CTD/003831



Groundwater Pumping Impact Assessment Guidance for Assessment and Reporting

# Overview

A Groundwater Pumping Impact Assessment (GPIA) is expert information provided by an applicant to Lower Murray Water (LMW) as Delegate for the Minister for Water to inform a decision regarding an application for a licence to take and use water from a bore.

The purpose of a GPIA is to demonstrate, to a high degree of confidence, the likely impacts of groundwater extraction on surrounding groundwater uses and the environment in consideration of the matters outlined in sections 53 and 40(1)(b)-(m) of the *Water Act 1989* (the Act). A GPIA may be requested to inform an application for a new licence, amendment of an existing licence, or an intended transfer of a licence.

A request for a GPIA may be made by LMW in respect of either an application for licensed entitlement or works. The onus for the provision of information for LMW to make a decision rests with the applicant. See sections 51(1)(2)(b)(ii) (entitlement) and, or section 67(2)(b)(ii) (works) of the Act, respectively.

If requested by the Minister, a GPIA must be provided at a high standard and within the timeframe specified by LMW. If not, the application may be refused at this point. In addition to the base information required by a GPIA, the assessment must address issues raised by the Minister to a high standard.

The scope of work that may be required under a GPIA may range from the provision of expert interpretation on a particular hydrogeological issue, through to pumping tests and associated analysis.

If a pumping test is required, it should be conducted, as far as practicable, in accordance with the Australian Standard *AS 2368-1990 Test pumping of water wells* (the Standard); and a report prepared in accordance with LMW’s *Minimum Requirements* which are provided at the end of this document.

A pumping test is to be designed, supervised, undertaken and analysed by suitably qualified and experienced practitioners (the consultant). This includes the preparation of a risk assessment and project plan supplied to LMW prior to conducting the investigation.

The first step of the GPIA process is to complete a risk assessment to outline the risk factors associated with the application and how they will be considered in work to be proposed in the GPIA. This work should outline the scale and complexity of assessment required to adequately assess the risks. The proposed work must be communicated and endorsed by LMW, prior to any detailed site-based investigations being conducted, to ensure that the scope of works is suitable. It is suggested that a process such as that identified in the Minister’s *Policies for Managing Section 76 Approvals 2010*, and the associated *Technical advisory notes for delegates (DSE, 2010)* would provide a useful template.

<https://waterregister.vic.gov.au/water-entitlements/about-entitlements/approvals-for-underground-disposal/>

In accordance with the Standard, final design and analysis is for the consultant to ascertain. LMW will not provide specification for the best depth and location of monitoring bores, or other particular matters that the Standard requires to be determined by the consultant.

Please note that LMW may pose specific questions or parameters that need to be determined which will set the scope and detail required for a final report. These issues must be addressed by the GPIA. These may include matters identified from any submissions made in response to an application which will be communicated by LMW in writing.

Before commencement of a pumping test, the applicant or representative should inform LMW to ensure that appropriate arrangements are in place for the management of water taken during testing and that appropriate information can be provided to concerned third parties.

Page **1** of **5**

Before engaging a consultant to undertake a GPIA, the following should be understood by the applicant:

* LMW may request a GPIA to be conducted in situations where potential risks to other groundwater uses and/or the environment have been identified.
* A GPIA may be requested in respect of an application for works, or take and use licences.
* A GPIA will be an important document in the case of VCAT or other legal proceedings.
* Failure to provide a GPIA within a specified timeline by LMW, or to the quality expected by the Minister/ Delegate, will likely result in refusal of the application by the Minister/ Delegate.
* A GPIA does not guarantee that a licence will be granted.
* Any new observations or relevant information (e.g. submissions, new bores) may require an adjustment to what is required by a GPIA to inform a licence decision – some iteration may be required with LMW prior to finalisation.
* An applicant wishing to engage a consultant should establish the potential of the consultant to represent their work in any legal proceedings and understand the potential associated costs.
* A GPIA is not a recommendation to the Minister/ Delegate in respect of an application, the work provides information to LMW regarding likely impacts of a proposed development.
* The conduct of technical assessment and review may be a time consuming process and assessment timeframes of up to one year are not uncommon for complex applications.
* Basic information regarding groundwater, such as aquifer hydraulic parameters and water quality derived from a GPIA, will be considered to be in the public domain.
* The applicant and the consultant should be aware that LMW reserves the right to submit all completed GPIAs for third party review – by an entity retained by LMW, an expert panel and/or relevant agencies

– prior to making a decision.

**Please note that it will be important that the GPIA adequately addresses the risks of extraction at the scale proposed by the application. For further consideration matters set out in sections 53 and 40(1)(b)-(m) of the Water Act are required to be addressed within the assessment the assessment.**

# Minimum Requirements – Assessment and Reporting

|  |
| --- |
| **1. APPLICATION OVERVIEW** |
| 1. A brief description of the application including:
	* Name
	* Address
	* Application type
	* Proposed licence volume, extraction rate and maximum daily volume
	* Proposed pumping regime (i.e. pumping period and time between pumping events)1
 |
| b) A map of the site showing all bores, waterways and groundwater dependent ecosystems within a minimum of 2 km of the applicant’s bore as well as other topographic features including towns and roads. Further mapping should be included based on the scale of the proposed development. |

|  |
| --- |
| **2. HYDROGEOLOGICAL SETTING** |
| 1. The development of a suitable conceptual model of the pumping test site and surrounding landscape, as well as mapping and graphical representation of the hydrogeology. This includes, but is not limited to, consideration of the following:
	* Aquifers present, type (e.g. confined, unconfined) and their interconnection
	* Groundwater level trends and seasonal drawdowns
	* Groundwater quality
	* Environmentally and/or culturally important features, including groundwater dependant ecosystems
	* The presence of waterways and springs within the meaning of the relevant definitions in the

*Water Act 1989,* and policy interpretations thereof.* + Drill logs from the pumping test bore, monitoring bores and potentially impacted bores (where available). If this information is not available, a methodology must be included to obtain this information.
	+ Detailed pumping test hydrogeological rationale – including directionality, recharge estimates and potential boundary effects, likely competency of confining sequences, well efficiency and leakage estimates.
	+ Any non-compliance of the proposed pumping bore with the *Minimum Construction Requirements for Water Bores in Australia (3rd edn)*, developed by the National Uniform Drillers Licensing Committee(2012).
 |
| b) Details of bore(s) that are the subject of the application, including the applicant’s bore(s) and any neighbouring bores within proximity2:**Bore ID Bore use Easting Northing Bore depth Bore screen Formation****interval screened** |
| c) Identify high-value groundwater dependent ecosystems (GDEs) within proximity of the pumping test bore, including those identified and communicated to the applicant by LMW. |
| d) Identify waterways within proximity of the pumping test bore, including those identified and communicated to the applicant by LMW. |

1 LMW may request further information

2 Proximity – a minimum of 1km but may be significantly greater depending on the risk assessment.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

|  |
| --- |
| **3. PUMPING TEST** |
| 1. Once a thorough examination of the licensing proposal (including risk assessment) has been undertaken by the consultant, recommendations for the conduct of a GPIA may include: a specification for a proposed pumping test and relevant analysis; or simple application of expert interpretation and analysis. In the latter case, agreement must be sought from LMW in writing to this course of action.
2. In the majority of cases, LMW will require the completion of a pumping test and associated analysis to a high standard.
3. It is recommended that the consultant (and proponent) hold at least one meeting with LMW staff to establish the pumping test criteria, risks and information exchange regarding risks identified by LMW – including those resulting from advertising, agency liaison, relevant submissions and LMW field inspection.
4. Note that prior to undertaking a pumping test the applicant (or the consultant) must contact LMW to confirm pumping arrangements and monitoring requirements. Applicants are encouraged to make productive use of water extracted during the pumping test.

LMW approves use for       purposes during this period.1. Details of the test and rationale are to be provided, including:

       day pump test performed on bore;  Pump rate for the test period to be the requested rate of       L/s;  Observation of water levels from       bore;  Water level measurement to be taken from       bore;  Continuous monitoring of the pumped rate from       bore for the duration of the test;  Regular monitoring of salinity and pH during pumping and during recovery;  Recovery monitoring over five days;  Recovery water level monitoring in      .  |
| 1. All time-drawdown and recovery data must be provided, both as plots in the report and in digital format.
2. Groundwater salinity is to be regularly monitored during the pumping test and reported with discussion on any trends.
3. If the pumping test bore is within proximity of waterways, GDEs, mine workings, or where testing for a boundary effect, obtain samples for analysis of key analytes and/or tracers. All results should be included in the report with discussion on any trends.
 |
| 1. A description of the pumping test analysis, including:
	* Solution applied and hypothesized and/or tested fitting
	* Calculated aquifer hydraulic characteristics, including transmissivity and storativity
 |

|  |
| --- |
| **4. IMPACT ASSESSMENT** |
| **Bores**a) Calculate the drawdown expected at surrounding bores after a suitable period of continuous pumping and present the data as per the table below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Bore ID** | **Distance from pumping test bore (m)** | **Standing water level****(m)** | **Pump depth (m)** | **Available drawdown (m)** | **Calculated drawdown (m)** | **Reduction in available drawdown (%)** |
|  |  |  |  |  |  |  |

 |
| Groundwater dependent ecosystems1. Calculate the drawdown expected at any high-value GDEs after a suitable period of continuous pumping and present the data as per the table below:

|  |  |  |  |
| --- | --- | --- | --- |
| **Feature name** | **Distance from pumping test bore (m)** | **Standing water level (m)** | **Calculated drawdown (m)** |
|  |  |  |  |

1. Where the reduction in available drawdown is greater than 0.1m, consideration should be given to how to reduce the pumping impacts (refer Victorian Government, 2015).
2. Provide details about the GDEs that might be relevant to the applicant.
 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  **Waterways**1. Calculate the stream depletion expected at nearby waterways after a suitable period of continuous pumping and present the data as per the table below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Feature name** | **Distance from pumping test bore (m)** | **Stream depletion rate (l/s)** | **Stream bed conductance (m/d)** | **Proportion of extraction from stream in 3 months (%)** |
|  |  |  |  |  |

1. Document assumptions and inputs to determine the stream depletion rate.
2. State the stream base-flow indices
3. Provide details about the stream that might be relevant to the application; e.g. perennial/ non- perennial
 |

|  |
| --- |
| **5. LIMITATIONS** |
| 1. Note any limitations or data gaps – e.g. any issues encountered (e.g. equipment failures).
2. Identify further work required to improve certainty in the assessment.
 |

|  |
| --- |
| **6. REFERENCES** |
| Department of Sustainability and Environment (DSE), 2010. *Technical advisory notes to delegates: Managed Aquifer Recharge.*Jacobs, 2015. *Groundwater Interference Assessment Tool Development – Hydrogeological logic and risk assessment*.National Uniform Drillers Licensing Committee, 2011. *Minimum Construction Requirements for Water Bores in Australia (3rd edn).*Standards Australia, 1991. *AS 2368-1990 Test pumping of water wells*.Victorian Government, 2015. *Guidelines for groundwater licensing and the protection of high value groundwater dependent ecosystems*.Victorian Government, 2014. *Policies for Managing Take and Use Licences*. Victorian Government, 2010. *Policies for Managing Section 76 Approval.*Victorian Government, 1989. *Water Act 1989*. |