, **risk is indicated** because annual actual take is a high proportion of the recharge at 0.91 (i.e. annual take is 91% of the recharge rate) and the SDL **exceeds recharge** at a rate of 1.36 (i.e. the SDL is 136% of the recharge rate). While the aquifer storage indicates that there is **high buffering** and that the total resource will have a relatively **low sensitivity** to an increase in use — in this case, there is a declining trend, and monitoring shows that in some areas of the Unit impacts are already being realised as the level of the resource has declined.

Groundwater take is close to SDL, and it is assessed that use of the full SDL is **likely**, with average annual take currently 67% of the SDL.

Consequence assessment

The risk assessment has detected long-term declining trends in water levels at more than 30% of monitoring bores, and that this trend has continued in some parts of the Unit over the short term. Furthermore, the SDL is greater than recharge rates, hence a consequence assessment has been undertaken which describes the nature of potential impact, the likely spatial scale of impact and the potential impact on key values. Table 4 presents the outcome of the consequence assessment.

Long term monitoring data indicates potential risks to the assessment characteristics of *GDEs*, *surface water groundwater connectivity* and the *productive base*.

Understanding the consequence assessment (Table 4)

Potential nature of impact describes the potential impact of groundwater level or water quality decline on connected GDEs (including whether the GDEs support significant sites or communities), connectivity and/ or impacts on the productive base.

Spatial scale is assigned as either: Low, site specific/local; Moderate, sub-unit; or High, SDL unit to Basin scale impacts.

Key values include: impact on connected GDEs and connected surface water, and, if known, the significant sites or communities they support (Ramsar, TLM Icon sites, EPBC-listed values). Impact on the productive base may include impacts to provisioning and other ecological services.

Final rating: a low rating requires no further action. Medium or High ratings will require a response.

Characteristic	Potential nature of impact	Spatial scale of impact	Impact on key values	Final rating
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GDEs	Potential to reduce discharge to surface water systems, which could lead to compromised condition of vegetation.	Low Site specific/local	Low <ul style="list-style-type: none"> There are few GDEs mapped in the areas of concern. 	LOW
Surface water - groundwater connectivity	Potential increase in losing streams (therefore increase in loss of surface water to groundwater). Potential reduction in base flows and low flows in surface water systems, which are important for supporting ecological values such as native fish.	Moderate Sub-unit	Low <ul style="list-style-type: none"> Baseflows in this area support maintenance of refuge habitat and longitudinal connectivity, which are important drivers for environmental outcomes. All reaches with flow data classified as ‘mostly losing’ during 2000-2019. The magnitude of the impact is uncertain. 	MEDIUM
Productive base	Potential impacts on provisioning services. Structural integrity of aquifer potentially compromised.	Med Sub-unit	High <ul style="list-style-type: none"> Current groundwater levels have significantly declined, RCLs for groundwater levels are exceeded over the long term and the ratio of recharge to take indicates significant risk. Insufficient volume to maintain provisioning services. 	HIGH

Table 4: outcome of consequence assessment

Potential GDEs of medium and high ecological value are mapped throughout the region, such as riparian and floodplain vegetation, however there are few GDEs mapped in the areas of concern. Hence the identified risk for *GDEs* in this Unit is assessed as **low consequence**.

Drivers of impact

In this Unit, *groundwater-surface water connectivity* and the *productive base* have been identified to be at risk. The initial assessment has identified declining groundwater levels due to groundwater take as a leading driver, and it appears that rate of recharge (which encapsulates climate change impacts) is an exacerbating factor. The Authority will test this assessment and the relative contribution of different drivers to this result.

Environmental outcomes under a fully utilised SDL and climate impacted future

Full use of the SDL

Many groundwater units across the Basin experience water take which is substantially less than the SDL, but it is important that the work of the Basin Plan Review is conducted with awareness of the effects of a fully utilised SDL — it is the SDL that must reflect an ESLT.

As summarised in Tables 3 and 4, the initial assessment has considered a scenario where take increased and use reached up to the SDL. This analysis considered new information about diffuse

recharge as a proportion of the SDL, our knowledge of total aquifer storage and average annual actual take. The analysis used an SDL to recharge proportion of 0.9 or more as an indicator of potential risk to maintaining groundwater levels within resource condition limits that support groundwater characteristics.

Climate change through to the 2036 Basin Plan Review and 2050

Table 5 presents a summary of the anticipated environmental impacts of climate change for the Unit by reference to the future recharge estimates.

SY2 climate scenario	Trend towards 2036		SY2 climate scenario	Trend towards 2050	
	Recharge greater than SDL	Recharge less than SDL		Recharge greater than SDL	Recharge less than SDL
	Low risk	High risk		Low risk	High risk
Warmer and slightly wetter		●	Hotter and slightly wetter		●
Warmer and drier		●	Hotter and drier		●
Warmer and much drier		●	Hotter and much drier		●

Table 5: Risk to assessment characteristics at full use of SDL using estimates of future recharge under future climate

The comparison of SDL to recharge under a range of plausible climate futures indicates additional risk to assessment characteristics under all scenarios. At the level of the SDL, the potential existing risks to the productive base would further increase.

The aquifer storage indicates that there is high buffering and therefore the resource will have lower sensitivity to an increase in use; but, as explored above, the observed decline in groundwater level is material. The associated impacts are already being realised, specifically for the *groundwater-surface water connectivity* and the *productive base*. Under full utilisation of the SDL or a drier climate (or both), the values listed in Table 2 (average annual water take as a proportion of recharge) would increase, and it is anticipated that the observed impacts on *groundwater-surface water connectivity* and the *productive base* to date would be further exacerbated.

Initial Assessment

On the balance of all 3 Lines of Enquiry, the Authority’s initial SDL assessment has found that SDLs **may not be supporting the Basin Plan’s environmental outcomes** under current conditions with *surface water – groundwater connectivity* and the *productive base* having been identified as at risk.

This risk may further increase under a drier or much drier future climate, or should water take increase towards the SDL. **Hence this initial assessment identifies a risk that environmental outcomes for this Unit are not being met, and further work is needed to consider whether the SDL reflects an environmentally sustainable level of take. The Authority is proposing to work further with the New South Wales government through 2026 and will recommend the most appropriate response to address this risk.**

Other relevant factors include planning by the New South Wales government in developing a groundwater level decline operational protocol that is intended to manage long-term declines like those identified in the Upper Namoi Alluvium. The protocol should provide greater structure and certainty of measures and triggers for restrictions on groundwater take in targeted areas of the SDL resource unit. The Authority will seek further understanding from NSW about the drivers of the risks and the management that may be appropriate to address this.

Consideration of Response

Given this initial assessment identifies that groundwater level decline in the Unit poses a potential risk to *surface water – groundwater connectivity* and the *productive base*, The Authority will continue to consider changes to the SDL, seeking further confidence and confirmation from **New South Wales** that the appropriate rules and management arrangements are in place to manage localised and Unit-scale issues.

High-level response options currently under consideration for this Unit include:

- Improved knowledge and information: more information is needed on the magnitude of impacts of surface water – groundwater connectivity on values in this unit.
- Targeted changes to rules or management settings
- Change the Sustainable Diversion Limit

The Authority intends to work with New South Wales to support initiatives already underway. This includes the development of a groundwater level decline operational protocol that is intended to manage long-term declines like those identified in the Upper Namoi Alluvium. The Authority will seek further understanding from NSW about the drivers of the risks and the management that may be appropriate to address this.

The risk of a changing climate continues to be actively considered in the Basin.

Evidence summary

In addition to the standard evidence sources presented in the *Summary of Assessment Approach* on the MDBA website, the following specific evidence sources were used for this Unit:

- NSW Department of Climate Change, Energy, the Environment and Water (March 2024): [presentation](#) on Upper Namoi zone 8: groundwater status update, model scenarios and management discussion 1 July 2023
- NSW Department of Planning and Environment (2022) Upper and Lower Namoi groundwater sources, [Review of groundwater levels in Upper and Lower Namoi groundwater sources 2021](#) PUB22/18
- NSW Department of Planning and Environment (2021) [2021 review of groundwater levels in alluvial groundwater sources of inland NSW](#). PUB22/15

The Authority utilised the best available evidence. Through the Basin Plan Review 12-week public consultation process, and the subsequent consideration of submissions and engagements over the course of the 2026 Basin Plan Review, the Authority will continue to build on the evidence used through the initial SDL Assessments to address uncertainties and knowledge gaps.