QCLNG PIPELINE PROJECT

Desktop Review of QCLNG Looping Scenario

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Rev.	Status	Prepared by	Checked by	Approved By	Date
A	Draft Report	Paul Beukelman	G. Bowley	M. Turner	04/12/09
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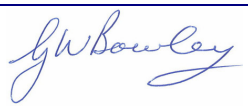
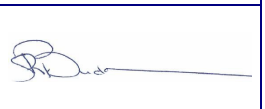
					

CONTENTS

1 EXECUTIVE SUMMARY

OSD was requested by QGC to assess the incremental costs associated with looping the proposed 340km 42" QCLNG Export Pipeline within its proposed 40m easement. Limited details on the pipeline system were provided but the project and location are well known to OSD, and this report utilises data from QGC, the public domain, and general knowledge of OSD personnel familiar with the project area and construction techniques of large bore pipelines.

In developing this report OSD has maintained the assumption that the pipeline route has not been designed to be looped in the short term. This generally implies that the pipeline easement and location of a pipeline in that easement is optimised for the first pipeline installed.

To determine a cost base estimate, OSD has made the following assumptions;

- It is anticipated that the looping construction will be undertaken at an average rate of 1.2 to 1.5km per day
- Using the OSD pipeline construction costing data base, it is anticipated that pipeline construction will be $24,000/inch/km
- On the basis of 42" and 340km pipeline length, this presents a pipeline construction estimate of $342.7million.

It is OSD's opinion that within the accuracy of our estimate, $342.7million would also be the construction cost if a parallel but separate 42" pipeline was constructed in an easement separated some distance (for example 1 -5 km) from the proposed QGC pipeline.

This base estimate is an independent assessment of the construction costs for this pipeline and is based on limited data, excluding indirect costs and specific items such as the narrows crossing near the QCLNG facility. The QCLNG Project will be using values different to this base estimate.

OSD assessed the pipeline route and addressed issues specific to this route rather than generic approaches to looping of pipelines. Our assessment shows that looping the entire pipeline length of 340 km (excluding the small subsea portion) would realise an incremental increase in construction costs of over 20%. A number of cost issues could not be addressed in this study, and OSD believe that the ultimate incremental cost would be between 20%-30%.

2 INTRODUCTION

QGC plans to build a gas pipeline from the Coal Seam Gas (CSG) production area located in the vicinity of the town of Wandoan to Curtis Island in Gladstone, where QGC will build a Liquefied Natural Gas (LNG) plant. The project is called the Queensland Curtis Island LNG Project (QCLNG).

The QCLNG LNG plant on Curtis Island will consist of up to three trains with the first two trains coming on line within a year of each other, with the third delayed by a period. QGC will construct its pipeline to ensure it has sufficient capacity to transport the gas.

QGC wishes to ensure it can utilise the capacity in the pipeline for the first two trains and for the expansion capacity to cover additional trains. In order to provide regulatory certainty for this pipeline, QGC's strategy is to apply for a Greenfield Exemption, under the National Gas (South Australia) Act 2008.

As part of the documentation required to be submitted to the regulator, QGC needs to include a cost assessment for expanding the pipeline by way of looping. This cost assessment is to be substantiated by an external credible independent pipeline expert. OSD Pipelines has been selected by QGC as this expert and this report forms the assessment.

OSD has not been supplied with QGC's total cost or cost breakdown for the export pipeline, and hence has approached the looping costing review from a ground up basis. This enables costing comparisons between an independent assessment of the planned pipeline by QGC and a proposed looped pipeline, to be undertaken by others.

A copy of the QGC scope of work has been included in Appendix A.

3 APPLICABLE LEGISLATION

There is a range of legislation applicable to the development and operation of pipelines. The issues relevant to legislation for this study are being addressed by QGC.

4 DESCRIPTION OF THE EXPORT PIPELINE

4.1 OVERVIEW

QGC is developing a project to export gas derived from CSG deposits in South East Queensland as Liquefied Natural Gas (LNG). The LNG plant is to be located on Curtis Island, near Gladstone.

The CSG shall be extracted from several production areas and transported by "Collection Headers" to a central location. This location is in the vicinity of Wandoan and is the commencement point of the QGC "Export Pipeline". It is noted that the collection header pipelines do not form part of this study.

The project is being permitted for a 12 MTPA (3 LNG trains) production capacity supported by a single 42 inch (DN 1050) export pipeline, (sized for two LNG trains free flow). When the third train is brought on line, the pipeline capacity will be upgraded by the addition of compression.

4.2 ROUTE

A route of the proposed export pipeline is included in the Appendix C. The route is north by north east, commencing at a gas Receipt Station near Wandoan and terminating at a delivery station on Curtis Island, (near Gladstone), a distance of approximately 340km.

The route is onshore except for a 1.5km underwater crossing between Gladstone and Curtis Island.

4.3 END POINTS AND FACILITIES

The original pipeline is understood to have the following end points and facilities;

- KP 0 (near Wandoan): Off take, Metering and Pig Launching facility
- 4 off Main Line Valves (MLV)
- 1 off Mid Line Scraper Station
- KP 340 (Curtis Island): Delivery, Filtering, Metering and Pig Receiving facility.

4.4 DIAMETER, COATING AND DEPTH OF COVER

The pipeline is to be 42" (DN 1050mm) diameter. The wall thickness ranges from 14.1mm to 23.5mm. The pipe is to be API5L Grade X70. The external

coating is to be dual layer Fusion Bonded Epoxy and the internal coating is two part epoxy paint.

In addition to the pipeline, a 40mm diameter optical fibre conduit is proposed to be installed at time of construction.

The pipeline is Class 600, with a Maximum Allowable Operating Pressure (MAOP) of 10,200kPag.

The pipeline depth of cover is a minimum of 750mm in rural areas and 900mm in other areas. Road and rail crossings are to be installed at greater depths.

4.5 EASEMENT

The Right Of Way is 40m wide, except where required to satisfy localised specific circumstances.

From the data provided by QGC, the 42" pipeline appears offset 15m from the boundary of the easement, generally defined as the left side when looking in the direction of flow.

A conduit for a fibre optic cable is proposed to be installed with an 11m offset, from the left side when looking in the direction of flow.

It is assumed the pipeline is being built from a south to north direction.

5 LOOPING SCENARIOS

5.1 INTRODUCTION TO LOOPING

5.1.1 General

Looping of pipelines is a common mechanism for increasing capacity throughput of pipeline systems. Very few pipelines are originally designed with intent for looping, and engineering design and land management practices do not necessarily address future looping of pipelines.

Looping part or all of a pipeline system requires particular attention to the integrity of the existing pipeline and infrastructure. This generally adds costs above "typical" construction costs for a pipeline system.

5.1.2 Looping Easement Requirements

The existing 40m wide easement would permit another pipeline to be installed in the existing easement, however for efficient pipeline construction; additional temporary working width would need to be acquired.

A sketch has been produced and is included in Appendix B showing a nominal 20m additional working width, with a 20m separation between the two pipelines.

This would include a 5m exclusion zone to protect any existing pipeline. Calculations or risk assessments to confirm the 5 m distance as sufficient protection for an existing 42" pipeline with 750 mm nominal cover have not been conducted.

5.2 DESKTOP REVIEW OF ROUTE

5.2.1 Geotechnical Review

A desktop review of the route description and using the supplied Geotechnical Exploration Programme (prepared by Advanced Geomecanics dated 22 September 2009) indicates that geomorphilogically the route can be broken down as follows;

Approx KP Interval	General Terrain Type
0-12	Low Lying Hills
12-20	Gently Undulating Terrain
20-75	Low Lying Hills
75-150	Gently Undulating Terrain
150-213	Low Lying Hills
213-215	Alluvial Plains
215-218	Low Lying Hills
218-222	Alluvial Plains
222-228	Moderately Rugged Hills
228-233	Alluvial Plains
233-265	Moderately Rugged Hills

Approx KP Interval	General Terrain Type
265-299	Alluvial Plains
299-304	Low Lying Hills
304-314	Alluvial Plains
314-328	Gently Undulating Terrain
328-334	Moderately Rugged Hills
334-340	Alluvial Plains

In summary, alluvial plains represent 61km (or 18%), gently undulating terrain 97km (or 29%), low lying hills 138km (or 41%) and moderately rugged hilly terrain 44km (or 13%).

The alluvial plains are characterised by very low slope gradients, with clayey top soils overlying silty sands and gravels. The gentle undulating terrain has minor relief, and is underlain by clayey soils and intermixed clays, sands, and gravels. The low lying hills are characterized by increasing slope gradients, and are underlain by thinner clayey and rocky soils with areas of shallow rock. The moderately rugged hills have low to moderate relief and are underlain by thin clayey soils, clayey gravels, and rock.

From a looping construction point of view;

Alluvial Plains and Gently Undulating Terrain

These conditions are typically suitable for pipeline looping construction using a 20m wide additional working width as discussed above.

Low Lying Hills and Moderately Rugged Hills

In Low Lying Hills and Moderately Rugged Hills, the original pipeline construction will be undertaken in areas with both minor and major side slopes. This is undertaken using cut/fill earthworks over the 40m wide easement width.

Subsequent pipeline looping would prove to be difficult, as additional 20m wide working width would not be readily available.

This implies generally that approximately 50% of the easement route is through terrain that is relatively straightforward for construction activities.

5.2.2 Land Use

It is understood that the last approximately 80km of the pipeline leading into Gladstone is in the process of being zoned a Government Corridor. This is proposed as a 100m wide pipeline corridor, to suit all intended pipelines and potentially other infrastructure.

Obviously, the timing of the looping, relative to the existing pipelines at time of looping construction, will have a bearing on ease or practicality of construction. Dependent on the alignment of pipelines within this corridor, it may require special construction techniques at substantial incremental costs to loop any of this section. OSD has assumed that an additional 20 m of easement could be obtained for the purpose of looping the QGC pipeline.

5.2.3 Callide Range

A total of 32km of the route is through the Callide Ranges, with granite boulders in the area. With pipeline looping construction, traditional methods of blasting to clear them will not be permitted due to the proximity of the existing pipeline, and controlled blasting techniques would need to be applied. This retains some risks with side slopes stability and controlling blast falls.

In this area either alternative means of construction may be required or a re-route will be needed. Alternative means of construction including rock hammers and rock saws at incremental construction costs may be utilised.

5.2.4 Reroutes

It is anticipated that up to 50 reroutes or variations from the original pipeline route will be required due to environmental, cultural heritage, or physical obstacles. It can be anticipated that each of the re-routes will add additional length to the pipeline. This is further discussed below.

6 TYPICAL COMPONENTS OF CONSTRUCTION COSTS

Pipeline construction can be broken down into the following components. These components have been further broken down by percentage of total costs and if they change with looping scenarios.

Activity	Typical % of Construction Cost for 40 m construction easement	Components which change in looping scenario
Clear & Grade	13%	Yes
Stringing & Bending, (from adjacent stock piles)	8%	No
Trenching & Blasting	10%	Yes
Welding, Coating & NDT	22%	No
Lowering in, Backfill and Tie Ins	14%	No
Reinstatement & Fencing	14%	No
Special Crossings	8%	Yes
Facilities Construction	5%	No
Testing & Commissioning	2%	No
Owners Costs	2%	Yes
Construction Insurances	2%	Yes

The above table is a high level breakdown of typical pipeline construction, on the basis of total owner design, with no allowance for land access and all material being supplied to a construction contractor by the owner (free issue materials). These items are further reviewed below.

7 LOOPING COSTING

7.1 BASE ESTIMATE ASSUMPTION

Using the OSD pipeline construction costing data base, it is anticipated that pipeline construction will be $24,000/inch/km. On the basis of 42" and 340km pipeline length, the construction component of a new pipeline would be $342.7million and this value is used to define incremental percentages associated with looping of the pipeline.

This base estimate is an independent assessment of the construction costs for this pipeline and is based on limited data, excluding specific items such as indirect costs and the narrows crossing near the QCLNG facility. The QCLNG Project will be using values different to this base estimate.

7.2 CLEAR AND GRADE

7.2.1 Identification of Existing Pipeline

To identify the centre line of the existing pipeline, it is common industry practice to use vacuum suction techniques to locate the pipeline and install PVC pipes for the duration of the construction period. These PVC pipes are then removed and the area backfilled.

Assuming pot holing is undertaken every 200m and a unit cost of $1000, this represents $1.9million.

7.2.2 Pipeline Construction with Side Slopes

In the rugged hills associated with the Callide Hills, the original pipeline construction will involve land levelling using cut and fill techniques. With the construction of the looping pipeline it will not be possible to secure additional working areas, next to the existing pipeline, as the area will either be up against a cut or working over fill.

Accordingly the looping pipeline construction in rugged areas with significant side slopes will involve construction within the original 40m easement. This will involve reduced access and working over spoil, with reduced construction efficiency.

It has been assumed that approximately 50% of the 32km through the Callide Hills will have this reduced construction efficiency.

It is estimated that a $24,000/inch/km reduced construction efficiency surcharge will apply. Assuming the length of side slopes represent 16km, this item represents $16.1million.

7.2.3 Re-Routes

It is anticipated that there will be up to 50 km of re-routes from the existing easement. The re-route will involve additional length to detour around the obstacles encountered and then return to the original alignment.

It is anticipated that this will result in an additional 10km of total pipeline length. Using the OSD Pipelines cost data base (for pipe and material, survey, project

management), it is anticipated that this item equates to $70,000/inch/km. On the basis of 42" and 10km reroute, this represents $29.4million.

7.2.4 Extra Working Width Acquisition

A temporary extra working width of 20m for the length of 340km has been assumed. A budget estimate to rent this land to cover compensation for loss of farming use, with its associated approvals, easement identification, preparation of drawings, etc. is $1million.

7.3 TRENCHING AND BLASTING

7.3.1 Callide Ranges

As discussed in 5.2.3, approximately 32km of the route will transverse area known to require blasting. Due to the proximity of the existing pipeline, extra construction costs will be incurred due to having to undertake controlled blasting, or utilise rock hammer excavation. An estimate of $200 per metre length has been allowed for this activity. This represents $6.4million, or a 23% increase in trenching and blasting costs.

7.4 SPECIAL CROSSINGS

There is a major underwater crossing at Port Curtis, which is excluded from this study.

From the desktop review, it is estimated that approximately 80 major or intermediate crossing will be undertaken, and 100 to 150 minor crossings.

Due to the nature of water course and other features crossings, it is typical to encounter difficulties in remaining parallel to an existing pipeline, to undertake an optimal crossing.

It is estimated that 25% of the major crossings (or 20 crossings) will require additional work or special construction procedures to enable efficient pipeline crossings.

A budget estimate of $0.5million per crossing has been assumed to cover construction difficulties. This represents $10million for the looping project.

7.5 OWNERS COSTS

During the construction phase of the looping owner's representatives will be required to prepare work permits and undertake owner's representative functions.

This could extend to 4 representatives over an 18 month period. Assuming a daily cost of $2000 per man this represents $4.4million.

7.6 LOOPING PROJECT INSURANCE

Due to construction activities occurring in proximity to the existing pipeline, both the construction contractor and the pipeline owner will need to take out specific additional insurance to safeguard against damage to the pipeline reducing or ceasing gas flow to the downstream LNG plant.

The economic impact of shutting down the LNG facility for any period of time, due the supply pipeline being damaged would be large, but OSD is unable to quantify the amount.

7.7 LOOPING COST SUMMARY

A summary of anticipated looping costs appears below (in AUD million, 2009):

Item	Anticipated Pipeline Cost	Incremental Looping Cost	Incremental Looping (%)
Construction Base Cost	**342.7**		
Clear and grade			
Identification of existing pipeline		1.9	
Construction with side slopes		16.1	
Re-Routes		29.4	
Extra Working Width		1.0	
Clear and grade sub total		**48.4**	14%
Trenching & Blasting			
Controlled Blasting Allowance		**6.4**	2%
Special Crossings			

Special Crossings Allowance		**10.0**	3%
Owners Costs			
Owners Representation		**4.4**	1%
Total	**$411.9**	**$69.2**	**20%**

These budget construction estimates should be considered as being accurate to ±35%.

7.8 OTHER FACTORS

Other looping factors which have not been specifically costed include the items below. These are difficult to quantify without additional study and discussions with QGC, and have been excluded at this time.

7.8.1 Environmental / Cultural Heritage Requirements

The original pipeline was given approval on the basis of the completion of an environmental and Cultural Heritage studies.

If a significant variation in the pipeline route is undertaken, a new environmental review process will be required to be undertaken. It is anticipated that a pipeline looping will also require a cultural heritage review. The costs of these activities have not been evaluated.

7.8.2 Safe Working Practices

Due to construction activities occurring in proximity to the existing pipeline, construction contractors and the pipeline owner will require additional safe working practices to be developed. The nature and cost impact of these practices is hard to quantify and OSD has not made a provision for these costs at this time.

7.8.3 Risk Assessments

Risk assessments are undertaken as part of the Australian standards for pipelines (AS2885) and can impose additional design, construction, and operation limitations on a pipeline project. Without a looping risk assessment being completed it is not possible to quantify any incremental costs that may be identified by such a study.

8 CONCLUSION

OSD has attempted to quantify the incremental costs for construction associated with the looping of an existing pipeline within a 40m easement. OSD has assessed the pipeline route and addressed issues specific to this route rather than generic approaches to looping of pipelines.

With the available data, OSD believes the accuracy of all estimates in this report is in the range ±35%, and the base construction cost would be a P50 value.

Our assessment shows that looping the entire pipeline length of 340 km (excluding the small subsea portion) would realise an increase in construction costs of over 20%. A number of cost issues could not be addressed in this study, and OSD believe that the ultimate incremental cost would be between 20%-30%.

Dependent on available land, it may be more practical and cost effective to construct a parallel pipeline separated by some nominal distance (say 1 – 5 km).

APPENDIX A

SCOPE OF WORK

SCOPE OF WORK

Background

QGC plans to build a gas pipeline from the CSG production area located in the vicinity of the town of Wandoan to Curtis Island in Gladstone where it will build an LNG plant. The LNG plant may consist of three trains with the first two trains coming on line together. QGC intends that production, transportation and liquefaction will be integrated within a single business. QGC will construct its own pipeline to ensure it has sufficient capacity to transport the gas.

QGC wishes to ensure it can utilise the capacity in the pipeline for the first two trains and for the expansion capacity. In order to provide regulatory certainty for this pipeline, QGC's strategy is to apply for a Greenfield Exemption.

As part of the documentation required to be submitted to the regulator, QGC needs to include a cost assessment for expanding the pipeline by way of looping. This cost assessment is to be substantiated by an external credible independent pipeline expert.

The requirements of the advice are as follows:

Desktop Study to determine the indicative percentage change in construction costs for the QCLNG pipeline in a scenario where the pipeline is looped along its total length using an identical pipeline:

1) Identify all typical components making up the construction costs of the pipeline
2) Identify which of the above components would change in cost in the scenario where the pipeline is looped
3) Identify the range of costs variations for these above components in the scenario where the pipeline is looped
4) Identify other factors which could influence the range of costs
5) As a result of the above, provide a percentage range for the change in construction costs for the QCLNG Pipeline where the original pipeline is looped along it total length.

QGC to provide the following information:

1) Size of original pipeline
2) Length of original pipeline
3) Class of pipeline
4) Map indicating pipeline route
5) Pipeline route terrain
6) Underwater crossing between Gladstone and Curtis Island
7) Width of easement for initial pipeline

8) Any other relevant technical information required.

OSD Pipelines to advise:

- ❑ Fees for providing the advice
- ❑ Time to complete the advice, including a start date for the advice
- ❑ Any additional information required to undertake this advice.

OSD Pipelines to provide:

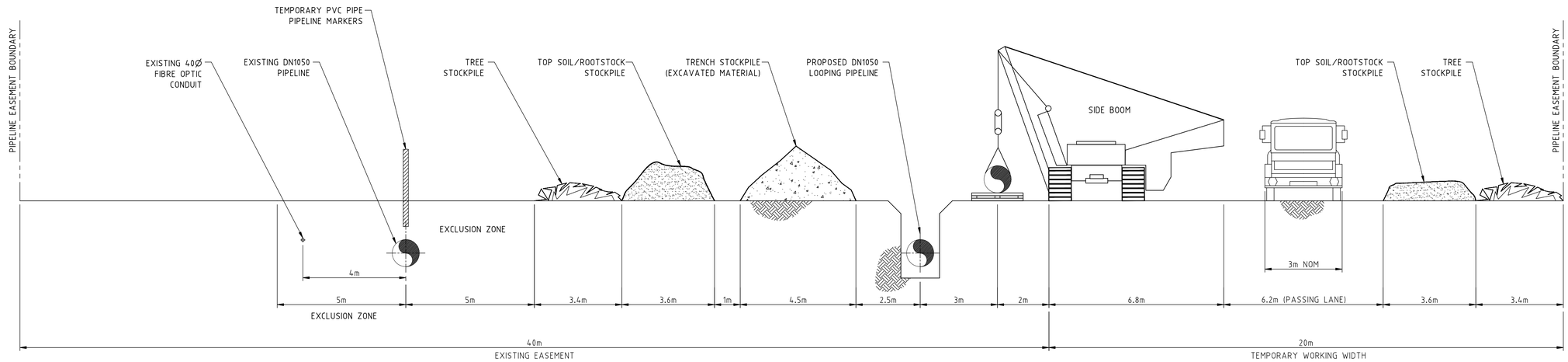
- ❑ A draft written report containing the above advice
- ❑ QGC to review and provide comments (once the draft report is available)
- ❑ A final written report having considered QGC's comments.

Other issues:

1) The advice will be part, directly or indirectly, of the documents sent to the NCC for their review of QGC's application
2) QGC may need to use the study in a public assessment process. Any report must clearly identify any information that is confidential.

APPENDIX B

EXPORT PIPELINE LOOPING CONTRUCTION RIGHT OF WAY CONCEPT SKETCH

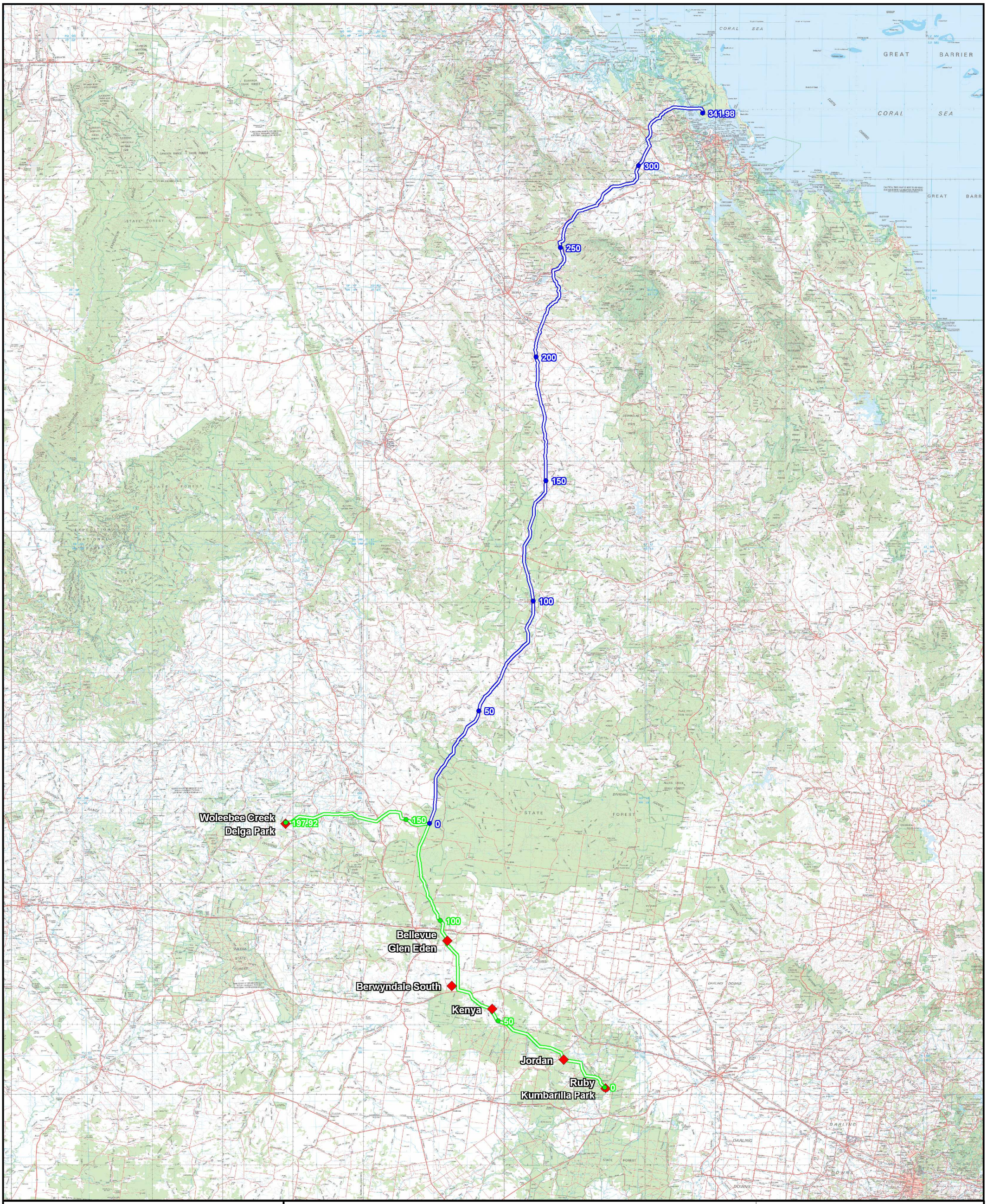


EXPORT PIPELINE LOOPING
CONSTRUCTION RIGHT OF WAY

73202-DGX-001
M.J.B 04/12/09

APPENDIX C

PROPOSED EXPORT PIPELINE DRAWING



CLIENT: QGC & BG International

PROJECT: Queensland Curtis LNG Project

TITLE: QCLNG Project Area for Hydraulic Analysis - Option2

DATE: 24-July-2009

DATA SOURCE:
1:250,000 Topographic Raster copyright Geoscience Australia

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SCALE: 1:1,200,000 (A3) GDA94 Lat/Long

-20 -10 0 10 20 30 40
Kilometres

LEGEND

- Export Pipeline Option2
- Collection Header Option2
- Central Processing Plant

DATE	DRAWN	APPROVED	DRAWING NO.	REVISION
2009.07.24	Mipela	CDP	WR_QGC_00185	A

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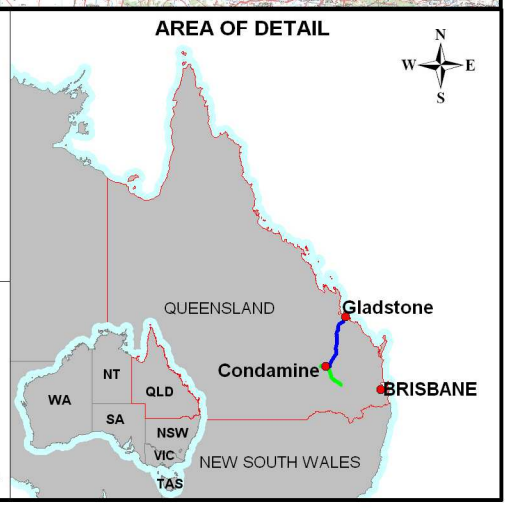
AREA OF DETAIL



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