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Understanding natural gas impacts and opportunities on agriculture in the South East of South Australia

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September 2019

Report to the Gas Industry Social and Environmental Research Alliance (GISERA)

ISBN (print): 978-1-4863-1336-5

ISBN (online): 978-1-4863-1337-2

Food and Agriculture

Citation

Huth, N, Llewellyn, R., Kuehne, G., Thomas, M., Ratcliff, C., and Bramley, R. (2019) Understanding natural gas impacts and opportunities on agriculture in the South East of South Australia. CSIRO, Australia.

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Human research ethics

This study was granted ethical clearance (162/18) by CSIRO's Social Science Human Research Ethics Committee in accordance with the National Statement on Ethical Conduct in Human Research.

Important disclaimer

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Acknowledgments

This Project was funded by the Gas Industry Social and Environmental Research Alliance (GISERA). GISERA is a collaborative vehicle established to undertake publicly-reported independent research addressing the socio-economic and environmental impacts of Australia's natural gas industries. The governance structure for GISERA is designed to provide for and protect research independence and transparency of funded research. See gisera.csiro.au for more information about GISERA's governance structure, funded projects, and research findings. The contributions of interviewees and members of the local project advisory committee are much appreciated.

Executive summary

This project seeks to assist community understanding and inform public policy development relating to potential primary industry impacts and opportunities from conventional gas development in the South East of South Australia (SESA) to minimise misinformation and maximise opportunities in the region. To achieve this, the project collated basic data on the environment of the local primary industries in the SESA, engaged with the primary industry and environmental stakeholders via in-depth interviews of relevant individuals, and provided a review of the literature relating to issues raised in the interviews. Key messages include:

1. Conventional gas activities have generally been well accepted by primary producers over a long period. A shift in attitudes to the gas industry occurred around 2014 when the potential for development using unconventional gas technology became apparent in the community.
2. Local stakeholders value the "Clean and Green" image of the region targeted in regional growth strategies. It was not clear that further gas development fitted comfortably within this regional image, even though the regional growth strategy includes clear intent to increase the availability and reliability of energy through the development of renewable energy sources
3. As found in previous studies from other regions, stakeholders may not be prepared to compromise their concern over the potential for natural resource, environmental and reputational risk when weighing up costs and benefits. For most, the perceived local benefits from the modest gas developments were not considered to balance perceived risks to agriculture and regional brands.
4. Study participants felt that communication of important information on issues such as industry regulation or monitoring was too slow and insufficient, allowing communications from polarised voices to dominate. Stakeholders raised concerns that public messages from those seeking to protect the regional image may inadvertently contribute to damage to the brand that they seek to protect by drawing the region into a public debate about local gas development.
5. Balance within the community debate may benefit from greater engagement by those in the community who hold the middle ground and/or offer a science-based voice. A role for the provision of clear, accurate messages from an independent and trusted source was recognised.

1 Introduction

Natural gas exploration and development has boomed around the world in recent years. While each project and region is different, varying enormously in scale and impact, significant literature now exists describing the perceived costs and benefits of gas development. Community understanding of issues arising from developments such as those in conventional gas often reflects the information available to the community members or the information they actively seek. Experience from other gas development regions highlights the role of independent public good research and communication of scientific data for informing community debate. However, the same experience has clearly shown that community members can feel overwhelmed by the volume, complexity and apparent contradictory nature of information available from the large number of sources available to them. It can be challenging for community members to place reports and experiences from rural regions with gas developments in other parts of Australia or the world in the context of what is likely in their local region. For example, Walton *et al.* (2017) stated the need to consider potential 'anticipatory effects' when studying gas development in rural Queensland. This project is aimed at addressing this challenge through timely sharing of locally relevant information.

The GISERA agricultural land management team has taken a lead role in other regions in presenting information in a form suitable for rural stakeholders. Experience tells us that information such as this is highly valued during engagement between community, government and industry on issues of future gas development. In this project there is a significant opportunity for early engagement and information provision prior to development to maximize the benefit to primary industry community understanding.

Therefore, this project will assist community understanding and inform public policy development relating to potential primary industry impacts and opportunities from conventional gas development in the south east of South Australia (SESA).

To achieve the project objective, we will:

1) Collate basic data on primary industries and the local primary industry environment in the SESA.
2) Engage with primary industry stakeholders via a structured survey of relevant individuals using experienced local rural social researchers to document and better understand the risks and opportunities identified for each sector.
3) Provide a comparative analysis of likely impacts and opportunities raised by stakeholders in the survey to demonstrate similarities and differences with resource developments in other regions.
4) Identify existing research gaps and processes required for monitoring potential issues.

2 Background

2.1 The Limestone Coast Region

The Limestone Coast region of south east of South Australia occupies 2.1 M Ha and is in the south and eastern-most part of the State bordering Victoria. The region comprises the Local Government Councils of the City of Mount Gambier, District Council of Grant, Kingston District Council, Naracoorte-Lucindale Council, District Council of Robe, Tatiara District Council, and Wattle Range Council (Figure 2). According to Primary Industries and Regions South Australia (2013) the 2011 population of the LC was approximately 63,000 with approximately 70% located in the southern part of the region including city of Mount Gambier (40%), District Council of Grant (12%) and Wattle Range Council (18%).

2.1.1 Climate

The climate of the region is described as Mediterranean with warm summers and cold and wet winters (Primary Industries and Regions South Australia, 2013). Rainfall is generally high relative to South Australian averages, with the Limestone Coast region averaging approximately 700 mm per annum (pa). However, rainfall patterns follow a strong north to south trend, with highest rainfall in the south, and a lesser coast to inland (west-east) trend; the rainfall in the extreme north-east is <400 mm pa whereas in the extreme south it is >800 mm pa. In recent decades there has been a slight reduction in annual rainfall across the region, including reductions in autumn and winter rainfall along with slightly increased summer rainfall (Primary Industries and Regions South Australia, 2013). Mean daytime temperatures vary from approximately 15 - 18°C in winter while the mean daytime temperature over summer is approximately 28°C. Approximately 75% of rainfall occurs between April and October (Figure 1).

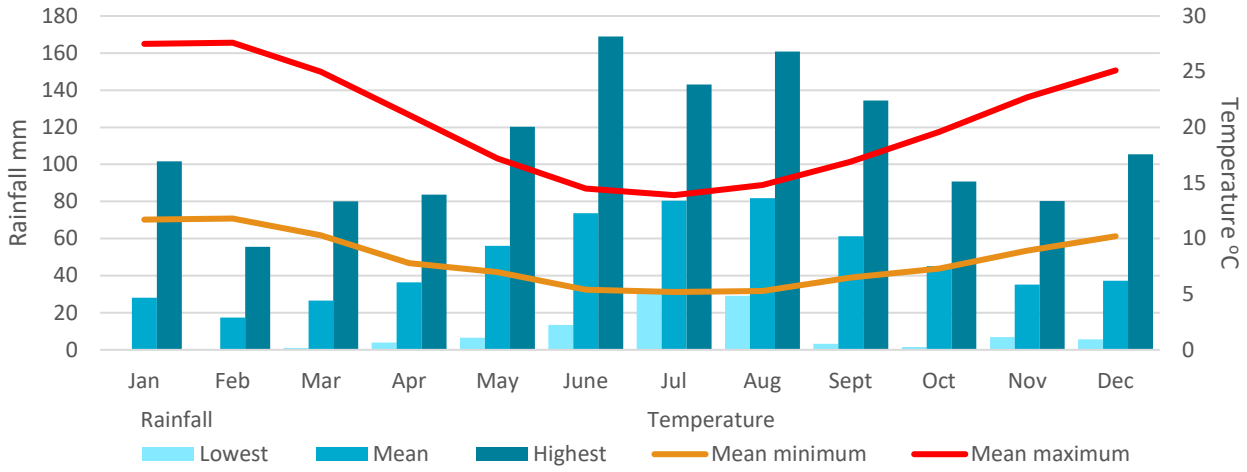


Figure 1 Monthly rainfall and temperature values for the Coonawarra weather station (id 026091) between 1985 and present. (source: Bureau of Meteorology)

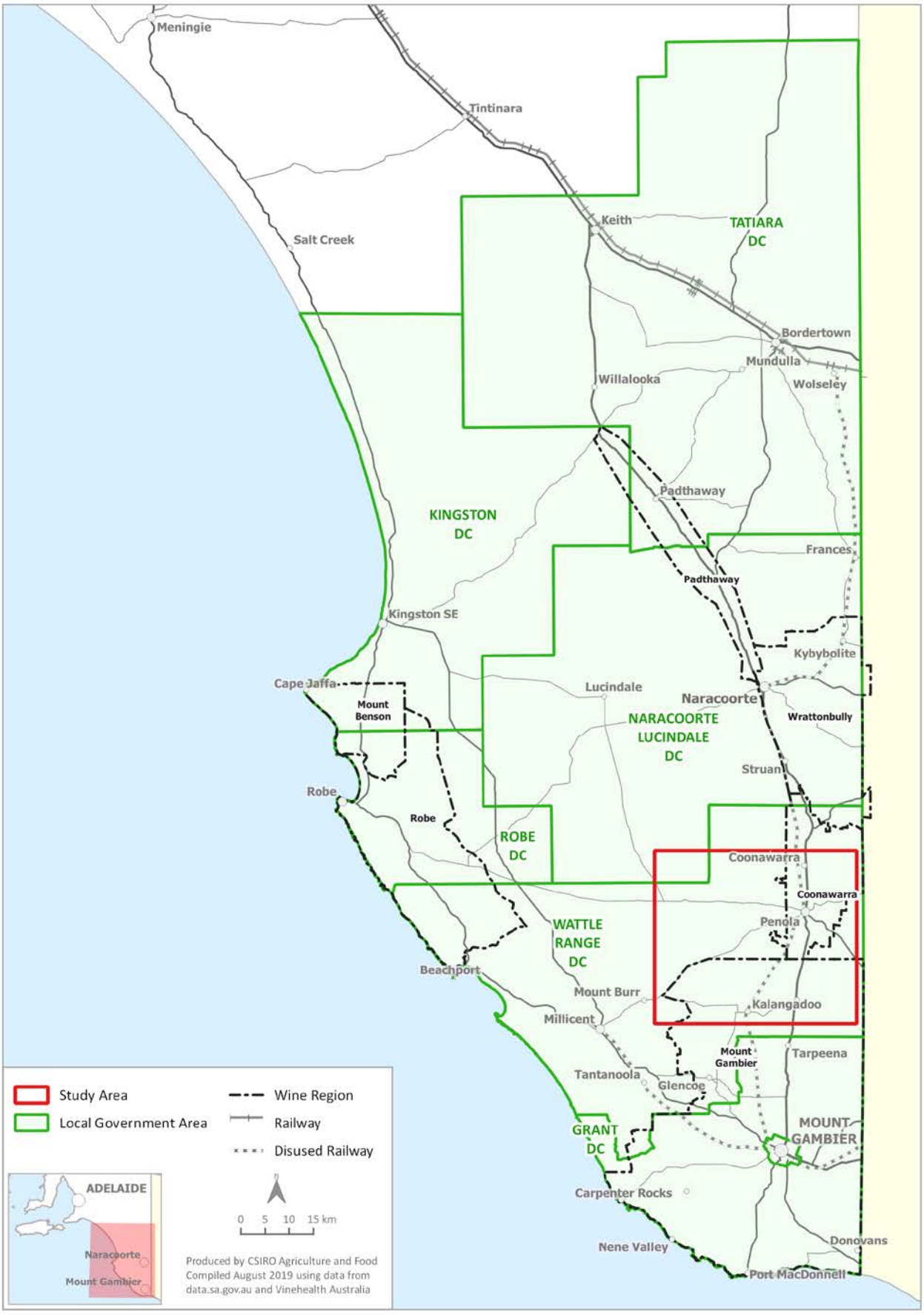


Figure 2 Local government areas and wine regions of the Limestone Coast. The area considered by this study is highlighted.

2.1.2 Landscapes

The region is dominated by a series of low elevation ridges running subparallel to the modern coastline. The ridges have low relief (10 to 20 m) and typically are between 1 to 2 km wide; none exceed 70 m above sea level (mASL). The ridges have been formed from ancient coastal dunes left stranded by coastline retreat during the Pleistocene epoch, and so moving west towards the present coastline the ridges become progressively younger. Tectonic uplifting during the Quaternary period has acted to preserve the ancient ridges and has also led to the formation of linear rises, including the Naracoorte Ranges (Kanawinka Fault) and Tartwaup Fault rising 40 m and 20 m above the local land, respectively. Volcanic eruptions approximately 6,000 years before present led to the formation of Mount Gambier (170 mASL) and Mount Schank (120 mASL), both of which are dominating topographic features in the southern Limestone Coast landscape. At 240 mASL Mount Burr also represents a local topographic high in the region (Figure 3).

The soils of the region received significant attention by CSIRO in the 1950s and 1960s and featured a period of systematic soil mapping to support land evaluation and understanding the land's potential (Blackburn, 1952, 1959b, a, 1964). The soil landscapes were again mapped during the 1990s and 2000s by State government at a mapping scale of 1:100,000. The principal purpose of the State mapping campaign included a systematic assessment of agricultural capability, as described by Hall *et al.* (2009).

The wide inter-ridge plains (locally, "avenues") and their low relief have an important bearing on patterns of soils and land use. These plains typically range in width between 2 to 10 km, and they are dominated by fine sediments soils laid down in low energy lagoonal or coastal conditions during the Pleistocene that have developed into deep to shallow clays, generally over hard carbonate. Natural drainage is northerly towards the Upper South East along the plains down a very gentle gradient e.g. 15 m fall over 100 km; this low gradient has had a significant regional effect on the land use options due to the poor drainage and the presence of swamps and wetlands. However, since the 1880s has seen construction of approximately 2,000 km (Harrington and Lamontagne, 2013) of drains to drain water off the plains, and then into the ocean and Coorong (Taffs, 2001) as seen in Figure 3. The drainage scheme has enabled a significant expansion of grazing and more recently cropping along the plains. More recently the emphasis in drain construction has been to manage salinity caused by periods of high rainfall.

The ridges tend to have sandy or loamy soils, generally shallow over carbonate rock or rubble, which is sometimes exposed. These shallower soils tend to support some grazing or are set aside to native vegetation conservation. There are also significant areas of deep sandy soils in the region, either highly leached or over clay, and derived mainly from earlier coastal sediments and often re-worked by wind to their present patterns of distribution. These areas underpin the large plantation forestry industry in the region. Finally, there are relatively small yet locally highly significant areas of shallow loams and clay loams on limestone (calcarenite) that support the high value viticulture and winemaking industries including the Coonawarra and Padthaway regions. These soils occur mainly in the central and eastern plain located in the oldest inter-ridge avenue.

In summary the soils of the Limestone Coast region often have high agricultural potential by virtue of the generally high rainfall. However, many of the soils also have low fertility, especially the deep sandy soils that now support the important commercial forestry industry. Other soils can contain

high levels of salinity, difficult structure, or have high and low pH. Waterlogging is a limitation on some soils, however drainage schemes have alleviated this over large parts of the region.

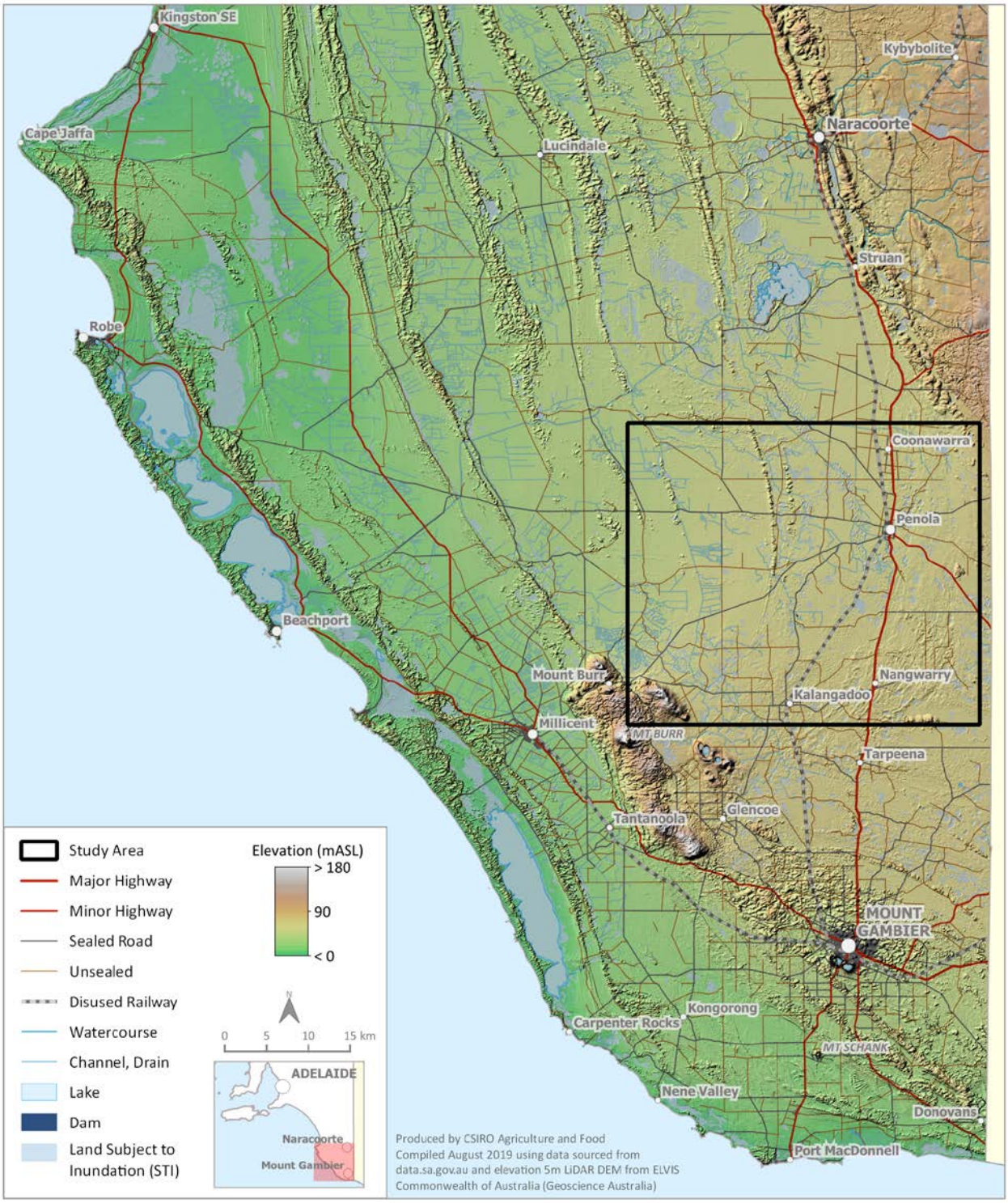


Figure 3 Elevation, wetlands, watercourses and transport networks of the lower south east with project study area shown.

2.1.3 Water resources

Along with its high rainfall in comparison to most of South Australia, the Limestone Coast region has abundant groundwater resources held in (i) an upper, unconfined aquifer, and (ii) a deeper confined aquifer.

The unconfined aquifer is characterised by the absence of a confining layer and waters are generally easy to access. The aquifer is maintained by rainfall and surface water flows, including recharge by local irrigation.

The confined aquifer has its origins in the regional topographic high of the Dundas Plateau in western Victoria and flows radially in a westerly and southerly direction to the coastline. This aquifer has a confining bed that separates it from the unconfined aquifer. However, in a few places there is connection between the two via fractures, faults and sinkholes. Most of the water in the confined aquifer can be considered as 'ancient' reflecting the time between recharge entry into the system at the Dundas Plateau and arrival in the Limestone Coast region. For management purposes the confined aquifer is often considered regionally as one, whereas in fact it is made up of multiple interlinking smaller systems. The same can be said for the unconfined aquifer.

In terms of groundwater utilisation, 90% of the water drawn for agriculture (viticulture, horticulture, cereal and dairy pasture) comes from the unconfined aquifer (Primary Industries and Regions South Australia, 2013). Non-agricultural uses of the aquifer include domestic water supplies for Mount Gambier, Millicent and Penola and supplies for regional industry. The aquifer also maintains ecologically important natural wetlands. The confined aquifer also supplies water for some agricultural, industrial and domestic needs in the region – particularly where salinity levels in the unconfined aquifer preclude these uses.

The plentiful supply of good quality groundwaters in the region, as well as the poorly defined drainage lines in the low relief terrain means that surface waters have been rarely developed. Recent regional water use figures are described in detail in Primary Industries and Regions South Australia (2013).

2.2 Study area

A study area has been defined for more detailed information about agriculture and gas development in SESA. The selected study area covers many of the natural gas assets and activities in the region, including exploration licenses, exploration and production wells (including proposed), processing facilities and distribution infrastructure. It also covers the localities for stakeholders interviewed within this project. The road network converges on Penola, which connects to Millicent (via Mount Burr), Padthaway and Keith (Princes Highway), and Mount Gambier (Figure 3). The disused railway line crosses north/south across the region. The boundary of the study area is shown in Figure 5 and covers an area of approximately 150,000 ha.

2.2.1 Soils

Figure 4 shows the distribution of soils in the study area derived from State mapping described in Hall *et al.* (2009). The dominant soil group (42% of area) includes sands over clay soils and these cover the majority of the western plain. These soils are typically poorly drained and may contain poor structure in the clayey subsoil. Other issues include poor nutrition, acidity in the topsoil and alkalinity in the subsoil. If carefully managed these soils have moderate potential for dryland and irrigated farming, the latter requiring attention to avoid salinity. The study area contains a significant proportion of shallow soils on calcrete or limestone (22%). Much of these are around the town of Penola and correspond to the prized wine growing "terra rossa" soils. These soils have favourable nutritional status and structure and are suitable for irrigation. Other variants of this soil group include shallow loam or sands over limestone/calcrete or are rocky (calcrete) making them unsuitable for farming. The last of the dominant soil group in the study area includes the highly leached sands (18%). These soils are commonly found in the southern and eastern parts and include the variants highly leached sand and wet highly leached sand. These soils have very low fertility and can have low to very low pH and can be excessively drained (droughty) or very poorly drained and prone to waterlogging. These soils often have poor to very poor agricultural potential, and much have been used in the regionally important commercial forestry industry or set aside for nature conservation. Combined, these soils represent 82% of the study area and thoroughly dominate.

2.2.2 Land use

Land use within the study area is presented in Figure 4, and as expected patterns of land use generally follow the distribution of soils. Grazing lands represent 49% of the study area. These areas are dominated by shallow soils on calcrete and the sand over clay soils. The next dominant land use is plantation forests (31%), which correspond well to the sandy soils (highly leached and sand over clay). Cropping and irrigated grapes areas represent 4% and 3% of the area, respectively. This farming is associated with the shallow soils on calcrete or limestone or sand over clay. Soils are generally suited to dryland cropping if they contain sufficient depth of sand over clay and favourable conditions in topsoils and subsoils, or in the case of shallow soils on calcrete or limestone, that the topsoil is finer textured (loam, clay), or there are sufficient fissures and cracks in calcrete or limestone allow sufficient root penetration to collect deeper reserves.

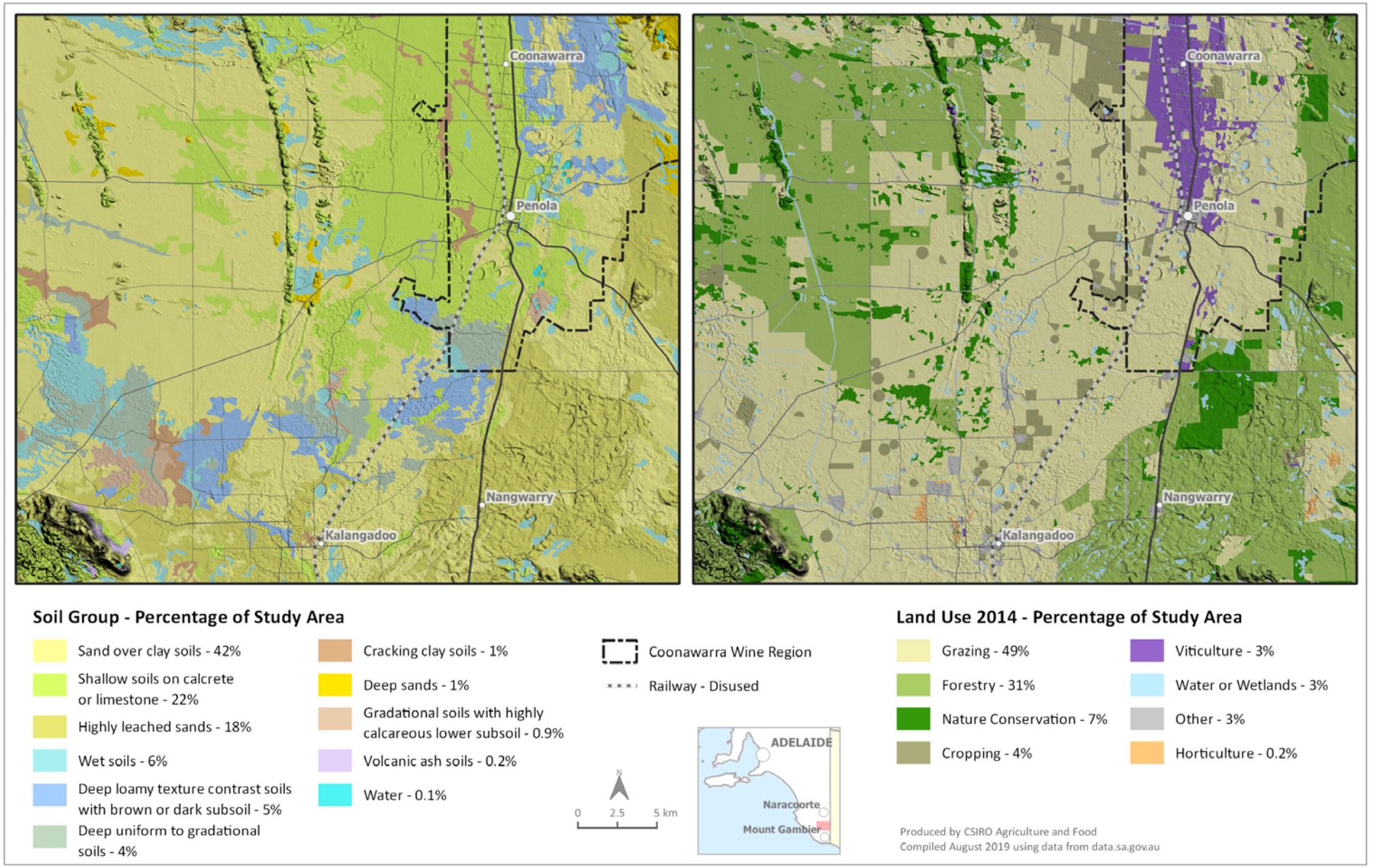


Figure 4 Soils and land use within the chosen study area for this report

2.2.3 Gas assets

The study area contains the towns (or localities) of Penola, Coonawarra, Kalangadoo and Nangwarry. The combined licences of Beach Holdings have a footprint covering the majority of the study area; a smaller proportion of the study area is covered by other licenses (Figure 5). Most of Beach Holdings' past and present exploration and gathering activities are contained in the PPL 32 and PPL 168 licenses. PPL 168 contains the Katnook gas plant and the Haselgrove 4 well. The regional spur pipeline, which connects to the SA-Victorian trunk pipeline, runs through the study area and to the Katnook plant to supply gas to Millicent and Mount Gambier businesses.

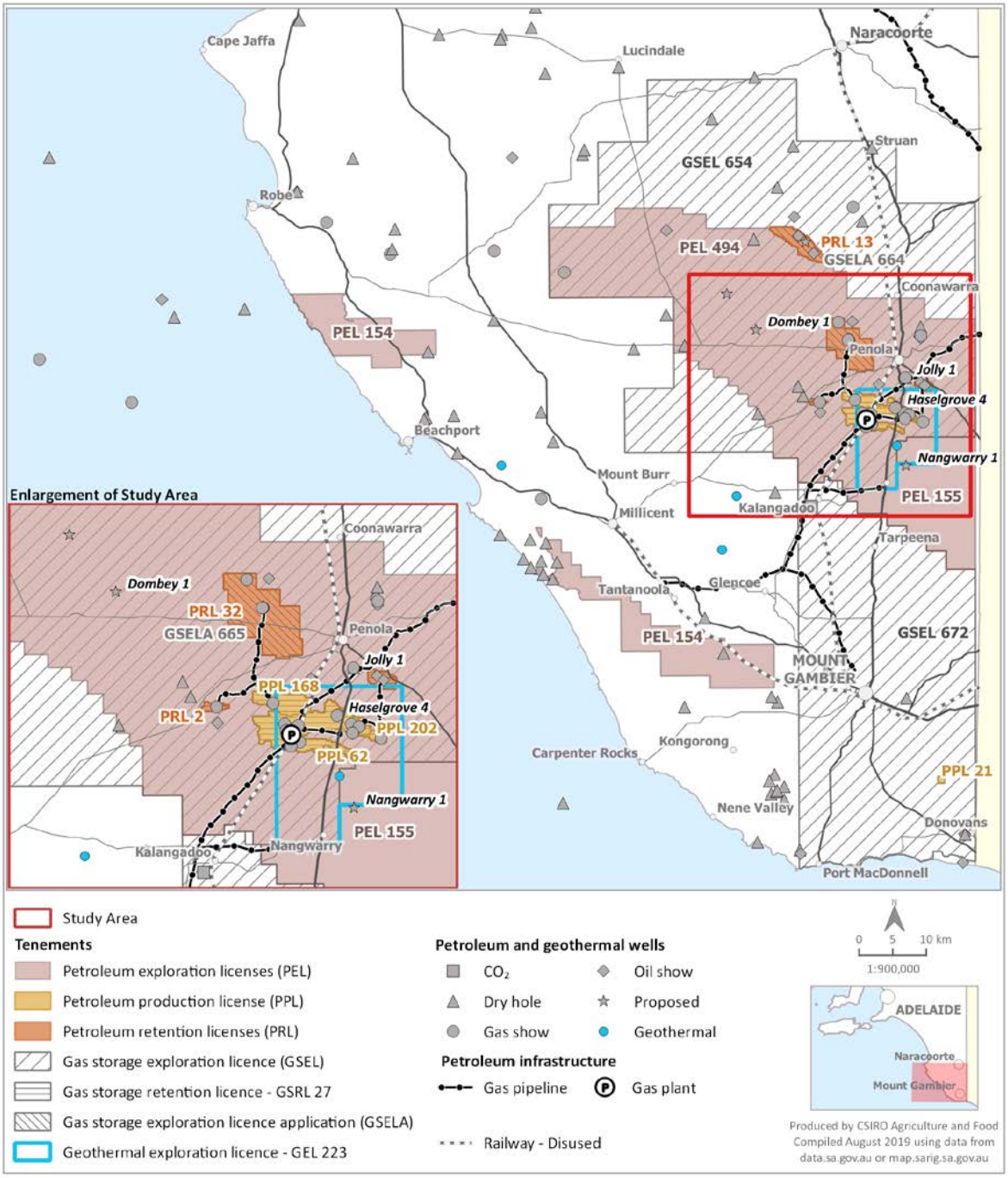


Figure 5 Boundary of study area (red box) centred on the town of Penola and surrounding natural gas assets

3 Primary industry stakeholder perspectives

3.1 Data collection

Perspectives on the impacts and opportunities arising from natural gas opportunities were sought from stakeholders involved in local primary industries. In depth interviews were conducted in the SE districts where gas development has been and/or is likely (see Figure 2). The interviews were semi-structured, face-to-face and typically took place at the participant's nominated location (see Appendix for interviewer question guide and background information provided to interviewees). All participants were asked the same questions during the interviews to increase the likelihood of data saturation.

The average interview length was 45 minutes. All interviews were digitally recorded. The interview files were fully transcribed. The transcripts were coded to themes using descriptive coding (Saldana, 2009) with the assistance of NVivo qualitative data analysis software. Quotes from the themes are used throughout this report.

The sample consisted of 20 interviewees including primary producers stratified into 3 subgroups of cropping, livestock and viticulture and one interview with a local government representative involved with local primary industry policy and issue management. A stratified purposeful sampling method (Patton, 2002) was used with the objective of identifying key informants from each of the three sub-groups and a sample that includes informants with the knowledge and experience to elucidate on the key themes of this study. Advice from a local reference group was used to inform the sampling.

Respondents came from the following localities: Penola (5); Coonawarra (4); Millicent (3); Kalangadoo (3); Naracoorte (2); Wattle Range (1); Fox (1); Conmurra (1). They represented the following primary industry sectors (numbers total greater than 20 due to mixed farming businesses): Livestock (sheep and beef) (7); Broadacre cropping (4); Grape growing (3); Wine making (3); Potatoes (2); Farm consultants (2); Rural land specialists (1); Local government (1). Whilst this sample size does not allow comparisons to be made between sub-groups, it does allow statements to be made about the main group, that is, primary producers of the South East of South Australia.

The key emerging themes from these interviews are described in the following sections. The range of perspectives are presented primarily in the words of the local primary industry stakeholders themselves.

3.2 Attitudes towards primary production in the South-East region

3.2.1 A highly productive region with a crucial groundwater resource

The primary producers of the South-East are proud of the productive capacity and diversity of production in their region:

> *This area's highly productive for farming. You've got forestry that occurs in the lower part, because of the rainfall. We've got red meat down here, so the best beef growing area in Australia, the highest grades of beef you'll find anywhere come off these areas and also around Coonawarra. You've got small seeds, you've got apples, roses, cherries, because it's cool enough for those. Then you've got vineyards and the wine industry all through this area, because it's flat, and the water's available.*

In some places you can have water and not the soil types and in other places you can have the soil types and not the water. Well the South- East has actually got the best of both components and so we're very concerned about that.

Primary producers repeatedly emphasise the unique quality and importance of their water resource and see it as a critical asset to be protected:

I don't think people understand the significance of our underground water enough. This is very, very unique. It's so easily accessible and creates a lot of production and it's very unique.

But I think this is a fantastic resource in this region. This is a natural winter rainfall catcher and storage system, that most of that water will percolate down into the upper aquifer, unconfined. The confined aquifer which is below, also has very high-quality water, from the Grampians.

We've got this water resource here that buffers us through different drought events. The quality of that water is so good that we can pump that up and use it. We don't have to treat it or filter it even. Most of the water quality in this area is excellent.

3.2.2 A perception of a clean and green production that is worth protecting

Clean and green is an image that the SA Government encourages, and has been successful for businesses targeting overseas markets:

I just can't help but think a tourist coming to the region will want to see the beautiful vineyards and the clean, green farming. I think that's important to maintain that quality standard that we have. If there was contamination of the irrigation water, or air quality, if there was a change of perception of the region; that could impact on the marketing and consumer's desire to drink wines from the South-East.

The Limestone Coast is an intensive region of production, potatoes, apples, vineyards, cattle. South Australia has a very good clean, green reputation. The government are trading on that. It seems a bit bipolar to be on one hand wanting to claim the clean green and then have this mix of gas and tourism and production together.

There is a recurring message from primary producers that clean and green production is worth more than the gas industry:

We feel that we have been successful in convincing the current government of the value of this region as a clean, sustainable production area for food that will be sustainable in the future. And that we're worth a lot more money than the gas could be over the same period of time.

The clean and green image of an industry can be impacted by negative publicity about the region:

I can't demonstrate the impact it's had on the wine sector with evidence. I do believe that in the height of that exploration that Beach did south of Penola, there was unwanted media interest that has had an effect on the wine sector and the market's perception of it being a clean, green product.

Voicing concerns about potential risks of the gas industry can be damaging in itself:

It's not good for us as an industry when we have to appear in the media and say we are trying to stop fracking from happening in our area.

Gas had a clean green image prior to fracking, because it was fairly cheap, it was abundant. And with fracking it has created such huge problems for them overseas and in Queensland that it now has a dirty image. It's not a dirty energy source, it's clean.

The perceptions of an impact can be as real as if that impact occurred:

This is our concern, that once some sort of contamination event happens, you can't undo it. It could have negative implications for the wine region with customers, even if the reality wasn't that the wine's contaminated, it can have negative downside.

But not everyone sees the gas industry as damaging to the clean and green image:

This area has been seen as clean and green, just because we've allowed gas exploration doesn't mean we're not clean and green. I think it's more a case of what actually happens when they're drilling and exploring for it.

3.3 Attitudes towards the South-East gas industry

3.3.1 Conventional gas activities have mostly been well accepted by primary producers over a long period

Conventional gas has been a part of the South-east landscape for many decades without major issues, including wells and a gas plant near the town of Penola:

Talking conventional gas, I think there is a recognition in the area that it's been happening for a long time and there hasn't been a problem.

Generally it's pretty positive, there's not a negative vibe I get, but there are those concerns; the unknown is the main concern.

It's happened for years now, probably 30-40 years in the South-East. We haven't seen a bad impact yet. If it continues that way it's all well and good.

There's over 120 identifiable gas drilling holes in the whole region over a period of time, most of which are capped and there's been no leakage of any material.

People are pretty resigned to conventional gas. And that's proven to be working quite well.

There's that opposition to conventional gas as well, but it's been happening here for 30-40 years and there's no problems at the moment.

I haven't found it to be a problem at all. There's a lot of people that make a problem where there's no problem yet. My theory in life is you haven't got a problem till you've got a problem.

I would assume of those 120 sites a number of farmers or at least the primary industry land will have sites on them. We're not aware of any long-term environmental impacts.

As far as conventional gas goes, you can nearly put that in the same basket as a solar or a wind farm, as far as the impact on the individual landowner. If it's well negotiated, and everybody respects everybody else, and there's an outcome they're happy with.

I haven't seen anything of concern through the South-East. We're a different system to a lot of areas that have had problems and our structure's different to that. These drills are going down 3-4 km, so for there to be an impact, there's a lot of distance between us and that.

Their impact hasn't been significant enough in the South-East at this stage to be a huge consequence. So, if they manage that in the future, if they kept it at the levels it's at the moment it's okay.

Probably the negatives would be quite minimal I would have thought, because really apart from the people right next to the wells, the rest of us really wouldn't know what's going on, unless you're driving past. If the current process is used, I think they would have minimal negative impact on the South-East.

We didn't have a problem with exploration back in the '80s, it's only become a problem recently.

Direct interaction between primary producers and the gas industry has been typically positive in the past:

Local farmers have been dealing with it for years, so 15-20 farmers have got wells and have had no issues.

Well our experience is that there are no dramas, but I presume that when you're that close to them they're very good at communicating, I would have thought. The people that I've spoken to have had wells on their properties, get on really well with them.

You hear all these other stories, but that seems to be more the fracking industry in Queensland. What happened here didn't have a significant impact. They did a pretty good job, they went out of their way to help out with stuff.

Farmers with gas infrastructure through their properties do not consider them a significant inconvenience:

We've got powerlines, gas lines, and the fibre optic cable going through the place. And trees. As far as a primary producer goes, the power lines are more of a hindrance (than gas lines), because we can't put centre pivots in.

They put a pipeline through us, back in might have been 1990 it was. It's not really an issue.

You can crop over the main SEA Gas pipeline that spurs off the line from Victoria, that goes through to Melbourne. I think that's down 4m or something like that, so it's a long way.

You do get an increase in traffic movements in unusual places, a lot of noise, when they're running 24 hours, you get a lot of noise come out of the sites, that does travel quite a distance because generally it's still at night. But they compensate you for what you were making off the land that year and then some, and for the inconvenience of having people coming through.

A gas well's quite a small area. Once they've done the drilling and gone, it really is quite small.

They put a whole heap of gravel there, then they gave us the gravel when they finished, so that was good. There's a bit of noise every now and then, but because it didn't come to anything, they just packed up and left. Took probably 6 months. And they packed it all up. All they did was leave a bit of a sign to mark where it was. We've got a pivot over it now. Wouldn't even know it's there. There's a sign there, off the side in the paddock near a fence which is the only thing that shows.

They've done seismic surveys through our property a number of times they go through with trucks, with a pad that pounds the surface and they're able to measure whether there's likely to be suitable structures for gas below. We did have one case where they've left some deep tracks in the paddock, but apart from that, nothing particularly negative, it's all okay.

I own a farm with a well on it. All it's done is give me a good road into the block. Nice flat pad at the end and all that's there now is a pole in the ground that says, test wells, water wells. You'd hardly know they've been.

3.3.2 A change in attitude towards the gas industry after a long history: the drilling of Jolly 1

On 11 January 2014 Beach Energy and its joint venture partner Cooper Energy announced to the ASX that it had spudded a gas well in the South Australian section of the onshore Otway basin. The primary objective of the exploratory well was to, "… assess the unconventional oil and gas potential of shales within the Casterton Formation through drilling to a prognosed total depth of 4,000 metres and collecting over 100 metres of conventional core" (Energy-pedia News, 2014). The well—Jolly-1—though not the focus of this report, helps to explain some of the recent developments in the relationships between the gas industry and the community of the South-East. Some of the most significant reasons for the shift in attitudes were the visibility of the drilling operations, combined with the potential for 'fracking':

I'm sure if they had their time again they wouldn't have put the rig 2 kilometres south of Penola. They walked in and they thought, she'll be right mate. The gas sector has been exploring conventionally in this area for 25 years and prior to that rig going up in Penola, they had done that in a collaborative way. When they started that activity and there was talk of fracturing being used extensively, they really put a lot of people offside.

I was driving to Penola one day when the flaring was on and all of a sudden, we had this gas type of smell come into the car. And then we got close to the flaring and the light was up. It was quite strong, and that was on the main road. That surprised me; who's monitoring that? What is in that stuff?"

When they were drilling and particularly flaring the local gas well, there was a noise impact in the evenings. Then that was quite close to Penola, so you could actually hear the roar of that going down. And to a certain degree, if the wind was right, you could hear the drill bit.

Previously the gas industry in the South-East drilled away from the main roads, were not visible, they had a low profile, and they were somewhat sensitive to visual amenity concerns.

It was a really difficult time for us, because we had this exploration well, that was occurring not 3 kilometres south of the township of Penola in the Coonawarra GI and we were mindful of the visual impact of that drilling rig. The questions we were answering around that time were, what impact is that having? Are you worried about it? Will it have a risk to the aquifer, will it have a risk to your natural environment?

I think they've learned from that exercise, drilling off the peripherals of the highway, has taken the issue off the ball. That might change again when two rigs go up in the next 6 months. The heat will be back on again. I'm sure of it.

Jolly-1 raised the possibility in the community that fracking could take place in the region, and became the motivating factor behind the growing response from concerned elements within the South-East community:

Beach was talking about fracking at that point and that made a lot of us realise that we needed to be active about this, otherwise it would just roll on.

The information that we were given at a Penola meeting was that we are running out of conventional gas in the South-East, so now we'll have to go to unconventional gas and by the

way, it's safe. And they were dismissing concerns. The problem was the whole truth was not being told at that meeting early in 2014.

3.3.3 Unconventional gas activity is seen to be different

The level of acceptance for the previous conventional gas activity changes generally does not extend to the prospect of unconventional gas activity:

There's certainly a negativity that goes with the word fracking. People got opinionated when there was a suggestion of unconventional exploration, particularly fracking.

There's always a split I think, but I think the majority are anti fracking and I would probably suggest it's as high as 90% and I'm not quite sure where I fit in that personally.

I think once you start with fracking, then you're talking about a whole different ball game. Because you're adding something that's not naturally there and the risk is either leakage of chemical or products, they put down the wells and other things into the water table from the fracturing process. That's the risk for me.

The unrest will come if there's fracking.

The unconventional thing clouds everything, because that's when people are getting scared, and there is a lot of campaigning going on against it.

There's been a fair bit of angst in the region. I think it's been uncertainty and fear about the unconventional gas fracking and things like that, which has really stirred things up in the area.

We've certainly got, as an industry (wine), an understanding with the government, that we're not opposed to conventional gas, but as soon as there's any move to change from that, we will as an industry be very politically active.

I think no one wants to see that shale gas and fracking go forward through this region, so I hope that it doesn't. I think measured and controlled development is okay, but no one wants to see that unconventional stuff go in.

If fracking became part of the standard operating procedure, I'd be pretty worried. If they go through a fault and they pressurise that fault, then those liquids are going to move along the fault line and so those fault lines actually transect through the two water layers, so they're in the unconfined aquifers.

I like to look at the science behind things. I'm not really across the gas industry. Sadly, with the little bit of research I've done, a lot of the unconventional developments have an environmental impact

I'm opposed to fracking, because I don't think it suits here anyway and sticking any chemical in the ground, probably not a good idea.

3.4 Perceived benefits Vs risks from the South-East gas industry

Whether people think that the gas industry creates more benefits than it creates problems is likely to influence whether they are prepared to grant it social licence to operate. While primary producers don't tend to identify major problems from past gas industry activity, they tend to see limited direct benefit. They can more readily identify potential risks.

3.4.1 Benefits from gas

The perceived local benefits to the South-East from the gas industry were viewed as being very limited:

There's not a lot of jobs, but if it brings 2 more families or 4 more families into the district and does it open another office, then that would be beneficial.

There's almost no value coming back to the local area. That's the problem with gas. It's taking something, they're not paying people for the land, they're not paying for the gas, they're putting it straight into the line to Adelaide.

They say it's local employment and opportunities and such forth. They're all fly in fly outs, so they don't come into town. The food suppliers are coming as a pre-package or bulk lot, coming out of Adelaide. Local contractor had the job of putting the pad down, that's about it. And everything else is supplied out of town. I haven't heard businesses saying, yeah, our business has increased because the gas job's here.

It will provide minimal employment. They'd be pumping the gas out of the district to provide capital cities or potentially export overseas.

Now if South Australia produces its own gas and it simply goes off shore and it's done so by a company that doesn't pay a lot of any company tax in Australia, that's not a lot of benefit to Australians or Australia."

The drilling team comes in and generally bring most of their contractors with them. It's just the purchases of fuel and meals and all of those ancillaries.

If the gas industry were allowed to do more in this region, it doesn't appear that any of that money is staying in this region, like it does with our other industries. So, there's a big question mark over that and it's another reason why residents down this way are not interested.

The story's not great at the moment, because all the benefits are elsewhere, but all the risk is here. If you could improve your benefits here, the story would get better.

The benefits of local gas supply to local industry is not highly visible:

We're aware of certain benefits to certain industries down here who are doing extremely well out of it and that is being turned into local employees. I'm not saying that the economics overweigh the environment at all, but what I'm saying is that there is an offset and that perception that they take our gas and run is probably not right. Other industries do it very well, articulating what they return to the community.

The net benefit we've got from gas as a community has been by way of people actually using gas. I'm only aware of two plants that actually have benefited from the gas well here. That's Kimberly Clark and SAFRIES.

You've got an industry who's desperately looking for affordable power. The industry tends to be, almost silent on it, because they're a consumer and they don't want to rock the boat. Their major concern is the pipelines and access to supply.

If it's going to Kimberly Clark, if it's going to businesses in the South-East and is employing people and is value adding our products, then I'm okay with it.

There is a strong perception that the benefits in such a productive agricultural area don't outweigh the risks:

The benefit will be elsewhere, and the financial benefit will be elsewhere, but the problems will be here.

If the wine industry disappeared tomorrow, from Penola, there would be thousands of people out of work, there would be hundreds of millions of dollars less GDP and there'd be a lot of suppliers who would be making a lot less money. We employ a lot of people and provide a lot of jobs.

To me it's just doesn't add up. The potential disadvantages far outweigh any possible advantages.

I don't see the urgency of going and looking for gas. If you look at the amount of money spent, the amount of royalties that the government get off it and the angst that it could cause through perforating aquifers or whatever. I just think the risk versus result doesn't line up to me.

We don't think the benefits are worth the risk to the sustainable, long term businesses that exist here. It's not worth it to risk these sorts of businesses by drilling in this geology, because its providing water storage and water will be very important for feeding people.

We have got a very good farming area and I think the risk can be used somewhere else where it's not as good a farming area. And that's what's presently happening with most of the gas. It's in the Cooper Basin. What's there to affect up there?

3.4.2 Risks of unconventional gas activity to groundwater and reputation are seen to be most important

Primary producers need to be confident that the aquifers are not at risk from future activity:

The fracking thing, it should be fine, but the risk is that our water system is actually worth more than what the gas system is.

There's one major concern and that's the underground water. All the other factors that have been talked about have either been grossly exaggerated or incorrectly stated.

The concern is if it affects the aquifers, that's liquid gold here. We're one of the few areas that does have an abundant supply of underground water.

I think when you're looking at the vast majority of South-East primary industry, you know, farmers, vignerons, foresters, those types of things, their major concern would just be the long-term health of the aquifer.

I think whether it's true or not, the environmental threat is very real. Like whether it's true or perceived, either way, it is there.

My concerns for the future come more with fracking, rather than conventional gas. We're reliant on the underground water table for stock water and irrigation. I don't have the ability to have dams here, so if I lose my stock water from the underground aquifer, we're done.

They're going to be drilling holes through that water table and sure, the holes might be a long way away from where they are, but we don't want contamination. Why do we want to be irrigating crops which potentially might have some form of contamination in the water?

We're using the upper aquifer. The confined aquifer is below that. The fracking, from what we've been told down here is deeper than those layers, but the risk for me is somehow cracks coming up through there. My knowledge on fracking and how far the fracture goes from the well bottom is limited. I need to know what the risk to my water table is, because if I lose my underground water, I'd lose my ability to run livestock.

While risks may be recognised as very low, a range of risks are raised and the cost of potential damage is weighted extremely highly:

You can't say that's definitely going to happen, but you almost need to look at worst case scenarios, because this could actually be of detriment to the 200 million dollars' worth of farming and community down here as far as agriculture goes, that's the tip of the iceberg.

The casing they do through these aquifers, as long as they close it up properly, should never be an issue. We don't have a lot of seismic activity. There's a bit of movement, but it's not huge amounts that would cause a dilemma. But that's the concern, the mixing of the two aquifers and any chemicals used in the process getting into these aquifers. If that scenario did happen, it could be very detrimental for the South-East.

I take on the precautionary principle and say, well look, hang on, there's too much concern here, you've either got to prove that you are definitely not causing any problem with the best monitoring in the world, or we just close it down.

We were told that waste was spread on a farm, where they had grazing animals. That to me is a concern. They argued that it was quite safe, because they hadn't been fracking. That sounds good on the surface, but when you look into it a little bit, what has mother nature got down 2 or 3 or 4 km below that has been brought up to the surface in the way of contaminants or microbes?

Future impact is the damage to our water table. Our communities, which basically use that water for human consumption. We cannot be protected, because we never know when we're going to get an earthquake.

3.4.3 Perceived differences in risk timeframes

Primary producers often refer to very long term time frames for risk and multi-generational considerations:

That's the difference between farmers and miners, that it might not be my lifetime, it might be my son or daughter or granddaughter's, but the problems of mining is that they look at profit differently to how we do.

I think the message is that our politicians are a little bit too short-sighted. We're 5 generations here and we're looking 5 generations into the future. Most of these guys are looking from one election to the next and I think that probably is where the issue is.

Whether that's in 100 years or 200 years, the chances are within 200 years, every well will break down and fail. So that's something that we're leaving our grandchildren, the next generation and next generation's grandchildren and so that concerns me. It's all very well for us to say well they won't break down in our time, but what are we leaving for the next generation?

Is the risk worth it? It's a very short-term gain, because I can repeat what we're doing here every year for one hundred years without changing anything. Without upsetting the ecosystem. You've got to have gas, but whether that's something that's going to have long term consequences, I don't know.

It's a bit like smoking; one cigarette's probably not going to harm you, but certainly as a business and as an industry we're very concerned about the amount of perforations going through the aquitard and the long-term effect that could have.

So, concrete will deteriorate over time eventually and metal will deteriorate over time, eventually. As to what that timeframe is, it's a little bit of an unknown but certainly somewhere around that hundred years, look out. From there on after we've got a problem.

Long-term stability of the unused wells is an issue, because well integrity breaks down over time. We have had in the South-East a few examples where wells were put in in the 50s and 60s were collapsing and these are on farmer's properties that are no longer administered by the company that put them in and they are causing issues for those landholders in terms of what you do.

What I'm hearing is, yeah, it's safe for 30 years. But that's not good enough. Now that may be incorrect, but once again, this is what we believe; what we're hearing.

The potential is that when things deteriorate in years to come, that we're leaving a pathway for poor quality water to mix with the good quality water. That's an obvious thing and who's going to come back in 50 or 100 years' time and fix that problem and how the hell do you fix it?

3.4.4 Perceptions of fracking risks

In addition to perceived risks of 'joining' aquifers, perceptions of contamination risks from fracking and water use are also important:

I understand what they use is carcinogenic and that could enter the water table of the Limestone Coast. Our water is good water and should not be contaminated.

Once you've fracked it, it only lasts 3 years. You only get the maximum amount of gas out of it for 3 years and then you're left with a bore and 400 different chemicals potentially in the water table.

They have secrecy behind what chemicals go into it. Nobody knows what chemicals go into it, the industry are not prepared to say and the government have allowed them to have a closed shop on it, they don't actually tell anybody what chemicals go into it.

The conclusion from that parliamentary inquiry was that there was no social license in the Limestone Coast. They acknowledged that there are risks with spills from oil and gas exploration, especially with fracking, because of the high-pressure pumps. That when you're drilling down 4 km you bring up a lot of pretty nasty chemicals, radioactive elements, cyclic, biogenic compounds, things like barium, arsenic, cadmium, then other things, which have to then be managed in ponds.

Available facts are not always useful for convincing people (APPEA suggest that 4-22 ML of water is required to frack a well):

Yeah, massive. I can't remember what it is, I think it's something like 4 gig of water needed per... I can't remember, per day or something. But if you time that out by what farmers would otherwise use, it's a huge amount of agriculture that this state desperately needs, going down a bore."

The amount of water they use is quite astronomical and for them to do it without actually having a water license will actually impact people who do have water licenses, depending on how they're put in and in which areas. So, if they were put it in the Coonawarra area, it would massively impact us.

3.4.5 Reputational risk to branded products

Perceptions are very important when marketing branded products in competitive markets; and reputational damage can occur by association:

> *Perception is a tricky risk to manage, because perception isn't always reality, but once that perception takes hold, it's hard to change.*

> *You only need a couple of extremists to create a lot of trouble. Bad publicity and bad news travels very quickly.*

> *If someone got hold of where the gas wells are and put that on a map that was publicly available, bearing in mind that there's international pressures in any industry, but in the wine industry we're competing on a world stage and when we're doing well in a market, we're taking market away from another country. We've seen this happen before, it caused all sorts of angst and trouble, purely through people, on the other side of the world, trying to make sure that Australia couldn't keep taking market share.*

> *Having exploration or extraction of gas on the property would have a negative effect on our business. We've invested a huge amount of money in getting our business to where we are and I think it would have a negative financial impact for us, due to the perceptions that would be in the marketplace. They view that the product that they're buying has no negative effects on them and is safe to consume. A gas field on our property certainly would have a negative effect on our brand.*

> *The wine industry is probably the most advanced industry by way of marketing and global reach. If something goes wrong down here and there's bad publicity, the effect on those companies that are marketing heavily from the region will be affected most.*

> *Facts and perception are worlds apart quite often. What the general public will know about it is not a lot. They just know it's bad. That's not a great thing.*

There is concern about the naming of gas wells and power stations using names associated with the wine industry:

> *Maybe someone from the gas industry thought it was a smart thing to do. They see a name that they can use to sort of create social license or social acceptance, and then name the well after that, which at the time seems pretty inconsequential, but if Katnook 1 is deemed to contaminate the water table and gets publicity, it will affect the business associated with that.*

Raising concern about gas activity can also bring negative publicity.

> *I guess our issue is that whenever we have to confront the media about potential negative effects of gas mining in our area we're negatively promoting the area.*

3.5 Information about gas activities and future developments

3.5.1 Past industry communication and engagement

Primary producers suggest that the gas industry needs to do a better job with communicating information:

> *I think they've got to do a lot more work in terms of convincing the public of its safety and I think they need to differentiate what's happening in terms of conventional gas and the history of its development, versus unconventional gas.*

If they want to turn that around in 10 years' time, they'll have to change public sentiment. And I see that as being very, very difficult to do, because the sentiment is so strong. I'm not 100% in favour of fracking by any means, but I discount a lot of the arguments against it. If they turned up on my door and wanted to do it, I wouldn't want it, because I'd have difficulty with all the neighbours and you just can't act in isolation on these things.

I think they've tried to consult the community and the engagement they are seeing is quite low. I think it will just be again that subjective view of an activity that's not supporting clean, green, primary production.

Thinking that the silent treatment would make the problem go away was a mistake. They should have been out there, informing the community about their intentions and informing the community about their views of the ongoing risks.

The companies have to communicate, tell people what's going on, don't just barge into a property and go hell for leather. Talk to the people on the properties, talk to the communities that you're coming into, try and inform them of what your plans are and the impacts that it will be. Be upfront on the impacts. It's the no information or the missed information that probably does more harm than good.

If they get to that stage and decide to frack, they've got to be a lot more open about it and what they're actually doing.

It's going to take a lot of work for the gas industry to become a trusted player in the conversation now, because the antagonistic views are now there and they're deeply entrenched in the people that I talk to.

They were too late in the argument, the protests got ahead of them. Beach held a number of public meetings where they've tried to correct that, but it was too little, too late.

Others see that changes to the communication approach have already been made:

I can see they're trying to change the way they've done things, it's all been a bit cloak and dagger. With anything unknown, it always scares people but I also think there's a bit of external scare mongering going on. Honestly, they could be a lot more open and a lot more giving with information that people want.

3.5.2 While many are mainly concerned about fracking, there has been broadening of anti-gas campaigning

The recent debate has led to some reconsideration of conventional gas activity:

Some of the messages I've seen that are representative of their campaign appears to have gone from anti-fracking to just anti-gas.

A lot of people have been swept along by the perceived risks of fracking and now there's sort of an overlap of not wanting any gas exploration.

What I would say is that I don't believe those who are arguing against fracking or unconventional gas exploration have done great credit to their argument by using emotional arguments rather than constructive ones and also that they've been led by outsiders whose objective is not to use any fossil fuels of any kind. I think people are quite rightly concerned over it, but the only strength in their argument is in terms of the underground water, particularly mixing between aquifers.

Conventional is not as safe as what I thought it was, there is gas getting released into the atmosphere, it is going down through our aquifers and eventually those wells will decay in time.

There is too much risk and therefore we should take the precautionary principle and shut the industry down, until they can prove that they are not causing these issues. We're talking increase of human birth defect, where pregnant mothers are living within a few km of gas wells. Why is that? There is decreased human birth weight where pregnant mothers are living within a few km of gas wells. Why is that? So, we're not only talking unconventional gas, we're talking conventional gas and oil. And we've got an increase in asthma rates. And there is widespread contamination of aquifers.

But the campaigning has become too extreme for many:

The issue of groundwater is a very sensitive one and that's an area that I would have some serious concerns about but to drag a whole lot of other arguments in there has really alienated me from the anti-fracking movement, because they're talking with emotion and not with fact.

The Shut the Gate alliance have done a good job, but they have been a little bit extreme, but most of us are in the middle, so that's what we're representing.

I'm open to everyone's views. But just a bit disappointed with the way that they've gone with the protesting. Everyone's got their own right to do and say what they want, but they don't have to come over on our farm and impact us.

I've been a bit disappointed with some of them. We've had to padlock our gate across the road, because we found people driving in there looking for the well. They said, "we got told there's a well here". I said, "what's it got to do with you?" We are disappointed by that sort of thing, where people think they know what's better for us than we do.

3.5.3 Using coal seam gas experience as a guide to risk assessment in the South-East

Experience with coal seam gas in places such as Queensland are influencing perceptions, despite the very different geologies and non-coal seam gas sources in the South- East:

If something broke out in the international market, because there was a shipment that had contaminated meat and it was found to be what was used in coal seam fracking, what do you think that country and other countries are going to do to our export market? That would be mammoth.

It depends on what they're doing. If they're just looking for a free-flowing gas well, it's not a significant impact, but if it becomes a fracking type thing, where they seem to have to grid the area for the extraction, then that would be a significant impact.

I haven't been really following it that strongly. They tend to grid the country a bit more when they do that (fracking), so it seems a bit more intrusive on the overall landscape.

So far we've seen negative backlash, regarding the shale gas exploration, CSG, those sorts of things, there seems to be a lot of negative feelings towards those developments. Whatever information companies might release will be viewed as having ulterior motives. And you'll probably get polarising information from both sides.

Anti-gas activists are sometimes recognised to be using coal-seam gas examples when trying to influence opinion in the South-East:

I've seen a picture on one of their flyers (ant-gas activists), which I'm pretty sure was out of Queensland. Very closely spaced gas wells and you'd sort of go, there just isn't an intention to drill that many wells. It's a very different scenario in the South-East when you're targeting gas at that depth compare to shallow coal seam gas, which has a very close interaction with the water table.

You hear a lot of stories from Queensland, a lot of stuff comes up about the negative impacts. If you read a bit deeper into it, I think that leakage has actually always happened. What I've sort of heard and read is that you've just about always been able to light up the river. And from what I gather, the coal seam there is actually relatively shallow, whereas here it's quite deep.

The amount of information coming out of the fracking that happened in Queensland was huge. It's been mis-portrayed.

The gas industry need to differentiate what might happen here as opposed to what might happen in other areas. And coal seam gas and so on is just so different to what's been happening here, or might happen in the future. I don't think they've been very good at getting that message out.

3.6 Expectations of gas industry expansion in the South-East

Many expect that the economic constraints will limit expansions of the gas industry in the South-East to only modest growth:

My vision is that in 10 years the gas industry will be finishing up the wells that are going in at the moment, that the SEA Gas pipeline will still run through the region from Bass Strait and that gas supply will be being used for industries and domestic uses and that exploration in the South-East will be stopped because of the economics and the environmental requirements.

I just think about assessing value for effort, and I don't really understand why they persist in this area, because they don't ever seem to get a lot.

They won't find any more, it will just simmer along. There's not a lot of gas here. There's hardly any gas. They've looked, they've been looking for a long time.

Developing gas in the Limestone Coast, to solve the problem of electricity pricing sounds nice, but is realistically not a solution, because the gas from down here is expensive, because of the depth and the amount of infrastructure required.

Without subsidies I wonder whether it's actually viable.

Each well that's drilled is very expensive. We won't see the sort of situation in Queensland where it's just a minefield of wells. Highly unlikely, given the cost, to drill a well.

I'd be surprised if they were exploring to the extent they are now if they didn't have government subsidies to do it.

Others see that the low potential for conventional gas is why unconventional gas will be revisited:

The gas industry struggles in this area because of the ability to be able to extract the gas and unless technology changes, that's when the moratorium will open up again and I don't know.

The issue in the South-East is extracting it. The gas doesn't just pour out of the ground. So that's why they were questioning using fracking. They've got a few free-flowing bores, but it doesn't seem to be significant. And until they find a way to extract bigger flows, I don't see it being a big industry here.

It's what will occur after the moratorium has expired. If fracking became part of the standard operating procedure I'd be pretty worried. If they go through a fault and they pressurise that fault, then those liquids are going to move along the fault line and so those fault lines actually transect through the two water layers, so they're in the unconfined aquifers. At this stage, we've got 10 years of them exploring conventionally.

I've got no doubt it will be a little bit bigger. It appears as though we'll have to accept some more wells coming down. However, once again, I'm hopeful that the public opinion is moving, and pressure will be put through education on industry and the public to make a change.

While a ten-year ban on fracking currently exists, the intentions of the industry after it expires are not clear:

We're talking about fracking. And they say they're not fracking and yet they won't sign a document saying they'll never frack. Assure us with a contract that fracking isn't going to happen or otherwise be open and honest about how it is done and what chemicals are used.

Beach say they're not going to frack, politicians have said great, sign a contract saying you're not going to frack. And they won't do it.

3.7 Community support and trust in the gas industry

There is a distrust of the gas industry among some primary producers:

These companies just churn. There's never going to be any recourse for them in the future. They'll just shut the company down and start another one. And the company that did it originally 20 years ago, it's gone now. Again, that's a fear, that how do you get back to a recourse on these companies when we don't even know the 400 chemicals they used. They won't actually even tell the government what's in it.

If you're a director of a company, it doesn't say anywhere there that you should make decisions based for the benefit of Australia and the whole community, it says that you must make decisions that are for the benefit of the company and the ongoing ability of the company to operate financially and be successful. Nowhere does it say you have to worry about social benefit.

But as far as what their full intentions are, once again, there doesn't seem to be a lot of transparency, saying in these areas, we've found a lot of gas, and we're going to put down wells. It all seems to be a little bit quiet, sneaking up on us. I would rather that we're aware of potential problems in advance, so that they can be discussed and debated.

3.7.1 Local engagement by the gas industry

Spending in the community is seen by some as a way of building social licence:

Try and put some of those dollars that you're generating back into the area where you're taking something from. All those sort of things will help people accept what's going on. By doing some of those things, they'll be seen as a little bit more local, not just a big company coming in and taking what they want.

I know that they're opening an office in town and I assume there's information there to help inform people. Obviously Beach are making a statement saying; we're here and we're not ashamed of that.

But efforts to contribute to the community don't always assist social licence:

I'd say it's a blatant attempt to buy social license and it's dividing the community, because in some cases if they're an existing sponsor of the club and then somebody else comes in and flashes a lot of money around, you'll quite often find that the existing sponsor will just not

want to be involved. The net result hasn't been that significant, because existing sponsors pull out, and it divides sporting groups. I think most people see it as a blatant attempt at buying community sentiment.

We know they've been looking to be putting money back in the community. For those of the community that have accepted some sponsorship money, I don't think it's had a negative impact on other funding streams.

The industry's communication about the gas industry has improved but changing people's minds will be a long process, especially if trust needs to be (re)built:

With Hazelgrove 3, they were very open, they held a range of public consultation meetings, they set up an office in Penola, so they could actually interact directly with the local community. I think they did a pretty good job of engaging and explaining.

Maybe the gas industry and agriculture can use the next 10 years to build up some understanding and communication. There's always going to be the extreme ends of the scale, the people who don't want any gas extraction at all, conventional and otherwise. There's always going to be the people who say 'pay me some money and you can do it on my farm'. Most people will be in the middle, so if the 10 years can be used to build good relationships and understanding and a feeling of security for the farmers and the industry then that would be good.

They've put a regional spokesperson in and he's part of the community. He's been pretty open, we got on really well with him. That's been quite successful. I mean you can always improve on anything really at the end of the day, but I think they approached that quite well.

3.8 Finding the way forward

3.8.1 Overcoming a lack of early communication and engagement

There's catching up to do because past communication and engagement strategies weren't pro-active enough:

They could have come out as an industry and not any particular company. The Lock the Gate group ran a very cleverly structured campaign predominantly targeting the gas industry and the gas industry sat there silently. There was a missed opportunity to put the other side. Now there is an expectation that there's fracking going on in the limestone coast. And every industry person I've spoken to has repeatedly said, there are no plans to frack. But they've left it too late.

If good science doesn't get its head above bad activists it's easy to spread fear.

They allowed the fearmongering and the anti-fracking groups to get ahead of the debate and they were too late in trying to put a balance into the discussion. That's where they've fallen down. To right what's happening now is going to be pretty difficult in terms of public opinion.

I think like any industry that's coming to a region, they needed to take people with them. And I think the gas industry has failed to do that. I just don't think they were communicative enough about what they were trying to do.

3.8.2 The role of the regulators

Greater awareness of legislated requirements may help to give people reassurance:

It's up to governments to set the rules to make companies operate within the law and good government sets good rules so that independent, private companies can flourish, but they are required to do the right thing. I think we've seen an unwinding of what has been good governance in Australia for many years.

Ensuring that their checks and balances are in place and that they have the best knowledge of what's underneath and that they're doing everything 100% right. At the end of the day they're the experts in their field, for us to tell them how to do their job is probably a little bit hard.

It's ensuring that government regulation is actually up to standard with environmental impact. The big concern, is that the desire for excise or employment gets put in front of the potential environmental impacts, that would be people's major concerns.

They've got to keep the government informed, I'm guessing again it's got to go through the EPA and all the checks and balances. You hope that they're doing it and again that's a bit more public consultation, letting people know what their actual checks and balances are.

So, change the technique to say, yeah, we acknowledge the aquifer is the primary resource here that we're all concerned about... Let's change up, let's do something different of how we put our hole through that and over deliver on the legislative requirement. So that if the legislation says that it's got to be cased 3 times, we've cased it 6 times.

3.8.3 Building on support and those in the pragmatic middle ground

A base of support for the gas industry does exist:

Yeah well in terms of the landscape, I mean gas is probably the least invasive of all. Put a hole in the ground and a pad that's the size of a house. I think in time we'll need all forms of energy that we can muster, particularly if we're tending away from coal."

I like my gas bottles, I like my gas in the car, I like gas to heat me up. Gotta have gas. I'm not pro gas, not pro or anti, but I'm a realist.

There's certainly no rampant drilling for gas in the South-East. It just seems to be, a well goes in everywhere now and again. If it's allowed to progress in a natural way, it will all be okay.

I'm just seeing it purely from a common-sense point of view and I think there's some risks, but there's risks with everything and our country needs energy, the world needs energy.

If they put more gas here then it's just another little hole in the paddock. I mean it would be terrible if there was 30-40 but one or two is probably not that much of a hindrance on us and if that's what they do, that's what they do

Some are prepared to accept risk if there is an appropriate amount of oversight:

There's people out there that don't want any risk, but we can't live in a society where you don't take some sort of risk. We wouldn't make money if we didn't take risks in any business. You're always sticking your neck out somewhere and that's no different to governments, hopefully they've got the checks and balances and the knowledge behind them to make those right decisions.

But the voice of those in the middle ground are relatively quiet:

The message about why they're so good, or not harmful, never gets enough air time. So, for the gas industry to actually try and prove they're actually safe, I mean that's essentially the issue, I'm not sure they could. I think they're stuck at a point where it's perceived that the risk is too great. Any bad story gets so much air time compared to the million good stories you never hear about.

Isn't it always the small minority of vocal opposition that seems to win over at the end of the day? Because governments don't like that publicity. So, you put a bit of bad publicity out there and they end up getting their view put. I think that's human nature and they know they can win that way.

Whenever they have an event, there's only 14-15 people turn up. So, they don't have that large scale following that I would expect, and their argument is, well people work. Well so do other people it's always a bit of a minority group and it's the same voices.

It's become; "are you're with the herd or not?"

I tend to find people are polarised. You're either for or against, there's not much in between.

I choose not to discuss it with them, because what I see in a public sense is that no matter what discussion I have with them, I don't think it would be a very productive or enjoyable discussion, it would be a polarised one.

Not only are the voices from the middle missing from the debate, the pro-gas industry voices are also missing:

A lot of people around here have been behind the Lock the Gate movement, I know plenty of people are anti. Whether the ones who are pro fracking tend not to speak out as much, I don't know.

Everything is a bell curve, isn't it? And we got the extremists both end and the Shut the Gate alliance have done a good job, but they have been a little bit extreme and their process is not necessarily quite right either, but most of us are in the middle.

The issue has become emotional and this has deterred some from expressing their point of view:

My understanding is that there is a whole lot of concern which is probably unfounded when you look at the science behind it. Like any community concern, it's about the need to understand the science, but that's never going to happen, because it's all about emotion as opposed to science.

In the last couple of years, I think one of the key things that I've seen in this debate has been a lot of angst being created and I thought while the information sessions were good, I'm not entirely sure how well it's technically understood as to what's proposed. There has been a mixing up of the two, fracking and conventional gas.

What I'd love to see is where people will debate from the opposite point of view but will still acknowledge the strong points of the opposition, rather than try to pull them down. It's not a raised voice debate, it's just about making the community far better informed of it from both perspectives. You don't go away from the debate as a winner or a loser, you go away having a better-balanced understanding of the issues involved. I don't think that happens.

3.8.4 Suggestions for future communication and engagement

There's still an opportunity for information and engagement to improve understanding, recognising that different audiences have different needs:

Rather than having their own traveling roadshow, they should be working through existing organisations and community groups. But that's easier said than done, because those groups are always going to be cautious about being seen to support the gas industry.

Unless you get people on the same boat right from the word go, all you tend to do is create increased volatility or bias, as you go forward. The starting point is a really important one and it's probably the key people that you need to engage to bring that about.

If you're a farmer and your livelihood is based only on agriculture and that's all you've got, you'd have to be worried about your water table. It's a matter of getting that right message across to those people who worry their livelihood is put at risk. It's clear, concise, accurate messages.

Most people just want real information and the chance to absorb it and feel like they can trust what they're listening to.

You see anti fracking messages everywhere. Where do you see any public boards that clearly articulate what the gas industry's doing? Now the gas industry might say, well they'll just get damaged, hacked and taken down. But drive past Hazelgrove 3's roadway entrance, there is no explanation board explaining the benefits of those sorts of things. I don't think there's been a significant way of actually reaching the farmer.

I wonder whether everyone quite understands the significant difference in depths of where they're targeting compared to the relatively shallow water tables. There needs to be some help with the understanding of the separation for the depth at which they're targeting I guess, or where these deposits are.

There have been attempts to put forward reasoned opposition using science on both sides but not always effectively:

We've tried to go through the proper channels in terms of talking to the government, putting a coherent, logical science-based case to them, not protesting with banners and all that sort of thing.

So many times, the research was paid for by the company. Well who else is going to pay for it? It's the likes of CSIRO that are neutral. And they come up with the science and everybody backs it.

There is good science that shows the things are safe, but then you listen to some other genuinely good science who are worried about it, and we're more talking unconventional gas extraction here, so which science do you believe?

Real independent information and that's where the CSIRO comes in, I would hope.

Communication has not allowed the facts to be portrayed properly. The community sentiment is so strong that it's going to be hard to get them to listen to what the gas industry are saying. Maybe some of that needs to come from CSIRO to give it credibility; because people will hear the gas industry and say well of course they would say that.

You're either on the pro side or against There's no one in the middle saying, if they started drilling this type of well, this is what would happen. But this is the well they're drilling, this is the facts.

Greater transparency and education I think are those key elements. Get out on the front foot, don't be afraid to talk about your technology. Because if they don't, that gap will be filled by someone else who might not necessarily understand the technology.

4 Relating the findings from the south east of South Australia to other regions

The results described in the previous section raises a number of issues arising from community perspectives on gas development, the local area, potential risks and opportunities, and issues regarding communication and community engagement. However, it may be difficult to explore many of these directly given the early stage of development of gas development in SESA. However, there is a wealth of research already undertaken in other regions and other resource developments that can be drawn upon to explore similarities and differences. A review of existing literature may help to provide insights into the issues raised in the stakeholder interviews. The following sections use this approach for four main themes arising from the survey responses.

4.1 Attitudes towards local area and gas development

Responses from primary industry stakeholders highlight the issues underpinning attitudes of members of the agricultural sectors towards gas development in their local area. Significant effort has been invested in the development of a "Clean and Green" image for the Limestone Coast and SESA, and the even wider area referred to as the "Greater Green Triangle Region". All levels of government (Commonwealth, State and Local) have contributed to the development of a regional growth strategy that raises awareness of the region's agricultural produce through marketing and regional branding (RDALC, 2017). This includes building and applying brand management frameworks to ensure a 'clean, green, high quality' brand image. Furthermore, a licenced brand has been developed for the Limestone Coast recognising the rich earth and water resources. All these efforts aim to attract investments into value adding to agricultural production for premium food and wine, and advanced manufacturing in the forest and forest products industry.

The interviews demonstrated that the "Clean and Green" marketing message resonates with primary producers and that they have high levels of pride in their region and commitment to maintaining the brand. Whilst regional growth strategies also include clear intent to increase power availability and reliability through the development of renewable energy sources such as wind, wave, biomass and geothermal (RDALC, 2017), it was not clear that those surveyed felt that conventional gas development fitted comfortably within this regional image. Whilst this response is likely driven by general perceptions regarding extractive industries and risks related to drilling through aquifers as found in previous studies (Walton and McCrea, 2018), the acceptance of gas infrastructure as part of a rural environment is also influenced by a person's environmental values and landscape aesthetic preferences. For example, Good (2006) compares the aesthetic value of windfarms for persons who see them primarily as a human construction within a natural environment, compared to those who see the role of wind farms in providing a clean source of renewable energy.

Whilst there is a potential for conventional gas to provide an energy source with lower atmospheric emissions to other common energy sources, comparisons are likely to be made with renewable energy sources under development in the region and this may impact on acceptance. For example, a study into landholder attitudes toward simultaneous natural gas and wind farm development in northern Pennsylvania Jacquet (2012) found that even though most landholders saw both energy developments

in a similar light, attitudes were generally more negative toward gas development than wind farm development. Environmental attitudes of land holders in northern Pennsylvania were a key driver of attitudes towards both energy industries.

For natural gas, the influence of environmental attitude was a greater driver than demographic factors or level of experience with the gas industry. Finally, studies in Queensland on the attitudes of residents of Brisbane toward the trade-offs between economic benefits and associated costs of CSG development in rural areas suggest that similar strength of concerns about community and environmental impacts extend outside of the gas development regions (Windle and Rolfe, 2013). In a study of sustainable energy production within iconic UK landscapes, Selman (2010) suggests that it may take time for communities to embrace an "acquired aesthetic" that sees energy production as part of an agricultural landscape. For this to happen, community members would need to "develop a taste" for the emerging landscapes by endorsing an underlying narrative of sustainable development.

4.2 Perceived Benefits and Risks

Previous studies have investigated the impacts perceived by residents of regions undergoing gas (Andersen and Theodori, 2009; Theodori, 2009; Brasier *et al.*, 2011; Walton and McCrea, 2018) or coal developments (Ivanova *et al.*, 2007; Rolfe *et al.*, 2007). In contrast to findings for large scale coal developments where benefits to employment, economic growth and health services have been readily identified by stakeholders (Ivanova *et al.*, 2007), studies in gas developments have found lower recognition of benefits from gas developments in some regions. Perceptions have been found to change with time with people's experience of the changing resource industry. For example, Theodori (2009) found that positive impacts were more likely to be perceived in more mature development areas where benefits had time to be realized and observed by residents, whereas Perry (2012) found that acceptance declined when adverse impacts were experienced. Walton and McCrea (2018) found more positive attitudes and perceptions of CSG development in an area of more mature gas development when compared to newer developments, and that changes in attitudes could change in direction over time. However, that study found that perceptions of benefits were generally marginal, although there was some variation in sub-regions with more recognition of benefits in larger towns. Brainstorming sessions with farmers in Queensland were quick to identify risks, but took time to identify benefits (Huth *et al.*, 2018). Recognition of the importance of perceived risks to overall acceptance of development is important because previous research has shown that people are often not prepared to compromise their concern over environmental impacts when weighing up benefits over costs (Zhang and Moffat, 2015).

In SESA there was acceptance and a common positive attitude towards the co-existence with the relatively small conventional gas industry that has existed in the past. However, a low perception of benefits found was still found in this study. This may be due to the modest size of the conventional gas industry within the region when compared to local agriculture or resource developments from other regions. The level of benefits often increases with the scale of development. For example, a study into the economic impacts of early unconventional gas development in New South Wales Marcos-Martinez *et al.* (2019) found a 7% increase in family income in regions with CSG development compared to those without for a gas industry including approximately 430 gas wells. This compared to a 15% increase in family income for gas development in Queensland including over 4000 wells (Fleming and Measham, 2015). Studies into the effect of natural gas development on employment and income in Colorado, Texas, and Wyoming Weber (2012) found that each million dollars in gas production created 2.35 jobs in

the county of production and that this led to an annualized increase in employment that was 1.5% of the preboom level. Whilst opportunities exist for gas industry expansion and increased economic diversity, analysis of development scenarios for SESA suggests a net increase of $32 million in gross regional product and increase in employment of 16 FTE over 10 years for the scenario deemed most likely by stakeholders (Poruschi *et al.*, 2019).

In some mining regions income inequality has been identified as the cause of perceptions of low economic benefits. Evidence from an analysis of 781 Statistical Local Areas across regional Australia Reeson *et al.* (2012) suggests that income inequality is impacted by proportion of the population employed in mining and that the impacts differ for males and females. These data indicate that inequality may tend to decrease with higher levels of employment in mining for males. However, given the modest size of the SESA gas industry, these results would suggest very little impact currently on income inequality for either gender.

Whereas recognition of benefits was low in responses to the survey in this study, in contrast, risks and concerns of gas development to ground water and reputation were seen to be substantial and important to primary industries. Concerns for ground water impacts from gas development, including impacts on both water quality and quantity, have been raised by stakeholders in similar studies in Australia (Huth *et al.*, 2018; Walton and McCrea, 2018) and overseas (Andersen and Theodori, 2009; Theodori, 2009; Crowe, 2019). The concerns for groundwater in the SESA by local stakeholders will be affected by the level of dependence for local agriculture and domestic water supplies for Mount Gambier, Millicent and Penola. Between 2001 and 2016, the Limestone Coast region's economy was mostly driven by agricultural activities (c. 20% of average added value) whilst Forestry and logging and wood product manufacturing accounted for 5.6% and 3.2% of the average added value (GISERA, 2019). The largest proportions of total land use for irrigated agriculture include irrigated pastures (1.9%), irrigated horticulture (3.1%) and irrigated cropping (0.8%). The predominant land use, non-irrigated grazing (47%) also has an important water requirement for livestock.

Some respondents in this current study suggested that the risks from gas development should be taken in regions of lower value agricultural production. Such concepts are not new for regional planning or government legislation for gas developments (Owens, 2012; Swayne, 2012). An analysis for a highly productive region of the Darling Downs suggested that economic comparisons between sole agriculture and co-existence with CSG could be closer than expected depending on assumptions on long term costs to agriculture and the proportion of value from CSG production retained within the national economy (Chen and Randall, 2013). The retention of value from gas production becomes an even more important consideration for people considering net effects on local communities. The primary industry stakeholder survey within this study found that perceived local benefits to the South-East from the gas industry were very limited. The perceived increases in jobs or business were said to be low. Whilst many of the perceived impacts were local, the more significant perceived benefits, such as the provision of energy, were realised elsewhere. Similar attitudes were found for farmers in Queensland (Huth *et al.*, 2018) who felt that much of the benefit lay with those receiving the exported gas. In this Queensland study, the majority of respondents were neutral (45%) or disagreed (30%) with the statement that they "felt a civic duty to support CSG as part of the national or local economic interests". The participants stated that the perceived weight of local risks was the main cause for these perceptions. Responses in the current study for the SESA mirror those from Queensland.

The perceived risk of impact to the brand of the region and the wine industry was raised in the interviews. The importance of such brands is captured within the regional development plan (RDALC, 2017). This plan highlights that "the region attracts more than 600,000 visitors each year, including an

average of 48,000 (8%) international visitors. The Limestone Coast is in the top 3 regions most visited in South Australia outside of Adelaide, outstripping both Kangaroo Island and the Barossa regions" and that therefore the plan should "continue to develop tourism opportunities across the entire region, with a focus on the natural resources, food, wine and quality accommodation" and that "Effective regional branding needs to be embraced by all industries and communities across the region". The importance of brand is highlighted in a submission on behalf of the Australian wine industry to the select Committee on Unconventional Gas Mining (SAWIA, 2016). This submission raised concerns of threats to the brand and reputation of the internationally recognised wine brands of specific regions and Australia more generally, and potential impacts on visual amenity that is inconsistent with tourism values of wine-growing regions. Furthermore, the submission reiterates lessons from previous impacts on Australian wine brands which showed significant impacts on value which persisted over time. The importance of regional image for branding in wine tourism in Australia is well understood (Carlsen *et al.*, 1998). For example, in a comparison of "Winescapes" in Australia and the USA (Thomas *et al.*), setting was important in both countries. However, whereas in USA, wine tourists look for wine value to enhance their satisfaction, Australian wine tourists seek out and engage with complementary products such as local produce to enhance their satisfaction. Wine tourism benefits from the regional "Clean and Green" image mentioned earlier for a wider range of agricultural commodities.

Responses from the interviews in this SESA study suggest a risk arising from a perverse outcome for many attempting to protect the regional image from perceived risks from gas development. There is a fear that communication of perceived risks may implicitly link negative messages with the brand they seek to protect. For example, the mechanisms for possible impacts on regional image arising from gas developments have been highlighted for the Hunter Valley region of NSW (Schweinsberg and Wearing, 2013). These authors suggest that the media play a significant role in shaping the message that is read by tourists and demonstrated the predominance of negative issues in reporting of CSG in the Sydney press. Responses to interviews in this current study also highlighted the link created between the gas and wine industries through the adoption of names of wine growing regions for co-located gas development. Such an approach of adopting local names (such as traditional farm station names) is also used within the CSG development areas of Queensland. However, these local names do not necessarily have the same level of market value for the commodities produced within these areas. The respondents in this study raise the concern that anti-gas arguments may implicitly mention the brands they may be trying to protect because of the shared naming.

4.3 Impact of Information and Misinformation

It is clear from the interviews, that stakeholders understand the value of accurate information. However, it is also clear that the potential damage from misinformation was also a concern. Stakeholders in the survey felt that the gas industry could be selective with the information that they provided and that activists were not selective enough. Trust can be difficult to build and maintain for gas companies (Huth *et al.*, 2016; Huth *et al.*, 2018) and it appears that in the SESA, a similar perception is arising regarding those opposing gas development. Stakeholders involved in this survey felt that those opposing gas developments lost the support of primary producers when they introduced issues that are not relevant for the local context. For example, they felt that much of the information related to the very different development for coal seam gas in Queensland. These sentiments match those received of farmers surveyed in coal seam gas developments in Queensland who described being mistrusting of any entity with strong views but preferred a neutral and less emotive perspective. The preference by many was for information to be provided in a neutral manner in a way that they could make their own

judgements (Huth *et al.*, 2016). Those involved in the survey also felt that the more informed understanding of gas development came from farmers' closer personal networks. This is also similar to findings for farmers in other gas developments in Queensland (Huth *et al.*, 2016; Huth *et al.*, 2018). However, responses in the survey also raise the issue of potential conflict on emotive issues such as gas which may restrict conversations within farmer networks. Survey participants suggested that some farmers' private views differed from public expressions due to fear of conflict. Similar suggestions have been observed in Queensland (Huth *et al.*, 2018), the United States (Perry, 2012), and NSW where a gas project was in its pre-approval phase (Walton, McCrea & Jeanneret 2018).

One study from the Barnett Shale development in Texas studied the perceptions of residents on a range of issues and concluded that it was important for resource companies to clearly communicate the potential positive and negative impacts of their industry, and that open and honest communication within the community was required to reduce the spread of rumours and inaccuracies about current and proposed developments (Theodori, 2009; Huth *et al.*, 2016). The same study stressed that gas companies needed to work with government and regulatory agencies to gain the public's trust. Surveys of people at agricultural Shows within the coal seam development areas within Queensland highlighted the need for research organisations to provide independent and objective information about gas (Huth *et al.*, 2016).

4.4 Communication and Engagement

In general, those interviewed felt that the gas industry interacted well with the farmers hosting their infrastructure. This working relationship is most likely aided by the relatively small size and rate of development of the gas industry. Larger, more intensive, and more rapid development of the CSG industry in Queensland led to less collaborative relationships, especially during the early development phases, and farmers were reluctant to embrace coexistence with gas development as part of the farm enterprise (Huth *et al.*, 2018).

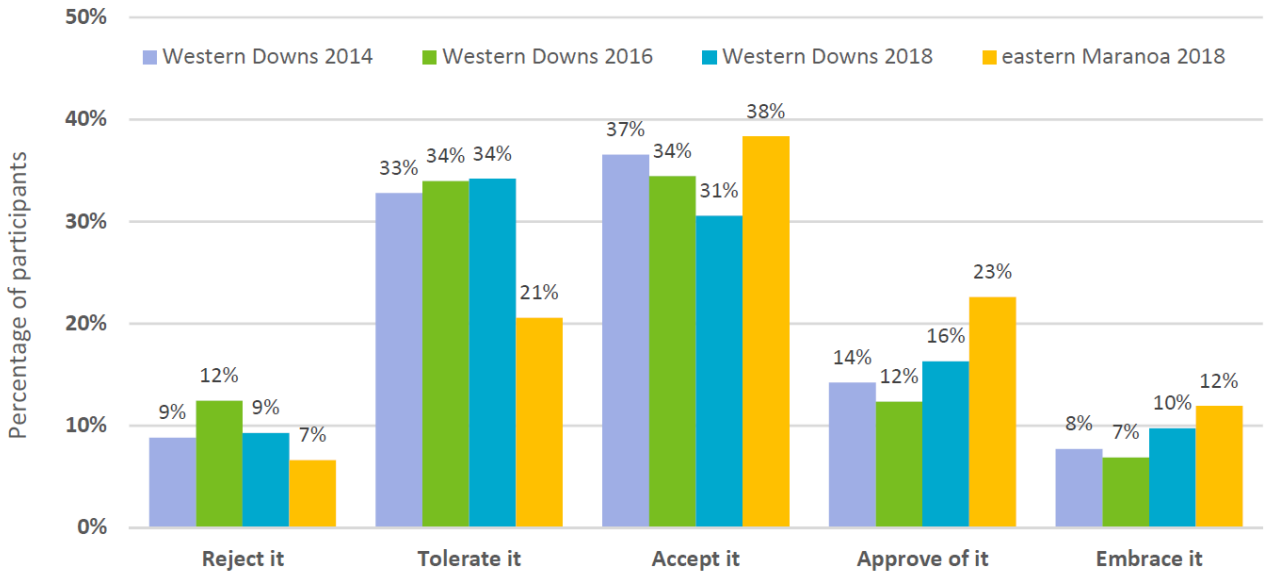
In terms of the broader engagement by industry and government, responses from the interviews in this study suggest that past communications were not proactive enough to provide for informed debate. They felt that, whereas anti-gas activists were quick to respond to issues, information from other sources had lagged. For example, they felt that information regarding regulation, checks and balances, may give people reassurance. This view is supported by large-scale surveys of the Australian public which showed that citizens expect legislative and regulatory processes reflect their interests and protect the environment alongside the need to develop resources for economic benefit (Zhang and Moffat, 2015). Moreover, one experimental study showed that proactively providing people with information about regulation and compliance, and industry's commitment to ensuring local communities had a say produced more favourable views of trust and fairness about a new mining proposal (Zhang, Measham, & Moffatt, 2018)

A summary of perceived information needs arising from interviews with rural folk in Queensland's CSG development area also suggests that information and engagement needs vary within a host community. Information such as on regulation and monitoring would be valued by people in the host community more so than those directly impacted by CSG development, who were more eager for information to help them planning, negotiating and conducting their farm enterprise (Huth *et al.*, 2016). People in the host communities of the Queensland CSG industry had an expectation that the science and monitoring

research would be considered by government and would inform industry standards and government policy.

The interviews with primary industry stakeholder in this study were also clear on the need for better engagement with those who hold the middle ground as the debate was felt to be dominated by more extreme voices. Similar results were found for wind farms in Australia with surveys showing stronger levels of community support than might have been indicated by media reports (Hall *et al.*, 2012). Surveys in Queensland's CSG area (Walton and McCrea, 2018) have shown that the majority of the population can lie within categories of tolerating, accepting or approving of development. Furthermore, these surveys have found that such trends can persist over time with only minor change during construction, post-construction and operations phases.

Interviews in SESA suggest that some support exists for the gas industry, but that those supportive, or in the middle ground, had remained quiet. Members of the community may be hesitant to engage for fear of impacts on relationships with others around them or concern for jeopardising more economically important local industries such as the wine industry, which has a long and successful history in the region. In surveys with farmers affected by CSG in Queensland (Huth *et al.*, 2018), 90% of responses agreed that their neighbours and community were important to them as a farmer and as a resident. Whilst these farmers gave no strong evidence of breakdown in relationships between farmers due to CSG development, they identified the potential for conflict. Breakdown in relationships had been observed in gas developments in the USA where inequalities existed between costs and benefits for individuals (Perry, 2012). Responses from those interviewed in the SESA suggest a lack of motivation may lie in disincentives, for individuals and government, to join into an emotional debate. The issue of fear of potential exclusion of community members raised by one respondent in this study has been described in the USA (Perry, 2012). Alternatively, time-poor farmers in Queensland suggested that they did not have the time required to effectively engage in the debate about gas development (Huth *et al.*, 2018).



Note: Percentages rounded to the nearest whole percent

Figure 6 Attitudes to CSG development in the Western Darling Downs in 2014/16/18 and eastern Maranoa in 2018 (Walton and McCrea, 2018).

Notwithstanding the possible difficulties outlined above, those interviewed in this study still felt there was a need and opportunity for improved communications through industry, government and independent engagement with key groups and individuals. Whilst the information needs and methods of communication will likely differ between groups and individuals, some similarities exist between information needs voiced in this study and others. One response in this study stated that "most people just want real information and the chance to absorb it". Another stated the need for "clear, concise, accurate messages". Another suggested that "I don't think there's been a way of actually reaching the farmer". Engagement with rural communities in Queensland during CSG development received similar messages. Surveys of people living in CSG development areas (Walton and McCrea, 2018) found that whilst the confidence in their own understanding of the industry were modest, over half of the respondents indicated that they needed more information. Farmers in Queensland identified the need for "facts and figures" that were targeted, up-to-date and relevant for landholders already "drowning in information" provided to them by the various parties they were already dealing with (Huth *et al.*, 2018). Another survey in Queensland identified the importance of communication of information in ways that didn't "dumb down the science" but that was easy to read and understand (Huth *et al.*, 2016). For example, the use of detailed maps, with some explanation of the underlying science was found to provide information in a neutral manner when dealing with the issues of erosion arising from gas development (Huth *et al.*, 2016).

The issue of trust in the information provided was important in many of the responses provided within interviews in this study. Similar importance was given to this issue by farmers in Queensland (Huth *et al.*, 2016), who placed high value in communication from independent voices within the community debate. However, they also highlighted the ongoing need to continue ensuring that mechanisms are maintained safeguarding research independence.

5 Summary

Responses from local stakeholders provided perspectives on a wide range of perceptions of the costs and benefits of gas development in SESA and ways to improve communications within the local community debate. Key messages include:

1. Conventional gas activities have generally been well accepted by primary producers over a long period. A shift in attitudes to the gas industry occurred around 2014 when the potential for development using unconventional gas technology became apparent in the community. Demonstrating how the industry can co-exist with the clean, green image would be important. For example, indicating the potential size and scope of the conventional gas industry as a relatively small footprint may be helpful in allaying concerns.
2. The relatively small size and rate of development of the conventional SESA gas industry in the past facilitated a common acceptance and generally positive relationship between the primary industry and gas activities. However, it is the perceived lack of large and obvious local economic benefit that is contributing to a common community view that the potential benefits will be outweighed by the risks. A clearer rationale as to why and how conventional gas development is needed in the area for stakeholders to consider the gas industry to be of net benefit would assist local stakeholders.
3. Local stakeholders value the "Clean and Green" image of the region targeted in regional growth strategies. It was not clear that further gas industry development fitted comfortably within the target regional image and reputation. As found in previous studies from other regions, stakeholders may not be prepared to compromise their concern over the potential for environmental and reputational risk when weighing up costs and benefits.
4. Stakeholders felt that communication of important information on issues such as industry regulation or monitoring was too slow, allowing communications from polarised voices to dominate. Although very different and largely incomparable, communication referring to intensive coal-seam gas developments in Queensland and similar regions have influenced perceptions. Stakeholders raised concerns that efforts to contribute realistic views to the debate to help protect the regional image could do damage to that which they seek to protect by bringing wider public attention to the gas developments in the region.
5. Balance within the community debate may benefit from greater engagement by those in the community who hold the middle ground. A role for provision of clear, accurate messages from an independent and trusted source was recognised.

In our study of the literature we found similarities with perceptions from stakeholders in other gas development areas or areas undergoing other forms of resource development (e.g. wind energy generation). In many cases, the research is clear and assists in understanding attitudes in the SESA. However, some areas may benefit from further research. For example, whilst the impact of resource development on regional and market brands has been raised in various studies, very few attempt to demonstrate this in a quantitative manner. Similarly, whilst research has sought to explore the impacts of resource development on highly valued landscapes as raised by concerned parties, little attention has

been given to the inadvertent impact of prominent debate on the value of brands that such a debate may be seeking to protect. Finally, the value of the "middle ground" or 'quiet' community members could be explored to provide greater diversity of opinion in important community discussions for large developments.

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7 Appendices

7.1 Interview question guide used by interviewer

- Have you personally experienced any interaction or impact with the gas industry in the SE?
- Up until now what impact, if any, has the gas industry had on primary industries in the SE; your primary industry activity?
- What could the gas industry have done differently to manage its impact on primary industries?
- Are you aware of future development plans for the gas industry in the SE?
- What impacts do you think these developments will have on primary industries in the SE; your primary industry activity?
- Considering some of the future alternative energy developments in your region such as wind, solar and bioenergy, what impacts do you think these developments will have on primary industries in the SE; your primary industry activity?
- What do you think the SE gas industry might look like in 10 years' time compared to now?
- What do you think the gas industry should do to manage its impact on primary industries in the future?
- If the SE gas industry had double the level of current activity in 10 years' time, what impact do you think that would have on primary industries in the SE; your primary industry activity?
- Do you see benefits from SA producing more of its own gas?

7.2 Information sheet text provided to interviewees before the interview

Perceptions and expectations of impacts of conventional gas development on primary industries in the South East of South Australia

The purpose of this study is to better understand the perspective and expectations of stakeholders in primary industries in the South East about a resumption of the conventional gas industry in the South East of South Australia. Findings from the project will help local communities, industry and government in their future decisions related to conventional gas and energy supplies in South Australia.

Who is funding this research?

The study is being conducted by the CSIRO and is funded by the Gas Industry Social and Environmental Research Alliance (GISERA SA), which is a collaborative vehicle established to undertake publicly-reported independent research addressing the socio-economic and environmental impacts of Australia's natural gas industries. Members of GISERA SA consist of the South Australian state government, the Federal government, and the CSIRO.

All research findings are made publicly available on the GISERA website. Further information on this project and the governance of GISERA can be found at www.gisera.org

Who is participating in the study?

Primary Industries stakeholders in the South East of South Australia will be involved in the research including local and state government, regulators, gas companies, peak agriculture bodies, special interest and local community groups, and local residents of the region.

You were recruited through publicly available information and/or local government, industry, and community networks.

What is involved?

You will be invited to participate in an interview with one of our researchers. The interview will be semi-structured, one on one, and largely take the form of a discussion.

We expect interviews will run for approx. 45-60 minutes and be face to face in a location that suits you.

We will ask questions about your perspective, concerns and expectations regarding conventional gas development in the South East. We will also gather some demographic information about people participating in the study (e.g. gender, occupation) to ensure we gain a variety of perspectives. This information will remain anonymous.

What happens with the information from this study?

A report on the survey will be written without identification of individuals. The report will be publicly available and used to inform future actions of community, industry and government regarding conventional gas development and energy supplies in the state. Research findings may also be used in scientific publications.

Confidentiality

All information collected in this study will be confidential and anonymous. Although interviews and small group discussions will be recorded and analysed by a researcher, the recording will only be available to members of our research team. Recordings ensure information is not lost as part of note taking. The data will be securely stored and used only for research purposes. The interview findings will be summarized and published in a report. No personal or identifiable information would be included.

Participation and withdrawal

Participation in this study is voluntary and you are free to withdraw at any time without prejudice or penalty. If you wish to withdraw, or modify your contribution simply notify the researcher listed below, and, your interview data will be destroyed or adjusted accordingly.

How can you find out more about the study?

More information about the project can be found by contacting the CSIRO researchers using the contact details below or by visiting the GISERA website (https://gisera.csiro.au/states/sa). A summary of the results and a link to the full report will be emailed to you at the conclusion of this study if you provide your email address on the consent form and checked the appropriate tick box.

Ethical clearance and contacts

This study has been approved by CSIRO's Social Science Human Research Ethics Committee in accordance with the National Statement on Ethical Conduct in Human Research. If you have any questions concerning your participation in the study feel free to contact the researchers via their contact details below. Alternatively, any concerns or complaints about the conduct of this study can be raised with the Manager of Social Responsibility and Ethics on (07) 3833 5693 or by email at csshrec@csiro.au