Centre for Natural Gas
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Resetting our understanding of the Surat Part of the Great Artesian Basin

Project

This working document is the final report of the Resetting our *Understanding of the Surat part of the Great Artesian Basin* project.

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Disclosure

The UQ Centre for Natural Gas is currently funded by the University of Queensland and the Industry members (Arrow Energy, APLNG and Santos). The Centre conducts research across Water, Geoscience, Petroleum Engineering and Social Performance themes.

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The Australian Code for the Responsible Conduct of Research outlines expectations and responsibilities of researchers to further ensure independent and rigorous investigations.

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1.3	H. Schultz	23 August 2021	Finalise document
1.4	H. Schultz	28 September 2021	Incorporate comments from A. Garnett
1.5	H Schultz	2 November 2021	Incorporate advisory group feedback.

Contents

Executive Summary

Since the mid-2000's there had been a significant increase in scientific studies of the Great Artesian Basin (GAB) due to expansion of the resources industries and a number of public funded research programs, and a range of findings had not been widely reported. This project was created to collate a state-of-the-art body of knowledge about the Great Artesian Basin (GAB) to inform the community regarding advances in scientific knowledge of the basin and strengthen decision making about optimal use of the resource. NERA's support for this project, in the form of project funding and collaboration on promotional activities, has been integral to the release of the findings from a broad range of recent scientific investigations undertaken by research institutions, industry, government and consultancy organisations. The project also could not have been realised without the substantial in-kind contributions from the authors and the Co-Guest Editors, and the support of their organisations.

This project has resulted in the publication of a Special Issue (SI) of the Hydrogeology Journal titled "Advances in hydrogeologic understanding of Australia's Great Artesian Basin", and publication of additional public information material via dedicated webpages (https://natural-gas.centre.uq.edu.au/great-artesian-basin).

The SI focused on advances in scientific understanding of the GAB's hydrological processes. It featured 26 peer-reviewed articles written by experts from very diverse organisations. It also includes an editorial article highlighting the importance of the SI, summarising all articles, and offering concluding remarks and suggestions for future work. The interdisciplinary SI documented a wide range of research that had been undertaken within these diverse organisations since the mid to late 2000s, making this data and analysis available to a much broader audience. The SI is freely available to the more than 4000 members of the International Association of Hydrogeologists, ensuring that groundwater experts working on GAB related investigations, or conducting research in analogous basins, have access to this substantial body of recent research. The SI was launched at the Australasian Groundwater Conference 2019 (Brisbane, November 2019), in advance of the hard copy release (February 2020). The Conference included a technical session that featured presentations based on seven of the SI articles, and the associated abstracts were also published as part of the conference proceedings. The project was also the subject of a further conference paper *A comprehensive, up-to-date evidence base to inform public, planning and policy for Australia's Great Artesian Basin,* delivered at the inaugural IAH Congress on Geoethics and Groundwater Management (online, 2020).

The public information material has been released as web-based products, including new artwork to illustrate key topic areas. The web material is not restricted to findings published in the SI, which were often focused on highly specialised areas of technical interest and importance. The project team elected to focus on issues that are known to be of interest to the community, or are often misunderstood. Unfortunately, Covid-19 restrictions resulted in original plans for both video material and a regional research roadshow to be altered. The video project was cancelled, and the roadshow was replaced by contributing to established workshop programs conducted by other organisations.

This project provided a unique opportunity to publish the findings from many projects conducted by a wide range of organisations and institutions. The publication captures knowledge derived from both publicly funded research and studies undertaken for regulatory or commercial purposes – results from these latter studies are often not published externally, and therefore not available for broader research use. The project was able to capitalise on the Hydrogeology Journal's established audience to ensure communication of the latest scientific findings to a large number of experts; and the Australasian Groundwater Conference 2019 to raise the profile of the publication and the excellent research therein. Researchers and other technical experts are now able to incorporate the SI research into future research, investigations and resource planning activities. The new web material has been released, and has been promoted via the Centre's LinkedIn account. Centre researchers will continue to feature these research findings in presentations to the public, and the information is now accessible to other experts undertaking similar roles.

1. Background

The Great Artesian Basin (GAB) is an iconic groundwater resource that supports high value agricultural and resource industry production, provides essential water supplies for regional communities, is central to the region's Indigenous culture, and supports unique and diverse natural systems. It covers approximately 22% of Australia, and while it has been the focus on research and study for more than a century, there is much still to learn. The resources boom in some areas, particularly the development of the coal seam gas industry in the Surat Basin, Queensland, has driven the generation of a large volume of data and analysis, which has expanded understanding in some areas. However, much of this information was held by government agencies and industry and not reported externally. Development activities were raising community concern regarding knowledge of the basin and the public debate indicated that a lot of discussion was based on misconceptions and outdated knowledge.

As a result, the Centre for Natural Gas successfully applied for NERA funding to develop an updated peer-reviewed evidence base of the latest scientific information to ensure that the latest findings were available to the broadest expert audience, and public communication materials could be developed to communicate accurate information to the public.

The project team engaged a project Steering Committee, with representatives from industry partners, NERA and key government agencies to provide guidance regarding the project. Several representatives also contributed manuscripts to the project.

2. Science publication

2.1 Publication process

After considering various publication options, the project team engaged with the Executive Editor of the Hydrogeology Journal (HJ) regarding the publication of a Special Issue (SI) focused on the GAB. This option was preferred as the project would not involve any printing costs; the peer-review process was well established; clear publication deadlines were set; the journal provided good academic recognition for authors; there was a linked launch opportunity; and the distribution to more than 4000 members of the International Association of Hydrogeologists (IAH) (both online and hard copy access) as well as to major universities in Australia and globally who subscribe to the journal (online access) was assured. Following consultation with the Steering Committee and the Executive Editor, it was agreed that the SI's title would be "Advances in hydrogeologic understanding of Australia's Great Artesian Basin".

In accordance with the publications practice of the HJ, the project team established a team of co-guest editors as shown in Table 1. The guest editorial team included leading researchers from major government research organisations, along with the UQ project team.

Table 1 Co-Guest Editors for the Special Issue

Co-Guest Editor	Organisation
Carlos Miraldo Ordens	The University of Queensland
Neil McIntyre	
Jim Underschultz	
Dirk Mallants	CSIRO
Catherine Moore	CSIRO / GNS NZ

Tim Ransley	Geoscience Australia

The project team also worked with the HJ Executive Editor to engage a wide range of highly qualified peer reviewers to independently assess the quality of the research and of the manuscripts. All Co-Guest Editors and peer reviewers volunteered their time to this project, which represents a substantial in-kind contribution. Many of the authors also prepared their articles in their own time while dealing with substantial workloads related to their duties over that period. All parties were working to extremely tight deadlines to meet the requirements of the journal publication process.

Early in the project, 104 potential authors with experience in working on hydrogeology or groundwater management of the GAB were invited to submit an expression of interest (EoI) for contributing articles to the SI. The invitations were distributed to experts in a wide range of research institutions (domestic and international universities, CSIRO, Geoscience Australia, Bureau of Meteorology); State government agencies, e.g. the then Queensland Department of Natural Resources, Mines and Energy, South Australian Department of Environment and Water; resource companies; and consultancy firms. 60 EoIs were received and after review, 49 were provisionally accepted for publication. Not all of the accepted EoIs resulted in articles due to the following reasons:

- Authors did not complete full manuscripts
- Manuscripts did not successfully progress through the peer-review process
- Some manuscript topics were not well aligned with the SI focus area.

2.2 Special Issue

Ultimately 26 manuscripts, plus the overview and summary articles, were published. Table 2 provides a listing of all articles, authors and affiliations. The articles were progressively published online as they were formally accepted by the HJ. The first articles appeared online in November 2019 and the hard copy of the journal was published in February 2020 – the first HJ issue of the year.

The Special issue include authors affiliated with five Australian universities, seven international universities, six government departments/research institutions, eight consultancy firms, four gas companies, along with one independent contributor (Dr M. A. Habermehl, previously Geoscience Australia).

An article providing an overview of the project was subsequently published in *Advances in Geoethics and Groundwater Management: theory and Practice for a Sustainable Development – Proceedings of the 1st Congress on Geoethics and Groundwater Management, Porto, Portugal, 2020.*

Table 2 List of Special Issue Articles by Topic Category

Category	Article	Authors	Affiliations
Overview article	Preface: Advances in hydrogeologic understanding of Australia's Great Artesian Basin	C. Miraldo Ordens[1], N. McIntyre[1], J.R. Underschultz[2], T. Ransley[3], C. Moore[4], D. Mallants[5]	[1] Centre for Water in the Minerals Industry, The University of Queensland [2] Centre for Natural Gas, The University of Queensland, [3] Geoscience Australia, [4] CSIRO Brisbane, [5] CSIRO Adelaide
History of the GAB	Review: the evolving understanding of the Great Artesian Basin (Australia), from discovery to current hydrogeological interpretations	M. A. Habermehl	Independent (previously Geoscience Australia)
Eminent researcher	Justin Costelloe: A champion of arid zone water research	A. W. Western, F. Matic, M. C. Peel	Department of Infrastructure Engineering, The University of Melbourne
Groundwater flow processes			
Compartmentalisation and connectivity	Connectivity between Australia's Great Artesian Basin, underlying basins, and the Cenozoic cover	B. Radke[1], T. Ransley[2]	[1] Consulting Geologist [2] Geoscience Australia
	Hydrogeological implications of active tectonics in the Great Artesian Basin, Australia	M. Sandiford[1], K. Lawrie[2], R.S. Brodie[2]	[1] School of Earth Sciences, University of Melbourne [2] Groundwater Branch, Geoscience Australia
Aquifer flows: pathways, rates and heterogeneity	Reconciling contradictory environmental tracer ages in multi-tracer studies to characterize the aquifer and quantify deep groundwater flow: an example from the Hutton Sandstone, Great Artesian Basin, Australia	A. Suckow, A. Deslandes, M. Raiber, A.R. Taylor, P. Davies, C. Gerber, F. Leaney	CSIRO Land and Water

	Flow system of the Hutton Sandstone in the northern Surat Basin, Australia	S. Vink[1,2], J. Underschultz[2], S. Guiton[3], J. Xu[2], V. Honari[2]	[1] Centre for Water in the Minerals Industry, The University of Queensland [2] Centre for Natural Gas, The University of Queensland [3] QGC
	Well log constrained porosity and permeability distribution in the Springbok Sandstone, Surat Basin, Australia	O. Gaede[1], M. Levy[1], D. Murphy[1], L. Jenkinson[2], T. Flottmann	[1] Faculty of Science and Engineering, Queensland University of Technology [2] Origin Energy
	Inter-aquifer connectivity between Australia's Great Artesian Basin and the overlying Condamine Alluvium: an assessment and its implications for the basin's groundwater management	S. Pandey[1], D Singh[1], S. Denner[2], R. Cox[3], S. Herbert[2], C. Dickinson[4], M. Gallagher[1], L. Foster[1], B. Cairns[1], S. Gossmann[2]	[1] Office of Groundwater Impact Assessment, Queensland Government [2] Arrow Energy [3] Formerly Office of Groundwater Impact Assessment [4] Klohn Crippen Berger, Brisbane
	Refined understanding of groundwater in heterogeneous units through identification of vertical stratification of hydrochemistry as identified in the Walloon subgroup of Australia's Great Artesian Basin	D. Owen[1], S. Herbert[2]	[1] Natural Resource Research Alliance, Brisbane [2] Arrow Energy
	Hydrogeological Implications of fault behaviour from in-situ pressure measurements of the Horrane Fault in the Surat Basin (Great Artesian Basin, Australia)	R. Viljoen[1], B. Pinder[1], S. Mukherjee[2], S. Herbert[1]	[1] Arrow Energy [2] School of Earth and Environmental Sciences, The University of Queensland
Numerical modelling	Enhancing geological and hydrogeological understanding of the Precipice Sandstone aquifer of the Surat Basin, Great Artesian Basin, Australia, through model inversion of managed aquifer recharge datasets	P. Hayes[1], C. Nicol[2], A. La Croix[3], J. Pearce[1,4], S. Gonzalez[1], J. Wang[5], A. Harfoush[1], J. He[6], A. Moser[7], L. Helm[7], R. Morris[8], D. Gornall[9]	[1] Centre for Natural Gas, The University of Queensland [2] Groundwater Logic, Melbourne [3] School of Science, University of Waikato [4] School of Earth and Environmental Science, The University of Queensland

			[5] Key Laboratory of Petroleum Resources, China University of Geosciences, Wuhan [6] Key Laboratory of Marine Reservoir Evolution and Hydrocarbon Enrichment Mechanisms, China University of Geosciences, Beijing [7] RDM Hydro, Brisbane [8] Santos/GLNG
	Regional scale modelling and predictive uncertainty analysis of cumulative groundwater impacts from coal seam gas and coal mining developments	J. Sreekanth[1], R. Crosbie[2], T. Pickett[1], T. Cui[1], L. Peeters[2], E. Slatter[3], J. Northey[3], L. Merrin[4], P. Davies[2], K. Miotlinski[5], W. Schmid[6], A. Herr[4]	[1] CSIRO Land and Water, Dutton Park, QLD [2] CSIRO Land and Water, Glen Osmond, SA [3] Geoscience Australia, Canberra [4] CSIRO Land and Water, Acton, ACT [5] Universidade Federal de Santa Catarina, Florianópolis, Brazil [6] CSIRO Land and Water, Floreat, WA
Springs and groundwater dependent ecosystems	A multidisciplinary approach to the hydrological conceptualisation of springs in the Surat Basin of the Great Artesian Basin (Australia)	S. Flook[1], J. Fawcett[2], R. Cox[1], S. Pandey[1], G. Schöning[1], J. Khor[1], D. Singh[1], A. Suckow[3], M. Raiber[4]	[1] Office of Groundwater Impact Assessment, Queensland Government [2] CDM Smith, Victoria [3] CSIRO, Glen Osmond, SA [4] CSIRO, Brisbane, Qld
	Field investigation of potential terrestrial groundwater dependent ecosystems within Australia's Great Artesian Basin	C. Jones[1], D. Stanton[2], N. Hamer[3], S. Denner[1], K. Singh[1], S. Flook[4], M. Dyring[2]	[1] Arrow Energy [2] 3D Environmental, Brisbane [3] Earth Search, Brisbane [4] Office of Groundwater Impact Assessment, Queensland Government

	Hydrochemical variations of groundwater and spring discharge of the western Great Artesian Basin, Australia: implications for regional groundwater flow	S. Priestley[1,2], P. Shand[2], A. Love[2], L. Crossey[3], K. Karlstrom[3], M. Keppel[4], D. Wohling[4], P. Rousseau-Gueutin[2]	[1] ANSTO, Lucas Heights, NSW [2] College of Science and Engineering, Flinders University [3] Department of Earth and Planetary Sciences, University of New Mexico [4] Department for Environment and Water, South Australian Government
	Elucidating sources to aridland Dalhousie Springs in the Great Artesian Basin (Australia) to inform conservation	F. Wolaver[1], S. Priestley[2], L. Crossey[3], K. Karlstrom[3], A. Love[4]	[1] Bureau of Economic Geology, Jackson School of Geosciences, The University of Texas at Austin [2] ANSTO, Lucas Heights, NSW [3] Earth and Planetary Sciences, The University of New Mexico [4] National Centre for Groundwater Research and Training, Flinders University
	Evidence for intra-plate seismicity from spring-carbonate mound springs in the Kati Thanda–Lake Eyre region, South Australia: implications for groundwater discharge from the Great Artesian Basin	M. Keppel, K. Karlstrom, L. Crossey, A. Love, S. Priestley	[1] College of Science & Engineering, Flinders University [2] Department of Earth Planetary Science, University of New Mexico [3] ANSTO, Lucas Heights, NSW
	Evidence for groundwater mixing at Freeling Spring Group, South Australia	T. Halihan[1], A. Love[2], M. Keppel[3], M. Dailey[1], V. Berens[3], D. Wohling[4]	[1] Boone Pickens School of Geology, Noble Research Centre, Oklahoma State University [2] School of the Environment, Flinders University [3] Department for Environment, Water and Natural Resources, South Australian Government

	An integrated remote-sensing mapping method for groundwater dependent ecosystems associated with diffuse discharge in the Great Artesian Basin, Australia	V. Matic[1,2], J. Costelloe[2], A. Western[2]	[1] Bureau of Meteorology, Melbourne [2] Department of Infrastructure Engineering, University of Melbourne
Groundwater governance and management tools	Challenges in sustainably managing groundwater in the Australian Great Artesian Basin: lessons from current and historic legislative regimes	J. Robertson	Griffith Law School, Griffith University
	The 3D Water Atlas: a tool to facilitate and communicate new understanding of groundwater systems	A. Wolhuter[1], S. Vink[2], A. Gebers[3], F. Pambudi[3], J. Hunter[3], J. Underschultz[1]	[1] Centre for Natural Gas, The University of Queensland [2] Sustainable Minerals Institute, The University of Queensland [3] School of Information Technology and Electrical Engineering, The University of Queensland
	Climate changes and variability in the Great Artesian Basin (Australian), future projections, and implications for groundwater management	G. Fu[1], Y. Zou[1,2], R. Crosbie[3], O. Barron[1]	[1] CSIRO Land and Water, Wembley, WA [2] Key Laboratory of Wetland Ecology and Environment & Jilin Provincial Joint Key Laboratory of Changbai Mountain Wetland and Ecology, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences [3] CSIRO Land and Water, Glen Osmond, SA
	Estimating current and historical water abstraction from the Great Artesian Basin and other regional scale aquifers in Queensland, Australia	C. Kent[1], S. Pandey[1], N. Turner[1], C. Dickinson[1], M. Jamieson[2]	[1] Kohn Crippen Berger, Brisbane [2] Department of Natural Resources, Mines and Energy, Queensland Government

	Improved characterisation of unmetered stock and domestic groundwater use in the Surat and southern Bowen basins of the Great Artesian Basin (Australia)	D. Singh, S. Flook, S. Pandey, D. Erasmus, L. Foster, K. Phillipson, J. Smallacombe, J. Khor, S. Lowry	Office of Groundwater Impact Assessment, Queensland Government
	Understanding the public's response towards 'enhanced water recovery' in the Great Artesian Basin (Australia) using the carbon capture and storage process	K. Witt[1], M. Ferguson[2], P. Ashworth[1,2]	Centre for Natural Gas, The University of Queensland School of Chemical Engineering, The University of Queensland
	The contribution of citizen science in managing and monitoring groundwater systems impacted by coal seam gas production: an example from the Surat Basin in Australia's Great Artesian Basin	M. Jamieson[1], M. Elson[1], R. Carruthers[1], C. Miraldo Ordens[2]	Department of Natural Resources, Mines and Energy, Queensland Government Centre for Water in the Minerals Industry, The University of Queensland
Project summary article (published in Advances in Geoethics and Groundwater Management: theory and Practice for a Sustainable Development)	A Comprehensive, Up-To-Date Evidence Base to Inform Public, Planning and Policy for Australia's Great Artesian Basin	C. Miraldo Ordens[1], N. McIntyre[1,2], J. Underschultz[3], P. Hayes[3]	[1] Centre for Water in the Minerals Industry, The University of Queensland [2] School of Civil Engineering, The University of Queensland [3] Centre for Natural Gas, The University of Queensland

Note: This table includes a standardised list of author affiliations. This has removed slight variations where the affiliations of the same author, or multiple authors from the same institution had been recorded differently in different articles. This has included updating references to the Centre for Coal Seam Gas to the current name of Centre for Natural Gas, which had been in place when the final publications were approved.

2.3 Special Issue Launch

A major advantage of the HJ publication was the opportunity to launch the SI at the International Association of Hydrogeologists Australasian Groundwater Conference 2019. The Conference, which was held in Brisbane, regularly attracts a large number of attendees from industry, government and research organisations and provided an excellent opportunity to promote the SI and inform attendees of key findings. Promotional activities included:

- Sponsorship of the conference dinner: The publication was launched at the dinner by Ms Juanita Hamparsum, then Chair of the Great Artesian Basin Coordinating Committee.
- Sponsorship of a Technical session: The project team chaired a technical session featuring presentations based on seven of the SI articles, and the associated abstracts were also published as part of the conference proceedings (Australasian Groundwater Conference: Groundwater in a Changing World. Flinders University. https://doi.org/10.25957/5DEF2C732D6D6)
- Centre for Natural Gas conference booth: The Centre displayed a range of material promoting the project and the SI.

Figure 1 Special Issue Activities at the Australasian Groundwater Conference 2019

2.4 Additional Dissemination Activities

The research was also featured in a workshop at the Centre for Natural Gas Annual Research Review on 12 December 2019. The workshop included a presentation of key findings from the SI, and a facilitated discussion of further research needs. The presenters/panel members were Dr Carlos Miraldo Ordens, Prof Neil McIntyre, and Mr Craig Walton (Principal Policy Officer, then Department of Natural Resources, Mines & Energy).

Dr Miraldo Ordens also delivered a workshop on the key findings from the project at the Queensland IAH meeting in February 2020.

The project, the resulting publication, and public education materials were the basis of two presentations delivered at international conferences:

- IAH Congress on Geoethics and Groundwater Management (online, May 2020) and the associated article *A comprehensive, up-to-date evidence base to inform public, planning and policy for Australia's Great Artesian Basin,* in the conference proceedings;
- U21 Early Career Researcher Workshop 'Water and Society' (Lund, Sweden, 19-22 November).

3. Public Information

The public information material has been released as web-based products, including new artwork to illustrate the three key topic areas of springs, water use and sustainability (see Figure 2). The web material is not restricted to findings published in the SI, which were often focused on highly specialised areas of technical interest and importance. Hydrogeology is a very complex field, and research findings are often reporting important, but incremental advances in understanding. While the SI collated a substantial set of material of scientific importance, it lacked the attention-grabbing 'headlines' that could form the basis of an education program based on new insights.

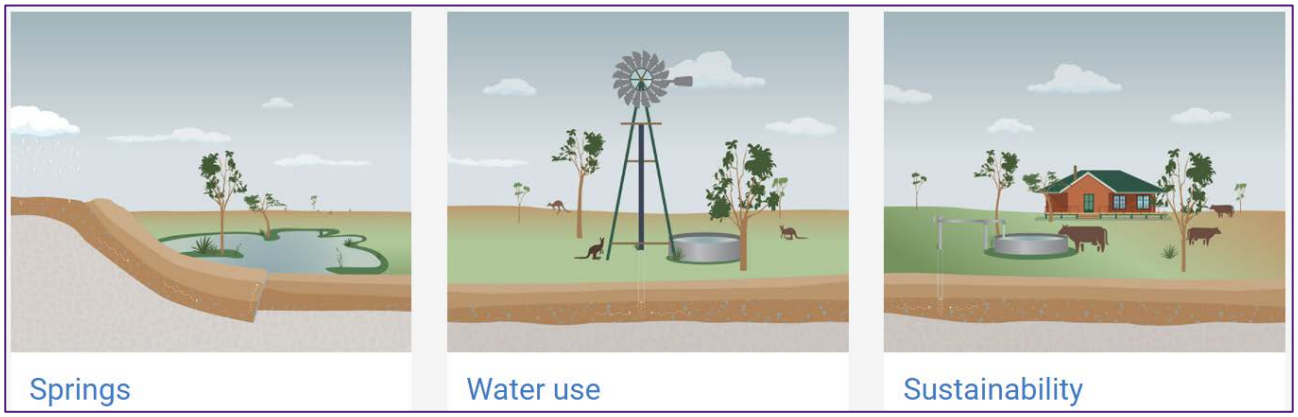

Figure 2 Webpage Artwork

The project team elected to focus on issues that are known to be of interest to the community, or are often misunderstood. It was also important that the information complement material that was already in the public arena, rather than duplicate information unnecessarily. The three selected topic areas allowed the material to present key information about hydrologic flow, unique ecosystems, the range of water uses, and major water management initiatives that are protecting the system. The material also provides links to a range of high-quality information sources regarding spring systems and citizen science initiatives that have been recently developed by other organisations, as well as current sustainability initiatives.

During the term of this project, the Centre also engaged with the community members leading the development of the Great Artesian Basin Interpretive Centre. This new stakeholder relationship provided the project team with insights regarding the community's contemporary understandings and misconceptions of the GAB, which has informed the selection of the topic areas. Several lead researchers and authors also contributed to video material developed by the Interpretative Centre production team, ensuring that the latest scientific information was used to address common community questions. The Centre for Natural Gas considers the Interpretative Centre will play an ongoing role in educating the public regarding the GAB, and we will continue to provide support where possible.

The web pages provide access to the abstracts for all articles in the SI. Full copies of the articles are readily available to people with an institutional subscription to relevant journal databases (usually researchers through their institutions), and of course members of the IAH, which ensures access by many experts in industry, government and consultancy firms. Other readers can also pay to download the full articles. The project team had considered making all articles open access, however this cost (~$70k) was far too great for the limited project budget. While this would have increased public access, given the complexity of the material it is unlikely to have achieved the goal of improving public understanding. Two key articles on improved modelling techniques and connectivity were made open access by their authors to encourage wider use.

The coronavirus pandemic has resulted in several changes to the initial communication strategy. Unfortunately, the initial plans for production of a series of short videos to highlight different topics was

unable to proceed due to Covid-19 restrictions. The Steering Committee also recommended that the best option for delivering related presentations to regional communities would involve participation in existing events, rather than initiating a new series of meetings. This was mainly in order to avoid stakeholder engagement fatigue. It also reflected the adjustment to responsible public event management under Covid-19 arrangements, and continues the Centre's program of collaborating with long-term partners regarding information sharing initiatives.

While opportunities for regional events have been limited, researchers have incorporated the scientific findings reported in the SI into presentations as part of Groundwater Net workshops (Department of Regional Development, Manufacturing and Water), GasFields Commission Queensland workshops, and company-specific stakeholder engagement groups, as well as discussions with individual landholders. The project team and fellow Centre for Natural Gas researchers will continue to integrate the SI findings into presentations and discussions as part of their standard approach to delivering the latest scientific findings to all stakeholders.

4. Conclusion

NERA's role in supporting this project has been essential in bringing science and information into the public domain quickly and more efficiently than would have otherwise been possible. This unique project facilitated the collaboration of experts from government, industry, research institutions and consultancy firms to produce a Special Issue of the Hydrogeology Journal, containing one editorial and 26 scientific articles reporting the latest scientific findings relating to the hydrogeology of the GAB. The articles in this SI report the findings from a wide range of research conducted by research institutions, government, industry and the consultancy sector since the mid-2000's, which had yet to be externally reviewed and reported. Without the impetus provided by this SI it is likely that much of this material would have remained within individual agencies and organisations, informing internal documents but not available to the broad range of groundwater experts who would find it useful. The commitment of authors and Co-Guest Editors to the publication process, especially given the tight timeframes; and the collaboration across sectors, were essential for the delivery of the SI.

The academic peer-review process has provided independent scrutiny to all manuscripts to ensure that the research is worthy of publication and that the articles are of high quality. While this process of managing timelines and reviewing content did create some engagement challenges at times, the final production of 26 high quality articles covering diverse topics is an achievement by all parties who contributed to the project.

The public education component of the project was constrained by both budget and the coronavirus pandemic. The web pages developed through the project have focused on topics that are known to interest the community, or are areas where misconceptions are reported. These web pages are integrated with the Centre for Natural Gas website and can be expanded as new and relevant research findings are delivered.

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