GOAL ATTAINMENT SCALING: A TOOL FOR EVALUATING PIPELINE ENVIRONMENTAL PERFORMANCE.

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ABSTRACT:

The recently released APIA Code of Environmental Practice identifies the fact that effective environmental management involves (inter alia) the establishment of environmental objectives, and criteria for measuring the achievement of those objectives.

The Petroleum Group of Primary Industries and Resources South Australia has successfully used a technique known as Goal Attainment Scaling (GAS) to assess environmental performance of petroleum exploration operations (in particular, the rehabilitation of abandoned wellsites and seismic lines). This method involves clearly identifying environmental objectives and establishing criteria to measure the extent of achievement of those objectives. PIRSA have recently begun trialing the technique on pipeline projects. The APIA Code of Environmental Practice references the use of the technique.

GAS has been utilised for two recent pipeline projects in South Australia. It has been found to be a useful tool in all phases of pipeline projects from environmental approval through to post-construction environmental auditing. The requirement to define environmental objectives and measurement objectives in quantifiable terms in the approval phase is particularly beneficial. GAS is one tool of many that can be used for environmental auditing, and should only be used where considered appropriate.

INTRODUCTION

The Australian Pipeline Industry Association (on behalf of the Australian pipeline industry) is dedicated to the continuation and improvement of the industry's excellent environmental record. To this end, the APIA has published a Code of Environmental Practice to provide minimum environmental management standards and thereby assist to maintain a consistently high level of environmental performance by the industry[1].

The APIA Code of Environmental Practice promotes the establishment of an effective Environmental Management System (EMS) as a key step in achieving and maintaining a high standard of environmental performance. One of the key elements of an effective EMS is a framework which sets environmental objectives and measurement criteria to assess the

achievement of those objectives. These objectives and criteria are most effective when established via a consultative process with key stakeholders.

The Petroleum Group of Primary Industries and Resources South Australia (PIRSA) has successfully adapted a technique known as Goal Attainment Scaling (GAS) to assess environmental performance of petroleum exploration operations (in particular, the rehabilitation of abandoned wellsites and seismic lines). This method involves clearly identifying environmental objectives and establishing measurement criteria. PIRSA have recently begun trialing the technique on pipeline projects.

HISTORY OF GOAL ATTAINMENT SCALING FOR ENVIRONMENTAL IMPACT EVALUATION

Goal Attainment Scaling (GAS) originated in the United States in the late sixties as a means of evaluating the effectiveness of mental health programs[2]. GAS was devised to handle the situation where a single program was applied to a diverse patient base in which treatment needs and outcomes are patient-specific. The technique centres on defining and documenting patient-specific outcomes which acknowledge that a range of outcomes are possible, and assigning a numeric value to the outcomes in that range. The numerical results are collated and assessed to determine overall program effectiveness.

In 1994 the Petroleum Group of PIRSA (then the Department of Mines and Energy, South Australia) decided to trial the application of the GAS system to its environmental audit program for petroleum operations in the Cooper Basin.

The key features of GAS recognised as valuable in environmental evaluation were:

- the recognition of a range of possible outcomes
- the requirement to define and document possible outcomes
- the application of a scoring system to assess the outcomes

PIRSA first applied GAS to the evaluation of abandoned wellsites. A series of goals were identified and expressed in terms of a range of possible outcomes in an expected timeframe. The outcomes were defined on the basis of the following table:

OUTCOME	GAS SCORE
much less than expected	-2
less than expected	-1
expected	0
more than expected	+1
much more than expected	+2

For example, the goal for revegetation of abandoned wellsites in the Cooper Basin after 5 years was expressed as follows[3]:

GAS SCORE	CRITERIA
-2 (much less than expected)	There is no revegetation
-1 (less than expected)	The revegetation mostly consists of annuals and biennials; in contrast to the surroundings there are few perennials
0 (expected)	The revegetation consists of annuals, biennials and perennials, but there are some bare patches which are inconsistent with the surroundings
+1 (more than expected)	The revegetation, mostly perennials, is consistent with the surroundings but there is a contrast in the maturity between them
+2 (much more than expected)	The revegetation type, density and maturity is indistinguishable from the surroundings

The results of an audit of 45 abandoned wellsites in the Cooper Basin yielded the following results[4]:

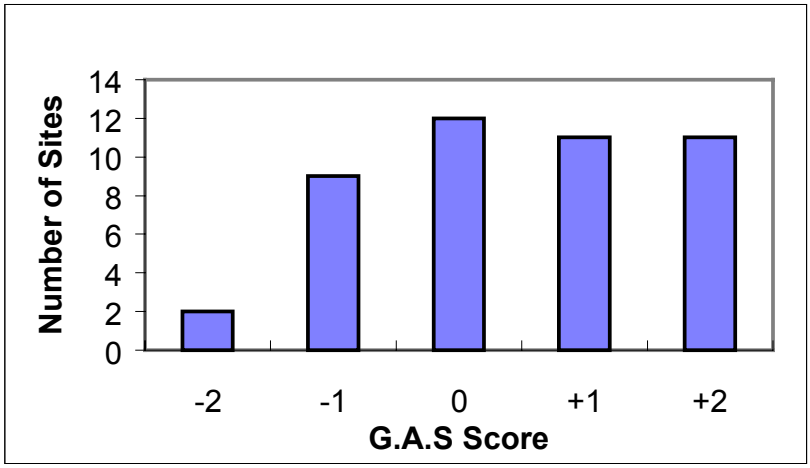

Figure 1: Results of G.A.S assessment for Objective: "Minimise impact on vegetation for well sites restored for more than 5 years"; Abandoned wellsites, Cooper Basin 1995-1997

These results show that regeneration of vegetation on abandoned wellsites was generally as good or better than expected and that there were only very few incidents of unacceptable regeneration outcomes. However, the main point of the example is that the technique has converted the raw data into a simple graphical form that demonstrates the overall effectiveness of the rehabilitation program, and highlights instances of unacceptable performance, which can then be rectified.

The following general comments are noteworthy:

- Expressing outcomes in terms of "less-than-expected", "expected", "more-than-expected", etc. requires that they be written with sufficient content to allow an auditor to assign a score for a given objective. This requires the

use of quantifiable terms. Once this is established and agreed upon, there should be no argument after the event as to how any given outcome should be assessed. This does not preclude the use of pictures or diagrams to demonstrate differing outcomes, as has been used successfully for the well site criteria.[5]

- The use of quantifiable language and a scale ranging from "much-less-than-expected" though to "much-more- than-expected" provides a basis for consultation and negotiation between stakeholders, as ambiguities in the use of broad terms such as "minimise" are reduced.

The Petroleum Group's success in using the GAS technique on wellsites and seismic lines has resulted in a number of other organisations adopting GAS for their environmental assessment programs. These organisations include:

- Environment Australia, for evaluating the performance of NHT funded Green Corp projects.
- Transport SA, for evaluating restoration practices on disused unsealed roads and tracks.
- Electricity Trust of South Australia (now Flinders Power), for evaluating the restoration coal mining operations sites.
- Western Mining Corporation, for evaluating the restoration of mineral drill hole sites in the Olympic Dam area.
- Minerals Group, PIRSA for evaluation of a number of mineral exploration programs.
- DNRE Vic, for evaluating the restoration of reclaimed pastoral land.[6]

This success and wide acceptance has provided encouragement to trial the technique on the assessment of rehabilitation of pipeline easements.

GAS APPLIED TO PIPELINES

The APIA Code of Environmental Practice identifies a number of typical environmental objectives associated with pipeline construction, encapsulated by the following:

- minimising disturbance to flora
- minimising impacts to fauna
- minimising impacts to soil and water
- minimising impacts on visual amenity
- minimising impacts on sites of cultural and historic heritage significance
- minimising disruption to landholders (including infrastructure and activities)
- optimising (maximising) rehabilitation success

The difficulty that arises is defining what constitutes "minimisation of visual impact", "minimisation of disturbance to flora" etc, and determining what is acceptable to all parties.

Terms such as “minimise” need to be expressed in a meaningful (quantifiable) manner, which is readily understood by all stakeholders. This needs to be done “up-front”, before construction activity commences, so that there are no arguments after the event regarding what constitutes minimisation of impacts. Otherwise, there is the potential to fall foul of the fact that “minimisation”, like beauty, is in the eye of the beholder. For this reason, the APIA Code of Environmental Practice stipulates that objectives be determined via a consultative process with relevant stakeholders, and that criteria for assessment of the achievement of the outcomes be established.

Environmental rehabilitation is a dynamic process. The efficacy of techniques employed before, during and after construction are often only ultimately proved by the passage of time. The APIA Code of Environmental Practice sets out a number of best practice techniques which should be employed to maximise the potential for the best environmental outcomes. These define a number of “enabling objectives” which facilitate the achievement of the ultimate objective.

For example, the broad objective of “maximising rehabilitation success” is achieved by:

- Stockpiling topsoil separately and respreading after construction.
- Preserving root stock on the right-of-way
- Ripping the right-of-way to remove compaction.
- Respreading stockpiled vegetation on the right-of-way.

These objectives must be assessed as soon as possible after construction to ensure that corrective action (if necessary) can be readily undertaken.

As described above, GAS provides a framework for achieving defining objectives and setting measurement criteria, and thereby serves as a useful tool for consultation. Consequently PIRSA, in consultation with the proponents and their environmental advisers, took the opportunity to trial the approach on some recent pipelines.

The Cuttapirrie to Moorari Raw Gas Pipeline

The Cuttapirrie to Moorari Raw Gas Pipeline was constructed in 1998 by Santos Ltd, with environmental advice from Social and Ecological Assessment Pty Ltd.

The pipeline is approximately 49 km long and conveys gas and associated liquids from the Cuttapirrie gas field to the Moorari Gas Satellite, situated approximately 70 kms NW of the Moomba Gas Plant in the South Australian Cooper Basin (Figure 2). While the majority of the pipeline traverses the dunefields of the Strzelecki Desert, particular environmental issues are raised by virtue of the fact that it crosses 4km of the Cooper floodplain which adjoins the North West Branch of the Cooper Creek. The Cooper Creek flows into the Coongie Lakes wetland system. The high conservation value of the Cooper Creek wetlands has been recognised:

- internationally, by protection under the Ramsar Convention for the Protection of Wetlands of International Importance;
- nationally, by inclusion of the lower Cooper floodplain on the Register of the National Estate; and
- at a State level by proclamation of the Innamincka Regional Reserve[7]. The pipeline runs adjacent to the Coongie Lakes Control Zone, an area recognised as having particular environmental significance within the Innamincka Regional Reserve, and requiring specific environmental management practices.[8]

The pipeline also crosses the Coongie Lakes track, which is used by increasing numbers of tourists visiting the area.

These factors combined to require that particular attention be paid to the environmental management of the project, and a Declaration of Environmental Factors (DEF) and Code of Environmental Practice were prepared as part of the approval process.

The DEF identified the potential environmental impacts of the project, the environmental objectives of the project, and the criteria for assessment of those objectives. A total of 35 different environmental objectives were established. The majority of these related to construction, while a few were operational objectives.

For each objective, a clear statement of what constituted acceptable performance was documented. Where possible, percentages were used to provide more meaning to words such as “some” or “most”. It was recognised that this was a first pass, and the appropriateness of these percentages would be subject to review.

Equally important were statements of what constituted unacceptable performance, and statements of better-than-expected performance. Statements of better-than-expected performance are considered important as they help to ensure that good performance is recognised and reported.

For example, in areas of dense vegetation surrounding the Cooper Creek, the right-of-way (ROW) was limited to 9 metres to minimise vegetation clearance and disturbance to visual amenity. The agreed range of outcomes are expressed in terms of GAS criteria in the table below:

GAS SCORE	CRITERIA
-2 (much less than expected)	ROW width often exceeds 9m in the "dense vegetation" sections, (>25% of ROW).
-1 (less than expected)	ROW width sometimes exceeds 9m in the "dense vegetation" sections, (<25% of ROW).
0 (expected)	ROW width does not exceed 9m on the "dense vegetation" sections.
+1 (more than expected)	ROW width is less than 9m on parts of the "dense vegetation" sections and never exceeds 9m.
+2 (much more than expected)	ROW width is generally less than 9m on the "dense vegetation" sections

While it is arguable that there is still a degree of subjectivity in the wording, the criteria represent a step forward in establishing a framework for assessing the acceptability of the outcome.

The complete suite of criteria for the project are shown in Appendix 1[9]. Note that in many cases there can be no improvement on the expected outcome ("0" score). For example, removal of all rubbish from the right-of-way is the expected outcome (Goal Ref 17). Since there can be no improvement on this outcome, no criteria are written in the "+1" and "+2" columns.

The audit of the western edge of the Cooper Floodplain Section is shown in Table 1[10]. This provides a ready visual reference as to the environmental performance on this section of the pipeline, and shows that in general the objectives set have been met. Where the criteria have proved too restrictive, additional comments have been provided to explain the basis for the assessment.

No attempt has been made to display the information in a graphical format, as the tabular format conveys sufficient information. The use of a graphical presentation may be useful for the assessment of a single, repeated operation such as dune re-profiling, (over 40 dunes were crossed by the pipeline route).

The Berri to Mildura Natural Gas Pipeline

The Berri to Mildura Natural Gas Pipeline was constructed in 1999 by Boral Energy Asset Management, with environmental advice from Ecos Consulting (Aust) Pty Ltd.

The pipeline is approximately 148 km long and conveys gas from the existing Riverland Pipeline that terminates as Berri to markets in Mildura (Figure 3). The South Australian portion of the pipeline passes through the outskirts of the township of Berri, before crossing the River Murray and then traversing vineyards, cropping and grazing land up to the SA/Vic border. Comments in this paper are restricted to the SA portion of the pipeline.

Areas of particular environmental significance in SA include the Lyrup Forest reserve on the eastern bank of the River Murray, and number of stands of remnant vegetation containing plant species of State significance.

The pipeline is required to be licensed under both South Australian and Victorian legislation. A Declaration of Environmental Factors / Environment Effects Report (DEF/EER)[11], which satisfied the legislative requirements of both states was prepared and a full public consultation process carried out. Again, environmental objectives and assessment criteria were established in this process. The consultation process generated a number of responses from public interest groups, which in South Australia were addressed in a Supplement to the DEF[12].

For this pipeline, the proponents proposed a more comprehensive set of goals, covering pre-, during- and post-construction periods (refer to Appendix 2). A greater degree of emphasis was placed on the "enabling objectives", including the development of procedures. The intent was to make a more holistic assessment of the environmental management system, rather than concentrate purely on the site-specific outcomes. A total of 57 sets of criteria were established, falling into three broad categories:

1. Those which cannot be assessed by a post-construction audit, and therefore required either continual on-site auditing or documentary evidence to demonstrate compliance. Examples include the development and implementation of procedures, stockpiling of topsoil, and washing down of vehicles to prevent spread of weeds.
2. Those which can be assessed by a site inspection immediately after construction. Examples include right-of-way width, ripping of compacted areas, and visual amenity in sensitive areas.
3. Those which can generally only be assessed after the passage of time. Examples include vegetation regrowth, subsidence over the trench, and weed infestation.

These categories represent the progression through the stages of preparation and restoration of the pipeline easement. Ultimately the project will be judged by the goals in second and third categories, which address the physical impacts of the project. In practice, the regulator and other stakeholders will tend to focus their attention on the achievement of these goals. However, it is important for the proponent and contractor to ensure the first category outcomes are achieved, as these deliver the second and third categories.

Different audits are undertaken by different parties due to a number of factors:

- The proponent is responsible for, and has greatest control over, the achievement of outcomes. Therefore the proponent needs to regularly review practices as construction proceeds to ensure that goals are achieved, and where they are not, prompt corrective action is taken, (when it is usually most cost effective). In addition, the proponent must be able to demonstrate that it has taken all reasonable steps to achieve the outcomes. Therefore, documentation of activities and regular system audits are required. This is especially pertinent where adverse outcomes may result in regulatory or legal scrutiny.

- A third party (e.g. special interest group, landholder) does not have the resources, technical expertise or legal power to conduct a system audit. In general, a third party will focus on post-construction outcomes. However, they may regularly review construction activities if they have ready access to the land and a strong interest in the land (e.g. a farmer can readily keep a close eye on construction proceedings on his land).
- In South Australia, PIRSA endeavours to visit the site at least once during construction and as soon as possible after construction to perform a formal post-construction audit. The prime focus is on right-of-way preparation and rehabilitation outcomes that can be assessed after construction (i.e. those described by the second category above). An audit of the system is normally only initiated if there is clear evidence of continued failure to achieve specified outcomes.

The two key parties using the GAS system for this project were Ecos Consulting (Aust), on behalf of the proponent (BEAM), and PIRSA as the regulatory authority.

Ecos made use of the GAS approach through all phases of the project, beginning at the environmental assessment phase. As previously stated, the GAS criteria were developed by Ecos in consultation with PIRSA on the basis of direct consultation with stakeholders during the preparation of the DEF/EER. The GAS framework forced clear definition of environmental goals and assessment criteria early in the project, thus providing a focus for the establishment of the environmental management program, and also for its communication to the construction contractors. The use of quantifiable language in the assessment criteria (Appendix 2) assisted to ensure that all parties clearly understood the environmental requirements prior to the commencement of construction.

During the pre-construction/design phase, Ecos established a set of environmental audit checklists for each construction activity. These checklists incorporated the GAS objectives and other environment management plan requirements. The audit checklists were then completed on a weekly basis during construction, and forwarded to Ecos for review and incorporation into the project database to assess the ongoing level of environmental compliance and trigger corrective action as required.

From Ecos' perspective, the GAS system provided an open and transparent method for assessing environmental compliance for the project. The quantifiable criteria were readily accessible to the proponent, the contractor and the regulator. This was evidenced by the successful post-construction audit carried out by PIRSA (see below), where only minor input from the Environmental Officer was necessary to conduct the audit.

PIRSA, accompanied by Ecos, conducted a post-construction audit on the SA section of the Berri to Mildura Pipeline, based on the approach used for the Cuttapirrie to Moorari Pipeline. The pipeline was separated into four sections (see Figure 4):

- the Berri township area
- the Lyrup Forest

- the sensitive areas identified by the DEF
- the agricultural areas

Audit sheets for each section were prepared. The route of the pipeline was then driven. In some places specific measurements were taken, while in others a general assessment of compliance was made. Where the pipeline traversed agricultural land, the easement was not driven (so as not to disturb rehabilitation). In these cases, the easement was viewed from ready access points, and in particular, road crossings.

The results of the audit are shown on Tables 2 to 5. These demonstrate that the overall environmental performance of the project met the expectations stated in the DEF. The only major shortfall identified was the failure to respread vegetation in the Lyrup Forest section, a situation that has since been remedied.

From PIRSA's perspective, the GAS approach again proved useful:

- It provided a simple template for documenting the audit. The tabular presentation of results provides a ready visual reference of overall performance.
- It provided an unambiguous basis for assessment and discussion of results with the proponent. In this case, as Ecos accompanied PIRSA on the audit, they were able to provide additional insight into what had happened on the ground and why. This highlighted the fact that an audit must take into account operational factors which cannot be entirely foreseen when the assessment criteria are established.
- Many of the goals were readily assessed without specialist environmental knowledge. This is considered important as it assists the transparency and openness of the audit, which is possibly subject to public scrutiny. In other words, a member of the public could conduct a similar audit and thereby assess the integrity of the formal audit. Similarly, personnel involved with the construction of the pipeline should readily be able to assess daily performance against stated goals.
- The GAS criteria provided guidance as to where environmental expertise was critical in the assessment of goals.

Both parties concluded that this project demonstrates that the GAS system provides a strong first step towards finding a quantifiable auditing system acceptable to public, government and pipeline industry. It is an open system where goals are readily recognisable, and highlights the importance of ensuring the criteria are carefully and thoroughly established during the approvals phase.

GENERAL COMMENTS / THE WAY FORWARD

In light of the experience gained from the application of GAS to the two pipelines mentioned, a number of general comments with regard to the entire process of identifying goals, establishing objectives and conducting an audit can be made:

- The application of GAS to pipelines has moved away from the approach applied by PIRSA to well sites in the Cooper Basin. However, the most important aspects have been preserved, namely: 1) the requirement to clearly define the environmental objectives for a project as part of the approval process; and, 2) the requirement to clearly specify criteria which measure the attainment of the environmental objectives in quantifiable language. The presentation of results in a checklist format has been found to be sufficient for conveying information regarding environmental performance.
- It is often difficult to establish 5 criteria for some goals, which are best assessed by use of a simple pass/fail test. The use of GAS criteria is not always appropriate, and attempts to develop criteria in these cases can be frustrating, unproductive and therefore not recommended, (i.e. one should not try to force-fit the GAS for the sake of the exercise). Rather, GAS is presented as one tool among many which should be adapted and used where it is indeed useful.
- The audit process is assisted by splitting the pipeline into sections of similar environmental value and characteristics (and consequently construction techniques). This highlights the fact that most attention should be paid to sections of higher environmental significance.
- There are varying degrees of importance that can be attached to different goals, (which may be site specific). There is scope for applying heavier weighting to key goals which have greater bearing on the ultimate recovery, in order to emphasise their importance. This could be included on the GAS assessment sheet and used as a filter to direct readers to the most important issues.
- From PIRSA's perspective, regulatory scrutiny of environmental performance needs to be concentrated where there is "market-failure". For example, in agricultural lands, the incentive to perform is primarily driven by easement agreements which involve penalties for non-performance, rather than regulatory scrutiny. Such agreements are generally carefully enforced by the landowner, who has a direct economic interest in the land. However, in public lands, these strong economic drivers don't exist or are less readily enforceable. In this case, a diffuse set of stakeholders rely on the regulator for enforcement of agreed environmental outcomes.
- In the case of the Berri to Mildura Pipeline, goals and GAS criteria were drafted following direct consultation with relevant stakeholders and included in the DEF/EER for public comment. No public comment was received on the goals and criteria, which indicates that they were either acceptable to all concerned or that little attention was paid to them in comparison with the rest of the document. Future consultation processes conducted by PIRSA will place greater emphasis on the discussion of goals and criteria, as it is considered that agreement on outcomes leaves the proponent free to employ any technique he/she likes to achieve those outcomes. In other words, agreement on outcomes is the most useful focus of consultation.

ACKNOWLEDGEMENTS

Steve Tunstill of Santos Ltd and Ross Piffl of Boral Energy Asset Management are acknowledged for their support of the concept of GAS for environmental monitoring of their respective pipelines, and their support of this paper.

Mike Malavazos of the Petroleum Group, PIRSA and Susie Smith of Ecos Consulting (Aust) Pty Ltd are acknowledged for their editorial comment and contribution in helping to adapt the GAS concept to its application to pipeline environmental audit.

Michael Ross of Publications and Displays, PIRSA is thanked for his expert drafting of the figures in this report.

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[2] Kiresuk, T.J., & Sherman R.E. 1968 "Goal Attainment Scaling: A General Method for Evaluating Comprehensive Community Mental Health Programs", Community Mental Health Journal, vol 4, no 6, pp 443-453.

[3] PIRSA "Field Guide for the Environmental Assessment of Abandoned Wellsites in the Cooper Basin, South Australia" April 1998, http://www.mines.sa.gov.au/petrol/guide.pdf

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[5] PIRSA "Field Guide for the Environmental Assessment of Abandoned Wellsites in the Cooper Basin, South Australia" April 1998, http://www.mines.sa.gov.au/petrol/guide.pdf

[6] Personal communication with M Malavazos, PIRSA, 1 October 1999.

[7] Santos Ltd; "Cuttapirrie to Moorari Pipeline, Declaration of Environmental Factors", prepared by Social & Ecological Assessment Pty Ltd, October 1997.

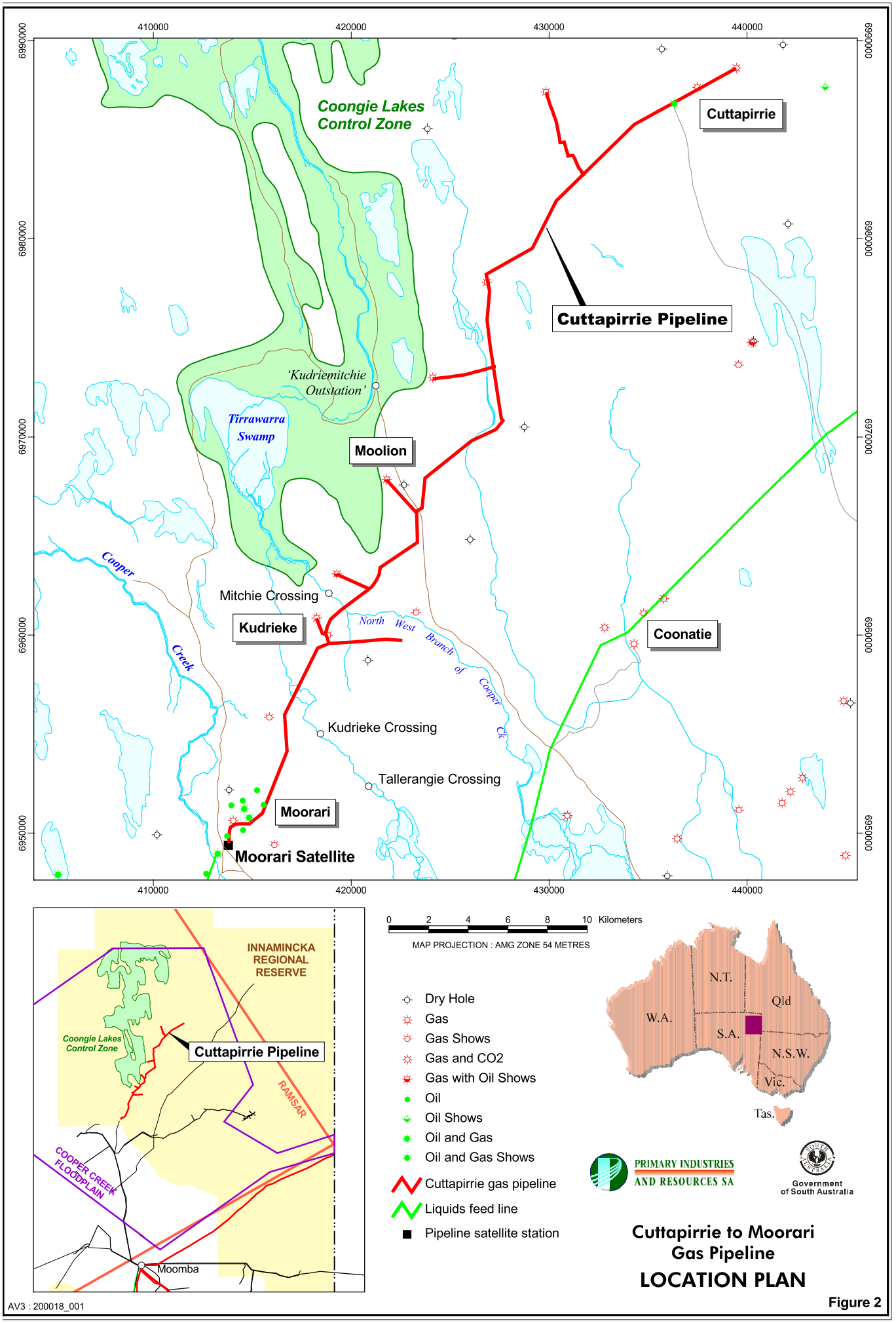
[8] DEHAA "A Review of Innamincka Regional Reserve 1988-1998" SA Department for Environment, Heritage and Aboriginal Affairs, December 1998.

[9] Santos Ltd; "Environmental Audit, Cuttapirrie to Moorari Pipeline", prepared by Social & Ecological Assessment Pty Ltd, July 1998.

[10] Santos Ltd; "Environmental Audit, Cuttapirrie to Moorari Pipeline", prepared by Social & Ecological Assessment Pty Ltd, July 1998.

[11] Envestra Limited; "Berri to Mildura Natural Gas Transmission Pipeline – Declaration of Environmental Factors / Environment Effects Report", prepared by Boral Energy Asset Management Limited and Ecos Consulting (Aust) Pty Ltd, October 1998.

[12] Envestra Limited; "Berri to Mildura Natural Gas Transmission Pipeline – Supplement to the Declaration of Environmental Factors", prepared by Boral Energy Asset Management Limited and Ecos Consulting (Aust) Pty Ltd, January 1999.



Cuttapirrie to Moorari Gas Pipeline

LOCATION PLAN

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Figure 2

PRIMARY INDUSTRIES AND RESOURCES SA

Berri to Mildura Gas Pipeline - PL11

LOCATION PLAN

Government of South Australia

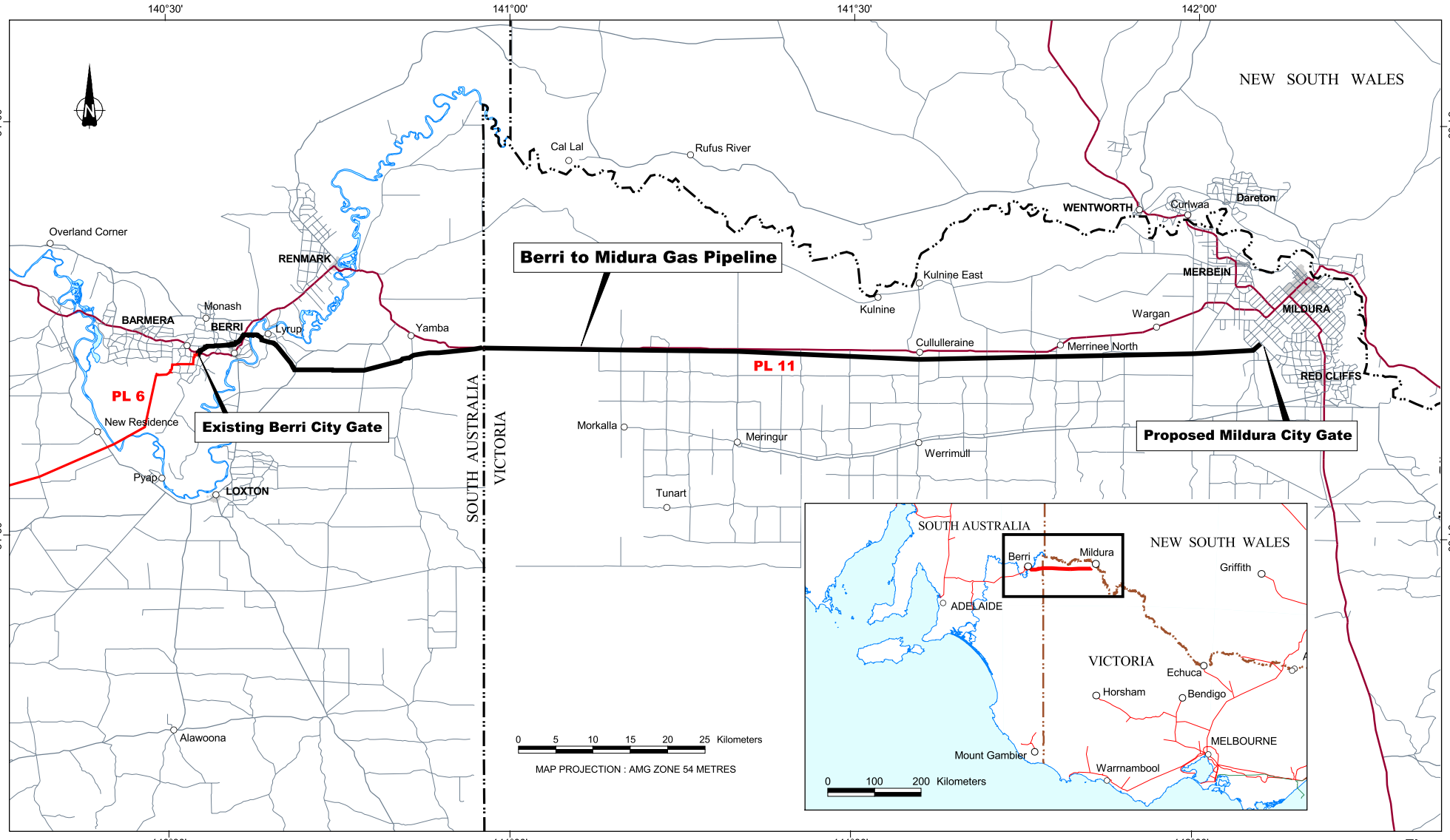

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Figure 3

PRIMARY INDUSTRIES AND RESOURCES SA

Berri to Mildura Gas Pipeline (South Australia portion)

LOCATION PLAN

Government of South Australia

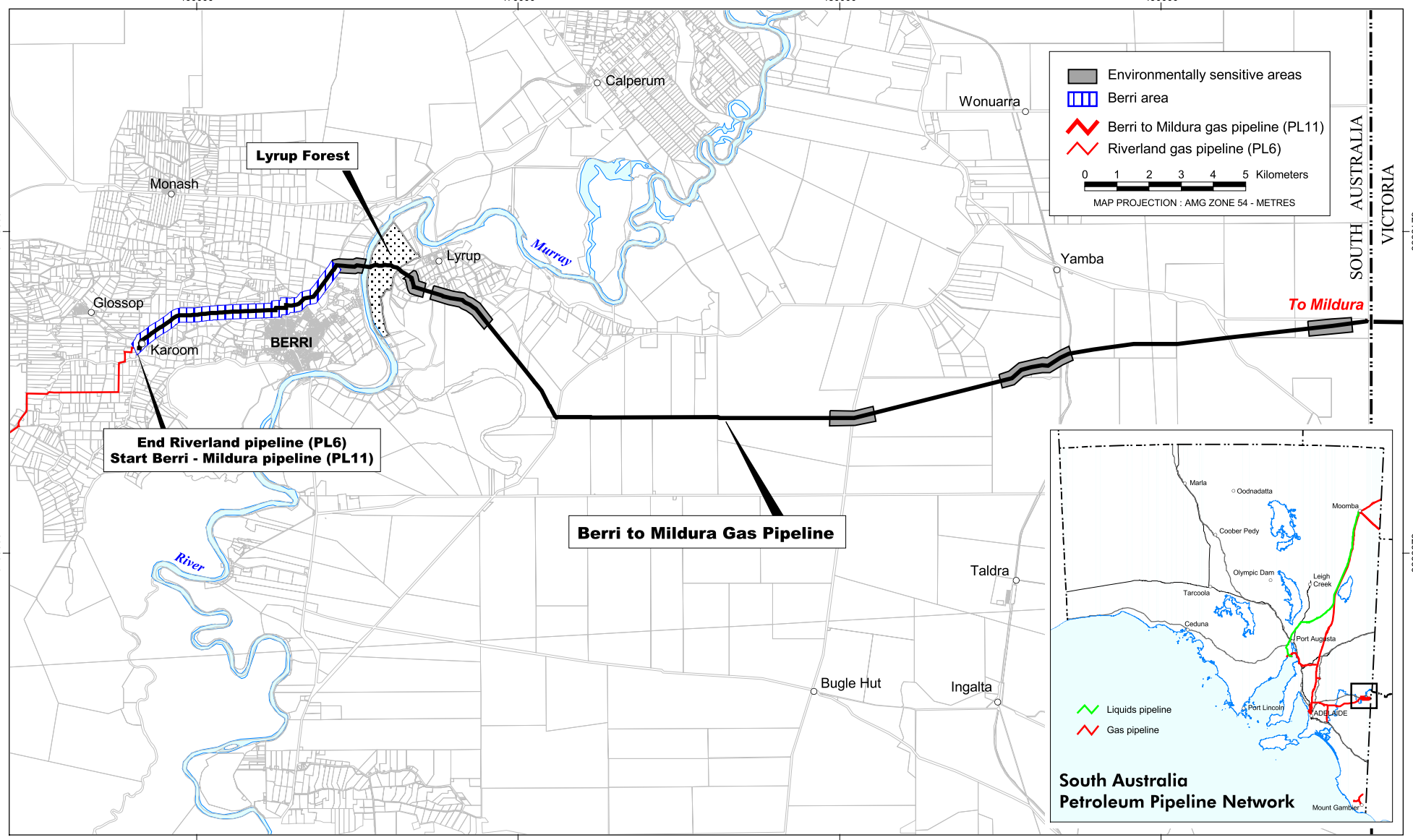

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Figure 4

Table 1: CUTTAPIRRIE TO MOORARI PIPELINE: Assessment of Moorari to western edge of Cooper Floodplain Section.

Ref[7]	Goal	GE[1]		GA[2s]	MS[3]	SS[4]	Comments
		+2[6]	+1	0	-1	-2	
	R.O.W. PREPARATION						
1.	Minimise R.O.W. width - standard section (15m)						In places 17-19m wide in dunefield.
2.	Minimise R.O.W. width - creek crossings (5m))			**n.a.**[5]			
3.	Minimise R.O.W. width - dense vegetation (9m)			**n.a.**			
4.	Leave trees on R.O.W.			**n.a.**			Very few trees in dunefield.
5.	Trim trees						
6.	Leave rootstock						Some regrowth from rootstock noted.
7.	Stockpile topsoil			**?**			
	R.O.W. REHABILITATION						
8.	Leave no windrows						Some are 30cm high.
9.	Follow crown protocol						
10.	Avoid subsidence						
11.	Respread vegetation						
12.	Reprofile dunes						
13.	Reprofile creeks			**n.a.**			
14.	Rip compacted areas						One access track ripped, one not ripped.
	RUBBISH						
17.	Remove all rubbish						Minor – rope, hessian bags, wooden pipe support.
18.	Recycle as appropriate			**n.a.**			
19.	Appropriate sewage disposal			**n.a.**			
	R.O.W. STABILITY						
20.	No dune blow-outs						
20.	No gullying/scouring						Small gullies may form into two borrow pits.
	PASTORAL						
26.	Repair pastoral infrastructure						
	ABORIGINAL HERITAGE						
31.	Sites identified in DEF are not disturbed			**n.a.**			

[1] **GE** = Goal exceeded
[2] **GA** = Goal attained
[3] **MS** = Minor shortfall
[4] **SS** = Significant shortfall
[5] **n.a.** = Not applicable
[6] **+2 etc** = GAS scores
[7] Reference no's correspond to GAS key (Appendix I)

Table 2: BERRI TO MILDURA PIPELINE: Assessment of Berri Area

Goal	Parameter	GE	GE	GA	MS	SS	Comment
		+2	+1	0	-1	-2	
2.6.1	ROW width (15m)						ROW measured in 7 locations, all much less than 15m
2.1.2	Trimming vs Clearing of trees			n.a.			No significant trees in this section
2.1.2	Off ROW activity						
2.1.4	Vegetation respread						
2.1.4, 2.2.1	Topsoil Respread						Much of pipeline laid under existing tracks
2.8.2	Line of sight			n.a.			No visually sensitive areas
2.9.1	Aboriginal sites			n.a.			No sites identified in this area
3.1.2	Public Access to ROW						Much of pipeline laid under existing tracks. Signposts in accordance with AS 2885.
3.2.1	Vegetation Regrowth			n.a.			Too early to assess.
3.2.3, 2.1.3	Weeds			n.a.			Too early to assess. Much of pipeline laid under existing tracks. In other sections (road verges), land is already degraded.
3.3.1	Windrows						
3.3.1	Subsidence						
3.3.2, 2.2.1	Erosion						Minor erosion site opposite meter station at Berrivale Orchard Plant which requires attention, (Figs 5, 6).
3.3.3	Ripping						Appropriate rehab in relevant sections.
3.4.1	Drainage						
3.6.1	Rubbish						

Table 3: BERRI TO MILDURA PIPELINE: Assessment of Lyrup Forest

Goal	Parameter	GE	GE	GA	MS	SS	Comment
		+2	+1	0	-1	-2	
2.6.1	ROW width (10m)						ROW measured in 7 locations, all much less than 10m.
2.1.2	Trimming vs Clearing of trees						No unnecessary clearance.
2.1.2	Off ROW activity						
2.1.4	Vegetation respread						No attempt to respread vegetation.
2.1.4, 2.2.1	Topsoil Respread						
2.6.5	Conservation Values						High degree of weaving, trimming of trees, minimal ROW width, strict adherence to ROW and minimal disturbance at river bank contribute to retention of conservation values.
2.8.2	Line of sight						High degree of weaving through Lyrup Forest (Fig 12, 14). ROW not evident from River Murray.
2.9.1	Aboriginal sites						Assessed on basis of advice from Ecos. Potential sites flagged.
3.1.2	Public Access to ROW						
3.2.1	Vegetation Regrowth			n.a.			Too early to assess.
3.2.3, 2.1.3	Weeds			n.a.			Too early to assess. No evidence of weeds.
3.3.1	Windrows						
3.3.1	Subsidence						
3.3.2, 2.2.1	Erosion						
3.3.3	Ripping						No ripping of ROW. Ecos advise that ripping may not be appropriate.
3.4.1	Drainage						Careful attention given to large channel near Lagoon Drive (Fig 20).
3.6.1	Rubbish						Existing rubbish at Lagoon Drive disturbed by construction operations, (Fig 21). However, this is consistent with surrounds.

Table 4: BERRI TO MILDURA PIPELINE: Assessment of Sensitive Areas

Goal	Parameter	GE	GE	GA	MS	SS	Comment
		+2	+1	0	-1	-2	
2.6.1	ROW width (10m)						ROW less than 10m at Berri dump. In other areas, ROW width less than 15m. However, this is not considered a problem.
2.1.2	Trimming vs Clearing of trees						No significant species cleared.
2.1.2	Off ROW activity						Minor excursions at Berri dump (Fig 27).
2.1.4	Vegetation respread						No final clean-up at Berri dump. No respread at site 7.
2.1.4, 2.2.1	Topsoil Respread						No final clean-up at Berri dump, all other areas OK.
2.6.5	Conservation Values						Management plan at Berri dump implemented to minimise impacts. Minimal disturbance at other sites.
2.8.2	Line of sight						
2.9.1	Aboriginal sites						Monitors on site at Berri dump. All other sites avoided.
3.1.2	Public Access to ROW						
3.2.1	Vegetation Regrowth			n.a.			Too early to assess.
3.2.3, 2.1.3	Weeds			n.a.			Too early to assess. No evidence of weeds. Berri dump highly degraded.
3.3.1	Windrows						
3.3.1	Subsidence						
3.3.2, 2.2.1	Erosion						
3.3.3	Ripping						Berri dump heavily compacted and requires ripping on final clean-up.
3.4.1	Drainage						
3.6.1	Rubbish						No construction rubbish at Berri dump site, original rubbish in topsoil.

Table 5: BERRI TO MILDURA PIPELINE: Assessment of Agricultural Lands

Goal	Parameter	GE	GE	GA	MS	SS	Comment
		+2	+1	0	-1	-2	
2.6.1	ROW width (15m)						
2.1.2	Trimming vs Clearing of trees			n.a.			No significant trees
2.1.2	Off ROW activity						
2.1.4	Vegetation respread			n.a.			
2.1.4, 2.2.1	Topsoil Respread						
2.6.2	Farmers needs			?			Not assessed. It is assumed that farmers will deal directly with BEAM if this becomes an issue.
2.6.3	Private assets			?			Not assessed. It is assumed that farmers will deal directly with BEAM if this becomes an issue.
2.6.5	Conservation Values			n.a.			
2.8.2	Line of sight			n.a.			
2.9.1	Aboriginal sites			n.a.			
3.1.2	Public Access to ROW						All sites within fenced paddocks.
3.2.1	Vegetation Regrowth						
3.2.3, 2.1.3	Weeds			?			Not assessed. It is assumed that farmers will deal directly with BEAM if this becomes an issue.
3.3.1	Windrows						
3.3.1	Subsidence						
3.3.2, 2.2.1	Erosion						
3.3.3	Ripping						
3.4.1	Drainage						
3.6.1	Rubbish						

APPENDIX I: CUTTAPIRRIE TO MOORARI PIPELINE GAS CRITERIA

Ref	Goal	GOAL EXCEEDED		GOAL ATTAINED	MINOR SHORTFALL	SIGNIFICANT SHORTFALL
		+2	+1	0	-1	-2
	R.O.W. PREPARATION					
1.	Minimise R.O.W. width – standard (15m)	R.O.W. never exceeds, and often is less than 15m on the standard section(>25% of R.O.W.).	R.O.W. never exceeds, and is sometimes less than 15m on the standard section(<25% of R.O.W.).	RO.W. does not exceed 15m on the standard section.	R.O.W. sometimes exceeds 15m of the standard section(<25% of R.O.W.).	R.O.W. often exceeds 15m on the standard section(>25% of R.O.W.).
2.	Minimise R.O.W. width – creek crossings (5m)			R.O.W. width does not exceed 5m at creek crossings.	R.O.W. width exceeds 5m at creek crossings.	R.O.W. width exceeds 9m at creek crossings.
3.	Minimise R.O.W. width – dense vegetation	R.O.W. width is generally less than 9m on the "dense vegetation" sections.	R.O.W. width is less than 9m on parts of the "dense vegetation" sections, and never exceeds 9m.	R.O.W. width does not exceed 9m on the "dense vegetation" sections.	R.O.W. width sometimes exceeds 9m of the "dense vegetation" sections (<25% of R.O.W.).	R.O.W. width often exceeds 9m of the "dense vegetation" sections (>25% of R.O.W.).
4.	Leave trees on R.O.W.	In addition to trees identified in Table 4 and flagged trees, there are numerous other trees left on the R.O.W.	In addition to trees identified in Table 4 and flagged trees, there are some other trees left on the R.O.W.	All trees identified in Table 4 remain standing, including flagged trees.	Some clearance of trees identified in Table 4.	All trees removed from R.O.W.
5.	Trim (rather than clear) trees in dense woodland			Extensive tree trimming in designated areas.	Minor tree trimming in designated areas. Some evidence of tree removal where trimming appropriate.	No trimming evident. Obvious evidence of tree removal where trimming appropriate.
6.	Leave root-stock (ie. minimal grading of R.O.W.)			No evidence of root-stock removal on R.O.W. beyond 3m of trench line. R.O.W. is either only lightly graded or not graded.	Evidence of some root-stock removal beyond 3m of trench line (<25% of R.O.W.).	All root-stock removed. R.O.W. generally deeply graded for full R.O.W. width (>25% of R.O.W.).
7.	Stockpile topsoil			Topsoil removed to a depth of 50mm and stockpiled separately.		No evidence of topsoil having been stockpiled.

APPENDIX I: CUTTAPIRRIE TO MOORARI PIPELINE GAS CRITERIA

Ref	Goal	GOAL EXCEEDED		GOAL ATTAINED	MINOR SHORTFALL	SIGNIFICANT SHORTFALL
		+2	+1	0	-1	-2
	R.O.W. REHABILITATION					
8.	Remove all windrows			No windrows associated with the pipeline evident (except on dunes where some windrows are inevitable after reprofiling, but will quickly disappear).	Occasional windrows remain on the R.O.W. (<10% of R.O.W.).	Regular windrows remain on the R.O.W. (>10% of R.O.W.).
9.	Follow crown protocol			No crown present, or crown present over the trench with periodic breaches.	Crown over trench but periodic breaches (where required) not evident.	Backfill insufficient to fill trench.
10.	Avoid subsidence			No subsidence evident on pipe trench.	Minor subsidence (< 50mm evident (<10% of the trench).	Significant subsidence (>50mm) evident, or regular minor subsidence (>10% of the trench).
11.	Respread cleared vegetation			Where vegetation removed it has been respread over full width of R.O.W., excluding access track.	Vegetation respread over the R.O.W., but some areas have been missed.	Little evidence of vegetation respread over the R.O.W. Stockpiled vegetation left unspread.
12.	Reprofile dunes to pre-existing contours	.		Dune profiles have been restored consistent with surrounding dune profiles for all dunes crossed.	Dune profiles have generally been restored consistent with surrounding dune profiles with occasional exceptions (<10% of dunes).	Dune profiles have not been restored consistent with surrounding dune profiles for numerous dunes crossed (>10% of dunes).
13.	Reprofile creek banks to pre-existing contours			Creek/channel banks restored to original profile.		Creek/channel banks not restored to original profile.
14.	Rip compacted areas (eg. access tracks)			All compacted soil ripped .	Some areas of compacted soil have not been ripped (<25%).	Numerous areas of compacted soil have not been ripped (>25%).

APPENDIX I: CUTTAPIRRIE TO MOORARI PIPELINE GAS CRITERIA

Ref	Goal	GOAL EXCEEDED		GOAL ATTAINED	MINOR SHORTFALL	SIGNIFICANT SHORTFALL
		+2	+1	0	-1	-2
15.	Leave trench open <24 hours to minimise fauna impacts.	Trench never open for more than 24 hours.		Trench rarely open for more than 24 hours (<20% of pipeline).	Trench occasionally open for more than 24 hours (<20% of pipeline).	Trench often open for more than 24 hours (>20% of pipeline).
	CAMPSITE					
16.	Avoid clearance of trees			No evidence that trees have been cleared at the campsite.		Evidence that trees have been cleared at the campsite.
	WASTE MATERIAL					
17.	Remove all rubbish			No evidence of waste on R.O.W. or at campsites.	Evidence that rubbish has been cleaned up, but some rubbish still on R.O.W.	Little or no evidence that rubbish has been cleaned up.
18.	Recycle waste materials where appropriate	All waste pits audited prior to backfill to ensure recyclable material not deposited. No recyclable waste present in pits.		Evidence/records show that recyclable material has been returned to Moomba Waste Management Depot.	No evidence/records that recyclable material has been returned to Moomba Waste Management Depot.	Open waste pits contain recyclable materials.
19.	Appropriate sewage disposal			Evidence/records show that appropriately designed sewage pits have been constructed.	No evidence/records of appropriately designed sewage pits.	Open pits of waste water and sewage. Pits are not of approved design.
	R.O.W. STABILITY					
20.	No erosion of the R.O.W.			No evidence of erosion on R.O.W.	Minor rills or deflation forming or likely to form on R.O.W., but unlikely to be a major issue (<200mm deep).	Significant gully or blow-out forming or likely to form on R.O.W. (>200mm deep).

APPENDIX I: CUTTAPIRRIE TO MOORARI PIPELINE GAS CRITERIA

Ref	Goal	GOAL EXCEEDED		GOAL ATTAINED	MINOR SHORTFALL	SIGNIFICANT SHORTFALL
		+2	+1	0	-1	-2
	COONGIE TRACK					
21.	Reduce R.O.W. width to less than 9m	R.O.W. width reduced to 5m at track crossing.	R.O.W. width less than 9m at track crossing.	R.O.W. width 9m at track crossing.	R.O.W. width greater than 9m at track crossing.	R.O.W. width greater than 15m at track crossing.
22.	Dog-leg R.O.W. to break line-of-sight	R.O.W. cannot be identified, except by signposts (required by legislation).	R.O.W. dog-legs at track crossing so that less than 50m is visible either side of the track.	R.O.W. dog-legs at track crossing so that less than 100m is visible either side of the track.	R.O.W. dog-legs at track crossing, but 250m of R.O.W. is visible either side of the track.	R.O.W. does not bend at track crossing and greater than 250m of R.O.W. is visible either side of the track.
23.	Install “no access” signs to discourage 3rd party use			"No access" signs installed 200m beyond intersection.		"No access" signs not installed.
24.	Leave vegetation on R.O.W. to conceal R.O.W.			Some trees and/or shrubs have been left on the R.O.W. to break the line-of sight.		All vegetation has been cleared from the R.O.W.
25.1	Re-establish the verge of the Coongie Track			Verge has been adequately re-established.		Verge has not been adequately re-established.
25.2	Consult with NPWS regarding Coongie Track crossing			NPWS consulted regarding the Coongie Track crossing, and satisfied with arrangements.	NPWS consulted regarding the Coongie Track crossing, but have some concerns.	NPWS not contacted concerning the Coongie Track crossing.
	PASTORAL ISSUES					
26.1	Repair fences to “as before” standard			Fences repaired to “as before” standard.	Fences repaired, but slightly poorer than before (but still stock-proof).	Fences either not repaired, or very poorly repaired (not stock-proof).
26.2	Consult with pastoralist			Pastoralist consulted, and happy with the Project.	Pastoralist consulted, but has some concerns.	Pastoralist not contacted concerning the Project.

APPENDIX I: CUTTAPIRRIE TO MOORARI PIPELINE GAS CRITERIA

Ref	Goal	GOAL EXCEEDED		GOAL ATTAINED	MINOR SHORTFALL	SIGNIFICANT SHORTFALL
		+2	+1	0	-1	-2
	FORMATION WATER					
27.	No visible oil on surface			No visible oil in unlined ponds.	Some visible oil in unlined ponds (covers <10% of the pond surface).	Significant amount of visible oil in unlined ponds covers >25% of pond surface.
28.	Achieve ANZECC guidelines for stock water			Water analysis does not exceed the limits specified in the ANZECC Water Quality Guidelines for stock.	Several paramters not including PAHs and phenols exceed the limits specified in the ANZECC Water Quality Guidelines for stock.	Several parameters including PAHs and Phenols exceed the limits specified in the ANZECC Water Quality Guidelines for stock.
29.	Fence formation water pond			Formation water pond is fenced.		Formation water pond is not fenced.
30.	Pastoralist is satisfied with arrangements			Written evidence that pastoralist is satisfied with water disposal arrangements.	No written evidence that pastoralist is satisfied with water disposal arrangements.	Pastoralist provides written complaint as to state of water disposal arrangements.
	ABORIGINAL HERITAGE					
31.	Sites identified in DEF are not disturbed			Sites identified by the archaeological survey are recorded, reported and remain undisturbed.	No evidence of disturbance to sites, but some procedural recommendations not followed.	There is evidence that sites identified by the archaeological survey have been disturbed. Key recommendation not followed.
32.	Correct protocol followed for sites discovered during construction			Either no sites encountered, or records show correct procedures were followed to avoid damage to additional sites.		Evidence that additional sites have been disturbed, and there are no records of ameliorative measures having been taken to avoid damage.

APPENDIX I: CUTTAPIRRIE TO MOORARI PIPELINE GAS CRITERIA

Ref	Goal	GOAL EXCEEDED		GOAL ATTAINED	MINOR SHORTFALL	SIGNIFICANT SHORTFALL
		+2	+1	0	-1	-2
	AUDIT					
33.	Submit audit to PIRSA			Audit undertaken on time and submitted to PIRSA by due date.	Audit undertaken and submitted to PIRSA weeks after due date.	Audit undertaken and submitted to PIRSA greater than 6 weeks after due date.

APPENDIX 2: BERRI TO MILDURA GAS PIPELINE GAS CRITERIA

Introduction

Goal Attainment Scaling (GAS) is a system being trialed by Primary Industry and Resources SA. GAS provides a system for scoring performance against agreed goals and objectives for environmental management, as identified in the DEF/EER. The system is self-assessable and provides Envestra with a measure of their performance and a tool for improvement. An independent body, such as PIRSA or DEHAA, can also use the checklist to verify the Envestra's findings.

The GAS criteria are defined as follows:

- (+2) an exceptional outcome;
- (+1) a better-than-expected outcome;
- (0) the expected outcome;
- (-1) a worse-than-expected outcome; and
- (-2) an unacceptable outcome.

The following sections outline the objectives and goals for the proposed GAS system for the Berri - Mildura Pipeline project, and Tables 1 – 3 provide the checklists and scoring criteria.

Pre - Construction

On - site planning

Objective	**1.1**	**To minimise adverse effects by on-site planning**
Goals	1.1.1	To successfully plan on-site for issues which will be addressed during the construction phase

Construction

Vegetation

Objective	**2.1**	**To minimise adverse impacts to vegetation**
Goals	2.1.1	To limit the disturbance to significant vegetation to an accepted level
	2.1.2	To contain the clearing of all native vegetation to an accepted extent
	2.1.3	Appropriately control the introduction and spread of weeds
	2.1.4	Maximise the potential for revegetation success

Soil

Objective	**2.2**	**To minimise adverse impacts to soil**
Goals	2.2.1	To limit soil erosion to an acceptable standard
	2.2.2	To limit soil contamination
	2.2.3	To appropriately control soil compaction

Fauna

Objective	**2.3**	**To minimise adverse impacts to fauna**
Goals	2.3.1	To reduce habitat disturbance to an acceptable level
	2.3.2	To adequately protect fauna from physical harm

	2.3.3	To provide appropriate protection against disturbance to the individual animal

Water (Surface / Subsurface)

Objective	**2.4**	**To minimise adverse impacts to water**
Goals	2.4.1	To appropriately protect water quality
	2.4.2	To avoid significant effects to the hydrological regimes

Air

Objective	**2.5**	**To minimise adverse impacts on air quality**
Goals	2.5.1	To achieve acceptable air emission standards

Landuse

Objective	**2.6**	**To minimise adverse impacts to landuse**
Goals	2.6.1	To adequately protect farm productivity
	2.6.2	To prevent significant adverse effects on stock
	2.6.3	To avoid unacceptable disturbances to land owner assets and infrastructure
	2.6.4	To contain disturbance to recreational activities to acceptable levels
	2.6.5	To adequately protect conservation issues
	2.6.6	To avoid adverse effects to infrastructure

Public Risk

Objective	**2.7**	**To minimise the risks to public health and safety**
Goals	2.7.1	To adequately protect public safety
	2.7.2	To adequately reduce the likelihood of fire

Public Amenity

Objective	**2.8**	**To minimise impact on public amenity**
Goals	2.8.1	To contain noise emissions to an acceptable level
	2.8.2	To have a limited effect on visual amenity

Cultural Heritage

Objective	**2.9**	**To minimise impact on cultural heritage**
Goals	2.9.1	To adequately protect sites of Aboriginal significance
	2.9.2	To avoid unacceptable adverse effects to cultural heritage values

Post - Construction and Operations

Operations

Objective	**3.1**	**To minimise the impacts associated with access during operation**
Goals	3.1.1	To provide appropriate access to monitor the operation of the pipeline
	3.1.2	To successfully deter public access using appropriate measures

Vegetation

Objective	**3.2**	**To promote and maintain the regrowth of vegetation**
Goals	3.2.1	To undertake all appropriate revegetation strategies
	3.2.2	To successfully replace all stockpiled vegetation
	3.2.3	To ensure that the right-of-way remains free of weeds

Soil

Objective	**3.3**	**To promote and maintain the original state of the soil**
Goals	3.3.1	To ensure that there is no alteration of the surface soil
	3.3.2	To ensure that there is no erosion on the right-of-way
	3.3.3	To ensure that ripping has occurred in the appropriate areas

Water

Objective	**3.4**	**To promote and maintain water drainage patterns**
Goals	3.4.1	To ensure that there is no evidence of altered drainage patterns

Infrastructure

Objective	**3.5**	**To promote and maintain the original state of the infrastructure**
Goals	3.5.1	To ensure that the landowners are satisfied with the restoration of the relevant infrastructure
	3.5.2	To ensure that the public are satisfied with the restoration of the relevant infrastructure

Waste

Objective	**3.6**	**To manage all Post construction and Operational wastes in an appropriate manner**
Goals	3.6.1	To ensure that all wastes are removed from the site and, in order, reused, recycled or appropriately disposed
	3.6.2	To conduct all activities in a manner that reduces the production of waste

Table 1: Goal Attainment Scaling - Berri to Mildura Natural Gas Pipeline - Pre Construction

'Most' means ≥ 75%; 'Some' means 25% - 75%

Goals	Parameter	+2	+1	0	-1	-2
1.1.1	*Written evidence of on-site planning*	All on-site planning issues have been considered and addressed and documented.	Most on-site planning issues have been considered and addressed.	Written evidence that all critical / high priority planning issues have been considered and addressed.	Some on-site planning issues have been considered and addressed, with verbal rather than written evidence available.	No evidence that on-site planning has occurred.
	Procedures	All comprehensive procedures are developed and appropriately documented		All critical procedures and most comprehensive procedures are developed and documented.		No comprehensive documents have been developed or documented.
	Training	.		All of the workforce has been appropriately trained and are aware of issues and procedure requirements	Some of the workforce has been trained and are aware of some of the issues and procedure requirements.	None of the workforce has been trained or are aware of the issues and procedure requirements.

Table 2: Goal Attainment Scaling - Berri to Mildura Natural Gas Pipeline – Construction

'Most' or 'majority' means ≥ 75%; 'Some' or 'part' or 'occasional' means 25% - 75%

Goals	Parameter	+2	+1	0	-1	-2
2.1.1	*Significant vegetation*	All significant vegetation avoided as identified in section 7.3 of the DEF/EER.		Wherever practicable, areas of significant vegetation have been avoided		Few key species of significant vegetation are avoided.
	Right-of-way			Right-of-way does not exceed 10m for the entire section of sensitive vegetation as adhered to in Section 7.3 of the DEF/EER.	Right-of-way does not exceed 10m for most of the section of sensitive vegetation.	Right-of-way does exceed 10m of most of the section of sensitive vegetation.
2.1.2	*Native vegetation*	No disturbance to any native vegetation.		Key species and remnant stands of vegetation, as identified in section 7.3 of the DEF/EER are avoided.		Remnant vegetation and isolated trees are cleared.
	Trimming versus clearing	All significant trees are recorded, flagged and left standing.	All significant trees are recorded, flagged and trimmed if essential, no trees are cleared.	Trees of significance, as identified in 7.3 of the DEF/EER are recorded, flagged and trimmed, and insignificant trees are cleared.	Some trees are recorded, flagged and trimmed, but most trees of significance have been cleared.	All trees are cleared, no recording, flagging and trimming has occurred.
	Right-of-way	All activities are restricted to the right-of-way, with no evidence of activities off of the right-of-way.		Right-of-way was adhered to for most of the route, with minimal evidence of activities off of the right-of-way.	Right-of-way was adhered to for some of the route.	Right-of-way was not adhered to for the significant sections of the route.

Goals	Parameter	+2	+1	0	-1	-2
2.1.3	*Weed control*			All vehicles and equipment from areas known to have weeds are washed / blown down before entering or leaving the site, and appropriate records are kept.	Some vehicles and equipment are washed / blown down before entering or leaving the site, and some records are kept.	No vehicles or equipment are washed / blown down, with no evidence of records kept.
	Extent of weed distribution	Cleared areas are monitored and there is no need for weed control methods as infestation hasn't occurred due to successful management.	Cleared areas are monitored regularly and weed control measures are implemented, and recorded.	Cleared areas are regularly inspected and appropriate weed control measures are implemented.	Cleared areas are occasionally inspected, with limited control measures implemented.	Cleared areas are not inspected.
2.1.4	*Respread vegetation.*	The stockpiled vegetation has been replaced to the correct location along the right-of-way.		Stockpiled vegetation was respread on the majority of the right-of-way, where applicable.	Stockpiled vegetation was respread on part of the right-of-way.	No stockpiling of vegetation occurred. No evidence of respreading vegetation.
	Respread topsoil		Topsoil has been respread in all areas, including the right-of-way and all sensitive areas.	Topsoil has been respread for most of the right-of-way but has been respread in all sensitive areas (as per section 7.3 of the DEF/EER).	Topsoil has been respread on some of the right-of-way, and on some sensitive areas.	No topsoil has been respread in any area, including no areas of sensitivity.

Goals	Parameter	+2	+1	0	-1	-2
	Rootstock	All stationary vehicles remained in the designated right-of-way boundaries and adhered to all tracks. Rootstock is preserved throughout all designated areas.		A limited number of stationary vehicles located outside of the designated right-of-way boundaries, and on some tracks. Most rootstock has been preserved in the designated areas.		Most stationary vehicles located outside of the designated right-of-way boundaries, and off of most of the tracks. Rootstock has been destroyed in most areas.
	Compaction *(See Soil 2. 2.3)*					
2.2.1	*Topsoil*	All topsoil has been stockpiled, and covered.		All soil is stockpiled and stored in safe areas, away from any substances such as oil, fuel etc, with dust appropriately managed.	Most soil has been stockpiled, and stored in safe areas.	Some soil has been stockpiled but soil is stored close to substances such as oil and fuel, without covering. No dust management methods have been employed.
	Erosion control structures	All appropriate erosion control berms and drains were installed, inspected and maintained and repaired if necessary.		Erosion control berms and drains were installed at the majority of the sites, and are monitored and maintained. Records are kept regarding erosion control structures.	Limited measures were taken to install a restricted number of control berms and / or drains, with minimal inspection or maintenance. Some records were kept.	No measures were taken to install any erosion control berms or drains at any sites. No records were kept.

Goals	Parameter	+2	+1	0	-1	-2
	Disturbance to soil.	All tracks are used under any circumstance, with no unnecessary disturbance to any site.	Most tracks are utilised for the majority of the time, with minimal disturbance at sites.	Tracks are utilised where possible, with only the required amount of disturbance occurring.	Occasional use of tracks , with occasional disturbance which could have been avoided.	No tracks have been utilised, with excessive amounts of ground disturbance.
	Exposure	Soil exposure times were minimal between clearing and restoration activities.		The period between initial clearing and restoration was three weeks for a given kilometre.	The period between initial clearing and restoration was four weeks for a given kilometre.	The period between initial clearing and restoration was six weeks for a given kilometre.
	Clearing *(see vegetation)*					
2.2.2	*Hazardous consumables such as cleaning solvents, primer and toxic goods*			Any hazardous consumables are stored and empty containers disposed of appropriately.		Hazardous consumables have not been stored appropriately and empty containers were not disposed of appropriately.
	Hydrostatic test water			Water quality is acceptable for disposal. Appropriate approvals are obtained and records are kept.		Water quality is unacceptable. The appropriate approvals were not obtained and there are no records kept.
	Storage of soil *(see topsoil 2.2.1)*					

Goals	Parameter	+2	+1	0	-1	-2
	Vehicle maintenance		All vehicles are regularly checked and maintained to avoid contamination of soil from substances from the vehicles.	Most vehicles are checked and maintained when possible.		The vehicles are not checked and have exposed substances such as oil, coolant etc, resulting in contamination to the soil.
2.2.3	*Tracks*	All tracks are used under any circumstance.	Most tracks are utilised for the majority of the time.	Tracks are utilised where possible.	Occasional use of tracks.	No tracks have been utilised.
2.3.1	*Habitat*	All measures have been taken to avoid every feeding, roosting and breeding ground of significance.		No significant feeding, roosting or breeding grounds, as identified in section 7.3 of the DEF/EER have been disturbed or cleared.		Clearance of some significant feeding, roosting or breeding grounds has occurred.
	Vermin		Putrescible wastes such as foodstuffs are transported to the relevant local authority.	Putrescible wastes have been transported away from the site and disposed of adequately.		Putrescible wastes are left at the site and are attracting vermin.
2.3.2	*Physical harm*	Allocation of a supervisory position to closely monitor the filling process at the pipeline, whilst occurring.	Duty allocated to a staff member to monitor the filling process at the pipeline whilst occurring.	General checking for entrapment of animals immediately prior to backfill	Sporadic checking of the backfill at a later period in time.	No monitoring of the backfilling process has occurred, resulting in entrapment of animals.

Goals	Parameter	+2	+1	0	-1	-2
2.3.3	*Disturbance to the individual animal*	All noise, lights and people are restricted from areas with known significant habitat value.	There is minimal noise, lights and people in the areas of known significant value for restricted periods of time.	There is limited noise, lights and people in areas of known significant habitat value as identified in section 7.3 of the DEF/EER.	Noise, lights and people are unavoidably in areas known for their significant habitat	Noise lights and people are in areas of known significant habitats for extended periods of time.
2.4.1	*Contamination*	The water quality has remained unaltered during the construction phase.		Management of soils, storage of chemicals and containment of oils are sufficient to halt any leaching into any of the water sources.	There has been some silt, chemicals and /or oils introduced in the water supply.	Soils have made their way into the water supply in the form of silt; chemicals have been introduced into the water supply, as has oil.
	Water quality *See Dust(2.5.1)*					
2.4.2	*Water quantity*		Watercourses have been unaltered.	Some structures have been installed which are not restricting the natural flow of water.	There has been a limited amount of structures installed to alter the directional flow of the water	The directional flow of water has been drastically changed with adverse effects resulting down the flow.
2.5.1	*Dust*	Watering has occurred at not only the stockpiles, but to any areas' of threat to wind erosion.	Covering of all soil stockpiles has occurred, and watering of most areas of threat to wind erosion have been watered.	Water has been applied to exposed soil, of significant quality, and stockpiled soil has been watered or covered	Limited water has been applied to exposed soil, and stockpiled soil has had minimal amounts of watering or covering, with a limited amount of dust the result.	No water has been applied to exposed soil, and no stockpiled soil has been water or covered, resulting in excessive dust.

Goals	Parameter	+2	+1	0	-1	-2
		Dust suppression methods were employed at all times and work was halted under adverse weather conditions.		Adequate dust suppression methods were employed at all times, which resulted in the continuation of construction during adverse weather conditions.		No dust suppression methods were employed.
	Vehicles	All vehicles travelled under the appropriate speeds on all of the designated tracks with no production of dust.	All vehicles travelled at the designated speeds, with the majority being on the designated tracks.	The majority of vehicles travelled at the appropriate speeds, on all of the designated tracks resulting in minimal dust. No anecdotal evidence or warnings issued.	Some vehicles travelled outside of the designated tracks, and above the designated speeds. Some anecdotal evidence and warnings issued to employees.	All of the vehicles travelled outside of the designated tracks and above the designated speeds resulting in excessive dust production. Speeding tickets were issued to one or more employees
	Vehicle emissions (See Vehicle maintenance 2.2.2)					
2.6.1	*Width of disturbance*			The agreed upon width of disturbance to farming land has been abided by for the majority of the areas	The agreed upon width of disturbance to farming land has been exceeded for some of the right-of-way	The agreed upon width of disturbance to farming land has been exceeded for all of the right-of-way.
	Erosion		No farming land has been eroded due to the construction phase.	Most of farming land has not been eroded due to the construction phase.	Some farming land has not been eroded as a result of the construction phase	The majority of farming land has been eroded as a result of the construction phase.

Goals	Parameter	+2	+1	0	-1	-2
	Topsoil		All valuable topsoil has been stockpiled, covered or water to stop erosion.	Most of the topsoil has been stockpiled, with some covering or watering to halt erosion.		No topsoil has been stockpiled, and left to dissipate.
2.6.2	*Farmers needs*			The agreed farmers needs have been appropriately met, such as opening gate procedures and the movement of stock etc.		The agreed farmers needs have not been met and there has been a loss of stock.
2.6.3	*Private assets and infrastructure*	No damage has occurred to the assets and / or infrastructure of the landowners.		If damage has occurred, repairs are considered as satisfactory from the landowner.	Slight damage has occurred to the assets and / or infrastructure of the landowner, but repairs are made immediately.	Damage has occurred to the landowner assets and / or infrastructure, with no repairs attempted.
2.6.4	*Recreation*	Recreational activities were able to continue and no reports of experiences being diminished were recorded.	Recreational activities have not been significantly diminished.	Recreational activities may have been altered, with minimal experiences being diminished, and one to two reports recorded.	Recreational experiences were altered, and the experiences were unsatisfactory, with less than five reports being recorded.	Recreational activities have had to be abandoned, with many reports being recorded.

Goals	Parameter	+2	+1	0	-1	-2
2.6.5	*Conservation*	Conservation values have been increased.	No degradation of conservation values.	No significant adverse effect on conservation values in project area as identified in section 7.3 of the DEF/EER as there has been limited fragmentation of habitat, and no disturbing of wildlife corridors.	Slight adverse effect on conservation values, with some fragmentation of habitat and some destruction of wildlife corridors.	Significant adverse effects on conservation values, including fragmentation of habitat and destruction of habitats.
2.6.6	*Public infrastructure*	All structures are protected and maintained, with some improvements made to pre-existing infrastructure.		All procedures to protect public infrastructure are followed, and no damage has occurred.	Some protection has been given to significant infrastructure only.	No structures have been installed to protect current infrastructure.
2.7.1	*Public safety*	The public is well informed and able to recognise the construction site, and remain completely safe.		Appropriate procedures have been followed to protect the safety of the public, such as sign posting etc, and no injuries to the public have occurred.	Some key public safety issues have been introduced.	No public safety procedures have been followed, with reports of injuries to the public.
2.7.2	*Fires*	All staff are trained in fire safety procedures and are actively involved in reducing the likelihood of fire.		All precautions have been taken to reduce the likelihood of fire at the site, resulting in no fires.		No precautions have been taken to protect the public from the treat of fire, with operations resulting in a bushfire.

Goals	Parameter	+2	+1	0	-1	-2
2.8.1	*Noise emissions*	Construction activities comply with noise regulations as referred to in section 7.8 of the DEF/EER and additional noise control measures have been employed.		Construction activities comply with the noise regulations as addressed in section 7.8 of the DEF/EER. There are no reports of complaints received.	Some construction activities comply with the noise regulations as addressed in section 7.8 of the DEF/EER, but there has been one or more complaints filed.	None of the construction equipment complies with the noise regulations and statutory requirements have not been met as addressed in section 7.8 of the DEF/EER, with numerous complaints filed.
2.8.2	*Waste*	Waste is removed from the site on a regular basis, and is restricted from view whilst waiting for removal.	Structures have been put in place to inhibit the view of the waste stockpiles.	Waste is stockpiled away from nearby residents and major roads.	Residents have a restricted view of the waste stockpile from their dwellings and the roadside.	Residents are clearly able to see the waste stockpiles from their dwelling and the roadside.
	Vegetation	No vegetation was removed, and a revegetation program is in place for the site.	Limited vegetation was removed, with revegetation programs in place for the site.	Most vegetation, which provided a significant level of visual amenity, has not been removed, and a revegetation program will be commencing.	Some key vegetation was unavoidably removed, and a revegetation program may begin.	The majority of vegetation providing a level of visual amenity was removed, and no revegetation program will be occurring.
	Line of site			The entire line of site is reduced to the minimum practicable through all visually sensitive areas as defined in section 7.9 of the DEF/EER.	Most of the line of site is reduced to the minimum practicable through all visually sensitive areas.	Some of the line of site is reduced to the minimum practicable through most visually sensitive areas.

Goals	Parameter	+2	+1	0	-1	-2
2.9.1	*Aboriginal Sites*	There has been no impact to any Aboriginal sites.		Impact to sites is avoided in accordance with requirements of the Aboriginal community	There has been some impact to sites, but the Aboriginal community has been notified.	Impact to sites has occurred, and the Aboriginal community has not been consulted.
2.9.2	*Cultural Heritage*		All listed heritage sites are avoided.	Some listed heritage sites are disturbed under appropriate approval.		Most listed heritage sites are damaged or altered.

Table 3: Goal Attainment Scaling - Berri to Mildura Natural Gas Pipeline - Post Construction

'Most' or 'majority' means ≥ 75%; 'Some' or 'part' means 25% - 75%

Goals	Parameter	+2	+1	0	-1	-2
3.1.1	*Access*		All access is restricted to approved tracks.	Most of the access is restricted to approved tracks, and permission is granted by the landowners for use of private roads.		Access tracks have not been used for a significant length of the line and / or in sensitive areas.
3.1.2	*Public access*			Appropriate deterrents to access are in place and public access is appropriately restricted or kept to acceptable levels as referred to in section 4.2 of the EMP).	Some measures have been taken to deter the public, with minimal access.	No appropriate measures have been taken to deter the public, and public access is excessive.
3.2.1	*Rehabilitation* *(In first growing season)*	There is a large amount of healthy native vegetation and pasture.		There is evidence of regrowth of most native vegetation and of most pasture.	There are signs that regrowth is occurring of some native vegetation and / or of some pasture.	There is no evidence that native vegetation or pasture is regrowing.

Goals	Parameter	+2	+1	0	-1	-2
3.2.2	*Stockpiled vegetation* *(See respreading vegetation 2.1.4)*					
3.2.3	*Weeds* *(2 months after)*			No noxious weeds on the right-of-way.	Noxious weeds are evident on some patches within the right-of-way.	Noxious weeds are evident on the majority of the right-of-way.
	Weeds *(2 years after)*			No noxious weeds evident on right-of-way and the site of construction.	Noxious weeds are evident on some of the right-of-way and throughout some of the site of construction.	Excessive amounts of weeds are evident on the entire site of construction.
3.3.1	*Windrows*	Surface contours are indistinguishable to the surrounding environment.		No windrows associated with the pipeline are evident.	There is evidence of an attempt to remove windrows from the edges of the right-of - way.	There is no evidence of any attempt to remove the windrows from the edges of the right-of-way.
	Subsidence			There is no subsidence evident on pipe trench or sensitive areas.	Subsidence is evident on some sections of the pipe trench or sensitive areas.	Subsidence is evident on numerous or extensive sections of the pipe trench or sensitive areas.
3.3.2	*Erosion*			There is no evidence of soil erosion in any previously disturbed areas.	There is some evidence of erosion in some of the previously disturbed areas.	There is excessive levels of erosion in most previously disturbed areas
3.3.3	*Ripping*		All compacted areas have been ripped in an appropriate manner.	Most compacted areas have been ripped in an appropriate manner.		No compacted areas have been ripped.
3.4.1	*Subsidence* *(See Soil 3.3.1)*					

Goals	Parameter	+2	+1	0	-1	-2
	Drainage		Surface drainage is not impeded or altered in any sections.	Surface drainage is not impeded or altered in the Lyrup Forest and State Forest west of Koorlong and to a limited extent in other areas.		Surface drainage is impeded or altered in the Lyrup Forest and/or State Forest west of Koorlong, or numerous sections.
3.5.1	*Private*		Written evidence that the landowner is satisfied with the restoration of infrastructure.	Verbal evidence that the landowner is satisfied with restoration of infrastructure.	No written or verbal evidence that landowner is satisfied with the restoration of the infrastructure.	Written evidence that the landowner is unsatisfied with the restoration of the infrastructure.
3.5.2	*Public*		Written evidence that the public is satisfied with the restoration of the infrastructure	No complaints from the public.		Written public complaints regarding the restoration of the infrastructure.
3.6.1	*Waste removal*			All construction waste has been removed from the site, and is reused, recycled or disposed of.	Minor construction waste is evident on the right-of-way.	A significant amount of waste remains on the site or in sensitive areas.
3.6.2	*Activities*			All activities are conducted in such a manner to minimise waste.	Some activities are conducted are in such a manner to minimise most waste.	Activities are conducted in such a manner resulting in waste.