



Donnelly River allocation statement

The Department of Water and Environmental Regulation (department) has assessed water allocation limits for the Donnelly River to determine water availability for an irrigation scheme, while continuing to maintain water for environmental flows and current self-supply water use. The proposed Southern Forest Irrigation Scheme aims to provide additional water in fully allocated areas of the Warren and Donnelly river catchments. The purpose of this allocation statement is to explain this assessment and set new water allocation limits.

Allocation limits includes water that is available for licensing – general (self-supply) and public water supply components – and water that is exempt from licensing (exempt component). Water that is left in the river to support environmental values and to carry water to downstream dams is accounted for before the allocation limits are set.

Most of the water allocation limits remain unchanged from those in the department’s *Warren–Donnelly surface water allocation plan*, set in 2012. Only three subareas upstream of the proposed scheme were adjusted – Middle Donnelly, Upper Donnelly and Record Brook (Table 1). These new water allocation limits will apply from 18 December 2018.

Table 1 Water allocation limits review for the Donnelly River and proposed Southern Forest Irrigation Scheme

| Subarea | 2012 allocation limit ¹ ML/year | New allocation limit ML/year | Change | Water available |
|-------------------------------------|---|---------------------------------|--|---------------------|
| Barlee Brook | 895 | 895 | No change | Yes |
| Beedelup Brook | 3499 | 3499 | No change | Yes |
| Carey Brook | 0 | 0 | No change | No |
| Fly Brook | 3839 | 3839 | No change | Yes |
| Lower Donnelly | 741 | 741 | No change | Yes |
| Manjimup Brook/ Yanmah-Dixvale | 7531 | 7531 | No change | No |
| Upper Donnelly | 4058 | 951 | Additional water available in developed areas only | Yes |
| Middle Donnelly | 2859 | 2104 | Additional water available in developed areas only | Yes |
| Middle Donnelly water reserve (new) | - | 15000 | Created a water reserve for the dam storage volume | Reserved for scheme |
| Record Brook (subarea removed) | 500 | - | Amalgamated into Middle Donnelly subarea | - |

¹ Allocation limits set in the department’s *Warren–Donnelly surface water allocation plan*.

Why have we assessed water allocation limits in the Donnelly River?

In the *Warren–Donnelly surface water allocation plan* the department identified that an irrigation scheme may be an option to supply more water in fully allocated areas and areas where more water isn't available through new or larger dams. With no plans for a scheme at the time, the department made no specific provisions for a scheme in the allocation plan.

Southern Forest Irrigation Scheme

In 2015 the state government contributed \$3.6 million to the first stage of the Water for Food program's Southern Forests Water Futures project, with the aim of supporting sustainable expansion of agriculture by developing a scheme. The department's work to assess whether there is sufficient water available in the Donnelly River to support the scheme was partly funded by this project.

The Southern Forest Irrigation Scheme will pump water from the Donnelly River (directly upstream of where Record Brook enters the Donnelly River), store the water in a 15 000 megalitre capacity dam on Record Brook and pipe it to customers across the Warren and Donnelly river catchments. Scheme infrastructure is designed to capture unallocated water from undeveloped, forested areas upstream and provide a total of 9300 megalitres a year to customers at a high reliability.

The Southern Forest Irrigation Scheme is yet to be referred to the Environmental Protection Authority.

Find more detail about the Southern Forest Irrigation Scheme at the Department of Primary Industries and Regional Development's website under Water for Food:

< www.agric.wa.gov.au/waterforfood/southern-forests-irrigation-scheme >

Temporary cap on water allocation limits

In November 2017, the department announced a temporary cap on water allocation in the Donnelly River to enable a review of water allocation limits by the end of 2018. The temporary cap meant that no additional licences were issued in the Donnelly River catchment and it allowed us to assess limits without ongoing changes to the amount of water allocated. This assessment focussed on the scheme and was not a full review of the water allocation plan and management arrangements in it.

Was new information used to assess the allocation limits?

The department did use new information to assess water allocation limits, including modelling for the Donnelly River which is outlined below.

Monitoring

The department installed new monitoring infrastructure (streamflow loggers) at several locations on the Donnelly River, including Chappels Bridge and Storry Road. These sites were important for calibrating the hydrological model built for this assessment and for considering potential environmental impacts downstream of the scheme.

Hydrological modelling

A new hydrological model of the Donnelly River and its tributaries was developed, including all existing farm dams. The model was used to estimate daily and annual river flows under different water access scenarios (self-supply and scheme) and to consider climate change. The model was built by Hydrology and Risk Consulting and was independently peer reviewed by EcoLogical Australia using best practice guidelines produced by the eWater Cooperative Research Centre. The peer review found the model suitable for use in our assessment of water allocation limits.

Calibration was a critical step in building and using the hydrological model. The calibration process makes sure modelled flows match observed (real) flows at monitoring locations across the catchment. The Donnelly River model can closely replicate both observed daily and annual variations in flow (Figure 1). This provides strong evidence that the model is suitable for the allocation limits assessment.

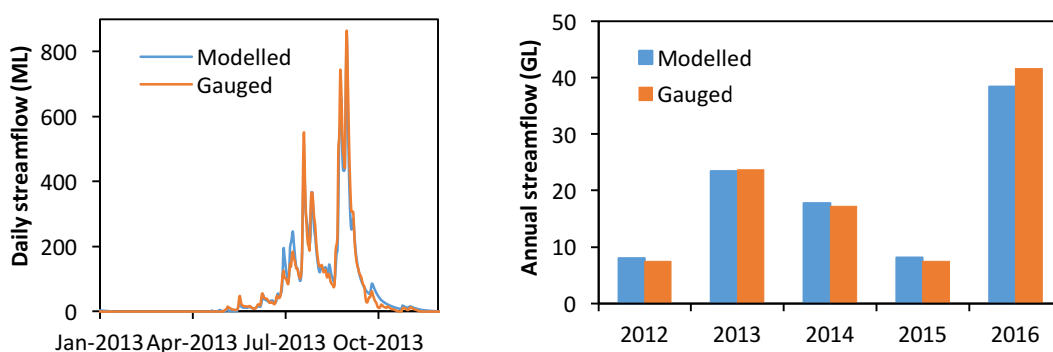


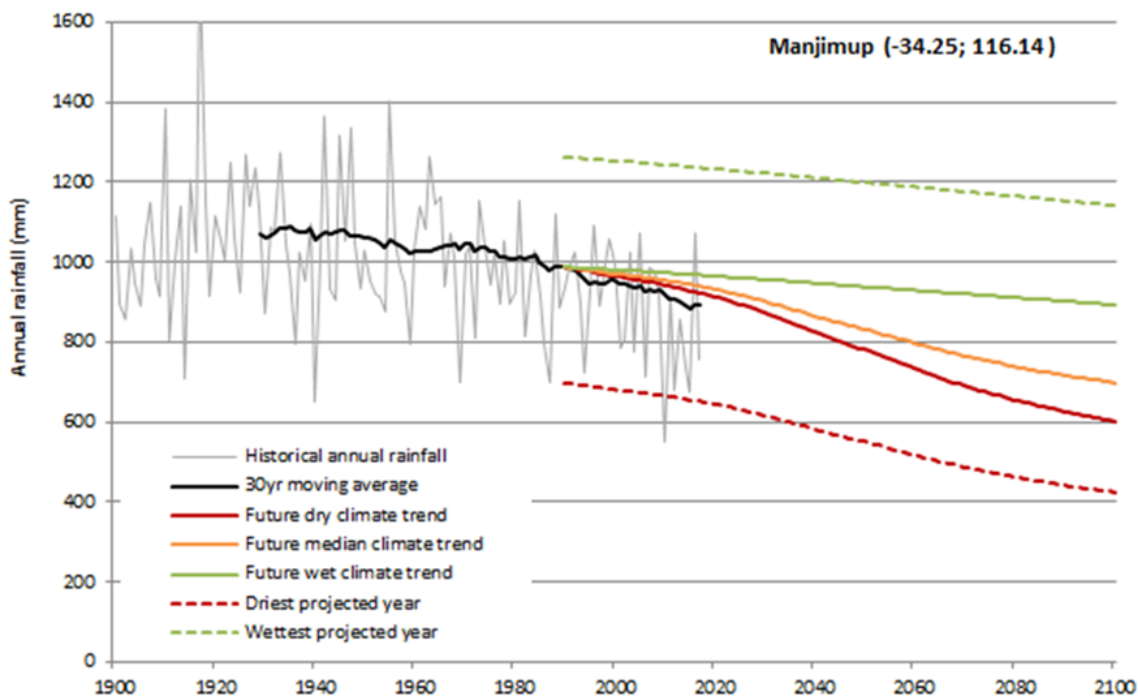
Figure 1 Modelled and observed daily flows (left) and annual flows (right) for the Donnelly River closely match

Climate

Similar to other catchments in south-west Western Australia, the Donnelly River has been affected by climate change. Both rainfall and river flows have declined over time (Figure 2). Long-term projections suggest the drying trend will continue (Figure 2a). Other factors also affect how water users and the proposed scheme may be impacted by climate change. For example, the sequence and magnitude of dry years strongly influences the scheme's design. Ways water users can mitigate the risk presented by climate change include water trading, improved efficiency and changes to crop types. Government is helping to mitigate the climate risk by providing allocation limits, variable take in wetter years and new infrastructure through the scheme.

Water allocation limits set in the 2012 plan were based on the driest year in the 1975–2007 period (1987). This ensured that self-supply licence entitlements could be taken at a high reliably (in all years wetter than 1987). To assess for the scheme, the department used projected rainfall instead of past rainfall records. Assuming a dry future climate scenario helps to make sure water needs can be met in most years. We used a 30-year future sequence to show the long-term climate risks to 2050, noting that in this timeframe the level of uncertainty grows considerably.

a) Historic rainfall and future rainfall projections at Manjimup



b) Annual flow volumes (megalitres) measured at Stricklands gauging station (upstream of the confluence of Barlee Brook and Donnelly River)

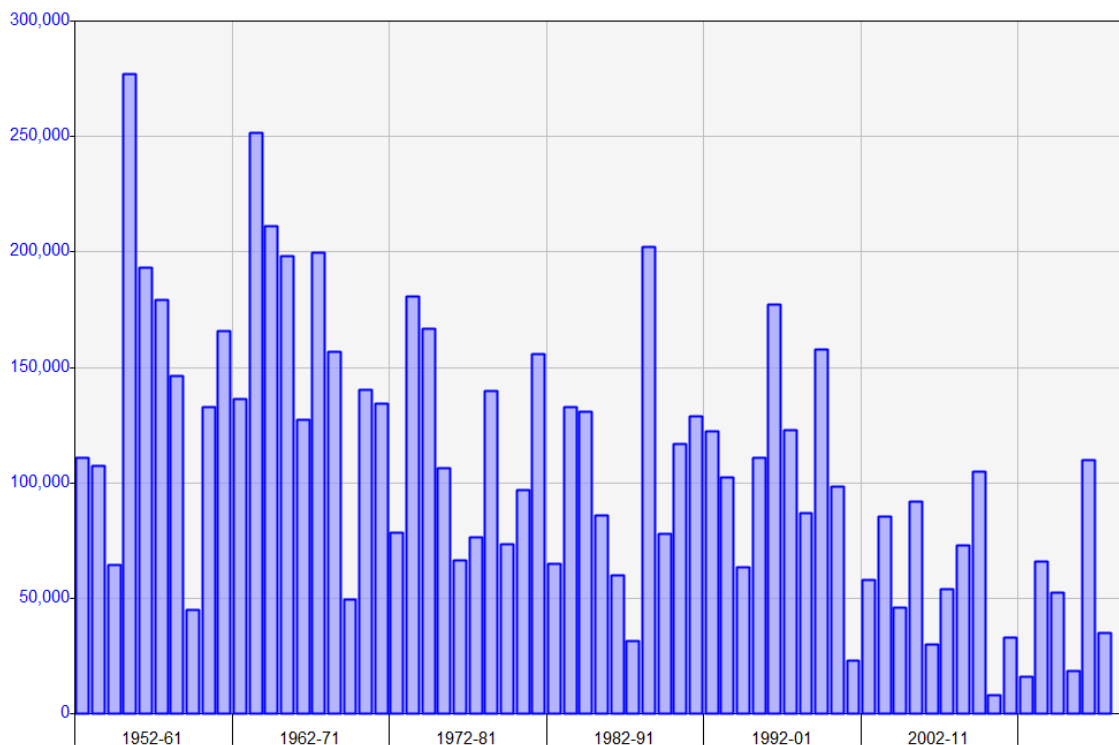


Figure 2 Climate change is causing declining rainfall and streamflow trends for the Donnelly River, so a future dry climate scenario was used (a) to provide a high reliability for scheme customers

Self-supply water use

The department used up-to-date information on self-supply water use at the time of the temporary cap in November 2017 (Figure 3). More water can be taken under the allocation limits in the allocation plan in some subareas (Figure 3). This data is the main variable we consider in modelling scenarios.

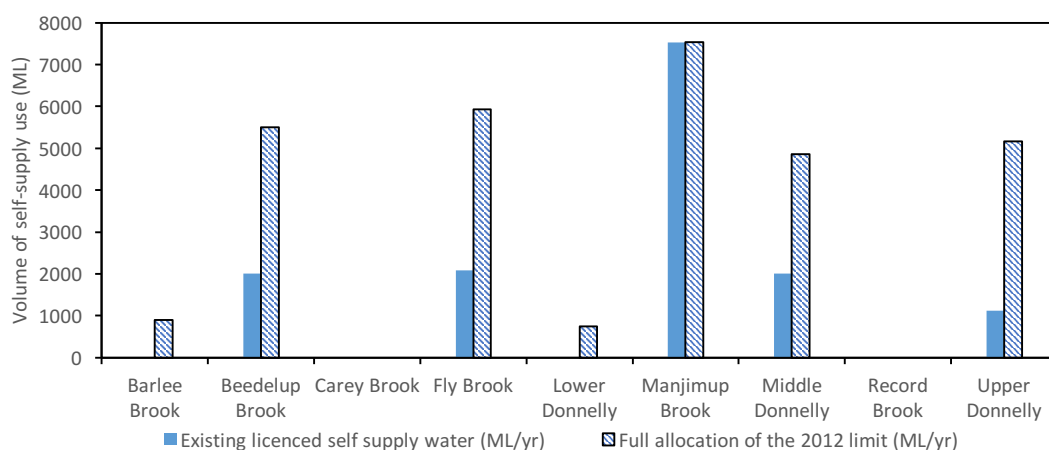


Figure 3 Water use versus full allocation in Donnelly River subareas (November 2017)

How did we assess allocation limits in the Donnelly River?

To assess water allocation limits, the department used the new hydrological model to evaluate subareas upstream and downstream of the proposed scheme dam, under different water use scenarios:

- Scenario 1 – Current self-supply use without the scheme.
- Scenario 2 – Current self-supply use with the scheme.
- Scenario 3 – Self-supply use increased to existing allocation limits with the scheme.

We then assessed these against three key objectives:

1. Sufficient water to support the scheme.
2. No impact on current licensees and their existing entitlements.
3. Protect the Donnelly River's natural flow regime from significant impacts.

Subareas upstream of the scheme

Question posed: Is there enough unallocated water for the scheme from the forested Middle Donnelly and Upper Donnelly subareas (upstream of the proposed dam) and not impact on existing water licence entitlements?

To assess subareas upstream of the scheme – Middle Donnelly and Upper Donnelly – the department ran scenarios using a 30-year future dry climate projection and compared this against the objectives. The Manjimup Brook/Yanmah-Dixvale subarea is also upstream of the scheme but has been fully allocated since 2010 and will not supply or be affected by the scheme.

All three objectives were met under scenario 2 (Current self-supply use with the scheme). This shows that the scheme could be supported as proposed using the volumes of unallocated water in the Middle and Upper Donnelly subareas and current levels of self-supply use. Under scenario 3 (full allocation and the scheme), the scheme is not able to supply the proposed 9300 megalitres per year at high reliability unless large portions of State Forest is cleared in the Middle and Upper Donnelly subareas, which contains threatened flora and fauna (Figure 6).

To find the optimum scenario, the department tested options between scenarios 2 and 3. The optimum scenario we developed means the scheme can supply 9300 megalitres a year and some additional water for future self-supply use is available (Figure 4). The additional 1050 megalitres of water for self-supply use is based on the driest year projected for the next 30 years (labelled in Figure 4). This means that reliability for both self-supply water users and scheme customers can remain high. A natural flow regime of varying high and low flow events will not be significantly affected because the scheme and self-supply use will only access a portion of annual flows (see how Environmental water varies in Figure 4).

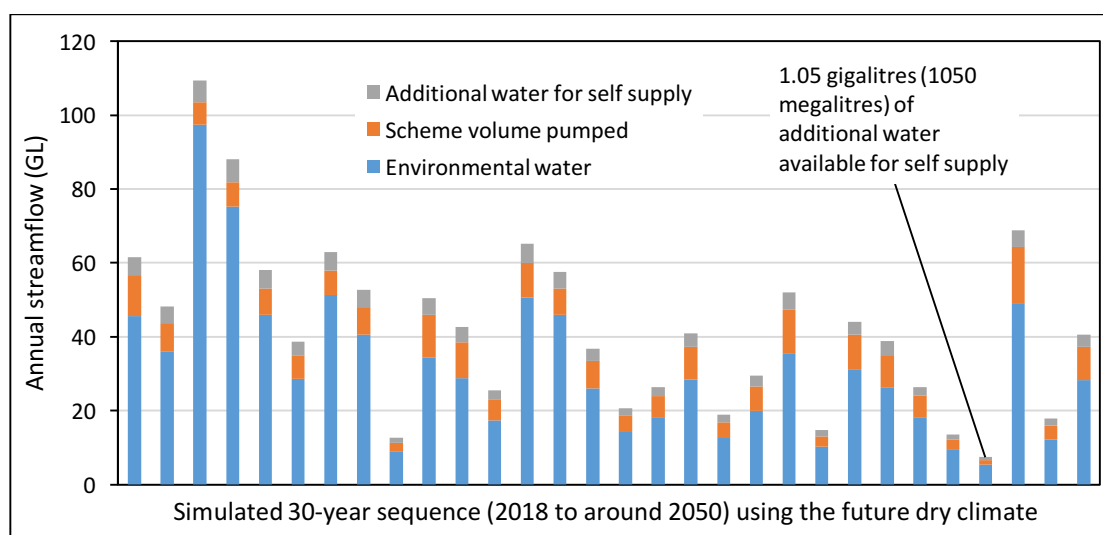


Figure 4 Modelled future water account for the Donnelly River downstream of the scheme, showing an optimal outcome. Environmental water represents the modelled annual flow in the river after volumes are taken to supply the scheme and additional water (above current use) in the Middle Donnelly and Upper Donnelly subareas.

In the Record Brook subarea, where the scheme’s storage dam will be built, the department re-allocated the public water supply reserve and some additional volumes to the scheme. In consulting with the Water Corporation we identified that the reserve was no longer needed because the Water Corporation intends to pursue groundwater or other climate-independent options in the future.

Subareas downstream of the scheme

Question posed: Does the proposed scheme have a significant impact on flows and environmental values downstream and does this mean we need to adjust allocation limits for the Lower Donnelly, Fly Brook, Beedelup Brook, Carey Brook and Barlee Brook subareas?

To assess subareas downstream of the scheme the department modelled daily flows at three important locations on the Donnelly River (Figure 5). Modelled daily flow plots at the three locations for scenarios 1 and 3 (current use versus full allocation and scheme use) show the full range of potential impacts to flow (Figure 5):

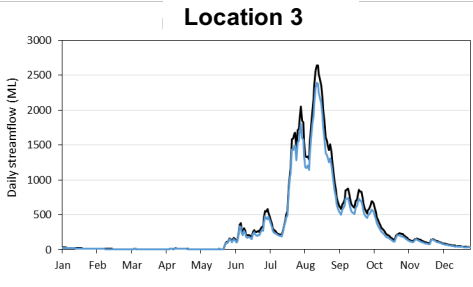
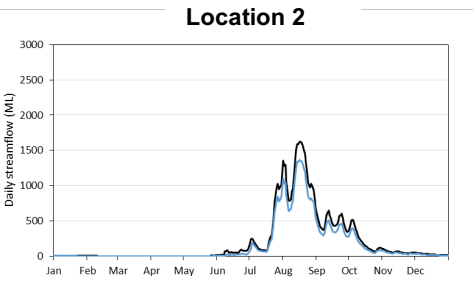
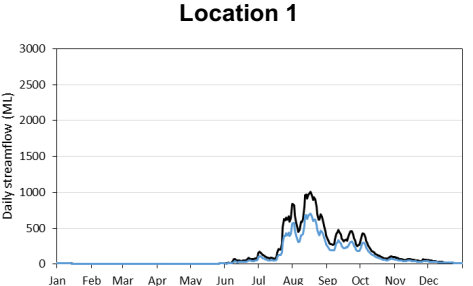
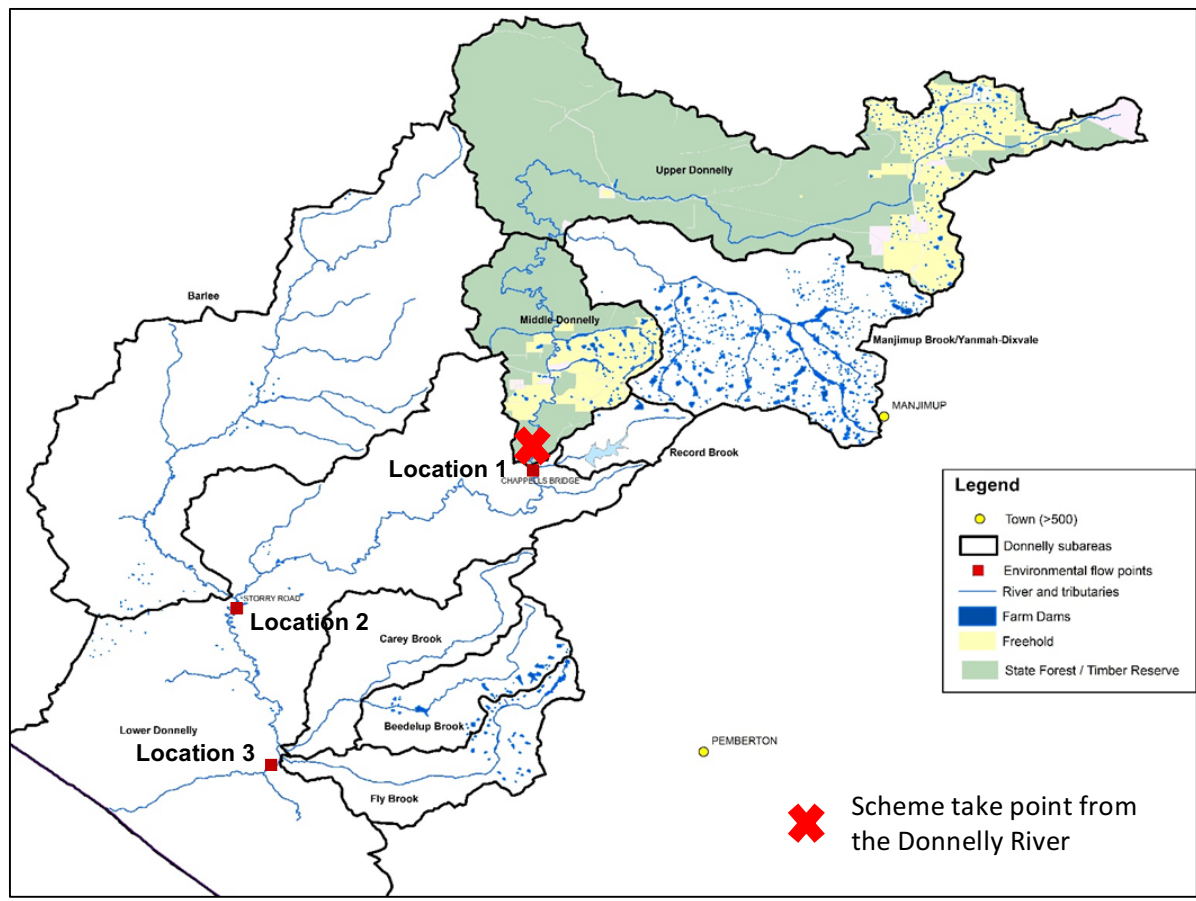
- Location 1 – Impacts will be highest immediately downstream of the scheme’s take point on the Donnelly River but the river will maintain a natural flow regime.
- Location 2 – Flows are less impacted downstream of the confluence of Barlee Brook and the Donnelly River because of the significant flows provided by Barlee Brook. Barlee Brook is a mostly undeveloped catchment and maintaining its flow contribution to the Donnelly River is a key strategy in the allocation plan for protecting important environments in the Lower Donnelly subarea. Model outputs show that increases in water use in the Barlee Brook subarea would not significantly impact on downstream flows.
- Location 3 – Modelled flows downstream of the Carey Brook, Fly Brook and Beedelup Brook subareas and outflow to the estuary are not significantly affected, even with full use of 2012 allocation limits and full scheme use.

The way that the scheme will access water from the Donnelly River has a large influence on the modelled outcomes and protection of natural flow regimes downstream of the scheme. In dry years the scheme will only be allowed to pump water if flow in the river is above a minimum threshold. This makes sure there are no changes to the critical low flows that maintain pools and refuge habitats. The scheme will also vary the proportion of flow taken in some years to maintain natural annual variability in flow.

How was the community consulted?

The department ran workshops between 23–25 October 2018 to provide information to stakeholders about this assessment and seek feedback about the adjusted allocation limits in the Donnelly River. Over this period, the department engaged 115 stakeholders, including individual growers, community members, the Warren Donnelly Water Advisory Committee, Shire of Manjimup Councillors, the Southern Forest Food Council and the Southern Forest Irrigation Cooperative Board.

Stakeholders had little objection to the specific changes proposed; however, they raised several other issues. These included concerns that the scheme would impact on existing licensed water entitlements and water users’ ability to expand operations in the future.



— Current level of entitlements (no scheme)
 — Flow with scheme and additional self-supply allocations

Figure 5 Locations of flow assessments downstream of the scheme, with the scheme take point immediately upstream of Location 1 and water to be stored in the dam shown on Record Brook

Adjustments to allocation limits

The department's modelling and assessment confirms that the Southern Forest Irrigation Scheme can be accommodated with minor adjustments to subareas and allocation limits in the Donnelly River catchment, as summarised below (see also Table 1 and Figure 6).

1) Allocations limits remain the same in the Lower Donnelly, Fly Brook, Beedelup Brook, Carey Brook and Barlee Brook subareas

The assessment concluded that the 2012 allocation limits for these subareas can remain because the natural flow regime of the Donnelly River can be maintained with full allocation and the scheme in place.

2) No change to water availability in the Manjimup Brook/Yanmah-Dixvale subarea

Self-supply use in this subarea has been fully allocated since 2010 and will remain unchanged as a result of this assessment.

3) Adjusted allocation limits for the Middle and Upper Donnelly subareas

Most of the unallocated water from the undeveloped and forested areas of the Middle and Upper Donnelly subareas is needed to supply the scheme. The assessment identified that an additional volume of water (1050 megalitres a year above current allocations) can be made available for self-supply use in existing developed areas. This volume has been distributed proportional to the area of freehold land in each subarea. This results in reinstating 350 megalitres a year in the Middle Donnelly subarea and 700 megalitres a year in the Upper Donnelly subarea.

4) Record Brook subarea amalgamated with the Middle Donnelly subarea

Record Brook subarea has been amalgamated with the Middle Donnelly subarea to support future licensing of the scheme. Water allocations have been repurposed from future public water supply to supply the future scheme.

5) A water reserve for the scheme has been created in the Middle Donnelly subarea

A new 15 000 megalitre water reserve has been created to facilitate future licensing of the Southern Forest Irrigation Scheme. This volume represents the capacity of the storage dam only, not annual take. Annual take will vary as a proportion of river flow.

Future work and water planning

Based on feedback from community consultation workshops, the department is committed to further work in the Donnelly River catchment as outlined below.

Variable take

Variable take licensing was introduced to allow water users to access additional volumes of water at lower reliability in fully allocated subareas. 'Variable' means the additional take only applies in wetter years when there is sufficient flow to meet existing licences,

environmental flows and variable take licences. The Manjimup Brook/Yanmah-Dixvale subarea is the only subarea in the Donnelly River catchment where variable take has been implemented.

In late 2017 further variable take licensing was put on hold to allow new, approved infrastructure to be constructed. This will allow the department, through its monitoring program, to identify if variable take licences issued to date are sustainable and not impacting on downstream users. Current modelling indicates there may be some risks and that the triggers for variable take need to be reassessed. Further variable take licensing will be subject to review of this information.

Encouraging water transfers and trading

In consulting with stakeholders we identified the need to facilitate and encourage water trading to maximise the use of water in fully allocated areas, like the Manjimup Brook/Yanmah-Dixvale subarea. Recent surveys of water use show that some water is underutilised, and this creates the impression that more water could be allocated. The department is working with the Warren Donnelly Water Advisory Committee to address the issues.

Donnelly River estuary

Although this assessment found that the scheme and growth in self-supply use will not significantly impact on natural flow regimes and downstream environments of the Donnelly River, further work is likely needed to meet the detailed assessment requirements of the Environmental Protection Authority, particularly in relation to the Donnelly River estuary.

Further information needed includes:

- groundwater contributions and its influence on the estuary – the department is currently working with the University of Western Australia on related research
- water requirements of the Donnelly River estuary – the department is working with the Southern Forest Irrigation Cooperative to investigate what information will be needed to inform the Environmental Protection Authority assessment of the scheme and possible impacts on the estuary – which will likely involve additional monitoring and estuary modelling.

Review of the *Warren-Donnelly surface water allocation plan*

By 2020 the department will consider whether there is a need to review and replace the 2012 water allocation plan. A new plan may be required given increasing levels of water allocation in both the Warren and Donnelly river catchments, implementation of the scheme, further variable take licensing and the ongoing challenges posed by climate change.

The current allocation plan and plan evaluation for 2012–2016 can be found on the department's website. For further information regarding water allocation and licensing, please contact our South West Region on 08 9726 4111.

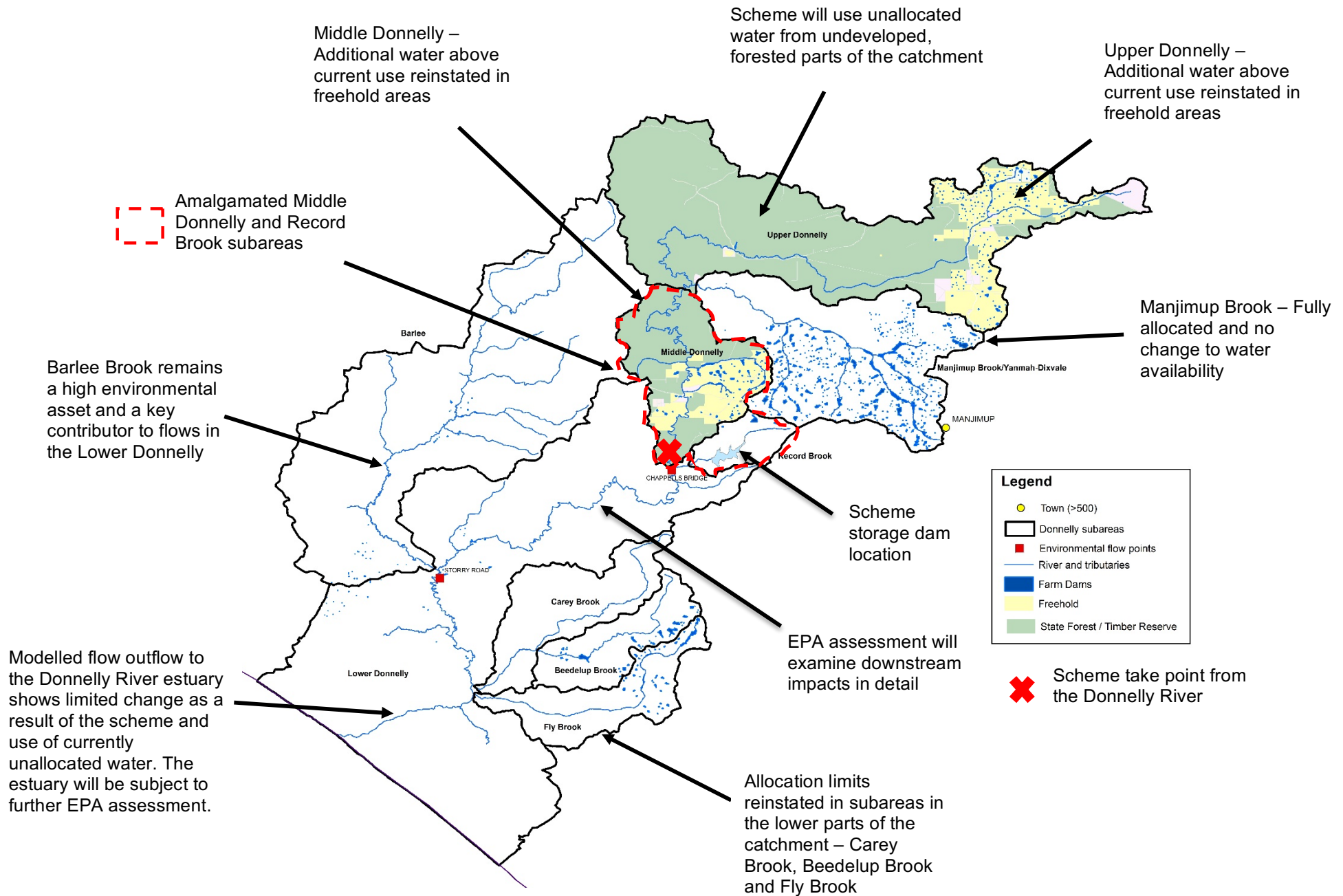


Figure 6 Summary diagram of assessment outcomes and allocation limits in the Donnelly River