Government of **Western Australia**
Department of **Water and Environmental Regulation**

West Canning Basin

Allocation statement

The West Canning Basin in the Pilbara region of Western Australia is an important water resource for regional development and supports both irrigated agriculture and mining. Located around 100 kilometres east of Port Hedland, the West Canning Basin covers approximately 3500 square kilometres and includes the Broome and Wallal aquifers in the Canning-Kimberley groundwater area, and the Wallal aquifer in the Pilbara groundwater area.

To manage water use the Department of Water and Environmental Regulation set allocation limits and licensing rules for the West Canning Basin in the Pilbara groundwater allocation plan (DoW, 2013) and then revised the limits in 2014 based on new hydrogeology and monitoring information. This allocation statement replaces section 5.3 of this plan and includes a change to the Wallal unconfined and confined aquifers.

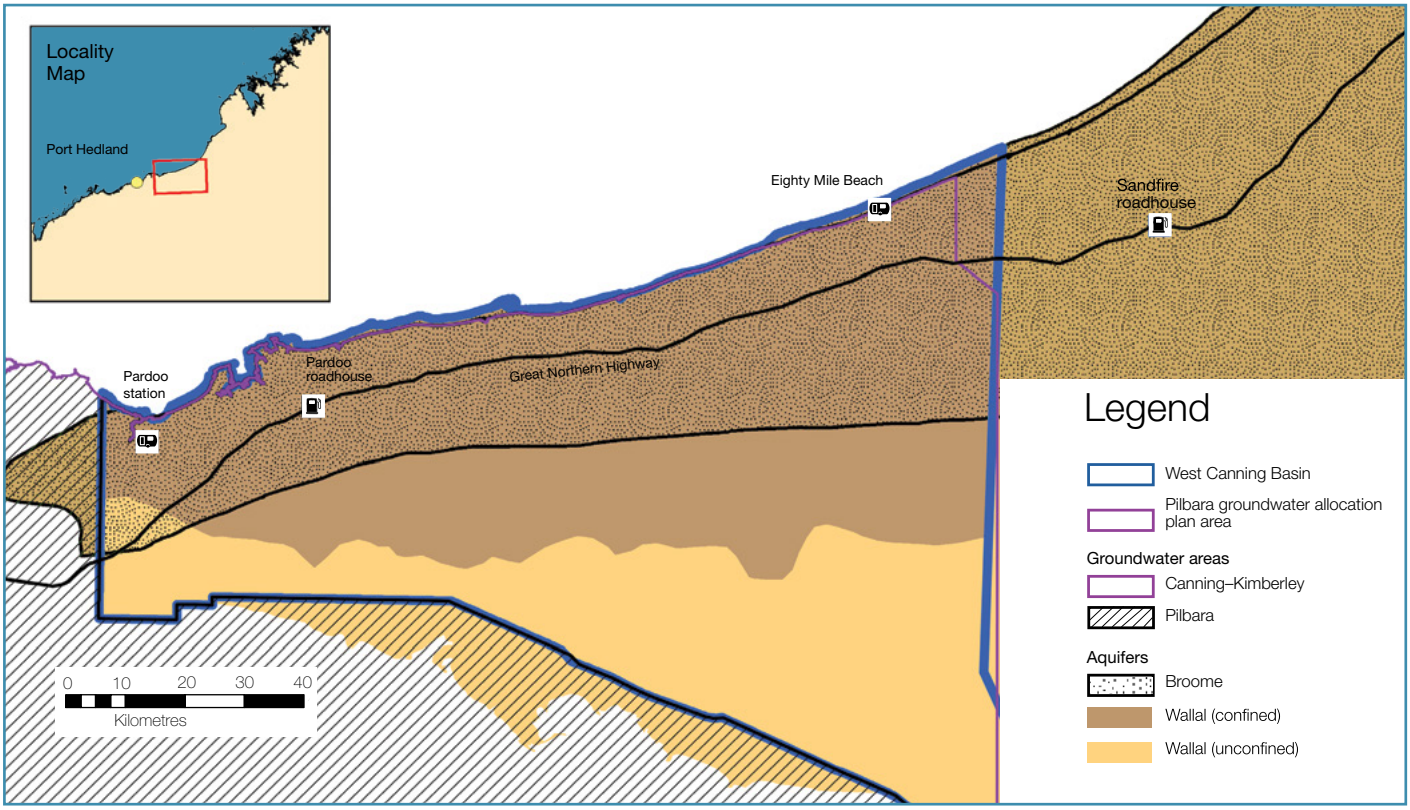

Figure 1: Location and aquifers of the West Canning Basin

Current water availability

Water demand for irrigated agriculture and mining has increased significantly in the West Canning Basin. Over the last two years, DWER has assessed and licensed water entitlements from the Wallal aquifer that now total almost 51 GL/year.

While there is currently no more water available for licensing from the Wallal aquifer, water is available from the 10 GL/year allocation for the Broome aquifer in the West Canning–Pardoo subarea, though quality and yield may vary from site to site (Table 1).

Table 1: Allocation limits and water availability for the Broome and Wallal aquifers in the West Canning Basin

Groundwater resource	Total allocation limit (kL/year)	At June 30 2018 (kL/year)	
		Water licensed and committed	Additional requested volumes
Canning – Broome	10 000 000	126 000	9 200 000
Canning – Wallal	50 000 000*	50 727 520**	10 000 000***

** The allocation limit will be reviewed by 2021 or as the use of allocated volumes increases*

***The department assessed and approved licences above the allocation limit using the detailed local information presented in support of licence applications.*

**** This is a request for temporary access to the (currently unused) public water supply reserve, and is in addition to the Water licensed and committed volume*

Pivot irrigated agriculture

The department is collaborating with licensees to focus on collecting and analysing data from groundwater monitoring bores. We will measure how the Wallal aquifer responds to use above the current abstraction rate of 7 GL/year up to the current licensed volume of 50.7 GL/year.

We will also be working with licensees to collect data at wetlands thought to be dependent on groundwater. We will use this information to assess how groundwater level, pressure, quality and groundwater-dependent vegetation are responding to groundwater abstraction, and ensure licence conditions are set to manage these responses.

New groundwater monitoring data will be used to update both regional and local scale numerical models. This will improve our ability to predict changes to aquifers in response to rainfall and abstraction and inform decisions about water availability and licence conditions into the future.

This approach will help ensure:

- the benefits of maintaining artesian pressure in the West Canning Basin are realised
- seawater remains offshore of the Wallal aquifer
- Ramsar listed Eighty Mile Beach and Mandora Marsh mound springs are protected into the future.

West Canning Basin: new information

Mandora Marsh

We are working with the Department of Biodiversity, Conservation and Attractions (DBCA) to better understand the water sources that support the Mandora Marsh mound springs. Environmental tracers, along with local chemistry and geophysics, suggest the springs are supported by both the Wallal and Broome aquifers and not just the Broome aquifer as previously thought.

Proponents will need to use this new understanding to support their licence applications and operating strategies. We are currently working with licensees to set monitoring and management conditions to minimise impacts to the Mandora Marsh mound springs as use increases. We will continue to work with DBCA as we expand our understanding of how this system works.

Saunders Springs

Groundwater investigation

The department's numerical groundwater model for the West Canning Basin was developed using results from:

- new hydrogeological drilling
- aquifer testing
- airborne electromagnetic surveys
- water quality analysis
- water level monitoring.

This work was funded through the $11 million West Canning Basin-Sandfire Royalties for Regions project

The drilling and testing component of the project focused on the eastern 'Sandfire' part of the West Canning Basin as the department and several mining companies had previously focused investigations on the western 'Pardoo' area.

From the aquifer testing we know the Wallal aquifer is a mostly homogenous and highly transmissive aquifer. Large volumes can be discharged quickly from the aquifer over an extended period and the water is generally fresh (typically between 250 and 600 mg/L total dissolved solids).

While the volume of water stored in the Wallal aquifer is very large, taking water from it will reduce the artesian pressure which supports groundwater-dependent ecosystems, maintains the seawater interface offshore, and drives centre pivot irrigation in the area.

Drilling work to support groundwater investigation

Managing water use

To guide licensing prior to a review of allocation limits, we have updated the resource objectives, management zones and local licensing policies in the *Pilbara groundwater allocation plan 2013* for the West Canning Basin.

These changes are in line with the findings of the groundwater investigation and our new hydrogeological understanding of the Wallal and Broome aquifers and their relationship with the Mandora Marsh mound springs and Eighty Mile Beach Ramsar site.

Resource objectives

The resource objectives (see box on right) replace those for the West Canning Basin (Broome and Wallal aquifers) outlined in Table 1 of the *Pilbara groundwater allocation plan 2013.*

DWER will use department and proponent monitoring data to assess if the resource objectives are being met.

Our water resource objectives are to:

- Maintain pressure heads in the Wallal aquifer so that the aquitard remains saturated.
- Prevent seawater intrusion into the onshore areas of the Wallal aquifer caused by abstraction.
- Maintain pressure heads in the Wallal aquifer so that the Mandora Marsh mound springs continue to be supported.
- Prevent seawater intrusion into the Broome aquifer caused by abstraction.
- Maintain groundwater levels in the Broome aquifer to avoid impacts to Eighty Mile Beach.

Management zones and local licensing policies

The licensing policies (Table 2) and management zones (Figure 2) were updated to reflect our new understanding of the Broome and Wallal aquifers, and how they interact with each other and the Mandora Marsh and Eighty Mile Beach wetlands.

These local licensing policies for managing water allocation and licensing in the West Canning Basin are applied together with the department's state-wide policies and guidelines.

Wallal aquifer groundwater flowing under artesian pressure

Table 2 - Local licensing policies for the West Canning Basin management zones

Zone	Policy details
A. All management zones	A1. A groundwater license to construct (26D) or take water (5C) is required under the *Rights in Water and Irrigation Act 1914* for all uses from an artesian aquifer.
	A2. Proponents may be required to demonstrate how they will manage groundwater drawdown from their abstraction to ensure there are no impacts to the Threatened Ecological Community listed Mandora Marsh mound springs.
	Bore construction
	A3. Licensees are required to submit bore log information to the department on the prescribed form within 30 days of constructing or decommissioning a bore (s.26E, *Rights in Water and Irrigation Act 1914*). Note: *National guidelines on minimum construction requirements for water bores in Australia edition 3* (National Uniform Drillers Licensing Committee 2012) provides guidance regarding the construction and decommissioning of bores.
	A4. A4. Bores must be surveyed by a licensed surveyor and submitted to the department. The report should include the survey to mAHD of all measured points on the bore, plus the local ground level.
	A5. The headworks to any bore where groundwater flows to the surface shall be constructed with a fitting to enable the measurement of the aquifer's hydraulic pressure (potentiometric head pressure). A valve and bayonet style fitting is recommended.
	A6. The clearance (annulus) between the casing and the side of the borehole shall be cement grouted from the top of the sand/gravel pack adjacent to the screen, or a point above the screen, to a point below ground level (BGL) or below top of casing (bTOC), as specified in the licence conditions of the 26D licence to construct, If targeting the artesian aquifer, then pressure-grouting to ground surface is required.
	A7. The bore shall be constructed with a clearance (annulus) of at least 30 mm between the casing and the sides of the borehole.
	A8. The casing(s) shall be equipped with centralisers not less than one per six meters of casing length to ensure that the casing remains central to the borehole.
	A9. The bore must be adequately capped to prevent surface entry of contaminants. Flowing bores must be equipped with a valve(s) to control the flow.
	A10.The licensee is to comply with the bore design submitted with the application and any amendments made by, or with, the approval of the department.

Zone	Policy details
A. All management zones	**Monitoring and management**
	A11. Department approved flow meters must be installed as close as is practicable to the bore or pump outlet and evidence of installation submitted.
	A12. Where the Wallal aquifer is artesian, licensees will be required to have department approved flow meters attached to all used outlets and one dedicated outlet for observing pressure on each bore. Potentiometric levels should be recorded every three-month period at a minimum and reported on annually.
	A13. If the monitoring of departmental bores is part of a licensing condition, then conditional access is granted. However, all information must comply with departmental standards and this information will be added to the public domain.
	A14. Drawdown limits may be included in proponents operating strategies for artesian bore: KP4, WCS06A and WCS08A to ensure their drawdown will not impact on the Mandora Marsh mound springs. If significant drawdowns are predicted, then proponents are likely to be asked to monitor and manage the impacts of their groundwater abstraction on the Wallal aquifer, the discharge rates of the Mandora Marsh mound springs, and the condition of the associated ecosystems. The Department of Water and Environmental Regulation and the Department of Biodiversity, Conservation and Attractions will work with proponents to develop the ecological monitoring program.
	A15. Licensees taking water may be required to record groundwater levels every three-month period (at a minimum) and report this information to the department annually. Licensees should submit data in excel format with the report.
B. Confined management zone	**Licence applications**
	B1. Proponents may be asked to provide hydrogeological assessments for the Broome aquifer to demonstrate that their proposal will not impact discharge to the coastal Ramsar wetlands and assess the risk of saline up-coning, seawater intrusion and nutrient export into the aquifer.
	B2. Proponent monitoring bores may be required in the Broome aquifer to monitor impacts from abstraction in the Wallal aquifer, or impacts as a result of irrigation.
	Monitoring Management
	B3. Licence conditions (including those in an operating strategy) may include a potentiometric head level that must be maintained in the Wallal aquifer above levels designated for specific bores in their operating strategies.
	B4. Proponents may be required to monitor water quality if hydrogeological assessments indicate that abstraction may reduce pressure heads below ground level in the Wallal aquifer.
	B5. Artesian pressure monitoring should be observed at a known, surveyed, measurement point and be monitored using a department approved digital (not analogue) pressure gauge.
	B6. Proponents may be required to monitor Broome aquifer groundwater levels and groundwater quality.

Management zones and local licensing policies continued

The new confined and unconfined management zones, (see Figure 2) were developed to reflect our findings from the groundwater investigation which redefined the extent of the Wallal aquifer (Figure 3). These new management zones replace those shown in Figure 4 in the *Pilbara groundwater allocation plan 2013*.

For licensing policies specific to the Mandora management zone refer to the *La Grange groundwater allocation plan, 2010.*

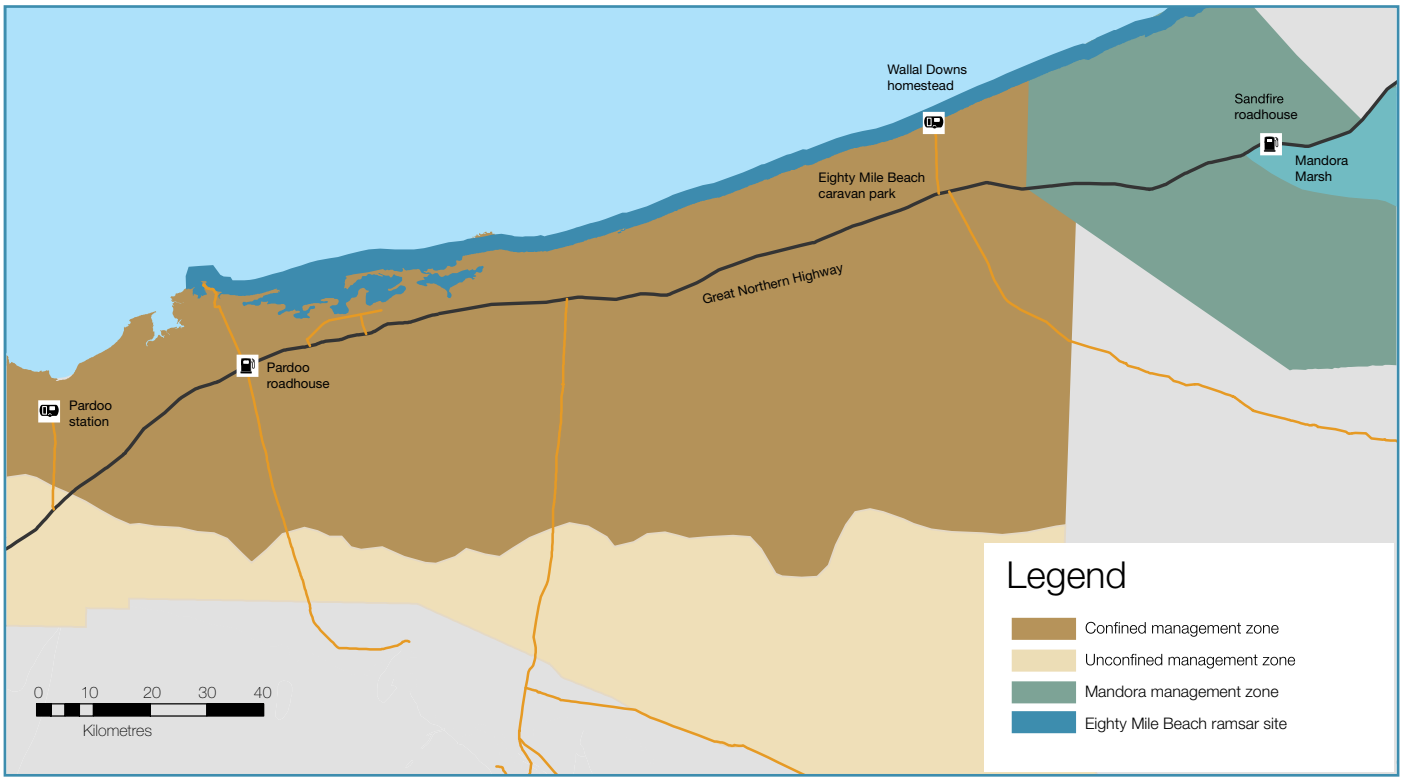

Figure 2: Groundwater management zones in the West Canning Basin

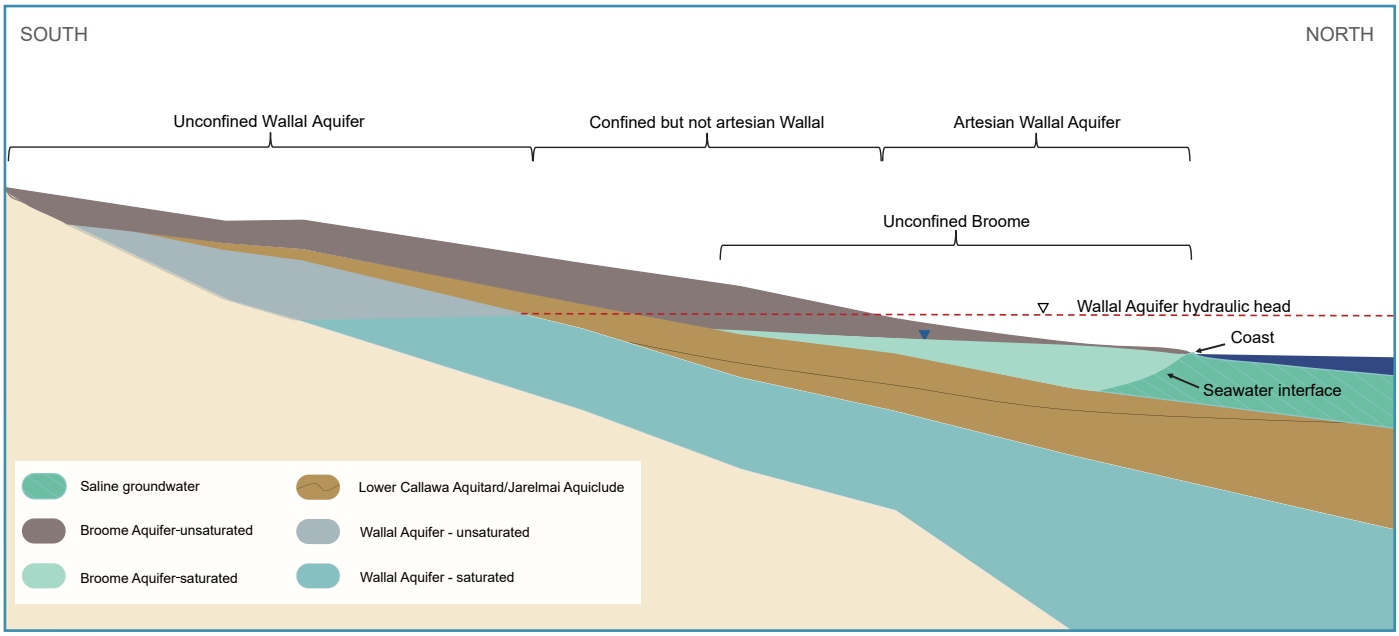

Figure 3: Cross-section and location of management zones of the West Canning Basin

Interference between water users

Licensees abstracting water in proximity to one another may impact on each other's artesian pressure. To enable the department to assess the risk of interference between users (see Pilbara groundwater allocation plan 2013), proponents are required to demonstrate that they have:

- estimated (by modeling for large proposals) the potential impacts of the proposed abstraction on the potentiometric pressure of existing/operating bores.
- designed their infrastructure to minimise the potential impacts (e.g. maximise the spatial spread of abstraction and design an effective monitoring network)
- developed an adaptive management approach for responding to monitoring and managing impacts.

If impacts are predicted, then licensees are required to consult and negotiate with existing water users to address any detrimental impacts, within reasonable timeframes, consistent with DWER's state-wide policy and guidelines.

We advise proponents to resolve issues around the risk of interference because they are best placed to identify impacts and how to manage them. However, if they cannot agree within reasonable time frames, then the department may define an approach to manage the potential impacts for them (consistent with section 7(2) of the *Rights in Water and Irrigation Act 1914*). If detrimental effects become evident from using a licence we may amend licences as per clause 24 of Schedule 1, Division 6 of the *Rights in Water and Irrigation Act 1914*. This includes the volume that can be taken on the groundwater licence.

We may request proponents use the department's regional groundwater model (Pells Sullivan Meynink, 2017) to ensure consistency in the modelling of cumulative impacts of groundwater abstraction.

Trading and transferring water

Proponents who wish to access additional water are reminded they can seek opportunities to trade water. Trading information is available on our website at www.dwer.wa.gov.au.

Looking across the West Canning Basin

Monitoring and evaluating the resource

Proponents are responsible for monitoring the local impacts of their abstraction on artesian pressure and seawater intrusion. Proponents and the department will work together to monitor and assess the regional impacts of abstraction to understand cumulative impacts on groundwater-dependent wetlands.

The department is currently undertaking a review of the regional monitoring program. The proposed monitoring program, designed to collect data to assess against the resource objectives, is detailed in Table 3 and shown in Figure 4.

Table 3 Monitoring to evaluate against resource objectives

Resource objectives	Non-proponent bore	Proponent bores
1. Maintain pressure heads in the Wallal aquifer so that the aquitard remains saturated	WCS06A* WCB15Y* WCB19Y* WCB23Y* WCS10A# NSO Kidson Bore 2#	As detailed in individual operating strategies
2. Prevent seawater intrusion into the onshore areas of the Wallal aquifer cause by abstraction	WCB04B* WCB11Y* De Grey No 8 (Blackheart)# De Grey No 2 (Brolga)#	As detailed in individual operating strategies
3. Maintain pressure heads in the Wallal aquifer so that the Mandora Marsh mound springs continue to be supported	Artesian Bore (KP4)* WCS06A* WCS08A* WCS12A#	As detailed in individual operating strategies
4. Prevent seawater intrusion into the Broome aquifer caused by abstraction	WCB25Z* WCS01B* WCS02B* WCS01S# WCS02S# WCS03B#	As detailed in individual operating strategies
5. Maintain groundwater levels in the Broome aquifer to avoid impacts to Mile Beach	WCB25Z* WCS01B* WCS02B* WCS06D*	As detailed in individual operating strategies

**Bores proposed to be monitored by proponents.*
 # Bores proposed to be monitored by the department

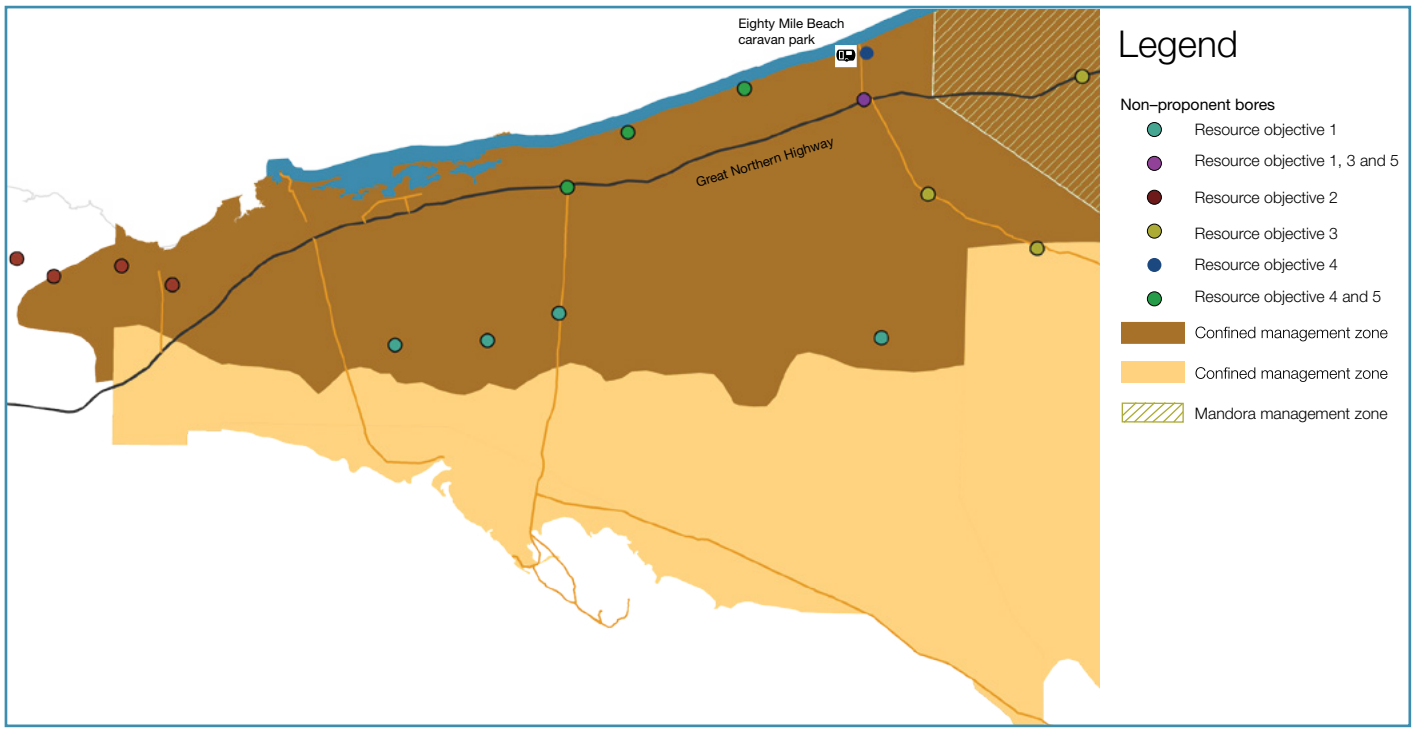

Figure 4: Resource objective monitoring bores (showing non-proponent bores only)

Reviewing the allocation limits

We now have a better understanding of the hydrogeology of the West Canning Basin and the impacts of abstracting small volumes from the aquifers. However, we are unable to predict how abstracting very large volumes will impact Broome and Wallal aquifers and the values they support. This is because of the size of the resources and the uncertainties of predicting aquifer responses with limited information.

DWER will review allocation limits for both Wallal and Broome aquifers by 2021 or as demand increases. With the aquifers fully tested by use, we will be able to assess how taking the current allocation limits is affecting the resource and its dependent systems. This includes understanding the impacts of taking large volumes of water on regional artesian pressure, potential seawater incursion into the aquifer and the health of wetlands dependent on groundwater.

This will inform our decision on the volume, location and rate of sustainable abstraction from the Broome and Wallal aquifers into the future.

Further information

For licensing information, please contact our North West regional office on (08) 9166 4100 or kununurra@dwer.wa.gov.au.

You can also view the latest water allocation and availability information through the water register on our website water.wa.gov.au/maps-and-data/maps/water-register

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