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Primary Industries

LOWER HUNTER *water* PLAN

MERI Annual Evaluation 2014



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Lower Hunter Water Plan: MERI Annual Evaluation 2014

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More information

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Cover image: Grahamstown Dam, taken by Eddie Cross for MWD

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1 Introduction

The Lower Hunter Water Plan (LHWP) sets out a mix of supply and demand measures to meet its objectives to:

- provide water security during drought
- ensure reliable water supplies to meet growing demand due to a growing population and increased business and industry activity
- help protect aquatic ecosystems
- maximise net benefits to the community.

At the time of the plan's release, the supply and demand estimates underpinning the LHWP indicated that augmentation of the lower Hunter's water supply to meet new growth would not be needed for around 20 years. Given this, the emphasis of the plan is on a portfolio of measures to respond to drought. The measures in the LHWP portfolio fall under the following categories: surface water, groundwater, water efficiency, demand management, recycling, stormwater, and temporary desalination.

A key feature of the plan is that it is flexible to adapt to challenges, such as our highly variable climate patterns and new information and experience gained over time, as well as to changes in the broader environment that impact the portfolio, such as population and business growth, regulatory context, technology and behaviour patterns. The plan will be reviewed every four to five years or as needed, so that the portfolio of measures can be adjusted over time to ensure that it continues to achieve its objectives.

As part of the implementation of the LHWP, the Metropolitan Water Directorate (MWD) engaged Evaluation and Sustainability Services Pty Ltd (ESS) to develop a Monitoring, Evaluation, Reporting and Improvement (MERI) Plan (April 2014).

The MERI plan sets out a framework to assess performance against the LHWP's objectives and to ensure that it can adapt to incorporate the latest knowledge, experience and technology. Key elements to be monitored include:

- the validity of the assumptions that underpin the LHWP
- the timely implementation of actions identified in the plan
- relevant developments in research and technology.

MWD maintains its role as the LHWP lead agency in implementing the MERI plan. In particular, MWD will lead the monitoring, evaluation and reporting processes as well as the development of future iterations of the LHWP.

The MERI framework also specifies timeframes for the evaluation of these key elements. Some elements of the evaluation will be undertaken annually, while other elements will be intermittent.

The purpose of this paper is to report findings and implications of the first annual evaluation against the MERI plan and to make recommendations to the LHWP governance groups.

2 The MERI Plan

2.1 Objectives of the MERI Plan

The overall aim of the MERI plan is to measure performance of the LHWP against its objectives. Another goal of the MERI framework is to report progress on implementation actions set out in the LHWP.

The MERI plan specifies monitoring, evaluation and reporting requirements to gather timely information to assess:

- the LHWP's effectiveness and efficiency in delivering on its objectives
- whether actions identified in the LHWP have been implemented in a timely manner
- key assumptions underpinning the LHWP, including costs of measures and factors considered in sensitivity analyses on demand forecasts and supply modelling
- the actual supply and demand balance compared with the plan's forecasts
- how the measures in the plan perform if a drought is experienced in the region, including whether the measures deliver the expected water savings and/or supply
- whether the measures in the plan continue to be appropriate and relevant in view of potential changes in the supply-demand balance or regulatory regime, advances in technology, and other developments.

Another critical objective of the MERI plan is to ensure early notice of any findings that would jeopardise delivery of the LHWP or achievement of its objectives, and trigger a major review of the LHWP. Triggers for a major review were developed by ESS, MWD and Hunter Water as part of the MERI framework and include, but are not limited to:

- If demand is likely to exceed supply within 13 years based on the latest supply-demand balance estimate. This timeframe is based on the lead time for a major supply augmentation to be producing water before a supply-demand imbalance occurs. The rationale for this is to avoid constraining the options available for consideration in a revised LHWP.
- If the cost-risk analysis indicates that the ranking of options has significantly changed and the LHWP portfolio would no longer be preferred. The cost-risk analysis will require a re-run of the source model (SoMo) and Drought Portfolio Evaluation Model (DPEM) and will occur as soon as practicable after each of the following:
 - an improved inter-regional model for Central Coast transfers has been developed
 - readiness activities for temporary desalination are undertaken
 - investigations into the feasibility of the Lower Hunter Alluvial aquifer for drought supply, if these indicate it is a viable alternative.
- the performance of drought measures is significantly below expectations, to the extent that the ability of the LHWP to maintain security of supply through an extreme drought is compromised.

2.2 Monitoring, Evaluation and Reporting

At least once each year, MWD will undertake an evaluation in accordance with the MERI plan. A series of Key Evaluation Questions (KEQ) were devised for the MERI plan. These KEQ are based on the MERI plan objectives and set the direction and focus of the evaluation. The KEQ are:

- How effective has the plan been in achieving its objectives?

- How effective are the measures within the plan?
- How efficiently has the plan been delivered?
- Do the measures within the plan remain appropriate?

The KEQ are broken into two further layers of more specific evaluation questions, with processes for annual and intermittent monitoring, evaluation and reporting. Answers to lower level evaluation questions will contribute to answering the key evaluation questions and therefore address the MERI objectives for the LHWP. A comprehensive list of evaluation questions can be found in the MERI plan.

Some elements of the evaluation will be undertaken annually, while other elements will be intermittent. The intermittent elements comprise evaluation associated with a drought event and for a major review of the plan. For a major review, the evaluation will be integrated with the comprehensive planning process to develop the next LHWP. Evaluation questions to be answered annually primarily provide information about:

- the supply-demand balance compared with forecasts underpinning the LHWP
- performance of non-drought measures
- progress on implementation actions
- costs of delivering actions
- changes in assumptions or the regulatory environment.

Table 1 summarises the MERI evaluation questions and the timing for review of each question. It should be noted that any evaluation can trigger a major review.

Table 1: Summary of MERI evaluation questions and timeframes

Key Evaluation Question	Evaluation Question	Timeframe for monitoring, evaluation and reporting		
		Annual	Intermittent	
			Drought event	Major review*
KEQ 1. How effective has the plan been in achieving its objectives?	EQ 1.1 To what extent are the LHWP's objectives being met?			
	EQ 1.2 Have the objectives been achieved as a result of the LHWP implementation?			
	EQ 1.3 The underlying premise of the plan is the supply and demand balance - is the forecast supply and demand balance still consistent with the LHWP's forecast?			
	EQ 1.4 Have there been any unintended outcomes (positive or negative) and how have these impacted on the LHWP's objectives?			
KEQ 2. How effective are the measures within the plan?	EQ 2.1 Do the measures perform as expected under drought conditions? Can any reasons for significant variation be explained?			
	EQ 2.2 Have the non-drought measures (ie, continuing measures) been effective in the supply, saving and substitution of water? Can any reasons for significant variation be explained?			

KEQ 3. How efficiently has the plan been delivered?	EQ 3.1 Have the identified implementation actions been delivered within agreed timeframes or consistent with identified triggers? What are the reasons for any significant variation and how can this understanding improve delivery of the LHWP?			
	EQ 3.2 Are the implementation actions consistent with the LHWP's expectation for deliverables and costs? What are the reasons for any significant variation and how can this understanding improve delivery of the LHWP?			
KEQ 4. Do the measures within the plan remain appropriate?	EQ 4.1 Are the assumptions underpinning the LHWP still appropriate? Do any changes influence the measures and implementation actions in the LHWP?			
	EQ 4.2 Is the regulatory and operating environment still consistent with the LHWP? Do any changes influence the measures and implementation actions in the LHWP?			
	EQ 4.3 Has new technology, information or methods emerged that will influence the measures and their implementation? Do any changes influence the measures and implementation actions in the LHWP?			

**The major review will be integrated with the comprehensive planning process for developing the next LHWP and will not necessarily require a standalone report*

In addition to the evaluation questions, the MERI plan lists the implementation actions identified in the LHWP, as well as the timing and responsibility for these actions. Most of the implementation actions have a specified due date, or are ongoing, with others triggered only if there is a drought. The MERI evaluations will report progress against these actions, as well as answering the evaluation questions.

There are a number of agencies involved in monitoring and reporting against the MERI Plan. Hunter Water is responsible for operational activities under the LHWP, and will be the primary provider of evidence to address the MERI evaluation questions. Other agencies will also be responsible for reporting progress against the MERI Plan where they are involved in delivering aspects of the LHWP. Under the current plan, along with MWD, the NSW Office of Water (NOW), Wyong Shire Council (WSC) and Gosford City Council (GCC) are key agencies with a role to play in the MERI reporting.

To ensure that MERI remains a practical, achievable activity within the scope of all Hunter Water's monitoring and reporting activities, the MERI plan leverages existing reporting such as requirements for Hunter Water to report to the Independent Pricing and Regulatory Tribunal (IPART) in accordance with its Operating Licence and associated Reporting Manual.

The annual MERI evaluation and report will be submitted to the Lower Hunter Water Senior Officers' Group (LHWSOG), the Independent Water Advisory Panel (IWAP) and the Metropolitan Water Chief Executive Officers' (MWCEO) Committee for endorsement in November 2014. The roles of the various audiences for MERI plan reporting are summarised in Table 2, and the annual evaluation process is illustrated in Figure 1.

Table 2: Audience for MERI Plan reporting

Category	Audience
Primary users Who will monitor, evaluate and adapt	MWD, Hunter Water, NOW, WSC, GCC
Secondary users Who need to be aware of the plan and evaluation outcomes	LHWSOG, MWCEO Committee, IWAP, Portfolio Minister

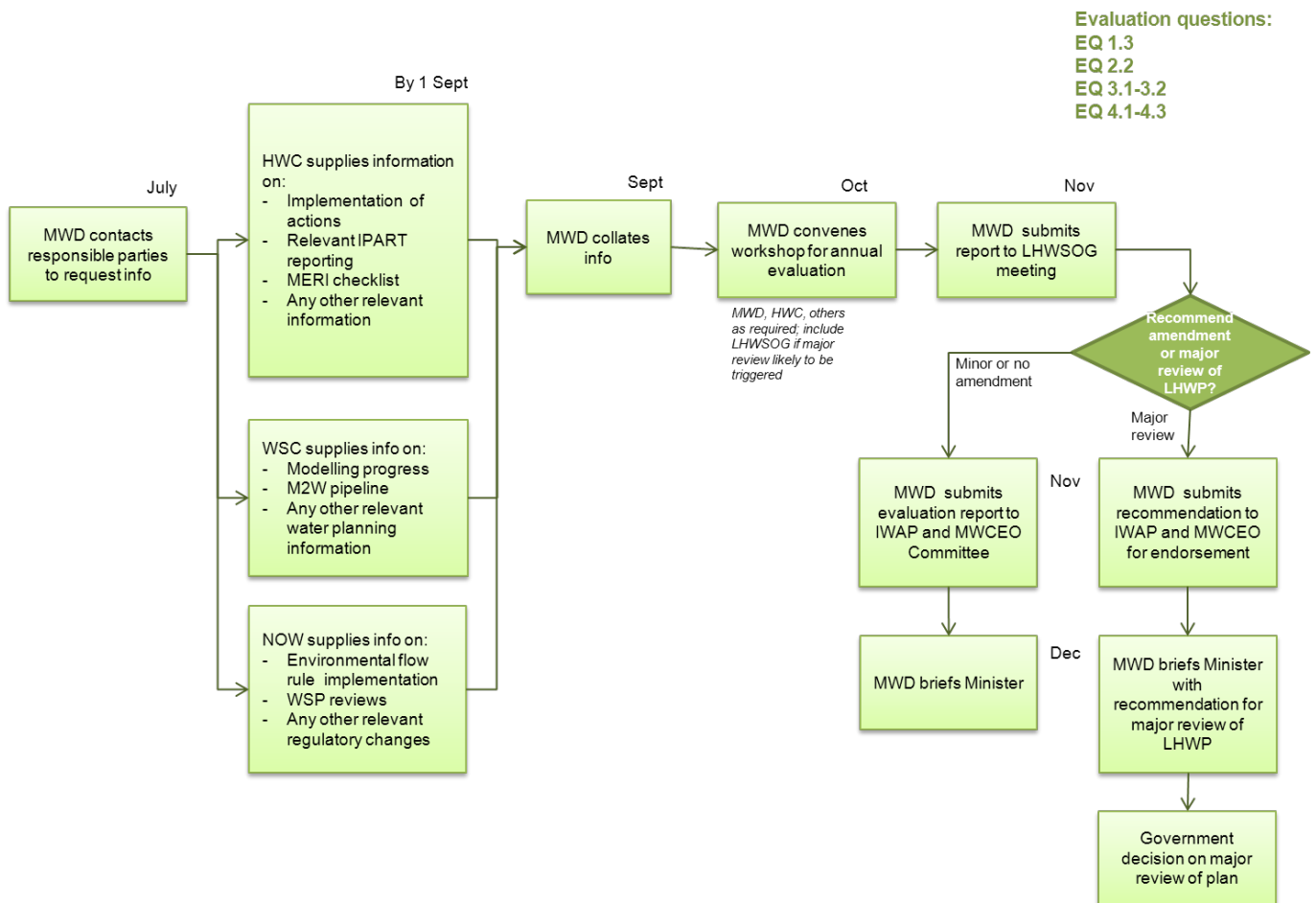


Figure 1: Annual MERI evaluation process

3 Annual evaluation 2014

The first evaluation of the LHWP against the MERI plan commenced in July 2014, three months after the LHWP was released. Agency responses were due by 1 September 2014 and all were submitted on time. As the lower Hunter was not experiencing a drought at this time, agencies reported on the annual evaluation questions and the implementation actions under the broad categories of measures in the LHWP.

MWD has collated the information from agencies and evaluated the results (refer Appendix A). For the majority of evaluation questions and implementation actions, agencies have achieved, or are on track to achieve, the objectives. Given that this is the first annual evaluation, some of the milestones for reporting have not yet been reached. The evaluation has highlighted a small number of key issues that require further discussion. These are addressed below.

3.1 Progress towards implementation actions

Actions required to implement the measures in the LHWP are set out in Appendix 8 of the MERI plan. These are additional to the MERI evaluation questions and progress towards their attainment is reviewed as part of the MERI framework.

Only two implementation actions were due for completion within the review period – introducing Water Wise Rules and conducting a trial with Lake Macquarie City Council to better understand rainwater tank failures and educate participants.

Following an education and awareness campaign, Water Wise Rules officially commenced on 1 July 2014, following approval by the Minister under clause 28 of the *Hunter Water Regulation 2010*. The Water Wise Rules are:

- watering with a sprinkler, irrigation system or trigger nozzle hose is permitted any day before 10am or after 4pm to avoid the heat of the day
- all hand held hoses must have a trigger nozzle
- no hosing of hard surfaces such as concrete, paths and driveways.

Hunter Water reports that 191 properties in Cameron Park and Fletcher (plus a few in adjoining suburbs) were recruited to participate in the rainwater tank trial. Audits on all properties have now been completed and 181 participants also completed a post audit survey. Preliminary findings from the audit were that:

- 75% of rainwater tanks were functioning correctly
- all those with a problem stated that they are planning to or have already done something about the problem
- 80% of participants thought the program was worthwhile or very beneficial.

Hunter Water advises that a full analysis of the audit and survey results is expected to be complete by the end of 2014.

The Kooragang Industrial Water Scheme is also scheduled to be operational by December 2014, with process verification nearing completion. This will be followed by a process proving period.

The other implementation actions set out in the MERI plan are reported to be on track for delivery within the specified timeframes.

There are a number of key actions not requiring completion during the 2014 MERI plan review period, but for which work is underway. These relate to Central Coast inter-regional transfers, temporary desalination readiness and investigations into the lower Hunter alluvial aquifer. These

measures have actions that are due for completion within the next two years and progress towards outcomes for these measures is discussed below.

In addition to these actions, NOW and Hunter Water are progressing with implementing the improved environmental flow rules for Chichester Dam and Seaham Weir. This action is being implemented in accordance with the regulatory framework for water sharing plans which is administered by NOW. More detail is included in Appendix A.

3.1.1 Central Coast inter-regional transfers

Hunter Water and Wyong Shire Council (WSC) are developing improved hydrologic models for inter-regional transfers. This work is on track for completion by October 2015, with the intention of using the enhanced modelling capability to optimise water transfers and, if appropriate, enhance the existing water transfer agreement. This work is coordinated through the ongoing Central Coast Working Group (CCWG), reporting to the LHWSOG.

New infrastructure is also required to increase the transfer capacity so that up to 30 million litres a day of water can be transferred north in accordance with the existing water transfer agreement. WSC will construct a new pipeline from Mardi to Warnervale, serving local customers as well as boosting the transfer capacity. WSC advises that the broad route for the pipeline has been selected, and design work is continuing.

Hunter Water will also need to modify its water supply system by building a new pipeline, constructing a new water pumping station at Wangi, and modifying the existing water pumping stations at Morisset and Fennell Bay. Hunter Water has advised that design is scheduled to start in 2014/15.

The infrastructure is planned to be completed in 2017.

3.1.2 Temporary desalination readiness

Hunter Water is progressing with 'readiness activities' for temporary desalination as identified in the LHWP, including site selection, technical and environmental investigations and a review of procurement options. These are important so that this important contingency drought measure is ready to be implemented if there is an extreme drought event. These activities are due for completion in December 2015.

The site selection phase is currently underway to confirm which of the sites shortlisted during the development of the *Lower Hunter Water Plan* are most suitable for temporary desalination. The following criteria have been assessed as part of this work:

- confirmation of available capacity in the water distribution network through network modelling under restricted demand
- an assessment of capacity to discharge brine from desalination to the sewer network, wastewater treatment plants and ocean outfalls
- energy supply for desalination, including the use of diesel generators, applying for additional load and utilising spare dry weather power capacity at wastewater treatment plan sites
- raw seawater inlet technique, including beach wells and direct intake
- assessment of site specific environmental and planning considerations, including a review of land zoning for all the sites and a preliminary heritage constraints investigation
- indicative costing for each shortlisted option.

Hunter Water advises that site selection is scheduled to be finalised following an Options Assessment Workshop scheduled for November 2014.

Hunter Water is planning to engage a consultant on concept design work in early 2015, to better define infrastructure requirements, approval needs, short-list suppliers, refine cost estimates and develop a procurement strategy. Hunter Water will also implement a water quality monitoring program for preferred sites, once these have been identified.

WSC has shared technical information from its experience with desalination planning in the last drought to assist Hunter Water with its investigations.

3.1.3 Review of Water Sharing Plan for Tomago and Tomaree groundwater sources

An action for MWD under the MERI plan is to consider any implications for the LHWP arising from review of the Water Sharing Plan (WSP) for the Tomago Tomaree Stockton groundwater sources.

The existing WSP has been extended to apply until its date of replacement (1 July 2015 or sooner). NOW is proceeding with proposed WSP rules for Tomago and Tomaree groundwater sources as recommended by the Interagency Regional Panel (IRP) in March 2014. The timing for public exhibition of this and other draft WSPs is uncertain.

NOW proposed that an amended cease to pump (CTP) rule for Tomago would apply from year 1 of the WSP, and an amended CTP rule for Tomaree would apply from year 6. Hunter Water's modelling indicates that the amended rules will result in a loss of 3GL in yield for Tomago, and a loss of 1.5GL of yield for Tomaree. Together, these impacts would bring forward the intersection of the supply and demand curves by around eight years.

The impacts on the supply-demand balance are discussed further in section 3.2.3.

3.1.4 Lower Hunter Alluvial investigations

A preliminary desktop assessment of potential new groundwater sources was initiated during development of the Lower Hunter Water Plan. The Lower Hunter Alluvial groundwater source, near the junction of the Hunter and Paterson Rivers in the Morpeth-Bolwarra area, was identified as warranting further investigation. When the LHWP was released, investigations had only reached a preliminary stage, and further work is required to test the quality and quantity of water that might be available, and hence understand whether the aquifer could be used to supplement water supplies in a drought. This action is due for completion in June 2016.

A staged process to investigate the feasibility of the aquifer has been agreed between MWD, Hunter Water and NOW. A site visit in June 2014 was unable to identify any existing bores from previous construction activities near Morpeth Bridge. The next step is to identify a suitable location for a test bore to assess water quality. If water quality (salinity) is suitable, the next step would be for Hunter Water to arrange a geophysical survey to identify the extent of the aquifer and evaluate whether it is likely to be economically viable as a drought reserve, before deciding whether or not to proceed with drilling test bores to investigate the aquifer characteristics. Investigations would cease if any step indicates the groundwater is not viable to supplement supplies in a drought.

A flowchart showing the staged process is attached at Appendix B. Progress on some steps was delayed while Hunter Water focused resources on drought readiness activities for temporary desalination due to low water storage levels in August 2014. The feasibility investigations should still be completed on time, subject to adequate water storage levels over the remaining period.

3.1.5 Costs of implementation actions

The MERI reporting framework includes reporting the annual costs of progress towards the implementation actions. This will provide useful information about whether cost estimates used in developing the 2014 LHWP were realistic and will inform the economic analysis for future LHWPs.

Hunter Water spent \$2.65M on water efficiency programs in 2013/14, including water loss management, showerhead exchange program, major customer water audits and implementing Water Wise Rules. Total expenditure on the Water Wise Rules program was \$263,000, compared with an estimate of \$318,000 used in the LHWP economic analysis.

A total of \$67 million has been spent to date on delivering the Kooragang Industrial Water Scheme, and the forecast total project cost is \$71 million.

3.2 Annual evaluation questions

As noted in section 2.2 above, a hierarchy of evaluation questions was developed for the MERI plan. The Key Evaluation Questions set the direction and focus of the evaluation. These high-level questions are quite broad, so a series of lower level evaluation questions (EQ) were defined to provide more focus and narrow the attention on the required evidence sources.

Of 46 specific evaluation questions in the MERI plan, 33 are relevant to address in the annual evaluation. As the LHWP was developed in late 2013 and released by the NSW Government in early 2014, insufficient time has passed for major changes to have occurred in the external or operating environments. This also means that most of the implementation actions have not yet occurred, as they are programmed to take place over the course of the LHWP. Given this, there are no major departures or concerns about the ability of the LHWP to deliver on its objectives.

There are, however, a small number of key factors that have changed, or may change in the future, which could impact on the supply-demand balance and may have implications for the next iteration of the LHWP. These are discussed below.

3.2.1 Updated demand forecast

Hunter Water has revised its water demand forecast for the purposes of the 2015 water price review. Due to a number of factors affecting both residential and non-residential water use, demand is forecast to increase in some sectors and decrease in others. The overall impact is a slight reduction in demand over the planning period, compared to the demand forecast used in developing the LHWP. The revised demand forecast is discussed in more detail below.

In mid-2014, the NSW Department of Planning and Environment released new population projections. Although Hunter Water uses its own dwelling projections for connected customers to forecast residential water demand, the population projections are an important input.

Hunter Water used the population projections to update the occupancy rates within its demand forecast. This change resulted in a small change in the forecast water demand over the planning period.

The introduction of Water Wise Rules and greater than expected efficiency of new clothes washing machines has also caused a reduction in forecast residential water demand.

In the non-residential sector, water demand forecasts for major customers are slightly higher than the previous forecast. Volumes for inter-regional transfers to Singleton are no longer expected and are therefore excluded from the forecast.

Overall, the forecast demand in 2035/36 has reduced to 74.1GL compared to the demand forecast of 74.7GL used in developing the LHWP, a reduction of 0.6GL. The changes and their impacts are summarised in Table 3.

Table 3: Changes in the demand forecast

Change	Description	Demand Impact in 2015/16 GL/year	Demand Impact in 2035/36 GL/year
Dwelling and population forecast	Forecast of dwelling connections reduced from 2933 to 2910 per year	- 0.1	- 0.15*
	Higher population forecast due to higher occupancy rate forecast by the Department of Planning and Environment	+ 0.1 (res) + 0.1 (nres)	+ 0.4 (res) + 0.3 (nres)
Residential outdoor water use	Water Wise Rules commenced on 1 July 2014	- 0.9	- 1.0
	Garden water use historic trend extended to include the period 2008 to 2014	+ 0.3	+ 0.35
Water efficiency	New clothes washing machines more efficient than forecast (new data)	- 0.6	- 1.1
Major customer demands	Recycled water supply for Kooragang Industrial Water Scheme forecast to be less than the capacity of the treatment plant	+ 0.6	+ 0.6
	Reduced demand forecast for large users resulting from water efficiency programs and updated historic consumption analysis	-0.5	+0.2
Inter-regional transfers	Potential supply to Singleton as a bulk water transfer no longer included in the forecast	- 0.2	- 0.2
Total	Combined impact of all measures	-1.2	-0.6

Although the latest total demand forecast is marginally lower than the previous estimate, it remains within the bounds of the sensitivity envelope, as shown in Figure 2.

The demand forecast is a forecast of annual demands in a year of average weather conditions. Several years of historic metered customer data are used to ensure the forecast is representative of an average year. This approach is used for residential garden water use and the non-residential customer sectors to ensure that the average annual demand forecast is not influenced by the weather in a particular year. The 2012/13 and 2013/14 years contained hotter and drier than average periods, and the resulting water consumption was higher than average. As a result, the last year of actual demand (2013/14) does not provide the start point for the demand forecast.

Actual non-residential demand in 2013/14 was 21.3 GL. This was higher than the 2013 demand forecast of 20.7 GL. The higher actual non-residential demand was a result of the drier periods of weather experienced during 2013/14. In particular, a number of the weather-dependent large water users had consumption levels that were significantly higher than their historical rates of water use. The increase in non-residential demand was still just within the upper sensitivity bound for large water users as shown in Figure 3.

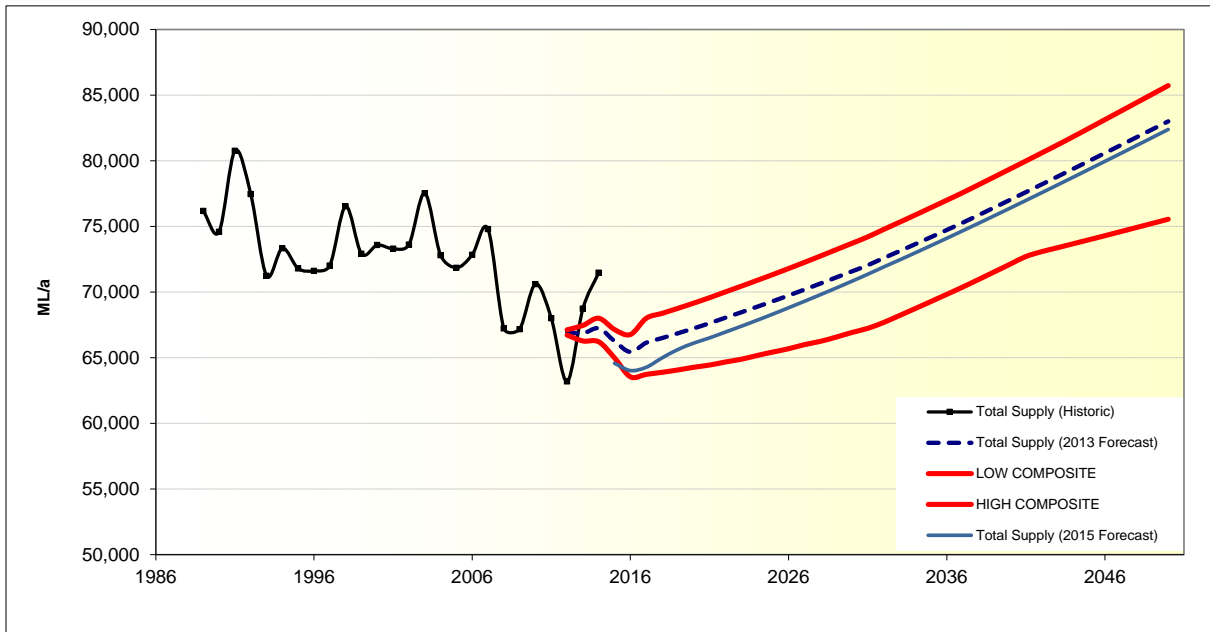


Figure 2: Total water supply forecast

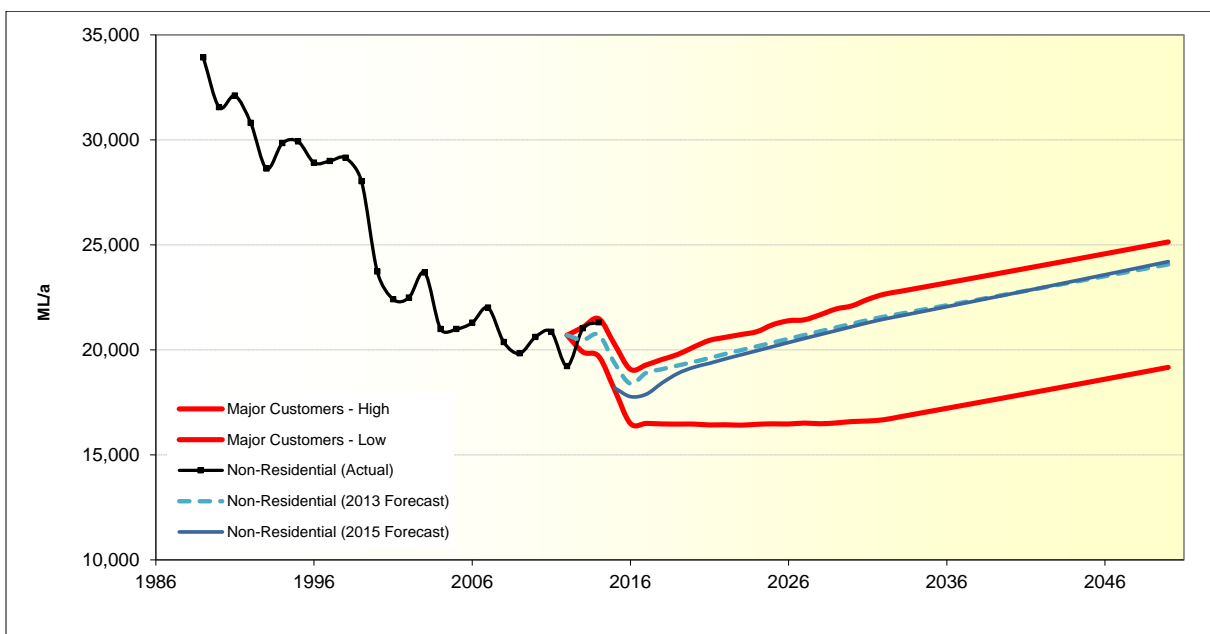


Figure 3: Non-residential water demand forecast

3.2.2 System yield

System yield is defined as the maximum average rate that treated water can be supplied for a given set of level of service criteria. The level of service criteria that were adopted for the LHWP are:

1. *Frequency*: the average frequency of imposing drought restrictions shall not exceed once per 10 years on average
2. *Duration*: the average duration of drought restrictions shall not exceed five per cent of the time

3. *Security*: the chance of water storages approaching empty (defined as 10 per cent total storage level) shall not exceed once per 10,000 years on average.

The maximum rate that treated water can be supplied is different for each of the three level of service criteria, with the relative performance against each being a function of the specific characteristics of the system that is being analysed. In the case of the lower Hunter system, the constraining criterion is the security criterion.

The calculation of forecast demand is separate from the calculation of system yield, with the two calculations being combined to estimate when system augmentation will be required. System augmentation is required when demand exceeds system yield.

During development of the LHWP, the water supply system yield was calculated as 75 GL/year for the existing system, including drought restrictions¹. Hunter Water has reported that there are no changes to the calculation of system yield or levels of service since the initial modelling for the LHWP.

The LHWP process found that even though demand has not yet reached the assessed yield, the risk of running out of water is not acceptable without introducing additional measures to further mitigate the risk. A wide range of portfolios were investigated as part of the LHWP in terms of cost, social and environmental impacts, over a 15 year planning horizon to achieve a suitable risk profile. The risk of reaching 10% storage was calculated for all of the portfolio options that were investigated, with the preferred portfolio resulting in a 1 in 90,000 year risk of reaching 10% storage at the end of the 15 year planning horizon. Without the portfolio of drought actions, this risk would have been once per 20,000 years after 15 years when demand reaches 71GL/year.

Consideration has been given to modifying the calculation of system yield to take into account the portfolio of drought measures that were developed for the LHWP, including water supply to and from the Central Coast and supply from temporary desalination during severe droughts.

Hunter Water and MWD agreed that the yield should continue to be calculated without including the benefit of the additional drought measures that are identified in the LHWP portfolio. The rationale for this is that the timing of system augmentation should be based on the performance of the underlying existing system rather than on the performance of emergency measures that would only be deployed in a drought. In line with this recommendation, it may be appropriate in the future to include supply to and from the Central Coast in the calculation of system yield once suitable system model enhancements have been developed and the additional infrastructure has been constructed to deliver the water transfer rates specified in the existing agreement.

This approach is consistent with the basis for the governance groups (including the LHWSOG and IWAP) endorsing the security criterion with a risk of 1 in 10,000 for initial modelling purposes to test the long term supply-demand balance. The IWAP noted that sensitivity analysis would be undertaken and that the portfolio analysis would replace this criterion for the purposes of drought modelling.

¹ Key assumptions in the yield calculation included: Tomago storage 60,000 ML, Chichester 18,350 ML, Grahamstown 182,400 ML, Anna Bay supplies constant 7 ML/day, adopted environmental flow releases at Chichester and Seaham. Restrictions reduce demand by 5%, 8%, 16% and 21% applied at 60%, 50%, 40% and 30% respectively. Water Wise Rules are taken into account on the demand side, so they are effectively included. .

3.2.3 Supply-demand balance

Based on the yield estimate of 75GL/year and without taking into consideration any other factors, the updated demand forecast discussed in section 3.2.1 would delay the intersection of the supply and demand curves by one year until 2036/37 (see Figure 4). In this instance, planning to address the next major supply augmentation would be needed no later than 2023/24.

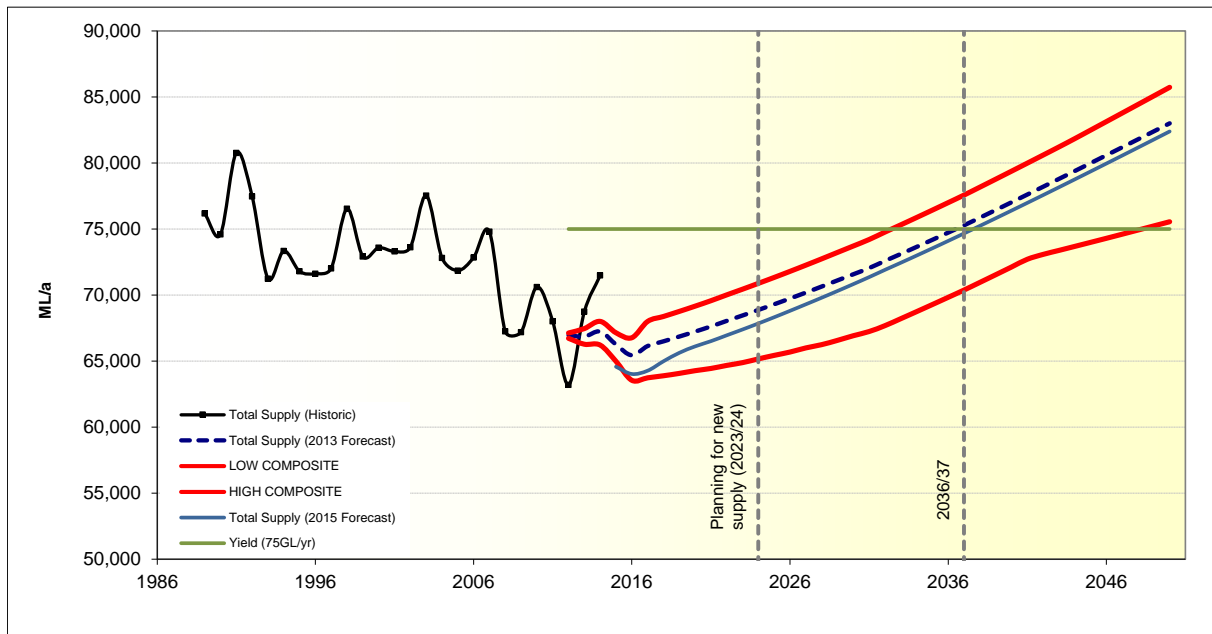


Figure 4: Supply demand balance based on revised demand forecast

As discussed in section 3.1.3 above, the impacts from NOW's review of the Water Sharing Plan (WSP) for the Tomago Tomaree Stockton groundwater sources could result in a loss of 3GL in yield for the Tomago source, and a loss of 1.5GL in yield for the Tomaree source. The yield impacts were estimated by Hunter Water using the peer-reviewed Source Model (SoMo) for Tomago, and storage behaviour analysis for Tomaree².

Together, these impacts would bring forward the intersection of the supply and demand curves by around eight years. In this scenario, planning for a major supply augmentation would need to start no later than 2015/16, based on the MERI trigger of allowing a 13-year lead time to avoid constraining the options. This is illustrated in Figure 5.

For sensitivity analysis, Figure 6 shows the impact on the supply-demand balance for a reduction in yield from the Tomago source only. In this scenario, the intersection of the supply and demand curves is brought forward by around five years and planning for a major supply augmentation would need to start no later than 2018/19. This is consistent with the next iteration of the LHWP, on the anticipated four to five year review cycle, needing to address a supply augmentation.

² The analysis for Tomaree is based on an earlier AQUIFEM-N model for this source. SoMo does not yet include a module to simulate behaviour of the Tomaree aquifer, instead assuming a constant extraction rate of 7 ML/day. SoMo may be expanded in 2015 to include a module for Tomaree.

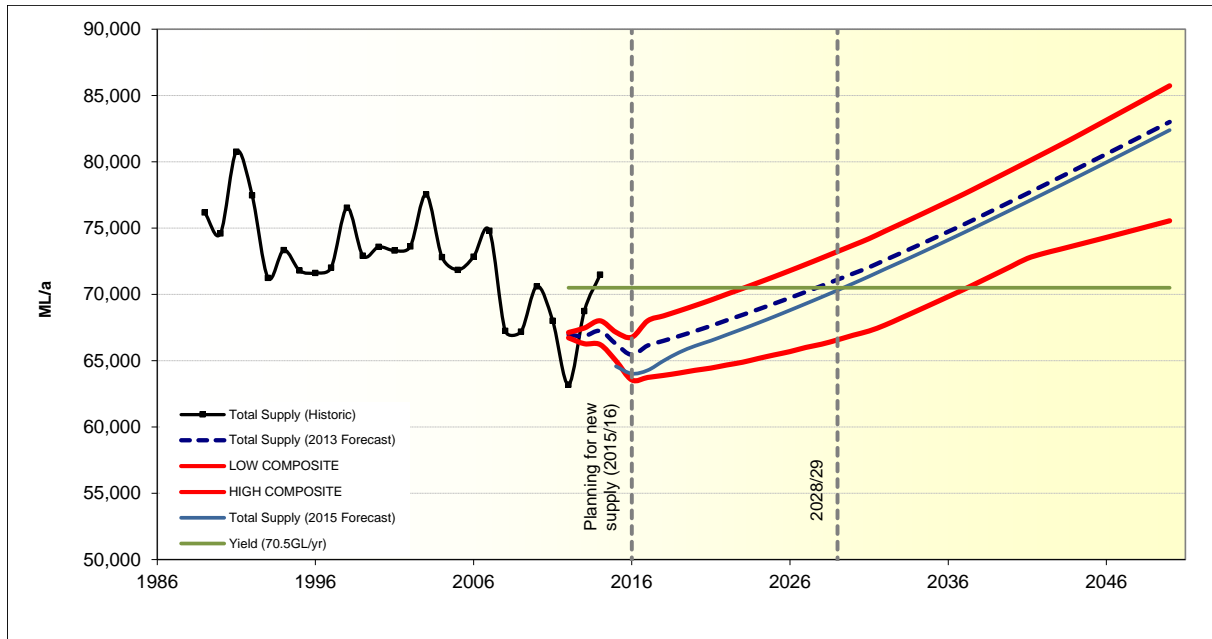


Figure 5: Supply-demand balance with potential reduction in yield for both Tomago and Tomaree arising from review of Water Sharing Plan

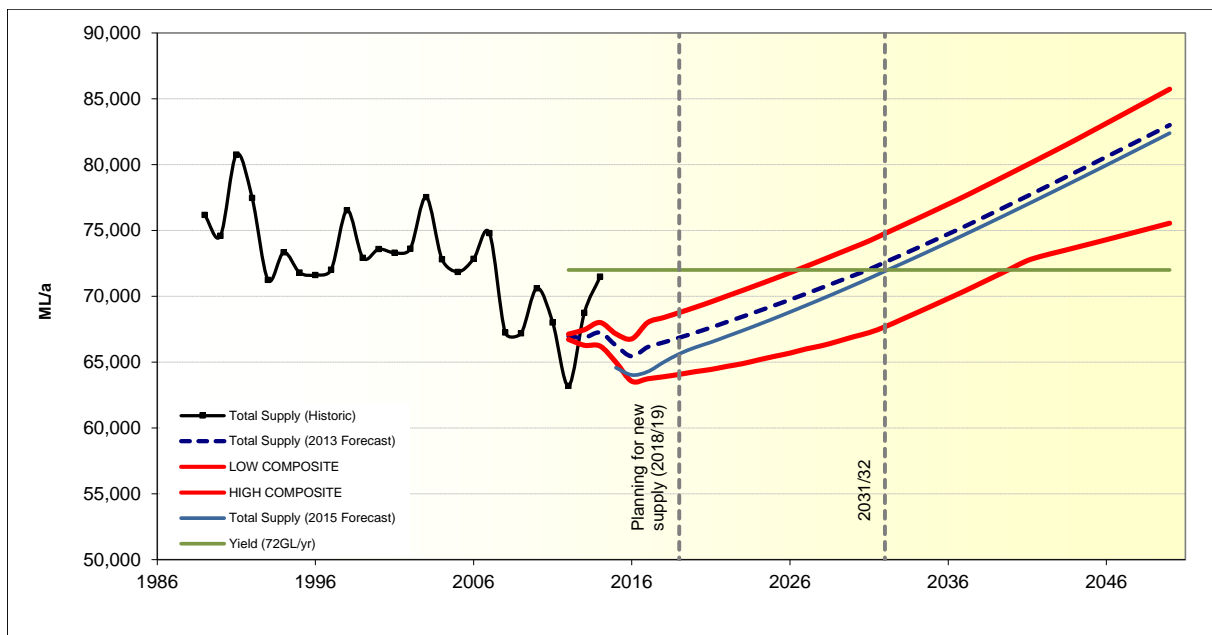


Figure 6: Supply-demand balance with potential reduction in yield for Tomago only

3.3 Evaluation workshop

A workshop was held on 16 October 2014 with participants from MWD, Hunter Water, NOW and WSC. The workshop was held to discuss the draft findings from the evaluation, review the draft evaluation report, and develop recommendations to put forward to the governance groups for endorsement at their meetings in November 2014, ie:

- Lower Hunter Water Senior Officers Group
- Metropolitan Water Chief Executive Officers Committee

- Independent Water Advisory Panel.

The workshop provided an opportunity for Hunter Water to present on changes to the demand forecast and the rationale for the yield calculation and implications of potential changes to groundwater access rules. It also provided a forum for the agencies involved in implementing the LHWP to contribute to developing strategies for working together to address issues emerging through the MERI process.

A number of actions were agreed during the workshop to progress work on implementation actions evaluated as part of the MERI process. The action summary from the meeting is included in Appendix C.

4 Findings and recommendations

4.1 Deliverables for 2014

For the majority of evaluation questions and implementation actions, agencies have achieved, or are on track to achieve, the objectives. Given that this is the first annual evaluation, some of the milestones for reporting have not yet been reached. Only two key implementation actions were due for completion in 2013/14:

- trial with Lake Macquarie City Council to better understand rainwater tank failures and educate participants (June 2014)
- introduce Water Wise Rules (1 July 2014 – for practical purposes, requiring actions to be completed in 2013/14).

Water Wise Rules were introduced on time, and the rainwater tank trial is slightly behind schedule, but will be completed by the end of 2014.

4.2 Other key actions and issues

The MERI evaluation examined some other key implementation actions in addition to deliverables for 2013/14, to ensure that future actions were progressing according to established timeframes, and found that the following projects are on track to be delivered on time:

- the Kooragang Industrial Water Scheme (KIWS)
- work on Central Coast transfers, including infrastructure investigations and system modelling
- readiness activities for temporary desalination, in particular, site selection work
- investigations into the Lower Hunter Alluvial Aquifer as a potential future drought response measure.

Hunter Water also reported costs incurred so far in implementing Water Wise Rules and the KIWS. The costs for implementing Water Wise Rules were lower than estimated during development of the LHWP.

Another key issue examined during the MERI evaluation related to the potential changes in the regulatory environment. This focused on proposed changes to the water sharing plan and groundwater access rules for the Tomago and Tomaree groundwater sources. Hunter Water's modelling indicates that the amended rules would result in a loss of 3GL in yield for Tomago, and a loss of 1.5GL in yield for Tomaree. This is discussed in more detail below.

4.3 Key finding

The key finding from the MERI evaluation process is that the proposed changes to groundwater access rules for Tomago and Tomaree would have a significant impact on system yield, with a consequence of bringing forward the need for major supply augmentation by around eight years.

Under the MERI Plan, endorsed by the various LHWP governance groups, a major review of the LHWP will be triggered:

If the evaluation of the latest supply-demand balance indicates that demand is likely to exceed supply within 13 years. The rationale for this timeframe is based on the lead time for a major supply augmentation to be delivered and producing water before a supply-demand imbalance occurs, in order to avoid constraining the options. The lead time must provide for strategic planning, investigations, environmental impact assessment, regulatory approvals, design, construction and commissioning.

If the proposed changes to groundwater access rules are approved, the modelling for the MERI evaluation indicates that a major review of the LHWP to plan for major supply augmentation

would need to begin in 2015/16. This is sooner than the expected major review cycle of every four to five years.

NOW advises that the existing Water Sharing Plan for the Tomago, Tomaree and Stockton groundwater sources was extended to 1 July 2015, if not replaced sooner. Its provisions have been incorporated into the *Draft North Coast Coastal Sands Water Sharing Plan*, incorporating the recommendations from the IRP meeting in March 2014.

Public exhibition of the draft WSP, along with a number of other plans, had been planned for late 2014, but the latest advice indicates this timeframe is now unlikely. Under the *Water Management Act 2000*, water sharing plans require approval from both the Minister for Natural Resources, Lands and Water, and the Minister for the Environment.

The MERI evaluation process has provided new information regarding the significant impact on system yield and potential triggering of a major supply augmentation, which would have environmental, economic and social impacts. Although preliminary advice on the possible impact on yield was available for the interagency review of amended rules proposed for the draft water sharing plan, the outcomes of the latest modelling and potential consequences for supply augmentation were not available for the IRP process in March 2014.

If the proposed amendments to the access rules had been suggested during the planning process to develop the LHWP, the implications would have been considered by the River Health Outcomes Group (RHOG). The RHOG was established to provide technical and environmental policy advice to the LHWSOG on issues related to the health of the Hunter region's rivers and aquifers and their associated ecosystems. The RHOG's original terms of reference state that:

The RHOG is not intended to replace existing statutory processes, such as those related to Water Sharing Plans and Water Management Licences, but may provide input to support these processes.

During development of the LHWP, the RHOG developed improved environmental flow rules for Chichester Dam and Seaham Weir through a collaborative interagency process. The delay in exhibiting the *Draft North Coast Coastal Sands Water Sharing Plan* provides an opportunity to conduct a similar process to evaluate the impact of the proposed amendments and consider whether other approaches could achieve the desired outcomes.

4.4 Recommendation

Based on discussions with the relevant agencies, MWD recommends establishing a groundwater sub-group of the RHOG, chaired by MWD and involving representatives from NOW, OEH, Hunter Water and MWD, to review the available information, develop potential options for access rules and timing, consider the ecosystem and system yield impacts, and develop a path forward by early 2015.

Subject to concurrence from the relevant agencies, the first steps in this process would be:

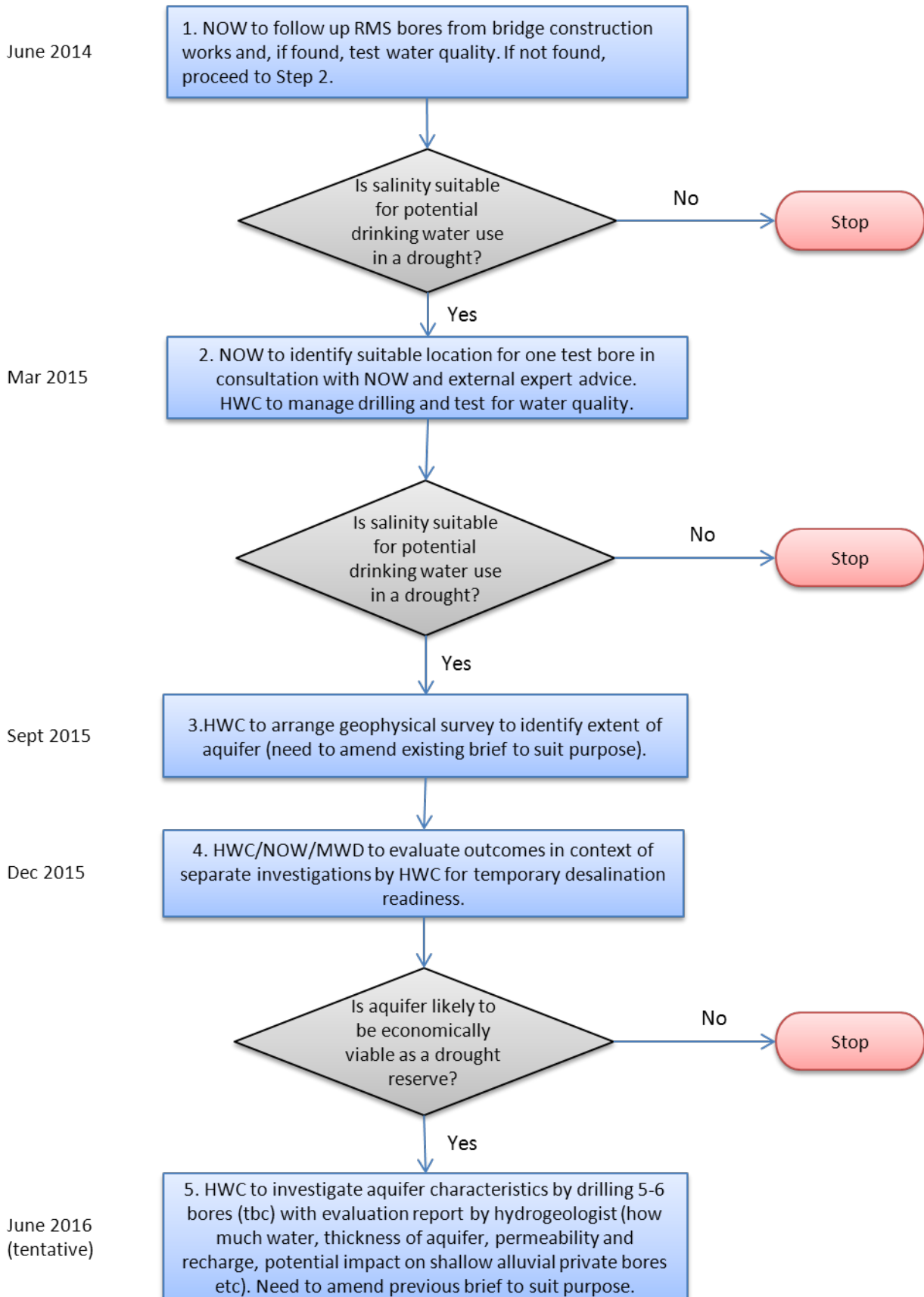
- establish the RHOG groundwater subgroup
- develop Terms of Reference (ToR), based on the RHOG ToR
- hold an inception meeting in late 2014.

As outlined in the RHOG terms of reference, this process is not intended to replace existing statutory processes for water sharing plans, but rather to provide input to support these processes.

APPENDICES

Appendix A Consolidated MERI reporting for implementation actions and annual evaluation questions

Appendix B Flowchart for Lower Hunter alluvial investigations



Appendix C Action Summary from MERI workshop

ACTION SUMMARY

2014 MERI evaluation workshop

Thursday 16 October 2014

11 am – 1.30 pm

Conference Room

Level 2, 117 Bull St, Newcastle West (State Government Office Block)

<i>Attendees</i>	MWD	Cathy Cole, Kate Drinkwater
	HWC	Emma Berry (<i>for Greg Bone</i>), Kirby Morrison, Brendan Berghout, Tony McClymont
	NOW	Bethany Hanson
	WSC/GCC	Garry Casement
<i>Apologies</i>	NOW	Eddie Harris
	OEH	Sharon Molloy
	DPE	Ben Holmes

Agenda item	Actions	Who	When
1. Introduction	nil		
2. 2014 MERI evaluation	<p>Central Coast inter-regional transfers</p> <ul style="list-style-type: none"> Technical meeting to be arranged re hydraulic modelling for infrastructure investigations Modelling discussions to be progressed Convene next meeting of CCWG after these discussions <p>Temporary desalination readiness</p> <ul style="list-style-type: none"> Confirm date for options assessment workshop and advise MWD Points to consider: latest info on Burwood Beach site constraints; community perceptions for sites involving co-location with WWTW; liaison with approval authorities in parallel with concept design <p>Lower Hunter Alluvial investigations</p> <ul style="list-style-type: none"> Review flowchart process/dates and advise MWD of any changes Add flowchart to final version of evaluation report (appendix?) 	<p>Garry/Tony</p> <p>Brendan / Rahman Cathy</p> <p>Kirby Kirby</p> <p>Kirby Cathy</p>	<p>31 Oct 2014</p> <p>31 Dec 2014 Jan 2015</p> <p>20 Oct 2014</p> <p>20 Oct 2014 24 Oct 2014</p>

Agenda item	Actions	Who	When
3. Updated demand forecast	Similar presentation for LHWSOG meeting	Tony	6 Nov 2014
4. System yield	Expand section in draft evaluation report on system yield, as per presentation and discussion	Brendan	20 Oct 2014
	Similar presentation for LHWSOG meeting	Brendan	6 Nov 2014
5. Supply-demand balance	Replace label on graphs saying 'Major review' with something like 'Planning for new supply' (since major reviews of LHWP also occur periodically) Key issue is the potential impact on yield arising from the proposed change to groundwater access rules in draft revised WSP for Tomago and Tomaree. Timing for exhibition of draft WSPs unknown, but unlikely before early 2015. Hunter Water propose to develop an improved model for Tomaree and to support a 3-year study by UTS to better understand the science regarding the impact of drawdown on ecosystem health (starting 2015/16). Recommendation from evaluation process is that further discussions on proposed changes to access rules be held using a similar process to the River Health Outcomes Group (RHOG) process to develop and agree on improved environmental flow rules for the LHWP. Involve at least NOW, OEH, MWD and HWC (others involved in Interagency Review Panel for WSP reviews were DPI Agriculture and LLS). Draft words for inclusion in evaluation report to LHWSOG (and subsequently MWCEO and IWAP) and circulate to attendees Discuss recommendation with NOW management	Cathy	20 Oct 2014
		Beth	24 Oct 2014
6. Evaluation process from here	Draft evaluation report to be edited (as above) and submitted to next LHWSOG meeting on 6 Nov 2014. Amendments relate to lower Hunter alluvial flowchart, system yield, labels for supply-demand balance graphs, and recommendations. Then to MWCEO meeting 20 Nov and IWAP on 25 Nov 2014.	Cathy	24 Oct 2014