

TRANSFORM PEEL

Peel Integrated Water Initiative



AT A GLANCE

- Water is a diminishing resource because of the impact of climate change and rainfall variability.
- Water is secure for current groundwater licences and groundwater-dependent ecosystems.
- The Peel Integrated Water Initiative (PIWI) project identifies innovative water supply options to explore and develop to secure water and food for the Transform Peel program.
- Short-term water demand may be met through groundwater and surface water sources.
- Current and future land uses can reduce and prevent excess nutrients entering the Peel-Harvey Estuary by using environmentally friendly fertilisers, soil amendments and closed-loop production systems.
- More research and land planning to inform water supply options, focused on establishing a greenhouse precinct, and other agricultural development opportunities, are already underway to deliver Transform Peel's vision.

Transform Peel building regional resilience

Transform Peel is a visionary and ambitious program for long-term development in Western Australia's booming Peel region, aiming to build resilience through economic growth, diversification and job creation. It has been described as a 'game changer' for the region and Western Australia because it delivers an agriculture, food-processing and research hub south of the Perth metropolitan area, close to road, rail and ports.

Transform Peel addresses the region's high population growth and unemployment rates and supports the region's transition from a population-driven economy to an export-oriented economy. It acknowledges the importance of protecting Peel-Harvey Estuary's internationally recognised waterways and wetlands, and aims to halve the high amount of nutrients entering these waterways from the surrounding catchment.

Phase 1 of the Transform Peel program comprises three projects enabled by the Western Australian government's \$49.3 million commitment:

- Peel Integrated Water Initiative
- Peel Food Zone
- Peel Business Park



Transform Peel is predicted to generate \$16.2 billion each year and create up to 33,000 jobs by 2050.

EMPLOYMENT



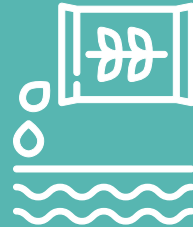
- **33,000**
additional local jobs for
the Peel region by 2050

ECONOMY



- **\$16.2 billion**
of additional economic
activity each year in the
region by 2050

ENVIRONMENT



- **50%**
less nutrients flowing into
the Peel-Harvey Estuary

Peel Integrated Water Initiative

Water is critical for effective and sustainable regional development. Water underpins economic development options and determines the viability of capital investments.

The Peel Integrated Water Initiative (PIWI) supports the Peel region's growth and economic development by providing water research, sustainable and secure water supply and management options for Transform Peel, and environmental benefits for future generations.

The PIWI team collaborated with researchers, scientists and industry leaders to investigate how development opportunities could be achieved under Transform Peel based on current and future water resources. Together, we focused on innovative techniques to identify and develop alternative water sources that are also climate independent, including treated wastewater.

Focus on water quantity and quality

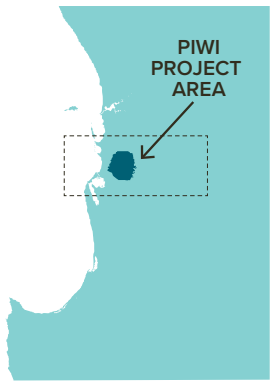
The Government of Western Australia commissioned PIWI to deliver two main objectives centred on water quantity and quality:

- **Water quantity:** Identify a range of technically viable water supply options to support the expected growth in demand from Peel Food Zone and Peel Business Park and maintain the region's water balance.
- **Water quality:** Develop strategies to protect the region's fragile ecosystem by minimising land-use impacts on the environment and reducing agricultural nutrient runoff from Nambeelup subcatchment into the Peel-Harvey Estuary by 50 per cent.

Technical analysis of Peel water system

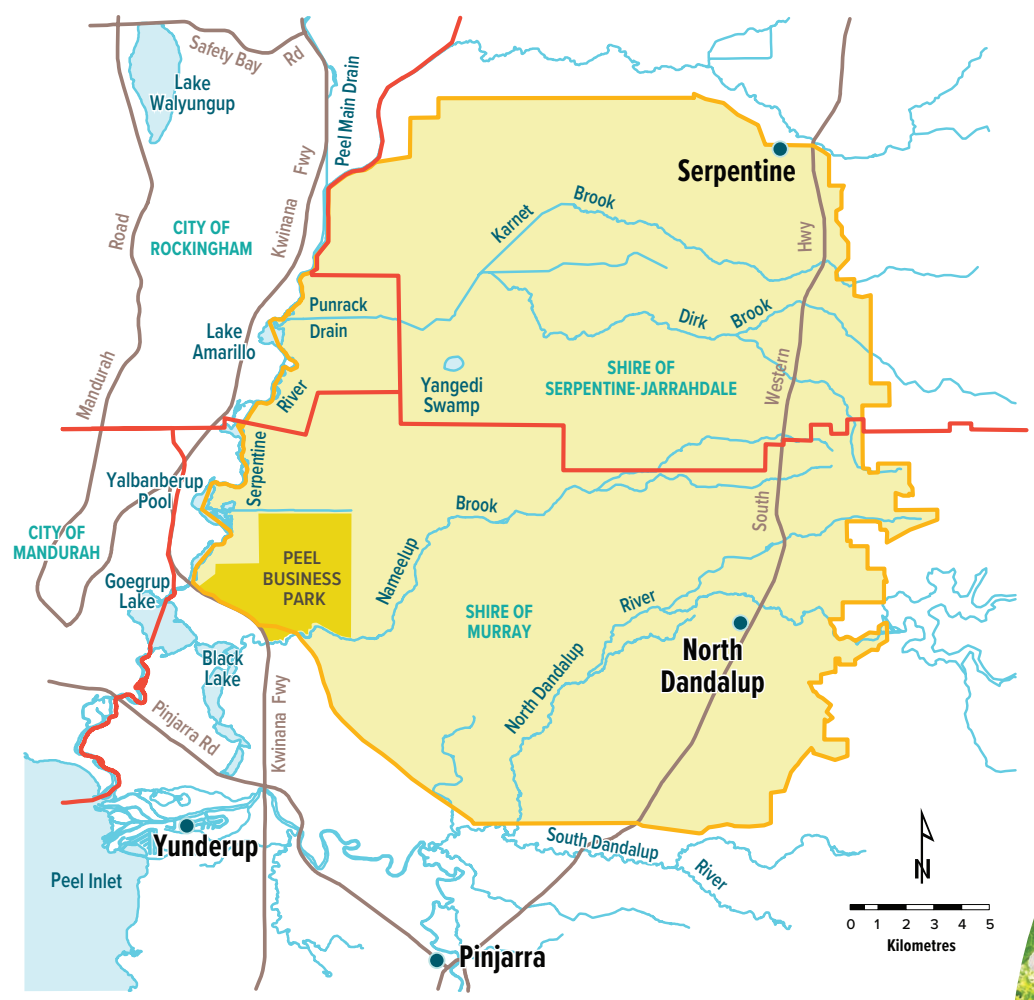
The PIWI team did extensive technical analyses to model and better understand Peel water systems including:

- **Managed aquifer recharge (MAR) feasibility study:** This study looked into the possibility of collecting water over the wet winter months and pumping it into the deep natural aquifer system for storage for future demand.
- **Groundwater environmental tracer analysis:** We used this to improve existing hydrogeological knowledge of the groundwater areas.
- **Airborne electromagnetic (AEM) and seismic surveys:** These surveys measured changes in below-ground conductivity (an indicator of groundwater salinity) to provide a better understanding of the regional groundwater system.
- **Ecological water requirements assessment:** We assessed and defined the quantity of water that needs to remain in the system to preserve groundwater-dependent ecosystems. This was used as part of assessing how much water can be sustainably taken out of groundwater resources in the PIWI project area and the associated water licensing policy.
- **Historical climate and climate change analysis:** This analysis identified the potential impact of recent and future climate change on water resources in the PIWI project area, including declining rainfall and fluctuating weather patterns.



LEGEND

- Towns
- Major roads
- Major rivers
- Lakes/inlets/swamps
- LOCAL GOVERNMENT AUTHORITIES
- PIWI project area
- Peel Food Zone
- Peel Business Park



- **Water supply-demand analysis:** This analysis shows how more intensive land uses would increase future demand for water.
- **Hydrological and nutrient modelling:** We modelled hydrology and nutrient loads under current and future climate to identify potential volumes of surface water available for use in the PIWI project area.

- **Soil amendment and testing:** This analysis shows how current interventions and new strategies could improve water quality in the Peel Food Zone and reduce nutrient loads into the Peel-Harvey estuarine system.

The knowledge we gained from these diverse and in-depth technical investigations led us to review groundwater allocation limits, to secure water for Peel water users and the environment under climate change.



Key findings from technical studies

AEM and seismic surveys separated the PIWI project area into distinct hydrogeological areas and confirmed the location of the Serpentine fault system, which is 500 m wide and at least 1,000 m below ground level. This is important because faults can affect groundwater flows and availability.

The AEM survey also revealed two areas we should investigate further: east of the Peel Food Zone and the Rockingham Sand in the Nambeelup groundwater subarea. These locations are expected to yield higher quality groundwater and productive bores. However, as these groundwater resources are connected (locally and regionally) and are experiencing water level declines, the allocation limits are unlikely to increase.

Climate change including declining rainfall and a slow, steady rise in evaporation have reduced the sustainable amount of surface water and groundwater available for use. This is affecting the regional water balance and highlights the need for long-term water resource management and planning.

Extensive clearing of native vegetation and modification of local hydrology and wetlands to facilitate agricultural development has occurred in the PIWI project area. Shallow depths to groundwater mean that significant portions of the remaining intact ecosystems are potentially reliant on groundwater. We identified 2,284 groundwater-dependent ecosystems and 575 km of waterways. The remaining ecosystems and waterways have significant environmental value and require careful consideration in any future groundwater resource development.

Years of nutrient runoff from agricultural production have led to large stores of phosphorus in soils, sediments and water in the catchment. To achieve the objective of reducing nutrient runoff into the Peel-Harvey Estuary by 50 per cent, the PIWI team recommends:

- fresh thinking about programs that help landowners adopt better ways to manage fertilisers
- identifying pathways to enable landowners to apply suitable soil amendments on new and existing horticultural areas, including the development of an approval process for the use of phosphorous retention soils from mine activity areas
- putting planning in place to support nutrient-sensitive, intensive horticulture development in appropriate areas.

What does this mean for Transform Peel?

Protected horticulture systems, such as greenhouses, using existing water sources and alternative supplies are the preferred development option for the Peel Food Zone. This is because these systems produce higher yielding crops, increase water efficiency (compared with conventional in-ground horticulture) and can capture and recycle nutrients and water.

A future focus for Transform Peel is to establish a greenhouse precinct close to Peel Business Park with access to a secure, sustainable water supply. To support this development, PIWI recommends investigating innovative waste-stream solutions.

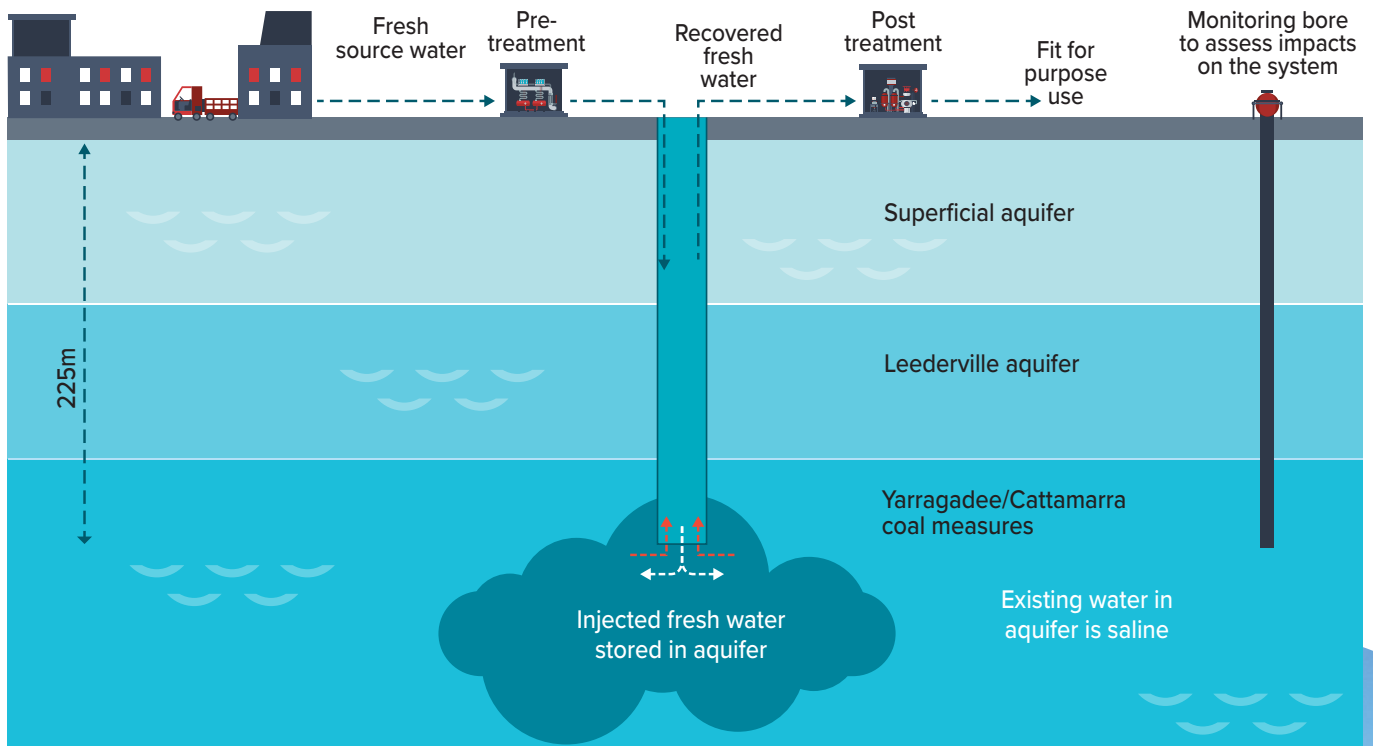
Water availability

We have reviewed groundwater allocation limits and made recommendations to reduce overall availability in the study area to secure existing groundwater licence entitlements, protect water-dependent ecosystems and support future development. Allocation limits reflect reduced recharge to the aquifers under climate change.

Under the proposed allocation limits in the PIWI investigation area, there is limited un-allocated water available for licensing to support new or expanding development. Future water demand will need to come from applying technology, greater water use efficiency and trading of licensed water entitlements. Short-term future water demand can be met through conventional sources, based on proposed water availability. However, groundwater and surface water are limited resources and this scenario could change quickly depending on the rate of new developments, hydrogeological constraints, and climate change. We will need innovative water supply options to secure water for the Transform Peel program for the next 50 years and beyond. Several alternative water sources exist but more investigation is needed before these can support development.



FIGURE Managed aquifer recharge is proposed to support Transform Peel, by storing treated fresh water in the deep saline aquifer and later recover and treat it for fit-for-purpose use



AT A GLANCE

Future water supply options

- Modelling of surface water drainage shows up to 2 gigalitres (billion litres) a year is available for harvesting in the medium term. This source becomes less reliable in the long term under climate change forecasts to 2050.
- The feasibility study for MAR at Nambeelup proved it is technically feasible, by using drainage and subsoil harvesting and storing it in the deep Cattamarra aquifer (see figure above). Engineering concept design has been completed and commercial and economic feasibility has been assessed to determine if a MAR scheme is viable in Peel Business Park or surrounding area.
- Excess wastewater from Water Corporation’s Mandurah No. 1 (Gordon Road) treatment plant could be used to help meet future industry needs. This climate-independent water source is the most readily available in the region, given existing and projected volumes of treated wastewater and its proximity to the PIWI investigation area and Peel Business Park.
- CSIRO identified additional groundwater is potentially available in the east of the PIWI project area (see map over page). We need to investigate the aquifer more

to determine if it could support development without affecting the water balance, because groundwater levels are currently declining.

- Small-scale greenhouse systems could be established to make more productive use of the existing water resources in the Peel Food Zone.
- Trading of water entitlements may be an option to meet demand and will ensure that water continues to go to its highest value use.

High quality water for manufacturing and industrial purposes in the Peel Business Park will be available through Water Corporation’s water supply scheme. Industry may also be able to connect to scheme supply in some locations in the Peel Food Zone. Industry should contact Water Corporation before investigating water supply availability or options.



New PIWI technical report informs decision-making

The Department of Water and Environmental Regulation collaborated with industry partners to develop a technical report that summarises the PIWI team's research and evaluates water opportunities and constraints for the Transform Peel development. The detailed information about water resources in the PIWI report will enable more informed decision-making by government, industry and the community.

Please refer to the back of this brochure for where to download a copy of the PIWI report and its supporting technical documents.



FIND OUT MORE

Please visit the Department of Water and Environmental Regulation website for more information about the PIWI project, or to download a copy of the PIWI report and supporting technical documents.

VISIT www.dwer.wa.gov.au/peel-integrated-water-initiative

Alternatively, visit the Transform Peel website to download a copy of the PIWI report or for more information about the three strategic elements: Peel Integrated Water Initiative, Peel Food Zone and Peel Business Park.

VISIT www.peel.wa.gov.au/transform-peel/

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