APPENDIX 15

ARROW LNG PLANT

Update to the Preliminary Safety Management Study for the Arrow Energy Feed Gas Pipeline

arrow energy
go further

UPDATE TO THE PRELIMINARY SAFETY MANAGEMENT STUDY FOR THE ARROW ENERGY FEED GAS PIPELINE

Prepared for: COFFEY ENVIRONMENTS AUSTRALIA PTY LTD
ON BEHALF OF ARROW CSG (AUSTRALIA) PTY LTD

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Disclaimer

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GLOSSARY

CSG	Coal seam gas. A natural gas created over millions of years as a by-product while organic matter is turned into coal; mainly comprising methane; trapped on the surface of the coal.
EIS	Environmental Impact Statement. A process used to assess and document the potential and actual environmental impact of a proposed development.
FEED	Front End Engineering Design. Stage of a project where the Project Design Basis is set, Process Flow Sheets, cost estimates and detailed assessments are produced.
Hazard	A hazard is a potentially harmful or dangerous situation, although not necessarily the harmful event itself. Once the event has started it is classified as an emergency or incident.
Preliminary SMS	Preliminary Safety Management Study, made in accordance with the requirement under AS2885.1 (paragraph B2.1.1(a)), generally used as the basis to obtain regulatory approvals for the project.
Liquefaction	Process of liquefying a gas (through cooling and depressuring) to (in the case of LNG) approximately -160 °C.
LNG	Liquefied Natural Gas. Natural gas (comprising mainly methane) that has been converted to liquid form for ease of storage or transport. LNG is odorless, colorless, non-corrosive, and non-toxic. It is stored at low pressure (around 180 mbar(g)) and very low temperature (around -160 °C).
Loss of containment (LOC)	Describes unexpected/unwanted loss of substances from the equipment/piping and associated valves, instruments, etc. holding them.
Propagation	Potential for an event to trigger secondary events due to layout, spacing, and failure of safety systems.
Risk	A measurable quantity associated with each hazard, determined by combining the likelihood of an event occurring, and the consequence, if it were to occur.
Safety Management Study (SMS)	The process that identifies threats to the pipeline system and applies controls to them, and (if necessary) undertakes assessment and treatment of any risks to ensure that residual risk is reduced to an acceptable level. This is the process specified under AS2885.1 for the design and construction of flammable and combustible pipelines.
Update to the preliminary SMS	Update to the preliminary Safety Management Study, following front end engineering design (FEED) stage.

UPDATE ADDENDUM TO THE PRELIMINARY SMS

1 INTRODUCTION

1.1 BACKGROUND

Arrow CSG (Australia) Pty Ltd (Arrow Energy) proposes to develop a liquefied natural gas (LNG) plant on Curtis Island off the central Queensland coast near Gladstone.

The Arrow LNG plant will be supplied with coal seam gas (CSG) from gas fields in the Surat and Bowen basins via high-pressure gas pipelines to Gladstone, from which a feed gas pipeline will provide gas to the LNG plant on Curtis Island. A tunnel is proposed for the feed gas pipeline crossing of Port Curtis.

An approximately 9km long feed gas pipeline will supply gas to the LNG plant from its connection to the Arrow Surat Pipeline (formerly the Surat Gladstone Pipeline) on the mainland adjacent to Rio Tinto's Yarwun alumina refinery.

An Environmental Impact Statement (EIS) was prepared in 2011 to assess potential impacts of the development and ensure that appropriate measures are in place to manage the identified impacts. As part of the EIS, a preliminary Safety Management Study (preliminary SMS, Ref 1) was prepared to assess the hazards and risks to people, property and the environment associated with the feed gas pipeline which could occur during all stages of the project.

Arrow Energy has, through front end engineering design (FEED), reviewed and revised the project description. A number of changes are proposed and an update to the preliminary SMS has been prepared.

1.2 SCOPE AND AIM

An update to the preliminary SMS developed as a part of the EIS has been prepared. The update is to be attached as an addendum to the supplementary report to the EIS (SREIS).

As such, the update addendum compliments the preliminary SMS which was conducted at the early design stage (pre-FEED phase) and focuses on the differences that have evolved during the development of the project through the front end engineering design phase (FEED phase).

The aim of the update is to assess the potential impact of the changes made to the project description, on the hazard and risk assessment made in the preliminary SMS and reported in the EIS.

By conducting a thorough review of the changes made to the project description it is possible to determine whether the design has altered sufficiently to warrant a comprehensive re-evaluation of the risks assessed, or whether the design basis has remained basically intact and the conclusions made in the preliminary SMS remain valid.

The review undertaken for the update addendum determines whether any of the project description changes will result in an increase (worsening) or a decrease (amelioration) of hazards and risks identified in the preliminary SMS.

The update further identifies any changes or additions to the design, safety controls and management measures, as detailed in the preliminary SMS, which are required to manage the potential hazards and risks, and any changes to (or additional) recommendations of the preliminary SMS.

The update has been prepared as a desktop study. It does not replace or substitute a detailed SMS which is required for the feed gas pipeline in accordance with the Australian Standard for flammable and combustible pipelines, AS2885.1 (Ref 2, para B2.1.1. (b)).

2 PROJECT DESCRIPTION CHANGES

There have been no substantial changes in the proposed design and operation of the feed gas pipeline since the early (pre-FEED) design stage and as assumed in the preliminary SMS.

Compared with the design of the proposed development at the time of writing the preliminary SMS (Ref 1), the only changes which have the potential to impact on the hazard and risk assessment are the change of location of the receival shaft of the feed gas pipeline tunnel on Hamilton Point and the separation of the feed gas pipeline from the GLNG haul road and cryogenic pipelines.

The revised feed gas pipeline alignment is presented in Figure 1 relative to the pre-FEED design reported on in the preliminary SMS.

These project description changes result in the following changes to the main assumptions in the preliminary SMS:

- The receival shaft of the tunnel has been moved 700m east of the location nominated in the EIS.
- The feed gas pipeline is now separated from the cryogenic pipelines whereas it was previously adjacent to them.
- The feed gas pipeline will make a short perpendicular crossing of the cryogenic pipelines inside the Arrow Energy allotment.
- The feed gas pipeline is now separated from the GLNG haul road by at least 90m (compared with 50m assumed in the preliminary SMS).
- The length of pipeline from the receival shaft to the gas inlet station is now 1.3 km compared with 2.1 km in the pre-FEED stage.

The impacts of these changes on the assumptions and conclusions drawn in the preliminary SMS are discussed below.

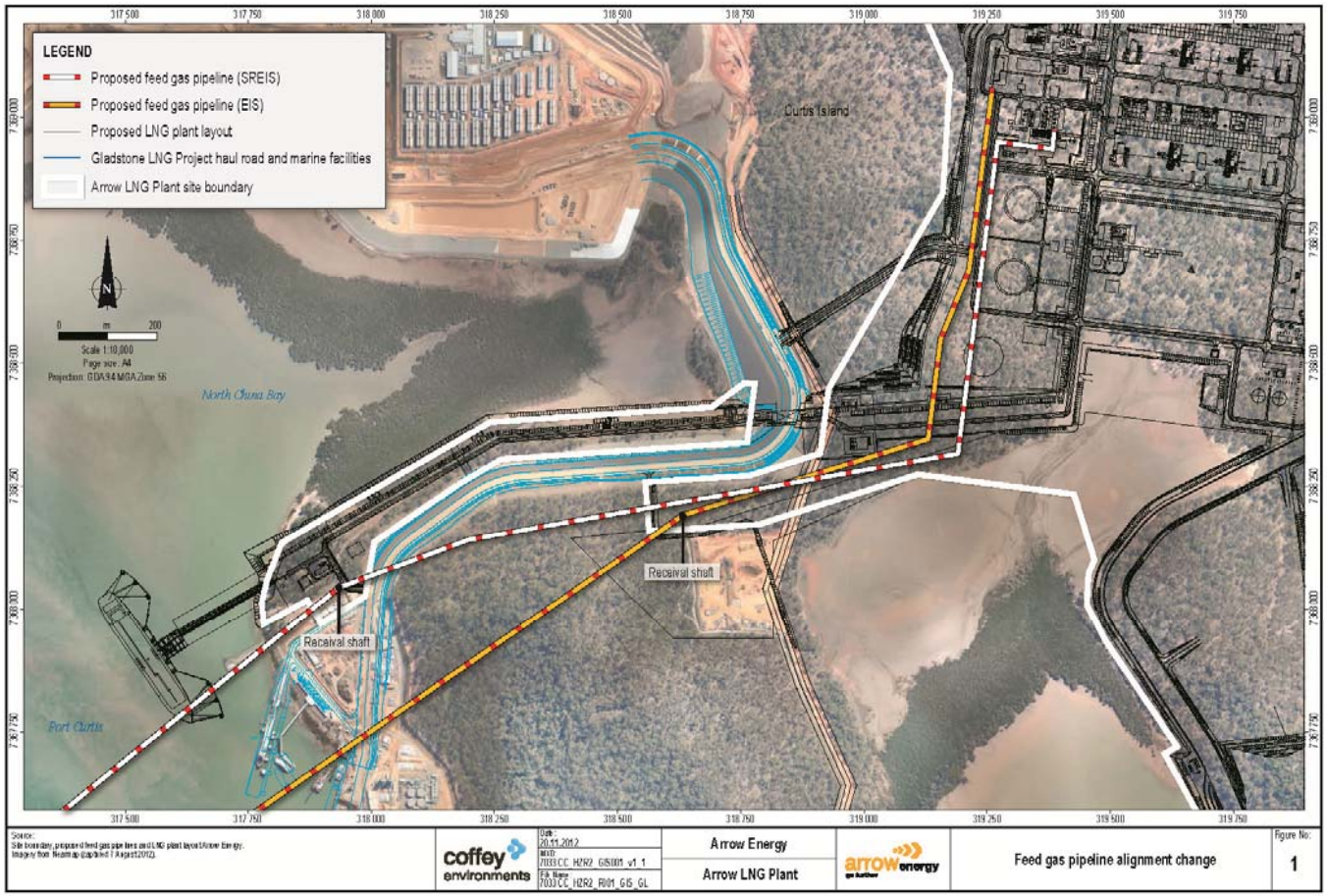

Figure 1 - Feed Gas Pipeline Alignment Change

3 LEGISLATIVE CONTEXT

Since issuing the preliminary SMS, the Work Health and Safety Act 1995 has been replaced by the Work Health and Safety Act 2011.

Neither this legislative change, nor the changes discussed in Section 5, alters the legislative context referred to in the preliminary SMS.

4 METHOD/APPROACH

A review of the project description changes was undertaken as part of this update.

The approach taken has been to systematically assess all major changes that have been made to the installations, material, safeguards or systems, which were proposed at the time of writing the preliminary SMS, that could potentially influence the results of the assessment of the hazards and risks associated with the feed gas pipeline, to surrounding land uses or to individuals present on site.

The review took the following steps:

1. Identify changes made to the installations, material, safeguards or systems that may influence the assumptions or conclusions made in the preliminary SMS.
2. Undertake a systematic assessment of each of the project description changes to determine whether it will result in an increase (worsening) or a decrease (amelioration) of hazards and risks identified in the preliminary SMS.
3. Identify any changes or additions to the design, safety controls and management measures, as detailed in the preliminary SMS, which are required to manage the potential hazards and risks.
4. Identify any changes to (or additional) recommendations of the preliminary SMS.
5. Summarise and document the findings in an addendum report to be attached to the supplementary report to the EIS (this report).

5 VALIDATION AND ASSESSMENT OF IMPACTS AND RISKS

5.1 LOCATION ANALYSIS

In the preliminary SMS, the feed gas pipeline was divided into three sections analysing the land usage and classification of the pipeline in each section. Section 1 described the route from the Arrow Surat pipeline to the tunnel launch shaft; section 2 described the route within the tunnel between the launch shaft on the mainland to the receival shaft on Hamilton Point; and section 3 described the route from the receival shaft on Hamilton Point to the LNG plant.

There have been no changes to sections 1 and 2 of the pipeline. The receival shaft of the pipeline in section 3 has moved, as have the cryogenic pipelines, further separating the feed gas pipeline from the cryogenic pipelines and the GLNG haul road. While the classification of section 3 remains unchanged, the land usage has changed slightly, as shown in Table 1 below.

Table 1 - Location Classes – Update from Preliminary SMS

Section	Land Usage	Proposed Classification
No change: Section 3 – From the Receival Shaft on Hamilton Point to the LNG Plant	**Small change:** Pipeline still runs underground from the receival shaft to the LNG plant and parallel to the GLNG haul road, but is now further separated from the above ground cryogenic pipelines and the road (except for a perpendicular crossing of the lines).	No change to the proposed classification of the location. The definition of the location class remains, as per that stated in the preliminary SMS, (refer definition in AS2885.1): *Primary: High Density (T2)- large numbers of people may congregate within a measurement length, in the normal use of the area* *Secondary: Heavy Industrial (HI)* The measurement length is consistent with AS2885.1 requirements and there have been no changes since the Preliminary SMS was prepared.

5.2 COMPARISON WITH PRELIMINARY SMS HAZARD AND RISKS

5.2.1 Safety Related Hazards and Risks Identified In Construction Phase

The safety hazards and risks identified in the preliminary SMS for the construction phase of the project remain unchanged.

5.2.2 Safety Related Hazards and Risks Identified In Operational Phase

The safety hazards and risks identified in the preliminary SMS for the operation phase of the project remain unchanged.

It should be noted that the proximity of the feed gas pipeline to the cryogenic pipelines and the haul road was not assessed in the preliminary SMS as it was not considered to pose a significant hazard to the health and safety of people in the area, the natural environment or the integrity of the feed gas pipeline. The change in alignment of the feed gas pipeline, resulting in further separation from the cryogenic pipelines and the haul road, reinforces this assessment and reduces the potential risk even further.

5.2.3 Safety Related Hazards and Risks Identified In Decommissioning

The safety risks identified in the preliminary SMS for the decommissioning phase of the project remain unchanged.

6 MANAGEMENT MEASURES

The changes to the proposed design and operation of the feed gas pipeline, following the FEED phase of the project, do not introduce the need for changes, or additions, to the design and safety controls and management measures identified and discussed in the preliminary SMS which are required to manage the potential hazards and risks.

Further, no changed, or additional, recommendations to manage risks have been identified as part of this update.

7 CONCLUSIONS

A review of changes to the project description for the Arrow LNG Plant has been undertaken following the front end engineering design (FEED) stage. A review of the implications of these changes on the assessment and conclusions drawn in the preliminary SMS was conducted.

The review has revealed that there have been no substantial changes in the proposed design and operation of the feed gas pipeline since the early (pre-FEED) stage and as assumed in the preliminary SMS. The change in alignment of the feed gas pipeline has resulted in it being further separated from the cryogenic pipelines and haul road, therefore further reducing any potential risk.

The new alignment of the feed gas pipeline from the receival shaft to the LNG plant has not resulted in any changes (to the installations, material, or systems) that could seriously increase or change the risk associated with the feed gas pipeline or to the LNG plant compared with that assessed in the preliminary SMS. No new, previously unidentified or assessed, hazard or risk has been introduced following the changes to the project description. The design, safety controls and management measures identified in the preliminary SMS remain unchanged. The updated preliminary SMS has not identified any changed, or additional recommendations to manage risks. The assessment made, and the conclusions drawn, in the preliminary SMS remain valid.

8 REFERENCES

1 *Preliminary Safety Management Study in Accordance With AS2885.1 of Arrow Energy's LNG Project: Feed Gas Pipeline, Gladstone, Queensland*, Planager Pty Ltd, November 2011

2 AS2885.1-2007 *Pipelines – Gas and Liquid Petroleum*, Part 1 – *Design and Construction, 2007*