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PETROVIETNAM SOUTHWEST GAS PROJECT MANAGEMENT BOARD

Block B&52-O Mon Gas Pipeline - Front End Engineering Design and Cost Estimate Services

Risk Management Report

493-J1-0027 – 00-PM-TSK-0001

7 January 2010

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PETROVIETNAM SOUTHWEST GAS PROJECT MANAGEMENT BOARD
BLOCK B&52-O MON GAS PIPELINE - FRONT END ENGINEERING DESIGN AND COST ESTIMATE SERVICES

RISK MANAGEMENT REPORT

Disclaimer

PROJECT 493-J1-0027 - BLOCK B&52-O MON GAS PIPELINE - FRONT END ENGINEERING DESIGN AND COST ESTIMATE SERVICES

REV	DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
0	Issued for Use	ANP	VS	N/A	7 Jan 2010	N/A	N/A

CONTENTS

Appendices

PETROVIETNAM SOUTHWEST GAS PROJECT MANAGEMENT BOARD
BLOCK B&52-O MON GAS PIPELINE - FRONT END ENGINEERING DESIGN AND COST ESTIMATE SERVICES

RISK MANAGEMENT REPORT

1. EXECUTIVE SUMMARY

This risk assessment workshop was held on *10th Nov 20009* at *WorleyParsons (Thailand) Office* in order to review and identify the Risks associated with the *Block B&52 O Mon Gas Pipeline – Front End Engineering Design and Cost Estimate Services* Project.

The risk assessment workshop identified *28* risks as Extreme and High. The top *10* of risks are as follows:

Risk 1 Safety during construction (Offshore) (e.g. Experience of EPC Contractor)

Risk 2 Safety during construction (Onshore)

Risk 3 Safety during construction (Offshore) (e.g. Experience of Subcontractor)

Risk 4 Completion of the pipeline coating (FBE) in time for the installation

Risk 5 Quality of the coating (FBE) contractor

Risk 6 Interface between all stake holders

Risk 7 Interface between lower tier stakeholder (e.g. EPC, subcontractor, vendor, etc.)

Risk 8 GSA approval (Time)

Risk 9 Potential subcontracting of Detailed engineering (e.g. poor engineering, etc.)

Risk 10 Potential changes to the FEED design basis due to changes of upstream design.

Actions have been developed to address the key risks identified for the project. Even after treatment *21* risks remain 'Extreme' and 'High' and will remain so unless additional mitigation actions are in implemented.

2. INTRODUCTION

PetroVietnam Southwest Gas Project Management Board of the Socialist Republic of Vietnam (PVSWG) is responsible for the development of the Block B&52 – O Mon Gas Pipeline Project implemented to transport natural gas from a proposed Central Processing Platform (CPP) located in Block B & 52 fields to Ca Mau, O Mon, Tra Noc Power Plants, and Neighbouring Industrial Zones in provinces along the pipeline route.

The development of CPP will be done by Chevron and including equipment of pipeline on CPP and Riser from the flange downstream of the gas sales meter to the flange downstream of Subsea Isolation Valve (SSIV).

Pipeline route originates from CPP and includes as follow:

- Approximately 90 m riser and facilities on CPP
- Approximately 246 km subsea pipeline
- Shore crossing
- Mui Tram Landfall station (LFS)
- Approximately 152.4 km onshore pipeline, including line break valve
- Ca Mau Gas Distribution Station (GDS)
- O Mon Gas Distribution Centre (GDC)
- Approximately 9.5 km onshore pipeline from GDC to Tra Noc GDS
- Tra Noc Gas Distribution Station (GDS)

The Project investment objective is to contribute to the economic development in Southwest provinces and to secure gas/power supply in Vietnam. The Offshore and Onshore pipeline is scheduled to be finished by the Q2-2014.

3. RISK ASSESSMENT PROCESS

The Company has used a formalised process for the identification and management of business and project risks for a number of years, both on behalf of our customers and for our own internal purposes. The basic driver behind these processes is to identify and manage business and project risks so that the best objectives can be achieved.

The process that the Company uses is based broadly on the Australian and New Zealand Standard for Risk Management AS/NZS 4360:2004, which is considered an international benchmark standard in risk management.

The process involves the following steps:

- The business/project risks are identified, generally by a facilitated brainstorming session involving key stakeholders in the project;
- The risks are evaluated, analysed and prioritised into broad categories (e.g. extreme, high, medium and low risks), based on the likelihood of the risk occurring, and the consequences if it were to occur;
- The critical risks are assessed and treated – treatment can include actions to reduce either the likelihood or the consequences or both, the off-loading of risks to another party more suitable to accept such risks, or the acceptance and on-going management of a risk. The treatment of a risk may involve allocating some money to cover the treatment.
- Opportunities are also identified utilising this process by focusing on the possible additional benefits which could be extracted.

The output form this process is a Risk Management Plan, which includes the following documents:

- Risk Maps, before and after treatment;
- Risk Register, Risk Treatment Plan and Risk Action Plan.

These documents form part of the strategic project management process for the project, and must be communicated to the project team and monitored, reviewed and update progressively throughout the project execution.

4. RISK ASSESSMENT WORKSHOP

The risk workshop was conducted in accordance with guidance given in AS 4360 and recorded in a spreadsheet format utilising a structured brainstorming approach.

The risk identification process was assisted with the use of guidewords, and drew on the experience of the assembled workshop participants.

Where a risk was identified and considered credible, the current controls and possible consequences were investigated and recorded. The risk associated with the identified risk were then characterised based on the identified consequence and likelihood of occurrence using a risk matrix.

4.1 Risk Evaluation Scales

This section details the scales utilised for this project risk workshop.

4.1.1 Consequence Scales

The Workshop Attendees reviewed the suggested risk consequences and agreed on the following scale for this workshop:

	Consequences				
	1 - Insignificant	**2 - Minor**	**3 - Moderate**	**4 - Major**	**5 - Catastrophic**
Safety and Health	**First Aid Case**	**Minor Injury,** Medical Treatment Case with/or Restricted Work Case.	**Serious injury** or Lost Work Case	**Major or Multiple Injuries** permanent injury or disability	**Single or Multiple Fatalities**
Environment	**No impact** on baseline environment. Localized to point source. No recovery required	**Localized** within site boundaries. Recovery measurable within 1 month of impact	**Moderate** harm with possible wider effect. Recovery in 1 year	**Significant** harm with local effect. Recovery longer than 1 year.	**Significant** harm with widespread effect. Recovery longer than 1 year. Limited prospect of full recovery
Financial	<$10m	$10m - $50m	$50m - $150m	$150m - $300M	>$300m
Production/Schedule	Up to 3 days	3 days – 1 week	1 wk – 1 month	1 – 6 months	> 6 months
Reputation	Localized temporary impact	Localized, short term impact	Localized, long term impact but manageable	Localized, long term impact with unmanageable outcomes	Long term regional impact
Business Impact	Impact can be absorbed through normal activity	An adverse event which can be absorbed with some management effort	A serious event which requires additional management effort	A critical event which requires extraordinary management effort	Disaster with potential to lead to collapse of the project

4.1.2 Likelihood Scales

The Workshop utilised the following likelihood scale for this workshop:

Likelihood Category				
E	**D**	**C**	**B**	**A**
Rare	**Unlikely**	**Moderate**	**Likely**	**Almost Certain**
Highly unlikely to occur on this project	Given current practices and procedures, this incident is unlikely to occur on this project	Incident has occurred on a similar project	Incident is likely to occur on this project	Incident is very likely to occur on this project, possibly several times
OR				
5% chance of occurring	20% chance of occurring	50% chance of occurring	80% chance of occurring	95% chance of occurring

4.1.3 Risk Matrix

		Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	Almost Certain	H	H	E	E	E
	Likely	M	H	H	E	E
	Moderate	L	M	H	E	E
	Unlikely	L	L	M	H	E
	Rare	L	L	M	H	H

Once evaluated, the above risk matrix allows risks to be prioritised for action/risk treatment.

Risk Severity Rating	Priority (1 is highest)	Action Required
E - Extreme	1	Immediate attention
H - High	2	Immediate attention
M - Moderate	3	Action as soon as practicable
L - Low	4	Low priority

4.2 Risk Treatment

Where the risks were evaluated and deemed intolerable by the workshop participants, risk treatment or 'action plans' were identified. For completeness and to check their effectiveness, the risks severity before and after treatment (i.e. with the action plan in place) were determined.

4.3 Workshop Attendees

The workshop was conducted on 10th November 2009 at Phaholyothin Conference Room, WorleyParsons Office, Thailand.

The workshop attendees are given in Table 1.

Table 1 Workshop Attendees

Name	Position	Company
Mr. Tran Van Vinh	General Manager of Gas Division	PVN
Mr. Nguyen Manh Tuong	Deputy Director	PVSWG
Mr. Chav Thanh Le	Manager of Technical Dept.	PVSWG
Mr. Julian Taylor	Manager of Project	WPV
Mr. V. G. Shanbhag	Project Director	WPV
Mr. Andrew J Wood	Business Group Manager (Pipeline and Terminal)	WPV
Mr. Anurak. Puengrostham	Senior Project Engineer	WPV
Mr. Lee Chong Fong	Project Manger (Offshore)	WPV

5. RISK WORKSHOP RESULTS

5.1 Stakeholders Identified

The following key Stakeholders were identified by the Risk Workshop Team:

- PetroVietnam
- PetroVietnam SouthWest Board
- Chevron
- WPV
- Local Authorities
- Local Population

5.2 Key Success Factors Identified

The following Key Success Factors were identified by the Risk Workshop Team:

- Achieve clear scope definition at FEED
- Achieve cost estimate to agreed accuracy.
- Achieve the project delivery schedule
- Achieve the functional requirement
- Maximization of Vietnamese content
- VSP performance
- Quality of end product
- Meeting local authority requirement
- Environmental Performance
- Access right, timing and cost

- Safety Performance to international standard

5.3 Risk Assessment Summary

A total of *42* risks were identified for the Block B&52 – O Mon Gas Pipeline Project.

Table 2 Risk Summary Table

Rank	No.	Description	Before		After
8	22	GSA approval (Time)	Extreme		Extreme
1	2	Safety during construction (Offshore)	Extreme		High
2	3	Safety during construction (Onshore)	Extreme		High
3	4	Safety during construction (Offshore)	Extreme		High
5	10	Completion of the pipeline coating (FBE) in time for the installation	Extreme		High
6	11	Quality of the coating (FBE) contractor	Extreme		High
4	20	Interface between all stake holders	Extreme		High
11	1	Safety in design	High		High
29	13	Escalation (outside EPC's SOW) over the duration of the project. e.g. Land Acquisition, etc.	High		High
21	14	Experience level of available suppliers / vendors	High		High
15	15	Estimated cost supplied by the vendor during FEED (accuracy)	High		High
16	19	Approval time for order (LLI) placement	High		High
12	28	Failure of Hydrostatic Test of Offshore Pipeline caused by workmanship	High		High
13	29	Failure of Hydrostatic Test of Offshore Pipeline caused by pipeline defect	High		High
26	35	The seasonal weather may impact the construction schedule during extreme dry or wet season.	High		High
17	38	Inadequate of material handling capability	High		High
27	39	Gas availability for commissioning	High		High
18	40	EPC contractor management of subcontractors and vendors	High		High
19	41	Relations with local community leading to possible delay of project	High		High
28	42	Limited experience of EPC Contractor.	High		High
33	33	Failure of Hydrostatic Test of Onshore Pipeline caused by workmanship	Moderate		High
7	21	Interface between lower tier stakeholder (e.g. EPC, subcontractor, vendor, etc.)	Extreme		Moderate
9	23	Potential subcontracting of Detailed engineering (e.g. poor engineering, etc.)	Extreme		Moderate
10	24	Potential changes to the FEED design basis due to changes of upstream design.	Extreme		Moderate
20	7	Disposal of the Hydrotest Water (Offshore)	High		Moderate
14	12	Escalation over the duration of the project	High		Moderate
22	16	Sub-Contractor, and Supplier Financial Stability	High		Moderate

23	18	Delay of Payment of EPC Contractor to subcontractors	High		Moderate
24	31	Risk of damage of the pipeline caused by method of installation at shore approaching area and shore crossing point to LFS	High		Moderate
25	32	Risk of slipage damage between concrete coating and corrosion coating during pulling the pipeline at the shore approaching area.	High		Moderate
30	17	Delay of Payment of Owner to EPC Contractor	Moderate		Moderate
31	27	Delay of offshore pipeline by the development of CPP by CVX.	Moderate		Moderate
34	34	Failure of Hydrostatic Test of Onshore Pipeline caused by pipeline defect	Moderate		Moderate
35	36	The risk of having limited HDD machines for crossing that could not be done by other method.	Moderate		Moderate
32	37	Risk of HDD unsuccessfully pulling the pipeline.	Moderate		Moderate
37	6	Impact to local environment during construction phrase (Onshore)	Low		Moderate
36	5	Impact to local environment during construction phrase (Offshore)	Low		Low
38	8	Disposal of the Hydrotest Water (Onshore)	Low		Low
42	9	Emission (pipeline only) impact to the environment	Low		Low
39	25	Delay of pipeline (offshore) installation by offshore UXO survey.	Low		Low
40	26	Platform location has not been confirmed by CVX.	Low		Low
41	30	Delay of Offshore pipeline installation caused by natural causes e.g. storm, etc.	Low		Low

Risk treatment has been applied where appropriate and action plans identified to reduce the risks.

The full workshop risk assessment findings are presented as Appendix 1 including all of the action plans identified. The workshop minutes should be read in their entirety and responsibilities and completion dates need to be assigned as part of this review. Appendix 2 presents the before and after treatment risk maps.

6. CONCLUSIONS AND RECOMMENDATIONS

The Risk Management Plan should be reviewed during the FEED as specified in the Project Management Plan to ensure that appropriate actions have been taken and followed up. Reviews should also occur at the commencement of a new project phase or if there are significant changes to the project scope or operating environment.

The Risk Management Plan, including action parties and forecast action close-out dates, is a “live” document and as such, should be maintained on the project schedule or a stand alone Risk Schedule. The Risk Management Plan attached is the current version resulting from the risk management session.

7. REFERENCES

1. AS/NZS 4360: 2004 Risk Management, Standards Australia

Appendix 1 - Risk Register

Risk Register and Action Plan

Column Key:

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Number	Rank	Risk Description (Event and Consequence)	Category	Existing Controls	Risk Severity Before Treatment					Risk Treatment Plan	Ability to Influence	Action Plan Type	Risk Severity After Treatment				
						Consequence		Likelihood	Risk Level Before Treatment					Consequence		Likelihood	Risk Level After Treatment
1	11	Safety in design	Safety and Health	FEED has defined international and local Code and Standard.	5	Catastrophic	E	Rare	*High*	Safety and design procedure for good engineering practice shall be defined in EPC package.	Moderate	Avoid / eliminate	5	Catastrophic	E	Rare	*High*
2	1	Safety during construction (Offshore)	Safety and Health	Using experienced and reputable EPC Contractor.	5	Catastrophic	D	Unlikely	*Extreme*	Experience Management Team will be appointed for the selection of the EPC contractor.	High	Reduce likelihood	5	Catastrophic	E	Rare	*High*
3	2	Safety during construction (Onshore)	Safety and Health	PVC has been norminated as Onshore EPC Contractor.	5	Catastrophic	D	Unlikely	*Extreme*	In house PMT will be responsible for EPC implementation.	Moderate	Reduce likelihood and consequence	5	Catastrophic	E	Rare	*High*
4	3	Safety during construction (Offshore)	Safety and Health	Subcontractor selection prequalification process will follow local regulation.	5	Catastrophic	D	Unlikely	*Extreme*	In house PMT will be responsible for EPC implementation.	Moderate	Reduce likelihood and consequence	5	Catastrophic	E	Rare	*High*
5	36	Impact to local environment during construction phrase (Offshore)	Environment	EIA study will be approved by local authority.	2	Minor	D	Unlikely	*Low*	Construction activities will be supervised by PMT and EIA's consultant.	Moderate	Reduce likelihood and consequence	2	Minor	D	Unlikely	*Low*
6	37	Impact to local environment during construction phrase (Onshore)	Environment	EIA study will be approved by local authority.	2	Minor	D	Unlikely	*Low*	Construction activities will be supervised by PMT and EIA's consultant.	Moderate	Reduce likelihood and consequence	2	Minor	D	Unlikely	*Low*
7	20	Disposal of the Hydrotest Water (Offshore)	Environment	FEED will specify the information to incorporate in the EIA report.	3	Moderate	C	Moderate	*High*	The same approved procedure of previous project will be adopted.	High	Avoid / eliminate	3	Moderate	D	Unlikely	*Moderate*
8	38	Disposal of the Hydrotest Water (Onshore)	Environment	FEED will specify the information to incorporate in the EIA report.	2	Minor	D	Unlikely	*Low*	Fresh water will be used for the Hydrostatic Test.	High	Avoid / eliminate	2	Minor	D	Unlikely	*Low*
9	42	Emission (pipeline only) impact to the environment	Environment	FEED will specify the emission rate.	1	Insignificant	D	Unlikely	*Low*	Design specification will specify the permissible emission rate.	High	Avoid / eliminate	1	Insignificant	D	Unlikely	*Low*
10	5	Completion of the pipeline coating (FBE) in time for the installation	Procurement/Contractors/Suppliers	None	4	Major	C	Moderate	*Extreme*	PMT will appoint a full time inspector plus a third party independent agency (DNV).	Moderate	Reduce likelihood	4	Major	D	Unlikely	*High*
11	6	Quality of the coating (FBE) contractor	Procurement/Contractors/Suppliers	None	4	Major	C	Moderate	*Extreme*	PMT will appoint a full time inspector plus a third party independent agency (DNV).	Moderate	Accept	4	Major	D	Unlikely	*High*
12	14	Escalation over the duration of the project	Procurement/Contractors/Suppliers	10% contingency	3	Moderate	B	Likely	*High*	The Lump Sum EPC contract will be used. (Risk is transferred to EPC contractor).	High	Avoid / eliminate	3	Moderate	D	Unlikely	*Moderate*
13	29	Escalation (outside EPC's SOW) over the duration of the project. e.g. Land Acquisition, etc.	Procurement/Contractors/Suppliers	10% contingency	2	Minor	A	Almost Certain	*High*	High level support from Sr. Management Level.	Moderate	Reduce likelihood	2	Minor	B	Likely	*High*
14	21	Experience level of available suppliers / vendors	Procurement/Contractors/Suppliers	FEED will define the approved vendor list.	3	Moderate	C	Moderate	*High*	The vendor list shall be continueously reviewed by PMT during the course of the project.	Low / None	Transfer / share	3	Moderate	C	Moderate	*High*
15	15	Estimated cost supplied by the vendor during FEED (accuracy)	Procurement/Contractors/Suppliers	To address in the cost estimate contingency	3	Moderate	B	Likely	*High*	Limit pricing to the approved vendor list.	Moderate	Reduce likelihood	3	Moderate	C	Moderate	*High*
16	22	Sub-Contractor, and Supplier Financial Stability	Procurement/Contractors/Suppliers	Prequalification Procedure	3	Moderate	C	Moderate	*High*	PMT will reserve the right to review any selection. Primary risk will transfer to the EPC Contractor.	High	Reduce likelihood	3	Moderate	D	Unlikely	*Moderate*
17	30	Delay of Payment of Owner to EPC Contractor	Procurement/Contractors/Suppliers	None	3	Moderate	D	Unlikely	*Moderate*	Payment will be linked to the Project Milestone.	High	Accept	3	Moderate	E	Rare	*Moderate*
18	23	Delay of Payment of EPC Contractor to subcontractors	Procurement/Contractors/Suppliers	None	3	Moderate	C	Moderate	*High*	PMT authorize to make a direct payment to subcontractor if agreed by EPC Contractor.	High	Accept	2	Minor	C	Moderate	*Moderate*
19	16	Approval time for order (LLI) placement	Procurement/Contractors/Suppliers	None	3	Moderate	B	Likely	*High*	The procurement schedule should include the period required by PMT for approval. The procurement procedure shall be developped at the beginning of the project.	Moderate	Accept	3	Moderate	C	Moderate	*High*
20	4	Interface between all stake holders	Project Management	None	4	Major	B	Likely	*Extreme*	The steering committee will be partipated by stakeholder's representative.	High	Avoid / eliminate	3	Moderate	C	Moderate	*High*
21	7	Interface between lower tier stakeholder (e.g. EPC, subcontractor, vendor, etc.)	Project Management	None	4	Major	C	Moderate	*Extreme*	Progress meeting and reporting.	Moderate	Reduce likelihood and consequence	3	Moderate	D	Unlikely	*Moderate*
22	8	GSA approval (Time)	Project Management	None	4	Major	C	Moderate	*Extreme*	None	Low / None	Accept	4	Major	C	Moderate	*Extreme*

Risk Register and Action Plan

Column Key:

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Number	Rank	Risk Description (Event and Consequence)	Category	Existing Controls	Risk Severity Before Treatment					Risk Treatment Plan	Ability to Influence	Action Plan Type	Risk Severity After Treatment				
						Consequence		Likelihood	Risk Level Before Treatment					Consequence		Likelihood	Risk Level After Treatment
23	9	Potential subcontracting of Detailed engineering (e.g. poor engineering, etc.)	Engineering	None	4	Major	C	Moderate	Extreme	Review and Approval by PMT of both selection of detailed designer and approval of designed documents.	High	Reduce likelihood	3	Moderate	D	Unlikely	Moderate
24	10	Potential changes to the FEED design basis due to changes of upstream design.	Engineering	Agreed battery limit conditions.	4	Major	C	Moderate	Extreme	Schedule will be revised to allow upstream FEED to be completed.	High	Reduce likelihood and consequence	3	Moderate	D	Unlikely	Moderate
25	39	Delay of pipeline installation by UXO survey.	Construction	PMT will complete the UXO survey before the installation.	2	Minor	D	Unlikely	Low	PMT will include the UXO survey into the Master Schedule for keeping monitoring.	Moderate	Reduce likelihood	2	Minor	E	Rare	Low
26	40	Platform location has not been confirmed by CVX.	Construction	None. Coordinate of CPP are assumed.	2	Minor	D	Unlikely	Low	CVX FEED will be completed prior to EPC's contract awarded.	High	Accept	2	Minor	D	Unlikely	Low
27	31	Delay of offshore pipeline by the development of CPP by CVX.	Construction	None	3	Moderate	D	Unlikely	Moderate	CVX FEED will be completed prior to EPC's contract awarded.	High	Accept	3	Moderate	D	Unlikely	Moderate
28	12	Failure of Hydrostatic Test of Offshore Pipeline caused by workmanship	Construction	100 % NDT (e.g. UT, RT, etc.)	4	Major	E	Rare	High	WQS and PQR will be approved. WQT will confirm the workmanship.	Moderate	Accept	4	Major	E	Rare	High
29	13	Failure of Hydrostatic Test of Offshore Pipeline caused by pipeline defect	Construction	Reputable mill, quality control procedure shall be approved by PMT.	4	Major	E	Rare	High	EPC contractor to verify FEED (e.g. buckling or lay stress analysis).	Moderate	Accept	4	Major	E	Rare	High
30	41	Delay of Offshore pipeline installation caused by natural causes e.g. storm, etc.	Construction	Contingency of both cost and schedule will be allowed.	2	Minor	D	Unlikely	Low	None	Low / None	Accept	2	Minor	D	Unlikely	Low
31	24	Risk of damage of the pipeline caused by method of installation at shore approaching area and shore crossing point to LFS	Construction	EPC responsible to propose the acceptable installation method.	3	Moderate	C	Moderate	High	Review of installation method by PMT and third party.	Moderate	Reduce likelihood	3	Moderate	D	Unlikely	Moderate
32	25	Risk of slipage damage between concrete coating and corrosion coating during pulling the pipeline at the shore approaching area.	Construction	EPC responsible to propose the acceptable installation method.	3	Moderate	C	Moderate	High	The acceptable method of installation to control the tension caused during pipeline laying. Tension testing of adhesion bonded of the concrete coating to corrosion coating shall be done.	Moderate	Reduce likelihood	3	Moderate	D	Unlikely	Moderate
33	33	Failure of Hydrostatic Test of Onshore Pipeline caused by workmanship	Construction	100 % NDT (e.g. UT, RT, etc.)	3	Moderate	E	Rare	Moderate	WQS and PQR will be approved. WQT will confirm the workmanship.	Moderate	Reduce likelihood	3	Moderate	E	Rare	Moderate
34	34	Failure of Hydrostatic Test of Onshore Pipeline caused by pipeline defect	Construction	Reputable mill, quality control procedure shall be approved by PMT.	3	Moderate	E	Rare	Moderate	Adequate number of inspection team.	High	Reduce likelihood	3	Moderate	D	Unlikely	Moderate
35	26	The seasonal weather may impact the construction schedule during extreme dry or wet season.	Environment	None	3	Moderate	C	Moderate	High	To be addressed by EPC contract when planning work crew allocation.	Low / None	Accept	3	Moderate	C	Moderate	High
36	35	The risk of having limited HDD machines for crossing that could not be done by other method.	Construction	Selection of the Contractor. The confirmation of equipment availability shall be made.	2	Minor	C	Moderate	Moderate	EPC Contractor should propose mitigation.	Low / None	Accept	2	Minor	C	Moderate	Moderate
37	32	Risk of HDD unsuccessfully pulling the pipeline.	Construction	The experienced sub-contractor shall be selected.	3	Moderate	D	Unlikely	Moderate	EPC Contractor should propose mitigation.	Low / None	Accept	3	Moderate	D	Unlikely	Moderate
38	17	Inadequate of material handling capability	Construction	None	3	Moderate	B	Likely	High	EPC Contractor shall have approved plan for logistic, storage, transportation, etc. Appointing experienced logistic coordinator should be considered.	Low / None	Accept	3	Moderate	B	Likely	High
39	27	Gas availability for commissioning	Commissioning	None	3	Moderate	C	Moderate	High	Interface with CVX to be managed throught the project life cycle. The contract provision should be made for delay also contingency plan for mothballing, etc.	Moderate	Accept	3	Moderate	C	Moderate	High

Risk Register and Action Plan

Column Key:

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Number	Rank	Risk Description (Event and Consequence)	Category	Existing Controls	Risk Severity Before Treatment					Risk Treatment Plan	Ability to Influence	Action Plan Type	Risk Severity After Treatment				
						Consequence		Likelihood	Risk Level Before Treatment					Consequence		Likelihood	Risk Level After Treatment
40	18	EPC contractor management of subcontractors and vendors	Project Management	None	3	Moderate	B	Likely	*High*	Experienced contractor project management personel (specifically sub-contract and procurement)	Moderate	Accept	3	Moderate	B	Likely	*High*
41	19	Relations with local community leading to possible delay of project	Community	Coordination with local authority for community relation.	3	Moderate	B	Likely	*High*	Security provision will be provided.	Low / None	Accept	3	Moderate	B	Likely	*High*
42	28	Limited experience of EPC Contractor.	Project Management	None	3	Moderate	C	Moderate	*High*	PMT will review and approve Key personels and capability.	Moderate	Accept	3	Moderate	C	Moderate	*High*
		Delay of Access to construction site due to land compensation/acquisition	Government / Regulatory	None	3	Moderate	C	Moderate	*High*	PMT will laison with local authority.	Low / None	Accept	3	Moderate	C	Moderate	*High*

Appendix 2 - Risk Map

Risk Map
Before Treatment

Likelihood			Consequence: Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
	A	Almost Certain		13			
	B	Likely			12 15 19 38 40 41	20	
	C	Moderate		36	7 14 16 18 31 32 35 39 42	10 11 21 22 23 24	
	D	Unlikely	9	5 6 8 25 26 30	17 27 37		2 3 4
	E	Rare			33 34	28 29	1

Risk Map
After Treatment

Likelihood			Consequence: Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
	A	Almost Certain					
	B	Likely		13	38 40 41		
	C	Moderate		6 18 36	14 15 19 20 33 35 39 42	22	
	D	Unlikely	9	5 8 26 30	7 12 16 21 23 24 27 31 32 34 37	10 11	
	E	Rare		25	17	28 29	1 2 3 4