प्रदूषण नियंत्रण समिति
Pollution Control Committee
संघ प्रदेश प्रशासन दादरा एवं नगर हवेली एवं दमन एवं दीव
U. T. Administration of Dadra and Nagar Haveli and Daman and Diu
प्रथम तल, उद्योग भवन, भेंसलोर, नानी दमन, दमन - ३९६२१०
1st Floor, Udyog Bhavan, Bhenslore, Nani Daman, Daman-396210
Ph.: 0260 - 2262524 / 2260975, e-mail – pcc-dnhdd@ddd.gov.in

No. PCC/DNH/GGL/PH/2025-26/65 Date:13 /06/2025

PUBLIC HEARING NOTICE

M/s. Gujarat Gas Ltd., Govt. Of Gujarat Undertaking, (formerly known as GSPC Distribution Networks Ltd.) with its corporate office at **Ground floor, Office No. 4 & 5, IT Tower-2, Infocity, Gandhinagar-382009, Gujarat, India** has proposed for the project of Environmental Clearance for laying of Natural Gas Distribution pipeline network for supply of Natural Gas through pipeline to the industrial, commercial and residential areas in **Union Territory Dadara Nagar Haveli** covering **Length 40.495Km** having 6"/8" Diameter for steel & 125mm Diameter for PE (polyethylene) with associated facilities. The project has to obtain Environment Clearance from the Ministry of Environment Forests and Climate Change as per the EIA notification No. S.O. 1533 dated 14th September, 2006 (as amendment) and therefore it is required to go through **Environmental Public hearing**.

As per MOEF proposal no.: **IA/DN/IND2/500703/2024**, MOEF TOR issued vide No. **IA-J-11011/419/2024-IA-II (I) dated 19/12/2024** and the request of the project Proponent the Environmental Public hearing shall be conducted by the Committee on **17/07/2025.** The details of the project are as follows;

Name of the Company and Address	M/s. Gujarat Gas Ltd., Govt. Of Gujarat Undertaking, (formerly known as GSPC Distribution Networks Ltd.) **Corporate office:** Gujarat Gas Limited, office No. 4 & 5, Ground Floor, IT Tower-2, Infocity, Gandhinagar 382009, Gujarat, India. **Registered office:** Gujarat Gas CNG Station, Sector-5/C, Gandhinagar-382006, and Gujarat, India.
Location of the Project	For laying of Natural Gas Distribution pipeline network in **Union Territory Dadara Nagar Haveli** covering **Length 40.495Km** having 6"/8" Diameter for steel & 125mm Diameter for PE (polyethylene)with associated facilities which includes i.e. 1. **Kharadpada**(20°15'2.69"N,72°58'0.70"E) **to Jhaveri Flexo** (20°12'42.16"N,72°58'16.00"E) **Connectivity** - *Length 4.515km & 125mm Dia. PE(along the existing road RoW)* 2. **Vasona Char Rastha** (20°12'28.89"N, 73° 1'30.01"E) **to Khanvel HP Petroleum**(20° 8'11.43"N, 73° 3'45.75"E) **Khanvel Connectivity (HP RO)**- *Length 15.125Km & 8" Dia. Steel (along the existing road RoW)* 3. **Sili Fatak** (20°17'13.16"N, 73° 1'34.12"E) **to Randhe Road**(20°17'48.62"N,73° 5'52.35"E) **Umarkui Connectivity** *-Length 8.525Km & 6" Steel/125mm Dia. PE (along the existing road RoW)* 4. **IMP Power Sayli** (20°17'21.90"N, 73° 4'52.24"E) & **Siddhant Ispat Connectivity Project**-*Length 7.200Km & 6" Steel/125mm Dia. PE(along the existing road RoW)* 5. **Jackson Industry** (20°16'4.53"N,73°4'26.07"E)**to Athola**(20°16'23.21"N,73°3'11.52"E) **Connectivity**

	Project-*Length 2.480Km & 125mm Dia. PE(along the existing road RoW)* 6. **Dabur Industry Connectivity**(Takeoff- 20°15'2.27"N, 73° 1'58.45"E **to Terminal Point-** 20°14'5.40"N , 73° 3'3.04"E)- *Length 2.650Km & 125mm Dia. PE(along the existing road RoW)*
Cost of the Project	**13 Corers**
Details of the Activity applied for	6(a) Oil and gas transportation pipe line (crude and refinery/petrochemical) for Natural Gas Distribution pipeline network in **Union Territory Dadara Nagar Haveli** covering **Length 40.495Km** having **6"/8" Diameter for steel** & **125mm Diameter for PE (polyethylene)** with associated facilities
Pollution Control measures	As per the Water Act 1974, Air Act 1981, the Solid Waste Management Rules 2016, the Hazardous Waste Management Rules 2016, and the Noise monitoring etc.
Date and time of Venue of Public Hearing.	**Date 17/07/2025 at 11.00 AM at Kalakendra building Silvassa**

All plausible stake holder of the project are requested to remain present in the public hearing or send their response in writing to Member Secretary, POLLUTION CONTROL COMMITTEE, DNH & DD, Daman. Other interested persons can submit their responses to Member Secretary, Pollution Control Committee, DNH & DD, Daman in writing before the hearing date. Places of availability of Project documents, viz. Executive summary of the EIA report & EIA report as per EIA notification which is kept open to public at the following offices are:

1. The District Magistrate/Collector, Collectorate, Silvassa UT of DNH.
2. The RDC, Khanvel, Silvassa.
3. The Chief Executive Officer, District Panchayat, Silvassa.
4. The Chief Officer, Silvassa Municipal Council, Silvassa.
5. The C.E.O., Smart City Mission, Silvassa.
6. The Member Secretary, Planning and Development Athourity, Silvassa.
7. The Mamlatdar, Silvassa.
8. The Mamlatdar, Khanvel, Silvassa.
9. The General Manager, District Industries Centre, Udyog Bhavan, Nani Daman.
10. The Chairman, PCC, UT of DNH & DD.
11. The Sarpanch, Dapada Panchayat Office, Silvassa.
12. The Sarpanch, Surangi Panchayat office, Silvassa.
13. The Sarpanch, Amboli Panchayat Office, Silvassa.
14. The Sarpanch, Khanvel Panchayat office, Silvassa.
15. The Sarpanch, Kharadpada Panchayat Office, Silvassa.
16. The Sarpanch, Kilwani Panchayat Office, Silvassa.
17. The Sarpanch, Galonda Panchayat Office, Silvassa.
18. The Sarpanch, Sayali Panchayat Office, Silvassa.
19. Regional Office, Ministry of Environment, Forest and Climate Change, A Wing,
20. Room No 407 & 409, Aranya Bhawan, Near CH 3 Circle, Sector 10A, Gandhinagar – 382010.
21. I.A. Division, Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jor Bagh, New Delhi – 110003.

Place: Daman

Dated: 13/06/2025

(S Asker Ali)
Member Secretary
Pollution Control Committee
DNH & DD

Copy to: -

1. **The Chairman, Pollution Control Committee, U.T. of DNH & DD for kind information.**
2. **The District Magistrate Dadra & Nagar Haveli with a request to make it convenient to attend the Public Hearing on the mentioned date, time and Venue please.**
3. **The Member Secretary Dadra & Nagar Haveli, Planning and Development Authority, Silvassa**
4. **The Director of Information Technology, I.T. Department, Daman, with a request to upload the same on the website of UT administration DNH & DD.**

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જાહેર સુનાવણીની નોટિસ

મેસર્સ ગુજરાત ગેસ લિમિટેડ,ગુજરાત સરકારના ઉપક્રમની કંપની હોઈ (જે અગાઉ જીએસપીસી ડિસ્ટ્રિબ્યુશન નેટવર્ક લિમિટેડ તરીકે ઓળખાતી હતી), જેનું કોર્પોરેટ કાર્યાલય ગ્રાઉન્ડ ફ્લોર, ઓફિસ નંબર ૪ અને ૫, આઇટી ટાવર, ઇન્ફોસિટી, ગાંધીનગર ૩૮૨૦૦૯, ગુજરાત, ભારત છે જેઓ દ્વારા કેન્દ્રશાસિત પ્રદેશ દાદરા અને નગર હવેલી તેમજ તેની આસપાસનાં વિવિધ ઔદ્યોગિક, વ્યાપારી અને રહેણાક વિસ્તારોમાં પાઇપલાઇન દ્વારા નેચરલ ગેસ પૂરો પાડવા ૪૦.૪૯૫કિમી લાંબી અને ૬ ૮" વ્યાસવાળી સ્ટીલ પાઇપલાઇન અને ૧૨૫મીમી વ્યાસવાળી પીઈ (પોલીઈથીલીન) પાઇપલાઇન અને સંલગ્ન સુવિધાઓ સ્થાપિત કરવાની યોજના છે. આ યોજનાને પર્યાવરણ, વન અને હવામાન પરિવર્તન મંત્રાલય તરફથી પર્યાવરણીય મંજૂરી મેળવવાની રહેશે. જે મુજબ ઈ. આઇ. એ. ના સૂચના નંબર એસ .ઓ.૧૫૩૩ તારીખ ૧૪ સપ્ટેમ્બર,૨૦૦૬ (સુધારા પ્રમાણે) પર્યાવરણીય લોક સુનાવણીમાંથી પસાર થવું જરૂરી છે.

આ પરિયોજનાને એમઓઇએફ દરખાસ્ત ક્રમાંક :**IA/DN/IND2/500703/2024** મુજબ ટીઓઆર **IA-J-11011/419/2024-IA-II(I), તા.૧૯.૧૨.૨૦૨૪** થી મળેલ છે અને પરિયોજનાના પ્રસ્તાવક દ્વારા **તા ૧૭/૦૭/૨૦૨૫** ના રોજ પર્યાવરણીય લોક સુનાવણી રાખવામા આવેલ છે .પરિયોજનાની માહિતી નીચે દર્શાવિલ છે .

કંપનીનું નામ અને સરનામું	મેસર્સ ગુજરાત ગેસ લિમિટેડ,ગુજરાત સરકારના ઉપક્રમે (જે અગાઉ જીએસપીસી ડિસ્ટ્રિબ્યુશન નેટવર્ક લિમિટેડ તરીકે ઓળખાતી હતી), **કોર્પોરેટ કાર્યાલય:** ગુજરાત ગેસ લિમિટેડ, ઓફિસ નં. 4 અને 5, ગ્રાઉન્ડ ફ્લોર, આઇટી ટાવર-2, ઇન્ફોસિટી, ગાંધીનગર 382009, ગુજરાત, ભારત. **રજીસ્ટર કાર્યાલય:** ગુજરાત ગેસ સીએનજી સ્ટેશન, સેક્ટર-5/સી, ગાંધીનગર-382006, ગુજરાત, ભારત.
પરિયોજનનું સ્થળ	કેન્દ્ર શાસિત પ્રદેશ દાદરા અને નગર હવેલીમાં હાલના રોડના ઉપયોગ કરવાની જગ્યામાં કામ કરવાના અધિકાર હેઠળ નેચરલ ગેસ ડિસ્ટ્રિબ્યૂશન પાઇપલાઇન નાખવી જેમાં **૧. ખારપાડા થી ઝવેરી ફ્લેકસો- ઝવેરી ફ્લેકસો કનેક્ટિવિટી** -લંબાઇ ૪.૫૧૫કિમી અને ૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન **(હયાત રોડની જગ્યામાં રોડને સમાંતર)** **૨. વાસોના ચાર રસ્તા થી ખાનવેલ HP પેટ્રોલિયમ – ખાનવેલ કનેક્ટિવિટી** -લંબાઇ ૧૫.૧૨૫કિમી અને ૮ ઇંચ વ્યાસ ધરાવતી સ્ટીલ પાઇપલાઇન**(હયાત રોડની જગ્યામાં રોડને સમાંતર)** **૩. સીલી ફાટક થી રાંધે રોડ-ઉમરકોઇ કનેટિવિટી** -લંબાઇ ૮.૫૨૫કિમી અને ૬ ઇંચ વ્યાસ ધરાવતી સ્ટીલ /૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન **(હયાત રોડની જગ્યામાં રોડને સમાંતર)** **૪. IMP પાવર સાયલી થી સિદ્ધાંત ઇસ્પાત કનેક્ટિવિટી** -લંબાઇ ૭.૨કિમી અને ૬ ઇંચ વ્યાસ ધરાવતી સ્ટીલ /૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન **(હયાત રોડની જગ્યામાં રોડને સમાંતર)** **૫. જેક્સન ઇંડસ્ટ્રી થી અથોલા કનેક્ટિવિટી** -લંબાઇ ૨.૪૮૦કિમી અને ૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન **(હયાત રોડની જગ્યામાં રોડને સમાંતર)** **૬. ડાબર ઇંડસ્ટ્રી કનેક્ટિવિટી** -લંબાઇ ૨.૬૫૦કિમી અને ૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન **(હયાત રોડની જગ્યામાં રોડને સમાંતર)** કુલ લંબાઇ ૪૦.૪૯૫કિમી

પરિયોજનનો ખર્ચ	રૂ. ૧૩ કરોડ
અરજી કરેલ પ્રવૃત્તિની વિગતો	૬(એ) ઓઇલ અને ગેસ પરિવહન પાઇપલાઇન(ક્રૂડ અને રિફાઈનરી/પેટ્રોકેમિકલ) કેન્દ્રશાસિત પ્રદેશ દાદરા અને નગર હવેલી (ડી. એન. એચ.)માં તેમજ તેની આસપાસનાં વિવિધ ઔદ્યોગિક, વ્યાપારી અને રહેણાક વિસ્તારોમાં પાઇપલાઇન દ્વારા નેચરલ ગેસ સપ્લાય કરવા માટે ગુજરાત ગેસ લિમિટેડ દ્વારા ૪૦.૪૯૫ કિમી લાંબી અને ૬"/૮" વ્યાસવાળી સ્ટીલ અને ૧૨૫મીમી વ્યાસવાળી પીઈ (પોલિઇથિલિન) પાઇપલાઇન અને સંલગ્ન સુવિધાઓ
લોક સુનાવણીની તારીખ, સમય અને સ્થળ	**તારીખ : ૧૭/૦૭/૨૦૨૫, સમય: સવારે ૧૧.૦૦ વાગ્યે, સ્થળ: કલાકેન્દ્ર બિલ્ડીંગ સિલવાસા**

પરિયોજનાના તમામ વ્યાજબી હિસ્સેદારને લોક સુનાવણીમાં હજાર રેહવા વિનંતી કરવામાં આવે છે અથવા તેમનો પ્રતિભાવ લેખિતમાં સચિવશ્રી, પ્રદૂષણ નિયંત્રણ કમિટી દાદરા નગર હવેલી, દમણ અને દીવ , દમણ ખાતે મોકલવા વિનંતી કરવામાં આવે છે.

અન્ય રસ ધરાવતા લોકોએ તેમનો પ્રતિસાદ સભ્ય સચિવ, પ્રદૂષણ નિયંત્રણ કમિટી,દાદરા નગર હવેલી દમણ અને દીવ , દમણ ને લોક સુનાવણીની તારીખ પહેલા લેખિતમાં રજૂ કરી શકે છે.

પરિયોજનાના દસ્તાવેજોની ઉપલબ્ધતાની જગ્યાઓ જેવા કે પર્યાવરણ અસર મૂલ્યાંકન અહેવાલનો કાર્યકારી સારાંશ અને વિગતવાર પર્યાવરણ અસર મૂલ્યાંકન અહેવાલ જાહેર જનતા માટે નીચેની કચેરીયોમાં ઉપલબ્ધ રાખવામાં આવ્યો છે.

1. કલેક્ટર/જિલ્લા મેજિસ્ટ્રેટ, કલેક્ટર કચેરી, સિલવાસા યુટી ડીએનએચ.
2. આરડીસી, રેસિડેન્શિયલ સબ કલેક્ટર ઓફિસ, ખાનવેલ, સિલવાસા
3. મુખ્ય કાર્યકારી અધિકારી, જિલ્લા પંચાયત, સિલવાસા.
4. મુખ્ય અધિકારી, સિલવાસા મ્યુનિસિપલ કાઉન્સિલ, સિલવાસા
5. સીઇઓ, સ્માર્ટ સિટી મિશન, સિલ્વાસા
6. સભ્ય સચિવ, આયોજન અને વિકાસ સત્તામંડળ, સિલવાસા.
7. મામલતદાર, મામલતદારની કચેરી, સિલવાસા
8. મામલતદાર, ખાનવેલ, સિલવાસા.
9. જનરલ મેનેજર, જીલ્લા ઉદ્યોગ કેન્દ્ર, ઉદ્યોગ ભવન, નાની દમણ
10. અધ્યક્ષ, પ્રદૂષણ નિયંત્રણ સમિતિ, યુટી ડીએનએચ એન્ડ ડીડી
11. સરપંચ, દાપડા પંચાયત કચેરી, સિલવાસા
12. સરપંચ, સુરંગી પંચાયત કચેરી, સિલવાસા
13. સરપંચ, આંબોલી પંચાયત કચેરી, સિલવાસા
14. સરપંચ, ખાનવેલ પંચાયત ઓફિસ, સિલ્વાસા.
15. સરપંચ, ખરડાપાડા પંચાયત કચેરી, સિલવાસા
16. સરપંચ, કિલવણી પંચાયત કચેરી, સિલવાસા
17. સરપંચ, ગાલોંડા પંચાયત કચેરી, સિલવાસા
18. સરપંચ, સયાલી પંચાયત કચેરી, સિલવાસા
19. પ્રાદેશિક કાર્યાલય, પર્યાવરણ, વન અને આબોહવા પરિવર્તન મંત્રાલય, એ વિંગ, રૂમ નંબર 407 અને 409, અરણ્ય ભવન, CH 3 સર્કલ પાસે, સેક્ટર 10A, ગાંધીનગર – 382010
20. I.A. વિભાગ, પર્યાવરણ, વન અને આબોહવા પરિવર્તન મંત્રાલય, ઇન્દિરા પર્યાવરણ ભવન, જોર બાગ, નવી દિલ્હી – ૧૧૦૦૦૩

સ્થળ :દમણ
તારીખ : 13/06/2025

(એસ. અસ્કર અલી)
સભ્ય સચિવશ્રી
પ્રદૂષણ નિયંત્રણ સમિતી,
દાદરા અને નગર હવેલી અને દમણ અને દીવ

નકલ રવાના:

૧. અધ્યક્ષ, પ્રદૂષણ નિયંત્રણ સમિતિ, યુ.ટી., ડીએનએચ અને ડીડી, કૃપા કરીને માહિતી માટે.

૨. જિલ્લા મેજિસ્ટ્રેટ દાદરા અને નગર હવેલી, ઉલ્લેખિત તારીખ, સમય અને સ્થળ પર જાહેર સુનાવણીમાં હાજરી

આપવા માટે કૃપા કરીને અનુકૂળ બનાવવા વિનંતી.

૩. સભ્ય સચિવ દાદરા અને નગર હવેલી, આયોજન અને વિકાસ સત્તામંડળ, સિલવાસા

૪. માહિતી ટેકનોલોજી નિયામક, આઇ.ટી. વિભાગ, દમણ, યુટી વહીવટીતંત્ર ડીએનએચ અને ડીડીની વેબસાઇટ પર તે અપલોડ કરવા વિનંતી.

प्रदूषण नियंत्रण समिति
Pollution Control Committee
संघ प्रदेश प्रशासन दादरा एवं नगर हवेली एवं दमन एवं दीव
U. T. Administration of Dadra and Nagar Haveli and Daman and Diu
प्रथम तल, उद्योग भवन, भेंसलोर, नानी दमन, दमन - ३९६२१०
1st Floor, Udyog Bhavan, Bhenslore, Nani Daman, Daman-396210
Ph.: 0260 - 2262524 / 2260975, e-mail – pcc-dnhdd@ddd.gov.in

No. PCC/DNH/GGL/PH/2025-26/65 Date: 13/06/2025

जन सुनवाई की सूचना

मेसर्स गुजरात गैस लिमिटेड, गुजरात सरकार का उपक्रम, (जिसे पहले जीएसपीसी डिस्ट्रीब्यूशन नेटवर्क लिमिटेड के नाम से जाना जाता था) जिसका कॉर्पोरेट कार्यालय ग्राउंड फ्लोर, ऑफिस नंबर 4 और 5, आईटी टॉवर-2, इन्फोसिटी, गांधीनगर-382009, गुजरात, भारत में है, उनके द्वारा केंद्र शासित प्रदेश दादरा नगर हवेली मे औधोगिक, वाणिज्यिक और आवासीय क्षेत्रोमे पाइपलाइन के माध्यम से नेचरल गेस की आपूर्ति के लिए नेचरल गैस वितरण पाइपलाइन नेटवर्क बिछाने के लिए परियोजना का प्रस्ताव दिया है, जिसकी लंबाई 40.495 किमी है, जिसमें स्टील पाइपलाइन की 6"/8" व्यास वाली और पीई (पॉलीइथिलीन)125 मिमी व्यास वाली पाइपलाइन और संबन्धित सुविधाएं सामील हैं। परियोजना को पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय से ईआईए अधिसूचना संख्या एस.ओ. 1533 दिनांक 14 सितम्बर, 2006 (संशोधित) के अनुसार पर्यावरण मंजूरी प्राप्त करनी है, इसलिए इसे पर्यावरणीय जन सुनवाई से गुजरना आवश्यक है।

पर्यावरण मंत्रालय के प्रस्ताव संख्या: IA/DN/IND2/500703/2024 के अनुसार, पर्यावरण मंत्रालय के TOR द्वारा जारी संख्या IA-J-11011/419/2024-IA-II(I) दिनांक 19/12/2024 और परियोजना प्रस्तावक के अनुरोध पर समिति द्वारा पर्यावरण जन सुनवाई **दिनांक १७/०७/२०२५** को आयोजित की जाएगी। परियोजना का विवरण इस प्रकार है;

कंपनी का नाम और पता	मेसर्स गुजरात गैस लिमिटेड, गुजरात सरकार उपक्रम, (पूर्व में जीएसपीसी डिस्ट्रीब्यूशन नेटवर्क लिमिटेड के नाम से जाना जाता था) **कॉर्पोरेट कार्यालय:** गुजरात गैस लिमिटेड, कार्यालय संख्या 4 और 5, ग्राउंड फ्लोर, आईटी टॉवर-2, इन्फोसिटी, गांधीनगर 382009, गुजरात, भारत। **पंजीकृत कार्यालय:** गुजरात गैस सीएनजी स्टेशन, सेक्टर-5/सी, गांधीनगर-382006, और गुजरात, भारत।
परियोजना का स्थान	केंद्र शासित प्रदेश दादरा नगर हवेली मे औधोगिक, वाणिज्यिक और आवासीय क्षेत्रोमे पाइपलाइन के माध्यम से नेचरल गेस की आपूर्ति के लिए नेचरल गैस वितरण पाइपलाइन नेटवर्क बिछाने के लिए परियोजना का प्रस्ताव दिया है, जिसकी लंबाई 40.495 किमी है, जिसमें स्टील पाइपलाइन की 6"/8" व्यास वाली और पीई (पॉलीइथिलीन)125 मिमी व्यास वाली पाइपलाइन और संबन्धित सुविधाएं जिसमें: 1. **खरादपाड़ा** (20°15'2.69"N,72°58'0.70"E) **से झवेरी फ्लेक्सो** (20°12'42.16"N,72°58'16.00"E) **कनेक्टिविटी** - लंबाई 4.515 किमी और 125 मिमी व्यास(पीई) **(मौजूदा सड़क आरओडब्ल्यू के साथ)** 2. **वासोना चार रास्ता** (20°12'28.89"N, 73° 1'30.01"E) **से खानवेल एचपी पेट्रोलियम** (20° 8'11.43"N, 73° 3'45.75"E) **खानवेल कनेक्टिविटी (एचपी आरओ)** - लंबाई 15.125 किमी और 8" व्यास(स्टील) **(मौजूदा सड़क आरओडब्ल्यू के साथ)** 3. **सिली फाटक** (20°17'13.16"N, 73° 1'34.12"E) **से रांधे रोड** (20°17'48.62"N, 73° 5'52.35"E) **उमरकुई कनेक्टिविटी** - लंबाई 8.525 किमी और 6" स्टील/125 मिमी व्यास (पीई) **(मौजूदा सड़क आरओडब्ल्यू के साथ)** 4. **आईएमपी पावर सायली** (20°17'21.90"N, 73° 4'52.24"E) **और सिद्धांत इस्पात कनेक्टिविटी परियोजना**- लंबाई 7.200 किमी और 6" स्टील/125 मिमी व्यास (पीई) **(मौजूदा सड़क आरओडब्ल्यू के साथ)** 5. **जैक्सन इंडस्ट्री** (20°16'4.53"एन, 73°4'26.07"ई) **से एथोला** (20°16'23.21"एन, 73°3'11.52"ई) **कनेक्टिविटी प्रोजेक्ट**-लंबाई 2.480 किमी और 125 मिमी व्यास (पीई) **(मौजूदा सड़क आरओडब्ल्यू के साथ)** 6. **डाबर इंडस्ट्री कनेक्टिविटी** (टेकऑफ़- 20°15'2.27"एन, 73° 1'58.45"ई से टर्मिनल पॉइंट- 20°14'5.40"एन, 73° 3'3.04"ई)- लंबाई 2.650 किमी और 125 मिमी व्यास (पीई) **(मौजूदा सड़क आरओडब्ल्यू के साथ)**
परियोजना की लागत	**१३ करोड़**

प्रस्तावित गतिविधि	6(a) पाइपलाइन द्वारा तेल और गैस परिवहन (क्रूड और रिफाइनरी/ पेट्रोकेमिकल) नेचरल गैस वितरण पाइपलाइन नेटवर्क बिछाने के लिए परियोजना का प्रस्ताव दिया है, जिसकी लंबाई 40.495 किमी है, जिसमें स्टील पाइपलाइन की 6"/8" व्यास वाली और पीई (पॉलीइथिलीन)125 मिमी व्यास वाली पाइपलाइन और संबन्धित सुविधाएं सामील हे।
प्रदूषण नियंत्रण उपाय	जल अधिनियम 1974, वायु अधिनियम 1981, ठोस अपशिष्ट प्रबंधन नियम 2016, शोर निगरानी अधिनियम इत्यादि के अनुसार
सार्वजनिक सुनवाई की तिथि, समय और स्थान	**दिनांक १७/०७/२०२५, समय: सुबह ११:००बजे,** **स्थान: कलाकेन्द्र बिल्डिंग सिलवासा**

सभी संभावित हितधारको से अनुरोध किया जाता है की वे जन सुनवाई मे उपस्थित हो या अपने लिखित सुजाव सदस्य सचिव, प्रदूषण समिति, दादरा नगर हवेली और दमन और दीव , दमन को भेजे । अन्य इच्छुक व्यक्ति अपनी लिखित प्रतिकृया जन सुनवाई की दिनांक से पहले सदस्य सचिव , प्रदूषण समिति , दादरा नगर हवेली और दमन और दीव , दमन को भेज सकते है।

पर्यावरण प्रभाव मूल्यांकन अधिसूचना दिनांक १४.०९.२००६ (संशोधित) के अनुसार , परियोजना दस्तावेज़ निम्नलिखित कार्यालयोमे सार्वजनिक रूप से उपलब्ध कराए गए है:

1. कलेक्टर/जिला मजिस्ट्रेट, कलेक्टरेट, सिलवासा यूटी, डीएनएच।
2. आरडीसी, आवासीय उप कलेक्टर कार्यालय, खानवेल, सिलवासा
3. मुख्य कार्यपालन अधिकारी, जिला पंचायत, सिलवासा।
4. मुख्य अधिकारी, सिलवासा नगर परिषद, सिलवासा
5. सी.ई.ओ., स्मार्ट सिटी मिशन, सिलवासा
6. सदस्य सचिव, योजना एवं विकास प्राधिकरण, सिलवासा।
7. मामलातदार, मामलातदार का कार्यालय, सिलवासा
8. मामलतदार, खानवेल, सिलवासा।
9. महाप्रबंधक, जिला उद्योग केंद्र, उद्योग भवन, नानी दमन
10. अध्यक्ष, पीसीसी, यूटी डीएनएच और डीडी
11. सरपंच, दपाड़ा पंचायत कार्यालय, सिलवासा
12. सरपंच, सुरंगी पंचायत कार्यालय, सिलवासा
13. सरपंच, अंबोली पंचायत कार्यालय, सिलवासा
14. सरपंच, खानवेल पंचायत कार्यालय, सिलवासा।
15. सरपंच, खरड़पाड़ा पंचायत कार्यालय, सिलवासा
16. सरपंच, किलावणी पंचायत कार्यालय, सिलवासा
17. सरपंच, गलौंडा पंचायत कार्यालय, सिलवासा
18. सरपंच, सयाली पंचायत कार्यालय, सिलवासा
19. क्षेत्रीय कार्यालय, पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय, ए विंग, कमरा नंबर 407 और 409, अरण्य भवन, सीएच 3 सर्कल के पास, सेक्टर 10 ए, गांधीनगर – 382010
20. आई.ए. प्रभाग, पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय, इंदिरा पर्यावरण भवन, जोर बाग, नई दिल्ली – 110003

(एस. अस्कर अली)
सदस्य सचिव
प्रदूषण नियंत्रण समिति
दादरा एवं नगर हवेली तथा
दमण एवं दीव

नकल रवाना:

1. अध्यक्ष, प्रदूषण नियंत्रण समिति, यू.टी. डीएनएच और डीडी को सूचनार्थ।
2. जिला मजिस्ट्रेट दादरा और नगर हवेली, अनुरोध है कि कृपया उल्लिखित तिथि, समय और स्थान पर जन सुनवाई में उपस्थित होने की सुविधा प्रदान करें।
3. सदस्य सचिव दादरा और नगर हवेली, योजना और विकास प्राधिकरण, सिलवासा
4. सूचना प्रौद्योगिकी निदेशक, आई.टी. विभाग, दमन, अनुरोध है कि इसे यू.टी. प्रशासन डीएनएच और डीडी की वेबसाइट पर अपलोड करें।

Executive Summary

Gujarat Gas Limited (formerly known as GSPC Distribution Networks Limited), is India's largest city gas distribution company, promoted by Government of Gujarat has planned to set up CGD network in Union Territory of Dadara & Nagar Haveli by providing natural gas to every end user for domestic, commercial and industrial use in phased manner for which GGL has received authorization from PNGRB (Petroleum and Natural Gas Regulatory Board), for laying, building, operating and expending City Gas Distribution Network in Union Territory of Dadara & Nagar Haveli Geographical Area. GGL is also in planning to setup CNG stations along the roads at various prime locations to facilitate Compressed Natural Gas (CNG) to en-route vehicles which will support to reduce pollution.

Gujarat Gas Limited is committed to reach out to every possible natural gas user in its expanded geographical area. The size and scale of the combined entity gives it the ability to achieve efficiencies and effectively manage the transformational changes in the sector. This major gain in productivity would benefit all the key stakeholders, i.e. Customers and Shareholders.

To supply Natural Gas (PNG) for various industrial, commercial & residential consumers within and around the Union Territory of Dadara & Nagar Haveli, GGL proposes lay Natural Gas distribution pipeline network including associated facilities in Union Territory Dadara & Nagar Haveli for Total Length 40.495Km having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene) with allied facilities.

As per the latest categorization by CPCB & MoEF & CC, “Oil and Gas transportation pipeline” activity falls under the industrial activity of “Green Category” due to its very marginal environmental impact. However, proposed Natural gas distribution pipeline route aligned parallel to already existing RoW under PWD department which through Dadara & Nagar Haveli Wild life sanctuary and the eco sensitive zone of the same sanctuary for 6.956Km and 7.722km respectively. So, the proposal attracts EIA notification 14 September 2006 MoEF & CC.

As per the EIA Notification 14 September 2006 & amendment therein proposed activity falls under 6(a) Oil & gas transportation pipe line (crude and refinery/ petrochemical products), passing through national parks /sanctuaries/coral reefs /ecologically sensitive areas including LNG Terminal and as per this carry out environmental Impact Assessment and Environmental Management plan is necessary for obtaining Environmental Clearance from MoEF & CC, New Delhi.

In order to assess the current status of the environment and the likely impacts which may be caused due to the proposed activities of the Pipeline Project, and for the same this Environmental Impact Assessment (EIA) study and preparation of Environmental Management Plan (EMP) is presented herewith.

1.1. Location

GGL proposes to lay Natural Gas Distribution pipeline network in Union Territory Dadara Nagar Haveli Covering Length 40.495Km having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene)with allied facilities which includes

1. Kharadpada (20°15'2.69"N,72°58'0.70"E) to Jhaveri Flexo (20°12'42.16"N,72°58'16.00"E) Connectivity- Length 4.515km & 125mm Dia. PE (along the existing road RoW)

2. Vasona Char Rastha (20°12'28.89"N, 73° 1'30.01"E) to Khanvel HP Petroleum(20° 8'11.43"N, 73° 3'45.75"E) Khanvel Connectivity (HP RO)-Length 15.125Km & 8’’ Dia. Steel(along the existing road RoW)

3. Sili Fatak (20°17'13.16"N, 73° 1'34.12"E) to Randhe Road(20°17'48.62"N,73° 5'52.35"E) Umarkui Connectivity-Length 8.525Km & 6” Steel/125mm Dia. PE(along the existing road RoW)

4. IMP Power Sayli (20°17'21.90"N, 73° 4'52.24"E) & Siddhant Ispat Connectivity Project-Length 7.200Km & 6” Steel/125mm Dia. PE (along the existing road RoW)

5. Jackson Industry (20°16'4.53"N,73°4'26.07"E) to Athola (20°16'23.21"N,73°3'11.52"E) Connectivity Project-Length 2.480Km & 125mm Dia. PE (along the existing road RoW)

6. Dabur Industry Connectivity(Takeoff- 20°15'2.27"N, 73° 1'58.45"E to Terminal Point-20°14'5.40"N , 73° 3'3.04"E)- Length 2.650Km & 125mm Dia. PE(along the existing road RoW)

1.2. Project Description

Unlike other liquid i.e. petrol, Diesel and solid fuels that generate lot of pollution on combustion and create lot of issues while handling, natural gas being a fuel does not create any pollution, inside the plant or house, does not litter and does not cause damage in handling of all these points which ensures good condition of house, plant and equipment. In view of environment friendly features of natural gas its uses are recommended in various industries for commercial purposes and in houses for domestic purposes.

Gujarat Gas limited is engaged in distribution of natural gas by PNG (piped natural gas) to its various consumers and customers through city gas distributing (CGD) network.

Gujarat Gas Limited proposed setup PNG network in Union Territory Dadara & Nagar Haveli and part of this GGL proposes to lay, Natural gas distribution pipeline network with associated

facilities having underground valve at every 1.0km for PE pipeline network and 3km for steel pipeline network.

Present report describes about the expected /likely Environmental impacts due to Pipeline section. It will pass through Union Territory Dadara & Nagar Haveli Geographical area.

Compare to other fuel, due to very low/negligible air pollution generating quality of natural gas, the use of the same will be improving the quality of environment. So, Transportation of Natural gas through pipeline is being an environmental friendly activity.

1.3. Project highlight:

M/s. Gujarat Gas Limited proposes to set up Natural Gas (PNG Network) within different cities of Gujarat State and also in Union Territory of Dadara & Nagar Haveli to supply Natural Gas (PNG) for various industrial, commercial & residential consumers within and around city.

M/s. Gujarat Gas Limited proposed to establishment of Natural Gas distribution pipeline network including associated facilities in Union Territory Dadara & Nagar Haveli (DNH) for which GGL has received PNGRB authorization for laying, building, operating or expanding CGD network Dated: 01.04.2015.

GGL proposes to lay Natural Gas distribution pipeline network including associated facilities in Union Territory Dadara & Nagar Haveli for total Length 40.495Km having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene) with allied facilities

Salient features of the proposed pipeline are as given below:

Table 1.1 Salient feature of the project

Name of Project	Establishment of Natural Gas Distribution pipeline network in Union Territory Dadara Nagar Haveli Covering Length 40.495Km having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene) with allied facilities which includes 1. **Kharadpada** (20°15'2.69"N,72°58'0.70"E) **to Jhaveri Flexo** (20°12'42.16"N,72°58'16.00"E) **Connectivity- Length 4.515km & 125mm Dia. PE** (along the existing road RoW) 2. **Vasona Char Rastha** (20°12'28.89"N, 73° 1'30.01"E) **to Khanvel HP Petroleum** (20° 8'11.43"N, 73° 3'45.75"E) **Khanvel Connectivity (HP RO) - Length 15.125Km & 8’’ Dia. Steel** (along the existing road RoW) 3. **Sili Fatak** (20°17'13.16"N, 73° 1'34.12"E) **to Randhe Road**

<table>
<tr><td></td><td colspan="3">(20°17'48.62"N,73° 5'52.35"E) Umarkui Connectivity - Length 8.525Km & 6” Steel/125mm Dia. PE (along the existing road RoW)
4. IMP Power Sayli (20°17'21.90"N, 73° 4'52.24"E) & Siddhant Ispat (20°14'16.43"N, 73° 3'32.48"E) Connectivity Project - Length 7.200Km & 6” Steel/125mm Dia. PE (along the existing road RoW)
5. Jackson Industry (20°16'4.53"N,73°4'26.07"E) to Athola (20°16'23.21"N,73°3'11.52"E) Connectivity Project - Length 2.480Km & 125mm Dia. PE (along the existing road RoW)
6. Dabur Industry Connectivity (Takeoff- 20°15'2.27"N, 73° 1'58.45"E to Terminal Point- 20°14'5.40"N, 73° 3'3.04"E) - Length 2.650Km & 125mm Dia. PE (along the existing road RoW)</td></tr>
<tr><td>Petroleum and Natural Gas Regulatory Authority(PNGRB) Authorization</td><td colspan="3">Natural gas being an ecofriendly & efficient fuel compared to other alternative fuels (i.e. Petrol, Diesel & Wood etc.) for industrial & domestic consumption, PNGRB has contemplated to build a network of Natural Gas distribution network in whole country including major cities and states. As a part of this, GGL was entrusted the job of establishment of Natural Gas distribution network in Union Territory of DNH GA also and hence, GGL has received PNGRB authorization for laying, building, operating or expanding CGD network dated: 01.04.2015 attached as Annexure III in online additional Attachments.</td></tr>
<tr><td>Source of Gas supply</td><td colspan="3">In upstream GGL network of gas supply in Union Territory Dadara & Nagar Haveli Geographical Area and as a downstream domestic and industrial customers Union Territory Dadara & Nagar Haveli Geographical Area</td></tr>
<tr><td>Pipeline Material</td><td colspan="3">Steel Pipeline
✓ Pipe Material: Carbon Steel; Electric Resistance Welded (ERW)
✓ Grade of Steel: X 52 as per API-5L (PSL-2)
Poly Ethylene (PE)
✓ Pipe Material: Poly Ethylene (PE)
✓ Grade of PE: P-100 as per IS -14885</td></tr>
<tr><td></td><td>8” NB(Steel)</td><td>6” NB(Steel)</td><td>125 mm(PE)</td></tr>
<tr><td>Design pressure</td><td>49.0 Barg</td><td>49.0 Barg</td><td>10 Barg</td></tr>
<tr><td>Operating Pressure</td><td>26.0 Barg</td><td>4.0 Barg</td><td>4.0 Barg</td></tr>
<tr><td>Inlet Pressure</td><td>26.0 Barg (maximum)</td><td>4.0 Barg (maximum)</td><td>4.0 Barg(maximum)</td></tr>
<tr><td>Outlet Pressure</td><td>19.0 Barg (minimum)</td><td>1.0 Barg (minimum)</td><td>1.0 Barg (minimum)</td></tr>
<tr><td>Inlet & Outlet Temperature</td><td colspan="3">Between 0ºC to 55ºC</td></tr>
<tr><td>Operating Temperature</td><td colspan="3">Between 15ºC to 45ºC</td></tr>
<tr><td>Schedule of construction and completion</td><td colspan="3">Tentative Timeline
Project Start Date - October-2025 (from the Date of permission issued)
Project Completion Date - March - 2027
(Note: Construction will be started after all requisite permissions</td></tr>
</table>

<table>
<tr><td></td><td>from the boards/authorities.)</td></tr>
<tr><td>Applicable standard and code</td><td>- Petroleum & Natural Gas Regulatory Board (PNGRB) guideline – Technical Standards & Specifications including Safety standards for CGD Network
- American Society of Mechanical Engineers (ASME) B 31.8 – Code for Gas Transmission and Distribution Piping Systems</td></tr>
<tr><td>Labour requirement</td><td>Construction Phase: 40 Nos. (Maxi.)</td></tr>
<tr><td>Water consumption</td><td>Requirement of water will be various activity during construction phase of pipeline is as given below which will be met by tanker supply from nearby municipal source
<table>
<tr><th>S. no</th><th>Activity</th><th>Water consumption in liters</th></tr>
<tr><td>1</td><td>Steel /PE laying by HDD Method if required</td><td>112000</td></tr>
<tr><td>2</td><td>Watering & compaction of the Trench (Note: For 1.0km of pipeline - 5000 liter, For Total 40.495 km -202475 liter)</td><td>202475</td></tr>
<tr><td>3</td><td>Water consumption for domestic use (Note: For One & half year - 46800 liter)</td><td>46800</td></tr>
<tr><td></td><td>Total</td><td>361275</td></tr>
</table></td></tr>
<tr><td>Energy requirement and number of DG sets with capacity in KVA</td><td>Temporary 3 KVA DG set will be required for electro fusion welding only during construction Phase of laying of PE pipeline and Temporary 25KVA DG set will be required for welding during only construction phase of laying of Steel pipeline.
No stationery /permanent DG sets required on pipeline route.</td></tr>
<tr><td>Cost of project</td><td>13 Corers</td></tr>
<tr><td>Capacity</td><td>0.25MMSCMD</td></tr>
<tr><td>Population Density Index</td><td>As per design factor 0.4,Class IV as per ASME B 31.8</td></tr>
<tr><td>Environmental Sensitivity of the project</td><td>Proposed natural gas transportation pipeline in union territory of DNH area passes through DNH Wild life Sanctuary for 6.956km and eco sensitive zone of DNH wild life sanctuary for 7.722km out of total length approx.40.495km.

The everyday vehicle movement on existing road passes through DNH WLS is currently present there. However, the proposed pipeline route will not have any permanent impact in this area because it is 1.0 to 1.2meter underground buried pipeline along the existing road RoW under PWD department. The impact envisaged only during construction phase of the laying of pipeline in that area which will be limited to only few days and the soil will be reinstated near to its original condition after laying of pipeline. So, no major impact on wild life sanctuary is expected on continuous basis. So, the project will have impact is very marginal,</td></tr>
</table>

temporary in nature and reversible.

Linked Forest Proposal no.

S.N.	Pipeline Section	MoEF & CC Forest Clearance Proposal No.	Area of Forest land (In Hectares)	Type of Forest Land
1	Jhaveri Flexo India Ltd. Connectivity	FP/DN/Pipeline/494625/2024	0.2278	P.F.
2	Sili Fatak to Randhe Road Umarkui Connectivity, IMP Power, Sayli & Siddhant Ispat, Umarkui Connectivity & Jackson Industry, Athola Connectivity	FP/DN/Pipeline/494608/2024	0.9152	P.F.
3	Vasona Char Rasta to Khanvel Petrol Pump (HP RO) Spurline	FP/DN/Pipeline/493459/2024	0.7617	P.F.
		Total	1.9047	P.F.

Linked Wildlife Proposal No.

S.N.	**Pipeline Section**	**WLS P. No.**	**ESZ – L(Km)**	**WLS-L(Km)**
1	Jhaveri Flexo Connectivity-4.515Km	**WL/DN/Pipeline/500455/2024**	1.736	2.151
2	Vasona Char Rastha Connectivity-15.125Km		1.572	1.838
3	Sili Fatak Connectivity-8.525Km		1.361	-
4	IMP Power Sayli		2.076	2.310

		Connectivity - 7.2Km			
	5	Jackson Industry Connectivity - 2.480Km		0.301	0.432
	6	Dabur India Connectivity- 2.650Km		0.676	0.225
			Total	**7.722**	**6.956**
National Park	Nil				
Coral reef	Nil				
Mangroves	Nil				

1.4. Power requirement

Temporary 3KVA DG set will be required for electro fusion welding during only construction phase of laying of pipeline and Temporary 25KVA DG set will be required for welding during only construction phase of laying of Steel pipeline.

No stationery/permanent DG sets required on pipeline in operational phase. However, during establishment of pipeline DG set will be used by construction contractor. Hence this moving nonpoint source will have temporary marginal and reversible impact.

1.5. Solid & hazardous waste management

Solid wastes generated from the temporary campsites and other wastes like plastics, paper, cardboard, etc. will be properly collected, segregated and reused / disposed off appropriately (recycle, reuse, and composting / landfill) as per the guideline of SPCB.

E- Waste: Now a day there has been lot of awareness towards disposal of E-Waste such as electronic circuits, picture tubes, special glassware, containers, tube lights, CFL tubes etc. The proponent shall carefully collect, store separately and safely, maintain records of inventories and dispose them by giving to TSDF approved by MoEF, New Delhi. The details of the same can be made available as per guidelines of SPCB.

No hazardous wastes are envisaged from pipeline construction activities.

1.6. For associated facilities:

Proposed pipeline will have underground valves at every 1.0Kms stretch of PE pipeline and 3.0km stretch of steel pipeline as associated facilities along the pipeline route.

1.7. Workforce arrangements

The construction works will be temporary and about 40 laborer's will be deployed at various location depending upon the requirement during the construction period for laying of this PE pipeline for transportation of Natural Gas. Temporary labour camp/Porta cabin sites will be set up with all treatment facilities near development facilities for construction purposes for staff. Construction workers will be preferably drawn from nearby villages.

1.8. Description of environment

The baseline environmental qualities of various environmental components like air, noise, water, land, flora and fauna and socio-economic form important and integral part of environmental study. The baseline data forms the basis for predicting/assessing the environmental impacts of the proposed project. The present report presents the data collected during the sampling period from December 2024 to February 2025. As per the recommendations of MOEF, the sampling and monitoring has been carried out during non-monsoon season, on dry days. Various environmental components were monitored and samples analyzed. Apart from this, additional data were also collected from secondary sources i.e. Government/Non-Governmental Agencies, Universities, Irrigation Department, Indian Meteorological Department (IMD), Ground Water Board etc. to substantiate the primary data collected from the site.

The baseline quality of various components of the environment, viz. air, noise, water, land, biology, meteorological and socio-economic is assessed within the impact zone of about 1.5 Km on either side along the complete route of the pipe line via physical monitoring and analysis.

1.9. Environment monitoring program

Environment monitoring program is a key component to carry out environment monitoring which includes technical aspects of monitoring the effectiveness of mitigation measures including measurement methodology for Air, Water, Soil and Noise environment, selection of location, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules.

The following five environmental components have been considered for the purpose of assessment and evaluation of the environmental impact due to the proposed project:

- Air Environment
- Noise Environment
- Water Environment
- Land Environment
- Biological Environment
- Socio Economic Environment

AIR ENVIRONMENT

To establish the baseline status of study area, total 15 AAQ monitoring stations were selected, along the pipeline route. In this region, conventional air pollutants viz. PM_{10}, Sulfur Dioxide (SO_2), Oxides of Nitrogen, as well as Carbon Monoxide (CO), are identified for air quality assessment.

Along Pipeline route

The 24 hourly PM_{10} concentration varied in the range of 57.2-72.8 µg/m^3 may be attributed to windblown soil, unpaved road etc. in rural areas in the study region. The concentrations of SO_2 were observed to be varying in the range of 7.4-13.1 µg/m^3. Similarly the concentration of NOx varied in the range 11-16 µg/m^3 along the pipeline route.

The observed carbon monoxide concentration at all the locations were <0.5 mg/m^3 which were found less than NAAQS.

NOISE ENVIRONMENT

Total fifteen (15) locations were identified based on the activities in the village area, traffic areas and sensitive areas

Along Pipeline Route

Equivalent noise levels, Leq (Day) and Leq (Night) were monitored across the pipeline route. The equivalent noise levels varied in the range of 43-69 dB(A). Vehicular traffic is the major noise sources and contributes mainly to background noise levels in the study area.

Noise levels Day and Night were monitored along the pipeline route were observed the range of 42-69 dB(A) during day and 35-70 dB(A) night time respectively.

WATER ENVIRONMENT

Water Quality Assessment

Surface Water Quality:

Surface water samples were collected from Near Amit Petroleum (Surangi), Near Sayli Road, Near Kilavani Road & Near Dapada to Surangi bridge. The analysis results indicate that the pH ranged between 7.29 to 7.59 which are well within the specified standard of 6.5 to 8.5. The TDS was observed to be 445-895 mg/l. The total hardness recorded was in the range of 134 to 285 mg/l as $CaCO_3$. The levels of chloride and sulphate were found to be in the range of 98.5-124.2 mg/l and 52.8 to 59.8mg/l respectively. Heavy metals content (i.e. As, Al, Cd, Cr, Cu, Pb, Fe, Mn, Zn and Hg) were found to be very low and within specified standards.

Surface water quality is well within the permissible limits IS 10500:2012.

Groundwater quality

The analysis results of ground water samples indicate that the pH ranged between 7.25 to 7.85 which are well within the specified standard of 6.5 to 8.5. The TDS was observed to be 878.4-1289.6 mg/l which is within the permissible limit of 2000 mg/l. The Total hardness recorded was

in the range of 197 to 276 mg/l as $CaCO_3$ which is also within the permissible limit of 600 mg/l. The levels of the ground water analysis results indicate that the water in the region is fairly potable except that disinfection may be required for ground water in certain areas before being used for drinking. However, the incremental value has no impact with reference to the project activity.

LAND ENVIRONMENT

Land use of the study area

The land use & land cover map of DNH pipeline stretch is prepared for the land use study. Land use and land cover of the study area as well as the morphology was carried out by standard method of analysis of remotely sensed data and followed by ground truth and interpretation of satellite data. The outcome of the land use study is presented in EIA report.

Soil:

Soil was collected at different stretches along the pipeline route. Soil samples were collected from15 different location along the pipeline route.

Physico-Chemical Characteristics

The texture of the soil was found to be Silty clay in nature. Regular cultivation practices increase the bulk density of soils thus inducing compaction. This results in reduction in water percolation rate and penetration of root through soils.

Chemical Characteristics

pH of soil in the study area was found to be slightly acidic to alkaline in reaction as pH was in the range of 7.24-7.84.

The electrical conductivity (EC), the EC of the soil sample was in the range of 1.20-1.35 ms/cm. It was observed that both Calcium and Magnesium carbonate concentrations were in the range of 448 – 623 mg/kg and 73 – 105 mg/kg respectively.

Nutrient Status:

Organic matter and organic carbon present in the soil influence its physical and chemical properties and is responsible for stability of soil aggregates. Organic matter and Total Kjeldahl Nitrogen were found in the range of 0.52-1.21 % and 328-438 mg/kg.

1.10. Additional studies

Additional Studies like

- √ Risk Assessment and Disaster Management Plan,
- √ Emergency Preparedness Plan and Response for Pipeline
- √ Training

1.11. Benefits of the pipelines

- ✓ High performance (Globally proven leak free system)
- ✓ More flexibility, coil ability, ductility, high elasticity
- ✓ Low density (low weight, high strength to weight ratio)
- ✓ High resistance to corrosion
- ✓ Low heat conductivity (small thermal loss)
- ✓ Smooth surfaces (Low pressure losses due to low pipe friction)
- ✓ Easy to transport, handle and lay
- ✓ Longer life
- ✓ Easier and speedier joining techniques to ensure leak tight joints by employing electro fusion techniques
- ✓ Higher productivity, i.e., reduction in installation time (15 minutes in case of PE against 4 hours in case of steel), thereby lesser inconvenience to public
- ✓ Reduced number of joints, hence safer and leak free system
- ✓ Less time is consumed to repair PE damages as compared to steel damages
- ✓ Good squeeze off properties
- ✓ Longer design life of PE pipes (50 years) as compared to steel pipeline (30 Years)
- ✓ Avoidance of NDT techniques in building premises, which is very critical
- ✓ Size of trench is less in case of laying of PE pipe as compared to steel

1.12. Project Benefits

- ✓ As a consequence of the rapid rate of industrialization in India, fuel needs are increasing at an equally rapid rate and the supply-demand gap is widening and steps are being taken to address this issue.
- ✓ Natural Gas is uses as a low carbon cooking and transportation fuel compared to alternative fuels like LPG, Petrol, Diesel and other traditional fuels.

- ✓ CGD networks ensure uninterrupted supply of ecofriendly cooking fuel in form of PNG and transportation fuel to vehicle in the form of CNG and thus benefiting public health at large
- ✓ Underground CGD networks will help in freeing up congested urban city roads from LPG cylinder distribution tempos/Motor vehicles
- ✓ PNG expansion will free up subsidized LPG cylinders from urban area so that the same can be further distributed to rural/remote areas and it will ensure the continuous cooking fuel supplies to households.

- ✓ Pipelines are internationally recognized as the preferred alternative for transport of fuels from the point of view of safety, economy and relative environmentally friendliness.
- ✓ The project would enhance employment opportunities through contractors for the local people during construction phase.
- ✓ There will not be any adverse impact on communication and transportation.
- ✓ One of the additional advantages of pipeline transportation is that the scope of economic offences like theft / pilferage and adulteration of products would be almost negligible.

1.13. Annual Operation and Maintenance plan

GGL is regularly maintaining annual operation and maintenance plan for PE pipeline natural Gas distribution network which includes monthly Patrolling of MPPE network and crossings, quarterly monitoring of LPT/LDT of PE network, half Yearly Special leak survey during festival.

Proposed DNH pipeline network will have isolation valve at every 1.0km distance for PE pipeline network and 3.0km to 5.0km distance for steel pipeline network which will be regularly inspected from Upstream and downstream level. GGL will regularly conduct training to its stake holders and beneficiary villages to create awareness of underground pipeline network and its working phenomena. PE pipeline network will have route marker at every 200 meter with emergency contact number for any future unforeseen. Natural gas PE pipeline network having with ethyl mercaptan added as odoring agent chemical in

natural gas to easily detect leakage by someone and emergency response vehicle act timely and stop gas flow by closing isolation valve to the affected leakage pipeline premises. This will help in any unforeseen fire and unexpected harmful incident. So, GGL is maintaining very high standard safety protocol which will protect nearby human being and surrounding environment in any crises.

1.14. Environment Management Plan

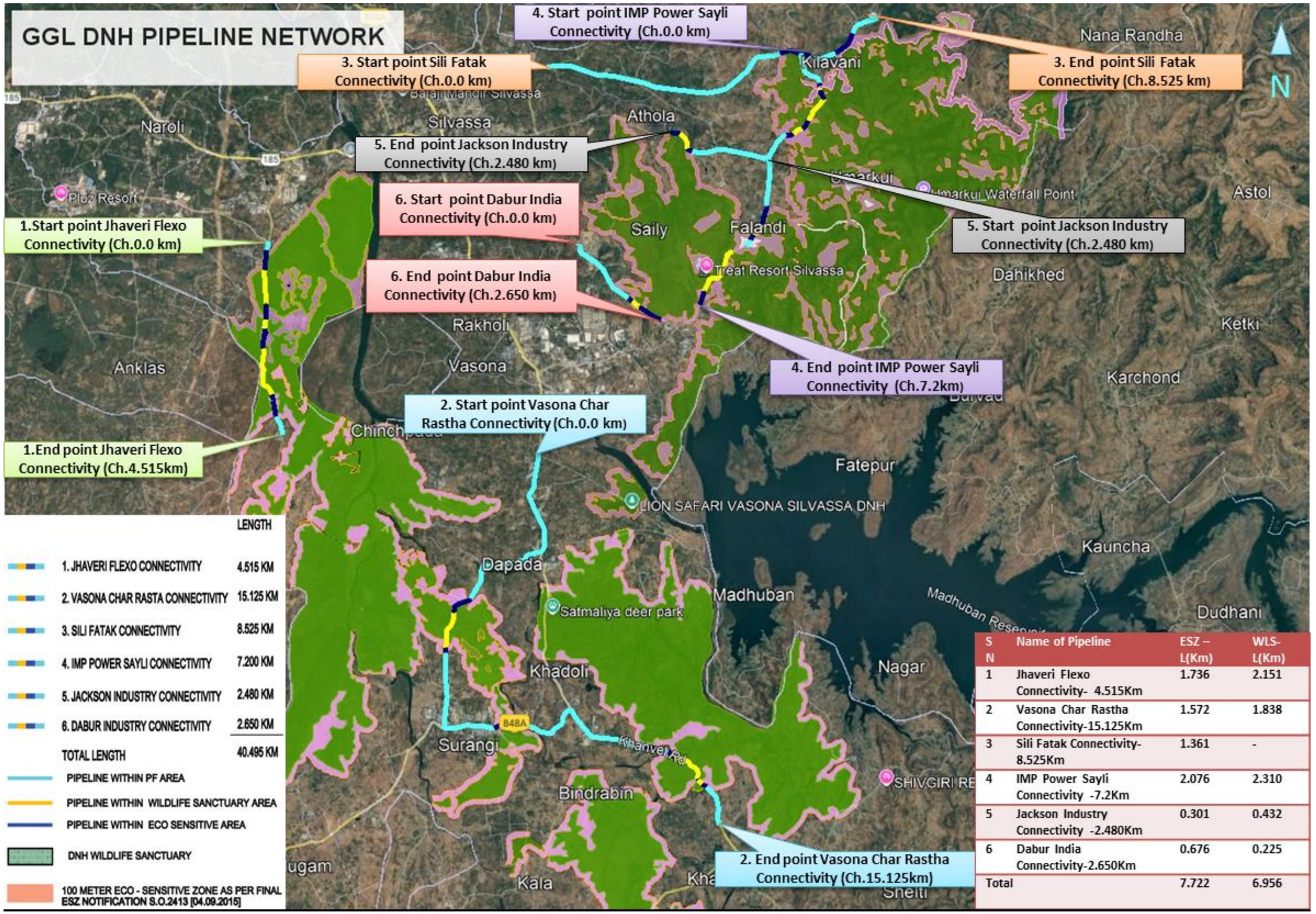
Environmental Management Plan (EMP) is the key to ensure a safe and clean environment. The present chapter on Environmental Management Plan envisages the management plan, which is going to be adopted for the Pipeline Project for the proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities.

The following issues have been addressed in this EMP:

- Mitigatory measures for abatement of the undesirable impacts caused during the constructions and operation stage.
- Details of management plans (Green belt development plan, Solid waste management plan etc.) institutional set up identified/recommended for implementation of the EMP
- Post project environmental monitoring program to be undertaken after commissioning of the project.
- Expenditures for environmental protection measures.

1.15. List of villages along the pipeline route

Proposed pipeline passes through villages i.e. Dapada, Chikhali, Surangi, Khadoli, Tinoda, Amboli, Bidrabin, Khanvel, Kala Chauda and Kherdi of Union Territory Dadara & Nagar Haveli. Route map showing proposed pipelines route is given on page no. 14.



S N	Name of Pipeline	ESZ – L(Km)	WLS-L(Km)
1	Jhaveri Flexo Connectivity- 4.515Km	1.736	2.151
2	Vasona Char Rastha Connectivity-15.125Km	1.572	1.838
3	Sili Fatak Connectivity-8.525Km	1.361	-
4	IMP Power Sayli Connectivity -7.2Km	2.076	2.310
5	Jackson Industry Connectivity -2.480Km	0.301	0.432
6	Dabur India Connectivity-2.650Km	0.676	0.225
Total		7.722	6.956

કેન્દ્રશાસિત પ્રદેશ દાદરા અને નગર હવેલી (ડી. એન. એચ.)માં તેમજ તેની આસપાસનાં વિવિધ ઔદ્યોગિક વ્યાપારી અને રહેણાક વિસ્તારોમાં પાઇપલાઇન દ્વારા નેચરલ ગેસ સપ્લાય કરવા માટે ગુજરાત ગેસ લિમિટેડ દ્વારા ૪૦.૪૯૫ કિમી લાંબી અને ૬"/૮" વ્યાસવાળી સ્ટીલ અને ૧૨૫મીમી વ્યાસવાળી PE (પોલિઇથિલિન) પાઇપલાઇન અને સંલગ્ન સુવિધાઓ

પર્યાવરણીય અસરના મુલ્યાંકનનો સંક્ષિપ્ત સારાંશ

ગુજરાતી આવૃત્તિ

ગુજરાત ગેસ લિમિટેડ.
ઓફિસ નં. ૪ અને ૫, ગ્રાઉન્ડ ફ્લોર,
આઈટી ટાવર-૨,
ઈન્ફોસિટી,
ગાંધીનગર-૩૮૨૦૦૯

કાર્યકારી સારાંશ

ગુજરાત ગેસ લિમિટેડ(જી.જી.એલ.) (જે અગાઉ જીએસપીસી ડિસ્ટ્રિબ્યુશન નેટવર્ક લિમિટેડ તરીકે ઓળખાતી હોઈ), ભારતની સૌથી મોટી સિટી ગેસ વિતરણ કંપની છે, જેની ગુજરાત સરકાર દ્વારા સ્થાપના કરવામાં આવેલ છે. જેના થકી કેન્દ્ર સરકાર દ્વારા સંચાલિત દાદરા અને નગર હવેલી કેન્દ્રશાસિત પ્રદેશમાં ગેસ પૂરો પાડતું નેટવર્ક સ્થાપવાની યોજના બનાવવામાં આવેલ છે, જેના દ્વારા દરેક અંતિમ વપરાશકારને કુદરતી ગેસ પૂરો પાડવામાં આવશે. ઘરેલું, વ્યાપારી અને ઔદ્યોગિક ઉપયોગ ધરાવતા વપરાશકારોને તબક્કાવાર રીતે ગેસ પૂરો પાડવામાં આવશે, જેના માટે જી.જી.એલ.ને પી.એન.જી.આર.બી. (પેટ્રોલિયમ અને નેચરલ ગેસ રેગ્યુલેટરી બોર્ડ) દ્વારા, દાદરા અને નગર હવેલી ભૌગોલિક પ્રદેશના કેન્દ્રશાસિત ક્ષેત્રમાં સિટી ગેસ ડિસ્ટ્રિબ્યુશન નેટવર્ક નાખવા, નિર્માણ તેમજ સંચાલન અને ખર્ચ માટેની અધિકૃતતા પ્રાપ્ત થયેલ છે. જી.જી.એલ. દ્વારા રસ્તા ઉપર આવતા મુખ્ય સ્થળોએ સીએનજી સ્ટેશન બનાવવાની યોજના હોઈ, આ યોજના અંતર્ગત માર્ગમાં આવતા વાહનોને સીએનજી ગેસ પૂરો પાડવામાં આવશે. જે પ્રદૂષણ ઘટાડવામાં મદદ કરશે.

ગુજરાત ગેસ લિમિટેડ તેના વિસ્તૃત ભૌગોલિક ક્ષેત્રના દરેક સંભવિત વપરાશકારો સુધી કુદરતી ગેસ પહોંચાડવા માટે પ્રતિબધ્ધ છે. કેન્દ્રશાસિત પ્રદેશ દાદરા અને નગર હવેલી(ડી. એન. એચ.)માં તેમજ તેની આસપાસનાં વિવિધ ઔદ્યોગિક વ્યાપારી અને રહેણાક વિસ્તારોમાં નેચરલ ગેસ સપ્લાય કરવા માટે જી.જી.એલ. દ્વારા સ્ટીલ/પોલીઈથિલીનની બનેલી ૪૦.૪૯૫ કિમી લાંબી નેચરલ ગેસ પરિવહન પાઇપલાઇન જમીનમાં સ્થાપિત કરવાની યોજના છે.

કેન્દ્રિય પ્રદૂષણ નિયંત્રણ બોર્ડ (સી. પી. સી. બી.) અને એમ. ઑ. ઇ. એફ. એન્ડ સી. સી. ના નવા કેટેગરાઈજેસન મુજબ " ઓઇલ અને ગેસ પરિવહન પાઇપલાઇન ઔદ્યોગિક પ્રવૃત્તિ" તે ગ્રીન કેટેગરીમાં પડે છે. કેમકે તેના દ્વારા બિલકુલ નહિવત પર્યાવરણીય અસરો થાય છે.

ઇ આઈ એ અધિનિયમ ૧૪ સપ્ટેમ્બર ૨૦૦૬ અને તેમાં થયેલ સુધારા મુજબ પ્રસ્તાવિત પરિયોજના "૬(એ) ઓઇલ અને ગેસ પરિવહન પાઇપલાઇન" કે જે નેશનલ પાર્ક/અભ્યારણ્ય/કોરલ રીફ/પરિસ્થિતિક સંવેદનશીલ ક્ષેત્ર (એલ એન જી ટર્મિનલ) સહિતમાં પડે છે તેમને આ અધિનિયમ મુજબ પર્યાવરણીય મંજૂરી લેવી જરૂરી હોઇ પર્યાવરણીય અસરોનું મૂલ્યાંકન અને પર્યાવરણીય વ્યવસ્થાપન યોજનાનો અભ્યાસનો અહેવાલ તૈયાર કરવો જરૂરી બને છે.

પ્રવર્તમાન પર્યાવરણની સ્થિતિ અને પ્રસ્તાવિત યોજનાને લીધે જે અસરો અનુમાનિત છે તેને ધ્યાનમાં રાખીને પર્યાવરણીય અસરનું મૂલ્યાંકન અને પર્યાવરણીય વ્યવસ્થાપન યોજના તૈયાર આવેલ છે.

1.1. પરિયોજનાના સ્થળ ની માહિતી

પ્રસ્તાવિત પરિયોજના દાદરા અને નગર હવેલીનાં નીચે દર્શાવેલ વિસ્તારમાંથી પસાર થાય છે. જે મુખ્ય છવિભાગમાં વિભાજિત કરેલ છે.

ક્રમ	શરૂઆતનું સ્થળ	અંતિમ નું સ્થળ	કુલ કિમી
૧	ખારપાડા (20°15'2.69"N, 72°58'0.70"E)	ઝવેરી ફ્લેકસો (20°12'42.16"N, 72°58'16.00"E)	લંબાઈ ૪.૫૧૫કિમી અને ૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન (**હયાત રોડની જગ્યામાં રોડને સમાંતર**)
૨	વસોના ચાર રાસ્ત (20°12'28.89"N, 73° 1'30.01"E)	ખાનવેલ HP પેટ્રોલિયમ (20° 8'11.43"N, 73° 3'45.75"E)	લંબાઈ ૧૫.૧૨૫કિમી અને ૮ ઇંચ વ્યાસ ધરાવતી સ્ટીલ પાઇપલાઇન (**હયાત રોડની જગ્યામાં રોડને સમાંતર**)
3	સિલી ફાટક (20°17'13.16"N, 73° 1'34.12"E)	રાંધે રોડ (20°17'48.62"N, 73° 5'52.35"E)	લંબાઈ ૮.૫૨૫કિમી અને ૬ ઇંચ વ્યાસ ધરાવતી સ્ટીલ /૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન (**હયાત રોડની જગ્યામાં રોડને સમાંતર**)
૪	IMP પાવર સાયલી (20°17'21.90"N, 73° 4'52.24"E)	સિધ્ધાંત ઇસ્પાત (20°14'16.43"N, 73° 3'32.48"E)	લંબાઈ ૭.૨કિમી અને ૬ ઇંચ વ્યાસ ધરાવતી સ્ટીલ /૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન (**હયાત રોડની જગ્યામાં રોડને સમાંતર**)
૫	જેક્સન ઇન્ડસ્ટ્રી (20°16'4.53"N, 73°4'26.07"E)	અથોલા (20°16'23.21"N, 73°3'11.52"E)	લંબાઈ ૨.૪૮૦કિમી અને ૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન (**હયાત રોડની જગ્યામાં રોડને સમાંતર**)
૬	ડાબર ઇન્ડસ્ટ્રી કનેક્ટિવિટી ટેક ઑફ (20°15'2.27"N, 73° 1'58.45"E)	ડાબર ઇન્ડસ્ટ્રી કનેક્ટિવિટી ટેર્મિનેટિંગ (20°14'5.40"N , 73° 3'3.04"E)	લંબાઈ ૨.૬૫૦કિમી અને ૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન (**હયાત રોડની જગ્યામાં રોડને સમાંતર**)

1.2. પરિયોજનાની માહિતી

અન્ય બળતણ જેવાકે પેટ્રોલ, ડીઝલ વગેરે જેના ઉપયોગથી મોટા પ્રમાણમાં પ્રદૂષણ પેદા થાય છે અને તેના રખરખાવ ની વ્યવસ્થામાં પણ ઘણી તકલીફ ઊભી થતી હોય છે. તેના કરતાં કુદરતી ગેસનો ઉપયોગ કોઇ પણ પ્રકારના પ્રદૂષણનું નિર્માણ થવા દેતો નથી. આમ તે એક રીતે પર્યાવરણીય મિત્રતા ધરાવતું બળતણ હોઇ તેના પ્લાન્ટ અથવા ઘરની અંદર, કચરો કરતું નથી અને નુકસાન કરતું નથી. આ બધા મુદ્દાઓને સંભાળવા ઉપરાંત તે ઘર, છોડ અને સાધનોની સારી સ્થિતિને સુનિશ્ચિત કરે છે. કુદરતી ગેસની પર્યાવરણને અનુકૂળ સુવિધાઓને ધ્યાનમાં રાખીને, વિવિધ ઉદ્યોગોમાં વ્યાપારી હેતુઓ માટે અને ઘરેલુ હેતુસર ઘરોમાં કુદરતી ગેસના ઉપયોગની ભલામણ કરવામાં આવે છે.

ગુજરાત ગેસ લિમિટેડ તેના વિવિધ ગ્રાહકો તેમજ શહેર વિસ્તારના ગ્રાહકોને પાઇપ દ્વારા નેચરલ ગેસ પૂરો પાડવાની યોજના સાથે સંકળાયેલી ગુજરાત સરકારની કંપની છે.

ગુજરાત ગેસ લિમિટેડ કેન્દ્રશાસિત પ્રદેશ દાદરા અને નગર હવેલીમાં નેચરલ ગેસ પુરો પાડતું પાઇપલાઇનનું નેટવર્ક સ્થાપિત કરવા જઇ રહ્યું છે અને જેના ભાગ રૂપે પાઇપલાઇન નાખવી, નેચરલ ગેસ નું વિતરણ કરવું અને તેની સાથે સંકળાયેલ સુવિધાઓ જેવી કે જમીનની અંદર ઇમરજન્સી સેફ્ટી વાલ્વ લગાવવા કે જે

પોલિઇથિલિન પાઇપલાઇન માટે દર 1.0 કિમી અંતરે અને સ્ટીલ પાઈપલાઇન માટે ૩.0 કિમી થી ૫.0 કિમી અંતરે સ્થાપિત કરવાનો સમાવેશ થાય છે.

પ્રસ્તુત અહેવાલમાં કેન્દ્રશાસિત પ્રદેશ દાદરા અને નગર હવેલીમાં પાઇપલાઇન નાખવાથી જે અપેક્ષિત અને સંભવિત છે તેવા પર્યાવરણીય પ્રભાવો વિશેનું વર્ણન કરેલ છે.

અન્ય ઇંધણની સરખામણીમાં નેચરલ ગેસના ઉપયોગ દ્વારા ખુબજ ઓછા તેમજ નહિવત કહી શકાય તેવી ગુણવત્તામાં થતાં વાયુ પ્રદુષણના ગુણના લીધે, નેચરલ ગેસના ઉપયોગથી પર્યાવરણની ગુણવત્તામાં કોઇ ખાસ નુકશાન થશે નહીં. આમ, પાઇપલાઇન દ્વારા નેચરલ ગેસનું પરિવહન તે પર્યાવરણીય અનુકૂળ પ્રવૃત્તિ છે.

1.3. પરિયોજના ઉપર પ્રકાશ

જી.જી.એલ. ગુજરાતનાં વિવિધ શહેરોમાં તેમજ કેન્દ્રશાસિત પ્રદેશ દાદરા અને નગર હવેલીમાં વિવિધ ઔદ્યોગિક, વ્યાપારી અને રહેણાક ઉપભોકતાઓને નેચરલ ગેસ પુરો પાડવા નેચરલ ગેસ વિતરણનું નેટવર્ક પ્રસ્તાવિત કરી રહ્યું છે. જેના માટે ગુજરાત ગેસ લિમિટેડ દ્વારા પાઇપલાઇન નાખવા, બાંધવા, ઉપયોગ તેમજ તેનું નેટવર્ક વધારવા માટે (પેટ્રોલિયમ એન્ડ નેચરલ ગેસ રેગ્યુલેટરી બોર્ડ) PNGRBની મંજૂરી લીધેલ છે.

આ કેન્દ્રશાસિત પ્રદેશ દાદરા અને નગર હવેલીમાંથી પસાર થતી પાઇપલાઇન કુલ મળીને ૪૦.૪૯૫ કિમી લંબાઇ સાથે ૬"/૮" ઇંચ વ્યાસ ધરાવતી સ્ટીલ અને ૧૨૫ મીમી વ્યાસ ધરાવતી પીઇ (પોલિઇથિલિન) નો સમાવેશ થાય છે. .

સૂચિત પાઇપલાઇનની મુખ્ય સુવિધાઓ નીચે મુજબ છે.

પરિયોજનાનું નામ	કેન્દ્ર શાસિત પ્રદેશ દાદરા અને નગર હવેલીમાં હાલના રોડના ઉપયોગ કરવાની જગ્યામાં કામ કરવાના અધિકાર હેઠળ નેચરલ ગેસ ડિસ્ટ્રિબ્યૂશન પાઇપલાઇન નાખવી જેમાં ૧. ખારપાડા થી ઝવેરી ફ્લેકસો- ઝવેરી ફ્લેકસો કનેક્ટિવિટી - લંબાઇ ૪.૫૧૫કિમી અને ૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન (**<u>હયાત રોડની જગ્યામાં રોડને સમાંતર</u>**) ૨. વાસોના ચાર રસ્તા થી ખાનવેલ HP પેટ્રોલિયમ – ખાનવેલ કનેક્ટિવિટી - લંબાઇ ૧૫.૧૨૫કિમી અને ૮ ઇંચ વ્યાસ ધરાવતી સ્ટીલ પાઇપલાઇન (**<u>હયાત રોડની જગ્યામાં રોડને સમાંતર</u>**) ૩. સીલી ફાટક થી રાંધે રોડ-ઉમરકોઇ કનેટિવિટી - લંબાઇ ૮.૫૨૫કિમી અને ૬ ઇંચ વ્યાસ ધરાવતી સ્ટીલ /૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન (**<u>હયાત રોડની જગ્યામાં રોડને સમાંતર</u>**) ૪. IMP પાવર સાયલી થી સિધ્ધાંત ઇસ્પાત કનેક્ટિવિટી -લંબાઇ ૭.૨કિમી અને ૬ ઇંચ વ્યાસ ધરાવતી સ્ટીલ /૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન (**<u>હયાત રોડની જગ્યામાં રોડને સમાંતર</u>**) ૫. જેક્સન ઇંડસ્ટ્રી થી અથોલા કનેક્ટિવિટી - લંબાઇ ૨.૪૮૦કિમી અને ૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન (**<u>હયાત રોડની જગ્યામાં રોડને સમાંતર</u>**) ૬. ડાબર ઇંડસ્ટ્રી કનેક્ટિવિટી

<table>
<tr><td></td><td>-લંબાઈ ૨.૬૫૦કિમી અને ૧૨૫મીમી વ્યાસ ધરાવતી PE (પોલિઇથિલિન) પાઇપલાઇન (<u>હયાત રોડની જગ્યામાં રોડને સમાંતર</u>)
કુલ લંબાઈ ૪૦.૪૯૫કિમી</td></tr>
<tr><td>ગેસ સપ્લાયનો સ્ત્રોત</td><td>ડી. એન. એચ. માં દાપડા ગામ નજીક આગળથી અપસ્ટ્રીમ(ઉપરવાસ)માંથી આવતો ગેસનો પુરવઠો અને ત્યારબાદ ખેરડી ગામથી ડાઉન સ્ટ્રીમ(હેઠવાસ)માં વિવિધ ઔદ્યોગિક અને રહેણાક ઉપભોકતાઓ સુધી</td></tr>
<tr><td>પાઇપલાઇન મટીરિયલ</td><td>સ્ટીલ પાઇપલાઇન
• પાઇપ સામગ્રી: કાર્બન સ્ટીલ; ઇલેક્ટ્રિક રેઝિસ્ટન્સ વેલ્ડેડ (ERW)
• સ્ટીલ ગ્રેડ: API-5L (PSL-2) મુજબ X 52
પોલી ઇથિલિન (PE)
• પાઇપ સામગ્રી: પોલી ઇથિલિન (PE)
• PE ગ્રેડ: IS -14885 મુજબ P-100</td></tr>
<tr><td></td><td>૮” NB(સ્ટીલ)</td><td>૬”NB(સ્ટીલ)</td><td>૧૨૫મીમી PE (પોલિઇથિલિન)</td></tr>
<tr><td>ડિઝાઈન પ્રેશર</td><td>૪૯.૦Barg</td><td>૪૯.૦Barg</td><td>૧૦ Barg</td></tr>
<tr><td>ઓપરેટિંગ પ્રેશર</td><td>૨૬.૦Barg</td><td>૪.૦Barg</td><td>૪.૦Barg</td></tr>
<tr><td>ઈનલેટ પ્રેશર</td><td>૨૬.૦Barg (maximum)</td><td>૪.૦ Barg (maximum)</td><td>૪.૦ Barg(maximum)</td></tr>
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<tr><td>ઈનલેટ તાપમાન</td><td colspan="3">૦°C થી ૫૫°C ની વચ્ચે</td></tr>
<tr><td>આઉટલેટ તાપમાન</td><td colspan="3">૧૫°C થી ૪૫°C ની વચ્ચે</td></tr>
<tr><td>બાંધકામ અને પ્રોજેકટ પૂર્ણતા માટેનો સમયગાળો</td><td colspan="3">પ્રોજેક્ટ શરૂ થવાની ટેમ્પરરી સમયરેખા તારીખ : ઓક્ટોબર-૨૦૨૫/પરવાનગી આપવામાં આવી હોય તે તારીખ
પ્રોજેક્ટ પૂર્ણ થવાની તારીખ: માર્ચ - ૨૦૨૭
(નોંધ: બોર્ડ પાસેથી બધી જરૂરી પરવાનગીઓ મેળવ્યા પછી જ બાંધકામ શરૂ કરવામાં આવશે.)</td></tr>
<tr><td>લાગુ પડતાં ધોરણ અને કોડ</td><td colspan="3">(પાઇપલાઇન એન્ડ નેચરલ ગેસ રેગ્યુલેટરી બોર્ડ) PNGRB, ટેક્નિકલ સ્ટાન્ડર્ડ એન્ડ સ્પેસિફિકેસન ઇન્ક્લુડિંગ સેફ્ટી સ્ટાન્ડર્ડ- સી જી ડી(ટી એસ ૪), ASME B ૩૧.૮</td></tr>
<tr><td>લેબરની જરૂરિયાત</td><td colspan="3">બાંધકામના તબક્કામાં – ૪૦</td></tr>
<tr><td>પાણી વપરાશ</td><td colspan="3">બાંધકામના તબક્કા દરમ્યાન<table>
<tr><td>૧</td><td>HDD પધ્ધતિથી PE/સ્ટીલ પાઇપલાઇન નાખવામાં</td><td>૧,૧૨,૦૦૦ લિટર</td></tr>
<tr><td>૨</td><td>ટ્રેંચના ઘનીકરણ માટે(નાલી ખોદયા બાદ પાઇપલાઇન બિછાવી જમીનથી પુરાણ કરી પાણીનો છંટકાવ કરી સમતલ કરવા માટે)</td><td>૨૦૨૪૭૫ લિટર</td></tr>
<tr><td>૩</td><td>રહેણાક વપરાશ માટે</td><td>૪૬૮૦૦</td></tr>
<tr><td></td><td>કુલ વપરાશ</td><td>૩૬૧૨૭૫ લિટર</td></tr>
</table></td></tr>
<tr><td>ડી જી સેટ ની જરૂરિયાત અને તેઓની ક્ષમતા KVAમાં</td><td colspan="3">પાઇપલાઇનના બાંધકામના તબક્કા દરમ્યાન કામચલાઉ ૩ KVAના ડી જી સેટની જરૂર પડશે જેનો ઉપયોગ ઈલેક્ટ્રો ફ્યુજન વેલ્ડિંગમાં થશે અને ૨૫ KVA ડી જી સેટનો ઉપયોગ સ્ટીલ પાઇપલાઇન વેલ્ડિંગમાં થશે. ઓપરેશનના તબક્કા દરમ્યાન પાઇપલાઇન પર કોઈ સ્થાયી / કાયમી ડી જી સેટ ની જરૂર પડશે નહીં.</td></tr>
<tr><td>પરિયોજનનો ખર્ચ</td><td colspan="3">૧૩ કરોડ</td></tr>
<tr><td>ક્ષમતા</td><td colspan="3">૦.૨૫ એમ એમ એસ સી એમ ડી(MMSCMD)</td></tr>
<tr><td>વસ્તી ઘનતા સૂચકાંક(PDI)</td><td colspan="3">ક્લાસ IV (ASME B 31.8 ના માનકો મુજબ)</td></tr>
<tr><td>પ્રોજેક્ટની પર્યાવરણીય</td><td colspan="3">કેન્દ્રશાસિત પ્રદેશ DNH વિસ્તારમાં કુલ લંબાઈ આશરે ૪૦.૪૯૫કિમી લંબાઇ પૈકી</td></tr>
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<tr><td>સંવેદનશીલતા</td><td>પ્રસ્તાવિત નેચરલ ગેસ પરિવહન પાઇપલાઇન DNH વન્યજીવન અભયારણ્યમાંથી ૬.૯૫૬કિમી અને DNH વન્યજીવન અભયારણ્યના ઇકો સેન્સિટિવ ઝોનમાંથી ૭.૭૨૨કિમી લંબાઈમાંથી પસાર થાય છે.

હાલના આ DNH વન્ય જીવ અભ્યારણ્યના રોડ ઉપર વાહનોની અવરજવર ચાલુ છે. તેમ છતાં, પ્રસ્તાવિત પાઇપલાઇન નાખવાની પ્રવૃત્તિ દરમ્યાન રોડને કોઈ પણ કાયમી ધોરણે અસર થતી નથી. કારણકે આ પાઇપલાઇન ૧ થી ૧.૨ મી જમીનમાં ઊંડે બિછાવવાની હોય છે અને તે હાલના રોડના કામ કરવાના અધિકાર હેઠળ જ નાખશે. જે પણ અસરો થશે તે ફક્ત બાંધકામના તબક્કા દરમ્યાન જ થશે અને તે પણ મર્યાદિત સમય માટે હોઈ થોડા દિવસ પૂરતી જ હશે. વધારાની માટી જે ખોદકામ દરમ્યાન બહાર કાઢવામાં આવી હશે તે પાછી જેમની તેમ સ્થિતિમાં પાઇપલાઇન નાખ્યા પછી સમતલ કરી પાણીના છંટકાવ દ્વારા ઘનીકરણ કરી દેવામાં આવશે. તેથી, કોઈ પણ દેખાતી મોટી અસર કાયમી ધોરણે વન્ય જીવ અભ્યારણ્યને થશે નહીં. આથી, પરિયોજના દ્વારા થતી અસર ખુબજ નહિવત કામચલાઉ અને પ્રતિવર્તી છે.</td></tr>
<tr><td>સંબંધિત વન વિભાગ મંજૂરી દરખાસ્ત નંબર</td><td>
<table>
<tr><th>ક્રમ</th><th>પાઇપલાઇન માહિતી</th><th>MoEF & CC વન મંજૂરી દરખાસ્ત નંબર</th><th>Area of Forest land (In Hectares)</th><th>Type of Forest Land</th></tr>
<tr><td>1</td><td>ઝવેરી ફ્લેક્સો ઇન્ડિયા લિમિટેડ કનેક્ટિવિટી</td><td>FP/DN/Pipeline/494625/2024</td><td>૦.૨૨૭૮</td><td>P.F. (સુરક્ષિત ફોરેસ્ટ)</td></tr>
<tr><td>2</td><td>સિલી ફાટકથી રાંધે રોડ ઉમરકુઇ કનેક્ટિવિટી, આઇએમપી પાવર, સાયલી અને સિધ્ધાંત ઇસ્પાત, ઉમરકુઇ કનેક્ટિવિટી અને જેક્સન ઇન્ડસ્ટ્રી, અથોલા કનેક્ટિવિટી</td><td>FP/DN/Pipeline/494608/2024</td><td>૦.૯૧૫૨</td><td>P.F. (સુરક્ષિત ફોરેસ્ટ)</td></tr>
<tr><td>3</td><td>વસોના ચાર રસ્તાથી ખાનવેલ પેટ્રોલ પંપ (HP RO)</td><td>FP/DN/Pipeline/493459/2024</td><td>૦.૭૬૧૭</td><td>P.F. (સુરક્ષિત ફોરેસ્ટ)</td></tr>
<tr><td colspan="3">Total</td><td>૧.૬૦૪૭</td><td>P.F. (સુરક્ષિત ફોરેસ્ટ)</td></tr>
</table>
</td></tr>
<tr><td>સંબંધિત વન્યજીવ વિભાગ મંજૂરી દરખાસ્ત નંબર</td><td>
<table>
<tr><th>ક્રમ</th><th>પાઇપલાઇન માહિતી</th><th>ESZ – L(Km)</th><th>WLS-L(Km)</th><th>MoEF & CC વન્યજીવ મંજૂરી</th></tr>
</table>
</td></tr>
</table>

					દરખાસ્ત નંબર
	1	ઝવેરી ફ્લેકસો કનેક્ટિવિટી – ૪.૫૧૫કિમી	૧.૭૩૬	૨.૧૫૧	**WL/DN/Pipeline/500455/2024**
	2	વસોના ચાર રસ્તા કનેક્ટિવિટી - ૧૫.૧૨૫કિમી	1.572	૧.૮૩૯	
	3	સિલિફટક કનેક્ટિવિટી - ૮.૫૨૫કિમી	1.361	-	
	4	IMP સાયલી કનેક્ટિવિટી -૭.૨કિમી	2.076	૨.૩૧૦	
	5	જેક્સન ઇંડસ્ટ્રી કનેક્ટિવિટી-૨.૪૮૦ કિમી	0.301	૦.૪૩૨	
	6	ડાબર ઇંડસ્ટ્રી કનેક્ટિવિટી ૨.૬૫૦કિમી	0.676	૦.૨૨૫	
		કુલ	**૭.૭૨૨**	**૬.૯૫૬**	
રષ્ટ્રીય ઉધ્યાન	નથી				
કોરલ રીફ	નથી				
મેંગ્રોવ (mangroves)	નથી				

1.4. પાવરની જરૂરિયાત:

પાઇપલાઇનના બાંધકામના તબક્કા દરમ્યાન પોલિઇથિલિન પાઇપલાઇન માટે ઇલેક્ટ્રો ફ્યુજન વેલ્ડિંગ કરવા માટે કામચલાઉ ૩ KVA ડી જી સેટ ની જરૂર પડશે તેમજ સ્ટીલ વેલ્ડિંગ માટે ૨૫ KVA ડીજી સેટની જરૂર પડશે. પાઇપલાઇન ઓપરેશન દરમ્યાન કાયમી ડી જી સેટોની જરૂરિયાત પડશે નહીં. તેમ છતાં, પાઇપલાઇન સ્થાપિત કરતાં સમયે ડી જી સેટ બાંધકામના કોન્ટ્રાકટર દ્વારાં વાપરવામાં આવશે. જેના દ્વારાં જે પણ અસરો થશે તે કામચલાઉ, નહિવત અને પ્રતિવર્તી હશે.

1.5. સોલિડ(ઘન) અને જોખમી કચરાનું વ્યવસ્થાપન:

કામચલાઉ કેમ્પોમાંથી જે ઘન કચરો નીકળશે અને બીજો કચરો જેવો કે પ્લાસ્ટિક, પેપર, કાર્ડ બોર્ડ વગેરે યોગ્ય રીતે એસ પી સી બી ના ધારા ધોરણો મુજબ સંગ્રહિત કરી, અલગ કરી, ફરીથી ઉપયોગ થશે અથવાતો યોગ્ય નિકાલ કરવામાં આવશે.

ઇ વેસ્ટ - હવે ના દિવસોમાં ઇ-વેસ્ટના નિકાલ પ્રત્યે ઘણી જાગૃતિ આવી છે જેવા કે ઇલેક્ટ્રોનિક્સ સર્કિટ્સ, પિક્ચર ટ્યૂબ, ખાસ કાચના વાસણો, કન્ટેનર, ટ્યુબ લાઇટ્સ, સી એફ એલ ટ્યુબ વગેરે. જેનો કંપની દ્વારાં કાળજી પૂર્વક એકત્રિત કરવામાં આવશે તેમજ અલગથી અને સુરક્ષિત રીતે સંગ્રહ કરાશે અને એમ ઓ ઇ એફ એન્ડ સીસી, નવી દિલ્લી દ્વારાં માન્ય ટી એસ ડી એફ ને યોગ્ય રેકોર્ડ બનાવીને નિકાલ કરી આપવામાં આવશે. તેની વિગતો એસ પી સી બી ના ધારા ધોરણો મુજબ ઉપલબ્ધ કરી દેવામાં આવશે.

પાઇપલાઇન બાંધકામની પ્રવૃત્તિમાં કોઈ પણ જોખમી કચરો થવાની સંભાવના નથી.

1.6. સંલગ્ન સુવિધાઓ

પ્રસ્તાવિત પાઈપલાઇનમાં આપતકાલીનમાં ગેસનું પરિવહન રોકવા માટે નિર્દેશિત અંતરે ભૂગર્ભ વાલ્વ લગાવવામાં આવે છે. આ વાલ્વ પોલીઈથિલિન પાઇપલાઇનમાં દર ૧.૦ કિલોમીટર અંતરે અને સ્ટીલ પાઇપલાઇનમાં દર ૩.૦ કિલોમીટર અંતરે બેસાડવામાં આવે છે.

1.7. કામદારોનું વ્યવસ્થાપન

બાંધકામના કામદારો કામ ચલાઉ ધોરણે લેવામાં આવશે અને અંદાજિત ૪૦ કામદારો પી ઇ પાઇપલાઇન નાખવાની કામગીરી દરમ્યાન વિવિધ સ્થળોએ જરૂરિયાત મુજબ બાંધકામના તબક્કા દરમ્યાન લગાવવામાં આવશે. બાંધકામના કામદારો નજીકના ગામોમાંથી પસંદગી કરી લેવામાં આવશે.બાંધકામની કામગીરી જે તે સ્થળે થોડા દિવસ પૂરતી ફકત કામચલાઉ હોઈ બાંધકામના સ્થળે કોઈ રહેઠાણ કે સ્થાયી વ્યવસ્થાની જરૂર નહીં પડે.

કામદારો માટે સ્વચ્છ પાણી, આરોગ્ય, પુરુષ/સ્ત્રીના શૌચાલયો વગેરેની સુચારું વ્યવસ્થા થશે. બળતણ માટે વનીય પેદાશ કે લાકડા બાળવા દેવામાં આવશે નહીં પણ કોન્ટ્રાકટર દ્વારા ગેસની યોગ્ય વ્યવસ્થા થશે.

1.8. પર્યાવરણનું વર્ણન

પર્યાવરણીય ઘટકોના મૂળભૂત પર્યાવરણીય ગુણો જેવા કે હવા, પાણી, અવાજ, જમીન, વનસ્પતિ અને પ્રાણી સૃષ્ટિ, સામાજિક તેમજ આર્થિક મહત્વ વગેરે પર્યાવરણીય અભ્યાસના મુખ્ય ભાગો છે. પ્રસ્તાવિત પ્રોજેકટ દ્વારાં થતાં પર્યાવરણીય પ્રભાવોની આગાહી તેમજ આકારણી આધાર સૂચિત (બેઝ લાઇન) ડેટા ઉપરથી કરવામાં આવી છે. વર્તમાન અહેવાલમાં ડિસેમ્બર ૨૦૨૪ થી ફેબ્રુઆરી ૨૦૨૫ સુધીના નમૂનાના સમયગાળા દરમ્યાન એકત્રિત કરવામાં આવેલી માહિતીની રજૂઆત કરવામાં આવી છે. એમ ઑ ઇ એફ એન્ડ સી સી ની માર્ગદર્શિકા મુજબ, સૂકા દિવસોમાં ચોમાસા સિવાયની સિઝનમાં નમૂના લેવામાં આવ્યા છે. જેમાં વિવિધ પર્યાવરણીય ઘટકોનું નિરીક્ષણ કરવામાં આવ્યું હતું અને નમુનાઓનું પણ વિશ્લેષણ કારવામાં આવ્યું હતું. આ ઉપરાંત, સેકન્ડરી સ્ત્રોતો એટલેકે સરકારી / બિનસરકારી એજેન્સીઓ, યુનિવર્સિટીઓ, સિંચાઇ વિભાગ, ભારતીય હવામાન વિભાગ (આઇ એમ ડી) ભૂગર્ભજળ બોર્ડ વગેરે પાસેથી પણ વધારાના ડેટા એકત્રિત કરવામાં આવ્યા હતા.

પર્યાવરણ ના મૂળભૂત ઘટકોની મૂળભૂત ગુણવત્તા જેમ કે હવા, અવાજ, પાણી, જમીન, બાયોલોજી/ હવામાન તેમજ સામાજિક – આર્થિક વગેરેનું પાઇપલાઇન માર્ગની બન્ને બાજુએ આશરે ૧.૫ કિમીના અસર વિસ્તારમાં અભ્યાસ ક્ષેત્ર અનુમાનિત કરવામાં આવેલું હતું.

1.9. પર્યાવરણ નિરીક્ષણ કાર્યક્રમ

પર્યાવરણનું નિરીક્ષણ કરવા માટે પર્યાવરણના નિરીક્ષણનું મૂલ્યાંકન એ એક મુખ્ય ઘટક છે. જેમાં હવા, પાણી, જમીન અને ઘોંઘાટવાળા પર્યાવરણ માટેની માપન પધ્ધતિ, સ્થાનની પસંદગી, ડેટા વિશ્લેષણ, અહેવાલ

સમય પત્રક, કટોકટી માટેની કાર્યવાહી, વિગતવાર સહિતના નિવારણ પગલાની અસરકારકતાના નિરીક્ષણના તકનીકી પાસાઓનો સમાવેશ થાય છે. નીચે દર્શાવેલ પાંચ પર્યાવરણીય ઘટકોને ધ્યાનમાં લઈને સૂચિત પ્રોજેકટ માટે પર્યાવરણીય પ્રભાવના મૂલ્યાંકનનો અભ્યાસ કરવામાં આવ્યો છે. જેની વિશદ છણાવટ અહેવાલમાં આવરી લેવાઈ છે.

- હવાનું પર્યાવરણ
- અવાજનું પર્યાવરણ
- પાણીનું પર્યાવરણ
- જમીનનું પર્યાવરણ
- જૈવિક પર્યાવરણ
- સામાજિક આર્થિક પર્યાવરણ

હવાનું પર્યાવરણ

પાઇપલાઇન માર્ગ સાથે

અભ્યાસ વિસ્તારમાં આધાર રેખા પ્રસ્થાપિત કરવા માટે કુલ 15 સ્થળો પસંદ કર્યા હતા. આ વિસ્તારમાં રૂઢિગત હવા, પ્રદૂષકો જેમાં પી. એમ. ૧૦, પી. એમ. ૨.૫, સલ્ફર ડાયોક્સાઇડ, ઓકસાઇડ્સ ઓફ નાઇટ્રોજન, એમોનિયા, ઓઝોન, ભારે ધાતુઓ, બેંઝો પાયરીન (બી એ પી) બેંઝિન તેમજ હાઇડ્રોકાર્બન અને કાર્બન મોનોક્સાઇડ ને હવાની ગુણવત્તાનું મૂલ્યાંકન કરવા માટે ચકાશવામાં આવેલ હતા. ૨૪ કલાકદીઠ પી એમ ૧૦ સાંદ્રતા ૫૭.૨-૭૨.૮µg/m3 ની વચ્ચે જોવા મળી હતી જે પવન ધ્વારા ફૂકાતી માટી, કાચા રસ્તાઓ વગેરેને લીધે હોઇ શકે છે. જ્યારે પી એમ ૨.૫ ની સાંદ્રતા ૨૩.૮-૨૭.૩ µg/m3ની રેંજમાં હતી. પાઇપલાઇન માર્ગ સાથે SO2 ની સાંદ્રતા ૭.૪-૧૩.૧ µg/m3 ની રેંજમાં જોવા મળી હતી. તેજ પ્રમાણે NOx ની સાંદ્રતા ૧૧-૧૬ µg/m3 ની રેંજમાં પાઇપલાઇન માર્ગ સાથે જોવા મળી હતી. બધાંજ મૂલ્યાંકન સ્થળોને ધ્યાનમાં રાખતા NH3 ની સરેરાશ સાંદ્રતા <૧૦ µg/m3 જોવા મળેલ હતી. જે રાસાયણિક ખાતર ઉધોગો, પશૂના કચરા અને માટીને લીધે હોઇ શકે છે. જ્યારે સરેરાશ O3 બધા મૂલ્યાંકન સ્થળોએ <૨૦ µg/m3 જોવા મળેલ હતો.

કાર્બન મોનોક્સાઇડ ની સાંદ્રતા બધાંજ મૂલ્યાંકન સ્થળોને ધ્યાનમાં રાખીને <૦.૫ mg/m3 જોવા મળી હતી. જે રાષ્ટ્રીય ધોરણોના માનક (NAAQS) માટેની કાર્બન ડાયોક્સાઇડની સાંદ્રતા કરતાં ઓછી છે. પાઇપલાઇન માર્ગમાં આવતા બધાજ મૂલ્યાંકન સ્થળોએ હાઇડ્રોકાર્બન સાંદ્રતા માપી ન શકાય તેવી ઓછી રેંજમાં જોવા મળેલ હતાં.

ધ્વનિનું પર્યાવરણ

પાઇપલાઇન માર્ગ સાથે

કુલ ૧૫ સ્થળોની પસંદગી ગામ વિસ્તારમાં થતી પ્રવૃત્તિઓ, ટ્રાફિક વિસ્તાર અને સંવેદનશીલ વિસ્તારને ધ્યાનમાં રાખીને કરવામાં આવી હતી. સમતુલ્ય ધ્વનિ સ્તર (Equivalent noise levels), Leq(દિવસ) અને Leq(રાત્રિ)નું મૂલ્યાંકન પાઇપલાઇન માર્ગમાં આવતા પસંદ કરેલ સ્થળોએ કરવામાં આવ્યું હતું. સમતુલ્ય ધ્વનિ સ્તર ૪૩-૬૯ની વચ્ચે ની રેંજમાં તથા ૪૨ – ૬૯dB(A) દિવસ દરમ્યાન અને રાત્રિના સમયે ૩૫-૭૦dB(A) અનુક્રમે માપવામાં આવેલ હતો. વાહનવ્યવહાર નો ટ્રાફિક તે ધ્વનિનો મોટો સ્ત્રોત છે અને બેકગ્રાઉન્ડ ધ્વનિ સ્તરમાં મહત્વનો ફાળો આપે છે. પાઇપલાઇન નાખતી વખતે ધ્વનિના સ્તરમાં થોડા પ્રમાણમાં કામચલાઉ વધારો થઈ શકે છે પરંતુ વપરાશના તબક્કામાં ધ્વનિના સ્તર ઉપર કોઈ પણ અસર થશે નહીં.

પાણીની ગુણવત્તાનું મુલ્યાંકન

સપાટી જળની ગુણવત્તા

સપાટી જળના નમૂના અમિત પેટ્રોલિયમ નજીક(સુરંગી),સાયલી રોડ નજીક, કલવાની રોડ નજીક અને દાફડા થી સુરંગી બ્રિજ પાસેથી લેવામાં આવ્યા હતા. જેનું પૃથક્કરણ પરિણામ જોતાં pHનું મૂલ્ય ૭.૨૯ અને ૭.૫૯ હતું, ટીડીએસનું મૂલ્ય ૪૪૫mg/L અને ૮૯૫ mg/L ,ટોટલ CaCO3 હાર્ડનેસ ૧૩૪ mg/L થી ૨૮૫ mg/L, ક્લોરાઈડ ૯૮.૫mg/L થી ૧૨૪.૨mg/L અને સલ્ફેટ ૫૨.૮ mg/L થી ૫૯.૮ mg/L ની રેંજમાં જોવા મળેલ છે. એકંદરે પાણીની ગુણવત્તા પાઇપલાઇન માર્ગ સાથે હાર્ડનેસ, ટોટલ ડિઝોલ્વ સોલીડ, ક્લોરાઈડ અને સલ્ફેટ જોતાં તે સ્વીકાર્ય પ્રમાણિત સ્તરની અંદર છે. હેવી મેટલ (i.e. As, Al, Cd, Cr, Cu, Pb, Fe, Mn, Zn and Hg) ઘણી ઓછી માત્રામાં, સ્વીકાર્ય પ્રમાણિત સ્તરની અંદર જોવા મળેલ હતી. સપાટી પરના પાણીની ગુણવત્તા IS 10500:2012 ની માન્ય મર્યાદામાં જોવા મળેલ હતું. પરિયોજનાની પ્રવૃત્તિના લીધે આજુબાજુના પર્યાવરણની પાણીની ગુણવત્તામાં કોઈ પણ અસર થવાની સંભાવના જણાતી નથી.

ભૂગર્ભજળ જળની ગુણવત્તા

ભૂગર્ભજળના નમૂનાઓના વિશ્લેષણ પરિણામો દર્શાવે છે કે pH ૭.૨૫ થી ૭.૮૫ ની વચ્ચે હતો જે ૬.૫ થી ૮.૫ ના નિર્દિષ્ટ ધોરણની અંદર છે. ટીડીએસ 878.4-1289.6 mg/l જોવા મળ્યું હતું જે 2000 mg/l ની માન્ય મર્યાદામાં છે. CaCO3 તરીકે નોંધાયેલ કુલ કઠિનતા 197mg/l થી 276 mg/l ની રેન્જમાં હતી જે 600 mg/l ની માન્ય મર્યાદામાં પણ છે. ભૂગર્ભજળ વિશ્લેષણ પરિણામોના સ્તર સૂચવે છે કે પ્રદેશમાં પાણી પીવાલાયક છે, સિવાય કે પીવા માટે ઉપયોગમાં લેતા પહેલા ચોક્કસ વિસ્તારોમાં ભૂગર્ભજળ માટે જીવાણુ નાશકક્રિયાની (Disinfectant) જરૂર પડી શકે છે. જો કે, પ્રોજેક્ટ પ્રવૃત્તિના સંદર્ભમાં વધારાના મૂલ્યની કોઈ અસર થતી નથી.

જમીનનું પર્યાવરણ

અભ્યાસ વિસ્તારનો જમીનનો ઉપયોગ

જમીનના ઉપયોગનો અભ્યાસ કરવા માટે ૪૦.૪૯પકિ.મી.ની લંબાઈને આવરી લેવા માટે ભૂ-ઉપયોગ અને ભૂ આચ્છાદન(LU/LC)ના નક્શાઓ બનાવવામાં આવેલા હતા. અભ્યાસ વિસ્તાર માટે ભૂ-ઉપયોગ અને ભૂ

આચ્છાદન તેમજ મોર્ફોલોજી અને અર્થઘટન સેટેલાઈટ માહિતીને અનુસરીને કરવામાં આવી હતી. જમીન ઉપયોગના અભ્યાસ દ્વારા મળેલા પરિણામના નિષ્કર્ષ ઇ. આઇ. એ. અહેવાલમાં દર્શાવેલ છે.

ભૌતિક – રાસાયણિક વિશેષતાઓ

અભ્યાસ વિસ્તારમાં પાઇપલાઇનના માર્ગ પરથી જુદાજુદા સ્થળોએથી કુલ ૧૫ જગ્યાએથી માટીના નમૂના લેવામાં આવ્યા હતા. જેથી તે માટીના ગુણવત્તાને દર્શાવી શકાય.

મુખ્ય માર્ગ

માટીની રચના પ્રાકૃતિક રીતે સેંડી લોમ અને રેતાળ વાળી જોવા મળી હતી.

રાસાયણિક વિશેષતાઓ

મુખ્યલાઈન માર્ગ

અભ્યાસ વિસ્તારમાં આવેલી જમીનમાં pHનું મૂલ્યાંકન કરતાં તે થોડી એસિડિકથી આલ્કલાઇન પ્રતિક્રિયા દર્શાવે છે. જેની pH રેંજ ૭.૨૪-૭.૮૪ હતી.

જમીન એક્સટ્રેક્ટ(નિષ્કર્ષ-૧:૫) માં દ્રાવ્ય ક્ષારો મળ્યા હતા, જે ઇલેક્ટ્રિકલ કંડક્ટિવિટી(ઇ સી)નાં સ્વરૂપમાં દર્શાવવામાં આવે છે. માટીનાં નમુનાની ઇ સી ૧.૨-૧.૩૫ ms/cm મળી હતી. માટીમાં રહેલા મહત્વના ધન આયન કેલ્શિયમ અને મેગ્નેશિયમ છે. તે પણ અવલોકનમાં આવ્યું હતું કે બંને કેલ્શિયમ અને મેગ્નેશિયમની સાંદ્રતા ૪૪૮ – ૬૨૩ mg/kg and ૭૩ – ૧૦૫ mg/kg અનુક્રમે હતી. જ્યારે ક્લોરીન ૩૦૧ – ૩૧૫mg/kg ની રેંજમાં જોવા મળેલ છે. સોડિયમ અને પોટેશિયમ ૧૫૫– ૨૦૨mg/kg અને ૬૯-૮૯mg/kgની રેંજમાં અનુક્રમે પાઇપલાઇન માર્ગ સાથે જોવા મળેલ છે. સૂચિત પરિયોજના ધ્વારા જમીનના પર્યાવરણમાં કોઈ પણ વિપરીત અસરો થવાની અપેક્ષા નથી.

પોષક તત્વોનું સ્તર

ઓર્ગેનિક કાર્બન, કુલ જેલડાલ નાઇટ્રોજન અને કુલ ફૉસ્ફરસ ૦.૫૨-૧.૨૧%, ૩૨૮-૪૩૮mg/kg અને ૧૩.૧૭-૧૬.૩૨ mg/kg ની રેંજમાં અનુક્રમે જોવા મળેલ હતા. સૂચિત પરિયોજના ધ્વારા જમીનના પર્યાવરણમાં રહેલા પોષકતત્વોના પ્રમાણ ઉપર કોઈ પણ વિપરીત અસરો થવાની અપેક્ષા નથી.

1.10. અન્ય અભ્યાસ:

અન્ય અભ્યાસ જેવાં કે

- જોખમ મુકલ્યાંકન અને આપત્તિ વ્યવસ્થાપન યોજના
- પાઇપલાઇન માટે આપતકાલીન તૈયારી અને પ્રતિભાવ
- યોગ્ય તાલીમ

1.11. પાઇપલાઇન નાખવાના ફાયદા

- ✓ ઉચ્ચતમ ગુણવત્તા ધરાવે છે. (વૈશ્વિક સ્તરે માન્યતા પ્રાપ્ત થયેલ છે.)
- ✓ વધુ સુગમતા અને ઉચ્ચ સ્થિતિસ્થાપકતા ધરાવે છે.

- ✓ ઉચ્ચ ઉત્પાદકતા ધરાવે છે જેમ કે પાઇપલાઇન ઓછા સમયમાં ઝડપથી જમીનમાં સ્થાપિત થઈ જાય છે. જેથી આજુ બાજુની વસાહતો અને લોકોને ઓછી તકલીફ પડે છે.
- ✓ ઓછી ઘનતા (પી ઈ પાઇપલાઇનનું વજન ઓછું હોવાથી વજનના પ્રમાણમાં ઉચ્ચ શક્તિ) ધરાવે છે.
- ✓ કાટ લાગવાની શક્યતા બિલકુલ નહીંવત હોવાથી તેમાં તે ઉચ્ચતમ પ્રતિકાર કરે છે.
- ✓ વળી તેની સપાટી સુવાળી હોવાથી પાઇપના ઘર્ષણને કારણે દબાણમાં ઓછો ઘટાડો થાય છે.
- ✓ સરળતા પૂર્વક નેચરલ ગેસનું પરિવહન થાય છે અને નિયમન પણ થાય છે.
- ✓ સ્ટીલ પાઇપલાઇન(30 વર્ષ) કરતાં પી ઈ પાઇપલાઇન(૫૦ વર્ષ)ની આવરદા વધુ હોય છે
- ✓ ઇલેક્ટ્રો ફ્યુજન પધ્ધતિ નો ઉપયોગ કરીને પાઇપલાઇનમાં આવતા સાંધાઓ લીક ચુસ્ત કરી સુનિશ્ચિત કરી શકાય છે જે એક ખુબજ ઝડપી અને સરળ પધ્ધતિ છે. આથી સરળ મરામત અને ઝડપી સમારકામ થઈ શકે છે.
- ✓ ઓછા સાંધા આવતા હોવાથી પી ઈ પાઇપલાઇન સુરક્ષિત છે અને લીકેજથી મુક્ત છે.
- ✓ પી ઈ પાઇપલાઈનમાં થતાં ભંગાણ કે નુકશાનના સમારકામમાં સ્ટીલ પાઇપલાઇન કરતાં ઓછો સમય લાગે છે.
- ✓ પી ઈ પાઇપલાઈનમાં ખોદવામાં આવતા ખાડાનું કદ સ્ટીલ પાઇપલાઈનમાં ખોદવામાં આવતા ખાડા કરતાં ઓછું હોય છે. આથી આર્થિક ફાયદો થાય છે.

1.12. પરિયોજનાથી થતાં ફાયદા

આપણાં દેશમાં જે રીતે ઔદ્યોગીકરણ ઝડપથી થઇ રહ્યું છે તે મુજબ બળતણની જરૂરિયાતમાં પણ તેજ ઝડપે વધારો થઈ રહ્યો છે. અને આ જોતાં જે પુરવઠો છે અને વર્તમાન માંગ છે તેમાં ઘણો તફાવત છે. અને તેના માટે જરૂરી પગલાં લેવામાં આવી રહ્યા છે.

- ❖ પાઇપલાઇન દ્વારા નેચરલ ગેસનું પરિવહન થવાથી રોડ દ્વારા ટેમ્પો અને મોટરથી થતાં ગેસ સિલિન્ડર વિતરણથી ગીચ શહેરી માર્ગને મુક્ત કરશે.
- ❖ વધુમાં તે વિવિધ ગ્રામીણ/દુરના વિસ્તારમાં ગેસ વહેચાવાથી રસોઈ માટેના વિશ્વશનીય રીતે સતત બળતણનો પુરવઠો પૂરો પાડી શકાશે. માર્ગ અકસ્માત, ટ્રાફિક જામ વગેરેથી ટેન્કરના દ્વારા થતાં પરિવહનમાં અવરોધ પેદા થાય છે જે પાઇપલાઇન દ્વારા થતાં પરિવહનને નડતું નથી.
- ❖ સલામતી, અર્થવ્યવસ્થા અને સંબંધિત પર્યાવરણીય મિત્રતાના દ્રષ્ટિકોણથી ઇંધણના પરિવહન માટે પાઇપલાઇનને આંતરરાષ્ટ્રીય સ્તરે માન્યતા પ્રાપ્ત થયેલ છે.
- ❖ બાંધકામના તબક્કા દરમ્યાન આ પરિયોજનાથી કોન્ટ્રાકટરો દ્વારા રોજગારીની તકોમાં વધારો કરાશે.

- સંદેશાવ્યવહાર અને પરિવહન ઉપર આ પ્રોજેકટ દ્વારા કોઈ પણ માઠી અસર થશે નહીં.
- ગેસનું પરિવહન પાઇપલાઇન દ્વારા થવાથી ચોરી કે ઉત્પાદનોમાં ભેળસેળ જેવા આર્થિક ગુનાઓનો અવકાશ લગભગ નહિવત હશે.
- આમ, પીઈ પાઇપલાઇન પ્રમાણમા ઓછી મુડી રોકાણથી અને વધુ ઝડપી રીતે નાખી શકાય છે તથા જાળવણીનો ખર્ચ પણ ઓછો છે.
- પાઇપલાઇન દ્વારા નેચરલ ગેસ ના પરિવાહનને લીધે અન્ય પરંપરાગત બળતણો જેવા કે પેટ્રોલ ડીઝલ વગેરેના બદલે પર્યાવરણને અનુકૂળ કુદરતી ગેસનો વપરાશ થશે.

1.13. વાર્ષિક કામગીરી અને જાળવણી યોજના

જી જી એલ દ્વારા વાર્ષિક કામગીરી અને જાળવણી યોજના નિયમિત રીતે કરવા માટે જ્યાં જ્યાં ક્રોસિંગ આવતા હોય ત્યાં માસિક પેટ્રોલિંગ, ત્રિમાસિક પી ઈ નેટવર્કનું નિરીક્ષણ, દર ૬ મહિને વિશેષ લીક સર્વે કરવો વગેરેનો સમાવેશ થાય છે.

- સૂચિત ડી એન એચ પાઇપલાઇન નેટવર્કમાં દર ૧.૦ કિમીના અંતરે આઇસોલેશન વાલ્વ લગાવવામાં આવશે. જે અપસ્ટ્રીમ અને ડાઉન સ્ટ્રીમ લેવલથી નિયમિત રીતે તપાસવામાં આવશે.
- જી જી એલ દ્વારા તેના લાભાર્થી અને લાભ થતાં ગામોને નિયમિત પણે અંડરગ્રાઉંડ પાઇપલાઇન નેટવર્ક અને તેના કાર્યકારી કાર્યપધ્ધતીના અંગે જાગૃતિ લાવવા તાલીમ આપવામાં આવશે.
- પાઇપલાઇન માર્ગમાં દર ૨૦૦મીના અંતરે રૂટ માર્કર લગાડવામાં આવશે.
- પી ઈ પાઇપલાઇન દ્વારા થતાં નેચરલ ગેસ પરિવહનમાં તેમાં ઈથાઈલ મરકેપ્ટન ઉમેરવામાં આવે છે. જે કુદરતી ગેસમાં વિશિષ્ટ પ્રકારની ઘરેલુ ગેસ જેવી વાસ દર્શાવતો હોઈ ક્યાંય પણ પાઇપલાઇન માર્ગમાં ગેસ લિકેજ હોય ત્યાં સરળતાથી અને ઝડપથી લિકેજ શોધી શકાય છે અને તત્કાલિન વાહન વ્યવસ્થાનો સમયસર લાભ લઈ શકાય છે. તેમજ અસરગ્રસ્ત લિકેજ પાઇપલાઇન પરિસરમાં આઇસોલેસન વાલ્વ બંધ કરીને ગેસનો પ્રવાહ બંધ કરી દેવામાં આવે છે. જેના દ્વારા અણધારી આગ અને અનપેક્ષિત હાનિકારક બનાવથી બચાવમાં મદદ મળે છે અને તેને રોકી શકાય છે. આ એક ભૂમિગત પાઇપલાઇન હોઈ સામાન્ય રીતે કુદરતી ગેસ હવા ન મળતી હોઈ જમીનમાં અંદર સળગતો નથી. આમ, જી જી એલ ખુબજ ઉચ્ચ સાવચેતીના માનક પગલાં જાળવી રહ્યું હોઈ કોઈ પણ સંકટની પરિસ્થિતીમાં નજીકના લોકો અને આસપાસના વાતાવરણનું રક્ષણ થશે.
- આ ઉપરાંત સલામતી અને અકસ્માતની પરિસ્થિતિમાં શું પગલાં લેવા તેનો ઊંડાણ પૂર્વક અભ્યાસ થયેલ છે. જે પર્યાવરણીય અસરોના અભ્યાસના વિસ્તૃત અહેવાલમાં દર્શાવેલ છે., જેથી અકસ્માત ટાળી શકાય છે તેમજ કદાય અકસ્માત થાય તો અણધાર્યા નુકશાનથી બચાવી શકાય છે.

- જોકે પાઇપલાઇન ખુબજ ઉચ્ચ ગુણવત્તાવાળા રાષ્ટ્રીય અને આંતરરાષ્ટ્રીય માપદંડો દ્વારા બનાવવામાં આવતી હોઇ, તેમજ વ્યવસ્થાપન થતું હોઇ અકસ્માતની શક્યતા ખૂબ નહીંવત હોય છે.

1.14. પર્યાવરણ વ્યવસ્થાપન યોજના

સ્વચ્છ અને સલામત વાતાવરણની જાળવણી માટે પર્યાવરણ સંચાલન યોજના (EMP) તે મુખ્ય ચાવી છે. આ યોજનામાં મુખ્ય નીચે જણાવેલા મુદ્દાઓને આવરી લેવામાં આવશે.

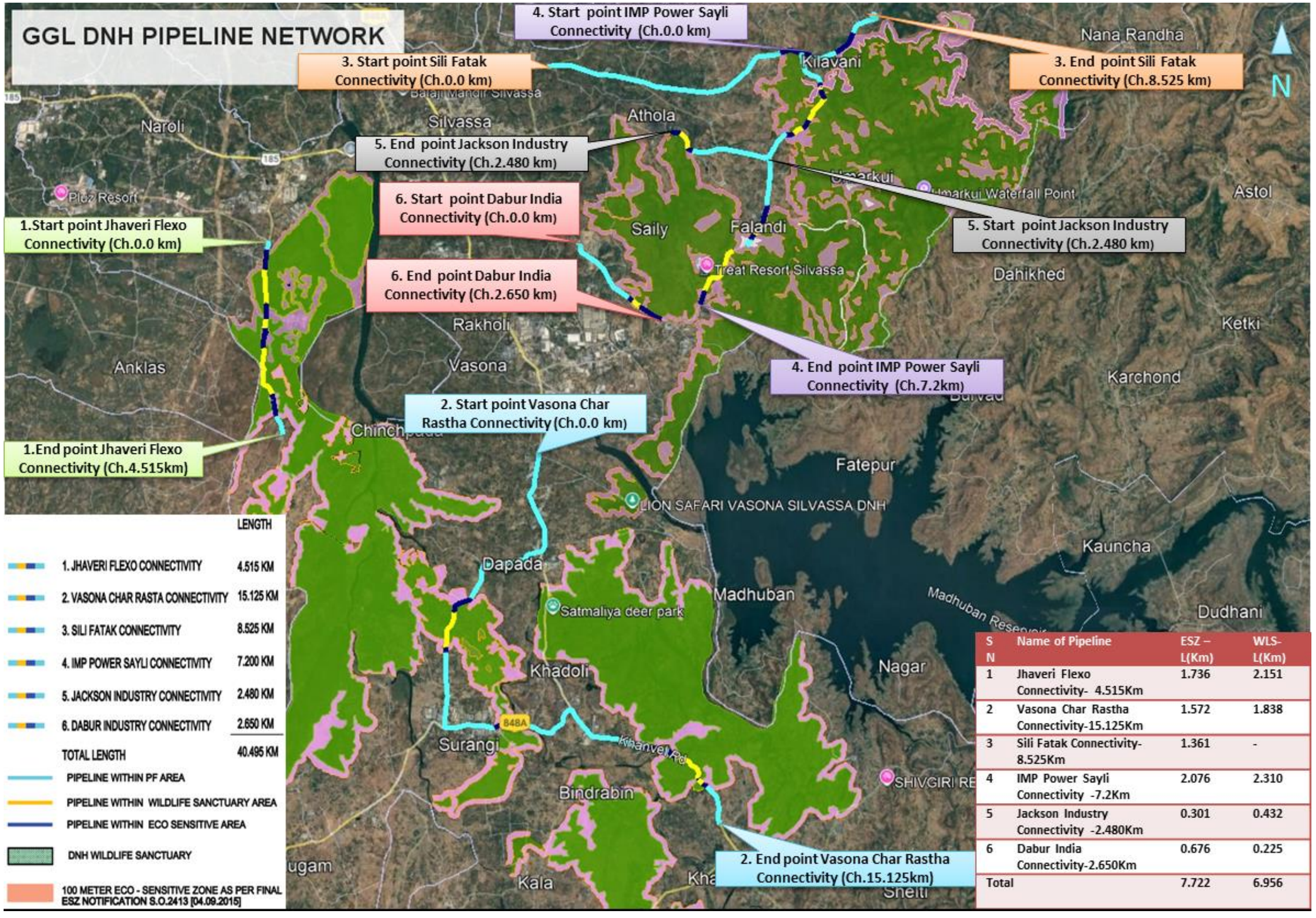
બાંધકામ અને કામગીરીના તબક્કા દરમ્યાન થતી અનિચ્છનીય અસરો ઘટાડવા માટેના પગલાં વિવિધ વ્યવસ્થાપન યોજનાઓ જેવીકે (ગ્રીન બેલ્ટ ડેવલપમેન્ટ પ્લાન, સોલીડ વેસ્ટ મેનેજમેંટ પ્લાન વગેરે) ઇ એમ પી ના અમલીકરણ માટે સંસ્થાકીય સુયોજીત/ભલામણ.

પ્રોજેક્ટની કામગીરી પૂર્ણ થયા પછીનો પર્યાવરણીય દેખરેખનો કાર્યક્રમ હાથ ધરવો.

પર્યાવરણના સંરક્ષણના પગલાં માટેના ખર્ચની માહિતી.

1.15. પાઇપલાઇન માર્ગમાં આવતા ગામોની યાદી

સૂચિત પાઇપલાઇન દપાડા,ચિખલી, સુરંગી, ખડોલી, તિનોડા, આંબોલી, બિંદ્રાબિન, ખાનવેલ, કળા ચૌડા, અને ખેરડી ગામો જે કેન્દ્રશાસિત પ્રદેશ દાદરા અને નગર હવેલીમાંથી પસાર થાય છે. પાઇપલાઇન માર્ગ દર્શાવતો નકશો પર્યાવરણીય અસરોના અભ્યાસના અહેવાલમાં પાન નંબર ૧૫ પર દર્શાવેલ છે.



S N	Name of Pipeline	ESZ – L(Km)	WLS-L(Km)
1	Jhaveri Flexo Connectivity- 4.515Km	1.736	2.151
2	Vasona Char Rastha Connectivity-15.125Km	1.572	1.838
3	Sili Fatak Connectivity-8.525Km	1.361	-
4	IMP Power Sayli Connectivity -7.2Km	2.076	2.310
5	Jackson Industry Connectivity -2.480Km	0.301	0.432
6	Dabur India Connectivity-2.650Km	0.676	0.225
Total		7.722	6.956

गुजरात गॅस लिमिटेड द्वारा केंद्र शासित प्रदेश दादरा और नगर हवेली (डी. एन. एच.) के औधोगिक, वाणिज्यिक और आवासीय क्षेत्रोमे पाइपलाइन के माध्यम से नेचरल गेस की आपूर्ति के लिए ४०.४९५ किमी लंबी और ६"/८" व्यास वाली स्टील और १२५एमएम व्यास वाली पोलीइथिलीन पाइपलाइन के साथ संबंधित सुविधाए

पर्यावरणीय प्रभाव आकलन का संक्षिप्त सारांश

(हिन्दी आवृत्ति)

गुजरात गॅस लिमिटेड.
कार्यालय नंबर ४ और ५, ग्राउंड फ्लोर
आईटी टावर-२,
इन्फोसिटि,
गांधीनगर-३८२००९

संक्षिप्त सारांश

गुजरात गॅस लिमिटेड (जी जी एल) (जो पहले जीएसपीसी डिस्ट्रिब्यूशन नेटवर्क के नाम से जानी जाती थी।) , , जो गुजरात सरकार द्वारा स्थापित भारतकी सबसे बड़ी प्राकृतिक गैस डिस्ट्रिब्यूशन कंपनी है। जिसके माध्यम से केंद्र सरकार द्वारा प्रबंधित केंद्र शासित प्रदेश दादरा और नगर हवेली में गैस आपूर्ति नेटवर्क स्थापित करने की योजना बनाई गई है, जिसके माध्यम से प्रत्येक अंतिम उपयोगकर्ता तक प्राकृतिक गैस की आपूर्ति की जाएगी। घरेलू, वाणिज्यिक और औद्योगिक उपयोग के लिए उपभोक्ताओं को चरणबद्ध तरीके से गैस की आपूर्ति की जाएगी, जिसके लिए जीजीएल को पीएनजीआरबी(पेट्रोलियम और प्राकृतिक गैस नियामक बोर्ड) के द्वारा केंद्र शासित प्रदेश दादरा और नगर हवेली में सिटी गैस वितरण नेटवर्क बिछाने, निर्माण, संचालन और प्रसार के लिए प्राधिकरण प्राप्त हुआ है। जीजीएल की योजना सड़क पर प्रमुख स्थानों पर सीएनजी स्टेशन बनाने की है और इस योजना के तहत सड़क पर चलने वाले वाहनों को सीएनजी गैस उपलब्ध कराई जाएगी। जिससे प्रदूषण कम करने में मदद मिलेगी।

गुजरात गैस लिमिटेड अपने विस्तृत भौगोलिक क्षेत्र में प्रत्येक संभावित उपभोक्ता तक प्राकृतिक गैस पहुंचाने के लिए प्रतिबद्ध है। जीजीएल केंद्र शासित प्रदेश दादरा और नगर हवेली (डीएनएच) और इसके आसपास के क्षेत्रों में विभिन्न औद्योगिक, वाणिज्यिक और आवासीय क्षेत्रों में प्राकृतिक गैस की आपूर्ति में लगी हुई है। कंपनी की योजना भूमिगत स्टील/पॉलीइथिलीन से बनी ४०.४९५किलोमीटर लंबी प्राकृतिक गैस परिवहन पाइपलाइन स्थापित करने की है।

केंद्रीय प्रदूषण नियंत्रण बोर्ड (सी.पी.सी.बी.) और पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय (MoEFCC) भारत सरकार के नए वर्गीकरण के अनुसार यह "तेल और गैस परिवहन पाइपलाइन औद्योगिक गतिविधि" हरित श्रेणी (Green Category) में आता है। क्योंकि इसका पर्यावरण पर प्रभाव बहुत कम है।

14 सितम्बर 2006 के पर्यावरण प्रभाव आकलन (Environmental Impact Assessment) अधिनियम और उसके संशोधनों के अनुसार, प्रस्तावित परियोजना "6(ए) तेल और गैस परिवहन पाइपलाइन" जो राष्ट्रीय उद्यान/अभयारण्य/कोरल रीफ/पारिस्थितिक रूप से संवेदनशील क्षेत्र (एलएनजी टर्मिनल सहित) के अंतर्गत आती है, इसलिए इस अधिनियम के अनुसार पर्यावरणीय मंजूरी प्राप्त करना आवश्यक है और इसलिए पर्यावरणीय प्रभाव आकलन और पर्यावरण प्रबंधन योजना अध्ययन रिपोर्ट तैयार करना आवश्यक हो जाता है।

मौजूदा पर्यावरणीय परिस्थितियों और प्रस्तावित परियोजना के कारण होने वाले संभावित प्रभावों को ध्यान में रखते हुए पर्यावरणीय प्रभाव आकलन और पर्यावरणीय प्रबंधन योजना तैयार की गई है।

1.1 परियोजना स्थान की जानकारी

प्रस्तावित परियोजना दादरा और नगर हवेली के निम्नलिखित क्षेत्रों से होकर गुजरती है। जिसे छह मुख्य भागों में बांटा गया है।

क्रम	प्रारंभिक स्थल	अंतिम स्थल	कुल किमी
१	खारपड़ा (20°15'"2.69N,	झवेरी फ्लेकसो (20°12'"42.16N,	४.५१५किमी लम्बी तथा १२५ मिमी

	72°58'"0.70E)	72°58'"16.00E)	व्यास वाली पीई (पॉलीइथिलीन) पाइपलाइन (मौजूदा सड़क स्थान में सड़क के समानांतर)
२	वासोना चार रास्ते (20°12'"28.89N, 73° 1'"30.01E)	खानवेल HP पैट्रोलियम (20° 8'"11.43N, 73° 3'"45.75E)	१५.१२५किमी लम्बी तथा 8 इंच व्यास वाली स्टील पाइपलाइन (मौजूदा सड़क स्थान में सड़क के समानांतर)
३	सिली फाटक (20°17'"13.16N, 73° 1'"34.12E)	राँधे रोड (20°17'"48.62N, 73° 5'"52.35E)	८.५२५किमी लम्बी और ६ इंच व्यास वाली स्टील/१२५ मिमी व्यास वाली पीई (पॉलीइथिलीन) पाइपलाइन (मौजूदा सड़क स्थान में सड़क के समानांतर)
४	IMP पावर सायली 17'"21.90N, 73° 4'"52.24E)	सिद्धान्त इंस्पात (20°14'"16.43N, 73° 3'"32.48E)	७.२किमी लम्बी और ६ इंच व्यास वाली स्टील/१२५ मिमी व्यास वाली पीई (पॉलीइथिलीन) पाइपलाइन (मौजूदा सड़क स्थान में सड़क के समानांतर)
५	जेकसन इंडस्ट्री (20°16'"4.53N, 73°4'"26.07E)	अथोला (20°16'"23.21N, 73°3'"11.52E)	२.४८०किमी लम्बी और १२५एमएम व्यास पीई (पॉलीइथिलीन) पाइपलाइन (मौजूदा सड़क स्थान में सड़क के समानांतर)
६	डाबर इंडस्ट्री कनेक्टिविटी (टेकऑफ़- 20°15'2.27"N, 73° 1'58.45"E)	टर्मिनल पॉइंट- 20°14'5.40"N, 73° 3'3.04"E)	२.६५०किमी लम्बी और १२५एमएम व्यास पीई (पॉलीइथिलीन) पाइपलाइन (मौजूदा सड़क स्थान में सड़क के समानांतर)

1.2 परियोजना विवरण

अन्य तरल अर्थात पेट्रोल, डीजल और ठोस ईंधनों के विपरीत, जो दहन पर बहुत अधिक प्रदूषण उत्पन्न करते हैं और हैंडलिंग के दौरान बहुत सारी समस्याएँ पैदा करते हैं, प्राकृतिक गैस एक ईंधन होने के कारण प्लांट या घर के अंदर कोई प्रदूषण नहीं फैलाती है, कूड़ा-कचरा नहीं फैलाती है और हैंडलिंग के दौरान इन सभी बिंदुओं पर नुकसान नहीं पहुँचाती है, जो घर, प्लांट और उपकरणों की अच्छी स्थिति सुनिश्चित करता है। प्राकृतिक गैस की पर्यावरण अनुकूल विशेषताओं को देखते हुए इसका उपयोग विभिन्न उद्योगों में वाणिज्यिक उद्देश्यों के लिए और

घरों में घरेलू उद्देश्यों के लिए करने की सिफारिश की जाती है। गुजरात गैस लिमिटेड अपने विभिन्न उपभोक्ताओं और ग्राहकों को सिटी गैस डिस्ट्रीब्यूटिंग (सीजीडी) नेटवर्क के माध्यम से पीएनजी (पाइप्ड नेचुरल गैस) द्वारा प्राकृतिक गैस के वितरण में लगी हुई है। गुजरात गैस लिमिटेड ने केंद्र शासित प्रदेश दादरा और नगर हवेली में पीएनजी नेटवर्क स्थापित करने का प्रस्ताव दिया है और इसके हिस्से के रूप में जीजीएल ने पीई पाइपलाइन नेटवर्क के लिए हर 1.0 किमी और स्टील पाइपलाइन नेटवर्क के लिए 3 किमी पर भूमिगत वाल्व वाली संबंधित सुविधाओं के साथ प्राकृतिक गैस वितरण पाइपलाइन नेटवर्क बिछाने का प्रस्ताव दिया है। वर्तमान रिपोर्ट पाइपलाइन खंड के कारण अपेक्षित/संभावित पर्यावरणीय प्रभावों के बारे में बताती है। यह केंद्र शासित प्रदेश दादरा और नगर हवेली भौगोलिक क्षेत्र से होकर गुजरेगी। अन्य ईंधन की तुलना में प्राकृतिक गैस की वायु प्रदूषण पैदा करने वाली गुणवत्ता बहुत कम/नगण्य होने के कारण, इसके उपयोग से पर्यावरण की गुणवत्ता में सुधार होगा। इसलिए, पाइपलाइन के माध्यम से प्राकृतिक गैस का परिवहन एक पर्यावरण अनुकूल गतिविधि है।

1.3 परियोजना की मुख्य विशेषताएं:

मेसर्स गुजरात गैस लिमिटेड ने गुजरात राज्य के विभिन्न शहरों और दादरा और नगर हवेली के केंद्र शासित प्रदेश में प्राकृतिक गैस (पीएनजी नेटवर्क) स्थापित करने का प्रस्ताव रखा है ताकि शहर के भीतर और आसपास के विभिन्न औद्योगिक, वाणिज्यिक और आवासीय उपभोक्ताओं को प्राकृतिक गैस (पीएनजी) की आपूर्ति की जा सके।

मैसर्स गुजरात गैस लिमिटेड ने केंद्र शासित प्रदेश दादरा और नगर हवेली (डीएनएच) में संबद्ध सुविधाओं सहित प्राकृतिक गैस वितरण पाइपलाइन नेटवर्क की स्थापना का प्रस्ताव रखा है जिसके लिए जीजीएल को सीजीडी नेटवर्क बिछाने, निर्माण, संचालन या विस्तार के लिए पीएनजीआरबी प्राधिकरण दिनांक: ०१.०४.२०१५ से प्राप्त हुआ है।

जीजीएल ने केंद्र शासित प्रदेश दादरा और नगर हवेली में संबद्ध सुविधाओं सहित प्राकृतिक गैस वितरण पाइपलाइन नेटवर्क बिछाने का प्रस्ताव रखा है

प्रस्तावित पाइपलाइन की मुख्य विशेषताएं नीचे दी गई हैं:

परियोजनका नाम	केंद्र शासित प्रदेश दादरा नगर हवेली में प्राकृतिक गैस वितरण पाइपलाइन नेटवर्क की स्थापना, जिसकी लंबाई 40.495 किमी होगी, जिसमें स्टील के लिए 6”/8” व्यास और पीई (पॉलीइथिलीन) के लिए 125 मिमी व्यास होगा, जिसमें संबद्ध सुविधाएं शामिल हैं 1. खरादपाड़ा (20°15'2.69"N,72°58'0.70"E) से झावेरी फ्लेक्सो (20°12'42.16"N,72°58'16.00"E) कनेक्टिविटी- लंबाई 4.515 किमी और 125 मिमी व्यास। पीई (मौजूदा सड़क आरओडब्ल्यू के साथ) 2. वासोना चार रास्ता (20°12'28.89"N, 73° 1'30.01"E) से खानवेल एचपी पेट्रोलियम (20° 8'11.43"N, 73° 3'45.75"E) खानवेल कनेक्टिविटी (एचपी आरओ) - लंबाई 15.125 किमी और 8'' व्यास। स्टील (मौजूदा सड़क RoW के साथ) 3. सिली फाटक (20°17'13.16"N, 73° 1'34.12"E) से रांधे रोड (20°17'48.62"N,73° 5'52.35"E) उमरकिउ कनेक्टिविटी - लंबाई 8.525

	किमी और 6" स्टील/125 मिमी व्यास। पीई (मौजूदा सड़क RoW के साथ) 4. आईएमपी पावर सायली (20°17'21.90"N, 73° 4'52.24"E) और सिद्धांत इस्पात (20°14'16.43"N, 73° 3'32.48"E) कनेक्टिविटी प्रोजेक्ट - लंबाई 7.200 किमी और 6" स्टील/125 मिमी व्यास। पीई (मौजूदा सड़क के साथ-साथ आरओडब्ल्यू) 5. जैक्सन इंडस्ट्री (20°16'4.53"एन, 73°4'26.07"ई) से एथोला (20°16'23.21"एन, 73°3'11.52"ई) कनेक्टिविटी प्रोजेक्ट - लंबाई 2.480 किमी और 125 मिमी व्यास। पीई (मौजूदा सड़क के साथ-साथ आरओडब्ल्यू) 6. डाबर इंडस्ट्री कनेक्टिविटी (टेकऑफ़- 20°15'2.27"एन, 73° 1'58.45"ई से टर्मिनल पॉइंट- 20°14'5.40"एन, 73° 3'3.04"ई) - लंबाई 2.650 किमी और 125 मिमी व्यास। पीई (मौजूदा सड़क के साथ-साथ आरओडब्ल्यू)		
पेट्रोलियम और प्राकृतिक गैस विनियामक प्राधिकरण (पीएनजीआरबी) प्राधिकरण	औद्योगिक और घरेलू खपत के लिए अन्य वैकल्पिक ईंधनों (जैसे पेट्रोल, डीजल और लकड़ी आदि) की तुलना में प्राकृतिक गैस एक पर्यावरण अनुकूल और कुशल ईंधन है, इसलिए पीएनजीआरबी ने पूरे देश में प्रमुख शहरों और राज्यों सहित प्राकृतिक गैस वितरण नेटवर्क का निर्माण करने पर विचार किया है। इसके एक हिस्से के रूप में, जीजीएल को डीएनएच जीए के केंद्र शासित प्रदेश में प्राकृतिक गैस वितरण नेटवर्क की स्थापना का काम भी सौंपा गया था और इसलिए, जीजीएल को सीजीडी नेटवर्क बिछाने, निर्माण, संचालन या विस्तार के लिए पीएनजीआरबी प्राधिकरण प्राप्त हुआ है।		
गैस आपूर्ति का स्रोत	केंद्र शासित प्रदेश दादरा और नगर हवेली भौगोलिक क्षेत्र में गैस आपूर्ति के अपस्ट्रीम जीजीएल नेटवर्क और केंद्र शासित प्रदेश दादरा और नगर हवेली भौगोलिक क्षेत्र में डाउनस्ट्रीम घरेलू और औद्योगिक ग्राहकों के रूप में		
पाइपलाइन मटिरियल	स्टील पाइपलाइन • पाइप सामग्री: कार्बन स्टील; इलेक्ट्रिक रेजिस्टेंस वेल्डेड (ERW) • स्टील का ग्रेड: API-5L (PSL-2) के अनुसार X 52 पॉली एथिलीन (PE) • पाइप सामग्री: पॉली एथिलीन (PE) • PE का ग्रेड: IS -14885 के अनुसार P-100		
	८" NB(स्टील)	**६" NB(स्टील)**	**१२५ mm(पीई)**
डिज़ाइन प्रैशर	४९.० बार्ग	४९.० बार्ग	४९.० बार्ग
ऑपरेटिंग प्रैशर	२६.० बार्ग	४.० बार्ग	४.० बार्ग
इनलेट प्रैशर	२६.० बार्ग (अधिकतम)	४.० बार्ग (अधिकतम)	४.० बार्ग (अधिकतम)
आउटलेट प्रैशर	१९.० बार्ग (अधिकतम)	१.० बार्ग (अधिकतम)	१.० बार्ग (अधिकतम)
इनलेट एवं आउटलेट तापमान	**0°C से 55°C के बीच**		
ऑपरेटिंग तापमान	**15°C से 45°C के बीच**		
निर्माण और समापन की अनुसूची	**संभावित समय-सीमा** परियोजना प्रारंभ तिथि - अक्टूबर-2025 (जरूरी सभी अनुमति जारी होने की तिथि से) परियोजना पूर्ण होने की तिथि - मार्च-2027		

<table>
<tr><td></td><td>(टिप्पणी: निर्माण कार्य बोर्ड/प्राधिकरणों से सभी अपेक्षित अनुमति के बाद शुरू किया जाएगा।)</td></tr>
<tr><td>लागू मानक और कोड</td><td>- पेट्रोलियम और प्राकृतिक गैस विनियामक बोर्ड (पीएनजीआरबी) दिशानिर्देश
- सीजीडी नेटवर्क के लिए सुरक्षा मानकों सहित तकनीकी मानक और विनिर्देश
- अमेरिकन सोसाइटी ऑफ मैकेनिकल इंजीनियर्स (ASME) B 31.8 – गैस ट्रांसमिशन और वितरण पाइपिंग सिस्टम</td></tr>
<tr><td>श्रम की आवश्यकता</td><td>निर्माण चरण: संख्या 40 (अधिकतम)</td></tr>
<tr><td>पानी की खपत</td><td>पाइपलाइन के निर्माण चरण के दौरान पानी की आवश्यकता विभिन्न गतिविधियों के लिए होगी, जो नीचे दी गई है, जिसे पास के नगरपालिका स्रोत से टैंकर आपूर्ति द्वारा पूरा किया जाएगा।
<table>
<tr><td>क्रम संख्या</td><td>गतिविधि</td><td>पानी की खपत लीटर में</td></tr>
<tr><td>१</td><td>आवश्यक के अनुसार HDD (हॉरिजॉन्टल डाइरेक्क्स्नल ड्रिलिंग)विधि द्वारा स्टील/पीई बिछाना</td><td>११२०००</td></tr>
<tr><td>२</td><td>पाइपलाइन बिछाने के दौरान ट्रेंच को सधन करने के लिए पानी डालना
(टिप्पणी: १.०किमी पाइपलाइन के लिए - ५००० लीटर, कुल ४०.४९५किमी के लिए - २०२४७५लीटर)</td><td>२०२४७५</td></tr>
<tr><td>३</td><td>डोमेस्टिक हेतु जल की खपत
(टिप्पणी: डेढ़ साल के लिए - ४६८०० लीटर)</td><td>४६८००</td></tr>
<tr><td></td><td>कुल</td><td>३६१२७५</td></tr>
</table></td></tr>
<tr><td>ऊर्जा की आवश्यकता और डीजी सेटों की संख्या (केवीए क्षमता के साथ)</td><td>- पीई पाइपलाइन बिछाने के निर्माण चरण के दौरान केवल इलेक्ट्रो फ्यूजन वेल्डिंग के लिए अस्थायी 3 केवीए डीजी सेट की आवश्यकता होगी ।
- स्टील पाइपलाइन बिछाने के निर्माण चरण के दौरान वेल्डिंग के लिए अस्थायी 25 केवीए डीजी सेट की आवश्यकता होगी।
- पाइपलाइन मार्ग पर किसी स्टेशनरी/स्थायी डीजी सेट की आवश्यकता नहीं है।</td></tr>
<tr><td>परियोजना का मूल्य</td><td>१३ करोड़</td></tr>
<tr><td>क्षमता</td><td>०.२५ MMSCMD (मिलियन मेट्रिक स्टैंडर्ड क्युबिक मीटर पर डे)</td></tr>
<tr><td>जनसंख्या घनत्व सूचकांक</td><td>क्लास IV (डिजाइन फैक्टर 0.4 और ASME B 31.8 के अनुसार)</td></tr>
<tr><td>परियोजना की पर्यावरणीय संवेदनशीलता</td><td>केंद्र शासित प्रदेश डीएनएच क्षेत्र में प्रस्तावित प्राकृतिक गैस परिवहन पाइपलाइन की कुल लंबाई लगभग 40.495 किमी में से 6.956 किमी डीएनएच वन्य जीव अभयारण्य से होकर गुजरती है तथा 7.722 किमी डीएनएच वन्य जीव अभयारण्य के पारिस्थितिकी संवेदनशील क्षेत्र से होकर गुजरती है।
मौजूदा सड़क पर प्रतिदिन वाहनों की आवाजाही डीएनएच वन्यजीव अभयारण्य से होकर गुजरती है।
हालांकि, प्रस्तावित पाइपलाइन मार्ग का इस क्षेत्र में कोई स्थायी प्रभाव नहीं होगा, क्योंकि यह पीडब्ल्यूडी विभाग के अधीन मौजूदा सड़क मार्ग के साथ १.० से १.२ मीटर भूमिगत पाइपलाइन है। इस क्षेत्र में पाइपलाइन बिछाने के निर्माण चरण के दौरान ही प्रभाव की परिकल्पना की गई है, जो केवल कुछ दिनों तक सीमित रहेगा तथा पाइपलाइन बिछाने के बाद मिट्टी को उसकी मूल स्थिति के निकट पुनः स्थापित कर दिया जाएगा। इसलिए,</td></tr>
</table>

वन्यजीव अभ्यारण्य पर निरंतर आधार पर कोई बड़ा प्रभाव अपेक्षित नहीं है। इसलिए, परियोजना का प्रभाव बहुत मामूली, अस्थायी प्रकृति का और प्रतिवर्ती होगा।

लिंक्ड वन प्रस्ताव संख्या.

क्रम संख्या	**पाइपलाइन सेक्शन**	**पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय (एमओईएफ और सीसी) वन मंजूरी प्रस्ताव संख्या**	**वन भूमि का क्षेत्रफल (हेक्टेयर में)**	**वन भूमि का प्रकार**
१	झावेरी फ्लेक्सो इंडिया लिमिटेड कनेक्टिविटी	FP/DN/Pipeline/494625/2024	०.२२७८	रक्षित वन
२	सिली फाटक से रंधे रोड उमरकुई कनेक्टिविटी, आईएमपी पावर, सायली और सिद्धांत इस्पात, उमरकुई कनेक्टिविटी और जैक्सन इंडस्ट्री, अथोला कनेक्टिविटी	FP/DN/Pipeline/494608/2024	०.९१५२	रक्षित वन
३	वासोना चार रास्ता से खानवेल पेट्रोल पंप	FP/DN/Pipeline/493459/2024	०.७६१७	रक्षित वन
		टोटल	१.९०४७	रक्षित वन

लिंक्ड वन्यजीव प्रस्ताव संख्या.

क्रम संख्या	**पाइपलाइन सेक्शन**	**पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय (एमओईएफ और सीसी) वन्यजीव मंजूरी प्रस्ताव संख्या**	**पारिस्थिति की संवेदनशील क्षेत्र में लंबाई**	**वन्य जीवन अभयारण्य में लंबाई**
१	झावेरी फ्लेक्सो इंडिया लिमिटेड कनेक्टिविटी	WL/DN/Pipeline/500455/2024	१.७३६	२.१५१
२	वासोना चार रास्ता कनेक्टिविटी		१.५७२	१.८३८
३	सिली फाटक कनेक्टिविटी		१.३६१	-
४	आईएमपी पवार सायली		२.०७६	२.३१०

		कनेक्टिविटी			
	५	जैकसन इंडस्ट्री कनेक्टिविटी		०.३०१	०.४३२
	६	डाबर इंडिया कनेक्टिविटी		०.६७६	०.२२५
			कुल	७.७२२	६.९५६
राष्ट्रीय उद्यान	शून्य				
कोरल रीफ़	शून्य				
मैनग्रोव	शून्य				

1.4 बिजली की आवश्यकता

पाइपलाइन बिछाने के केवल कन्स्ट्रकशन चरण के दौरान इलेक्ट्रो फ्यूजन वेल्डिंग के लिए अस्थायी 3 केवीए डीजी सेट की आवश्यकता होगी और स्टील पाइपलाइन बिछाने के केवल कन्स्ट्रकशन चरण के दौरान वेल्डिंग के लिए अस्थायी 25 केवीए डीजी सेट की आवश्यकता होगी।

पाइपलाइन ऑपरेशन के दौरान किसी स्टेशनरी/स्थायी डीजी सेट की आवश्यकता नहीं है। हालाँकि, पाइपलाइन की स्थापना के दौरान डीजी सेट का उपयोग कन्स्ट्रकशन कोंटराक्टर द्वारा किया जाएगा। इसलिए इसका प्रभाव अस्थायी, कम और प्रतिवर्ती होगा।

1.5 सॉलिड हजार्डस प्रबंधन

अस्थायी शिविरों से उत्पन्न सॉलिड वेस्ट और प्लास्टिक, कागज, कार्डबोर्ड आदि जैसे अन्य अपशिष्टों को एसपीसीबी के दिशानिर्देश के अनुसार उचित रूप से एकत्रित, पृथक और पुनः उपयोग/निपटान किया जाएगा ।

ई-वेस्ट

आजकल इलेक्ट्रॉनिक सर्किट, पिक्चर ट्यूब, विशेष कांच के बर्तन, कंटेनर, ट्यूब लाइट, सीएफएल ट्यूब आदि जैसे ई-कचरे के निपटान के प्रति बहुत जागरूकता आई है। प्रस्तावक को सावधानीपूर्वक संग्रह करना होगा, अलग से और सुरक्षित रूप से संग्रहीत करके, सूची का रिकॉर्ड रखा जाएगा और उन्हें एमओईएफ, नई दिल्ली द्वारा अनुमोदित टीएसडीएफ को देकर उनका निपटान किया जाएगा। इसका विवरण एसपीसीबी के दिशा-निर्देशों के अनुसार उपलब्ध कराया जाएगा।

पाइपलाइन बिछानेकी गतिविधियों से किसी भी प्रकार का खतरनाक अपशिष्ट उत्पन्न होने की संभावना नहीं है।

1.6 संबद्ध सुविधाओं के लिए:

प्रस्तावित पाइपलाइन में पाइपलाइन मार्ग पर संबद्ध सुविधाओं के रूप में पीई पाइपलाइन के प्रत्येक 1.0 किमी हिस्से पर भूमिगत वाल्व तथा स्टील पाइपलाइन के 3.0 किमी हिस्से पर भूमिगत वाल्व होंगे।

1.7 कार्यबल व्यवस्था

निर्माण कार्य अस्थायी होगा और प्राकृतिक गैस के परिवहन के लिए इस पीई पाइपलाइन को बिछाने के लिए निर्माण अवधि के दौरान आवश्यकता के आधार पर विभिन्न स्थानों पर लगभग 40 मजदूरों को तैनात किया जाएगा। कर्मचारियों के लिए निर्माण उद्देश्यों के लिए विकास सुविधाओं के पास सभी उपचार सुविधाओं के साथ अस्थायी श्रमिक शिविर/पोर्टा केबिन स्थल स्थापित किए जाएंगे। निर्माण श्रमिकों को अधिमानतः आस-पास के गांवों से लिया जाएगा।

1.8 पर्यावरण का विवरण

वायु, ध्वनि, जल, भूमि, वनस्पति और जीव-जंतु तथा सामाजिक-आर्थिक जैसे विभिन्न पर्यावरणीय घटकों की आधारभूत पर्यावरणीय गुणवत्ता पर्यावरणीय अध्ययन का महत्वपूर्ण और अभिन्न अंग है। आधारभूत डेटा प्रस्तावित परियोजना के पर्यावरणीय प्रभावों की भविष्यवाणी/मूल्यांकन का आधार बनता है। वर्तमान रिपोर्ट दिसंबर 2024 से फरवरी 2025 तक की नमूना अवधि के दौरान एकत्र किए गए डेटा को प्रस्तुत करती है।

पर्यावरण एवं वन मंत्रालय की सिफारिशों के अनुसार, गैर-मानसून मौसम के दौरान, शुष्क दिनों में नमूनाकरण और निगरानी की गई है। विभिन्न पर्यावरणीय घटकों की निगरानी की गई और नमूनों का विश्लेषण किया गया। इसके अलावा, साइट से एकत्र किए गए प्राथमिक डेटा को पुष्ट करने के लिए द्वितीयक स्रोतों यानी सरकारी/गैर-सरकारी एजेंसियों, विश्वविद्यालयों, सिंचाई विभाग, भारतीय मौसम विज्ञान विभाग (IMD), भूजल बोर्ड आदि से अतिरिक्त डेटा भी एकत्र किया गया।

पर्यावरण के विभिन्न घटकों, जैसे वायु, ध्वनि, जल, भूमि, जीव विज्ञान, मौसम विज्ञान और सामाजिक-आर्थिक, की आधारभूत गुणवत्ता का आकलन भौतिक निगरानी और विश्लेषण के माध्यम से पाइप लाइन के सम्पूर्ण मार्ग के दोनों ओर लगभग 1.5 किलोमीटर के प्रभाव क्षेत्र में किया गया है।

1.9 पर्यावरण निगरानी कार्यक्रम

पर्यावरण निगरानी कार्यक्रम पर्यावरण निगरानी करने के लिए एक महत्वपूर्ण घटक है जिसमें वायु, जल, मिट्टी और ध्वनि पर्यावरण के लिए माप पद्धति, स्थान का चयन, डेटा विश्लेषण, रिपोर्टिंग कार्यक्रम, आपातकालीन प्रक्रिया, विस्तृत बजट और खरीद कार्यक्रम सहित शमन उपायों की प्रभावशीलता की निगरानी के तकनीकी पहलू शामिल हैं। प्रस्तावित परियोजना के कारण पर्यावरणीय प्रभाव के आकलन और मूल्यांकन के उद्देश्य से निम्नलिखित पाँच पर्यावरणीय घटकों पर विचार किया गया है।

- वायु पर्यावरण
- ध्वनि पर्यावरण
- जल पर्यावरण
- भूमि पर्यावरण
- जैविक पर्यावरण
- सामाजिक आर्थिक पर्यावरण

वायु पर्यावरण

अध्ययन क्षेत्र की आधारभूत स्थिति स्थापित करने के लिए, पाइपलाइन मार्ग के साथ कुल 15 AAQ निगरानी स्टेशनों का चयन किया गया। इस क्षेत्र में, पारंपरिक वायु प्रदूषक जैसे PM10, सल्फर डाइऑक्साइड (SO2), नाइट्रोजन के ऑक्साइड, साथ ही कार्बन मोनोऑक्साइड (CO) की पहचान वायु गुणवत्ता मूल्यांकन के लिए की जाती है।

पाइपलाइन मार्ग के साथ

अध्ययन क्षेत्र के ग्रामीण क्षेत्रों में हवा से उड़ने वाली मिट्टी, कच्ची सड़क आदि के कारण 24 घंटे में PM10 की सांद्रता 57.2-72.8 µg/m3 के बीच रही। SO2 की सांद्रता 7.4-13.1 µg/m3 के बीच पाई गई। इसी तरह पाइपलाइन मार्ग पर NOx की सांद्रता 11-16 µg/m3 के बीच पाई गई।

सभी स्थानों पर कार्बन मोनोऑक्साइड की सांद्रता <0.5 mg/m3 थी, जो राष्ट्रीय परिवेशी वायु गुणवत्ता मानक(NAAQS) से कम पाई गई।

ध्वनि पर्यावरण

गांव क्षेत्र, यातायात क्षेत्र और संवेदनशील क्षेत्रों में गतिविधियों के आधार पर कुल पंद्रह (15) स्थानों पर ध्वनि का निरीक्षण किया गया है।

पाइपलाइन मार्ग के साथ

पाइपलाइन मार्ग पर समतुल्य ध्वनि स्तर, Leq (दिन) और Leq (रात) की निगरानी की गई। समतुल्य ध्वनि स्तर 43-69 dB(A) की सीमा में रेकॉर्ड किए गए थे। वाहन यातायात प्रमुख ध्वनि स्रोत है और अध्ययन क्षेत्र में बैकग्राउंड ध्वनि के स्तर में मुख्य रूप से योगदान देता है। पाइपलाइन मार्ग पर दिन और रात के ध्वनि स्तरों की निगरानी की गई, जो दिन के दौरान 42-69 dB(A) और रात के समय 35-70 dB(A) की सीमा में क्रमशः देखे गए।

जल पर्यावरण
जल गुणवत्ता मूल्यांकन
सतही जल की गुणवत्ता:
सतही जल के नमूने अमित पेट्रोलियम (सुरंगी) के पास, सायली रोड के पास, किलावाणी रोड के पास और दापाड़ा से सुरंगी पुल के पास से एकत्र किए गए। विश्लेषण के परिणाम दर्शाते हैं कि पीएच 7.29 से 7.59 के बीच था, जो कि 6.5 से 8.5 के निर्दिष्ट मानक के भीतर है। टीडीएस 445-895 मिलीग्राम/लीटर पाया गया। टोटल हार्डनेस CaCO3 के रूप में 134 से 285 मिलीग्राम/लीटर के बीच दर्ज की गई। क्लोराइड और सल्फेट का स्तर क्रमशः 98.5-124.2 मिलीग्राम/लीटर और 52.8 से 59.8 मिलीग्राम/लीटर पाया गया। भारी धातुओं की मात्रा (अर्थात As, Al, Cd, Cr, Cu, Pb, Fe, Mn, Zn और Hg) बहुत कम और निर्दिष्ट मानकों के भीतर पाई गई। सतही जल की गुणवत्ता स्वीकार्य सीमा IS-10500:2012 के निर्दिष्ट मनकोके भीतर है।

भूजल गुणवत्ता

भूजल नमूनों के विश्लेषण के परिणाम दर्शाते हैं कि पीएच 7.25 से 7.85 के बीच है, जो 6.5 से 8.5 के निर्दिष्ट मानक के भीतर है। टीडीएस 878.4-1289.6 मिलीग्राम/लीटर पाया गया जो 2000 मिलीग्राम/लीटर की स्वीकार्य सीमा के भीतर है। दर्ज की गई टोटल हार्डनेस CaCO3 के रूप में 197 से 276 mg/l की सीमा में थी जो 600 mg/l की अनुमेय सीमा के भीतर ही है। भूजल विश्लेषण के परिणामों के स्तर से संकेत मिलता है कि क्षेत्र में पानी काफी पीने योग्य है, सिवाय इसके कि पीने के लिए उपयोग किए जाने से पहले कुछ क्षेत्रों में भूजल

के लिए कीटाणुनाशक उपचार की आवश्यकता हो सकती है। हालाँकि, वृद्धिशील मूल्य का परियोजना गतिविधि के संदर्भ में कोई प्रभाव नहीं है।

भूमि पर्यावरण

अध्ययन क्षेत्र का भूमि उपयोग

भूमि उपयोग अध्ययन के लिए डीएनएच पाइपलाइन के लिए लैंड यूस लैंड कवर मेप तैयार किया गया है। भूमि उपयोग अध्ययन के परिणाम ईआईए रिपोर्ट में प्रस्तुत किए गए हैं।

भूमि

पाइपलाइन मार्ग के विभिन्न हिस्सों से मिट्टी एकत्र की गई। पाइपलाइन मार्ग के १५ अलग-अलग स्थानों से मिट्टी के नमूने एकत्र किए गए।

भौतिक-रासायनिक विशेषताएँ

मिट्टी की बनावट में सिल्टी क्ले की प्रकृति पाई गई। नियमित खेती की पद्धतियों से मिट्टी का घनत्व बढ़ जाता है, जिससे संघनन होता है। इसके परिणामस्वरूप पानी के रिसाव की दर और मिट्टी में जड़ों के प्रवेश में कमी आती है।

रासायनिक लक्षण

अध्ययन क्षेत्र में मिट्टी का पीएच मान थोड़ा अम्लीय से क्षारीय पाया गया, क्योंकि पीएच 7.24-7.84 की सीमा में था। मिट्टी के नमूने की इलैक्ट्रिकल कंडक्टिविटी (ईसी), ईसी 1.20-1.35 एमएस/सेमी की सीमा में थी। यह देखा गया कि कैल्शियम और मैग्नीशियम कार्बोनेट सांद्रता क्रमशः 448 - 623 मिलीग्राम/किग्रा और 73 - 105 मिलीग्राम/किग्रा की सीमा में थी।

पोषक तत्व स्थिति:

मिट्टी में मौजूद कार्बनिक पदार्थ और कार्बनिक कार्बन इसके भौतिक और रासायनिक गुणों को प्रभावित करते हैं और मिट्टी के समुच्चयों की स्थिरता के लिए जिम्मेदार होते हैं। कार्बनिक पदार्थ और कुल केजेलडाहल नाइट्रोजन 0.52-1.21% और 328-438 मिलीग्राम/किग्रा की सीमा में पाए गए।

1.10 अतिरिक्त अध्ययन

अतिरिक्त अध्ययन जैसे

√ जोखिम मूल्यांकन और आपदा प्रबंधन योजना,

√ आपातकालीन तैयारी योजना और पाइपलाइन के लिए प्रतिक्रिया

√ प्रशिक्षण

1.11 पाइपलाइन से गेस परिवहन के लाभ

- बहेतर परफोरमन्स (विश्व स्तर पर प्रमाणित रिसाव मुक्त प्रणाली)
- अधिक फ्लेक्सिबिलिटी, दक्टिलिटी और अधिक इलास्टिसिटी
- कम घनत्व (कम वजन, वजन अनुपात में उच्च शक्ति)

- पीई पाइपलाइन में जंग के प्रति उच्च प्रतिरोध
- कम तापीय चालकता (थर्मल नुकसान की कम संभावना)
- स्मूथ सरफेस (कम धर्षण)
- परिवहन, संभाल और बिछाने में आसान
- लंबी अवरदा
- पीई पाइपलाइनमे इलेक्ट्रो फ्यूजन तकनीकों को नियोजित करके रिसाव रहित जोड़ों को सुनिश्चित करने के लिए आसान और तेज़ जुड़ने की तकनीक।
- उच्च उत्पादकता, यानी, स्थापना समय में कमी (स्टील के मामले में 4 घंटे के मुकाबले पीई के मामले में 15 मिनट), जिससे जनता को कम असुविधा होती है।
- जोड़ों की संख्या कम, इसलिए सुरक्षित और रिसाव मुक्त प्रणाली
- स्टील पाइपलाइन की तुलना में पीई पाइपलाइन मे क्षति की मरम्मत में कम समय लगता है।
- लंबी डिज़ाइन लाइफ; पीई पाइपलाइन ५० साल और स्टील पाइपलाइन ३० साल

1.12 परियोजना के लाभ

भारत में औद्योगीकरण की तीव्र दर के परिणामस्वरूप, ईंधन की जरूरतें भी उतनी ही तेजी से बढ़ रही हैं तथा आपूर्ति-मांग का अंतर भी बढ़ रहा है तथा इस समस्या के समाधान के लिए कदम उठाए जा रहे हैं।

- प्राकृतिक गैस का उपयोग एलपीजी, पेट्रोल, डीजल और अन्य पारंपरिक ईंधनों जैसे वैकल्पिक ईंधनों की तुलना में कम कार्बन वाला और खाना पकाने और परिवहन ईंधन के रूप में किया जाता है।
- सीजीडी पाइपलाइन नेटवर्क के द्वारा बिना कोई अंतराल से पर्यावरणीय अनुकूल इंधन की प्राप्ति होती है। सीएनजी के रूप में वाहनों के लिए परिवहन ईंधन की निर्बाध आपूर्ति सुनिश्चित करते हैं और इस प्रकार बड़े पैमाने पर सार्वजनिक स्वास्थ्य को लाभ पहुंचाते हैं।
- भूमिगत सीजीडी नेटवर्क से शहरी क्षेत्रों की भीड़भाड़ वाली सड़कों को एलपीजी सिलेंडर वितरण टेम्पो/मोटर वाहनों से मुक्त करने में मदद मिलेगी।
- पीएनजी के विस्तार से शहरी क्षेत्रों में सब्सिडी वाले एलपीजी सिलेंडरों की उपलब्धता कम हो जाएगी, जिससे उन्हें ग्रामीण/दूरस्थ क्षेत्रों में वितरित किया जा सकेगा और इससे घरों में खाना पकाने के लिए ईंधन की निरंतर आपूर्ति सुनिश्चित होगी।
- सुरक्षा, मितव्ययिता और पर्यावरण मित्रता की दृष्टि से ईंधन के परिवहन के लिए पाइपलाइनों को अंतरराष्ट्रीय स्तर पर पसंदीदा विकल्प के रूप में मान्यता प्राप्त है।
- इस परियोजना से निर्माण चरण के दौरान स्थानीय लोगों के लिए ठेकेदारों के माध्यम से रोजगार के अवसर बढ़ेंगे।
- संचार एवं परिवहन पर कोई प्रतिकूल प्रभाव नहीं पड़ेगा।
- पाइपलाइन परिवहन का एक अतिरिक्त लाभ यह है कि चोरी और उत्पादों में मिलावट जैसे आर्थिक अपराधों की गुंजाइश लगभग नगण्य होगी।

1.13 वार्षिक संचालन और रखरखाव योजना

- ✓ जीजीएल नियमित रूप से पीई पाइपलाइन प्राकृतिक गैस वितरण नेटवर्क के लिए वार्षिक संचालन और रखरखाव योजना बनाए रखता है, जिसमें MPPE नेटवर्क और क्रॉसिंग की मासिक गश्त, पीई नेटवर्क के LPT/LDT की त्रैमासिक निगरानी, त्योहार के दौरान अर्धवार्षिक विशेष रिसाव सर्वेक्षण शामिल है।
- ✓ प्रस्तावित डीएनएच पाइपलाइन नेटवर्क में पीई पाइपलाइन नेटवर्क के लिए प्रत्येक 1.0 किमी की दूरी पर और स्टील पाइपलाइन नेटवर्क के लिए 3.0 किमी से 5.0 किमी की दूरी पर आइसोलेशन वाल्व होगा, जिसका नियमित रूप से अपस्ट्रीम और डाउनस्ट्रीम स्तर से निरीक्षण किया जाएगा।
- ✓ जीजीएल अपने हितधारकों और लाभार्थी गांवों में भूमिगत पाइपलाइन नेटवर्क और इसकी कार्यप्रणाली के बारे में जागरूकता पैदा करने के लिए नियमित रूप से प्रशिक्षण आयोजित करेगा। पीई पाइपलाइन नेटवर्क में हर 200 मीटर पर रूट मार्कर होगा, जिसमें भविष्य में किसी भी अप्रत्याशित स्थिति के लिए आपातकालीन संपर्क नंबर होगा।
- ✓ प्राकृतिक गैस पीई पाइपलाइन नेटवर्क में एथाइल मर्कैप्टन नामक रसायन को प्राकृतिक गैस में गंध उत्पन्न करने वाले एजेंट के रूप में मिलाया जाता है, जिससे किसी के द्वारा रिसाव का आसानी से पता लग जाता है और आपातकालीन प्रतिक्रिया वाहन समय पर कार्य कर प्रभावित रिसाव पाइपलाइन परिसर में आइसोलेशन वाल्व को बंद करके गैस के प्रवाह को रोक देता है।
- ✓ इससे किसी भी अप्रत्याशित आग और अप्रत्याशित हानिकारक घटना से निपटने में मदद मिलेगी। इसलिए, GGL बहुत उच्च मानक सुरक्षा प्रोटोकॉल बनाए रख रहा है जो किसी भी संकट में आस-पास के लोगों और आसपास के पर्यावरण की रक्षा करेगा।

1.14 पर्यावरण प्रबंधन योजना

पर्यावरण प्रबंधन योजना (ईएमपी) सुरक्षित और स्वच्छ पर्यावरण सुनिश्चित करने की कुंजी है। पर्यावरण प्रबंधन योजना पर वर्तमान अध्याय में प्रबंधन योजना की परिकल्पना की गई है, जिसे परियोजना गतिविधियों से उत्पन्न होने वाले प्रतिकूल प्रभावों को कम करने के लिए शमन उपायों के उचित कार्यान्वयन के लिए पाइपलाइन परियोजना के लिए अपनाया जा रहा है।

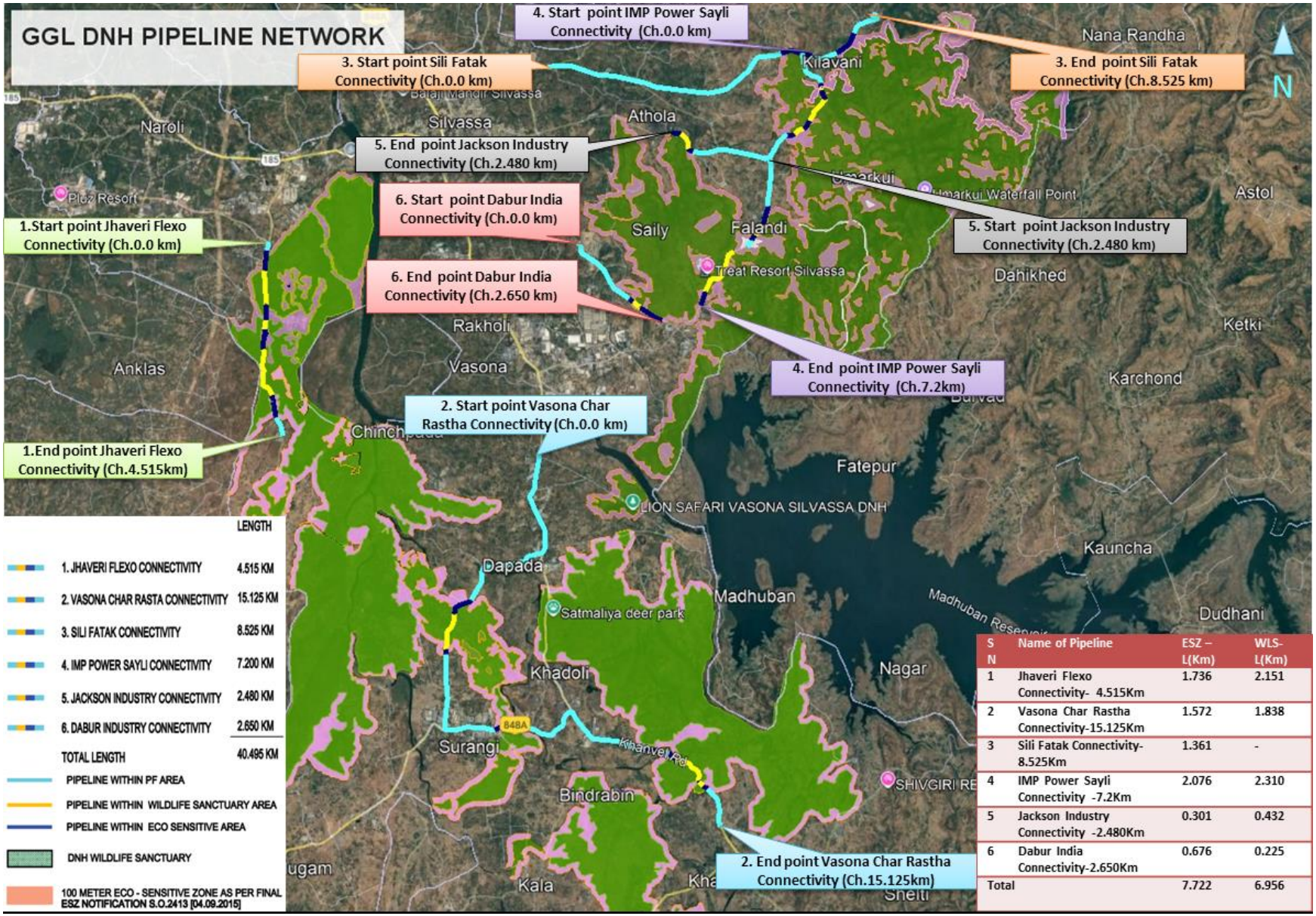
ईएमपी में नीचे दिये हुए निम्नलिखित मुद्दों पर ध्यान दिया गया है:

- ✓ निर्माण और संचालन के दौरान होने वाले अवांछनीय प्रभावों के निवारण के लिए शमन उपाय।
- ✓ ईएमपी के कार्यान्वयन के लिए पहचानी गई/अनुशंसित प्रबंधन योजनाओं (हरित पट्टी विकास योजना, ठोस अपशिष्ट प्रबंधन योजना आदि) और संस्थागत ढांचे का विवरण।
- ✓ परियोजना के चालू होने के बाद परियोजना-पश्चात पर्यावरण निगरानी कार्यक्रम चलाया जाएगा।
- ✓ पर्यावरण संरक्षण उपायों के लिए खर्च।

1.15 पाइपलाइन मार्ग के किनारे बसे गांवों की सूची

प्रस्तावित पाइपलाइन केंद्र शासित प्रदेश दादरा और नगर हवेली के दापाड़ा, चिखली, सुरंगी, खडोली, तिनोदा, अंबोली, बिद्राबिन, खानवेल, काला चौड़ा और खेरडी गांवों से होकर गुजरती है।

प्रस्तावित पाइपलाइनों का मार्ग दर्शाने वाला रूट मैप पृष्ठ संख्या 14 पर दिया गया है।दर्शाने वाला रूट मैप पृष्ठ संख्या 15 पर दिया गया है।



S N	Name of Pipeline	ESZ – L(Km)	WLS-L(Km)
1	Jhaveri Flexo Connectivity- 4.515Km	1.736	2.151
2	Vasona Char Rastha Connectivity-15.125Km	1.572	1.838
3	Sili Fatak Connectivity-8.525Km	1.361	-
4	IMP Power Sayli Connectivity -7.2Km	2.076	2.310
5	Jackson Industry Connectivity -2.480Km	0.301	0.432
6	Dabur India Connectivity-2.650Km	0.676	0.225
Total		7.722	6.956

GUJARAT GAS LIMITED

India's largest CGD Company ISO 9001:2015 Certified

Environmental Impact Assessment, Environmental Management Plan, Risk Assessment and Disaster management Plan as per ToR

Natural Gas Distribution pipeline network in Union Territory Dadara Nagar Haveli Covering Length 40.495Km having 6"/8" Diameter for steel & 125mm Diameter for PE (polyethylene)with allied facilities i.e.:

1. **Kharadpada to Luhari Ind. Area (Jhaveri Flexo India Ltd.) Connectivity- Length 4.515km & 125mm Dia. PE**
2. **Vasona Char Rastha to Khanvel Petroleum Khanvel Connectivity (HP RO)-Length 15.125Km & 8" Dia. Steel**
3. **Sili Fatak to Randhe Road Umarkui Connectivity-Length 8.525Km & 6" Steel/125mm Dia. PE**
4. **IMP Power Sayli & Siddhant Ispat Connectivity Project-Length 7.200Km & 6" Steel/125mm Dia. PE**
5. **Jackson Industry Athola Connectivity Project-Length 2.480Km & 125mm Dia. PE**
6. **Dabur Industry Connectivity- Length 2.650Km & 125mm Dia. PE**

PREPARED BY

SURVEY CONSULTANT

SECON

ISO 9001 : 2015

SECON PVT. LTD.
Vadodara – 390 002
Phone/Fax No.:91-265-6630700/6630707
E-mail: secon.baroda@secon.in
Regd. Office
Bangaluru- 560 066.

ASSOCIATED EIA CONSULTANT

GREEN MEMBER GROUP
THE GREEN PEOPLE

GREEN CIRCLE, INC., Green Empire, Above AXIS Bank, Near Yash Complex, Gotri, Vadodara (Gujarat, India.
www.greencircleinc.com

MAY 2025

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ACKNOWLEDGEMENT

Secon Pvt Ltd. & Green Circle, Inc. highly appreciates the opportunity provided by Gujarat Gas Limited, Gandhinagar by assigning the preparation of Rapid Environmental Impact Assessment, Environmental Management Plan, Risk Assessment and Disaster Management Plan study report for Natural Gas Distribution pipeline network in Union Territory of Dadara & Nagar Haveli. We express our sincere gratitude to the officials of GGL for the cooperation and support extended to us during this assignment, but for which this report could not have been successfully prepared.

The assistance of large number of persons in government departments and private individuals in data collection are also thankfully acknowledged.

GREEN CIRCLE, INC.

Integrated HSEQR Consulting Engineers, Scientists & Trainers

(MoEF&CC Recognized Environment Laboratory)

(An ISO: 9001, 14001,17025/NABL & OHSAS: 18001 Certified Organization & GPCB approved Environment Auditor – Schedule II)

QCI NABET CERTIFICATE No. NABET/EIA/24-27/IA 0138, Dated 13.02.2024 valid up to 13.02.2027

EIA CERTIFICATE

*This is to certify that M/s. Green Circle, Inc. Vadodara has conducted EIA study in association with M/s. SECON PVT. LTD; Bengaluru for **"Union Territory Dadara & Nagar Haveli Natural Gas transportation pipeline network project of Gujarat Gas Limited**" for the period of December, 2024 to February, 2025. The project granted ToR from MoEF & CC vide No. IA-J-11011/419/2024-IA-II(I), Dated 19.12.2024 and prescribe ToR have been complied with. The Information and Data in the EIA/EMP report submitted is factually correct and as per the generic structure of EIA Notification 2006.*

For: Green Circle Inc.

Mr. Pradeep Joshi

Group President & CEO

www.greencircleinc.com*E: *info@greencircleinc.com

भारतीय गुणवत्ता परिषद्
QUALITY COUNCIL OF INDIA
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NABET

National Accreditation Board for Education and Training

Certificate of Accreditation

Green Circle Inc, Vadodara

Green Empire (Anupushpam), Above Axis Bank, Near Yash Complex,
Gotri Main Road, Vadodara, Gujarat-390021

*The organization is accredited as **Category-A** under the QCI-NABET **Scheme for Accreditation of EIA Consultant Organization, Version 3**: for preparing EIA/EMP reports in the following Sectors.*

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1.	Mining of mineral-opencast mining only	1	1 (a) (i)	B
2.	Petroleum refining industry	10	4 (a)	A
3.	Petro-chemical complexes (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics)	18	5 (c)	A
4.	Synthetic organic chemicals industry	21	5 (f)	A
5.	Sugar Industry	25	5 (j)	B
6.	Oil & gas transportation pipeline	27	6 (a)	A
7.	Common hazardous waste treatment, storage and disposal facilities (TSDFs)	32	7 (d)	B
8.	Building and construction projects	38	8 (a)	B
9.	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in IAAC minutes dated April 5, 2024, posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/ACO/24/3260 dated May 29, 2024. The accreditation needs to be renewed before the expiry date by Green Circle Inc, Vadodara following due process of assessment.

Issue Date
May 29, 2024

Valid up to
February 13, 2027

Mr. Ajay Kumar Jha
Sr. Director, NABET

Certificate No.
NABET/EIA/24-27/IA 0138

Prof (Dr) Varinder S Kanwar
CEO-NABET

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

भारत सरकार
पर्यावरण एवं वन मंत्रालय
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT & FORESTS

No. Q-15018/32/2007 -CPW

Dated: 19-10-2010

To

M/s Green Circle, Inc.
401-402, Reign Plaza
Opp. Kalpvruksh Complex
Gotri Road
Vadodara – 390021
Gujarat

Sub: Recognition of Environmental Laboratory under the Environment (Protection) Act, 1986 of M/s Green Circle, Inc., Vadodara.

Please refer to your application seeking recognition of your environmental laboratory under the Environment (Protection) Act, 1986. As approved by the competent authority, it has been decided to accord recognition to your laboratory under Environment (Protection) Act 1986. The terms & conditions as given in the Annexure – III, IV & V have already been agreed by you.

2. The laboratory shall compulsorily participate in the Analytical Quality Control (AQC) exercise conducted by the Central Pollution Control Board to ascertain the capabilities of recognized laboratories and analysts from time to time.

3. The E(P)A recognized laboratory has to submit quarterly reports to the Ministry in the enclosed format regarding its activities and the number of samples analysed during the reporting period.

4. It may also be noted that periodic surveillance of recognized environmental laboratory under the Environment (Protection) Act, 1986 will be undertaken by Central Govt. to assess the proper functioning, systematic operation and reliability of data generated at the laboratory.

Raina

(Dr. M. Raina)
Director / Sc. E
Telefax: 24360270

Encl: as above

Executive Summary

Gujarat Gas Limited (formerly known as GSPC Distribution Networks Limited), is India's largest city gas distribution company, promoted by Government of Gujarat has planned to set up CGD network in Union Territory of Dadara & Nagar Hiveli by providing natural gas to every end user for domestic, commercial and industrial use in phased manner for which GGL has received authorization from PNGRB[1] (Petroleum and Natural Gas Regulatory Board), for laying, building, operating and expending City Gas Distribution Network in Union Terrotory of Dadara & Nagar Haveli Geographical Area. GGL is also in planning to setup CNG stations along the roads at various prime locations to facilitate Compressed Natural Gas (CNG) to en-route vehicles which will support to reduce pollution.

Gujarat Gas Limited is committed to reach out to every possible natural gas user in its expanded geographical area. The size and scale of the combined entity gives it the ability to achieve efficiencies and effectively manage the transformational changes in the sector. This major gain in productivity would benefit all the key stakeholders, i.e. Customers and Shareholders.

To supply Natural Gas (PNG) for various industrial, commercial & residential consumers within and around the Union Territory of Dadara & Nagar Haveli, GGL proposes lay Natural Gas distribution pipeline network including associated facilities in Union Territory Dadara & Nagar Haveli for Total Length 40.495Km having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene)with allied facilities. As per the latest categorization by CPCB & MoEF & CC, “Oil and Gas transportation pipeline” activity falls under the industrial activity of “Green Category” due to its very marginal environmental impact. However, proposed Proposed Natural gas distribution pipeline route aligned parallel to already existing RoW under PWD department which through Dadara & Nagar Haveli Wild life sanctuary and the eco sensitive zone of the same sanctuary for 6.956Km and 7.722km respectively. So, the proposal attracts EIA notification 14 September 2006 MoEF & CC.

As per the EIA Notification 14 September 2006 & amendment therein proposed activity falls under 6(a) Oil & gas transportation pipe line (crude and refinery/ petrochemical products), passing through national parks /sanctuaries/coral reefs /ecologically sensitive areas including LNG Terminal and as per this carry out environmental Impact Assessment and Environmental

[1] The Petroleum and Natural Gas Regulatory Board (PNGRB) was constituted under The Petroleum and Natural Gas Regulatory Board Act, 2006, (NO. 19 OF 2006) notified via Gazette Notification dated 31st March 2006 to protect the interests of consumers and entities engaged in specified activities relating to petroleum, petroleum products and natural gas and to promote competitive markets and for matters connected therewith or incidental thereto.

Management plan is necessary for obtaining Environmental Clearance from MoEF & CC, New Delhi.

In order to assess the current status of the environment and the likely impacts which may be caused due to the proposed activities of the Pipeline Project, and for the same this Environmental Impact Assessment (EIA) study and preparation of Environmental Management Plan (EMP) is presented herewith.

1.1. Location

GGL proposes to lay Natural Gas Distribution pipeline network in Union Territory Dadara Nagar **No index entries found.**Haveli Covering Length 40.495Km having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene)with allied facilities which includes

1. **Kharadpada**(20°15'2.69"N,72°58'0.70"E) **to Jhaveri Flexo** (20°12'42.16"N,72°58'16.00"E) **Connectivity- Length 4.515km & 125mm Dia. PE**(along the existing road RoW)
2. **Vasona Char Rastha** (20°12'28.89"N, 73° 1'30.01"E) **to Khanvel HP Petroleum**(20° 8'11.43"N, 73° 3'45.75"E) **Khanvel Connectivity (HP RO)-Length 15.125Km & 8’’ Dia. Steel**(along the existing road RoW)
3. **Sili Fatak** (20°17'13.16"N, 73° 1'34.12"E) **to Randhe Road**(20°17'48.62"N,73° 5'52.35"E) **Umarkui Connectivity-Length 8.525Km & 6” Steel/125mm Dia. PE**(along the existing road RoW)
4. **IMP Power Sayli** (20°17'21.90"N, 73° 4'52.24"E) **& Siddhant Ispat** (20°14'16.43"N, 73° 3'32.48"E) **Connectivity Pro ject-Length 7.200Km & 6” Steel/125mm Dia. PE**(along the existing road RoW)
5. **Jackson Industry** (20°16'4.53"N,73°4'26.07"E)**to Athola**(20°16'23.21"N,73°3'11.52"E) **Connectivity Project-Length 2.480Km & 125mm Dia. PE**(along the existing road RoW)
6. **Dabur Industry Connectivity(Takeoff-** 20°15'2.27"N, 73° 1'58.45"E **to Terminal Point-** 20°14'5.40"N , 73° 3'3.04"E**)- Length 2.650Km & 125mm Dia. PE**(along the existing road RoW)

1.2. Project Description

Unlike other liquid i.e. petrol, Diesel and solid fuels that generate lot of pollution on combustion and create lot of issues while handling, natural gas being a fuel does not create any pollution, inside the plant or house, does not litter and does not cause damage in handling of all these points which ensures good condition of house, plant and equipment. In view of environment friendly features of natural gas its uses are recommended in various industries for commercial purposes and in houses for domestic purposes.

Gujarat Gas limited is engaged in distribution of natural gas by PNG (piped natural gas) to its various consumers and customers through city gas distributing (CGD) network.

Gujarat Gas limited proposed setup PNG network in Union Territory Dadara & Nagar Haveli and part of this GGL proposes to lay, Natural gas distribution pipeline network with associated facilities having under ground valve at every 1km.

Present report describes about the expected /likely Environmental impacts due to Pipeline section. It will pass through Union Territory Dadara & Nagar Haveli Geographical area.

Compare to other fuel, due to very low/negligible air pollution generating quality of natural gas, the use of the same will be improving the quality of environment. So, Transportation of Natural gas through pipeline is being an environmental friendly activity.

1.3. Project highlight:

M/s. Gujarat Gas Limited proposes to set up Natural Gas (PNG Network) within different cities of Gujarat State and also in Union Territory of Dadara & Nagar Haveli to supply Natural Gas (PNG) for various industrial, commercial & residential consumers within and around city.

M/s. Gujarat Gas Limited proposed to establishment of Natural Gas distribution pipeline network including associated facilities in Union Territory Dadara & Nagar Haveli (DNH) for which GGL has received PNGRB authorization for laying, building, operating or expanding CGD network Dated: 01.04.2015 attached as **Annexure I**.

GGL proposes to lay Natural Gas distribution pipeline network including associated facilities in Union Territory Dadara & Nagar Haveli for total Length 40.495Km having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene)with allied facilities

Salient features of the proposed pipeline are as given below:

Table 1.1 Salient feature of the project

Name of Project	Establishment of Natural Gas Distribution pipeline network in Union Territory Dadara Nagar Haveli Covering Length 40.495Km having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene)with allied facilities which includes **1. Kharadpada**(20°15'2.69"N,72°58'0.70"E) **to Jhaveri Flexo** (20°12'42.16"N,72°58'16.00"E) **Connectivity- Length 4.515km & 125mm Dia. PE**(along the existing road RoW) **2. Vasona Char Rastha** (20°12'28.89"N, 73° 1'30.01"E) **to Khanvel HP Petroleum**(20° 8'11.43"N, 73° 3'45.75"E) **Khanvel Connectivity (HP RO)-Length 15.125Km & 8’’ Dia. Steel**(along the existing road RoW) **3. Sili Fatak** (20°17'13.16"N, 73° 1'34.12"E) **to Randhe Road**(20°17'48.62"N,73° 5'52.35"E) **Umarkui Connectivity- Length 8.525Km & 6” Steel/125mm Dia. PE**(along the existing road RoW) **4. IMP Power Sayli** (20°17'21.90"N, 73° 4'52.24"E) **& Siddhant Ispat** (20°14'16.43"N, 73° 3'32.48"E) **Connectivity Project- Length 7.200Km & 6” Steel/125mm Dia. PE**(along the existing road RoW) **5. Jackson Industry** (20°16'4.53"N,73°4'26.07"E)**to Athola**(20°16'23.21"N,73°3'11.52"E) **Connectivity Project- Length 2.480Km & 125mm Dia. PE**(along the existing road RoW) **6. Dabur Industry Connectivity(Takeoff-** 20°15'2.27"N, 73° 1'58.45"E **to Terminal Point-** 20°14'5.40"N , 73° 3'3.04"E**)- Length 2.650Km & 125mm Dia. PE**(along the existing road RoW)
Petroleum and Natural Gas Regulatory Authority(PNGRB) Authorization	**Natural gas being an ecofriendly & efficient fuel compared to other alternative fuels (i.e. Petrol, Diesel & Wood etc.) for industrial & domestic consumption, PNGRB has contemplated to build a network of Natural Gas distribution network in whole country including major cities and states. As a part of this, GGL was entrusted the job of establishment of Natural Gas distribution network in Union Territory of DNH GA also and hence, GGL has received PNGRB authorization for laying, building, operating or expanding CGD network dated: 01.04.2015 attached as Annexure III in online additional Attachments.**
Source of Gas supply	In upstream GGL network of gas supply in Union Territory Dadara & Nagar Haveli Geographical Area and as a downstream domestic and industrial customers Union Territory Dadara & Nagar Haveli Geographical Area
Pipeline Material	**Steel Pipeline** ✓ Pipe Material: Carbon Steel; Electric Resistance Welded

<table>
<tr><td></td><td colspan="3">(ERW)
✓ Grade of Steel: X 52 as per API-5L (PSL-2)
Poly Ethylene (PE)
✓ Pipe Material: Poly Ethylene (PE)
✓ Grade of PE: P-100 as per IS -14885</td></tr>
<tr><td></td><td>8” NB(Steel)</td><td>6” NB(Steel)</td><td>125 mm(PE)</td></tr>
<tr><td>Design pressure</td><td>49.0 Barg</td><td>49.0 Barg</td><td>10 Barg</td></tr>
<tr><td>Operating Pressure</td><td>26.0 Barg</td><td>4.0 Barg</td><td>4.0 Barg</td></tr>
<tr><td>Inlet Pressure</td><td>26.0 Barg (maximum)</td><td>4.0 Barg (maximum)</td><td>4.0 Barg(maximum)</td></tr>
<tr><td>Outlet Pressure</td><td>19.0 Barg (minimum)</td><td>1.0 Barg (minimum)</td><td>1.0 Barg (minimum)</td></tr>
<tr><td>Inlet & Outlet Temperature</td><td colspan="3">Between 0ºC to 55ºC</td></tr>
<tr><td>Operating Temperature</td><td colspan="3">Between 15ºC to 45ºC</td></tr>
<tr><td>Schedule of construction and completion</td><td colspan="3">Tentative Timeline
Project Start Date - October-2025 (Date of permission issued)
Project Completion Date - March - 2027
(Note: Construction will be started after all requisite permissions from the boards/authorities.)</td></tr>
<tr><td>Applicable standard and code</td><td colspan="3">- Petroleum & Natural Gas Regulatory Board (PNGRB) guideline – Technical Standards & Specifications including Safety standards for CGD Network
- American Society of Mechanical Engineers ([2]ASME) B 31.8 – Code for Gas Transmission and Distribution Piping Systems</td></tr>
<tr><td>Labour requirement</td><td colspan="3">Construction Phase: 40 Nos. (Maxi.)</td></tr>
<tr><td>Water consumption</td><td colspan="3">Requirement of water will be various activity during construction phase of pipeline is as given below which will be met by tanker supply from nearby municipal source
<table>
<tr><td>S. no</td><td>Activity</td><td>Water consumption in liters</td></tr>
<tr><td>1</td><td>Steel /PE laying by [3]HDD Method if required</td><td>112000</td></tr>
<tr><td>2</td><td>Watering & compaction of the Trench (Note: For 1km of pipieline-5000 liter, For Total 40.495 km -202475 liter)</td><td>202475</td></tr>
</table></td></tr>
</table>

[2] The American Society of Mechanical Engineers promotes the art, science & practice of multidisciplinary engineering and allied sciences around the globe and helps the global engineering community develop solutions to real world challenges. Founded in 1880 as the American Society of Mechanical Engineers. ASME codes and standards, publications, conferences, continuing education, and professional development programs provide a foundation for advancing technical knowledge and a safer world.

[3] Horizontal Directional Drilling (HDD) is a trenchless method of installing pipes and utilities underground. It's a surface-launched technique that uses a drill rig to create a tunnel under a waterway or other area. The pipe is then pulled through the tunnel.

<table>
<tr><td></td><td>
<table>
<tr><td>3</td><td>Water consumption for domestic use (Note: Earlier for One Year -31200 liter, Now for One & half year -46800 liter)</td><td>46800</td></tr>
<tr><td></td><td>Total</td><td>361275</td></tr>
</table>
</td></tr>
<tr><td>Energy requirement and source number of DG sets with capacity in KVA</td><td>Temporary 3 KVA DG set will be required for electro fusion welding only during construction Phase of laying of PE pipeline and
Temporary 25KVA DG set will be required for welding during only construction phase of laying of Steel pipeline.
No stationery /permanent DG sets required on pipeline route.</td></tr>
<tr><td>Cost of project</td><td>13 Corers</td></tr>
<tr><td>Capacity</td><td>0.25MMSCMD</td></tr>
<tr><td>Population Density Index</td><td>As per design factor 0.4,Class IV as per ASME B 31.8</td></tr>
<tr><td>Environmental Sensitivity of the project</td><td>Proposed natural gas transportation pipeline in union territory of DNH area passes through DNH Wild life Sanctuary for 6.956km and eco sensitive zone of DNH wild life sanctuary for 7.722km out of total length approx.40.495km.

The everyday vehicle movement on existing road passes through DNH WLS is currently present there. However, the proposed pipeline route will not have any permanent impact in this area because it is 1 to 1.2meter underground buried pipeline along the existing road RoW under PWD department. The impact envisaged only during construction phase of the laying of pipeline in that area which will be limited to only few days and the soil will be reinstated near to its original condition after laying of pipeline. So, no major impact on wild life sanctuary is expected on continuous basis. So, the project will have impact is very marginal, temporary in nature and reversible.</td></tr>
<tr><td>Linked Forest Proposal no.</td><td>
<table>
<tr><th>S.N.</th><th>Pipeline Section</th><th>FC P.No.</th><th>Area(In Hectares)</th><th>Type of Forest Land</th></tr>
<tr><td>1</td><td>Jhaveri Flexo India Ltd. Connectivity</td><td>FP/DN/Pipeline /494625/2024</td><td>0.2278</td><td>P.F.</td></tr>
<tr><td>2</td><td>Sili Fatak to Randhe Road Umarkui Connectivity, IMP Power, Sayli & Siddhant Ispat, Umarkui Connectivity & Jackson Industry, Athola Connectivity</td><td>FP/DN/Pipeline /494608/2024</td><td>0.9152</td><td>P.F.</td></tr>
<tr><td>3</td><td>Vasona Char Rasta to Khanvel Petrol Pump (HP RO) Spurline</td><td>FP/DN/Pipeline /493459/2024</td><td>0.7617</td><td>P.F.</td></tr>
<tr><td></td><td>Total</td><td></td><td>1.9047</td><td>P.F.</td></tr>
</table>
</td></tr>
</table>

Linked Wildlife Proposal No.	S. N.	Pipeline Section	WLS P. No.	ESZ – L(Km)	WLS-L(Km)
	1	Jhaveri Flexo Connectivity-4.515Km	**WL/DN/Pipeline/500455/2024** (i.e. For Diversion of 0.3478 Ha Land)	1.736	2.151
	2	Vasona Char Rastha Connectivity-15.125Km		1.572	1.838
	3	Sili Fatak Connectivity-8.525Km		1.361	-
	4	IMP Power Sayli Connectivity -7.2Km		2.076	2.310
	5	Jackson Industry Connectivity - 2.480Km		0.301	0.432
	6	Dabur India Connectivity-2.650Km		0.676	0.225
			Total	**7.722**	**6.956**

1.4. Power requirement

Temporary 3KVA DG set will be required for electro fusion welding during only construction phase of laying of pipeline and Temporary 25KVA DG set will be required for welding during only construction phase of laying of Steel pipeline.

No stationery/permanent DG sets required on pipeline in operational phase. However, during establishment of pipeline DG set will be used by construction contracter. Hence this moving nonpoint source will have temperory marginal and reversible impact.

1.5. Solid & hazardous waste management

Solid wastes generated from the temporary campsites and other wastes like plastics, paper, cardboard, etc. will be properly collected, segregated and reused / disposed off appropriately (recycle, reuse, and composting / landfill) as per the guideline of SPCB.

E- Waste: Now a day there has been a lot of awareness towards disposal of E-Waste such as electronic circuits, picture tubes, special glassware, containers, tube lights, CFL tubes etc. The proponent shall carefully collect, store separately and safely, maintain records of inventories and dispose them by giving to TSDF approved by MoEF, New Delhi. The details of the same can be made available as per guidelines of SPCB.

No hazardous wastes are envisaged from pipeline construction activities.

1.6. For associated facilities:

Proposed pipeline will have underground valves at every 1 Kms stretch of PE pipeline and 3km stretch of steel pipeline as associated facilities along the pipeline route.

1.7. Workforce arrangements

The construction works will be temporary and about 40 labourers will be deployed at various locations depending upon the requirement during the construction period for laying of this pipeline network for transportation of Natural Gas. Temporary labour camp/Porta cabin sites will be set up with all treatment facilities near development facilities for construction purposes for staff. Construction workers will be preferably drawn from nearby villages.

1.8. Description of environment

The baseline environmental qualities of various environmental components like air, noise, water, land, flora and fauna and socio-economic form important and integral part of environmental study. The baseline data forms the basis for predicting/assessing the environmental impacts of the proposed project. The present report presents the data collected during the sampling period from December 2024 to February 2025. As per the recommendations of MOEF, the sampling and monitoring has been carried out during non-monsoon season, on dry days. Various environmental components were monitored and samples analyzed. Apart from this, additional data were also collected from secondary sources i.e. Government/Non-Governmental Agencies, Universities, Irrigation Department, Indian Meteorological Department (IMD), Ground Water Board etc. to substantiate the primary data collected from the site.

The baseline quality of various components of the environment, viz. air, noise, water, land, biology, meteorological and socio-economic is assessed within the impact zone of about 1.5 Km on either side along the complete route of the pipe line via physical monitoring and analysis.

1.9. Environment monitoring programme

Environment monitoring programme is a key component to carry out environment monitoring which includes technical aspects of monitoring the effectiveness of mitigation measures including measurement methodology for Air, Water, Soil and Noise environment, selection of location, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules.

The following five environmental components have been considered for the purpose of assessment and evaluation of the environmental impact due to the proposed project:

- Air Environment
- Noise Environment

- Water Environment
- Land Environment
- Biological Environment
- Socio Economic Environment

AIR ENVIRONMENT

To establish the baseline status of study area, total 15 AAQ monitoring stations were selected, along the pipeline route. In this region, conventional air pollutants viz. PM10, Sulfur Dioxide (SO2), Oxides of Nitrogen, as well as Carbon Monoxide (CO), are identified for air quality assessment.

Along Pipeline route

The 24 hourly PM10 concentration varied in the range of 57.2-72.8 µg/m3 may be attributed to windblown soil, unpaved road etc. in rural areas in the study region. The concentrations of SO2 were observed to be varying in the range of 7.4-13.1 µg/m3. Similarly the concentration of NOx varied in the range 11-16 µg/m3 along the pipeline route.

The observed carbon monoxide concentration at all the locations were <0.5 mg/m3 which were found less than NAAQS.

NOISE ENVIRONMENT

Total Fifteen (15) locations were identified based on the activities in the village area, traffic areas and sensitive areas

Along Pipeline Route

Equivalent noise levels, Leq (Day) and Leq (Night) were monitored across the pipeline route. The equivalent noise levels varied in the range of 43-69 dB(A). Vehicular traffic is the major noise sources and contributes mainly to background noise levels in the study area.

Noise levels Day and Night were monitored along the pipeline route were observed the range of 42-69 dB(A) during day and 35-70 dB(A) night time respectively.

WATER ENVIRONMENT

Water Quality Assessment

Surface Water Quality:

Surface water samples were collected from Near Amit Petroleum (Surangi), Near Sayli Road, Near Kilavani Road & Near Dapada to Surangi bridge. The analysis results indicate that the pH ranged between 7.29 to 7.59 which are well within the specified standard of 6.5 to 8.5. The TDS was observed to be 445-895 mg/l .The Total hardness recorded was in the range of 134 to 285 mg/l as CaCO3 . The levels of chloride and sulphate were found to be in the range of 98.5-

124.2 mg/l and 52.8 to 59.8mg/l respectively. Heavy metals content (i.e. As, Al, Cd, Cr, Cu, Pb, Fe, Mn, Zn and Hg) were found to be very low and within specified standards.

Surface water quality is well within the permissible limits IS 10500:2012.

Groundwater quality:

The analysis results of ground water samples indicate that the pH ranged between 7.25 to 7.85 which are well within the specified standard of 6.5 to 8.5. The TDS was observed to be 878.4-1289.6 mg/l which is within the permissible limit of 2000 mg/l. The Total hardness recorded was in the range of 197 to 276 mg/l as CaCO3 which is also within the permissible limit of 600 mg/l. The levels of the ground water analysis results indicate that the water in the region is fairly potable except that disinfection may be required for ground water in certain areas before being used for drinking. However, the incremental value has no impact with reference to the project activity.

LAND ENVIRONMENT

Land use of the study area

The land use & land cover map of DNH pipeline stretch is prepared for the land use study. Land use and land cover of the study area as well as the morphology was carried out by standard method of analysis of remotely sensed data and followed by ground truth and interpretation of satellite data. The outcome of the land use study is presented in EIA report.

Soil:

Soil was collected at different stretches along the pipeline route. Soil samples were collected from 15 different locations along pipeline route.

Physico-Chemical Characteristics

The texture of the soil was found to be Silty clay in nature. Regular cultivation practices increase the bulk density of soils thus inducing compaction. This results in reduction in water percolation rate and penetration of root through soils.

Chemical Characteristics

pH of soil in the study area was found to be slightly acidic to alkaline in reaction as pH was in the range of 7.24-7.84.

The electrical conductivity (EC), the EC of the soil sample was in the range of 1.20-1.35 ms/cm. It was observed that both Calcium and Magnesium carbonate concentrations were in the range of 448 – 623 mg/kg and 73 – 105 mg/kg respectively.

Nutrient Status:

Organic matter and organic carbon present in the soil influence its physical and chemical properties and is responsible for stability of soil aggregates. Organic matter and Total Kjeldahl

Nitrogen were found in the range of 0.52-1.21 % and 328-438 mg/kg.

1.10. Additional studies

Additional Studies like

- √ Risk Assessment and Disaster Management Plan,
- √ Emergency Preparedness Plan and Response for Pipeline
- √ Training

1.11. Benefits of the pipelines

- ✓ High performance (Globally proven leak free system)
- ✓ More flexibility, coil ability, ductility, high elasticity
- ✓ Low density (low weight, high strength to weight ratio)
- ✓ High resistance to corrosion
- ✓ Low heat conductivity (small thermal loss)
- ✓ Smooth surfaces (Low pressure losses due to low pipe friction)
- ✓ Easy to transport, handle and lay
- ✓ Longer life
- ✓ Easier and speedier joining techniques to ensure leak tight joints by employing electro fusion techniques
- ✓ Higher productivity, i.e., reduction in installation time (15 minutes in case of PE against 4 hours in case of steel), thereby lesser inconvenience to public
- ✓ Reduced number of joints, hence safer and leak free system
- ✓ Less time is consumed to repair PE damages as compared to steel damages
- ✓ Good squeeze off properties
- ✓ Longer design life of PE pipes (50 years) as compared to steel pipeline (30 Years)
- ✓ Avoidance of NDT techniques in building premises, which is very critical
- ✓ Size of trench is less in case of laying of PE pipe as compared to steel

1.12. Project Benefits

- ✓ As a consequence of the rapid rate of industrialization in India, fuel needs are increasing at an equally rapid rate and the supply-demand gap is widening and steps are being taken to address this issue.
- ✓ Natural Gas is uses as a low carbon cooking and transportation fuel compared to alternative fuels like LPG, Petrol, Diesel and other traditional fuels.

- ✓ CGD networks ensure uninterrupted supply of ecofriendly cooking fuel in form of PNG and transportation fuel to vehicle in the form of CNG and thus benefiting public health at large
- ✓ Underground CGD networks will help in freeing up congested urban city roads from LPG cylinder distribution tempos/Motor vehicles
- ✓ PNG expansion will free up subsidized LPG cylinders from urban area so that the same can be further distributed to rural/remote areas and it will ensure the continuous cooking fuel supplies to households.
- ✓ Pipelines are internationally recognized as the preferred alternative for transport of fuels from the point of view of safety, economy and relative environmentally friendliness.
- ✓ The project would enhance employment opportunities through contractors for the local people during construction phase.
- ✓ There will not be any adverse impact on communication and transportation.
- ✓ One of the additional advantages of pipeline transportation is that the scope of economic offences like theft / pilferage and adulteration of products would be almost negligible.

1.13. Annual Operation and Maintanance plan

GGL is regularly maintaining annual operation and maintenance plan for PE pipeline natural Gas distribution network which includes monthly Petroling of MPPE network and crossings, quarterly monitoring of LPT/LDT of PE network, half Yearly Special leak survey during festival.

Proposed DNH pipeline network will have isolation valve at every 1 km distance which will be regularly insptected from Up stream and down stream level. GGL will regularly conduct training to its stack holders and befeficiary villages to creat awareness of under ground pipeline network and its working phenomina. PE pipeline network will have route marker at every 200 meter with emergency contact number for any future unforescene. Natural gas PE pipeline network having with ethyle mercaptan added as odering agent chemical in natural gas to easily detact leakage by some one and emergency respoce vehicle act timely and stop gas flow by closing isolation valve to the affected leakage pipeline premises. This will help in any unforescene fire and unaspected harmful incedent. So, GGL is maintaining very high standard safety protocol which will protect nearby human being and surrounding environment in any crises.

1.14. Environment Management Plan

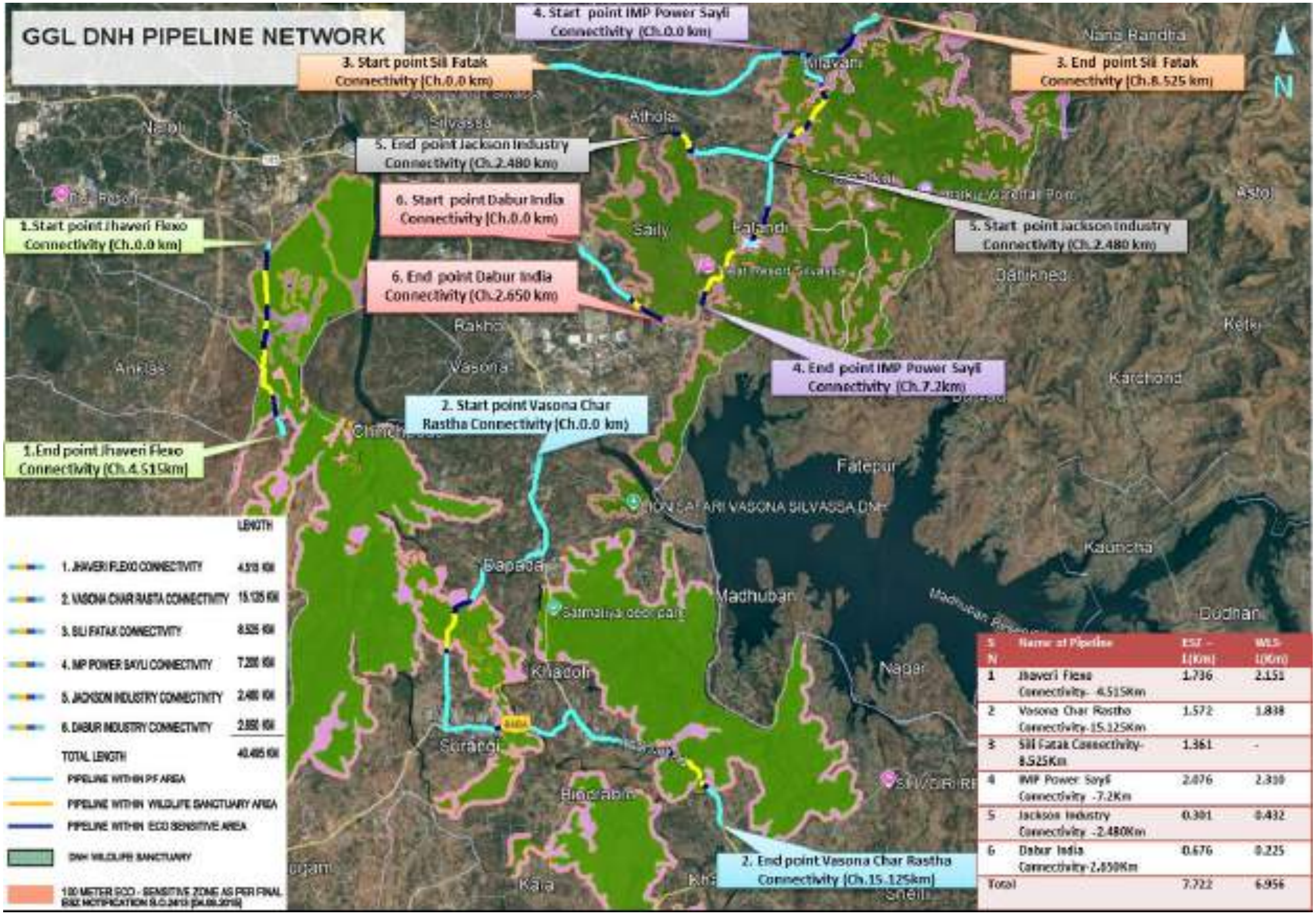
Environmental Management Plan (EMP) is the key to ensure a safe and clean environment. The present chapter on Environmental Management Plan envisages the management plan, which is going to be adopted for the Pipeline Project for the proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities.

The following issues have been addressed in this EMP:

- Mitigatory measures for abatement of the undesirable impacts caused during the constructions and operation stage.
- Details of management plans (Green belt development plan, Solid waste management plan etc.) institutional set up identified/recommended for implementation of the EMP
- Post project environmental monitoring programme to be undertaken after commissioning of the project.
- Expenditures for environmental protection measures.

1.15. List of villages along the pipeline route

Proposed pipeline passes through villages i.e. Dapada, Chikhali, Surangi, Khadoli, Tinoda, Amboli, Bidrabin, Khanvel, Kala Chauda and Kherdi of Union Territory Dadara & Nagar Haveli. Proposed pipelinen network on google image is given on page no. 16.



S N	Name of Pipeline	ESZ – L(Km)	WLS- L(Km)
1	Jhaveri Flexo Connectivity- 4.515Km	1.736	2.151
2	Vasona Char Rastha Connectivity-15.125Km	1.572	1.838
3	Sili Fatak Connectivity-8.525Km	1.361	-
4	IMP Power Sayli Connectivity -7.2Km	2.076	2.310
5	Jackson Industry Connectivity -2.480Km	0.301	0.432
6	Dabur India Connectivity-2.650Km	0.676	0.225
Total		7.722	6.956

Chapter 1. Introduction

1.1 Purpose of the Report

Gujarat Gas Limited (formerly known as GSPC Distribution Networks Limited), is India's largest city gas distribution company, promoted by Government of Gujarat has planned to set up CGD network in the Union Territory of Dadara & Nagar Haveli to provide natural gas to every end user for domestic, commercial and industrial use in phased manner for which GGL has received authorization from PNGRB (Petroleum and Natural Gas Regulatory Board), for laying, building, operating and expending Natural Gas Distribution Network. Attached in this report with **Annexure I.**

GGL is also in planning to setup CNG stations along the roads at various prime locations to facilitate Compressed Natural Gas (CNG) to en-route vehicles which will support to reduce pollution.

Gujarat Gas Limited is committed to reach out to every possible natural gas user in its expanded geographical area. The size and scale of the combined entity gives it the ability to achieve efficiencies and effectively manage the transformational changes in the sector. This major gain in productivity would benefit all the key stakeholders, i.e. Customers and Shareholders.

To supply Natural Gas (PNG) for various industrial, commercial & residential consumers within and around the Union Territory of Dadara & Nagar Haveli, GGL proposes lay Natural Gas distribution pipeline network including associated facilities in Union Territory Dadara & Nagar Haveli for Total Length 40.495Km having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene)with allied facilities. As per the latest categorization by CPCB & MoEF & CC, “Oil and Gas transportation pipeline” activity falls under the industrial activity of “Green Category” due to its very marginal environmental impact. However, proposed Proposed Natural gas distribution pipeline route aligned parallel to already existing RoW under PWD department which through Dadara & Nagar Haveli Wild life sanctuary and the eco sensitive zone of the same sanctuary for 6.956Km and 7.722km respectively. So, the proposal attracts EIA notification 14 September 2006 MoEF & CC.

In order to assess the current status of the environment and the likely impacts which may be caused due to the proposed activities of the Pipeline Project, Environmental Impact Assessment (EIA) & Environmental Management Plan (EMP) study report has been prepared jointly with QCI NABET Approved Environmental consultants M/s. GREEN CIRCLE CONSULTANTS

(INDIA) PVT. LTD., Vadodara & SECON PVT. LTD. for the proposed pipeline with total capcity of 0.25 MMSCMD.

1.2 Identification of the Project and Project Proponent

1.2.1 Project Proponent

Gujarat Gas Limited (“GGL”/ “the Company”) (Formerly known as GSPC Distribution Networks Limited) is a company that was incorporated on February 21, 2012 with the objects as specified in the Memorandum of Association. The Board of Directors at its meeting dated 24th February 2014, granted its "in-principle" approval to the consolidation by way of amalgamation of erstwhile GSPC Gas Company Limited ("GSPC Gas"), erstwhile Gujarat Gas Company Limited ("GGCL"), erstwhile Gujarat Gas Financial Services Limited ("GFSL") and erstwhile Gujarat Gas Trading Company Limited ("GTCL") with Gujarat Gas Limited ["the Company" (Formerly known as GSPC Distribution Networks Limited)] through a High Court approved Composite Scheme of Amalgamation and Arrangement (“Scheme”). The Board at its meeting held on 21st April 2014 approved the Scheme of Amalgamation and Arrangement.

The aforesaid Scheme of Amalgamation and Arrangement was sanctioned by the Honorable High Court of Gujarat (“HC Order”) at Ahmedabad vide common oral order dated March 30, 2015 with the Appointed Date of April 01, 2013. The certified copy of the order was received by the company on April 18, 2015 and filed with the Registrar of Companies (“RoC”) at Ahmedabad on May 14, 2015. The said Composite Scheme of Amalgamation and Arrangement became effective on May 14, 2015 with an Appointed Date of April 01, 2013 and subsequently the Company’s name was changed from GSPC Distribution Networks Limited to Gujarat Gas Limited with effect from May 15, 2015.

1.2.2 About the Project

Unlike other liquid i.e. petrol, Diesel and solid fuels that generate lot of pollution on combustion and create lot of issues while handling, natural gas being a fuel that does not create any pollution, inside the plant or house, does not litter and does not cause damage in handling of all these points which ensures good condition of house, plant and equipment. In view of environment friendly features of natural gas its uses are recommended in various industries for commercial purposes and in houses for domestic purposes.

Gujarat Gas limited is engaged in distribution of natural gas by PNG (piped natural gas) to its various consumers and customers through city gas distributing (CGD) network.

M/s. Gujarat Gas Limited proposed to establishment of Natural Gas distribution pipeline network including associated facilities in Union Territory Dadara & Nagar Haveli(DNH) for which GGL has received PNGRB authorization for laying, building, operating or expanding CGD network Dated:01.04.2015 attached as **Annexure I**.

GGL proposes to lay Natural Gas Distribution pipeline network in Union Territory Dadara Nagar Haveli Covering Length 40.495Km having 6"/8" Diameter for steel & 125mm Diameter for PE (polyethylene)with allied facilities which includes

1. **Kharadpada**(20°15'2.69"N,72°58'0.70"E) **to Jhaveri Flexo** (20°12'42.16"N,72°58'16.00"E) **Connectivity- Length 4.515km & 125mm Dia. PE**(along the existing road RoW)
2. **Vasona Char Rastha** (20°12'28.89"N, 73° 1'30.01"E) **to Khanvel HP Petroleum**(20° 8'11.43"N, 73° 3'45.75"E) **Khanvel Connectivity (HP RO)-Length 15.125Km & 8'' Dia. Steel**(along the existing road RoW)
3. **Sili Fatak** (20°17'13.16"N, 73° 1'34.12"E) **to Randhe Road**(20°17'48.62"N,73° 5'52.35"E) **Umarkui Connectivity-Length 8.525Km & 6" Steel/125mm Dia. PE**(along the existing road RoW)
4. **IMP Power Sayli** (20°17'21.90"N, 73° 4'52.24"E) **& Siddhant Ispat** (20°14'16.43"N, 73° 3'32.48"E) **Connectivity Project-Length 7.200Km & 6" Steel/125mm Dia. PE**(along the existing road RoW)
5. **Jackson Industry** (20°16'4.53"N,73°4'26.07"E)**to Athola**(20°16'23.21"N,73°3'11.52"E) **Connectivity Project-Length 2.480Km & 125mm Dia. PE**(along the existing road RoW)
6. **Dabur Industry Connectivity(Takeoff-** 20°15'2.27"N, 73° 1'58.45"E **to Terminal Point-** 20°14'5.40"N , 73° 3'3.04"E**)- Length 2.650Km & 125mm Dia. PE**(along the existing road RoW)

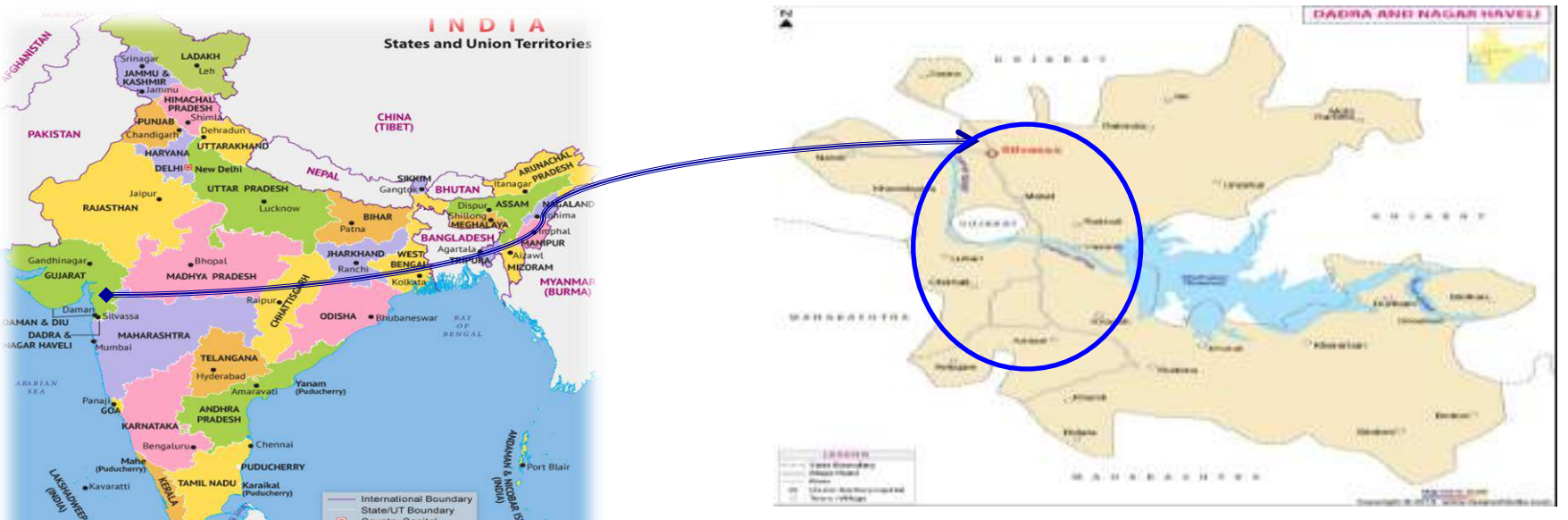
Proposed Natural gas distribution pipeline route aligned parallel to already existing RoW under PWD department which passes through Dadara & Nagar Haveli Wild life sanctuary and the eco sensitive zone of the same sanctuary as tabulated below. So, the proposal attract EIA notification 14 September 2006 as per 6(a) project activity and as per the same notification the environmental clearance from the MoEF & CC is required.

The everyday vehicle movement on existing road passes through DNH WLS is currently present there. **However, the proposed pipeline route will not have any permanent impact in this area because of it is 1 to 1.2meter underground buried pipeline along with existing road RoW.** The impact envisaged only during construction phase of the laying of pipeline in that area

which will be limited to only few days and the soil will be reinstated near to its original condition after laying of pipeline. So, no major impact on wild life sanctuary is expected on continuous basis. So, the project will have impact is very marginal, temporary in nature and reversible.

The study area for the present report of Environmental impact of proposes pipelines are 1.5 Km either side length of the pipeline and 1 Km either side of the pipeline for PDI study which will be useful for Risk Assessment Study for pipeline.

Figure 1.1 DNH Pipeline network Location map



1.3 Brief Description of Nature, Size, Location of the Project and its Importance to the Country, Region.

The UT of Dadra and Nagar Haveli lies in the middle of the undulating watershed of the Daman Ganga River, which flows through Nagar Haveli and later forms the short southern border of Dadra. The towns of Dadra and Silvassa lie on the north bank of the river. The Western Ghats range rises to the east, and the foothills of the range occupy the eastern portion of the UT. While the UT is landlocked, the Arabian Sea is just to its west, and can be reached via the state of Gujarat. The major river of the area is Damanganga which flows in SE- NW direction. The major tributaries of Damanganga are Dudhninadi, Sakartondnadi, Dongarkhadinadi, Pipriya and Ratinadi.

The objective of the primary research was to understand the present fuel consumption patterns in the Union Territory of DNH Geographical Area. The objective of the secondary research was to find out the growth of all the segments in our study region. As Indian economy is growing it is necessary to see how energy demand will grow in this phase. Natural gas could possibly become significant portion of the future fuel mix in India. However, there is still great uncertainty surrounding the size of this potential market and therefore its impact on the gas trade.

It is inferred that Union Territory of DNH has natural gas dimand in industrial, commercial and domestic spread. However, there is a good demand for transport linked CNG business.

Technical Assessment includes technical design in line with the specifications as mentioned in T4S (Technical Specification and Safety Standards) published by PNGRB and ANSI-B-31.8.

The diagram below depicts three major activities of Natural Gas Industry and their key market player.

The Ministry of Petroleum and Natural Gas (MOPNG) regulates the entire value chain of the oil sector, including exploration and production (E&P), refining, supply, and marketing.

Brief Description and Nature of the Project:

Proposed project is for Distribution of Natural Gas through pipeline in Union territory of DNH GA area Covering Length 40.495Km having 6"/8" Diameter for steel & 125mm Diameter for PE (polyethylene). Proposed pipeline will be buried underground at the depth of 1 to 1.2meter and having with associated facility of underground valve at every 3-5km distance for Steel pipeline and 1km distance for PE pipeline throughout entire pipeline route.

After laying the pipeline the soil will be reinstated to near its original condition and site will be left neat and clean so no adverse impact on surface soil structure, run off hydrology and solid waste component will be there. Any impact on Air due to fugitive dust and noise will be temporary marginal and reversible limited construction period only which will last for some days only whereas in operational phase there will be no requirement of power, water or other natural resources will be there and thereby the project is in green category which offers employment during construction phase but does not have any significant adverse impact on environment.

In addition, Natural gas being containing environmental friendly property and less pollution generating property compare to other fuel like petrol & diesel, its uses are recommended in various industries and domestic purpose and will reduce pollution level in the surrounding area and meet the energy requirement of industries and domestic consumers in economic and ecofriendly manners.

Table 1.1 Salient feature of the DNH pipeline network

Name of Project	Establishment of Natural Gas distribution pipeline network along the existing road RoW under PWD department including associated facilities in Union Territory Dadara & Nagar Haveli i.e. **1.** Kharadpada to Luhari Industrial Area (Jhaveri Flexo India Ltd.) Connectivity- Length 4.515km & 125mm Dia. PE **2.** Vasona Char Rastha to Khanvel Petroleum Khanvel Connectivity (HP RO)-Length 15.125Km & 8'' Dia. Steel **3.** Sili Fatak to Randhe Road Umarkui Connectivity-Length 8.525Km & 6" Steel/125mm Dia. PE **4.** IMP Power Sayli & Siddhant Ispat Connectivity Project-Length 7.200Km & 6" Steel/125mm Dia. PE **5.** Jackson Industry Athola Connectivity Project-Length 2.480Km & 125mm Dia. PE **6.** Dabur Industry Connectivity- Length 2.650Km & 125mm Dia. PE Covering Length 40.495Km having 6"/8" Diameter for steel & 125mm

	Diameter for PE (polyethylene)		
Petroleum and Natural Gas Distribution Regulatory Authority (PNGRB) authorization	GGL has received **Petroleum and Natural Gas Distribution Regulatory Authority (PNGRB) authorization for laying, building, operating or expanding CGD network Dated: 01.04.2015 attached as Annexure II.**		
Source of Gas supply	In upstream GGL network of gas supply near Dapada village in DNH and as a downstream domestic and industrial customer near village Kherdi in DNH		
Pipeline Material	Poly ethylene (PE) grade P-100,SDR-17.6 & IS-14885		
	8" NB(Steel)	**6" NB(Steel)**	**125 mm(PE)**
Design pressure	49.0 Barg	49.0 Barg	10 Barg
Operating Pressure	26.0 Barg	4.0 Barg	4.0 Barg
Inlet Pressure	26.0 Barg (maximum)	4.0 Barg (maximum)	4.0 Barg(maximum)
Outlet Pressure	19.0 Barg (minimum)	1.0 Barg (minimum)	1.0 Barg (minimum)
Maximum quantity at any point of time (cubic meter or tones)	13000 Cubic Meters	1250 Cubic Meters	1250 Cubic Meters
Inlet & Outlet Temperature	Between 0ºC to 55ºC		
Operating Temperature	Between 15ºC to 45ºC		
Schedule of construction and completion	**Tentative Timeline** Project Start Date - October-2025 (Date of permission issued) Project Completion Date - March - 2027 **(Note: Construction will be started after all requisite permissions from the boards/authorities.)**		
Applicable standard and code	- Petroleum & Natural Gas Regulatory Board (PNGRB) guideline – Technical Standards & Specifications including Safety standards for CGD Network - American Society of Mechanical Engineers (ASME) B 31.8 – Code for Gas Transmission and Distribution Piping Systems		
Labour requirement	Construction Phase: 40 Nos. (Maxi.)		
Water consumption	Requirement of water will be various activity during construction phase of pipeline is as given below which will be met by tanker supply from nearby municipal source		

<table>
<tr><td></td><td>
<table>
<tr><th>S. no</th><th>Activity</th><th>Water consumption in liters</th></tr>
<tr><td>1</td><td>Steel /PE laying by HDD Method if required</td><td>112000</td></tr>
<tr><td>2</td><td>Watering & compaction of the Trench (Note: For 1km of pipieline-5000 liter, For Total 40.495 km -202475 liter)</td><td>202475</td></tr>
<tr><td>3</td><td>Water consumption for domestic use (Note: Earlier for One Year -31200 liter, Now for One & half year -46800 liter)</td><td>46800</td></tr>
<tr><td></td><td>Total</td><td>361275</td></tr>
</table>
</td></tr>
<tr><td>Energy requirement and source number of DG sets with capacity in KVA</td><td>Temporary 3KVA DG set will be required for electro fusion welding during only construction phase of laying of pipeline. No stationery/permanent DG sets required on pipeline during operational phase.</td></tr>
<tr><td>Cost of project</td><td>13 Crore</td></tr>
<tr><td>Capacity</td><td>0.25MMSCMD</td></tr>
<tr><td>Population Density Index</td><td>As per design factor 0.4, Class IV as per ASME B 31.8</td></tr>
<tr><td colspan="2">Environmental Sensitivity of the project</td></tr>
<tr><td>Sanctuaries area</td><td>Proposed natural gas transportation pipeline in union territory of DNH area passes through DNH Wild life Sanctuary for 6.956km and eco sensitive zone of DNH wild life sanctuary for 7.722km out of total length approx.40.495km.

The everyday vehicle movement on existing road passes through DNH WLS is currently present there. However, the proposed pipeline route will not have any permanent impact in this area because of it is 1 to 1.2meter underground buried pipeline along the existing road RoW. The impact envisaged only during construction phase of the laying of pipeline in that area which will be limited to only few days and the soil will be reinstated near to its original condition after laying of pipeline. So, no major impact on wild life sanctuary is expected on continuous basis. So, the project will have impact is very marginal, temporary in nature and reversible.</td></tr>
<tr><td>National Park</td><td>Nil</td></tr>
<tr><td>Coral Reefs</td><td>Nil</td></tr>
<tr><td>Mangroves</td><td>Nil</td></tr>
</table>

Linked Proposal no.	Forest (Conservation) Act,1980 P. NO: 1. FP/DN/Pipeline/494625/2024 2. FP/DN/Pipeline/494608/2024 3. FP/DN/Pipeline/493459/2024 Wild life Protection Act, 1972 P.NO: 1. WL/DN/Pipeline/500455/2024

(i) Need for the Project and its Importance to the Country and or Region.

As a consequence of the rapid rate of industrialization in India, need of fuel is increasing at an equally rapid rate and the supply-demand gap is widening and there is a need to take steps must be taken to address this issue.

Overland transport of fuels by trucks & Tempo is uneconomical, unsafe, and is a contributor to environmental degradation in terms of the fuel consumed and pollutants released by vehicles in transit and by accidents and spillages (common on Indian roads).

Pipelines are internationally recognized as the preferred alternative for transport of fuels from the point of view of safety, economy and relative environmentally viable. The qualities of underground pipelines that make them desirable from these angles are that they are buried underground (at a minimum depth of 1-1.2m), and are controlled by periodic monitoring and rapid closure of valves, etc., and that they are routed to avoid human settlements and ecologically sensitive areas.

(ii) Demand - Supply Gap.

Natural gas is a colorless, odorless, naturally occurring gaseous mixture of hydrocarbon compounds. Natural gas is used in a variety of applications, such as feedstock in fertilizer in the petrochemical industry and as fuel in the power generation manufacturing of steel, textile, ceramic, glass and other industrial products. As a fuel, natural gas competes with a range of alternative products such as coal and lignite as well as petroleum products such as liquefied petroleum gas, naphtha, high speed diesel, light diesel oil and fuel oil. However, due to lower fuel operating costs and better combustion characteristics, natural gas has distinct economic advantages over other sources of energy. In addition, natural gas has substantial environmental advantages over other energy sources, due to lower emissions.

Worldwide, the percentage of global primary energy consumption of natural gas increased from 19% in 1980 to 24% in 2002. High growth in demand of natural gas is expected to occur in developing countries at a rate of 3.9% per year between 2001 and 2025.

The Indian natural gas market is relatively underdeveloped compared to other regions of the world. By the years 2024 to 2025, the share of natural gas would increase to 20% of total primary energy consumption, according to Hydrocarbon Vision 2025.

In addition, natural gas has substantial environmental advantages over other energy sources, due to lower emissions. As it can be seen from given **Table 1.4**:

Table 1.2 Relative CO2 emissions from various fuels:

Sr. No.	Fuel	CO_2 (Kg/MMBTU)
1	LNG / CNG	53
2	LPG	63
3	Aviation Gasoline	70
4	Automobile Gasoline	71
5	Kerosene	72
6	Fuel Oil	73
7	Coal	98

(Source: eia, U.S. Energy Info.)

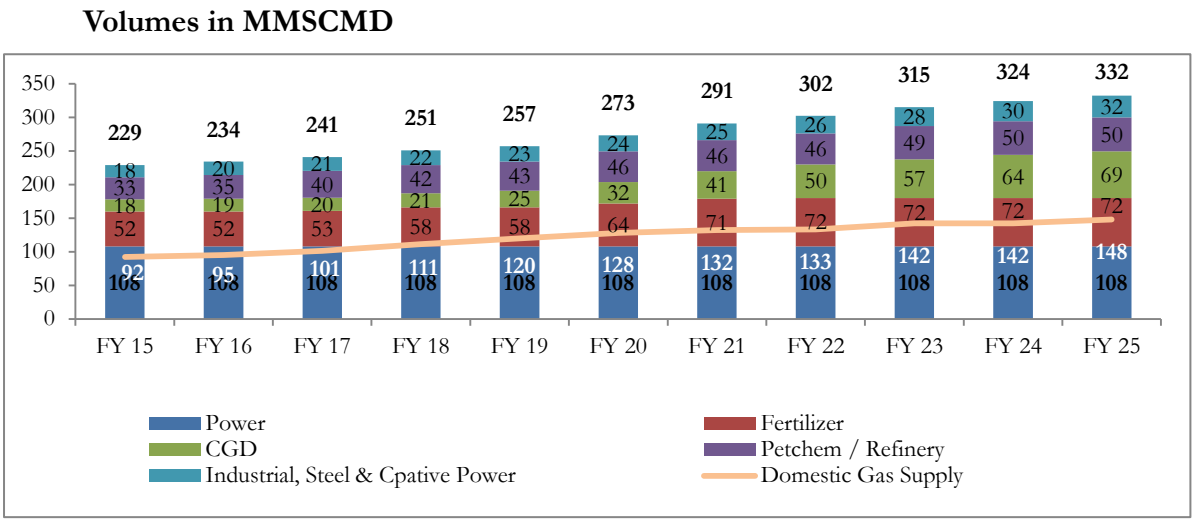
- CNG is an eco-friendly fuel.
- It can reduce NOx, SOx and particle emissions by 50% if used in place of Oil

Worldwide, the percentage of global primary energy consumption of natural gas rose from 19% in 1980 to 24% in 2002. High growth in demand of natural gas is expected to occur in developing countries at a rate of 3.9% per year between 2001 and 2025. The Indian natural gas market is relatively underdeveloped compared to other regions of the world. By the years 2024 to 2025, the share of natural gas would increase to 20% of total primary energy consumption, according to Hydrocarbon Vision 2025.

Gas Demand

City Gas Distribution, Fertilizer, Power, Oil Refinery and Ceramic industry form the demand drivers for the natural gas. The demand of gas will be supplemented by additional demand in the refinery, petrochemicals, steel and glass industry.

GGL has assessed the requirement of the companies in the above mentioned sectors and these industries would form anchor customers who could support a long-term agreement for significant proportion of the projected gas throughput through referenced pipeline sections. Once the transmission infrastructure is established, demand from a number of other consumers in various other sectors is expected to materialize.

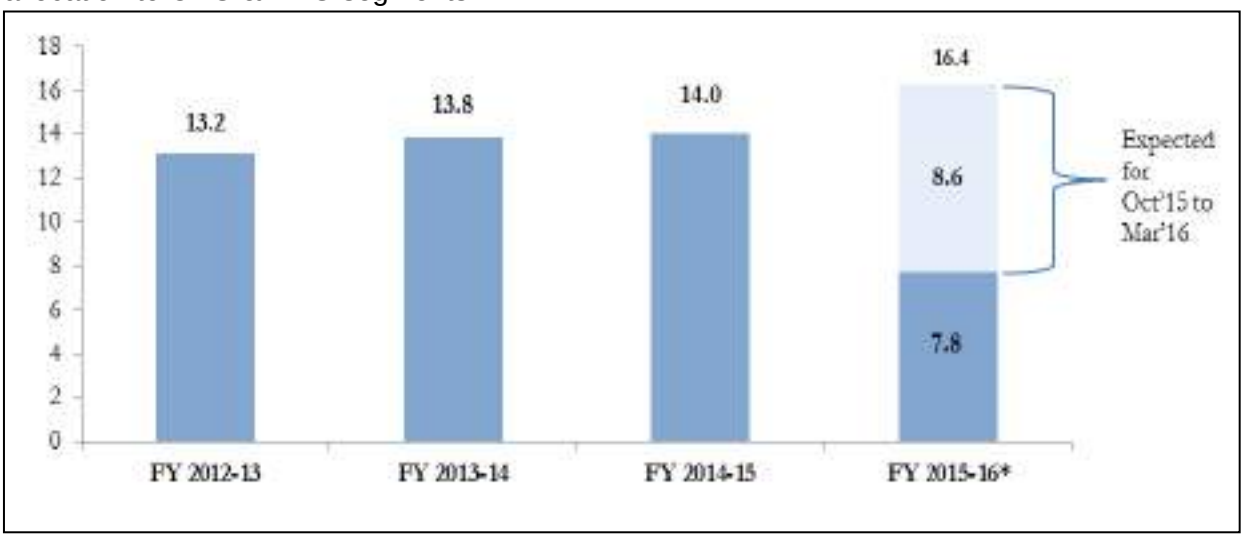


(Source: ICRA's Indian Gas Utilities report, July 2015)

Figure 1.2 Figure Showing Sector-wise Requirement of Natural Gas through Pipeline

Further, as evident from the graph below, the total demand for Natural Gas in India is far higher against domestically produced gas, which has resulted in acute requirement of infrastructure to bring in LNG, i.e. LNG terminals and in-turn supporting pipeline infrastructure for transportation of Re-gasified LNG. Due to evident gap in demand – supply, LNG import has witnessed significant growth in recent years.

As is evident the demand for natural gas in India looks robust. While, industrial segments (Refinery, Petchem, gas for industrial use) have the ability to consume R-LNG at market determined prices, the outlook for CGD sector also looks promising with domestic gas allocation to CNG & PNG segments.



(Source: PPAC / Company data) (*Provisional data till Sep'15)

Figure 1.3 Figure Showing Demand of Natural Gas in Last Financial Years.

Gas Supply

Gas will be supplied from upstream GGL network of gas grid near Dapada village in DNH and as downstream domestic and industrial customers near village Kherdi in DNH. The pipeline will be of length approx.40.495km having 6"/8" Diameter for steel & 125mm Diameter for PE (polyethylene) and will have pressurized natural gas to meet the requirement of industries and domestic end use consumers.

(iii) Imports vs. Indigenous production.

It is necessary to achieve energy security locally. There is ample demand for natural gas both within and outside the country. Despite the steady increase in India's natural gas production, demand has outstripped supply and the country has been a net importer of natural gas since 2004. India's net imports reached an estimated 445 Bcf in 2009.

(iv) Export Possibility.

The internal demand for natural gas is so high for industrial and domestic consumption of natural gas, that export of natural gas is not envisaged.

(v) Domestic / Export Markets.

In 2009, India consumed roughly 1.8 Tcf of natural gas, almost 300 billion cubic feet (Bcf) more than in 2008. Natural gas demand is expected to grow considerably, largely driven by demand in the power sector. The power and fertilizer sectors account for nearly three-quarters of natural gas consumption in India. Natural gas is expected to be an increasingly important component of energy consumption as the country pursues energy resource diversification and overall energy security.

Natural gas marketing may be defined as the selling of natural gas. In even looser terms, marketing can be referred to as the process of coordinating, at various levels, the business of bringing natural gas from the wellhead to end-users. The role of natural gas marketers is quite complex, and does not fit exactly into any one spot in the natural gas supply chain. Marketers may be affiliates of producers, pipelines, and local utilities, or may be separate business entities unaffiliated with any other players in the natural gas industry. Marketers, in whatever form, find buyers for natural gas, ensure secure supplies of natural gas in the market, and provide a pathway for natural gas to reach the end-user. Marketing natural gas can include all of the intermediate steps that a particular purchase requires; including arranging transportation, storage, accounting, and basically any other step required to facilitate the sale of natural gas. Some of the key players are Indian Oil, BPCL and HPCL. Also, the country's refining segment is primarily dominated by domestic players such as Hindustan petroleum Corporation Limited (HPCL), Bharat Petroleum Corporation Limited (BPCL), IOC and Reliance Industries.

(vi) Employment Generation (Direct and Indirect) due to the Project.

The proposed project will generate direct employment at local level due to laying of natural gas pipeline. The downstream activity of maintenance of uninterrupted natural gas supply will generate continuous employment and revenue.

Routemap showing proposed Natural Gas distribution pipeline network is attached as Annexure II.

Financial and social benefits with special emphasis on the benefit to the local people including tribal population, if any, in the area.

- Residential/Built up lands will not be acquired for the proposed project and hence there is no displacement of population.
- Transportation by pipeline is comparatively less expensive than the other modes of transport, both in the capital and operating costs. If a good network of pipelines is implemented throughout the country, this will ensure that the pipeline-transported products will be available to the consumers at a lower cost than alternate modes of transport.
- The pipeline mode for transportation of gas is a safer and reliable mode of assured supply of gas fuel.
- It is unaffected by external disturbances like law and order, road accidents etc.
- It offers a cost effective and speedy supply of gas.
- The project would enhance employment opportunities through contractors for the local People during construction phase.
- There will not be any adverse impact on communication and transportation.
- One of the additional advantages of pipeline transportation is that the scope of economic Offences like theft / pilferage and adulteration of products would be almost negligible and the consumers will get immense benefit and value for money.

1.4 Scope of the Study: Details of Regulatory Scoping Carried Out

This study was carried to comply with the guideline of Ministry of Environment and Forests. The purpose of this study is:

To determine at the time of studies, the prevailing situation relating to the environment, human beings and local communities, the wildlife and aquatic life (if any) in the contact area and in the adjoining / neighboring areas.

To establish the likely effect on the environment, human beings and local communities, the wildlife and aquatic life (if any) in the contract area and in the adjoining / neighboring areas as a consequence of the relevant phases of this Natural Gas transmission project, and to work out

methods and measures for minimizing the environmental damage as well as carrying out site restoration activities.

This report is prepared keeping in mind the above two requirements before commencement of any fieldwork, relating to pipeline laying activities.

The scope of work includes collection of baseline data with respect to major environmental components namely air, noise, water, land, biological and socio-economic components along the pipeline route, impact assessment of proposed activities and finally, preparation of Environmental Management Plan.

1.5 Environmental monitoring data:

a. Air Environment: Collection of surface meteorological data like wind speed, wind direction, relative humidity and rainfall along the pipeline route in the study area. Measurement of 24 hourly average background concentration levels of PM_{10} and $PM_{2.5}$, SO_2, NOx, HC, CO as per MoEF guidelines were done.

b. Noise Environment:

Monitoring of noise levels along the pipeline route.

c. Water Environment:

Collection and analysis of surface and ground water samples within the study area

d. Land Environment:

Sampling and analysis of soil quality along the pipeline route

e. Biological Environment:

Study of terrestrial and aquatic environment along the pipeline route

f. Socio-economic environment:

Collection of baseline data including demographic details, infrastructure resource space, economic resources space, education, industries and aesthetic attributes within the study area.

1.6 Rapid Environmental Impact Assessment

The Environmental Impact Assessment (EIA) report prepared for the proposed pipeline project covers the environmental components such as air, water, land, noise, flora and fauna and socio-economic aspects in the study area i.e. within the corridor of 3 Km i.e. 1.5 Kms either side of the proposed pipeline along the complete route of pipeline.

The EIA covers:

- A brief description of pipeline activities, route, construction methodology etc.
- Collection and Assessment of existing Environmental baseline status based on the current information relating to meteorology, air quality, water quality, socio-economic

aspects, flora and fauna, existing land use pattern, etc. within the study area.

- Identification of impacts due to proposed project
- Prediction and Evaluation of the Environmental Impacts that may result from proposed project.
- Outline the Environmental Management Plan to mitigate the negative impacts of the proposed project.

1.7 Framework of assessment

Based on the scope of work, guidelines generally followed for EIA studies, a corridor of 3 Km along the route of proposed pipeline has been taken as the spatial frame for the impact assessment. Temporal frame of assessment has been chosen to reflect the impacts in two distinct phases of the project namely:

1. Construction phase
2. Operation phase

1.8 Methodology of rapid environmental impact assessment

The methodology adopted for carrying out the Environmental Impact Assessment for the proposed pipeline project has been based on the guidelines issued by Ministry of Environment and Forests (MoEF). An effective Environmental Assessment calls for identification of environmental parameters likely to be impacted, depending on the activities to be carried out during the construction and operation phase of the proposed pipeline project. This is followed by collection of baseline data on various environmental components through reconnaissance survey, sampling and a review of available literature, etc. Prediction and evaluation of impacts is then made based on baseline data. Finally and Environmental Management Plan (EMP) is proposed, to mitigate negative impacts on environment including a plan for Post Project Environmental Monitoring. The methodology adopted in preparing this EIA report is outlined in the following sections:

1.9 Project Setting and Description

This section covers details pertaining to the proposed project. The environmental considerations given during design of this project and construction and operation of the project have been discussed.

1.10 Baseline Data Collection

After identifying the possible affected environmental parameters a monitoring network is set up for each environmental parameter to establish its background quality. The data for other environmental components such as air, noise, water, land, socio-economic were collected along the pipeline route.

1.11 Identification of Impacts/Mitigation Measures

In this part of the report the sources of pollution generation (gaseous, liquid, solid, noise) due to the proposed activities are identified and their emission load and characteristics are estimated. Predictions were then carried out to know their quantitative and qualitative effect on various environmental parameters. Part of the predictions is qualitative in nature also especially in cases where such predictive techniques are not available. These predictions are subsequently superimposed on the background quality of various environmental components and their individual and synergistic impact is evaluated using the cause and effect relationship.

1.12 Environmental Management Plan Preparation

In order to mitigate or minimize the negative impacts of the proposed project an effective EMP is called for. Therefore in the final part of the report, planning and implementation of various pollution abatement strategies including monitoring has been proposed**.**

1.13 Structure of the report

The report contains analysis of primary field study/survey/monitoring data and secondary data, environmental impact assessment, mitigation measures, and EMP. The report completes with necessary tables, drawings and annexure. The structure of the report is as follows:

Chapter 1: Introduction, Background & EIA Methodology

Chapter 2: Project Description

Chapter 3: Description of the Environment

Chapter 4: Anticipated Environmental Impacts & Mitigation Measures

Chapter 5: Analysis of Alternatives (Technology & Site)

Chapter 6: Environmental Monitoring Program

Chapter 7: Additional Studies

Chapter 8: Project Benefits

Chapter 9: Environmental Cost Benefit Analysis

Chapter 10: Environmental Management Plan

Chapter 11: Summary & Conclusion (This will constitute the summary of the EIA Report)

Chapter 12: Disclosure of consultants engaged

Chapter 2. Project Description

2.1 Condensed Description of Project

To Supply of Natural Gas (PNG) to various industries, commercial & residential consumers in Union Territory of Dadara & Nagar Haveli, M/s. Gujarat Gas Limited, Gandhinagar proposes to set up Natural Gas (PNG) Network.

City Gate Distribution (CGD) is a facility, set-up for supplying PNG to domestic, commercial, industrial and CNG to automobile customers. The system receives unodourized gas at high pressure through the sub-transmission pipeline from tap-off point and supplies the same to the CGD Network after filtration, pressure reduction, odourization and custody metering at City Gate Station.

The pressure reduction will be in four stages within the network before natural gas reaches to the consumers (in case of automobile sector pressure reduction is at one stage only). The first pressure reduction is carried out at City Gate Station, second at DRS, third at service regulator and fourth and final at customer premises. The odourization for imparting odour to the gas is installed at CGS. The major assets in the network are CGS, underground steel distribution pipeline network, PRS, CPRS, DRS, Polyethylene (PE) network, Individual Pressure Regulating Station (IPRS), Service Regulators (SR), Galvanized Iron (GI) network and customer connections.

The size, rating and type of major and sub assets are selected based on the pressure rating, capacity and other applicable criteria. These are considered for city gate distribution system to meet the current and future gas demand, health and safety of employees, customers and public at large besides ensuring environment protection.

Table 2.1 Sizing of Pipe

Dia. inch	Dia. Mm	Wall thickness mm
16	406	7.5
12	304.8	7.5
10	254	6.4
8	203.2	6.4
6	152.4	6.4
4	101.6	6.4

The design of the CGD network will comply with statutory, legal requirements, national/ international technical and safety standards/ practices and PNGRB regulations.

The main objective of the distribution of Natural Gas through pipeline is to ensure safe and uninterrupted gas supply to customers for 24 hours, 365 days by manning the control room,

round the clock, by deploying the team of competent engineers and technicians, for handling various customers complaints about gas leak/escape, customer queries and carrying out planned operation and maintenance activities, as per annual operation and maintenance plan for ensuring safe and uninterrupted gas supply and integrity of the network.

The proposed alignment also meets the other broader requirements of the laying criteria of the pipelines. Accordingly, the present pipeline route has been selected for the transmission of natural gas to various parts of Union Territory of Dadara & Nagar Haveli.

The entire pipeline is passing through a fair and leveled ground. The pipeline shall be laid at 1.0-1.2 m below the ground level. The land shall be reinstated to its original land use. The pipeline shall be laid as per API guidelines.

2.2 Type of the Project:

GGL Present project is to establishment of Natural Gas distribution pipeline network including associated facilities in Union Territory Dadara & Nagar Haveli (DNH) for which GGL has received PNGRB authorization for laying, building, operating or expanding CGD network Dated:01.04.2015 attached as **Annexure I**.

In respect to environmental sensitivity around the study area of 1Km (500meter on either side of the pieline from the centerline), the detailed status of various environmental component as per MoEF & CC guideline are as mentioned in given below Table 2.3.

Table 2.2 Environmental sensitivity

Sr.No.	Areas	Name/ Identity	Aerial distance (within 15 km.) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	Yes	Proposed natural gas transportation pipeline in union territory of DNH area passes through DNH Wild life Sanctuary for 6.956 km and eco sensitive zone of DNH wild life sanctuary for 7.722 km out of total length approx.40.495 km
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	Yes	Proposed natural gas transportation pipeline in union territory of DNH area passes through DNH Wild life Sanctuary for 6.956 km and eco sensitive zone of DNH wild life sanctuary for 7.722 km out of total length approx.40.495 km

3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	Yes	Proposed natural gas transportation pipeline in union territory of DNH area passes through DNH Wild life Sanctuary for 6.956 km and eco sensitive zone of DNH wild life sanctuary for 7.722 km out of total length approx.40.495 km
4	Inland, coastal, marine or underground waters	NO	Not applicable
5	State, National boundaries	Yes	Not applicable. Proposed Natural Gas Transportation pipeline network falls in Union territory of DNH Geographical area.
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	No	Not Applicable
7	Defence installations	No	Not Applicable
8	Densely populated or built-up area	Yes	Proposed Natural Gas transportation pipeline network falls in Union territory of DNH Geographical area.
9	Areas occupied by sensitive man-made land uses *(hospitals, schools, places of worship, community facilities)*	Yes	As per route map attached
10	Areas containing important, high quality or scarce resources *(ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)*	No	Not envisaged
11	Areas already subjected to pollution or environmental damage. *(those where existing legal environmental standards are exceeded)*	No	Not applicable

12	Areas susceptible to natural hazard which could cause the project to present environmental problems (*earthquakes, subsidence, landslides, erosion, flooding* *or extreme or adverse climatic conditions*)	No	Since it is buried pipeline and it will not affect due to floods, earthquake etc. (Study area falls in Moderate Risk Seismic Zone III), cloud burst and landslide. While crossing the rivers, streams, creeks etc. will be done by HDD method and will be safe below maximum scouring depth. Pipeline will be laid by assuring soil parameters by engineering and Geo-technical parameters and applying best available technology to prevent any probable damage if identified.

2.3 Need of the project

As a consequence of the rapid rate of industrialization in India, fuel needs are increasing at an equally rapid rate and the supply-demand gap is widening and steps must be taken to address this issue.

Overland transport of fuels by trucks is uneconomical, unsafe, and is a contributor to environmental degradation in terms of the fuel consumed and pollutants released by vehicles in transit and by accidents and spillages (common on Indian roads).

Pipelines are internationally recognized as the preferred alternative for transport of fuels from the point of view of safety, economy and relative environmentally friendliness. The qualities of underground pipelines that make them desirable from these angles are that they are buried underground (at a minimum depth of 1-1.2m), are controlled by perioding monitoring and rapid closure of valves at every 1km distance for PE pipeline and 3km to 5km distance fpr steel pipeline, and that they are routed to avoid human settlements and ecologically sensitive areas.

The laying of transport pipelines for fuels (such as in proposed project), are an improvement to environment as they greatly reduce transport fuel usage and movement of heavy vehicles. The Ministry Of Environment and Forests, Govt. of India, has recognized the significance and viability of transportation of Petroleum products through underground pipeline, therefore EIA report is required to be submitted for oil/gas pipelines.

2.4 Justification with Respect to Environmental Attributes

- The proposed route has suitable geological and geo – structural properties.
- The proposed route doesn't require any major deforestation.
- Transportation of Natural Gas through pipeline in inland condition is an interesting and eco-friendly option in comparison to other alternatives like road, rail transport etc. as it offers a safer

option, its ability to traverse through difficult terrains, controlled rate, continuous supply and unaffected by external factors like weather, law and order, etc. and hence offers rapid & reliable supply at low unit cost.

- As a consequence of the rapid rate of industrialization in India, fuel needs are increasing at an equally rapid rate and the supply-demand gap is widening and steps must be taken to address this issue.
- Overland transport of fuels by trucks is uneconomical, unsafe, and is a contributor to environmental degradation in terms of the fuel consumed and pollutants released by vehicles in transit and by accidents and spillages (common on Indian roads).
- Pipelines are internationally recognized as the preferred alternative for transport of fuels from the point of view of safety, economy and relative environmentally friendliness. The qualities of underground pipelines that make them desirable from these angles are that they are buried underground (at a minimum depth of 1m), are controlled by periodic monitoring and rapid closure of valves, etc., and that they are routed to avoid human settlements and ecologically sensitive areas.

2.5 Cumulative Impact Due to Existing Pipe Line Network

It is an important feature of project that, at places the pipeline will be layed in the vicinity of already existing pipe lines as mentioned above. It has an advantage of (I) It reduces land acquisition significantly (II) The infrastructural facilities of accessing the existing pipeline can be readily used for proposed pipe line as well

When additional pipeline are layed in the vicinity of existing pipe line necessary care of laying the pipe line at a safe inter pipe line distance maintained as recommended by OISD. Again, as both the pipe lines are buried pipe lines at the depth of 1 to 1.2 meter at least. As a result of this during construction activities utmost care is required to be taken while excavation, transportation, trenching etc. so that, existing pipe line network is not damaged. During operational phase no environmental impact is envisaged as both the pipe lines are buried at depth and inter pipeline distance. Hence, cumulative environmental impact due to laying such pipe line is marginal, temporary and reversible, provided all necessary precautions and recommendation are observed carefully.

However, it is important to give safety considerations which are separately addressed by detailed independent studies on Risk Assessment and Disaster Management Plan. The recommendation there in shall be strictly followed.

Following points are important in addressing concern regarding safety of pipeline networks (Transporting Petroleum Product/Natural Gas) located in the vicinity:-

1. As mentioned above, both the existing and proposed pipelines are buried pipe line hence in case of rapture of pipeline and catching time will be devoid of/ supply of Air or Oxygen hence will not be combustible and will be catch fire.
2. The detailed RA/DMP studies are carried out and all recommendation there in will be adopted strictly which will reduce the risk significantly.
3. Inter pipeline distance will be kept adequate/more than that prescribed by OISD
4. Past experience and data analysis reveal that frequencies of rupture are of very low order in case of proposed specification of pipe line. Hence, probability of pipe line catching fire individually / mutually is also of very low order.
5. There will be a regular monitoring of underground pipeline and manual operations for safety and health of pipe line.

The pipeline route is optimized based on the following considerations:

- Safety of public lives and property and safety of the pipeline from engineering and other considerations.
- Shortest pipeline length
- Easy and favorable terrain condition free of large water bodies, low lying marshy lands, obstacles like ravines, depressions and unstable grounds, meandering rivers, etc.
- Ground profile for pipeline hydraulics and avoidance of steep rising and falling ground, hills and valleys having sloping right of way.
- Availability of infrastructure and access to the pipeline route during construction and maintenance.
- Environmental impact and avoidance of environmentally sensitive lands, such as reserved forests, marine parks, built-up areas, places of worship, burial and public events.
- Minimum crossing of existing pipelines, transmission lines, parallel alignment, etc.
- Minimum road, rail, river and Canal crossings.
- Avoidance of rugged and intricate grounds with hard strata, exposed rocks, boulders and quarries.
- Existing and future developments in the region, such as roads, rail lines, Canal network, reservoirs, townships, industrial units, etc.
- Scope for future expansion of the pipeline

Map showing general location, specific location, project boundary & Project site lay out are attached as **Annexures I**.

2.6 Size or Magnitude of Operation Including Associated Activities Required by the Project

To meet the requirements of various parts of Union territory of DNH GA, GGL has proposed an approx. 40.495km having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene) pipeline along with underground valve at distance of every 3km to 5km for steel pipeline and 1Km for PE pipeline respectively. The proposed alignment also meets the other broader requirements of the laying criteria of the pipelines. Accordingly, the present pipeline route has been selected for the transmission of natural gas to various parts Union Territory of Dadara & Nagar Haveli.

2.7 Selection of Route Criteria

A key environmental mitigation measure already implemented is the routing of pipeline to avoid high environmentally sensitivity areas. The route of the proposed pipeline has been finalized taking into consideration the following factors:

- Connectivity between supply and demand centers
- Least disturbance to the environment
- Least disturbance to human habitations during construction and operation phase;
- Avoiding environmentally sensitive areas such as sanctuaries, Biospheres, Marine Parks and National parks etc.
- To avoid any disturbance to archaeological sites and any areas of ecological significance or sensitivity;

2.8 Pipeline Elements

The proposed pipeline system shall comprise of the following elements:

1. Proposed pipe line that carries the Natural Gas in Union Territory of Dadara & Nagar Haveli
2. Telecom facilities
3. Isolation valve at every 1Km distance for PE pipeline and 3km to 5km distance for steel pipeline
4. Route Marker at every 200meter distance with emergency contact number with personal available 24X7

2.9 Technology and Process Description

The following steps have been adopted for preparation for the assessment of CGD network for Union Territory of DNH district (excluding area already authorized).

1. Natural Gas Demand Assessment
2. For Domestic, Commercial and Automobile categories through primary survey and secondary research;

3. Survey of industrial units, commercial units, road junctions, critical reference points, important landmarks covering entire studies, existing petrol pumps and etc.
4. Determination of design criteria for CGD network;
5. Table Top Study & Reconnaissance Survey for steel grid route selection for developing the CGD network;
6. Study on potential locations of CNG Stations & DRS and determination of the location;
7. Steel network hydraulics;
8. Operation and Maintenance philosophy to ensure long-term system integrity for safe and reliable operation of CGD network;
9. Estimation of Capex, Opex and its phasing, in line with the demand estimates;
10. Health, safety and Environment for gas distribution system
11. Emergency response and disaster management plan to prevent occurrence of any emergency or disaster;
12. Project Financial

The description of CGD Network should include specific description of the primary networks, secondary and tertiary networks with respect to design specifications, length, major installations. The major assets of CGD Network with function & technical details are following such as;

i. Sub-Transmission line: Carrying high pressure gas from main transmission line to CGS

ii. City Gate Station: It receives high pressure gas through sub-transmission pipeline and carries out filtration, heating (if required), pressure reduction, metering and odourization before dispatching to steel distribution network

iii. Steel Distribution Network: Carrying gas at 26 to 49 barg pressure from CGS downstream and taking upto CPRS/IPRS/DRS and CNG stations.

iv. District Regulating Stations (DRS): It receives gas through steel network and carries out filtration, at Upto 49 barg upstream to Upto 4 barg downstream pressure and dispatches to PE distribution network.

v. Common Pressure Reduction Station (CPRS)/Individual Pressure Reduction Station (IPRS): Carrying gas at 4 barg and supply to industrial customer connections as the specified required pressure.

vi. Domestic Consumer Connection: Consists of regulator, meter, GI / Copper pipeline and neoprene tube.

vii. Commercial Consumer Connection: Consists of regulator, meter, GI / Copper pipeline and neoprene tube. The gas pressure will be specific as per requirement of consumer.

viii. Industrial Consumer Connection: Consists of filter, regulator, meter, PE pipeline. The gas pressure will be specific as per requirement of consumer.

The pressure regime of the proposed CGD network is shown in below table

Table 2.3 Pressure Regime of the Proposed CGD Network

Sr. No.	Network Component	Upstream Pressure	Downstream Pressure
1	Sub transmission Pipeline	50 - 99 barg	50 - 99 barg
2	City Gate Station	50 - 99 barg	26- 49 barg
3	Steel Network	26- 49 barg	Upto 19 barg
5	CNG station	19-49 barg	Upto 210 barg
6	DRS	10- 49 barg	4 barg
7	Service Regulator	1- 4 barg	100-110 m.barg
8	Commercial Regulator	Upto 0.5 – 4 barg	50 – 75 m.barg
9	Domestic Regulator	Upto 50 m.barg	Upto 24 m.barg

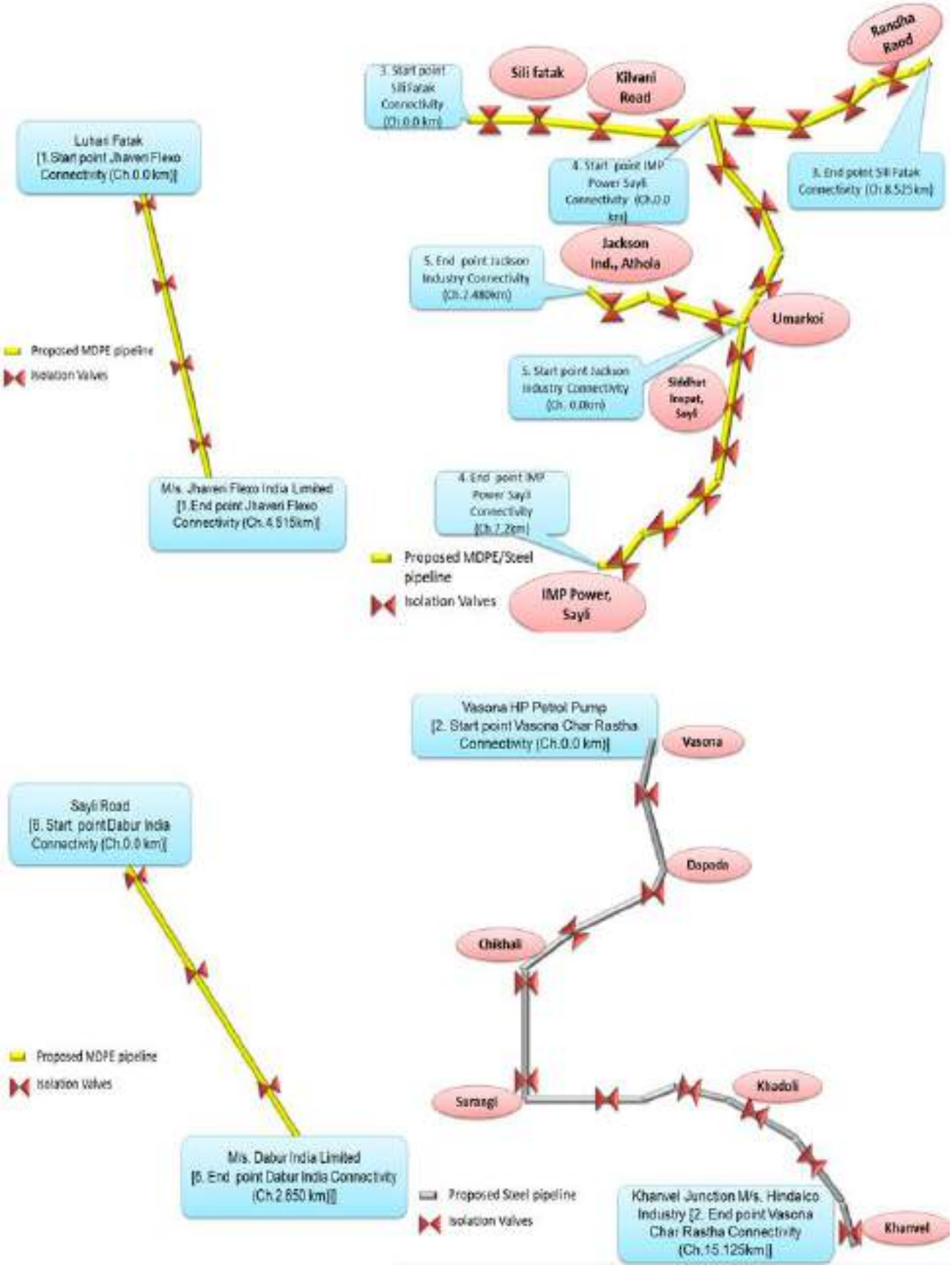
The present report is for proposed GGL Natutal Gas transportation pipeline network in Union Territory of Dadara & Nagar Haveli area covering network (Approx. length 40.495Km having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene)) including associated facilities.

Process description

To supply Natural Gas (PNG) for various industrial, commercial & residential consumers within and around the Union Territory of Dadara & Nagar Haveli, GGL proposes lay Natural Gas distribution pipeline network including associated facilities in Union Territory Dadara & Nagar Haveli for Total Length 40.495Km having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene). The section wise details of proposed pipeline network is as furnished below:


1. Kharadpada-Luhari Fatak
125mm Dia.MDPE pipeline laying for length 4.515km with isolation valve at every 1km
Upto M/s. Jhaveri Flexo India Ltd.
2. Vasona HP Petrol Pump
8" Steel pipeline of 15.125Km length with isolation valve at every 3km
Khanvel Junction M/s. Hindalco Industry
3. Sili Fatak
Laying of 125mm Dia. MDPE /6" Dia. Steel pipeline of 8.525km length with isolation valves at every 1Km
Randha Road
4. Kilvani Road
Laying of 125mm Dia. MDPE /6" Dia. Steel pipeline of 7.2km length with isolation valves at every 1Km
IMP Power, Sayli
5. Umarkoi
Laying of 125mm Dia. MDPE pipeline of 2.480km length with isolation valves at every 1Km
Jackson Industry, Athola
6. Sayli Road
MDPE pipeline laying for length 2.650km with isolation valve at every 1km
M/s. Dabur India Limited

2.10 Process flow diagram (Proposed DNH Natural Gas Distribution pipeline network)



2.11 Material of Pipeline

Steel Pipeline

- ✓ Pipe Material: Carbon Steel; Electric Resistance Welded (ERW)
- ✓ Grade of Steel: X 52 as per API-5L (PSL-2)

Poly Ethylene (PE)

- ✓ Pipe Material: Poly Ethylene (PE)
- ✓ Grade of PE: P-100 as per IS -14885

2.12 Pipeline design parameters

- PNGRB guideline as per Technical Standards & Specifications including Safety Standard for CGD ([4]T4S), ASME B 31.8

2.13 Design and Operating Details:

Table 2.4 Operating parameters of proposed pipeline

Pipeline length	40.495km		
Diameter of pipeline	**8" NB(Steel)**	**6" NB(Steel)**	**125 mm(PE)**
Design pressure	49.0 Barg	49.0 Barg	10 Barg
Operating Pressure	26.0 Barg	4.0 Barg	4.0 Barg
Inlet Pressure	26.0 Barg (maximum)	4.0 Barg (maximum)	4.0 Barg(maximum)
Outlet Pressure	19.0 Barg (minimum)	1.0 Barg (minimum)	1.0 Barg (minimum)
Inlet & Outlet Temperature	Between 0ºC to 55ºC		
Operating Temperature	Between 15ºC to 45ºC		

2.14 Main phases of the project

The proposed project, involves two phases construction and operation of the pipeline:

I. Construction phase

A. For pipeline

[4] The "Technical Standards & Specifications including Safety Standards for City or Local Natural Gas Distribution Networks" (T4S) regulations, issued by the Petroleum and Natural Gas Regulatory Board (PNGRB), outline the standards for designing, installing, testing, and commissioning CGD networks, including material and equipment, welding, piping, and safety procedures.

The pipeline shall be designed and engineered, laid and tested in accordance with the provision of ANSI/ASME Code B 31.8 for 'Transmission and Distribution Piping System' and other relevant Codes and Standards.

The pipeline construction is proposed to be carried out through deployment of mainline spreads. During construction, the following activities will be carried out:

a. Clearing and Grading

Right of Use (ROU) area shall be cleared off for vegetation and other obstacles such as boulders etc. In scrubland, vegetation will be stockpiled for re-spreading as part of the restoration process.

b. Trenching

Trenchers and backhoe type excavators will be used to dig the trench for laying the pipeline. The topsoil will be removed and segregated from the remaining backfill material excavated from the trench. The topsoil will be replaced in its original position during the backfilling operation.

c. Stringing

The pipes, after unloading using side booms will be strung adjacent to the trench. Trailers and cranes will be used for the maneuvering of pipes.

d. Bending

The pipe will be bent using a bending machine to the appropriate angle to match the vertical and horizontal alignment of the trench.

e. Lowering

Padding will be provided, wherever required, in the bottom of trench to prevent damage to the coating.

f. Backfilling

The excavated soil will be returned to the trench. The topsoil, which has been preserved on the side of the Right of Use, will be spread over the filled up trench. A crown of soil will be kept on top of the trenched portion to allow for future settlement. Excess or unsuitable material will be cleared from the site and disposed off at a suitable site.

g. Crossings

The method used for the crossing of waterways and other infrastructure facilities like national highway, state highway, major district roads, canals, rivers, nalas and railway lines will vary from place to place depending on the environmental setting and the geo-technical features of the area.

h. Restoration

Restoration of the RoU will be conducted progressively / following the completion of construction works. This will involve removal of foreign material such as construction debris.

The terrain will be returned to its original condition by spreading the topsoil over the ROU and agriculture activities will be restored to original.

B. For associated facilities

- The steps of construction shall be more or less same as the pipeline given below:
- Clearing of the identified location
- Modification of the boundary wall wherever required.
- Leveling and approach road laying
- Foundation works
- Construction water supply
- Structural works
- Mechanical erection

II. Operational phase

A. For pipeline

The activities involved in the operational phase of the project are as follows:

- **Commissioning of the pipeline**: Prior to commissioning of the pipeline, a number of pre-commissioning operations like cleaning and hydrostatic testing of pipeline, starting of mechanical and rotating equipments will be carried out. After successful pre-commissioning activities, the pipeline shall be commissioned for transfer of Natural Gas.
- **Utilities:** The water requirement in the stations during the operational phase will be met by existing bore wells or outsourced through road tankers.
- **Normal operation:** During the normal operation of pipeline, the activities will be mainly confined to the battery limits of terminals.
- **Infrastructure facilities**: Infrastructure facilities to support the anticipated worker population and the project like municipal facilities, firefighting facilities, sewerage maintenance, power supply, water supply and maintenance etc, will be provided where ever required.
- **Post construction protection system:** As the proposed pipeline is PE pipeline so no requirement of cathodic protection.
- **Inspection of pipeline:** Regular inspection of the pipeline shall be carried out as per standard practices.

B. For associated facilities:

Once the pipeline is commissioned, there will be a regular visit by the operation engineers as per drawn up schedule to ensure safe operations. Inspection work will be undertaken on a routine

basis. Inspection pigs will be propelled in the pipeline once in two years to check the health and dimension of the pipeline.

2.15 Pipeline leak detection system

A. Before operation (During construction)

As per the construction standard, the welds are required to be radiographed by x-ray and then followed by the hydrostatic test. This will ensure that there are no leaks from the pipe manufacturing source or the construction work. After confirming the leak test by the contractor, sectionalizing valves will be installed in accordance with the design at intervals.

The pipeline will be hydrostatically tested to a pressure of atleast 1.5 times the design pressure of the pipeline system. Also, the hoop stress will not be allowed to exceed 90% of the specified minimum yield stress (SMYS). The hydrostatical test will be for a minimum of twenty four hours and will be conducted as per the internationally accepted standard for high pressure pipeline design; construction and testing in the above standard and those specifics to pipelines on land will be referred to ASME B 31.8.

B. During operation

The entire system will be monitored continuously from a control station. The monitoring station will be manned continuously. All stations shall have necessary detectors to give necessary alarm in event of leakage and this alarm shall be repeated to Central control Room.

2.16 Safety provisions

A. During construction:

Majority of the potential adverse impacts will be avoided by the use of standard environmental protection and prevention measures during construction and operation as recommended by Oil Industries Safety Directorate (OISD).

External/Internal Corrosion Coating

Suitable anti-corrosive coating would be provided for external corrosion protection, compatible joint material shall be provided at the joints following welding. Three layer external PE coating consist of epoxy, adhesive and Polyethylene having coating thickness of 2.2 mm. minimum shall be provided. Pipeline is protected from internal corrosion by injecting corrosion inhibitor at the required rate during pumping of products through pipeline.

Insulating Joints

Insulating joints would be provided between underground and above ground portions of the pipeline for electrical isolation. Insulating joints would be of mono block type and suitable for above ground/below ground installation.

B. During Operation:

After the commissioning of each pipeline section, it will be handed over to O&M Team; O&M team will also be involved during pipeline commissioning. The manual has been prepared on the

basis of ASME B31.8.This is supplementary to the Engineering and Vendor Documentation. O&M manual provides the general operating instructions and guidelines for preparing and testing the unit prior to commissioning, operating procedures for special equipment and also broad guideline on safety.

The Operation and Maintenance manual should be issued in a controlled manner to O & M team with a proper record of the recipients. Anytime a change is done or the manual is updated, either copy of the changed pages or the complete manual will be given to all the original recipients. It shall be the duty of the recipients to either replace the updated sheets (with new revision number) in the manual or the old manual should be destroyed after receipt of an updated manual.

2.17 Control & maintenance

Preventive Maintenance:

Equipment manufacturer / supplier's maintenance manual would be followed for details of the steps to be taken. An overall preventive maintenance manual would be followed for details of steps to be taken. An overall preventive maintenance schedule shall be evolvedby the proponent. Some of the common steps to be taken in general would be changed to top up of maintenance, and performance will be maintained for each component of the pipeline system. Since the Natural Gas service is hazardous in nature and contamination of the main line products is not tolerable, great care will be taken while preparing the equipment for maintenance and also while taking the equipment back in line.

2.18 Information important for EIA requirement

Aspects likely to cause environmental effects

The proposed Natural Gas transportation pipeline project would cause some temporal environmental impacts due to associated construction activities. These impacts shall be temporary in nature and shall be mitigated or eliminated by implementing a well-organized Environmental Management Plan (EMP) during the construction and operational phases of the project as described below.

III. Air Emissions:

The emissions to the atmosphere shall be from construction equipment / vehicles or activities during construction phase and DG sets/ diesel engines during operation phase.

IV. Water Requirement:

Requirement of water is about maximum 300Lit/Day during construction period and in operational phase it is nil.

V. Wastewater Generation:

No waste water on continuous basis from pipeline operations is envisaged. The waste water generated during hydrostatic testing of equipment and pipeline is a temporary and one time activity. The same water will be reused for multiple tests in other sections. The residual hydrostatic testing wastewater at the end of the test will be non-toxic and disposed off suitably.

VI. Noise:

During construction phase, noise shall be generated through Vehicle movement, construction activities, DG sets etc.

VII.Land:

Proposed pipeline will be layed along the existing RoW of road under PWD authority which will be used temporarily for construction & laying of pipeline. After completion of laying of pipeline land shall be restored back & handed over to land owners.

VIII. Solid and Hazardous waste:

No major solid wastes except the soils from trenches and no hazardous wastes other than oils used for maintenance are envisaged from pipeline construction and operation activities.

IX. E- Waste:

Now a day there has been lot of awareness towards disposal of E-Waste such as electronic circuits, picture tubes, special glasswares, containers, tube lights, CFL tubes etc. The proponent shall carefully collect, store separately and safely, maintain records of inventories and dispose them by giving to TSDF approved by MoEF, New Delhi. The details of the same can be made available as per guidelines of SPCB.

X. Flora and Fauna:

No rare, endangered, endemic or threatened species as per international Red Data book of plants/animals are envisaged to be located along the proposed route. Pipeline is not passing through any dense forest which is conducive for existence of significant wildlife in the area.

XI.Socio-Economic:

The proposed activities shall generate indirect employment in the region.

XII.Power Requirement

No Stationary /permanent DG sets required on pipeline route.

XIII. Workforce Arrangements

The construction works will be temporary. About 40 laborers will be deployed at various locations depending upon the requirement during the construction period.

Temporary camp sites will be set up with all facilities near to the development facilities for construction purposes. Construction workers will be preferably drawn from nearby villages and they will be transported back to their villages. Suitable transportation facilities will be made.

XIV. Abandonment of Operations

At the completion of the pipeline laying and commissioning program, an orderly withdrawal of all personnel and the removal of all construction & testing equipment's and non-fixed items from the site will be undertaken. Upon completion of pipeline laying, the soil and top spoil will be backfilled into pits and the area will be restored close to normal. The land will be restored to its near original condition.

2.19 Assessment of New and Untested Technology for the Risk of Technological Failure.

The transportation of natural gas through pipeline is a very sensitive but very important method for transportation of Natural gas. GGL as a very alert organization, realizing the fact, right from designing, selection of material, erection and commission stage, monitoring, Operational stage, utmost care is taken to adopt state of art technology and practices, also making it sure that it is already a proven safe and efficient appropriate technology. Every activity is as per the standardized protocol and new technology is not involved unless proven safe and accepted as standardized practice & robust R&D back up. Again, it is realized that it is an area of public safety and public sensitivity. Hence, risk of failure of technology is avoided.

Chapter 3. Description of Environment

3.1 Introduction

This chapter of the report provides an overview of the environmental baseline conditions within the study area that might be affected by the proposed activities. **An environmental baseline survey was conducted as part of the EIA study for the** pipeline network in Union Territory of DNH Geographical area and it included collection of primary and secondary data. As the proposed poipeline will be buried underground 1 to 1.2meter. So, the project will not have any permanent environmental impact which harmful to near by environment. The environmental impact envisaged only during the establishment stage of pipeline which include scattering of soil particles, temporary noise generation during laying activities by the construction equipment used etc. However, the soil will be reinstated to near its original condition after laying of pipeline and also handed over to its land owners. Proposed pipeline will be parallel to existing state highway so, no major impact envisaged on human setellment and habitation. However, it will increase the quality of environment because of natural gas has very less carbon creadit producing nature compre to other fuels like petrol, diesel, kerosin.

Environmental monitoring has been carried out during December 2024 to February 2025 (One season non monsoon period) as per the standard TOR received from the MoEF & CC.

3.2 Study Area

The study area is considered to be the area covered by the project under the Union territory of DNH natural Gas distribution pipeline network Project. Studies were carried out for about 1.5 Km on either side along the complete route of the pipeline with respect to meteorology, flora, fauna, land, geology, hydrogeology and socioeconomics of the area. Further the air quality, water quality, noise level and soil quality sampling, analysis, biodiversity study and socio economic study were carried out. The air quality, water quality, noise level and soil quality in the study area is evaluated based on this physical sampling and MoEF Approved laboratory analysis.

3.3 Components and Period of the Study

The baseline of environmental quality of various environmental components like air, noise, water, land, flora and fauna and socio-economic are important and integral parts of environmental study. The baseline data forms the basis for predicting/assessing the environmental impacts of the proposed project. The present report presents the data collected

during the sampling period from December 2024 to February 2025. As per the recommendations of MoEF&CC, the sampling and monitoring has been carried out during non-monsoon season, on dry days. Various environmental components were monitored and samples analyzed. Apart from this, additional data were also collected from secondary sources i.e. Government/Non-Governmental Agencies, Universities, Irrigation Department, Indian Meteorological Department (IMD), Ground Water Board etc. to substantiate the primary data collected from the site.

The baseline quality of various components of the environment, viz. air, noise, water, land, biology, meteorological and socio-economic is assessed within the impact zone of about 1.5 Km on either side along the complete route of the Pipeline via physical monitoring and analysis.

3.4 Geography/ Geology

Geomorphologically, the UT of DNH forms part of Deccan Plateau. The UT of DNH is divided into three units i.e., Residual Plateaus, Denudational Slopes and Valley Plains

Residual Plateau's

These are flat-topped crests surrounded by steep scarps. These residual plateaus occur in the western fringe, the south-eastern part and in the isolated patches in the north eastern part of the Territory covering an area of about 183 sq.km. The elevation in this category ranges between 100-300 m amsl the elevation more than 200 m amsl is seen in north eastern and south-eastern part of the Territory.

Denudational Hills

These form the scarp zone between plateaus and plains occupying an area of about 124 sq.km., and comprises of moderate to steep slopes. The major area under this category lies almost in the eastern part in north south alignment in dissected form ranging roughly between 50 and 100m above MSL.

Valley Plains

The valley plains occupying an area of 184 sq.km. and forms the flat topography with gentle slope of SE-NW forming the Damanganga River and its tributaries and it ranges in elevation below 50 m above m amsl. It comprises of weathered rock fragments and soils. The rock fragments are various sizes and mixed with soils.

(Source: CGWB, Ministry of Water Resources, River Development & Ganga Rejuvenation, Govt. of India)

3.5 Seismicity of the Study Area

The area is categorized in the seismic zone III, which is classified as Moderate damage Risk Zone. Earthquake zoning map of Maharashtra is shown as **Figure 3.1**

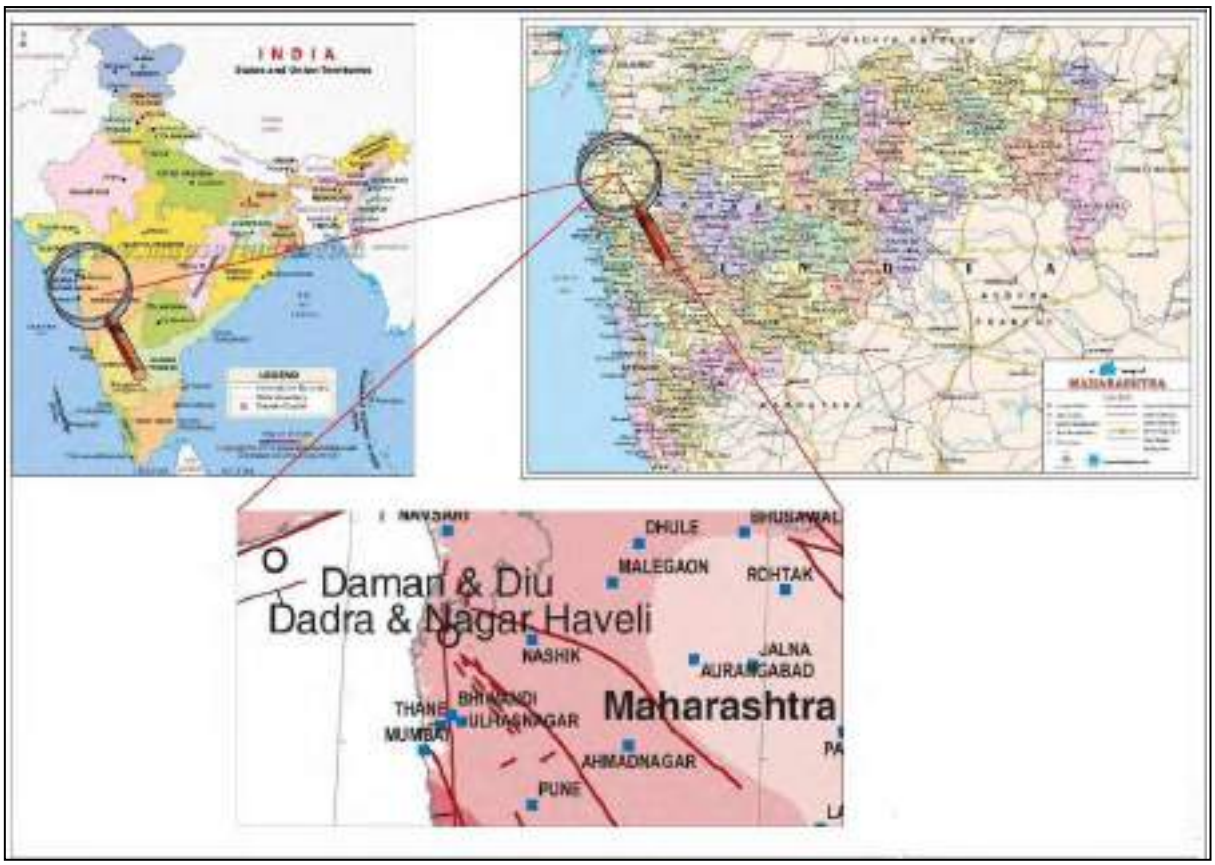


Figure 3.1 Seismic Status of the Study Area

3.6 Ambient Air

To assess the baseline status of ambient air quality along the proposed pipeline route, monitoring is undertaken to ascertain the baseline pollutant concentrations in ambient air. However the proposed project won't cause any significant impacts on the Ambient air quality as it passes through the agricultural land and dry fields.

3.7 Methodology for monitoring

Monitoring was conducted in respect of the following parameters:

- PM_{10}
- $PM_{2.5}$
- Sulphur Dioxide (SO_2)
- Oxides of Nitrogen (NO_2)
- Carbon Monoxide (CO)
- Lead (Pb)
- Ammonia (NH_3)
- Ozone (O_3)
- Arsenic
- Nickel
- Benzene
- Benzopyrene
- Hydrocarbon

Fine Particulate Samplers and Respirable Dust Samplers have been used to collect samples for PM_{10} & $PM_{2.5}$ in ambient air at a constant flow rate of 1.0 m3/hr. The ambient air was sucked through the wins impacters and filter paper by a blower. Samples of gases were drawn at a flow rate of 0.2 liters per min. and were analyzed in the laboratory.

PM_{10} & $PM_{2.5}$ have been estimated by gravimetric method (IS: 5182 P-IV 1999). Jacobs-Hochheiser method (IS-5182 Part VI, 2000) has been adopted for the measurement of NO_2. Modified West and Gaeke (IS-5182 Part II 2001) have been adopted for measurement of SO_2 and CO, Lead and Ammonia were analyzed by APHA method (2nd Ed.)

The Ambient air quality monitoring methodology are summarized in **Table 3.1**

Table 3.1 Methodology for ambient air quality monitoring

Parameter	Measurement Methods
PM_{10}	Gravimetric
$PM_{2.5}$	Gravimetric
SO_2	Colorimetric (EPA modified West & Gaeke Method)
NO_2	Colorimetric (Arsenite modified Jacobs & Hochheiser Method)
CO	Non Dispersive Infra Red (NDIR) Spectroscopy Technique
Pb	By AAS
NH_3	Colorimetric
O_3	Colorimetric

Parameter	Measurement Methods
PM_{10}	Gravimetric
Arsenic	AAS
Benzene	Gas Chromatography Based Continuous Analyzer
Benzopyrene	Gas Chromatography Based Continuous Analyzer
Nickel	AAS
Hydrocarbon	Gas Chromatography Based Continuous Analyzer

3.8 Selection of stations for sampling

Depending upon the purpose of the study IS: 5184 (part XIV) lays down various criteria for selecting sampling stations. For EIA / EMP, the purpose is to ascertain the baseline pollutant concentrations in ambient air. Accordingly, the criterion can be selected to ascertain quality of air at important human settlements or environmentally sensitive areas if any located along the route of proposed pipeline.

The locations for AAQM study were selected as close as possible within the 1.5 Km corridor on both side of the proposed pipeline Project. Thus,15 locations were monitored to generate representative ambient air quality data. The sampling locations are given in **Table 3.2**

Table 3.2 AAQ monitoring locations along the pipeline route

Sample code	Sampling Location (Village)	Description	District	Latitude	Longitude
AAQ 1	Near Kilvani Gram Panchayat	Take off point of Near Kilvani Gram Panchayat Connectivity	Dadra Nagar Haveli	20°17'41.99"N	73° 5'33.54"E
AAQ 2	Near Athola Branch Post office (Wasona)	Take off point of Near Primary Guajarati school Connectivity	Dadra Nagar Haveli	20°17'7.59"N	73° 2'16.60"E
AAQ 3	Near K K Dhaba	Take off point of Near K K Dhaba	Dadra Nagar	20°16'42.70"N	73° 5'5.56"E

	(Kilavani)	Connectivity	Haveli		
AAQ 4	Near CPS Falandi Cummunity Class (Falandi)	Near CPS Falandi Cummunity Class Umerkoi Rd Connectivity	Dadra Nagar Haveli	20°16'7.33"N	73° 4'18.69"E
AAQ 5	Near Primary School Umerkoi (Umarkui)	Near Primary School Umerkoi & satish sapta Connectivity	Dadra Nagar Haveli	20°15'33.10"N	73° 4'17.51"E
AAQ 6	Near UD Pharma rubber (Falandi)	Near UD Pharma rubber & BAPS Swaminarayan mandir Connectivity	Dadra Nagar Haveli	20°16'8.76"N	73° 3'28.41"E
AAQ 7	Near Umarkoi Bhujadpada Primary School	Near Umarkoi Bhujadpada Primary School Connectivity	Dadra Nagar Haveli	20°14'57.91"N	73° 4'1.69"E
AAQ 8	Near Swaminarayan Mandir Sayli	Terminal Point of Shree Sai Food Industry Connectivity	Dadra Nagar Haveli	20°14'13.57"N	73° 2'45.55"E
AAQ 9	Near Kendriya Vidhyalaya Salyli	Terminal Point of Namo Medical Collage Connectivity	Dadra Nagar Haveli	20°14'46.34"N	73° 2'11.24"E
AAQ 10	Near Javeri Flexo (Kharadpada)	Terminal Point of Unovel industries Pvt.	Dadra Nagar Haveli	20°12’44.69”N	72°58’17.00”E

		Connectivity			
AAQ 11	Near Bhavin container Naroli	Terminal Point of Capri coating solution Pvt. Connectivity	Dadra Nagar Haveli	20°14'41.92"N	72°57'58.27"E
AAQ 12	Near Khanvel Road (Khanvel)	Near jai crop Ltd. connectivity	Dadra Nagar Haveli	20°12'16.11"N	73° 1'30.75"E
AAQ 13	Near Sacred Heart English School Dapada	Near KEI Industries Ltd compounding	Dadra Nagar Haveli	20°11'11.58"N	73° 1'14.92"E
AAQ 14	Near Amit Petroleum(Air, Water, Soil, Noise) Surangi	Near manisha kirana store	Dadra Nagar Haveli	20° 9'13.24"N	73° 1'37.37"E
AAQ 15	Sahajanand Park 2 (Air, Water, Soil, Noise) Khanvel	Near Hotel Indo Mountain	Dadra Nagar Haveli	20° 8'19.32"N	73° 3'40.51"E

Figure 3.2 Air-quality Monitoring location Union Territory Dadara & Nagar Haveli pipeline network

3.9 Status of ambient air quality

The detailed on-site 24/8-hourly monitoring results of PM_{10}, NO_2, SO_2, CO, Pb, NH_3, $PM_{2.5}$, O_3 Benzene, Benzopyrene, Nickel, Arsenic and Hydrocarbon corresponding to air quality stations AAQ1 to AAQ 8 are presented in below table from 3.3

Table 3.3 Ambient Air Quality Monitoring Results

Sr. No.	Name of Location	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_X (µg/m³)	CO (mg/m³)	O_3 (µg/m³)	Pb (µg/m³)	Ni (µg/m³)	As (µg/m³)	NH_3 (µg/m³)	C_6H_6 (µg/m³)	Benzo (a) Pyrene (µg/m³)	HC (µg/m3)	VOC (µg/m3)
1.	Near Kilvani Gram Panchayat	72.8	36.4	13.1	16.0	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
2.	Near Athola Branch Post office (Wasona)	72.0	36.0	8.6	14.4	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
3.	Near K K Dhaba (Kilavani)	71.5	35.8	9.3	14.3	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
4.	Near CPS Falandi Cummunity Class (Falandi)	68.3	34.2	8.9	13.7	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
5.	Near Primary School Umerkoi (Umarkui)	70.8	34.0	9.2	14.2	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
6.	Near UD Pharma rubber (Falandi)	64.9	27.2	8.4	12.3	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
7.	Near Umarkoi Bhujadpada Primary School	67.0	28.1	8.7	12.7	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
8.	Near Swaminarayan Mandir Sayli	71.0	29.8	9.2	14.2	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
NAAQ Standards for Industrial Residential ,Rural and other area (24 hourly)		100	60	80	80	2.0	100 (8 hrs)	1.0	05	06	400	05	01	<1	<0.5
NAAQ Standards for ecologically and sensitive area(24 hourly)		100	60	80	80	2.0	100 (8 hrs)	1.0	05	06	400	05	01	<1	<0.5

Sr. No.	Name of Location	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_X (µg/m³)	CO (mg/m³)	O_3 (µg/m³)	Pb (µg/m³)	Ni (µg/m³)	As (µg/m³)	NH_3 (µg/m³)	C_6H_6 (µg/m³)	Benzo (a) Pyrene (µg/m³)	HC (µg/m3)	VOC (µg/m3)
9.	Nr.Dapada Village	69.2	29.1	9.0	13.1	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
10.	Nr. Chikhali Village	57.8	26.0	7.5	11.0	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
11.	Nr. Surangi Village	57.9	26.0	7.5	11.0	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
12.	Nr. Umbervarni & Tinoda	57.2	25.7	7.4	10.9	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
13.	Nr. Khanvel Village	60.3	27.1	7.8	11.5	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
14.	Nr. Chauda Village	59.0	26.5	7.7	11.2	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
15.	Nr. Kherdi Village	58.3	26.2	7.6	11.1	<0.5	<20	<0.01	<10	<5	<20	<3	<0.5	<1	<0.5
NAAQ Standards for Industrial Residential ,Rural and other area (24 hourly)		100	60	80	80	2.0	100 (8 hrs)	1.0	05	06	400	05	01	<1	<0.5
NAAQ Standards for ecologically and sensitive area(24 hourly)		100	60	80	80	2.0	100 (8 hrs)	1.0	05	06	400	05	01	<1	<0.5

Interpretation

The proposed route of pipeline is parallel to the state highway and ambient air quality locations ware selected within the study area of 500m along the pipeline route as per ToR received from MoEF & CC. PM 10 and PM2.5 results were some upper site but well within the standard limit. It is inferred from the analysis of various parameters at sampled location that the results are well within the limit prescribed by MoEF and CPCB published in Gazette of India, New Delhi, and Dated November 18, 2009 as shown in above table.

The air quality along the project stretch may get affected during the construction period. Particulate matter will be the predominant pollutant affecting the air quality during the construction phase. As the construction activities are likely to generate dust. Mostly the additional automobile traffic and construction machineries involved during construction activities will generate petroleum pollutants. However, this will not lead to any tangible effect, as the additional traffic volume related to construction activities will be low.

Potential emissions sources during construction phase include the following:

1. Deterioration of air quality due to fugitive dust emissions from construction activities (especially during dry season) like excavation, back-filling and dumping of earth materials, from construction spoils, vehicular movements along unpaved roads, loading / unloading and transportation of construction materials
2. Equipment deployed during the construction phase is also likely to result in marginal increase in the levels of SO2, NOX, and particulate matter
3. Operation of equipment and machinery for earth-moving, grading, pipeline laying and civil works at pipeline ROW and other sites
4. Operation of temporary Diesel Generator (DG) sets, emission of PM, NOx and SOx.

Mitigation Measures

During construction phase of the proposed project appropriate mitigation measures have to be implemented to ameliorate the anticipated air quality problems. The following mitigate measures will be employed during construction period to reduce the pollution level to acceptable limits

1. Proper and prior planning, appropriate sequencing and scheduling of all major construction activities have to be done, and timely availability of infrastructure supports needed for construction to be ensured to shorten the construction period vis-à-vis reduce pollution.

2. Construction materials to be stored in covered godowns or enclosed spaces to prevent the windblown fugitive emissions.
3. Stringent construction material handling / overhauling procedures to be followed.

Results of Air Modelling

Sr. No.	Parameter	Baseline Concentration ($\mu g/m^3$)	Incremental Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS Limit ($\mu g/m^3$)
1.	PM	72.8	2.25	75.05	100
2.	NOx	16.0	2.50	18.5	80
3.	SO2	13.1	0.08	13.18	80

Atmospheric inversion refers to a meteorological phenomenon in which the temperature increases with altitude instead of decreasing. This inhibits the vertical dispersion of pollutants and can lead to their accumulation near the ground level. For the proposed project in Dadra & Nagar Haveli, the determination of the inversion level is important for understanding worst-case scenarios during air quality modeling.

Particulate Matter (PM) Emissions from Trench Excavation Activity

For Kharadpada to Luhari Industrial Area (Jhaveri Flexo India Ltd.) Connectivity-Length 4.515km & 125mm Dia. PE					
Sr. No.	**Excavation Volume (m3)**	**Trench Area Calculation (m2)**	**Area in acres**	**PM_{10} Emission Estimate**	**PM_{10} Emission per m^3 of Excavated Soil (kg/m3)**
1.	4515*1.2*1.5= 8127	4515m*1.2m=5418m2	1.34	1459.5 kg PM10	0.179
For Vasona Char Rastha to Khanvel Petroleum Khanvel Connectivity (HP RO)-Length 15.125Km & 8'' Dia. Steel					
Sr. No.	**Excavation Volume (m3)**	**Trench Area Calculation (m2)**	**Area in acres**	**PM_{10} Emission Estimate**	**PM_{10} Emission per m^3 of Excavated Soil (kg/m3)**
2.	15125*1*1.5 = 22687	15125*1= 15125	3.74	4072 kg PM10	0.1795
Sili Fatak to Randhe Road Umarkui Connectivity-Length 8.525Km & 6" Steel/125mm Dia. PE					
Sr. No.	**Excavation Volume (m3)**	**Trench Area Calculation (m2)**	**Area in acres**	**PM_{10} Emission Estimate**	**PM_{10} Emission per**

					m^3 of Excavated Soil (kg/m3)
3.	8525*1.2*1.5=15345	8525*1.2= 10230	2.53	2751.9 kg PM10	0.179
IMP Power Sayli & Siddhant Ispat Connectivity Project-Length 7.200Km & 6" Steel/125mm Dia. PE					
Sr. No.	**Excavation Volume (m3)**	**Trench Area Calculation (m2)**	**Area in acres**	**PM_{10} Emission Estimate**	**PM_{10} Emission per m^3 of Excavated Soil (kg/m3)**
4.	7200*1.2*1.5= 12960	7200*1.2= 8640	2.135	2330.8 kg PM10	0.1798
Jackson Industry Athola Connectivity Project-Length 2.480Km & 125mm Dia. PE					
Sr. No.	**Excavation Volume (m3)**	**Trench Area Calculation (m2)**	**Area in acres**	**PM_{10} Emission Estimate**	**PM_{10} Emission per m^3 of Excavated Soil (kg/m3)**
5.	2480*1.2*1.5= 4464	2480*1.2=2976	0.735	873.85	0.1957
Dabur Industry Connectivity- Length 2.650Km & 125mm Dia. PE					
Sr. No.	**Excavation Volume (m3)**	**Trench Area Calculation (m2)**	**Area in acres**	**PM_{10} Emission Estimate**	**PM_{10} Emission per m^3 of Excavated Soil (kg/m3)**
6.	2650*1.2*1.5= 4770	2650*1.2= 3180	0.786	934.48	0.196
Considering Emission Factor for Excavation: 1.2 tons/acre/month					

Local Meteorological Conditions:

- The project area lies in a tropical region with relatively high humidity and stable weather conditions.
- Inversions typically occur during the early morning and late evening hours, especially during the winter months.

Expected Inversion Height:

- Based on regional meteorological data (Desktop data assessment) and historical weather records, the typical inversion height for Dadra & Nagar Haveli ranges from **100 m to 200 m** during the cooler months.

Implications for the Project:

- During inversion conditions, pollutant dispersion is limited, which can result in higher ground-level concentrations of PM10 and NOx.
- As a precaution, construction activities generating high emissions should be minimized during early morning hours in winter.
- Mitigation measures such as dust suppression and scheduled operations are particularly critical during inversion-prone periods.

3.10 Water

3.10.1 Reconnaissance

The water requirement forms an integral part of any project. However, in this particular project water requirement is not of high order. The water requirement during construction phase is only for various civil and mechanical jobs, drinking purpose and hydrostatic testing of pipes and during operation phase only for firefighting and drinking purpose. The amount of waste water (mainly sewage) generated is very less in quantity and shall be disposed off suitably through septic tank. Hence there shall be no major impact of these activities on the surface as well as sub-surface water quality.

In the region, villages along with the pipeline route mainly depend on groundwater and/or small pond in most of the seasons. The baseline water quality of ground water / surface water in the region is obtained by collecting sample from villages and major rivers / dam coming in the way while considering the both side of pipeline. Samples of ground water, surface and river water were collected for assessing the baseline water environment quality.

3.10.2 Sources of raw water in study area

The sources of raw water in the study area are:

- Ground water
- Surface water/Rivers / canals

3.10.3 Methodology for monitoring

In order to establish the base line water quality of the surface and subsurface sources in the study area ground water and surface water sampling locations were selected along the proposed pipeline route. These locations were selected during the reconnaissance survey based on the water availability in the surface water bodies and proximity of ground water to the proposed pipeline route.

The samples collected were preserved, stored and analyzed as per methods given in IS - 3025 / Standards methods for the Analysis of water and Wastewater. (APHA, AWWA and WPCF, 1995) to assess physiochemical, biological and bacteriological quality of water.

3.10.4 Ground Water locations

Samplings for Groundwater were carried out at four locations as under **Table 3.4**.

Table 3.4 Ground water quality monitoring locations

Code	Sampling Location	Date	District	Sample	Latitude	Longitude
GW 1	Near Kilvani Gram Panchayat	07/01/2025	Dadra Nagar Haveli	Ground Water	20°11'16.70"N	73° 1'24.56"E
GW 2	Near Athola Branch Post office (Wasona)	07/01/2025	Dadra Nagar Haveli	Ground Water	20°10'46.11"N	73° 0'37.56"E
GW 3	Near CPS Falandi Cummunity Class (Falandi)	07/01/2025	Dadra Nagar Haveli	Ground Water	20° 9'5.50"N	73° 0'41.35"E
GW 4	Near Primary School Umerkoi (Umarkui)	08/01/2025	Dadra Nagar Haveli	Ground Water	20° 8'26.48"N	73° 3'50.46"E
GW 5	Near UD Pharma rubber (Falandi)	08/01/2025	Dadra Nagar Haveli	Ground Water	20° 7'25.50"N	73° 3'4.38"E
GW 6	Near Swaminarayan Mandir Sayli	08/01/2025	Dadra Nagar Haveli	Ground Water	20° 5'39.48"N	73° 0'14.40"E
GW 7	Near Kendriya Vidhyalaya Salyli	08/01/2025	Dadra Nagar Haveli	Ground Water		
GW 8	Near Javeri Flexo	08/01/2025	Dadra Nagar Haveli	Ground Water		

Code	Sampling Location	Date	District	Sample	Latitude	Longitude
	(Kharadpada)					
GW 9	Near Khanvel Road (Khanvel)	07/01/2025	Dadra Nagar Haveli	Ground Water		
GW 10	Near Sacred Heart English School Dapada	07/01/2025	Dadra Nagar Haveli	Ground Water		
GW 11	Near Amit Petroleum (Surangi)	07/01/2025	Dadra Nagar Haveli	Ground Water		

Figure 3.3 Water quality Monitoring location for DNH pipeline network

3.10.5 Ground water quality at selected sources

Water sample was collected (grab sample) and analyzed as per the standard methods and the results are given in **Table 3.5**

Table 3.5 Ground water quality Anyalysis Results

Sr. No.	Parameter	Units	Result									Detection Limit	Desirable Limit	Permissible Limit as Per IS 10500:2012	Reference Method
Sample Identification			GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	GW9				
1.	pH	---	7.48	7.49	7.25	7.8	7.62	7.48	7.85	7.76	7.63	1-14	6.5 to 8.5	No Relaxation	APHA 4500 H+
2.	Conductivity	µs/cm	534	485	510	502	496	457	520	509	468	0.4-200	-	-	APHA 2510
3.	Turbidity	NTU	<1	<1	<1	<1	<1	<1	<1	<1	<1	1-100	1	5	APHA 2130
4.	Color	Hazen	<5	<5	<5	<5	<5	<5	<5	<5	<5	5-100	5	15	APHA 2120
5.	Odor	-	Agreeable									Agreeable	Agreeable	Agreeable	APHA 2150
6.	Total Dissolved	mg/L	899.2	996.8	910.4	923.2	1014.4	1289.6	1092.8	878.4	910.4	2-5000	500	2000	APHA 2540 C
7.	Sulphate	mg/L	48.6	54.8	64.2	50.2	42.5	62.5	84.5	76.8	58.4	1-1000	200	400	APHA4500-SO42-
8.	Chloride	mg/L	120.3	126.4	154.2	138.4	100.2	136.5	160.2	158.4	140.2	2-1000	250	1000	APHA4500-Cl-
9.	Total Hardness	mg/L	225	249	228	231	254	197	276	220	228	4-1000	200	600	APHA 2340
10.	Calcium as Ca	mg/L	56.2	62.3	56.9	57.7	63.4	80.6	68.3	54.9	56.9	2-1000	75	200	APHA-3500 Ca
11.	Magnesium Mg	mg/L	31.9	35.3	32.2	32.7	35.9	45.7	38.7	31.1	32.3	2-1000	30	100	APHA 3500-Mg
12.	Alkalinity	mg/L	146.2	158.4	176.4	184.2	174.2	164.8	210.4	204.6	190.4	5-1000	200	600	APHA 2320
13.	Copper	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.1-10	0.05	1.5	APHA 3500-Cu
14.	Zinc	mg/L	0.46	0.54	0.64	0.52	0.74	0.56	0.52	0.84	0.65	0.1-10	5	15	APHA 3500-Zn

Sr. No.	Parameter	Units	Result									Detection Limit	Desirable Limit	Permissible Limit as Per IS 10500:2012	Reference Method
Sample Identification			GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	GW9				
15.	Iron	mg/L	0.12	0.14	0.08	0.2	0.18	0.13	0.11	0.22	0.1	0.1-10	0.3	No relaxation	APHA 3500-Fe
16.	Lead	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5-10	0.01	No Relaxation	APHA 3500-Pb
17.	Nickel	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.1-10	0.02	No Relaxation	APHA 3500-Ni
18.	Cadmium	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.1-10	0.003	No Relaxation	APHA 3500-C
19.	Calcium Hardness as CaCO3	mg/L	94	104	95	96	106	134	114	92	95	2-1000	-	-	APHA 3500-Ca
20.	Magnesium Hardness as CaCO3	mg/L	131	145	133	135	148	188	159	128	133	2-1000	-	-	APHA 3500-Mg
21.	Phenolic compound	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.1-10	0.001	0.002	APHA 5530
22.	Fluoride	mg/L	0.58	0.64	0.48	0.34	0.54	0.25	0.3	0.45	0.65	0.1-10	1	1.5	APHA 4500-F-

Sr. No.	Parameter	Units	Result		Detection Limit	Desirable Limit	Permissible Limit as Per IS 10500:2012	Reference Method
Sample Identification			GW10	GW11				
1.	pH	---	7.50	7.47	1-14	6.5 to 8.5	No Relaxation	APHA 4500 H+
2.	Conductivity	ms/cm	489	554	0.4-200	-	-	APHA 2510
3.	Turbidity	NTU	<1	<1	1-100	1	5	APHA 2130
4.	Color	Hazen	<5	<5	5-100	5	15	APHA 2120
5.	Odor	-				Agreeable	Agreeable	APHA 2150
6.	Total Dissolved Solid	mg/L	982	1047	2-5000	500	2000	APHA 2540 C
7.	Sulphate	mg/L	49.3	53.5	1-1000	200	400	APHA4500- SO42-
8.	Chloride	mg/L	121.3	120.6	2-1000	250	1000	APHA4500-Cl-
9.	Total Hardness	mg/L	230	225	4-1000	200	600	APHA 2340
10.	Calcium as Ca	mg/L	57.3	65.9	2-1000	75	200	APHA-3500 Ca
11.	Magnesium Mg	mg/L	30	34	2-1000	30	100	APHA 3500-Mg
12.	Alkalinity	mg/L	148.3	160.3	5-1000	200	600	APHA 2320
13.	Copper	mg/L	<0.05	<0.05	0.1-10	0.05	1.5	APHA 3500-Cu
14.	Zinc	mg/L	0.48	0.52	0.1-10	5	15	APHA 3500-Zn
15.	Iron	mg/L	0.11	0.12	0.1-10	0.3	No relaxation	APHA 3500-Fe

Sr. No.	Parameter	Units	Result		Detection Limit	Desirable Limit	Permissible Limit as Per IS 10500:2012	Reference Method
Sample Identification			GW10	GW11				
16.	Lead	mg/L	<0.01	<0.01	0.5-10	0.01	No Relaxation	APHA 3500-Pb
17.	Nickel	mg/L	<0.02	<0.02	0.1-10	0.02	No Relaxation	APHA 3500-Ni
18.	Cadmium	mg/L	<0.003	<0.003	0.1-10	0.003	No Relaxation	APHA 3500-C
19.	Calcium Hardness as CaCO3	mg/L	98	110	2-1000	-	-	APHA 3500-Ca
20.	Magnesium Hardness as CaCO3	mg/L	130	147	2-1000	-	-	APHA 3500-Mg
21.	Phenolic compound	mg/L	<0.002	<0.002	0.1-10	0.001	0.002	APHA 5530
22.	Fluoride	mg/L	0.54	0.62	0.1-10	1	1.5	APHA 4500-F-

3.10.6 Surface water sampling and analysis

Table 3.6 Details of Locations (Surface Water)

Sr.No.	Sampling Location	Date	District	Sample	Latitude	Longitude
1	Near Amit Petroleum (Surangi)	07/01/2025	Dadra Nagar Haveli	Surface Water	20° 9'19.36"N	73° 1'12.31"E
2	Near Sayli Road	07/01/2025	Dadra Nagar Haveli	Surface Water	20°14'27.75"N	73° 2'27.61"E
3	Near Kilavani Road	07/01/2025	Dadra Nagar Haveli	Surface Water	20°16'53.93"N	73° 3'27.18"E
4	Near Dapada to Surangi bridge	08/01/2025	Dadra Nagar Haveli	Surface Water	20°11'6.67"N	73° 0'48.88"E

Surface water sampling analysis results are given in below table.

Table 3.7 Water Analysis Results (Surface Water)

Sr. No.	Parameter	Unit	Results				Detection limit	Reference Method
Sample Identification			SW1	SW2	SW3	SW4		
1.	pH	---	7.36	7.59	7.29	7.38	1-14	APHA 4500 H+
2.	Conductivity	mS/cm	1.46	0.985	0.685	0.874	0.4-200	APHA 2510
3.	Turbidity	NTU	<2	<2	<2	<2	1-100	APHA 2130
4.	Color	Hazen	<5	<5	<5	<5	5-100	APHA 2120
5.	Odor	-	Agreeable					Agreeable
6.	Total Dissolved	mg/L	895	640	445	568	2-5000	APHA 2540 C
7.	Total Suspended	mg/L	10	12	20	24	2-500	APHA 2540 B
8.	Sulphate	mg/L	59.8	53.9	56.6	52.8	1-1000	APHA 4500- SO42-
9.	Chloride	mg/L	124.2	120.5	98.5	104.2	2-1000	APHA 4500 - Cl-
10.	Total Hardness	mg/L	285	192	134	170	4-1000	APHA 2340

Sr. No.	Parameter	Unit	Results				Detection limit	Reference Method
Sample Identification			SW1	SW2	SW3	SW4		
11.	Calcium as Ca	mg/L	75.9	51.2	35.6	45.4	2-1000	APHA -3500 Ca
12.	Magnesium Mg	mg/L	23.1	15.6	10.8	13.8	2-1000	APHA 3500-Mg
13.	Alkalinity	mg/L	245	245	148	215	5-1000	APHA 2320
14.	Copper	mg/L	<0.1	<0.1	<0.1	<0.1	0.1-10	APHA 3500-Cu
15.	Zinc	mg/L	<0.1	<0.1	<0.1	<0.1	0.1-10	APHA 3500-Zn
16.	Iron	mg/L	<0.1	<0.1	<0.1	<0.1	0.1-10	APHA 3500-Fe
17.	Lead	mg/L	<0.01	<0.01	<0.01	<0.01	0.1-10	APHA 3500-Pb
18.	Nickel	mg/L	<0.02	<0.02	<0.02	<0.02	0.1-10	APHA 3500-Ni
19.	Cadmium	mg/L	<0.003	<0.003	<0.003	<0.003	0.1-10	APHA 3500-C
20.	Total Coliform	MPN/100 ml	220	280	170	240	1.8-1600	APHA 9221 B
21.	Faecal Coliform	MPN/100 ml	10	6	12	17	1.8-1600	APHA 9221 E
22.	E. Coli	MPN/100 ml	Absent	Absent	Absent	Absent	1.8-1600	APHA 9221 F
23.	Calcium Hardness as CaCO3	mg/L	190	128	89	114	2-1000	APHA 3500-Ca
24.	Magnesium Hardness as CaCO3	mg/L	95	64	45	57	2-1000	APHA 3500-Mg
25.	Phenol	mg/L	<0.002	<0.002	<0.002	<0.002	0.1-10	APHA 5530
26.	Fluoride	mg/L	0.52	0.42	0.35	0.62	0.1-10	APHA 4500-F-
27.	Salinity	mg/L	0.73	0.49	0.34	0.44	2-1000	APHA 2520 B
28.	Chemical Oxygen	P/A	20	8	16	20	4-10000	Gas Chromatography
29.	Biochemical Oxygen	mg/L	<2	<2	<2	3.0	2-1000	APHA 5220

Sr. No.	Parameter	Unit	Results				Detection limit	Reference Method
Sample Identification			SW1	SW2	SW3	SW4		
30.	Dissolved oxygen	mg/L	5.3	5.5	5.1	5.2	0.2-10	APHA 5210

3.10.7 Interpretation

The ground water analysis results indicate that the water in the region is fairly potable except that disinfection may be required for ground water in certain areas before being used for drinking. However, the incremental value has no impact with reference to the project activity. Reference method, Acceptable & permissible limits are shown in **Annexure III.**

3.11 Noise

3.11.1 Reconnaissance

During construction phase, noise shall be generated through Vehicle movement & construction activities. There will not be any increase in noise during operation phase of the pipeline project. However, the expected noise levels will be in the range of 70-85 dB (A) and shall be further attenuated by appropriate measures.

To measure the existing noise sources and to identify the background noise levels, the noise pollution survey around the proposed pipeline was carried out. The collection of baseline noise environment data included Identification of noise sources and to measure background noise levels and Measurement of noise levels due to transportation and other local activity. The noise monitoring was carried out at the same locations as air monitoring. **Table: 3.10** give the details of noise monitoring locations.

3.11.2 Noise Levels at Monitoring Stations

Specific studies reveal that noise levels in industrial areas are generally within the prescribed limits but exceed the standards in respect of commercial, residential and silence zones during certain hours.

Figure 3.4 Noise quality Monitoring location for DNH Pipeline network

Table 3.8 Noise Monitoring in the Study Area

Sr. No.	Location name	Zone	Units	Day Time		Night Time	
				Result	CPCB Permissible Limit 2000	Result	CPCB Permissible Limit
N 1	Near Kilvani Gram Panchayat	Residential	dB(A) Leq	48	55	40	45
N 2	Near Athola Branch Post office (Wasona)	Residential	dB(A) Leq	47	55	38	45
N 3	Near K K Dhaba (Kilavani)	Residential	dB(A) Leq	49	55	39	45
N 4	Near CPS Falandi Cummunity Class (Falandi)	Commercial	dB(A) Leq	58	65	49	55
N 5	Near Primary School Umerkoi (Umarkui)	Silence	dB(A) Leq	45	50	39	40
N 6	Near UD Pharma rubber (Falandi)	Industrial	dB(A) Leq	68	75	65	70
N 7	Near Umarkoi Bhujadpada Primary School	Silence	dB(A) Leq	48	50	35	40
N 8	Near Swaminarayan Mandir Sayli	Residential	dB(A) Leq	50	55	38	45
N 9	Near Kendriya Vidhyalaya Salyli	Silence	dB(A) Leq	45	50	39	40
N10	Near Javeri Flexo (Kharadpada)	Industrial	dB(A) Leq	69	75	66	70
N11	Near Bhavin container Naroli	Industrial	dB(A) Leq	68	75	69	70
N12	Near Khanvel Road (Khanvel)	Commercial	dB(A) Leq	58	65	54	55
N13	Near Sacred Heart English School Dapada	Silence	dB(A) Leq	42	50	35	40
N14	Near Amit Petroleum (Surangi)	Industrial	dB(A) Leq	70	75	64	70
N15	Sahajanand Park 2 (Khanvel)	Residential	dB(A) Leq	52	55	39	45

3.11.3 Equivalent Sound Energy Level or Leq

In most of the acoustic environments, the sound pressure level fluctuates with time due to changes in noise generation sources. The fluctuating noise levels are reported as equivalent sound energy level or Leq. It is defined as the steady sound pressure level which would have given the same total energy as the actual time varying sound pressure level over the given time period. By noise levels recorded during measurements, Leq was computed using following the statistical relationship:

$$Leq = L_{50} + (L_{10} - L_{90})^2/60$$

Where,

L_{90} = the noise levels exceed 90 percent of the time

L_{50} = the noise levels exceed 50 percent of the time

L_{10} = the noise levels exceed 10 percent of the time

It may be noted here that L_{10}, L_{50} and L_{90} values can be considered as peak, average and background sound pressure levels at each location, respectively.

Sound pressure level (Leq) evaluated at the monitoring locationa are 60 and 74 dBA respectively for location N1 and N2 and the L_{10}, L_{90}, L_{50} & L_{eq} levels are given in **Table 3.11**

Table 3.9 Equivalent Sound Energy Level or Leq

Sr. No.	Station Code	Noise Monitoring location /village Name	Category of Area/Zone	L_{10}	L_{90}	L_{50}	L_{eq}
1.	N 1	Near Kilvani Gram Panchayat	Residential	48	40	44	45
2.	N 2	Near Athola Branch Post office (Wasona)	Residential	47	38	43	44
3.	N 3	Near K K Dhaba (Kilavani)	Residential	49	39	44	46
4.	N 4	Near CPS Falandi Cummunity Class (Falandi)	Commercial	58	49	54	55
5.	N 5	Near Primary School Umerkoi (Umarkui)	Silence	45	39	42	43
6.	N 6	Near UD Pharma rubber (Falandi)	Industrial	68	65	67	67
7.	N 7	Near Umarkoi Bhujadpada Primary School	Silence	48	35	42	44
8.	N 8	Near Swaminarayan Mandir Sayli	Residential	50	38	44	46
9.	N 9	Near Kendriya Vidhyalaya Salyli	Silence	45	39	42	43
10.	N 10	Near Javeri Flexo (Kharadpada)	Industrial	69	66	68	68
11.	N 11	Near Bhavin container Naroli	Industrial	68	69	69	69
12.	N 12		Commercial	58	54	56	56
13.	N 13	Near Khanvel Road (Khanvel)	Silence	42	35	39	39
14.	N 14	Near Sacred Heart English School Dapada	Industrial	70	64	67	68
15.	N 15	Near Amit Petroleum (Surangi)	Residential	52	39	46	48

3.11.4 Interpretation

During noise measurement at sampling locations, it was observed that the noise results values ware lift up to some upper side due to vehicles movement. No other majour parameter observed which required to be given attention to lower noise pollution. However, the noise results shows for most of the time the noise level is within the acceptable limits.

3.12 Soil

Objectives

- To identify physical and chemical properties of soils.
- To identify soil pollution and suggest mitigation measures

3.12.1 Methodology

A field visit was conducted during January 2025 to study site-specific existing soil quality and conditions which includes soil color, texture, mineralogical content and plasticity in order to identify the possible impact on the environmental setting after the proposed project.

3.12.2 Soil sample collection Methodology

The locations for soil sample collection were randomly selected at the project site as well as from the surrounding areas namely Soil-1 to Soil-15. The soil samples from 0-15 cm depth were collected by using spade and pawada. The samples were homogenized and about 1 Kg soil sample was collected in the polythylene bag, Labelled with sample ID which includes site numbers and project name. The samples were brought to the laboratory for analysis of physical (porosity, water holding capacity, permeability, and particle size distribution) and chemical properties (cation exchange, electrical conductivity, sodium adsorption ratio, pH, Ca, Mg, Na, K).

3.12.3 Characteristics of soil

Location of colletion of Soil samples are tabulated as **Table 3.12.**

Table 3.10 Soil Sampling Location

Sr.No.	Sampling Location	Date	District	Tehsil	Latitude	Longitude
1	Near Kilvani Gram Panchayat	07/01/2025	Dadra Nagar Haveli	Kilvani	20°17'41.99"N	73° 5'33.54"E

Sr.No.	Sampling Location	Date	District	Tehsil	Latitude	Longitude
2	Near Athola Branch Post office (Wasona)	07/01/2025	Dadra Nagar Haveli	Wasona	20°17'7.59"N	73° 2'16.60"E
3	Near K K Dhaba (Kilavani)	07/01/2025	Dadra Nagar Haveli	Kilvani	20°16'42.70"N	73° 5'5.56"E
4	Near CPS Falandi Cummunity Class (Falandi)	08/01/2025	Dadra Nagar Haveli	Falandi	20°16'7.33"N	73° 4'18.69"E
5	Near Primary School Umerkoi (Umarkui)	08/01/2025	Dadra Nagar Haveli	Umarkui	20°15'33.10"N	73° 4'17.51"E
6	Near UD Pharma rubber (Falandi)	08/01/2025	Dadra Nagar Haveli	Falandi	20°16'8.76"N	73° 3'28.41"E
7	Near Umarkoi Bhujadpada Primary School	08/01/2025	Dadra Nagar Haveli	Umarkui	20°14'57.91"N	73° 4'1.69"E
8	Near Swaminarayan Mandir Sayli	08/01/2025	Dadra Nagar Haveli	Sayli	20°14'13.57"N	73° 2'45.55"E
9	Near Kendriya Vidhyalaya Salyli	07/01/2025	Dadra Nagar Haveli	Sayli	20°14'46.34"N	73° 2'11.24"E
10	Near Javeri Flexo (Kharadpada)	07/01/2025	Dadra Nagar Haveli	Kharadpada	20°12'44.69"N	72°58'17.00"E
11	Near Bhavin container Naroli	07/01/2025	Dadra Nagar Haveli	Naroli	20°14'41.92"N	72°57'58.27"E
12	Near Khanvel Road (Khanvel)	07/01/2025	Dadra Nagar Haveli	Khanvel	20°11'11.58"N	73° 1'14.92"E
13	Near Sacred Heart English School Dapada	08/01/2025	Dadra Nagar Haveli	Dapada	20° 9'13.24"N	73° 1'37.37"E

Sr.No.	Sampling Location	Date	District	Tehsil	Latitude	Longitude
14	Near Amit Petroleum (Surangi)	08/01/2025	Dadra Nagar Haveli	Surangi	20° 8'19.32"N	73° 3'40.51"E
15	Sahajanand Park 2 (Khanvel)	07/01/2025	Dadra Nagar Haveli	Khanvel	20° 8'19.32"N	73° 3'40.51"E

Analysis results for various environmental parameters of the soil are given in **Table: 3.13**

Table 3.11 Analysis of Soil Results

Sr. No.	Parameters	Unit	Results										Reference Method
			S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	
1.	pH	-	7.84	7.64	7.64	7.84	7.25	7.48	7.64	7.72	7.48	7.34	IS 2720 : Part 26 : 1987
2.	Electrical Conductivity	ms/cm	1.24	1.35	1.26	1.28	1.21	1.28	1.25	1.42	1.48	1.26	IS 14767: 2000 (RA-2016)
3.	Soil Moisture Content	%	6.2	6.4	7.5	6.8	7.4	7.3	8.4	6.9	7.8	8.2	IS 2720 – Part – 2
4.	Organic Carbon	%	0.59	0.56	0.63	0.54	0.57	0.63	0.7	0.69	0.30	0.36	IS 2720 : Part 22 : 1972
5.	Organic Matter	%	1.02	0.97	1.09	0.93	0.98	1.09	1.21	1.19	0.52	0.62	IS 2720 : Part 22 : 1972
6.	Phosphorus	mg/kg	140	142	130	150	132	140	145	148	152	160	IS 6092 : (Part 3/Sec 2) : 2004
7.	Total Nitrogen	mg/kg	420	426	380	435	390	405	416	432	438	430	IS 14684 : 1999
8.	Potassium as K	mg/kg	214	216	195	215	200	205	208	210	125	120	IS 9497 : 1980
9.	Calcium	mg/kg	452	462	524	485	623	520	450	490	510	468	GCI/LAB/TP/SW12, Based Handbook of methods in Environment studies (Vol- 21st Edition)
10	Magnesium	mg/kg	75	77	87	82	103	85	75	80	84	80	GCI/LAB/TP/SW13, Based IARI – 1999.

Sr. No.	Parameters	Unit	Results										Reference Method
			S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	
11	Chloride	mg/kg	156	134	158	175	148	128	164	184	190	156	IS 6925: 1973
12	Copper as Cu	mg/kg	10.6	12.5	14.2	16.4	18.4	15.5	10.2	20.4	26.5	18.8	EPA 7000 B Rev. 2:2007
13	Zinc as Zn	mg/kg	36.5	54.2	29.5	41.5	51.3	27.8	48.5	59.4	60.2	26.8	EPA 7000 B Rev. 2:2007
14	Iron as Fe	mg/kg	50.2	68.4	52.3	59.4	48.2	70.5	68.4	84.2	75.6	40.6	EPA 7000 B Rev. 2:2007
15	Lead as Pb	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	EPA 7000 B Rev. 2:2007
16	Nickel as Ni	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	EPA 7000 B Rev. 2:2007
17	Sand	(%)by mass	58	56	54	52	59	57	55	60	56	59	IS 2720-P-4
18	Clay	(%)by mass	24	26	25	28	23	20	27	24	26	28	IS 2720-P-4
19	Silt	(%)by mass	18	18	21	20	18	23	18	16	18	13	IS 2720-P-4
20	Water holding capacity	(%)by mass	42.6	40.5	45.1	48.5	40.5	39.4	46.5	44.8	45.7	47.9	Handbook of Soil & Solid Waste Analysis, P. K. Behera
21	Porosity	(%)by mass	32.4	36.8	34.5	40.5	35.9	38.7	36.4	35.6	30.4	28	IS 2720 : Part 17 : 1986
22	Texture	-	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	-

Sr. No.	Parameters	Unit	Results					Reference Method
			S11	S12	S13	S14	S15	
1.	pH	-	7.54	7.28	7.24	7.80	7.23	IS 2720 : Part 26 : 1987
2.	Electrical Conductivity	ms/cm	1.20	1.34	1.30	1.25	1.27	IS 14767: 2000 (RA-2016)
3.	Soil Moisture Content	%	6.6	6.9	7.3	6.5	7.5	IS 2720 – Part – 2
4.	Organic Carbon	%	0.60	0.57	0.62	0.59	0.58	IS 2720 : Part 22 : 1972
5.	Organic Matter	%	1.01	0.95	1.00	0.97	0.96	IS 2720 : Part 22 : 1972
6.	Phosphorus	mg/kg	139	145	125	151	137	IS 6092 : (Part 3/Sec 2) : 2004
7.	Total Nitrogen	mg/kg	419	420	381	430	328	IS 14684 : 1999
8.	Potassium as K	mg/kg	215	225	190	225	218	IS 9497 : 1980
9.	Calcium	mg/kg	450	454	525	448	622	GCI/LAB/TP/SW12, Based Handbook of methods in Environment studies (Vol-21st Edition)
10.	Magnesium	mg/kg	73	76	85	80	105	GCI/LAB/TP/SW13, Based IARI – 1999.

Sr. No.	Parameters	Unit	Results					Reference Method
			S11	S12	S13	S14	S15	
11.	Chloride	mg/kg	155	136	156	170	143	IS 6925: 1973
12.	Copper as Cu	mg/kg	11.3	10.5	13.6	15.4	17.4	EPA 7000 B Rev. 2:2007
13.	Zinc as Zn	mg/kg	32.5	55.2	30.5	40.5	53.3	EPA 7000 B Rev. 2:2007
14.	Iron as Fe	mg/kg	50.2	63.4	56.3	60.4	52.2	EPA 7000 B Rev. 2:2007
15.	Lead as Pb	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	EPA 7000 B Rev. 2:2007
16.	Nickel as Ni	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	EPA 7000 B Rev. 2:2007
17.	Sand	(%)by mass	55	54	53	51	54	IS 2720-P-4
18.	Clay	(%)by mass	25	22	24	23	22	IS 2720-P-4
19.	Silt	(%)by mass	19	18	20	21	17	IS 2720-P-4
20.	Water holding capacity	(%)by mass	41.3	42.5	43.1	45.5	43.5	Handbook of Soil & Solid Waste Analysis, P. K. Behera
21.	Porosity	(%)by mass	30.4	34.8	33.5	39.5	34.9	IS 2720 : Part 17 : 1986

Sr. No.	Parameters	Unit	Results					Reference Method
			S11	S12	S13	S14	S15	
22.	Texture	-	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	-

It is very important to know about corrosive properties of soil in terms of soil resistivity and quality of soil water extracts and Soil stratifications, as this information will be of utmost importance during construction and operation phase of pipeline.

Figure 3.5 Soil quality Monitoring location for DNH pipeline network

3.13 Climate of the study area

Agriculture in the area depends mainly on the rainfall from south-west monsoon. The area experiences the sub-tropical to tropical temperate monsoon climate. The summers are hot and become more humid in their later part with temperatures reaching as high as 39° in the month of May. The monsoon starts in the month of June and extends until September. The rainfall is brought by South West monsoon winds. Winters are between maritime temperate and semi-tropical with temperatures ranging from 14° to 30°. The average wind speed recorded is 7.4 km/h.

The average annual rainfall for the decade was found to be 2459.54 mm.

3.13.1 Temperature

Ambient temperature is important part of meteorology for living organisms as it has direct as well as indirect effects on their survival. Also it plays an important part in influencing in the rate of atmospheric chemical reactions. The monitoring of ambient air temperature was carried out at the present site for duration of three months (December 2024 to February 2025). During the monitoring period average high temperature was observed to the tune of 34ºC whereas the

Average low temperature was recorded to the tune of 20 ºC. The following section describes variations relative humidity.

3.13.2 Prominent wind direction in different seasons

Prominent wind direction in different seasons is given in **Table 3.14.**

Table 3.12 Prominent wind direction

Season	Prominent wind directions
Summer	Southwest-Northwest
Monsoon	West-southwest
Post – Monsoon	Northwest
Winter	Northeast-Northwest

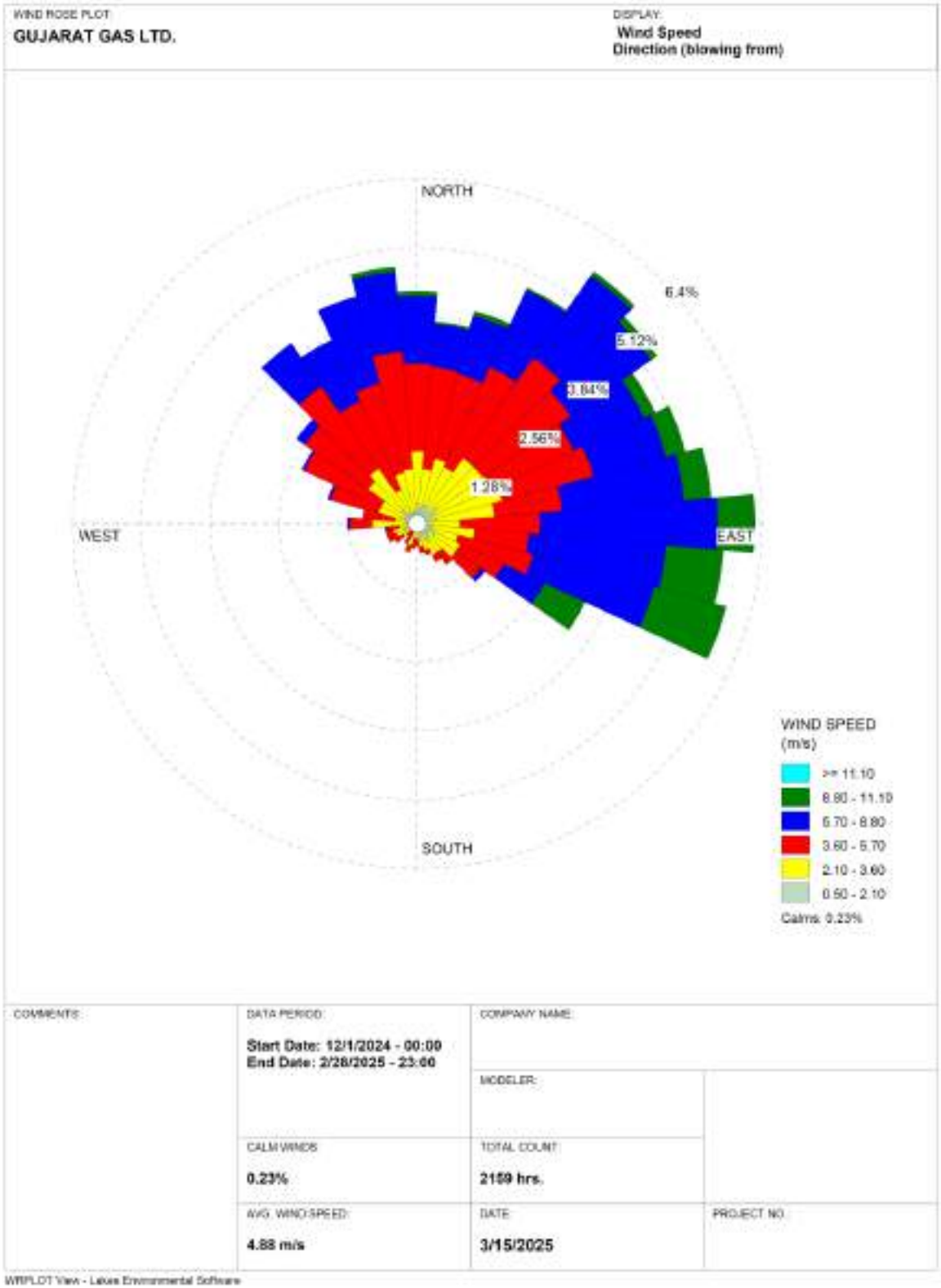


Figure 3.6 Wind rose diagram Near Swaminarayan Mandir Sayli

3.13.3 Rainfall

Average rainfall during baseline perod was Nil.

3.13.4 Humidity

Relative humidity can be explained as the ratio of the partial pressure of water vapor to the equilibrium vapor pressure of water at a given temperature. Relative humidity depends on temperature and spatial distribution of the given area. It is known to vary spatially and temporally.

Based on the available data it can be said that relative humidity during the study period varied between 40 to 86 %. The highest value for humidity was recorded in the month of May. The minimum Relative Humidity was recorded during the month of March. It is important to note that the highest average value for relative humidity was computed for the month of May (75 %).

Table 3.13 Average Meteorological Condition based on Long-term Data

Month	Mean Daily Temparature		Rainfall (mm) Monthly Total	No. of Rainy days	Relative Humidity (%), (Morning)	Relative Humidity (%), (Evening)
	Max	Min				
January	27.6	16.7	0.1	0	66	67
February	28.3	17.6	0.1	0	64	66
March	30.5	20.7	0.1	0	66	64
April	32.5	24	0.2	0	73	67
May	33.6	26.9	9.4	0.4	75	70
June	32.6	26.6	400.3	11.9	83	77
July	30.4	25.3	665.8	20.7	88	84
August	29.8	24.9	464.2	18.9	88	83
September	30.4	24.3	254.2	11.3	86	77
October	32.4	23.3	35.3	1.8	75	70
November	32.1	20.7	18.9	1	66	69
December	29.7	18.2	2.8	0.2	66	70
Total	--	--	1851.4	66.2	--	--
Average	30.8	22.4	--	--	69	49

3.14 Biological Environment

3.14.1 Introduction

Study of biological environment is one of the most important aspects of EIA in view of the need for conservation of environmental quality and biodiversity. Ecological systems show complex inter-relationships between biotic and abiotic components including dependence, competition and mutualism. Biotic components comprises of both plant and animal communities which interact not only within and between themselves but also with the abiotic components viz. Physical and chemical components of the environment.

Generally, biological communities are the good indicators of climatic and edaphic factors. Studies on biological aspects of ecosystems are important in EIA for safety of natural flora and fauna. Information on the impact of environmental stress on the community structure serves as an inexpensive and efficient early warning system to check the damage to a particular ecosystem. The biological environment includes mainly terrestrial ecosystem and aquatic ecosystem.

3.14.2 Survey Methodology

The information was collected by visual observations and discussion with the villagers about flora and fauna in this region. The secondary data related to this region was also obtained from District Forest Department, District Fisheries Department, District Agricultural Department, Social Forestry Division and District Horticulture Department and other literature.

3.14.3 Flora

The aim of the present study was to enumerate the available plant resources including endangered species and obtaining a broad representation of the existing floristic variations in the core area covering 10 km radius around proposed project area and buffer area.

3.14.4 Plant Diversity

a. Vegetation diversity of the area:

Flora and fauna of the area reveals that vegetation in the study area falls under tropical moist mixed deciduous and tropical dry mixed deciduous types as per the Champion and Seth's revised classification based on phenological pattern like evergreen, semi-evergreen and deciduous.

The most dominant trees in this region are *Prosopis julifera, Azadiracta indica, Albizia lebbeck* which are found in co-association with *Acacia nilotica*. On wasteland the vegetation cover consists of *Pongamia pinnata*, Ficus sp, *Jatropha gosifolium* and *Leucaea leucocephala*. Th shrubs consist of *Zizyphus mauritiana*, *Xanthium stromarium*, *Tridax procumbens*, *Tephrosia hamiltonii*, *Lantana camara*, *Calotrops gigantea* etc. Species of bamboo and grasses like *Dendrocalamus strictus*, *Cynodon dactylon*, *Cymbopogon martin*i were also observed during the survey.

b. Floristic Structure and Composition:

The phyto-ecological structure of vegetation found in Buffer zone shows three different strata i.e. Top, Middle and Ground. Top storey covered by Albizzia sp., Bauhinia sp., Bombax malabaricum, Ficus religiosa, Syzygium cumini, Cocos nucifera, Azadiracta indica, Terminalia cattapa etc. Middle storey in this region comprises Adhatoda vasica, Capparis spinosa, Emblica officinalis, Lantana camara etc. The dominant herbs in ground vegetation are Aegeratum conyzoides, Argemone mexicana, Indigofera tinctoria, Tridax procumbens, Alternantera sisesselis.

Trees species like Coccos nucifera, Prosopis julifera and Azadiracta indica are observed in some places. Herbs are abundant only during monsoon.The area is dominated with tree members as compared to shrubs and herbs. Cocos nucifera is the dominant tree species.

A plant community is governed by several factors like climatic, edaphic, topographic and biotic. Even local variations in environment affect components of plant community. Presence of large number of trees and shrubs and herbaceous vegetation indicates tropical vegetation structure. Grasses and sedges were found to be significant in the area. These indicate fertile and wet soil in upper layer of soil profile.

The list of plants (trees, shrubs, herbs and grasses) are presented in following **Table.3.14**

Table 3.14 List of Plants

S.No	Botanical Name	Local Name	Family
1	Acacia auriculiformis	Acacia/ Sunajhari	Mimosaceae
2	Acacia catechu	Khair	Mimosaceae
3	Acacia jacquemontii	Mandvi bavdi	Mimosaceae
4	Acacia leucophloea	Gohira	Mimosaceae
5	Acacia nilotica	Babul	Mimosaceae
6	Acacia planofrons	Chatri Bawal	Mimosaceae
7	Acacia senegal	Gorad	Mimosaceae
8	Acacia senegal	Gorad	Mimosaceae
9	Acanthus illicifolius,	Harkach	Acanthaceae
10	Adina cordifolia	Haldu/kurum	Rubiaceae
11	Aegialitis rotundifolia	Bana Ruar	Plumbaginaceae
12	Aegiceras corniculatum	Kharsi	Myrsinaceae
13	Aegle marmelos	Bel	Rutaceae
14	Ailanthus excelsa	Mahanimba	Simarubaceae
15	Alangium lamarckii	Ankula	Alangiaceae
16	Alangium salvifolium	Ankol	Alangiaceae
17	Albizia lebbeck	Kalasiris	Mimosaceae

18	Albizia oderatissima	Sarasado	Mimosaceae
19	Albizia procera	Dhalasiris / Shiras	Mimosaceae / Fabaceae
20	Alstonia scholaris	Chhatian	Apocynaceae
21	Anacardimum	Cashew	Anacardiaceae
22	Annona reticulate	Lanka badhial	Annonaceae
23	Anogeissus latifolia	Dhaura	Combretaceae
24	Anthocephalus cadamba	Kadam/Kadamba	Rubiaceae
25	Aphanamixis	Panikusum/Pitakusum	Meliaceae
26	Artocarpus integrifolia	Panas	Moraceae
27	Azadirachta indica	Neem/Limbo	Meliaceae
28	Balanites aegyptia	Ingoria	Simarubaceae
29	Bauhinia purpurea	Barada	Caesalpinaceae
30	Bauhinia recemosa	Ambta	Fabaceae
31	Bauhinia variegate	Kanchan	Fabaceae
32	Bombax ceiba	Simal/Simili	Bombacaceae
33	Borassus flabellifer	Tad	Arecaceae
34	Borassus flabelliformis	Tala	Palmae/Arecaceae
35	Bruguiera	Kekra	Rhizophoraceae
36	Bruguiera gymonbiza,	Bandari	Rhizophoraceae
37	Buchanania lanzan	Chara	Anacardiaceae
38	Bursera penicellata	Lemur Mai/ Raj Mai	Burseraceae
39	Butea monosperma	Palas/Phalas	Fabaceae
40	Callotropis gigantia	Moto akdo	Asclepiadaceae
41	Capparis gradis	Dumro	Cappar indaceae
42	Cardia monica	Kathgundi	Ehretiaceae
43	Careya arborea	Kumbhi	Lecythidaceae
44	Carissa carandus	Karamdi	Apocynaceae
45	Carpparis aphylla	Kerdo	Cappar idaceae
46	Caryota urens	Salap	Palmae/Arecaceae
47	Cassia auriculata	Aval or Avar	Caesalpinicaceae
48	Cassia fistula	Sunari	Caesalpinaceae
49	Cassia siamea	Chakunda	Ceasalpinaceae
50	Casuarinas equisitifolia	Saru	Cauarinaceae
51	Chloroxylon swietenia	Bheru	Rutaceae
52	Citrus aurantium	Kandhia	Rutaceae
53	Citrus grandis	Tava	Rutaceae
54	Cleistanthus collinus	Karada/Karla	Euphorbiaceae
55	Commiphora mukul	Gugal	Burseraceae
56	Cordia dichtoma	Gunda	Boraginaceae
57	Dalbergia latifolia	Sissoo / Rosewood/	Fabaceae
58	Dalbergia paniculata	Barabakulia/Dhoben	Fabaceae

59	Dalbergia sissoo	Sissoo	Fabaceae
60	Delonix elata	Sandasado	Caesalpiniaceae
61	Delonix regia	Krushanchuda	Caesalpiniaceae
62	Dillenia indica	Oau	Dilleniaceae
63	Emblica officinalis	Amla/ Aunla	Phyllanthaceae
64	Erythrina indica	Paldhua	Fabaceae
65	Eucalyptus sp.	Eucalyptus/ Nilagiri	Myrtaceae
66	Eugenia jambolana	Jamun	Myrtaceae
67	Euphorbia neriifolia	Siju	Euphorbiaceae
68	Euphorbia nivulia	Kantharo Thar	Euphorbiaceae
69	Ficus benghalensia	Vad / Bara	Moraceae
70	Ficus glomerata	Umra	Moraceae
71	Ficus hispida	Tambal	Moraceae
72	Ficus lanceolata	Dimiri	Moraceae
73	Ficus religiosa	Aswatha/ Peepal/ Osta	Moraceae
74	Gardenia latifolia	Damgurubu	Rubiaceae
75	Glochidion zeylanicum	Chikini/Kalchua	Euphorbiaceae
76	Gmelina arborea	Gambhari	Verbenaceae
77	Grewia tenax	Gangeti	Tiliaceae
78	Grewia tiliifolia	Dhaman	Malvaceae
79	Grewia villosa	Luo or lue	Tiliaceae
80	Heterophrag	Waras	Bignoniaceae
81	Hibiscus tiliaceus	Baniah / Baniya	Malvaceae
82	Ixora arborea	Telkuruma/Bhuinkuruma	Rubiaceae/Fabaceae
83	Kandelia candal	Sindhika	Rhizophoraceae
84	Kydia calycina	Banakapasia	Malvaceae
85	Lagerstroemia	Nana	Lythraceae
86	Lagerstroemia speciosa	Panipatuli	Lythraceae
87	Lannea coromandelica	Mai	Anacardiaceae
88	Leptadenia spartium	Khip	Asclepiadaceae
89	Limonia acidissima	Kaitha	Rutaceae
90	Lumnitzera racemosa	Churunda	Combretaceae
91	Macaranga roxburghii	Chandada	Euphorbiaceae
92	Madhuca indica	Mohul	Sapotaceae
93	Mallotus philippinensis	Kamlagundi	Euphorbiaceae
94	Mangifera indica	Amba/Aam	Anacardiaceae
95	Maytenus emerginata	Vingo	Celastraceae
96	Mellingtonia hortensis	Akasmali / Akas nim	Bignoniaceae
97	Memecylon edule	Anjan	Melastomataceae
98	Michelia champaca	Champa	Annonaceae
99	Miliusa velutina	Gandha palas	Annonaceae

100	Mimusops elengi	Baula	Sapotaceae
101	Mitragyna parviflora	Mundi/Mitkania	Rubiaceae
102	Moringa oleifera	Saruguva	Moringaceae
103	Moringa pterigosperma	Sajana	Moringaceae
104	Nyctanthes arbortristis	Ganga siuli	Oleaceae
105	Ougeinia oojeinensis	Bandhan / Tinsa	Fabaceae
106	Peltophorum	Radhachuda	Caesalpiniaceae
107	Polyalthia longifolia	Debadaru	Annonaceae
108	Pongamia pinnata	Karanja	Fabaceae
109	Premna obtusifolia	Kundher	Verbenaceae
110	prosopis cineraria	khijdo,samdo	Mimosaceae
112	Pterocarpus marsupium	Piasal/Bija	Fabaceae
113	Pterospermum	Giringa	Sterculiaceae
114	Rhizophora mucronata	Karod	Rhizophoraceae
115	Salvadora persica	Khari Jar / Mithi jar /Miriga	Oleaceae / Salvadoraceae
116	Salvadora persica		Oleaceae
117	Schleichera oleosa	Kusum	Sapindaceae
118	Sonaretia appittela	Keruhan	Sonneratiaceae
119	Sonneratia	Orua	Sonneratiaceae
120	Soyamida febrifuga	Ron	Maeliaceae
121	Suaeda fruticosa	Luno	Chinopodiaceae
122	Syzygium cumini	Jamun/Jambu	Myrtaceae
123	Tamarindus indicus	Chinch / Imli /	Fabaceae
124	Tamarix dioica	Achi	Tamaricaceae
125	Tecomella undulata	Rohido	Bignoniaceae
126	Tectona grandis	Sag	Lamiaceae
127	Terminalia bellerica	Bahada	Combretaceae
128	Terminalia catappa	Kathabadam	Combretaceae
129	Terminalia chebula	Hirda	combretaceae
130	Terminalia tomentosa	Ain	Combreteaceae
131	Trewia nudiflora	Panigambhari/Tabhar	Euphorbiaceae
132	Xeromphis spinosa	Mindhol	Rubiaceae
133	Xeromphis uliginosa	Gongad (Kanjo)	Rubiaceae
134	Ziziphus mauritiana	Barkoli	Rhamnaceae
135	Ziziphus xylocarpus	Ghontol (Gotha)	Rhamnaceae
136	Zizyphus mauritiana	Bordi	Rhamnaceae
137	Zizyphus numularia	Cheni Bor	Rhamnaceae

Table 3.15 List of Shrubs & Herbs

S.No	Botanical Name	Local Name	Family
1	Alangium salvifolium	Ankula	Ajangiaceae
2	Andrographis paniculate	Bhuin-neem	Acanthaceae
3	Annona squamosal	Ata	Annonaceae
4	Amorphopallus	Amorphopallus	Araceae
5	Begonia crenata	Berki, Motiyen	Begoniaceae
6	Calotropis gigantean	Arakha	Asclepidaceae
7	Carrissa opaca	Ankhukoli	Apocynaceae
8	Carvia callosa	Karvi	Acanthaceae
9	Cassia tora	Banchkunda	Fabaceae
10	Celosia argenta	Mayurachulia	Amaranthaceae
11	Celosia cristata	Iswarjata	Amaranthaceae
12	Cleome viscosa	Ban soris	Capparaceae
13	Clerodendron inermes	Chiani	Verbcnaceae
14	Clerodendrum viscosum	Kharkhari	Verbenaceae/Lamiaceae
15	Croton oblongifolius	Gotha	Euphorbiaceae
17	Curcuma neilgherrensis	Kapurkachali /	Zingiberaceae
18	Curculigo orchoides	Kali musli	Hypoxidaceae
19	Cycas circinatis	Urguna	Cycadaceae
20	Dalbergia spinosa	Gohirakanta	Apilionaceae
21	Datura fastuosa	Dhatura	Solanaceae
22	Euphorbia nivulia	Kantasiju	Euphorbiaceae
23	Flacourtia indica	Baincha koli	Flacourtiaceae
24	Gardenia gummifera	Kuruda/Ghurudu	Rubiaceae
25	Gardenia turgida	Kharal	Rubiaceae
26	Grewia elastica	Mirgichra/Barenga	Tiliaceae
27	Helicteres isora	Muraphal/ muri muri	Sterculiaceae
28	Hemidesmus indicus	Anantmula	Asclepidaceae
29	Holarrhena	Kurei/kher	Apocynaceae
30	Indigofera cassioides	Giliri/gilira	Fabaceae

31	Ipomia fistula	Amiri/ Raipani	Convolvulaceae
32	Jatropha gossypifolia	Baigaba	Euphorbiaceae
33	Lantana camara	Lantana/Bholupadi	Verbenaceae
34	Lawsonia inermis	Kathamanjuati	Lithraceae
35	Manilkara hexandra	Khirkoli	Sapotaceae
36	Mimosa pudica	Laj wanti/Lajkulilata	Mimosaceae
37	Murrya koenigii	Bhersunga / Bhugsang	Rutaceae
38	Ocimum basilicum	Bantulasi	Lamiaceae
39	Ocimum sanctum	Tuls	Lamiaceae
40	Pandanus fascicularis	Ketakikia	Pandanaceae
41	Pandanus foetidus	Lunikia	Pandanaceae
42	Phoenix dactylifera	Khajuri	Arecaceae
43	Phoenix sylvestris	Bankhajuri/Pinokhajuri	Palmaceae
44	Phyllanthus fraternus	Badianla	Euphorbiaceae
45	Phyllanthus niruri	Bhuin Anla	Euphorbiaceae
46	Phyllochlamys spinosa	Jhumpuri	Moraceae
47	Raphanus sativas	Mula	Brassicaceae
48	Sida spinosa	Bajramuli	Malvaceae
49	Solanum xanthocarpum	Ankarati	Solanaceae
50	Strobilanthus auricunatus	Bhains dera	Acanthaceae
51	Tabernaemontana sp	Milk wood	Apocynaceae
52	Tamrix troupii	Jagula	Tamricaceae
53	Tragia involucrate	Bichuati	Euphorbiaceae
54	Tridax procumbens	Bisalyakarani	Asteraceae
55	Tylophlora indica/	Anantmula	Asclepidaceae
56	Urena cinnata	Jatjatiamota	Malvaceae
57	Urena repanda	Jatijatia saru	Malvaceae
58	Ventilago denticulate	Kantamaul	Rhamnaceae
59	Vernonia cinerea	Agnijal/Bana jalangi	Asteraceae
60	Vitex negundo	Begunia	Verbenaceae
61	Woodfordia fruticosa	Dhatiki	Lythraceae

62	Ziziphus rugosa	Tinakoli	Rhamnaceae
63	Zizyphus mauritiana	Barkoli	Rhamnaceae

Table 3.16 List of Grasses

S.No	Botanical Name	Local Name	Famil
1	Acrachne recemosa	-	Poaceae
2	Aeloropus lagopoides	Kadvano	Poaceae
3	Apluda mutica	-	Poaceae
4	Apluda mutica	Bhongoru	Poaceae
5	Arisida histricula	Lamodu	Poaceae
6	aristida adscensionis	Dabholu	Poaceae
7	Bothriochloa intermidia	Saravu	Poaceae
8	Bothriochola ischaemum	Dungri Zenzvo	Poaceae
9	Cenchrus setigerus	Dhramnu	Poaceae
10	Cymbooogon martini	Rois	Poaceae
11	Cymbopogon jwarancusa	Gandharu	Poaceae
12	Cymbopogon martini	Dhanwantary/Khara	Poaceae
13	Cynodon dactylon	Daro	Poaceae
14	Cynodon dactylon	Duba	Poaceae
15	Cyperus corymbosis	Keuti	Cyperaceae
16	Desmostachya bipinnata	Darabh	Poaceae
17	Dichanthium annulathum	Jinjvo	Poaceae
18	Dinebra retrofelxa	Khariu	Poaceae
19	echinocloa colonum	Samo	Poaceae
20	Eleusine compressa	Khovan (Gandhir)	Poaceae
21	Eleusine indica	Adhen nasli	Poaceae
22	Eragrostis japonica	Panighasa	Poaceae
23	Evolvulus alsinoides	Chepti	Convolvulaceae
24	Heterophogon contortus	Dab saliu	Poaceae
25	Heteropogon contortus	Sinkhola	Poaceae
26	Imperata arundinaceae	Chhana	Poaceae

27	Iseilema prostratum	Mosti	Poaceae
28	iseilema anthephoroides		Poaceae
29	Porteresia coarctata	Dhanidhana	Poaceae
30	Paspalum canarea	Bahia grass	Poaceae
31	Sacchaum spontaneum	Kans	Poaceae
32	Schima sulcatum	Saniar	Poaceae
33	Setaria etalica	Chano	Poaceae
34	Sorgham halepense	Baru	Poaceae
35	Themeda cymbaria	Ratad	Poaceae
36	Vetiveria zizaniodes	Bena	Poaceae

3.14.5 Fauna

The recommended strategy for under taking “one-off” inventory surveys is both plot based and targeted methodologies. The basis of plot-based surveys is to sample the study area, describe the vegetation communities and fauna habitats. Whilst the plot-based survey will not document all of the species within the study area, it enables collection of specific habit data and has the following advantages.It allows for quantitative analysis of species distribution and abundance at the time of survey;

3.14.6 Primary Survey

Specific methods were adopted for counting animals in the field. For finding the bird population of migratory and local categories random sampling readings were taken at every location and for observing mammals, amphibians and reptiles were done by noting their calls, droppings, burrows, pugmarks and other signs. The on-site information (observation and interview with local people) collected during survey was further enriched by the information collected from different secondary sources.

Wild Animals: The diversity in fauna basically depends upon density and diversity of flora. The richer the diversity among the flora better will be the diversity in fauna. The study area has tropical moist mixed deciduous vegetation. Present conditions of the area do not support higher mammals. There are animals like neelgai, hare, mouse, langur, jackal and squirrels. The faunal species commonly reported in the study area are presented in following Table

Reptiles: Garden lizards and monitor lizards were seen during the survey. In snakes Dhaman, and Cobra, Monitor lizard was noted during personal interviewing with local peoples.

Table 3.17 List of Fauna

Scientific Name	Common Name	Schedule
Mammal		
Canis laureus	Jackal	Schedule II: Part –II
Baselaphus tragocamelus	Nilgai	Schedule III
Funambulus pennati	Squirrel	Schedule IV
Herpestes edwardsii	Mongoose	Schedule II: Part –II
Lepus nigricollis	Hare	Schedule V
Micro chiroptera	Bat	Schedule V
Presbytis entellus	Common Langur	Schedule II: Part –I
Rusa unicolor	Sabar Deer	Schedule III
Axis axis	chital deer	Schedule III
Antilope cervicapra	blackbuck	Schedule I
Aves / Birds		
Accipiter badius	The Shikara	Schedule IV
Acridotheres tristis	Common Myna	Schedule IV
Aloedo atthis	Small Blue Kingfisher	Schedule IV
Andea alba	Large Egret	Schedule IV
Ardea cinere	Grey Heron	Schedule IV
Ardeola grayii	Pond Heron	Schedule IV
Athene brama	Spotted Owlet	Schedule IV
Bubulcus ibis	Cattle Egret	Schedule IV
Ceryle rudis	Pied Kingfisher	Schedule IV
Columba livia neglecta	Blue Rock Pegion	Schedule IV
Coracias benghalensis	Indian Roller	Schedule IV
Grus spp.	Saras Crane	Schedule IV
Grus leucogeranus	Common crane	Schedule IV
Pavo cristatus	Peafowl	Schedule I
Gallus spp.	Jungle fowls	Schedule IV
Plegadis falcinellus	Ibis (Glossy)	Schedule IV
Egretta egretta	Little egret	Schedule IV
Dicruru adsimitis	Black drongo	Schedule IV

Turdodides caudatus	Babbler	Schedule IV
Alcedo atthis	Kingfisher	Schedule IV
Streptopelia spp.	Dove	Schedule IV
Vermin	Common Crow	Schedule IV
Passer domesticus	Sparrow	Schedule IV
Polyplectron bicalcaratum	Peacock	Schedule IV
Psittacidae	Parakeet	Schedule IV
Columbidae	Dove	Schedule IV
Strigidae	Owls	Schedule IV
Fam. Accipitidae	Hawk	Schedule IV
Phasianiclae	Partridge	Schedule IV
Eudynamys scolopacea	Koel	Schedule IV
Reptailes		
Varanus bengalensis	Monitar Lizzard	Schedule II: Part –II
Ptyas mucosus	Rat snake	Schedule II: Part –II
Naja naja	Indian cobra	Schedule II: Part –II
Bungarus caeruleus	Common Indian Krait	Schedule II: Part –II
Calotes versicolor	Garden lizard	Schedule IV

3.15 Socio-economic Profile of Study Area

3.15.1 Reconnaissance:

Reconnaissance has been done to assess socio economic status in the study area. The study area is rural however basic amenities were observed to be available.

3.15.2 Methodology:

Detailed socio economic data were collected within 10 km radius of the existing Project site. Preliminary information was collected during field investigation followed by secondary data from the census of India 2011.

3.15.3 Socio Economic Assessment

Socio economic status of the population is the indicator of the change in the life style due to the developmental activities taking place in the region. The villages which appears within the 10 km radius from the centre of the proposed Project site are considered for socio economic study.

3.15.4 District Overview

An official Census 2011 detail of Union Territory of Dadara & Nagar Haveli is as given below

3.15.5 District Population (2011)

In 2011, DNH had population of 343709 of which male and female were 98305 and 84809 respectively.

Table 3.18 Population in District

District	Male	Female	Sex Ratio	Total Population
UT-DNH (2011)	98,305	84,809	774	343709

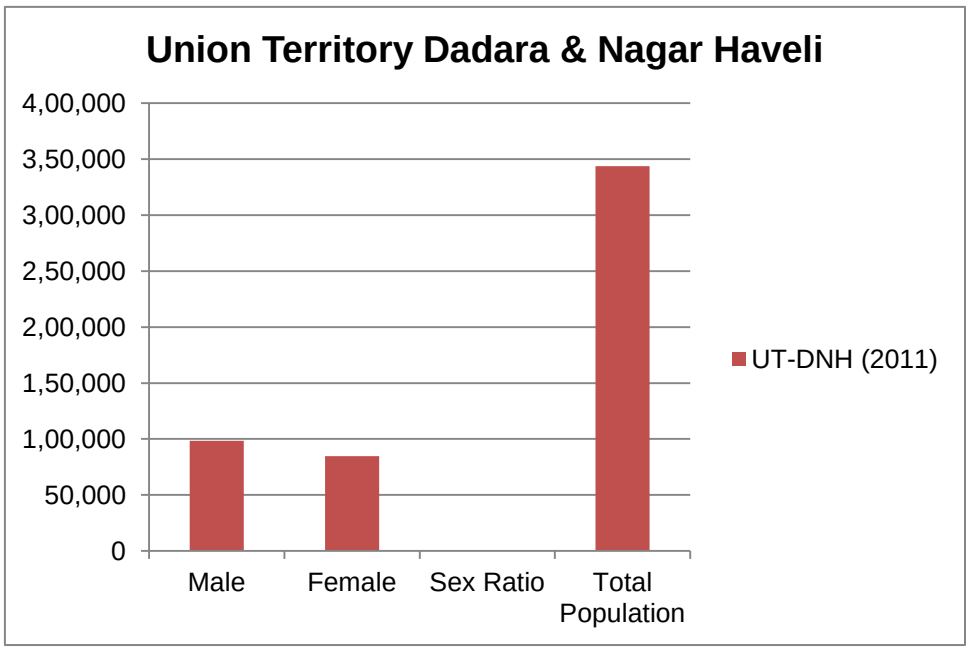


Figure 3.7 Graph showing Population in District

3.15.6 Literacy Rate (2011)

Average literacy rate of UT-DNH in 2011 were 76.2. If things are looked out at gender wise, male and female literacy were 85.2 and 64.3 respectively. Total literate in District were 3,43,709 of which male and female were 98,305 and 54,532 respectively. In 2001, District had 875,519 in its district. The literacy in the district as per Census 2011 is given in **Table: 3.19.**

Table 3.19 Literacy in District

	Male			Female			Total Population		
District	**Literates**	**Male Literacy %**	**Total**	**Literates**	**Female Literacy %**	**Total**	**Literate**	**Total Literacy %**	**Total**
UT-DNH (2011)	83,755	85.2	98,305	84,809	64.3	54,532	261906	76.2	343709

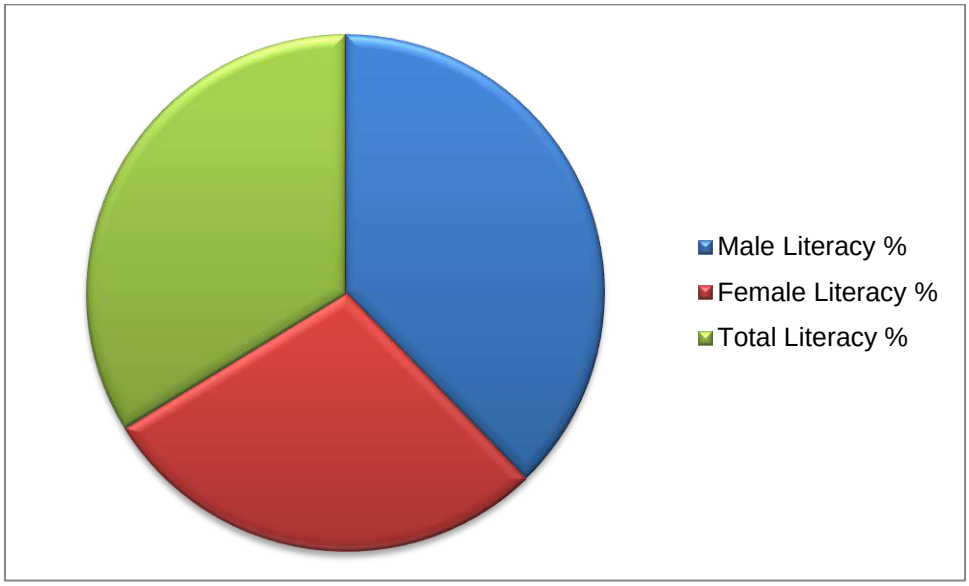


Figure 3.8 Graphs Showing Literacy Rate in District

3.16 List of villages along the pipeline route

Proposed pipeline is passes through Surangi, Athal, Chikhli, Chindhpada, Dapada, Khadoli, Khanvel, Kharadpada, Lohari, Saili, Silvassa, Tinoda,Umbarkui Villages of union territory Dadara & Nagar Haveli

Chapter 4. Anticipated Environmental Impacts

4.1 Details of Investigated Environmental Impacts due to Project Location and Possible Accidents Project Design and Project Construction

4.2 Project Location

The study area for the present report of Environmental impact of pipepeline network in Union Territory of Dadara & Nagar Haveli with its connectivity pipeline network is 1.5 Km either side length of the pipeline and 1 Km either side of the pipeline for PDI study which will be useful for Risk Assessment Study for pipeline.

Lengths of the pipelines based on detailed route survey along the identified pipeline corridor are as below:

Pipeline network in Union Territory of Dadara & Nagar Haveli: Approx. Length 40.495Km & having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene)

4.3 Introduction and Methodology

This section identifies and predicts the potential impacts on different environmental components due to the construction and operation of the proposed project. It details all the potential impacts on biophysical and socio-economic components of the local environment due to the proposed activities and sub-activities.

Prediction of impacts is the most important component in the Environmental Impact Assessment studies. Several qualitative and quantitative techniques and methodologies are used to conduct analysis of the potential impacts likely to occur as a result of the proposed development activities on physical, ecological and socio-economic environments. Such predictions are superimposed over the baseline (pre-project) status of the environmental quality to derive at the ultimate (post-project) scenario of environmental conditions. The prediction of impacts helps to minimize the adverse impacts and maximize the beneficial impacts on environmental quality during pre and post project execution. The proposed project would create impacts on the environment in two distinct phases:

Phase 1: During the construction phase which may be regarded as temporary or short – term

Phase 2: During the operation stage which may have marginal/high impact and could be long term.

4.4 Impact Assessment Methodology

A. Environmental Aspects

These are elements of an organization’s activities or products or services that can interact with the environment. Environmental aspects could include activities that occur during normal, abnormal and emergency operations.

B. Environmental Impacts

Environmental impacts are defined as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.

C. Environmental Indices

The environment includes surroundings in which an organization operates such as air, water, land, natural resources, flora, fauna, humans and their interrelation.

The environmental indices (or parts of the receiving environment on which impacts are being assessed) include: Land use/land cover, air quality, noise quality, surface water environment, ground water environment, soil, ecology and bio diversity, socio economics, occupational health, community health and safety After the identification of impacting activities, impacts require to be assessed based on subjective / objective criteria to assess the impacting activities. This is done as following.

4.5 Impacts on Ambient Air Environment

The potential ambient air quality impacts arising from the proposed project would occur mainly during project construction phase. Particulate Matter (PM_{10} and $PM_{2.5}$) would be the predominant pollutant generated from construction activities. The gaseous emissions such as SO_2, NOx would be generated from the construction equipments and vehicles. During operation phase, DG sets would be the only point source of emission.

The ambient air quality monitoring results show that Particulate Matter (PM_{10} and $PM_{2.5}$) concentrations at most of the locations within the core zone of the proposed project site are close to the norms prescribed for the residential areas. However, appropriate mitigation measures would still be employed during the construction stage to reduce any incremental rise in pollution level to an acceptable limit.

Monitored values of SO_2, NO_x in the ambient air are well within the limits indicating low pollution level (L) as per the CPCB criteria.

A. During Construction

The construction activities are required for the facilities to be created for laying of pipeline**.** During construction, the project would have two major impacts on ambient air quality due to an increase in gaseous emissions by heavy construction equipments and vehicles, and an increase in dust by construction activities. Earth excavation work, material storage, transportation and handling of construction materials, and wind erosion are the major factors that would produce a temporary, localized increase in Particulate Matter levels. The increased movement of heavy vehicles carrying construction materials, operation of DG sets as standby power back up system would generate gaseous emissions. The degree of dust generated would depend on the soil compaction and moisture content of the ground surface during

construction. Dust and exhaust particulate emissions from heavy equipment operations would temporarily degrade air quality in the immediate construction zone.

The construction contractor will visually monitor dust levels on the site during construction. Dust suppression will be instituted, by sprinkling water through tankers mounted on tractors, sprinklers and other means as necessary, in the event that high levels of dust are observed, strong winds and dry conditions make dust generation likely, and complaints about dust are received. Other diffused source of gaseous emissions from the construction site would be if the construction laborers use fuel wood for cooking and heating during winters. The construction contractor will ensure that such practice is not adopted by the laborers and they are provided with LPG cylinders for cooking in their labor camps.

B. During Operation

None of the proposed structures at the project site would be expected to have an impact on air quality during their normal operation. However, the only point source of emission will be DG sets which will be installed as standby power supply system. To meet the power requirement during emergencies, the project has proposed to install DG sets as standby power supply system.

It is proposed to install individual stacks of adequate height to exhaust the DG emissions. The stacks of adequate height will be provided from above the roof of the building as per the norms. Since natural gas will be used, very small quantity of Particulate matter, SO_2, NOx will be generated during the combustion process.

Considering the nature of activities which the proposed project will result, low level of vehicles movement and low threshold values, air pollution is not expected to be a major concern.

4.6 Impacts of Ambient Noise on Environment

A. During Construction

Construction activities normally result in temporary and short duration increases in noise levels. The main sources of noise during construction period include movement of vehicles for loading and unloading of construction materials, fabrication, handling of equipment and materials, operation of power shovels, concrete mixing plants, generators etc. The areas affected are those close to the site.

Under the worst case scenario, considered for prediction of noise levels during construction phase, it has been assumed that all these equipments generate noise from a common point at an average noise level of 85 dB (A). However, the resultant noise levels on proposed project site at 50m distance at peak level of construction are anticipated to be about 55 – 60 dB(A), which is well within the limit for commercial/ residential area during the day time.

Further to minimize these potential impacts, major construction activities would be scheduled during normal daylight working hours and would be implemented consistent with the applicable standards. The construction contractor will use equipments that are adapted to operate with appropriate noise muffling devices resulting in the least possible noise. Every effort would be taken to minimize the noise levels including the mandatory use of construction equipment with operable mufflers.

B. During operation

During operation, the DG sets will be the sources of noise pollution. The DG sets will be provided with proper acoustic arrangements would be made to control the noise generated from their rooms. The noise levels outside the room will be maintained within the stipulated norms both during the day and night time.

The effect of high noise levels on the operating personnel due to DG sets will also be considered and appropriate mitigation measures would be adopted. The continuous exposures to high noise level above 90 dB (A) affects the hearing capacity of the workers/operators and hence would be avoided.

4.7 Impacts on Water Environment

A. Impacts on Ground Water

The proposed project does not have the potential of impacting the ground water quality and quantity in a significant manner in the long term during the construction or operation phase. The water requirement during the construction phase will be partly met through tankers and in limited and unavoidable case through bore well and hence no adverse impacts on ground water are envisaged. Groundwater quality in the study area was compared to IS: 10500 (2012) for evaluation. Most of the parameters are observed to be within the limits prescribed by this standard. Mobile STP will be provided at temporary camp site during construction period. Whererever difficulaty to convery Mobile STP, the generated sewage would pass through a septic tank and soak pit safely. If required, it will be collected and disposed off suitably in nearby municipal drain.Since no wastewater will be discharged into the open, no impact on groundwater quality is envisaged.

B. Impacts on Surface or River Water:

During the construction phase that is while clearing the site and setting up the RoU or laying of the pipeline, temporary impacts on river water quality and aquatic life are envisaged. However, these impacts are reversible and temporary in nature and can be mitigated by restricting construction at these locations to specified periods of the year**.**

However, there may be possibility of changes in the water quality at the time of pipe laying during the river and canal crossings.

C. Impacts Due to Wastewater Generation

a. During Construction

The major source of water pollution during project construction phase will be sewage from labor camps/Porta cabin and makeshift office. It is expected that at any given time during the construction phase, the peak manpower strength on construction site comprising of technical staff, clerical/supervisor, skilled and unskilled workers would be about 40 persons.

Requirement of water will be various activity during construction phase of pipeline is as given below which will be met by tanker supply from nearby municipal source

S. no	Activity	Water consumption in liters
1	Steel /PE laying by HDD Method if required	112000
2	Watering & compaction of the Trench (Note: For 1km of pipieline-5000 liter, For Total 40.495 km -202475 liter)	202475
3	Water consumption for domestic use (Note: For One Year -31200 liter, Actual project completion period of One & half year -46800 liter)	46800
	Total	361275

b. During operation

During project operation phase, due to the absence of any large scale construction activities, the cause and source of water pollution will be much different and limited. During operational phase impact on water quality will be restricted to the use of water for drinking purpose and fire fighting. No additional liquid effluent is envisaged for the proposed project.

Wastewater generation during operational phase due to cleaning, washing, mopping, bathing ,toilet, sanitation will be very marginal and it will be disposed to nearby municipal drains. Waste water generated from washing and cleaning from industrial use will be approx. 20 liter per day and will be utilized in gardening and green belt development.

4.8 Impacts on land environment

A. Impacts on land use

With the setting up of this project the land use pattern will not be affected because of thereis no pumping station, major installation and SV stations are envisaged. Only underground valves to be constructed at every 1 Kms stretch of pipeline. So, there is no permanent type of land use. However, construction of approach roads and laying of the proposed pipeline shall

affect the topography. So,it is anticipated that the construction activities of the proposed project would not have an adverse effect on the land use activities in the project area, and will not be encroached during the construction of the project.

The land adjacent to the site that shall be utilized during construction for transportation or other construction related activities shall be restored to normal use once the construction is over and the pipeline is commissioned.

The other minor impacts on land environment, due to these operations could be due to vegetation loss during access cutting and site preparation. These impacts can be mitigated by simply considering adequate afforestation in near-by wastelands.

Development of green belt and other landscape on the proposed site would enhance the visual aesthetics of the area. Gardening/ green belt will be developed as the land available & proposed by forest department as per their guidance as required.

4.9 Impacts on Soil

The site clearing and preparation activities will involve removal of only scanty vegetation existing on the proposed plant site. The project site is primarily dominated by undergrowth and unwanted bushes. As the topography in and around the site is mostly plain with no slope, the setting up of RoU for laying the pipeline, would not result any significant effect on soil erosion and silt run off, even during the heavy rains. The project requires extensive work on the excavation and removal of soil and hence will temporarily affect soil structure and stability, which would be localized in nature.

The project proponent will adopt good construction practices that will ensure the environmental impacts of waste effluents generated on-site during construction will be minimized.

4.10 Impact due to Construction / Solid Wastes

The generation of waste material is inevitable during the construction phase of the project development. Waste is generated at different stages of construction process.

The ROU will be restored to original shape and returned to the owner for agriculture or any other intended use once the pipeline is laid. Hence no impacts on land environment along the proposed pipeline ROU are expected, during the operation phase.

4.11 Impact on Biological Environment

The biological environment is another important component of the environment on which the impacts of the proposed project need to be studied. The terrestrial and aquatic life forms (Flora and fauna) constitute the biological environment.

Proposed pipeline route in along the existing Road RoW under PWD authority passes through Eco Sensitive Zone of DNH Wild life sanctuary and protected area of DNH wild life sanctuary for length 7.722km and 6.956km respectively. Proposed pipeline route is within the existing RoW of road under PWD authority which will be used temporatiry for construction & laying of pipeline. After laying of pipeline land will be reinstated to near its original condition. So, impact envisaged only during the construction phase of pipeline which will be temporary and marginal and reversible.

a. Flora:

Analysis of abiotic factors reveals that ambient air and fresh water quality will remain practically unaffected. Thus, significant indirect adverse impact on flora is ruled out. The floristic component of the study area does not include any rare or endangered species. Also the reconnaissance survey suggested no ecologically precarious habitats / vegetation types along the proposed pipeline route. Thus, impact on rare and endangered species of flora is also ruled out.

b. Fauna:

The quality of ambient air and fresh water system will remain practically unaffected. Thus indirect impact on fauna, due to these abiotic factors is ruled out. The proposed activities do not envisage destruction of habitat and feeding or breeding area of faunal species. Further, development of plantation to substitute the access cutting, site preparation will provide habitat, food and breeding areas to birds, small animals and insects. Thus a positive impact is envisaged. No rare or endangered species of fauna are reported to exist in the area. Thus, no impacts on rare / endangered species are envisaged due to normal operations.

A number of species of flora and fauna were present along the proposed sites during the survey.

During construction phase, due to movement of machinery or equipment, digging of trench and clearing of ROU will have impact on the local flora and fauna. The impact that may be observed on fauna is the tendency of migration of certain living beings. However most of these are highly mobile and are prone to short term disturbances that are likely during the laying of pipeline.

Summer and pre-monsoon period is preferred period for construction of the proposed project because of the following:

- The primary breeding season for most of the resident birds commences with monsoon.
- Winter is the main migratory season for birds.
- During monsoon and winter, the number of bird species will be high in the area.

The environmental impact evaluation when carried out for both when construction and operational phases showed low score indicating negligible impact of the proposed sites on the flora and fauna.

4.12 Impacts on Socio – Economic Environment

a. Impact on Construction Workers and the Local Population

The most important construction aspects are the impediment of temporary drainage by blocked silt traps or the pounding of water within foundation works. Other mosquito breeding sites maybe created through the use of uncovered water tanks. The project will give careful attention to the design and maintenance of earthworks and drainage systems during construction to avoid the creation of significant habitat areas for mosquito larvae. The use of larvicides may be required to prevent mosquito breeding in silt traps.

b. Housing and transportation of construction workers

The project will facilitate maximum participation of local work force through engaged contractors for the construction. This will not only benefit local economy and employment, but also reduce the need to build temporary shelter and supply services. The project will provide portable toilets, washing facilities, potable water supply, and LPG for cooking on site during construction. The sewage will be disposed off by septic tanks and soak pit.

In no case burning of wood will be allowed at camp site, and no waste water will be allowed to be mixed with ground water or surface water as the case is.

c. Socio economic impacts

The project will contribute to the socio-economic development of the area at the local level. Indirect employment to the local population during the construction and operation of the project at both skilled and unskilled levels will benefit the local population and its specific groups. Along with indirect employment, there will be scope for generation of secondary employment to provide services to the working people during the operation of the proposed project for various needs. Once the pipeline is laid, development of other infrastructure facilities shall follow. All these will be beneficial to the local economy.

d. Electricity

Electricity will be used during construction to provide power to construction equipment and in operation for lighting of buildings and running utilities equipment. Electricity consumption will be kept at a minimum when possible by adopting energy conservation measures.

The project proponent will ensure that the contractor selected to execute the project will implement best management practices to conserve power during construction as well as operation phase.

Savings of electricity and energy saving would be encouraged during project activities like use of solar energy, use of LED tubes for lightings, energy saving during cooking, savings in domestic water use,optimum use of DG sets, control of waste of energy resources, water etc. would be practiced to the maximum possible extent.

4.13 Impact analysis

Critical analysis of the existing physical and socio-economic profile of the area vis-à-vis its scenario with proposed project activities identifies the following impacts:

Positive impacts

The positive impacts of the proposed project are as given below:

- The project will provide cleaner fuel stock for the industries in region, and is environment friendly fuel due to which adverse impacts on environment are found minimal.
- The project would enhance employment opportunities through contractors for the local people during construction phase.
- There will not be any adverse impact on communication and transportation
- Residential/Built up will not be acquired for the proposed project and hence there is no displacement of population.

Negative impacts

The negative aspects of the proposed project are as given below:

- There may be damage to the crops for short-term due to transporting of machineries through agricultural fields and agricultural activities will be affected during construction phase. Therefore, preferably construction activity will be undertaken during dry season to avoid crop loss.
- During construction phase, traffic disturbances may occur.

Thus, no adverse impact is expected on sanitation and community health.

4.14 Irreversible and Irretrievable Commitments of Environmental Components

Present report addresses the transportation of Natural Gas pipeline in Union Trerritory of Dadara & Nagar Haveli Geographical area which includes:

Natural gas transportation pipeline network covering total lengt 40.495 Km having 6”/8” Diameter for steel & 125mm Diameter for PE (polyethylene) passes through villages Athal, Chikhali, Chinchpada, Dapada, khadoli, Khanvel, Kharadpada, Lohari, Saili, Silvassa, Surangi, Tinoda, Umbarkui in Union Territory of DNH.

The Natural Gas pipeline is buried under ground up to 1.0 to 1.2 Meter. So, land will be used on Right of Work bases during Construction of pipeline and the land will be reinstated to its

original position once pipeline laying is completed. Utmost care to be taken to avoid negative impact on environment during construction phase of pipeline laying. However, the impact due to laying of pipeline is reversible, temporary and marginal.

4.15 Assessments of Significance of Impacts (Criteria For Determining Significance, Assigning Significance)

The summary of environmental Impacts, significance rating and mitigation measures are given in **Table 4.1**

Table 4.1 Summary of environmental Impacts, significance rating and mitigation measures

Sl. No.	Problem	Location	Quantification	Significance Rating	Proposed Measures / Actions
1	**Agriculture lands**	• Along the pipeline RoU (temporary)	During pipeline construction only (Temporary)	MS	• Compensation for the loss of crop and devaluation of agriculture lands. Land will be restored to near original contours, so as to minimize the loss of fertility of the top soil • Restoration of the land • Management of topsoil
2	**Physical Environment**				
a	Generation of Particulates	• Along the pipeline RoU • At camp sites	Not quantified	MS NS	• Spraying of water • Reducing speed of vehicles • Deploying vehicles with PUC certificate
b	• Surface water contamination • Increased sedimentation	• Along the pipeline RoU • Soil erosion prone area • Water body crossings	Not quantified	NS MS MS	• Soil erosion control measures • Restricted and controlled activities at water body crossing • Applying HDD method for major rivers and canals
	Ground water contamination	Not expected	-	-	-

Sl. No.	Problem	Location	Quantification	Significance Rating	Proposed Measures / Actions
c	Spillage and sanitary wastes	Near campsites	Very marginal during pipeline construction only	NS	• Waste management and spill control • Treatment of sanitary wastes
d	Solid waste	• Along the pipeline RoU	Not quantified	NS	• The formation cuttings will be preserved and used to refill the trenches • The top soil shall be stored separately and use to cover the land after laying of pipeline.
E	Generation of Noise	• Along the pipeline RoU	Not quantified but localized	MS MS	• Restricted operation in the night time • Selection of machinery generating noise less than 90 dB(A) • Fitting on noise attenuation devices
f	Soil erosion	• Along the pipeline RoU	Not quantified; initiates a chain of impacts	MS	• Controlled discharge of hydrostatic water • Conducing construction activities in non-monsoon season • Oil spill prevention measures
g	Stability of slopes/ land	• At cutting • At fragile and precarious areas	Not quantified	HS MS	• Stabilization of slopes using rip-rap technique • Conducting construction activities in

Sl. No.	Problem	Location	Quantification	Significance Rating	Proposed Measures / Actions
					non-monsoon season
h	Land use and Aesthetics	• Along the pipeline RoU • At camp sites • At other utilities like scraper stations	Not quantifiable	MS MS HS	• Contouring of the affected areas • Cleaning the RoU stretch immediately after the construction activities are over • Restoration and re-vegetation to the best possible extent.
3.	**Biological Environment**				
a	Removal of vegetation	• Along the pipeline RoU • At camp sites	Quantification will be done in consultation with Forest Department	MS NS	• Limit activities to the RoU • Restoration and re-vegetation • Use of fire woods will be strictly avoided. • Compensatory vegetation
b	Loss of forest	Along the pipeline RoU		NS	• Compensatory afforestation • Restriction of activities to RoU • Limit of activities to the RoU
c	Removal of orchards	Along the pipeline RoU		MS	• Compensation package • Restriction of activities to the RoU
d	Loss of wildlife	No wildlife habitation proximity to pipeline route	Not applicable	-	• Strictly prohibiting hunting and similar activities

Sl. No.	Problem	Location	Quantification	Significance Rating	Proposed Measures / Actions
					• Restricting the speed of movement of vehicles • Keeping "trench plugs" at strategic locations • Shifting the nests, wherever possible
e	Loss of wildlife habitat	No wild life habitation proximity to pipeline route because of prposed pipeline will be layed along existing road RoW	Not applicable	-	
4.	**Socio-Economic**				
a	Human habitations affected	• No major habitation falling within 50 m of the RoU	Not quantified, but critical locations are identified	MS	• Villagers in the proximity will be informed on the project activities
b	Economic implications	Along the pipeline RoU	Not quantified. The implications with regard to loss of seasonal crops and plantations are identified	HS	• Compensation to the affected people • Employment, wherever possible, to the unskilled local people. • The impact is positive.

Sl. No.	Problem	Location	Quantification	Significance Rating	Proposed Measures / Actions
C	Social conflicts	Along the pipeline route	Not quantifiable	NS	• Keeping good relationship with the local people
5.	➢ **Miscellaneous**				
a	Infrastructure	• Near human habitations • Road and railway crossings	Not quantified	NS	• Rehabilitation of the affected infrastructure components • Leaving behind the infrastructure facilities like approach roads and facilities at the campsites for the local inhabitants
b	Historic and archaeological importance	Along the pipeline right of use	No structure on the surface possibilities are there of sub-surface structure	NS	• Inform the concerned authority in case of coming across any structure of archaeological significance
c	Waste generation during Pigging operation	Along the pipeline	During operation phase only	MS	• During Operation phase of the pipeline pigging operation may generate solid waste which may be safely collected, stored and disposed to MoEF approved TSDF vendor

Where, HS = Highly significant,MS= Moderate significant, NS=Negligible/ Notsignificant

4.16 Mitigation Measures

I. Air environment

√ Particulate emissions would be controlled by water sprinkling wherever necessary.

√ All vehicles, machinery/equipment will meet the emission norms specified by Central/ State Pollution Control Boards.

II. Noise environment

√ All vehicle and construction equipment will be installed with proper silencers.

√ Each item of powered machinery used on site would be properly maintained.

√ Construction workers while working near noise generating equipment / activities would use ear plugs/muffs as required.

III. Water environment

√ Major crossing job will be carried out during dry season.

√ After construction, the weakened banks of water bodies would be restored.

√ Liquid effluents from construction camps and spoiled/drained lubricant oil washings from construction machinery would not be discharged to any water body without treatment.

√ Domestic Sewage will be disposed off suitably during construction period.

√ Rain water harvesting will be encouraged at the office building as practicable

IV. Land environment

√ Any excess excavated material would be removed from the construction site after the completion of excavation operations & disposed off suitably.

√ Excavation for pipeline and grading operations would be carried out in a manner that would not reduce the slope stability of soil.

V. Solid and hazardous waste

√ Solid wastes generated from the temporary campsites and other wastes like plastics, paper, cardboard, etc. will be properly collected, segregated and reused / disposed off appropriately (recycle, reuse, and composting / landfill)

√ No hazardous wastes are envisaged from pipeline construction activities.

√ During Operation phase of the pipeline pigging operation may generate solid waste which may be safely collected, stored and disposed to approve TSDF vendor.

VI. E- waste:

Now a days there has been lot of awareness towards disposal of E-Waste such as electronic circuits, picture tubes, special glass wares, containers, tube lights, CFL tubes etc. The proponent shall carefully collect, store separately and safely, maintain records of inventories and dispose them by giving to TSDF approved by MoEF, New Delhi. The details of the same can be made available as per guidelines of SPCB.

VII. Flora and fauna

√ As far as possible, minimum number of trees will be cut while laying pipeline.

√ 10 times the number of trees cut in pipeline route shall be planted as per guidelines of Ministry of Environment & Forests.

VIII. Socio – economic environment

√ Caution would be exercised to avoid disturbance to existing infrastructure along the pipeline route, such as telephone and electrical cables, water pipelines etc.

√ The compensation for acquisition of land for laying the pipeline would be as per P & MP Act, 1962 (Right of User in Land)

Chapter 5. Analysis of Alternatives

5.1 Description of each alternative

Route selection is a process of identifying constraints, avoiding undesirable areas and maintaining the economic feasibility of the pipeline. Diversion of pipeline around obstacles can be very costly. The ideal route, of course, would be a straight line from the origin to the terminal point. However, physiographic, environmental, design and construction constraints usually alter the route. The following factors are considered while selecting the optimal route of the pipeline both for cross-country as well as in the city area.

5.2 Proper Alignment

The information supplied by GGL regarding co-ordinates (Latitude and Longitude), of Take Off and Terminal locations have been transferred to 1:50,000 scale map based on the maps which are covered by GGL pipeline were identified. Since part of the area falls under restricted zone, pipeline route was transferred to available maps and refined to the extent possible. All the alternatives were studied in the office during desktop study and later on it was verified physically on the ground and the best Alignment has been surveyed which was approved by GGL.

5.3 Pipeline Route and options

The route has been selected confirming to the requirement of GGL. The major constraints along the route are furnished below:

- Avoiding the developments to the extent possible.
- Fairly level terrain has been observed along the pipeline.
- Avoiding difficulties in obtaining environmental clearance.
- Keeping the entire above requirement, constraints, etc. the pipeline route has been selected. Efforts were made to avoid water logged areas as far as possible.
- All efforts have been made to select the shortest possible route. Pipeline route so selected also meets the requirement of economics, safety, constructability and availability of RoU including scope for further expansion.

5.4 Alternative Locations

At the time of selection of locations a safe distance will be kept from the nearest habitation and water bodies and other sensitive receptors.

5.5 Summary of Adverse Impacts for Each Alternative and Selection of Each Alternatives

The present proposed natural gas transportation pipeline has no adverse impact for alternative and selection of alternative.

5.6 Alternative Technologies

The applicable Technologies and standards for laying of the pipeline and developing associated facilities for the project activities are summarized as under:

The transportation of natural gas though is a very sensitive but very important method for transportation of Natural gas. As a very alert organization realizing the fact, right from designing, selection of material, eraction and commission stage, monitoring, Operational stage utmost care will be taken to adopt state of art technology and practices, also making it sure that it is already a proven safe and efficient appropriate technology. Every activity is as per the standardized protocol and new technology is not involved unless proven safe andaccepted as standardized practice & robust R&D back up. The applicable standards are mentioned below.

Again, it is realized that it is an area of public safety and public sensitivity.

However, newer technologies like rain water harvesting, use of solar energy for energy saving, etc. are included in proposed activities wherever possible.

Table 5.1 Applicable Standards:

Sr. No.	Applicable Standards
1	“PNGRB Act” : Petroleum And Natural Gas Regulatory Board Act
2	“PMPA” : Petroleum Minerals Pipeline Act 1962 /Gujarat Water & Gas ROU (Acquisition) Act, 2000;
3	ASME B 31.8 Gas Transmission and Distribution Piping Systems
4	API 5L Specification for Line pipe
5	OISD-Standard- 141 & 226 Design and Construction Requirements for Cross country Hydrocarbon pipelines

5.7 Alternative Resources

The present route of pipeline finalized through actual route survey, analysis of site alternatives, analysis of route alternatives and minimal disturbance to any habitats and human settlements. Laying of the pipeline and associated facilities are well planned, commissioned, operated and maintained as per best available practices, well documented protocols, codes and standards internationally and the same shall be practiced in the proposed project as well.

5.8 Alternative Treatment Options

Laying of the pipeline and associated facilities are well planned, commissioned, operated and maintained as per best available practices, well documented protocols, codes and standards internationally and the same shall be practiced in the proposed project as well.

Chapter 6. Environmental Monitoring Programme

6.1 Environmental Monitoring Program

Environment monitoring program is a key component to carry out environment monitoring which includes technical aspects of monitoring the effectiveness of mitigation measures including measurement methodology for Air, water, Soil and Noise environment, selection of location,Meteorologicla data collection, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules.

6.2 Technical Aspects of Monitoring the Effectiveness of Mitigation Measures

Main purpose of the project is transportation of Natural Gas through pipeline. Impact due to pipeline section is envisaged during construction period/laying of pipeline. Whereas in case of operation phase of pipeline no significant impact is envisaged on soil,surface water, ground water, air, noise, flora, fauna etc. due to already buried pipeline below 1.0-1.2 meter. Utmost care should be taken during construction period of pipeline. Summary of environmental Impacts, significance rating and mitigation measures is given in **Ch. 4** in **Table no. 4.1**. Mainly pipeline will be buried underground 1.0 – 1.2 meter hence in case of rapture of pipe line and catching time will be devoid of/ supply of Air or Oxygen hence will not be combustible and will be catch fire. So, in operation period no major impacts envisaged on environmental component due to pipeline section.

6.3 Selection of locations

The pipeline route is optimized based on the following considerations

- Safety of public lives and property and safety of the pipeline from Engineering and other considerations.
- Shortest pipeline length.
- Easy and favorable terrain condition free of large water bodies, low lying marshy lands, obstacles like ravines, depressions and unstable grounds, meandering rivers, etc.
- Ground profile for pipeline hydraulics and avoidance of steep rising and falling ground, hills and valleys having sloping right of way.
- Availability of infrastructure and access to the pipeline route during construction and maintenance.
- Environmental impact and avoidance of environmentally sensitive lands, such as reserved forests, marine parks, built-up areas, places of worship, burial.
- Minimum crossing of existing pipelines, transmission lines, parallel alignment, etc.
- Minimum road, rail, river and canal crossings.

- Avoidance of rugged and intricate grounds with hard strata, exposed rocks, boulders and quarries.
- Existing and future developments in the region, such as roads, rail lines, canal network, reservoirs, townships, industrial units, etc.
- Scope for future expansion of the product pipeline.
- The land required for the pipeline project shall be obtained on Right of Use (RoU) basis and there will be temporary disturbance during construction phase. The land will be reinstated to its original position once pipeline laying is completed.

6.4 Reporting Schedules

Regular monitoring of all environmental components (like Air, Water, Soil & Noise) affected during the project activity will be done as per the guide line of Ministry of Environment and Forest, New Delhi and stipulated condition given by SPCB. Regular audit if applicable as per the schedule category of SPCB will be done and report for the same will be submitted to authority in suggested time period from SPCB.

6.5 Emergency procedures

- Fire prevention and code enforcement is one of the major areas of responsibility for the fire service. Following are the general recommendations for the proposed facility
- Following firefighting facilities can be used to tackle the fire
  - √ Water supply
  - √ Fire hydrant and monitor nozzle installation
  - √ Water sprinkler system
  - √ Mobile Firefighting equipment
- Surrounding population (includes all strata of society) should be made aware of the safety precautions to be taken in the event of any mishap due to pipeline. This can effectively be done by conducting the safety training programs
  - √ Critical switches and alarm should be always kept in line
  - √ Shut off and isolation valves should be easily approachable in emergencies
  - √ Periodical mock drills should be conducted so as to check the alertness and efficiency of the DMP and EMP and records should be maintained
  - √ Signboard including phone numbers, no smoking signs and type of emergencies should be installed at various locations

On site & off site emergency plan with Risk assessment and Disaster management plan study is done for proposed pipeline project. The same will be implemented at project site as per the standard practice as recommended in the study report.

Chapter 7. Additional Studies

This chapter deals with the study of prevention and mitigation of incidents / accidents which can lead to personal injuries, damage or loss of property, material, plant, equipment, and the environment.

The study is mainly concerned with conducting a risk assessment to identify the hazards and risks associated with the various activities and to identify and evaluate the control measures to eliminate / prevent accidents and loses, and / or mitigate the risk to minimum acceptable level.

The other aspect considered for the study includes the disaster management plan. Even after providing all necessary control measures, things may go wrong. The study includes the conditions, activities, material, manmade or natural, will be considered, which can lead to an emergency situation. A, well defined, disaster management plan will provide awareness and prompt action by employees to control emergency situation promptly and effectively and will minimize the losses.

7.1 Content

In this chapter we are going to discuss on these two topics:

A. Disaster Management Plan

B. Risk Assessment

7.1.1 Disaster Management Plan

Several Government agencies, both at the Central and State levels, are entrusted with the responsibility of ensuring safety and management of hazardous chemicals under acts and rules made for the purpose. Construction of pipeline shall be carried out in accordance with relevant codes and specifications. Despite these measures, the possibility of accidents cannot be ruled out. In order to face risk of accidents during transportation of gas, a disaster management plan is prepared to mitigate the impact.

Disaster management plan (DMP) was prepared for the proposed transfer of Natural Gas 1) Kharadpada to Luhari Industrial Area (Jhaveri Flexo India Ltd.) Connectivity- Length 4.515km & 125mm Dia. PE 2) Vasona Char Rastha to Khanvel Petroleum Khanvel Connectivity (HP RO)-Length 15.125Km & 8'' Dia. Steel 3) Sili Fatak to Randhe Road Umarkui Connectivity-Length 8.525Km & 6" Steel/125mm Dia. PE 4) IMP Power Sayli & Siddhant Ispat Connectivity Project-Length 7.200Km & 6" Steel/125mm Dia. PE 5) Jackson Industry Athola Connectivity Project-Length 2.480Km & 125mm Dia. PE 6) Dabur Industry Connectivity-Length 2.650Km & 125mm Dia. PE. The plan was prepared in compliance with the PNGRB

regulations. The plan describes the emergency situation, the organization and line of command, the system and equipment to be used and duties of the key personnel. Site specific plans prepared based on the risk analysis undertaken for the proposed operations, which identifies the potential worst-case scenarios that can develop into an emergency. The plan considered both proposed preventive and mitigation measures.

In spite of various preventive and precautionary measures taken in works, the possibility of a mishap cannot be totally ruled out. Hence the need to prepare emergency plan for dealing with the incidences which may still occur and are likely to affect life and property in the residential areas and other places are identified in this plan. Such an emergency could be the result of malfunction or non-observance of operating instructions. It could, at times, be the consequences of acts outside the control of residents / employees like severe storm, flooding, or deliberate acts of arson or sabotage.

7.1.2 Objectives

The objective of any facility is to ensure safe and trouble free operation which can be achieved by taking precautions in designing the pipeline as per the standard codes, selecting proper material of construction and instruments. Safety should also be ensured by operating the facility by trained manpower. In spite of all precautions, accidents may happen due to human error or system malfunction. Any accident involving release of hazardous material may cause loss of human lives and property and damage to the environment. Industrial installations are vulnerable to various natural as well as manmade disasters. Examples of natural disasters are flood, cyclone, earthquake, lightening whereas manmade disasters are fire, explosion, accidental leakage of toxic and poisonous gases and liquids, civil war, nuclear attacks, terrorist activities etc.

The purpose of DMP is to give an approach to detail organizational responsibilities, actions, reporting requirements and support resources available to ensure effective and timely management of emergencies associated to production and operations in the site.
The overall objectives of DMP are:

- Minimize or eliminate any further danger or risk to individuals
- Minimize or eliminate any further risk to company's operations and asserts
- Minimize or eliminate any adverse publicity and to ensure all external inquiries are handled consistently by a nominated spokes person
- Ensure that all legal aspects of response are considered.
- Ensure safety of people, protect the environment and safeguard commercial considerations

- Immediate response to emergency scene with effective communication network and organized procedures.
- Obtain early warning of emergency conditions so as to prevent impact on personnel, assets and environment;
- Safeguard personnel to prevent injuries or loss of life by protecting personnel from the hazard and evacuating personnel from an installation when necessary
- Minimize the impact of the event on the installation and the environment, by:
    - Minimizing the hazard as far as possible
    - Minimizing the potential for escalation
    - Containing any release.
- To provide guidance to help stack holders take appropriate action to prevent accidents involving hazardous substances and to mitigate adverse effects of accidents that do nevertheless occur. Fig. 7.1 shows effect of loss of containment from the process

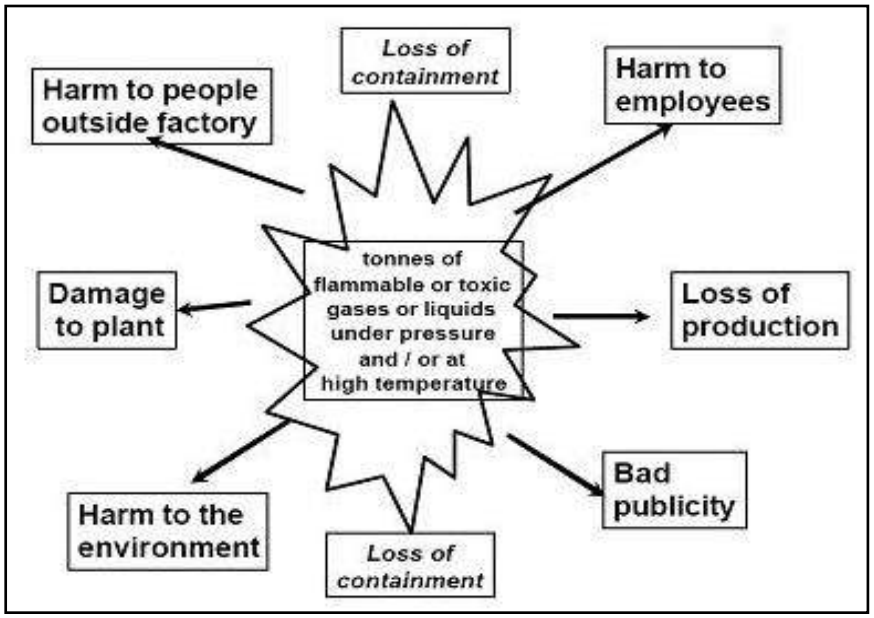


Figure 7.1 Focus on Loss of Containment from the Process

7.1.3 Disaster Scenarios

Various scenarios that are anticipated to cause major emergencies are fire, explosion and natural calamities like cyclone, flood and earthquake. All emergencies relevant to oil evacuation pipeline are presented in brief in the following text

- Leakage of Natural Gas from flange joints.
- Leakage of Natural Gas through pressurised line.
- Flash fire
- Jet fire
- Fire Ball

- Vapour Cloud Explosion

Causes of Disasters:

The common causes for the above events are tabulated below:

Man made	Natural Calamities	Extraneous
• Heavy Leakage • Fire • Explosion • Failure of Critical Control system • Design deficiency • Unsafe acts • Inadequate maintenance	• Flood • Earth Quake • Cyclone • Outbreak of Disease • Excessive Rains • Tsunami	• Riots/Civil Disorder/ Mob Attack • Terrorism • Sabotage • Bomb Threat • War / Hit by missiles • Abduction • Food Poisoning/ Water Poisoning

7.1.4 Different Levels of Emergencies

Emergencies can be categorized into three broad levels on the basis of seriousness and response requirements, namely,

Level 1: This is an emergency or an incident which;

- can be effectively and safely managed, and contained within the site, location or installation by the available resources;
- has no impact outside the site, location or installation

Level 2: This is an emergency or an incident which;

- cannot be effectively and safely managed or contained at the location or installation by available resource and additional support is alerted or required;
- is having or has the potential to have an effect beyond the site, location or installation and where external support of mutual aid partner may be involved;
- is likely to be danger to life, the environment or to industrial assets or reputation

Level 3: This is an emergency or an incident with off-site impact which;

- Could be catastrophic and is likely to affect the population, property and environment inside and outside the installation, and management and control is done by district administration. Although the Level-III emergency falls under the

purview of District Authority but till they step in, it should be responsibility of the unit to manage the emergency

7.1.5 Disaster Management Plan: Key Elements

Following are the key elements of Disaster Management Plan:

- Basis of the plan
- Accident / emergency response planning procedures
- On-site Disaster Management Plan
- Off-site Disaster Management Plan

7.1.6 Basis of the Plan

Identification and assessment of hazards is crucial for on-site emergency planning and it is therefore necessary to identify what emergencies could arise in transportation of hydrocarbons. One of the emergencies is due to hazards from spread of fire or release of flammable chemicals during transportation. Hazard identification is the basis of the Disaster Management Plan to tackle the unforeseen events. It is therefore necessary to identify what emergencies could arise in storage of various products. Hazard analysis or consequence analysis gives the following results.

- Hazards from spread of fire or release of flammable and toxic chemicals from storage and production units.
- Hazards due to formation of pressure waves due to vapour cloud explosion of flammable gases and oil spill hazard.

7.1.7 Accident/Emergency Planning and Response Procedures

Emergency rarely occurs therefore activities during emergencies require coordination of higher order than for planned activities. To effectively coordinate emergency response activities, an organizational approach to planning is required. The important areas of emergency planning are organization and responsibilities, procedures, communication, transport, resource requirements and control centre. Offsite emergency requires additional planning over and above those considered under onsite plans, which should be properly integrated to ensure better coordination.

The emergency planning includes anticipatory action for emergency, maintenance and streamlining of emergency preparedness and ability for sudden mobilization of all forces to meet any calamity.

Emergency Co-coordinators would be appointed who would undertake the responsibilities like firefighting, rescue, rehabilitation, transport and provide essential and support services. For this purposes, Security In-charge, Personnel Department, Essential services personnel would be engaged. All these personnel would be designated as Key personnel.

In each shift, electrical supervisor, electrical fitters, pump house in-charge, and other maintenance staff would be drafted for emergency operations. In the event of power or communication system failure, some of staff members in the office/plant offices would be drafted and their services would be utilized as messengers for quick passing of communications. All these personnel would be declared as essential personnel.

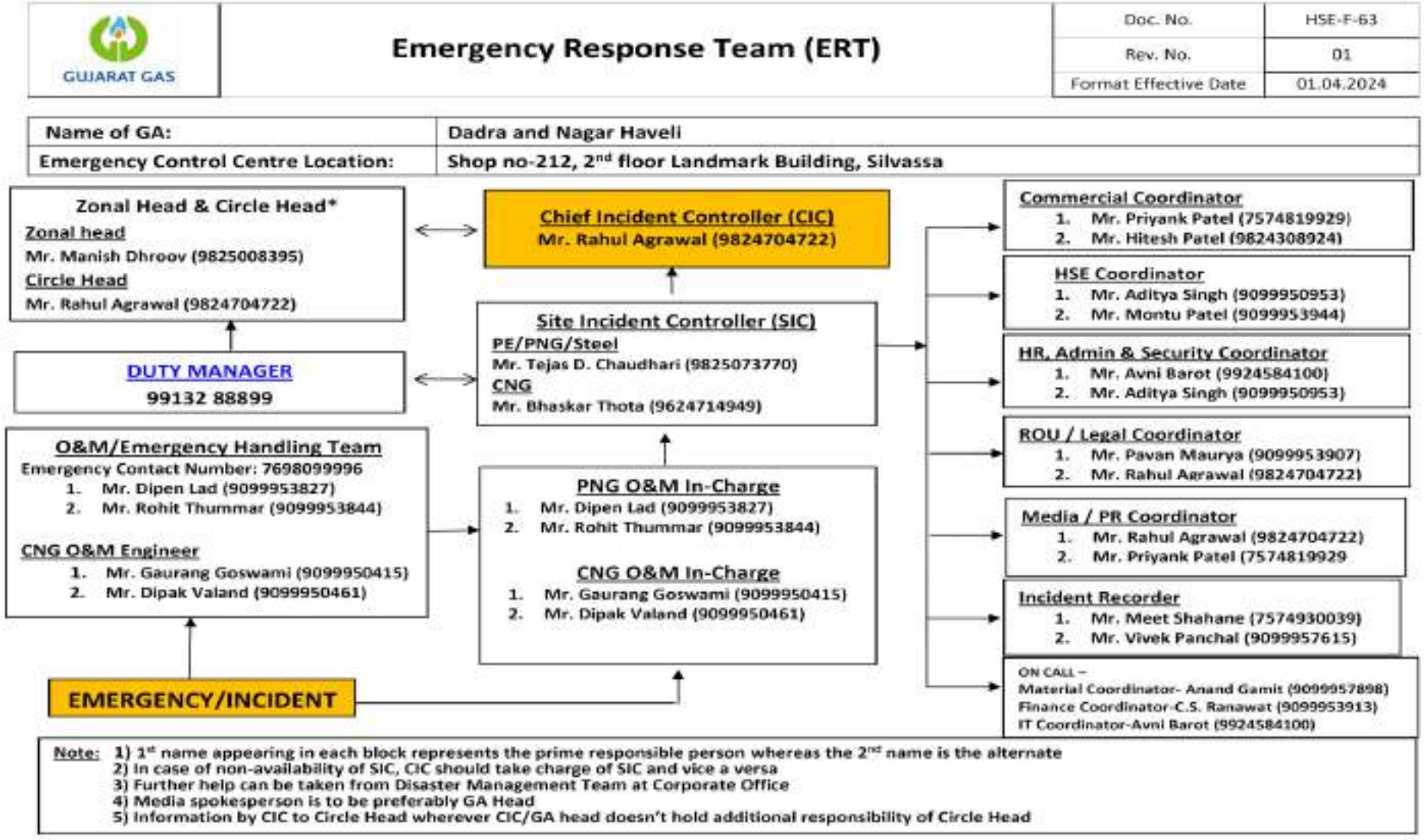


Figure 7.2 Emergecny Reponse Team Chart

A. Emergency Communication

Whoever notices an emergency situation such as fire, growth of fire, leakage etc would inform his immediate superior and Emergency Control Center. A place nearer to the Gate House Complex shall be identified as Emergency Control Center. The person on duty in the Emergency Control Center would appraise the Site Controller. Site Controller verifies the situation from the Incident Controller of that area or the Shift In-charge and takes a decision about an impending On Site Emergency. This would be communicated to all the Incident Controllers, Emergency Co-coordinators. Simultaneously, the emergency warning system would be activated on the instructions of the Site Controller.

7.1.8 Roles and Responsibilities

The responsibilities of the key personnel are appended below:

a) Chief Incident Controller

CIC	HOD (TS&OM)

On receiving information about emergency he would rush to Emergency Control Center (ECC) and take charge of ECC and the situation. His responsibilities would be as indicated below:

1. Preparation, review and updating of the ERP;
2. Assessment of situation and declaration of emergency;
3. Mobilization of main coordinators and key personnel;
4. Activation Emergency Control Centre (ECC);
5. Taking decision on seeking assistance from mutual aid members and external agencies like Police, Fire Brigade, Hospitals etc.;
6. Continuous review of situation and decide on appropriate response strategy;
7. Taking stock of casualties and ensure timely medical attention;
8. Ensuring correction accounting and position of personnel after the emergency;
9. Ordering evacuation of personnel as and when necessary;
10. Taking decision in consultation with District Authorities when an Off-site emergency to be declared.
11. He will constitute a committee to investigate the cause of the incident.
12. Assesses the magnitude of the situation on the advice of Incident Controller and decides;
13. Whether the affected area needs to be evacuated;
14. Whether personnel who are at assembly points need to be evacuated;

15. Declares Emergency and orders for operation of emergency siren;
16. Organizes announcement by public address system about location of emergency;
17. Assesses which areas are likely to be affected, or need to be evacuated or are to be alerted;
18. Maintains a continuous review of possible development and assesses the situation in consultation with Incident Controller and other Key Personnel as to whether shutting down the plant or any section of the plant is required and if evacuation of persons is required;
19. Directs personnel for rescue, rehabilitation, transport, fire, brigade, medical and other designated mutual support systems locally available, for meeting emergencies;
20. Controls evacuation of affected areas, if the situation is likely to go out of control or effects are likely to go beyond the premises of the factory, informs the District Emergency Authority, Police, Hospital and seeks their intervention and help;
21. Informs Inspector of Factories, Deputy Chief Inspector of Factories, CECB and other statutory authorities;
22. Gives a public statement if necessary;
23. Keeps record of chronological events and prepares an investigation report and preserves evidence; and
24. On completion of On Site Emergency and restoration of normalcy, declares all clear and orders for all clear warning.

b) Site Incident Controller (SIC)

SIC	Base In-charge

1. He will maintain a workable emergency control plan, establish emergency control centre, organize and equip the organization with ERP and train the personnel;
2. The SIC assumes complete charge of the control centre and directs all activities;
3. He communicates with duty manager, management and also the external agencies like District Authorities, Disaster Management cell, Mutual Aid Scheme, Police, GGL (H.O.) and base managers;
4. He will be assisted by the Maintenance In-charge (O&M), Shift In-Charges, Maintenance crews, HSE and Administrative departments.
5. He will ensure that all key personnel are called in.
6. He will coordinate with various internal and external agencies for augmenting resources.
7. He will ensure that the essential emergency services are called in & directed to site.

8. He will decide and direct the shutdown of systems or plants in a safe manner with consultation with CIC and also decide where to stop activities.
9. He will decide in consultation with CIC on evacuation requirements and coordinate with local authorities.
10. He will ensure that casualties, if any, are receiving adequate medical assistance, arrange additional help, if required.
11. He will arrange for chronological record of emergency.
12. He will keep the top management informed of the status.
13. If emergency is prolonged he will arrange for replacement in consultation with CIC.
14. He will organize for temporary repair & plan for permanent repair of the pipeline in consultation with CIC.
15. He will give briefing to CIC, Admin In-charge & Top Management for press statements.
16. Assembles the incident control team;
17. Directs operations within the affected areas with the priorities for safety to personnel minimize damage to the plant, property and environment and minimize the loss of materials.
18. Directs the shutting down and evacuation of plant and areas likely to be adversely affected by the emergency.
19. Ensures that key personnel help is sought.
20. Provides advice and information to the Fire and Security Officer and the Local Fire Services as and when they arrive.
21. Ensures that all non-essential workers/staff of the affected areas are evacuated to the appropriate assembly points, and the areas are searched for casualties.
22. Has regard to the need for preservation of evidence so as to facilitate any inquiry into the causes and circumstances, which caused or escalated the emergency.
23. Co-ordinates with emergency services at the site.
24. Provides tools and safety equipment to the team members.
25. Keeps in touch with the team and advices them regarding the method of control to be used.
26. Keeps the Site Controller of Emergency informed of the progress being made

c) Administration in Charge

The Administration In-Charge helps the emergency team in the following manner.

1. Render all administrative help to SIC.
2. He will do the press statements and give information on “need to know basis” with due approval from Managing Director.

3. Coordinate with civil authorities like district collector, deputy collector, tahasildar, village Municipal chief etc.
4. Control and allow only authorized entries, control traffic and communication channels.
5. Liaise with local hospitals, nursing homes etc. to take an additional load.
6. To ensure head counts at assembly points
7. Coordinate and represent the company for any post-accident activities like compensation etc.
8. Coordinate all legal matters pertaining to the emergency.
9. Coordinate with insurance company.
10. Arrange photo/video coverage for record and information.
11. He will liaise with community leaders and the affected population to keep up the morals and their psychological needs.
12. Manage adequate quantity of medicines.
13. Coordinate welfare activities like provision of food, water and the care for the relatives of injured persons.
14. Fulfill requirements of mutual aid agencies.
15. Receive all the communication on emergencies received from other colleagues, employees and general public carefully.
16. Communicate the villagers/public for necessary evacuation procedure to be followed.
17. To arrange evacuation as directed by the CIC by following the procedure established for “Public evacuation” in case of emergency Public evacuation as described in 5.6 of this chapter and in coordination with the civil authorities like police, panchayat / municipal authorities etc.
18. Coordinate all legal matters pertaining to the emergency
19. Coordinate with insurance company.
20. Arrange photo/video coverage for record and information.
21. He will liaise with community leaders and the affected population to keep up the morals and their psychological needs.
22. Manage adequate quantity of medicines.

d) Fire & Safety Coordinator

1. Activate emergency sirens as per the practiced codes;
2. Take charge of all fire fighting and rescue operations and safety matters;
3. Ensure that key personnel are called in and to release crew of fire fighting operations as per emergency procedure;

4. Access functioning of his team and communicate with the CIC and or administrative controller for any replenishment or replacement of manpower or fire fighting equipment;
5. Direct the fire brigade personnel and mutual aid members to their desired roles as also proper positioning of the manpower and equipment;
6. Decide the requirement of mutual aid and instruct fire station, who, in turn will contact mutual aid members;
7. Coordinate with outside fire brigades for properly coordinated fire fighting operation;
8. Ensure that casualties are promptly sent to fire aid centre / hospital;
9. Arrange requirement of additional fire fighting resources including help from mutual aid partners;
10. Continually liaise with the SIC and CIC and implement the emergency combat strategies as communicated by him
11. Ensure logging of incidents and incident management team composition and their requirements and fire & safety related advises.
12. Establish contact with mutual aid agencies.

e) Support and Auxiliary Services for Major Installation

The following additional coordinators are nominated and delegated the specific responsibilities falling under the basic function of SIC/CIC.

f) Maintenance In-charge

Repair of high-pressure pipeline carrying flammable hydrocarbon involves risk, special skill and expertise. Time is a major constraint. Considerable planning of the details, mobilization of manpower tools and tackles to site and transportation and communications are essential for success.

1. He is responsible for immediate repair, and maintenance of damaged or affected equipment / area.
2. He is responsible for all materials required for controlling the situation.
3. He has to arrange for local repairs, temporary venting, positive isolation, etc. as and when required by the SIC.
4. He has to ensure proper decommissioning, de-pressurization, non-spark tools, safety precautions, breathing apparatus, fire protection clothes etc. in order to carry out maintenance and repair in a safe manner.
5. He has to organize emergency round the clock.

6. Ensure tools, tackles, pipe materials, spares, valves, gaskets, sealant, quick couplings etc. are available at site.
7. Locate local civil agencies, or other repair contractors to be made available at site.

g) Duty Manager

The duty manager is responsible for incident management support during working and non-working hours.

The duty manager shall:

1. Act as a focal point for notification of incident till the management of emergency takes place.
2. Decide whether or not to mobilize the GGL Crisis Management Team (CMT)
3. Notify the Managing Director / Occupier of any incident.
4. Initiate activation and callout of CMT
5. Initiate activation of CMP control room & prepare duty roaster for round the clock manning.

h) HSE Representative

The HSE Coordinator emergency management role is to provide professional health, safety, environmental and regulatory authority advice to the Chief Incident Controller and for implementing the emergency response actions described below:

1. Work in close association with SIC, shift in charge and maintenance in charge.
2. Render technical guidance and logistic support to fire crew.
3. He will make sure that area had been cordoned off and necessary markers have been placed, like ‘NO SMOKING’, ‘WORK IN PROGRESS’.
4. Request and obtain outside assistance from other fire stations.
5. Plan and organize the evacuation services with the help of security staff.
6. Arrange and keep necessary fire fighting appliances and suppliers like mobile water and foam tenders, foam compound, dry powders, houses, etc.
7. Arrange mock drills and periodic fire fighting exercises to keep the crew well trained.
8. Install and maintain fire detection equipment.

i) Shift in-charge

1. He will work in co-ordination with shift in-charges of other C/R like suppliers & end consumers.

2. He will work closely in co-ordination with Site Incident Controller.
3. He takes control of the situation till the SIC takes charge.
4. He acknowledges the receipt of alert/alarm signals and information.
5. He assists in containment of hydrocarbon and isolation of damaged area.
6. He arranges for pipelines surveillance team to visit affected area as fast as possible and assess the situation.
7. He will inform all the employees in the section and arrange for their evacuation if required.
8. He will organize the safe shut down as instructed by SIC.
9. Start fire fighting or fire containment or fire prevention activities till the regular fire crew takes charge. Initiate rescue operation, first aid etc. to affected persons.
10. Issue emergency operating instructions to various pipeline terminals and valve stations so that loss is contained.
11. Coordinate with maintenance and repair crew for decommissioning and isolation of area including emergency repairs.

j) Security Coordinator

The Security Coordinator reports to the Chief / Site Incident Controller and is responsible for security of the installation during any incident or emergency situation and for implementing the action below:

1. Obtaining an approved visitor list from the security department or reception for ensuring that personnel on the list are escorted to reception by security staff;
2. Maintaining security of the office in the event of an office evacuation;
3. Providing office security and assisting authorities in the vent of civil unrest or when required organizing additional security at the emergency scene;
4. Obtaining initial briefing from Chief /Site Incident Controller and providing security information and or status reports to Site Incident Controller; and
5. Assessing the emergency, identify security specific problems and recommend solutions to Chief Incident Controller.

k) Maintenance of ERDMP Records

MR (Section) maintain the ERDMP records and HOD (HSE) maintain the records of all kind of emergencies that covers near miss, Level-I, Level-II and Level-III. Organization register for the above purpose and post–disaster documentation like resources

deployed, relief, rehabilitation measure and lesson learn to avoid re-occurrence of any such emergency is maintained by HOD (HSE).

l) Recorder

The existing facility is having four base and three sub bases. The SIC (BIC)/shift in-charge (MCR) works as a recorder during the handling of emergency and parallel duty manager/in-charge of ECC will record the same.

7.1.9 Communication Services

An emergency control center (ECC) identified by GGL for coordinating the operations of the Emergency Situations.

ECC provides overall assessment, damage control, notifications and communications, and employee, public & facility protective actions during a multiple emergency.

HOD HSE is responsible to maintain to high standards of communication system and remain functional throughout the emergency. He provides quality and diverse communication systems for use in routine and emergency situations.

7.1.10 Siren Codes

Sirens rely on different types and lengths of tones to convey pre – identified messages. An alarm should do more than just warn. It should also instruct people to carry out specific assignments, such as reach an assembly point for further instructions and actions, or carry out protective measures, such as take shelter in the case of a toxic materials release. This can be achieved only if the people are familiar with the alarm system and are trained to respond to it.

As sirens can convey only very few and simple messages, public address (PA) system is advantageous as it can provide a verbal message. However, the messages should be kept simple and should clearly specify the actions to be taken.

- The Emergency siren/s is located suitably to cover the whole area with the operational control within the installation. These should be tested at least once in a week to keep them in working condition.
- Emergency siren codes are given below:
  - Emergency Level-I: A wailing siren for two minutes.
  - Emergency Level-II and III: Same type of siren as in case of Level - I and II but the same will be sounded for three times at the interval of one minutes i.e.(wailing siren 2min + gap 1 min + wailing siren 2min + gap 1 min + wailing siren 2min) total duration of Disaster siren to be eight minutes.

- ALL CLEAR: Straight run siren for two minutes.
- TEST: Straight run siren for two minutes at frequency at least once a week
- Public address system should be provided with message.

7.1.11 Declaration of onsite and offsite Emergency

a) Initial Response

- The routine maintenance crew, pipeline surveillance team, or an outsider from nearby village can notice incident. Whenever incident is noticed it must be first brought to attention of the ERP executor who in our case is Base-In-Charge.
- The information should be recorded in a particular format for further reference or analysis.
- Time and date
- Nature of incident
- Source of information
- Location of leak
- Action taken
- Injuries to people and property
- Fire incident involved or not etc.
- After receiving the information the ERDMP executor should acknowledge the incident by executing plan as described in chapter.

b) Raising Alert: Employees of Suppliers / Customers

For raising an alarm any of the following communication system may be used to contact the Main/Master control room (MCR) of GGL:

- Internal telephone (OFC network)
- External telephones (P & T) & faxes.
- Mobile Phones
- E-mail
- The following sets of instruction for raising the alert are applicable for the employees of GGL and other neighboring industries while giving the message, the person should:
- Identify himself.
- State briefly the types of emergency i.e. whether fire, explosion or any un-ignited release of Natural Gas.
- Specify the location of the incident.

- Estimate the severity of the incident and return to the area of incident (if and only if it is safe to do so) and await instructions from the control room (MCR) and / or Incident Controller.
- Check wind direction and move towards site direction in case of natural gas release.
- Conduct a preliminary check and try to identify the cause, type and location of the accident, if and only if it is safe to do so.
- Standby to render all possible assistance or act as advised/instructed by the incident controller from the Control Room (MCR).
- Attempt to extinguish the fire with the aid to a probable extinguisher if and only if you are well trained in firefighting, some more persons are available with you and without compromising your safety.
- Do not attempt any heroic effort.

c) Fact Finding Mission

Immediately on the receipt of incident report, a fact-finding team should be dispatched to the site (this is special task force trained for specific events as these) to locate and assess the situation roughly at first hand. In the meantime close watch of the operating parameters, leak detection system, trends etc. Fact-finding team must continuously send the discovered information to all the terminals and sub stations.

d) Plans for Action

For every employee a general course of action to be taken for pipeline emergency should be displayed in the emergency control center. These are only general indicatives as below:

- Operator must close relevant remotely operated isolated valve immediately after confirmation of leakage or rupture.
- Operator must inform the incident controller as soon as possible.
- Fact-finding team should be immediately sent to site.
- Further actions are to be taken by the fact-finding team.
- If leak is repairable, immediately emergency repair crew team should be send to site.
- If gas is splitting continuously out of line fire-fighting team should be sending immediately to the site.
- In case of emergency evacuation is to be announced by the authorities care should be taken that rumors are not entertained.
- Only responsibly authority should attain the press to avoid further problems.

7.1.12 On-site Disaster Management Plan

Onsite Emergency/disaster is an unpleasant event of such magnitude which may cause extensive damage to life and property due to the emergencies resulting from deficiencies in Operation, Maintenance, Design and Human error, Natural Calamities like Flood and Earthquake; and deliberate and other acts of man like Sabotage, Riot and War etc. An Onsite Disaster may occur all of a sudden or proceeded by a Major Fire. The purpose for making on-site disaster management plan should be

- To protect persons and property of pipeline associated equipments in case of all kinds of accidents, emergencies and disasters
- To inform people and surroundings about emergency if it is likely to adversely affect them
- To inform authorities including helping agencies (doctors, hospitals, fire, police transport etc.) in advance, and also at the time of actual happening
- To identify, assess, foresee and work out various kinds of possible hazards, their places, potential and damaging capacity and area in case of above happenings. Review, revise, redesign, replace or reconstruct the process, Flammable chemical pipe lines and control measures if so assessed.

During an emergency in order to handle disaster / emergency situations, an organizational chart entrusting responsibility to various personnel showing their specific roles during emergency should be available.

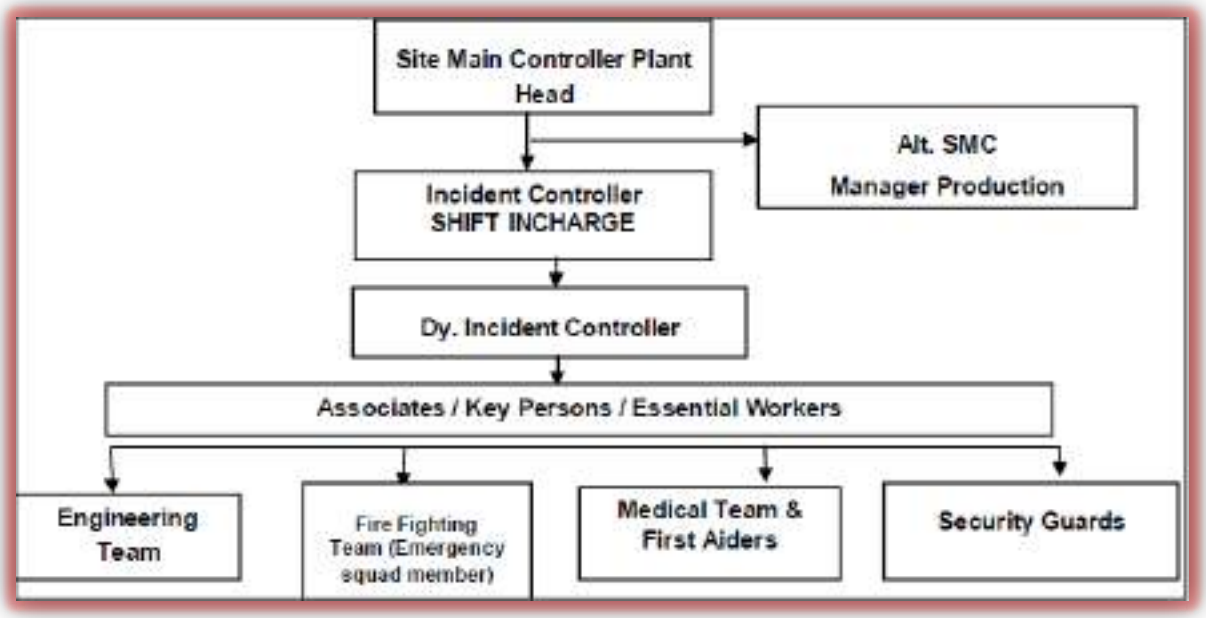


Figure 7.3 On site Emergency Plan

Before Crisis

- Prepare a plan for the terminal, dispatch terminal SV stations premises and surroundings showing therein the areas of various hazards like fire, explosion, and location of assembly points, fire station or equipments room, telephone room, emergency control rooms and nearby hospitals along the pipeline route.
- The fire protection equipment shall be kept in good operating condition at all the time and fire fighting system should be periodically tested for people functioning logged for record and corrective action.
- The fire fighting training shall be provided to all officers and operators
- There should be regular mock fire drills and record of such drills shall be maintained
- Assign key personnel and alternate responsible for the pipeline safety
- Describe risk associated with each operation conducted.

During Crisis

- Evacuate the space near to pipeline and terminal, dispatch terminal SV stations.
- Perform no other duties that may interfere with their primary responsibilities
- Notify the operator if they experience any warning signs or symptoms of exposures or detect a dangerous condition
- Reporting Procedure

In the event of fire from accidental release of flammable gas or liquid, a person seeing the incident will follow the laid down procedure and report as follows:

- Will dial the nearest telephone
- Will state his name and exact location of emergency
- Will contact affected officers on duty
- People reporting the accident will remain near the location to guide emergency crew arriving at the scene

In case fire emergency person should activate the nearest available push button type instrument which will automatically sound an alarm in fire control room indicating the location of fire.

After Crisis

- Report injuries or blood or body fluid exposures to the appropriate supervisor immediately
- Assembly points:

- Assembly points shall be set up farthest from the location of likely hazardous events, where pre-designed persons from the works, contractors and visitors would assemble in case of emergency. Up-to-date list of pre-designed employees shift wise must be available at these points so that roll call could be taken. Pre-designated persons would take charge of these points and mark presence as the people come into it

- Wash wounds and skin sites that have been affected with soap & water
- Workers should be seen as soon as possible by a health professional
- Provide information to the relevant public authority and community including other closely located facilities regarding the nature of hazard and emergency procedure in event of major accident
- Record and discuss the lessons learned and the analysis of major accidents and misses with employees and employee representative

Evacuation

- Planning and training on evacuation techniques are important in preventing injuries. Evacuation of local communities or people near the site may be prudent depending on the situation and downwind dispersion information etc. Although this action will normally be initiated and handled by district authorities, the affected installation shall help to implement such evacuation.
- This evacuation plan shall also consider:
    1. Basis for recommending onsite or offsite actions
    2. Authorize person for area or site evacuation
    3. Mode of communication
    4. Training in locating exits from buildings, areas and the site
    5. Location of escape equipment
    6. Provisions for flashlights or other supplemental lighting
    7. Which areas can function as safe area
    8. Moving crosswind from fume releases, etc.

9. Provision of food and drinking water at assembly point and transfer point.

- If evacuation takes place after initial head counts are reported, means for recounting may be necessary. Where it is safe to do so, areas being evacuated should be thoroughly searched to ensure everyone has departed safely. Portable mobile vehicle for announcement should be available in the emergency.

Information to Public

- The safety measures to be taken in the event of an emergency shall be made known to the general public who are likely to be affected
- For the purpose, use of Dos' and Don'ts' shall be prepared and furnished to the Crisis management Group. Display boards carrying do's and don'ts should be located outside the pipeline system.

7.1.13 Off-site Disaster Management Plan

Emergency is a sudden unexpected event, which can cause serious damage to personnel life, property and environment as a whole, which necessitate evolving off-site emergency plan to combat any such eventuality. In offsite disaster management plan, many agencies like Revenue, Public Health, Fire Services, Police, Civil Defence, Home Guards, Medical Services and other Voluntary organizations are involved. Thus handling of such emergencies requires an organized multidisciplinary approach.

If it becomes necessary to evacuate people, then this can be done in orderly way. The different agencies involved in evacuation of people are civil administration (both state and central), non Govt. organizations, factory Inspectorate and police authorities.

Purpose:

- To save lives and injuries and to prevent or reduce property losses
- To provide necessary assistance for quick resumption of normal situation or operation
- To make explicit inter related set of actions to be undertaken in the event of an accident posing hazards to the community
- To plan for rescue and recuperation of casualties and injuries. To plan for relief and rehabilitation
- To plan for prevention of harms, total loss and recurrence of disaster. It will be ensured that absolute safety and security is achieved within the shortest time

Following are the activities of the government, Non-Government organizations and concerned personnel involved in off-site disaster management plan.

- This will include the safety procedure to be followed during an emergency through posters, talks and mass media in different languages including local language. Leaflets containing do's/ don'ts should be circulated to educate the people in vicinity
- People in vicinity of hazardous installation, and others who are potentially affected in the event of an accident, should be aware of the risks of accidents, know where to obtain information concerning the installation, and understand what to do in the event of an accident
- Non-Governmental Organizations (NGO's) (Such as environmental, humanitarian and consumer group) should motivate their constituents and others, to be involved in risk reduction and accident prevention efforts. They should help to identify specific concerns and priorities regarding risk reduction and prevention, preparedness and response activities. NGO should provide humanitarian, psychological and social assistance to members of community and response personnel
- Public authorities (at all levels) and management of hazardous installation should established emergency planning activities/ program's for accidents involving the hazardous substance
- As the off-site plan is to be prepared by the Government, a central control committee should be formed under the chairmanship of area head. Other officers from police, fire, factory, medical, engineering, social welfare, publicity, railway, transport and requisite departments shall be incorporated as members. Some experts will also be included for guidance
- Medical Help, Ambulance and Hospital Committee consisted of doctors and supporting staff for medical help to the injured persons because of disaster should be formed. Functions and duties of the committee include, to provide first Said treatment for injured at the spot or at some convenient place and shift them to nearby hospitals for further treatment if required.
- Traffic Control, Law and Order committee is headed by District Superintendent of Police. Functions and duties of this committee are to control traffic towards and near disaster, to maintain law and order, to evacuate the places badly affected or likely to be affected, to shift the evacuated people to safe assembly points and to maintain wireless sets and instruments for quick communications. The police should assist in controlling of the accident site, organizing evacuation and shifting injured people to nearby hospitals

- The fire brigade shall organize to put out fires other than gas fires and provide assistance as required. Approach roads to accident site and means of escape should be properly identified. Chief fire officer should co-ordinate entire fire control measures. Routine training of fire fighting equipments and special rescue equipments should be carried out. Concerned officer should ensure adequate supply of fire water and fire fighting agents at the site of emergency. Maintenance of standby equipment / personnel for fire fighting should be ready at any given time.
- The media should have ready and continuous access to designated officials with relevant information, as well as to other sources in order to provide essential and accurate information to public throughout the emergency and to help avoid confusion. Members of the media should facilitate response efforts by providing means for informing the public with credible information about accidents involving hazardous substances

Before Crisis:

- This will include the safety procedure to be followed during an emergency through posters, talks and mass media in different languages including local language. Leaflets containing dos/ don'ts before and during emergency should be circulated to educate the people in vicinity.
- People in vicinity of hazardous installation, and others who are potentially affected in the event of an accident, should be aware of the risks of accidents, know where to obtain information concerning the installation, and understand what to do in the event of an accident
- Non-governmental Organizations (NGO's) (Such as environmental, humanitarian and consumer group) should motivate their constituents and others, to be involved in risk reduction and accident prevention efforts. They should help to identify specific concerns and priorities regarding risk reduction and prevention, preparedness and response activities
- NGO's should facilitate efforts to inform the public and should provide technical assistance to help the public analyze and understand information that is made available
- Public authorities (at all levels) and management of hazardous installation should established emergency planning activities/ program's for accidents involving the hazardous substance

- All parties who will be involved in emergency planning process. In this respect public health authorities, including experts from information centres should be involved in relevant aspects of offsite emergency planning
- Emergency warning alert system should be in place to warn the potentially affected public, or there is an imminent threat of an accident
- The system chosen should be effective and provide timely warning. Suitable warning system could include or a combination of for e.g.: sirens, automatic telephone message, and mobile public address system

During Crisis:

a) Central Control Committee:

- As the off-site plan is to be prepared by the government a central control committee shall be formed under the chairmanship of area head. Other officers from police, fire, factory, medical, engineering, social welfare, publicity, railway, transport and requisite departments shall be incorporated as members. Some experts will also be included for guidance. The functions of committee should be:
- To work as main co-coordinating body constituted of necessary district heads and other authorities with overall command, coordination, guidance, supervision, policy and doing all necessary things to control disaster in shortest times
- To prepare, review, alter or cancel this plan and to keep it a complete document with all details
- To take advice and assistance from experts in fields to make plan more successful
- To set in motion all machineries to this plan in event of disaster causing or likely to cause severe damage to public, property or environment
- The incident control committee, traffic control committee and press publicity committee will first be informed, as they are needed first
- Medical Help, Ambulance and Hospital Committee: This committee consisted of doctors for medical help to the injured persons because of disaster. Injuries may be of many types. As such doctors are rarely available we have to mobilize and utilize all available doctors in the area. Functions and duties of the committee include:
- To give medical help to all injured as early as possible
- Civil surgeon is the secretary who will organize his team

- On receiving information to rush to spot he will immediately inform his team and will proceed with all necessary equipments
- First aid and possible treatment shall be provided at the spot or at some convenient place and patients may be requested to shift to hospitals for further treatment
- All efforts shall be made on war basis to save maximum lives and to treat maximum injuries
- Continuity of the treatment shall be maintained till the disaster is controlled

b) Traffic Control, Law and Order:

- The committee is headed by District Superintendent of Police. Functions and duties of this committee should be:
- To control traffic towards and near disaster , to maintain law and order
- To evacuate the places badly affected or likely to be affected
- To shift the evacuated people to safe assembly points
- To rehabilitate them after disaster is over.
- Necessary vehicles, wireless sets and instruments for quick communications shall be maintained and used as per need

After Crisis:

- At the time of disaster, many people may badly be affected. Injured people shall be treated by medical help, ambulance and hospital committee, but those not injured but displaced kept at assembly points, whose relative or property is lost, houses collapsed and in need of any kind of help shall be treated by this welfare and restoration committee. Functions and duties of this committee are:
- To find out persons in need of human help owing to disastrous effect. They may give first aid if medical team is not available
- They will serve the evacuated people kept at assembly points. They will arrange for their food, water, shelter, clothing, sanitation, and guidelines to reach any needful places
- They will look for removal and disposal of dead bodies, for help of sick, weak, children and needy persons for their essential requirements
- The team will also work for restoration of detached people, lost articles, essential commodities etc.

- The team will also look after the restoration of government articles
- The team will also ensure that the original activities, services and systems are resumed again as they were functioning before the disaster

a) Police Department

- The police should assist in controlling of the accident site, organizing evacuation and removing of any seriously injured people to hospitals.
- Co-ordination with the transport authorities, civil defence and home guards
- Co-ordination with army, navy, air force and state fire services
- Arrange for post mortem of dead bodies
- Establish communication centre

b) Fire Brigade

- The fire brigade shall organize to put out fires and provide assistance as required.

c) Hospitals and Doctors

- Hospitals and doctors must be ready to treat any injuries.
- Co-ordinate the activities of Primary Health Centres and Municipal Dispensaries to ensure required quantities of drugs and equipments
- Securing assistance of medical and paramedical personnel from nearby hospitals/institutions
- Temporary mortuary and identification of dead bodies

d) Media

- The media should have ready and continuous access to designated officials with relevant information, as well as to other sources in order to provide essential and accurate information to public throughout the emergency and to help avoid confusion
- Efforts should be made to check the clarity and reliability of information as it becomes available, and before it is communicated to public
- Public health authorities should be consulted when issuing statements to the media concerning health aspects of chemical accidents
- Members of the media should facilitate response efforts by providing means for informing the public with credible information about accidents involving hazardous substances

e) Non-governmental organizations (NGO)

- NGO's could provide a valuable source of expertise and information to support emergency response efforts. Members of NGOs could assist response personnel by performing specified tasks, as planned during the emergency planning process. Such tasks could include providing humanitarian, psychological & social assistance to members of community and response personnel.
- Duties of NGO are listed below:
- Evacuation of personnel from the affected area
- Arrangements at rallying posts and parking yards
- Rehabilitation of evacuated persons
- Co-ordination with other agencies such as police, medical, animal husbandry, agriculture, electricity board, fire services, home guards and civil defence.
- Establishing shelters for rescue, medical, fire fighting personnel

f) District Administration

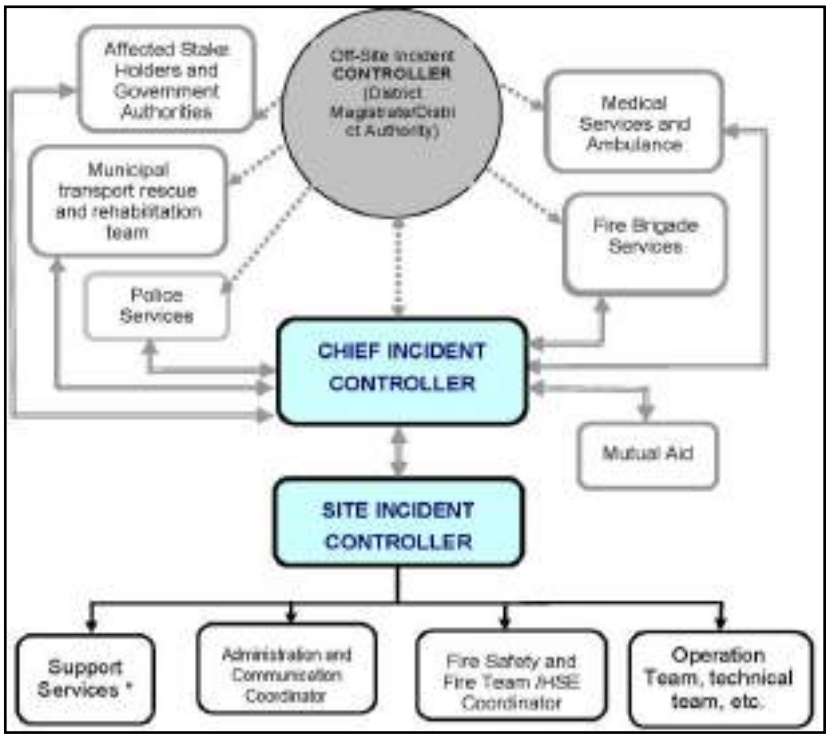


Figure 7.4 Various Organizations involved during Emergencies

On receipt of information, District Administration may take the following actions as per Schedule-V derived from the National Disaster Management Guidelines Chemical Disasters (Industrial), April, 2007. However, on receipt of information, following actions should be taken care.

- To keep watch on the overall situation

- Rush ambulance to the incident site if casualties are reported
- Direct cranes or any other such equipment to carry out rescue operations
- Issue warning messages to people through public address system, if any evacuation is required.
- Arrange emergency vehicles for evacuation purposes
- Give direction to hospitals having burns injury ward for readiness to receive patient in case of incident involving fire
- Provide basic amenities, e.g., water, electricity, food and shelter to the affected people as required

In addition to the above, the **Schedule-V** shall be followed

Schedule – V

The important Roles and Responsibilities of Various Stakeholders

- The district authority is responsible for the Off-Site emergency plan and it shall be equipped with up-to-date Major Accident Hazard units, website, control room etc., with provisions for monitoring the level of preparedness at all times. Regular meetings of various stakeholders of Chemical Disaster Management will be conducted by district administration/District Disaster Management Authority to review the preparedness of Chemical Disaster Management.
- The police will be an important component of all disaster management plans as they will be associated with investigation of incidents/disasters. Police take overall charge of the Off-Site situation until the arrival of the district collector or its representative at the scene.
- The fire services are one of the first responders and shall be adequately trained and equipped to handle chemical emergencies. Fire services are to acquire a thorough knowledge of likely hazards at the incident site and the emergency control measures required to contain it.
- In a chemical emergency, the revenue department shall coordinate with other agencies for evacuation, establishment of shelters and provision of food, etc.
- When required for evacuation purposes in a chemical emergency, the
- Department of transport should made transport promptly available.
- The role of civil society and private sector in the Off-Site plan shall be defined.

- The health department needs to assure that all victims get immediate medical attention on the site as well as at the hospitals/health-care facility where they are shifted. In addition, the department needs to network all the health-care facilities available in the vicinity for effective management and also take effective measures to prevent the occurrence of any epidemic.
- Pollution control boards need to ascertain the developing severity of the emergency in accordance with responsive measures by constant monitoring of the environment. If and when an area is fit for entry will depend upon the results of the monitoring. A decontamination operation would be required to be carried out with the help of other agencies and industries.

7.1.14 Emergency Preparedness Plan and Response for Pipeline

- GGL should continue to share its experience with respect to the use of safety management systems for pipelines, and improve the efficiency of individual elements / techniques of these systems
- General principles applicable to emergency planning for hazardous installations also apply to pipelines, it may be necessary to make further efforts
- Emergency planning for pipelines may be complicated because of some of their characteristics including the fact that pipelines are normally unmanned; the length and location of pipelines; the need to be able to shut off or depressurized the flow of material, and the need to ensure access by emergency response personnel
- Pipeline location will be clearly marked at fence lines and road crossings to minimize risk of third party damage
- GGL should review, develop and implement systems to reduce third party interference as this is a major cause of accident
- This should be done in co-operation with public authorities in all regions
- Systems for reducing third party interference involve ensuring that proper information is circulated among interested parties concerning the location of pipeline in a given area. In, addition it is important to facilitate communication between the pipeline operator and third parties
- Options for dealing with pipeline that are no longer in use include removal, outright abandonment, or abandonment with additional actions. Care should be taken to properly assess the associated risks to each option, on a case-by-case basis

recognizing that the best solution in a given situation may be a combination of methods

- Information should be collected and made available concerning the relationship between failure and the characteristic of the pipeline in order to better understand the nature and causes of accidents (e.g., relating to age, size, location, and construction of the pipeline)
- Public education is often an integral part of damage prevention program. Pipeline route maps could be supplied and informal training given to groups to alert them. The quality of the public education program can assessed by evaluating components
- An appropriate level of public education is to be mail outs, advertisements, and speaking engagements for urban areas, and mail outs with annual landowner / tenant visits for rural areas. The program generates these standards by simply identifying the population density value and assigning points accordingly.

7.1.15 Training

On job training to the engineers on various facets of risk analysis would go a long way in improving their horizon which in turn is expected to reflect in the operation of plant, especially from the safety stand point. In order to combat with emergency situations arising out of accident release of hazardous chemicals, it is necessary for industries to prepare an exhaustive offsite and onsite emergency preparedness plan. The fire crew belonging to the fire fighting department shall be given intensive training for the use of all equipment and in various fire fighting methods for handling different types of fires.

Training inclues various safety awareness programmes as under:

1. Safety awareness Program for Gram Panchayat

   During safety awareness programme conducted by Gujarat Gas limited in Gram Panchayats following very important safety aspects were discussed along with local people i.e.

   ✓ Hazardous property of Natural Gas

   ✓ Emergency contact details of Gujarat Gas

   ✓ Operation instructions of isolation valves

   ✓ Do’s and Don’ts in case of gas leakage

- ✓ No storage of any flammable material surrounding the Industrial Metering Skid

- ✓ In case of any fire in premises, immediate isolate the Gas supply by closing of main
- ✓ Isolation valve and inform Gujarat Gas
- ✓ Before carrying out any excavation within premises near gas pipeline, inform Gujarat Gas
- ✓ Safety instructions like no smoking; no mobile phone shall be followed strictly.

2. Safety Awareness Program at Schools

During safety awareness programme conducted by Gujarat Gas limited in schools following very important safety aspects were discussed

- ✓ Introduction of Gujarat Gas Ltd.
- ✓ Properties of Natural gas
- ✓ Different scenarios of gas leakage regarding emergency at our home
- ✓ Safety precaution that need to be followed for safe use of PNG
- ✓ DO's and DON'T while using PNG
- ✓ Sharing of Emergency number and also made them familiar about our emergency response team and its functions

3. Safety awareness Program for Commercial customer

Safety awareness programme also conducted for commercial customer with all necessary safety aspect and emergency preparedness and actions in worse case scenario.

7.2 Risk Assessment

7.2.1 Objective of the Study

Quantitative Risk Assessment (QRA) study for M/s. GGL has been carried out based on data provided by **M/s. GGL.**

The main objective of risk assessment -Quantitative Risk Assessment (QRA) is to identify and determine the potential damage or loss of life, property and environment and to provide a scientific argument for decision makers to provide and maintain the safety levels of the facilities to prevent or mitigate harm and loses. This is achieved by the following:

- Identification of hazards that could be realized from manufacturing processes, plant equipment and machinery, raw materials and products.
- Identify the potential failure scenarios that could occur within the facility.
- To Asses, the potential risks associated with identified hazards to which the plant and its personal and community outside may be subjected. Consequences analysis of various hazards is carried out to determine the vulnerable zones for each probable accident scenario.
- Evaluate the process hazards emanating from the identified potential accident scenarios.
- Analyze the damage effects to the surroundings due to such accidents.
- Conclusion and Recommendation to mitigate measures to reduce the hazard / risks.
- To provide guidelines for the preparation of On-site response plan.

7.2.2 Scope of the Study

The Project will undertake Quantitative Risk Assessment (QRA) study for the Pipeline:

- Pipeline network in Union Territory of Dadara & Nagar Haveli

7.2.3 QRA study will include the following task:

- Hazard Identification
- Failure Scenario
- Consequence Analysis
- Dispersion Modelling
- Risk Assessment
- Evaluation of risk reduction options and risk management plan

7.2.4 Methodology Adopted for Quantitative Risk Assessment

(QRA) Failure or ineffectiveness of the controls can lead to hazardous situation in any industry handling potentially hazardous materials. Following factors govern the severity of consequence of the loss of containment.

- ✓ Intrinsic properties, flammability, instability and toxicity.

- ✓ Dispersive energy, pressure, temperature and state of matter.
- ✓ Quantity present.
- ✓ Environmental factors; topography and weather.
- ✓ Awareness, Training and Communication

The study has been carried out in accordance with the National and International codes of practices using Process Hazard Analysis Software Tool (PHAST) software. The latest version of the renowned PHAST software package of DNV is used for carrying out the risk analysis.

The full terms of potential hazardous scenarios and consequence events associated with the installation and operation was considered in the analysis.

Based on the operations to be carried at the plant, the Risk Analysis conducted to identify the affected distances and the damage of property and population from the identified scenarios considering the Maximum Credible Loss Scenario (MCLS) & Worst case scenario.

Maximum credible loss scenarios have been worked based on the inbuilt safety systems and protection measures to be provided for the operation of the facility & the Worst case scenario i.e. 100% catastrophic rupture have been worked out based on failure of the inbuilt safety system.

The Worst case Scenario assumed as catastrophic rupture, as per the guidelines suggested by DNV – UK, and maximum inventory at the time of failure.

Consequence analysis and calculations are effectively performed by computer software using models validated over a number of applications. Consequence modelling is carried out by PHAST of DNV Software, UK.

PHAST uses the Unified Dispersion Model (UDM) capable of describing a wide range of types of accidental releases. The Model uses a particularly flexible form, allowing for sharp-edged profiles, which become more diffuse downwind.

PHAST contains data for a large number of chemicals and allows definition of mixtures of any of these chemicals in the required proportion. The calculations by PHAST involve following steps for each Modeled failure cases:

- Run discharge calculations based on physical conditions and leak size.
- Model first stage of release (for each weather category).Determine vapor release rate by flashing of liquid and pool evaporation rate.
- Dispersion modeling taking into account weather conditions.
- In case of flammable release, calculate size of effect zone for fire and explosion.
- The hazardous materials considered in this study are mostly flammable liquids.

Software Used

PHAST has been used for consequence analysis include discharge and dispersion calculations.

Other Factors Considered for Risk Assessment

Metrological Condition

The consequences of released toxic or flammable material are largely dependent on the prevailing weather conditions. For the assessment of major scenarios involving release of toxic or flammable materials, the most important meteorological parameters which affect the atmospheric dispersion of the escaping material include crucial variables such as wind direction, wind speed, atmospheric stability and temperature. Rainfall does not have any direct bearing on the results of the risk analysis; however, it can have beneficial effects by absorption / washout of released materials. Actual behaviour of any release would largely depend on prevailing weather condition at the time of release.

Atmospheric Parameters

The wind speed and wind direction data which have been used for the study is summarized below:

Wind Speed : 1.5&5 m/s

Atmospheric Stability : D and F

Weather Category

One of the most important characteristics of atmosphere is its stability. Stability of atmosphere is its tendency to resist vertical motion or to suppress existing turbulence. This tendency directly influences the ability of atmosphere to disperse pollutants emitted into it from the facilities. In most dispersion scenarios, the relevant atmospheric layer is that

nearest to the ground, varying in thickness from a few meters to a few thousand meters. Turbulence induced by buoyancy forces in the atmosphere is closely related to the vertical temperature gradient.

Temperature normally decreases with increasing height in the atmosphere. The rate at which the temperature of air decreases with height is called Environmental Lapse Rate (ELR). It will vary from time to time and from place to place. The atmosphere is said to be stable, neutral or unstable according to ELR is less than, equal to or greater than Dry Adiabatic Lapse Rate (DALR), which is a constant value of 0.98°C/100 meters.

Pasquill stability parameter, based on Pasquill – Gifford categorization, a meteorological parameter, describes the stability of atmosphere, i.e., the degree of convective turbulence.

Pasquill has defined six stability classes ranging from `A' (extremely unstable) to `F' (moderately stable). Wind speeds, intensity of solar radiation (daytime insulation) and nighttime sky cover have been identified as prime factors defining these stability categories.

When the atmosphere is unstable and wind speeds are moderate or high or gusty, rapid dispersion of pollutants will occur. Under these conditions, pollutant concentrations in air will be moderate or low and the material will be dispersed rapidly.

When the atmosphere is stable and wind speed is low, dispersion of material will be limited and pollutant concentration in air will be high. In general, worst dispersion conditions (i.e. contributing to greater hazard distances) occur during low wind speed and very stable weather conditions.

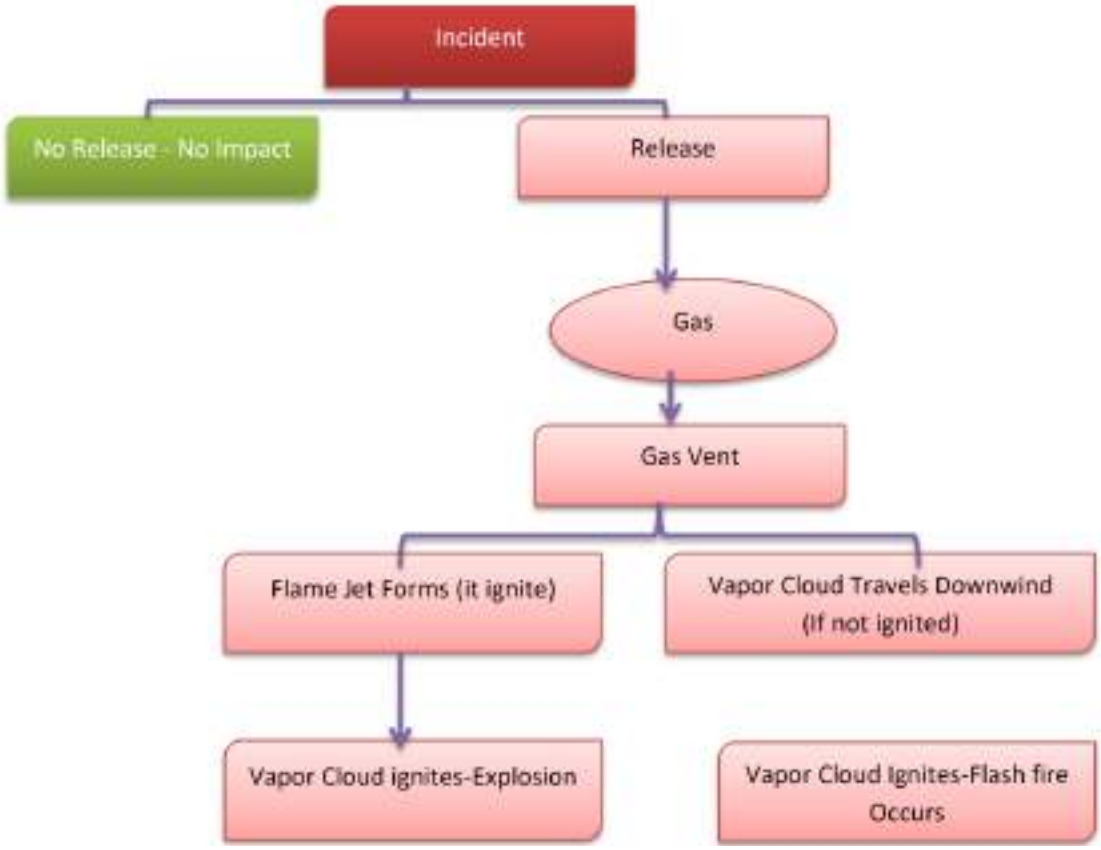


Figure 7.5 Consequence analysis; Event Tree Analysis for release of flammable liquid.

7.2.5 Hazards & Damage Criteria of Materials

A. Definitions

Hazards associated with Flammable chemicals

The release of flammable gas or liquid can lead to different types of fire or explosion scenarios and will depend on the material released, mechanism of release, temperature and pressure of the material and the point of ignition. Types of flammable effects are as follows.

Fire Ball:

The A fireball is a rapidly expanding, spherical mass of flame caused by the ignition of a flammable gas or vapor cloud. It occurs when a large quantity of combustible material is released and ignited in an open space, producing intense heat and radiation. Fireballs are typically associated with BLEVE (Boiling Liquid Expanding Vapor Explosion) incidents or fuel-rich explosions. Their impact is primarily thermal, causing severe burns, secondary fires, and structural damage within a short duration (usually a few seconds).

Flash fire:

It occurs when a vapor cloud of flammable material burns. The cloud is typically ignited on the edge and burns towards the release point. The duration of flash fire is very short (seconds), but it may continue as jet fire if the release continues. The overpressures generated by the combustion are not considered significant in terms of damage potential to persons, equipment or structures. The major hazard from flash fire is direct flame impingement. Typically, the burn zone is defined as the area the vapor cloud covers out to half of the LFL. This definition provides a conservative estimate, allowing for fluctuations in modeling. Even where the concentration may be above the UFL, turbulent induced combustion mixes the material with air and results in flash fire.

Jet Fire:

Jet flames are characterized as high-pressure release of gas from limited openings (e.g. due to small leak in a vessel or broken drain valve). Boiling liquid expanding vapor explosion (BLEVE) or fireball: A fireball is an intense spherical fire resulting from a sudden release of pressurized liquid or gas that is immediately ignited. The best known cause of a fireball is a boiling liquid expanding vapor explosion (BLEVE). Fireball duration is typically 5 – 20 seconds.

Vapor cloud explosion:

When a large quantity of flammable vapor or gas is released, mixes with air to produce sufficient mass in the flammable range and is ignited, results a vapor cloud explosion (VCE). Without sufficient air mixing, a diffusion-controlled fireball may result without significant overpressures developing. The speed of flame propagation must accelerate as the vapor cloud burns. Without this acceleration, only a flash fire will result.

7.2.6 Hazards Associated with Explosives chemicals

Damage Criteria

Damage due to thermal radiations and overpressure have been arrived at by taking in to consideration the published literature on the subject. The consequences are then visualized by the superimposing the damage effects zones on the proposed plan site and identifying the elements within the project site as well as in the neighbouring environment, which might be adversely affected, should one or more hazards materialize.

Thermal Damage

The effect of thermal radiation on people is mainly a function of intensity of radiation and exposure time. The effect is expressed in terms of the probability of death and different degrees of burn. The following tables give the effect of various levels of heat flux.

FATAL RADIATION EXPOSURE LEVELS

Table 7.1 Fatal radiation Exposure level

RADIATION LEVEL kW/m^2	FATALITY		
	1%	**50%**	**99%**
	EXPOSURE IN SECONDS		
4.0	150	370	930
12.5	30	80	200
37.5	8	20	50

7.2.7 Overpressure Damage

Table 7.2 Overpressure Damage Criteria

OVER PRESSURE (mbar)	MECHANICAL DAMAGE TO EQUIPMENTS	DAMAGE TO PEOPLE
300	Heavy damage to plant & structure	1% death from lung damage >50% eardrum damage >50% serious wounds from flying objects
100	Repairable damage	>1% eardrum damage >1% serious wounds from flying objects
30	Major glass damage	Slight injury from flying glass
10	10% glass damage	***

7.2.8 Fire and Explosion Index (FEI):

Fire and Explosion Index (FEI) is useful in identification of areas in which the potential risk reaches a certain level. It estimates the global risk associated with a process unit and classifies the units according to their general level of risk. FEI covers aspects related to the intrinsic hazard of materials, the quantities handled and operating conditions. This factor gives index value for the area which could be affected by an accident, the damage to property within the area and the working days lost due to accidents. The method for evaluation of FEI involves following stages.

Selection of pertinent process unit which can have serious impact on plant safety

Determination of Material Factor (MF): This factor for a given substance in the process unit gives intrinsic potential to release energy in case of fire or an explosion. Material Factor can be directly obtained from Dow's Fire and Explosion Index Hazard classification Guide of American Institute of Chemical Engineers, New York. The factor can also be evaluated from NFPA indices of danger, health, flammability and reactivity.

Determination of Unit Hazard Factor: The Unit Hazard Factor is obtained by multiplication of General Process Hazard (GPH) factor and Special Process Hazard (SPH) factor. GPH factor is computed according to presence of exothermic reactions and loading and unloading operations. The penalties due to each of these reactions / operations are summed up to compute GPH factor. Similarly, SPH factor can be evaluated for the operations close to flammable range or pressures different from atmospheric. Penalties of these operations for both factors can be obtained from Dow's EFI index form.

Fire and explosion index is then calculated as the product of Material Factor (MF) and Unit Hazard Factor. Degree of hazards based on FEI is given in Table.

Table 7.3 Degree of Hazards Based on FEI

FEI Range	Degree of Hazard
0 – 60	Light
61 – 96	Moderate
97 – 127	Intermediate
128 – 158	Heavy
159 – Severe	Severe

Preventive and protective control measures are recommended based on degree of hazard. Therefore, FEI indicates the efforts to be taken to reduce risks for a particular unit. FEI computed for various proposed Pipe Pipelines are given following Table.

Table 7.4 Fire and Explosion Index

Sr. No.	Pipeline	FEI	Nature of Hazard
1	Dapada to Khanvel	92.46	Moderate
2	Khanvel to Kherdi		
3	Surangi to Kherdi		

7.2.9 Consequence Analysis

❖ **Introduction**

- The consequence analysis is carried out to determine the extent of spread (dispersion) by accidental release which may lead to jet fire, pool fire, tank fire resulting into generating heat radiation, overpressures, explosions etc.

- In order to form an opinion on potentially serious hazardous situations and their consequences, consequence analysis of potential failure scenarios is conducted. It is qualitative analysis of hazards due to various failure scenarios. In consequence analysis, each failure case is considered in isolation and damage effects predicted, without taking into the account of the secondary events or failures it may cause, leading to a major disastrous situation. The results of consequence analysis are useful in developing disaster management plan and in developing a sense of awareness among operating and maintenance personnel. It also gives the operating personnel and population living in its vicinity, an understanding of the hazard they are posed to.

❖ **Selected Failure Cases**

- Earlier, it was the practice to select a particular item in a unit as failure scenario, e.g. line rupture of pipeline. Such selection is normally subjective on following parameters:
  - Properties of material namely Toxic or Flammable.
  - The likely severity of consequence in the event of accidental release based on inventory, operated pressure & operated temperature.
  - The probability of failure of various equipments such as valves, flanges, pipe, pressure vessels etc.

- **Size of Release**: For accidental releases identified for consequence analysis is 50mm leakage. The scenarios are considered to be confined to those equipment failures which involve the leakage of flammable or toxic products, of which the frequency of occurrence and the severity of the consequences have been taken into consideration and which may have a low probability of early detection.

- Taking this factor into consideration, a list of selected failure cases was prepared based on process knowledge, inventory, engineering judgment, and experience, past incidents associated with such facilities and considering the general mechanisms for loss of containment. Cases have been identified for the consequence analysis.

❖ **Effect of Release**

- When hazardous material is released to atmosphere due to any reason, a vapor cloud is formed. Direct cloud formation occurs when a gaseous or flashing liquid escapes to the atmosphere.
  - Dispersion of hydrocarbon vapor with wind till it reaches its lower flammability limit (LFL) or finds a source of ignition before reaching LFL, which will result in a flash fire or explosion.
  - Spillage of liquid hydrocarbons will result in a pool of liquid, which will evaporate taking heat from the surface, forming a flammable atmosphere above it. Ignition of this pool will result in pool fire causing thermal radiation hazards.
  - A fireball or BLEVE (Boiling Liquid expanding Vapor Explosion) occurs when a vessel containing a highly volatile liquid (e.g. LPG, Propylene etc.) fails and the released large mass of vapor cloud gets ignited immediately. It has damage potential due to high intensity of radiation and generation of the overpressure waves, causing large scale damage to nearby equipment and structures.
  - Line Rupture failure of pipeline, spur line, flanges and valves etc. can result in equipment fragments flying and hitting other equipment of the plant.
  - Release of toxic compounds results in the toxic vapour cloud traveling over long distances, affecting a large area, before it gets sufficiently diluted to harmless concentration in the atmosphere.
  - The material is in two phases inside the containment - liquid & vapor. Depending on the location of the leak liquid or vapor will be released from the containment. If vapor is released a vapor cloud will form by the mixing of the vapor and air. The size of the vapor cloud will depend on the rate of release, wind speed; wind direction & atmospheric stability will determine the dispersion and movement of the vapor cloud.
  - If liquid is released there will be some flashing as the boiling point of liquid is below the ambient temperature. The vapor formed by immediate flashing will behave as vapor release. The liquid will fall on the ground forming a pool. There will be vaporization from the pool due to the heat gained from the atmosphere & ground.
  - There will be dispersion and movement of vapor cloud formed by evaporation of liquid.
- The behaviour of material released by loss of containment depends on the following factors:
  - Physical properties of the material
  - Conditions of material in containment (pressure and temperature)
  - Phase of material released (liquid or gas)
  - Inventory of material released
  - Weather parameters (temperature, humidity, wind speed, atmospheric stability)

- Material with boiling point below ambient condition.

7.2.10 Hazards Associated with Toxic Materials

It is necessary to specify suitable concentration of the toxic substance under study to form the end-point for consequence calculations. American Industrial Hygiene Association (AIHA) has issued Emergency Response Planning Guidelines (ERPG) for many chemicals, describes the various scenarios:

- **ERPG-1** is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined, objectionable odour.
- **ERPG-2** is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms, which could impair an individual's ability to take protective action.
- **ERPG-3** is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.

Toxic limit values as TLV (Threshold Limit Value), STEL (Short Term Exposure Limit), Immediately Dangerous to Life or Health (IDLH) concentrations are issued by US National Institute for Occupational Safety and Health (NIOSH).

- **TLV:** Threshold Limit Value – is the permitted level of exposure for a given period on a weighted average basis (usually 8 hrs.for 5 days in a week).
- **STEL:** A Short Term Exposure Limit (STEL) is defined by ACGIH as the concentration to which workers can be exposed continuously for a short period of time without suffering from:
    - Irritation
    - Chronic or irreversible tissue damage
    - Narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue or materially reduce work efficiency.

The permitted Short Time Exposure Limit usually have maximum exposure for 15-minute.

IDLH: IDLH is an acronym for Immediately Dangerous to Life or Health. This refers to a concentration, formally specified by a regulatory value, and defined as the maximum exposure concentration of a given chemical in the workplace from which one could escape

within 30 minutes without any escape-impairing symptoms or any irreversible health effects. This value is normally referred to in respirator selection.

7.2.11 Consequence Analysis

A. Introduction

The consequence analysis is carried out to determine the extent of spread (dispersion) by accidental release which may lead to jet fire, tank fire resulting into generating heat radiation, overpressures, explosions etc.

In order to form an opinion on potentially serious hazardous situations and their consequences, consequence analysis of potential failure scenarios is conducted. It is qualitative analysis of hazards due to various failure scenarios. In consequence analysis, each failure case is considered in isolation and damage effects predicted, without taking into the account of the secondary events or failures it may cause, leading to a major disastrous situation. The results of consequence analysis are useful in developing disaster management plan and in developing a sense of awareness among operating and maintenance personnel. It also gives the operating personnel and population living in its vicinity, an understanding of the hazard they are posed to.

B. Selected Failure Cases

Earlier, it was the practice to select a particular item in a unit as failure scenario, e.g. rupture of reactor outlet pipe. Such selection is normally subjective on following parameters:

- Properties of material namely Toxic or Flammable.
- The likely severity of consequence in the event of accidental release based on inventory, operated pressure & operated temperature.
- The probability of failure of various equipments such as valves, flanges, pipe, pressure vessels etc. used in the plant.

Size of Release: For accidental releases identified for consequence analysis is 50mm leakage. The scenarios are considered to be confined to those equipment failures which involve the leakage of flammable or toxic products, of which the frequency of occurrence and the severity of the consequences have been taken into consideration and which may have a low probability of early detection.

Taking this factor into consideration, a list of selected failure cases was prepared based on process knowledge, inventory, engineering judgment, and experience, past incidents associated with such facilities and considering the general mechanisms for loss of containment. Cases have been identified for the consequence analysis.

C. Effect of Release

When hazardous material is released to atmosphere due to any reason, a vapor cloud is formed. Direct cloud formation occurs when a gaseous or flashing liquid escapes to the atmosphere.

1. Dispersion of hydrocarbon vapor with wind till it reaches its lower flammability limit (LFL) or finds a source of ignition before reaching LFL, which will result in a flash fire or explosion.

2. Catastrophic failure of tanks/ pressurized vessels, rotary equipment and valves etc. can result in equipment fragments flying and hitting other equipment of the plant.

3. Release of toxic compounds results in the toxic vapour cloud traveling over long distances, affecting a large area, before it gets sufficiently diluted to harmless concentration in the atmosphere.

4. The material is in two phases inside the containment - liquid & vapor. Depending on the location of the leak liquid or vapor will be released from the containment. If vapor is released a vapor cloud will form by the mixing of the vapor and air. The size of the vapor cloud will depend on the rate of release, wind speed; wind direction & atmospheric stability will determine the dispersion and movement of the vapor cloud.

5. There will be dispersion and movement of vapor cloud formed by evaporation of liquid.

The behavior of material released by loss of containment depends on the following factors:

1. Physical properties of the material
2. Conditions of material in containment (pressure and temperature)
3. Phase of material released (liquid or gas)
4. Inventory of material released
5. Weather parameters (temperature, humidity, wind speed, atmospheric stability)
6. Material with boiling point below ambient condition.

7.2.12 Consequence Analysis:

Table 7.5 Input Sheet

Sr. No.	Loss of containment	Material handled in Pipeline	Flow Rate (MMSCMD)	Operating Pressure in bars (G)	Operating Temp in °C	Dia. of P/L in Inches	Length of the P/L in KM	U/G or A/G	Failure Case (in mm.)
1	1 km from Start point Vasona Char rasta (15.125 kms)	Natural Gas	0.25	26.0	15ºC to 45ºC	8	15.125	U/G	5, 25, 50, FBR
2	0.5 km from start point Dabur Industry Connectivity- (Length 2.650Km)	Natural Gas	0.25	4.0	15ºC to 45ºC	4.92	2.650	U/G	
3	1.11 kms from start point of Kharpada to luhari (Line 4.515 kms)	Natural Gas	0.25	4.0	15ºC to 45ºC	4.92	4.515	U/G	
4	2.04 kms from start point Sili Fatak to Randhe Road Umarkui (Connectivity-Length 8.525Km)	Natural Gas	0.25	4.0	15ºC to 45ºC	6	8.525	U/G	
5	2 kms from start point IMP Power Sayli & Siddhant Ispat Connectivity Project-(Length 7.200Km)	Natural Gas	0.25	4.0	15ºC to 45ºC	6	7.200	U/G	
6	1.11 kms from start point Jackson Industry Athola Connectivity Project-Length 2.480Km	Natural Gas	0.25	4.0	15ºC to 45ºC	4.92	2.480	U/G	

7.2.12.1 Vasona Char Rastha to Khanvel Petroleum Khanvel Connectivity

For Vasona Char Rastha to Khanvel Petroleum Khanvel Connectivity (HP RO) of Length 15.125Km & 8'' Dia. Steel pipeline analysis for Jet fire, Flash fire, Overpressure(Vapour Cloud Explosion) has been carried out at 1 km from Start point Vasona Char rasta as furnished below:

Jet Fire (m)					
Scenario	**Weather**	**Flame length [m]**	**Distance downwind to intensity level 1 (4 kW/m2) [m]**	**Distance downwind to intensity level 2 (12.5 kW/m2) [m]**	**Distance downwind to intensity level 3 (37.5 kW/m2) [m]**
5 mm	Category 1.5/F	2.72	3.66424	NR	NR
	Category 1.5/D	2.735	3.66424	NR	NR
	Category 5/D	2.042	3.66332	NR	NR
25 mm	Category 1.5/F	4.847	15.0158	22.1059	18.1448
	Category 1.5/D	4.831	15.0158	22.1059	18.1448
	Category 5/D	3.544	15.1895	21.5558	17.9811
50 mm	Category 1.5/F	4.847	27.5901	46.6725	36.9251
	Category 1.5/D	4.831	27.5901	46.6725	36.9251
	Category 5/D	3.544	28.6205	46.0915	37.2523

Flash Fire (m)			
Scenario	**Weather**	**Distance downwind to LFL [m]**	**Distance downwind to LFL Fraction [m]**
5 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
25 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
50 mm	Category 1.5/F	NR	45.9405
	Category 1.5/D	NR	45.0272
	Category 5/D	NR	44.2815
FBR	Category 1.5/F	20.5247	27.0749
	Category 1.5/D	20.5018	26.9763
	Category 5/D	21.5321	32.6092

Fire Ball (m)					
Scenario	**Weather**	**Fire Ball diameter [m]**	**Distance downwind to intensity level 1 (4 kW/m2) [m]**	**Distance downwind to intensity level 2 (12.5 kW/m2) [m]**	**Distance downwind to intensity level 3 (37.5 kW/m2) [m]**
FBR	Category 1.5/F	76.3095	304.168	175.814	100.562
	Category 1.5/D	76.3095	304.168	175.814	100.562
	Category 5/D	76.3095	304.168	175.814	100.562

Overpressure (m)				
Scenario	**Weather**	**Overpressure level [bar]**	**Maximum distance [m]**	**Diameter [m]**
5 mm	Category 1.5/F	0.02068 0.1379 0.2068	33.7781 14.6214 13.465	47.5562 9.24287 6.92995
25 mm	Category 1.5/F	0.02068 0.1379 0.2068	32.9481 14.4601 13.344	45.8962 8.92024 6.68806
	Category 1.5/D	0.02068 0.1379 0.2068	31.639 14.2057 13.1533	43.2781 8.41138 6.30653
50 mm	Category 1.5/F	0.02068 0.1379 0.2068	91.543 50.0177 47.5109	103.086 20.0355 15.0218
	Category 1.5/D	0.02068 0.1379 0.2068	89.2239 49.567 47.173	98.4477 19.134 14.3459
	Category 5/D	0.02068 0.1379 0.2068	86.5564 49.0486 46.7843	93.1128 18.0971 13.5685
Full Bore Rupture	Category 1.5/F	0.02068 0.1379 0.2068	407.267 95.2679 76.433	774.533 150.536 112.866
	Category 1.5/D	0.02068 0.1379 0.2068	408.623 95.5314 76.6306	777.245 151.063 113.261
	Category 5/D	0.02068 0.1379 0.2068	408.04 95.4182 76.5457	776.08 150.836 113.091

❖ **Flash Fire Envelope (m)**

Figure 7.6 FBR & 5D weather condition

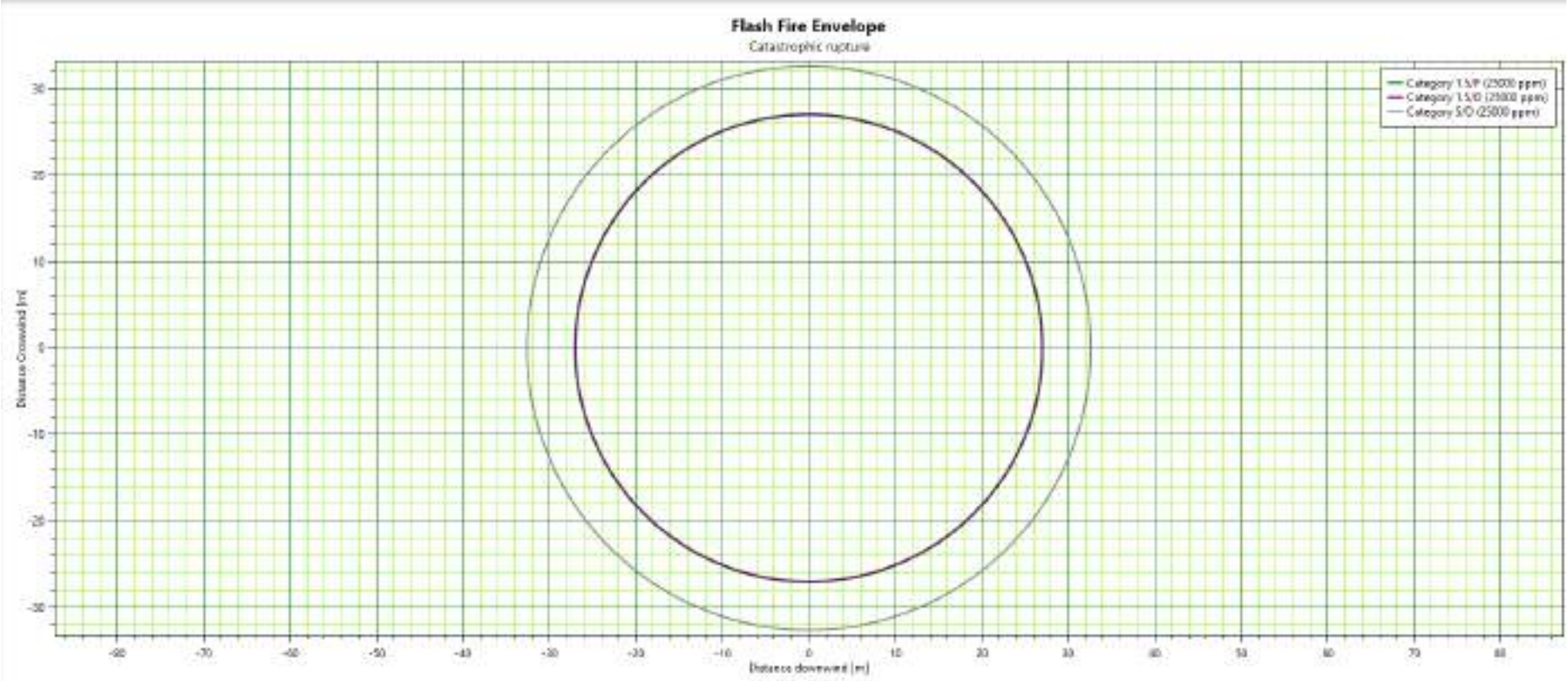


Figure 7.7 FBR & 5D weather condition

❖ **Thermal Damage Distance by Jet Fire (m)**

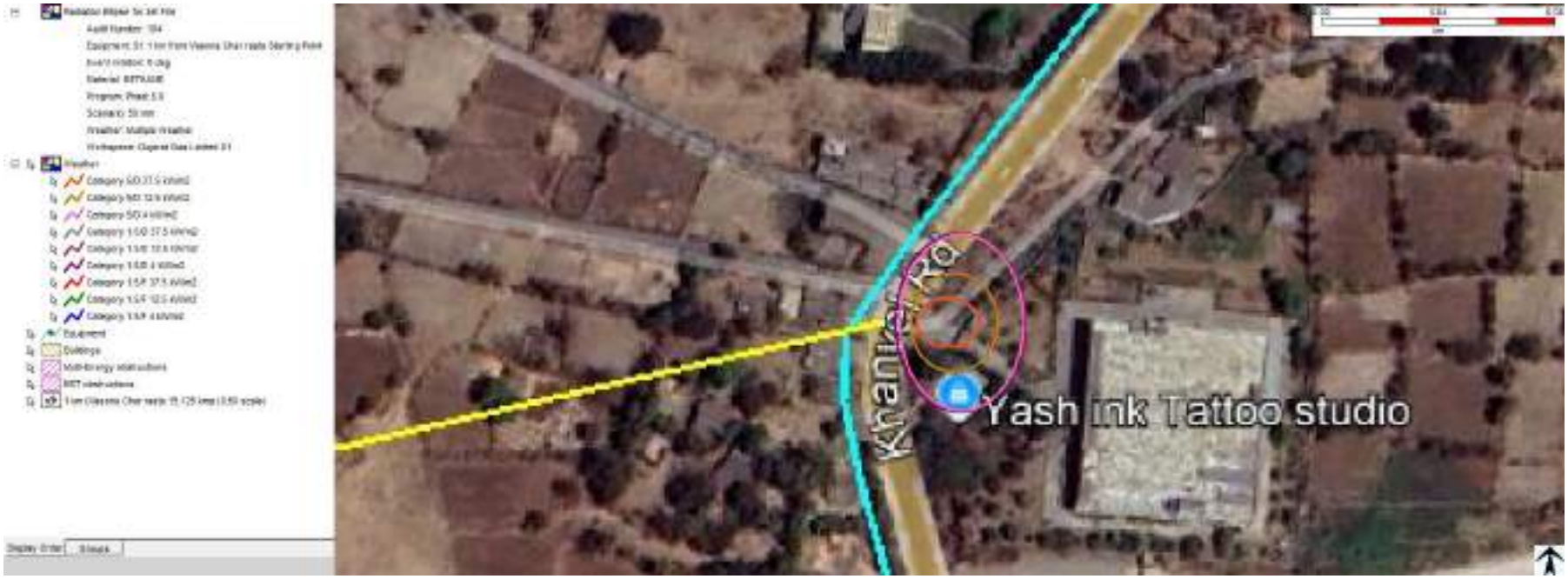


Figure 7.8 50 mm leak & 1.5D weather condition

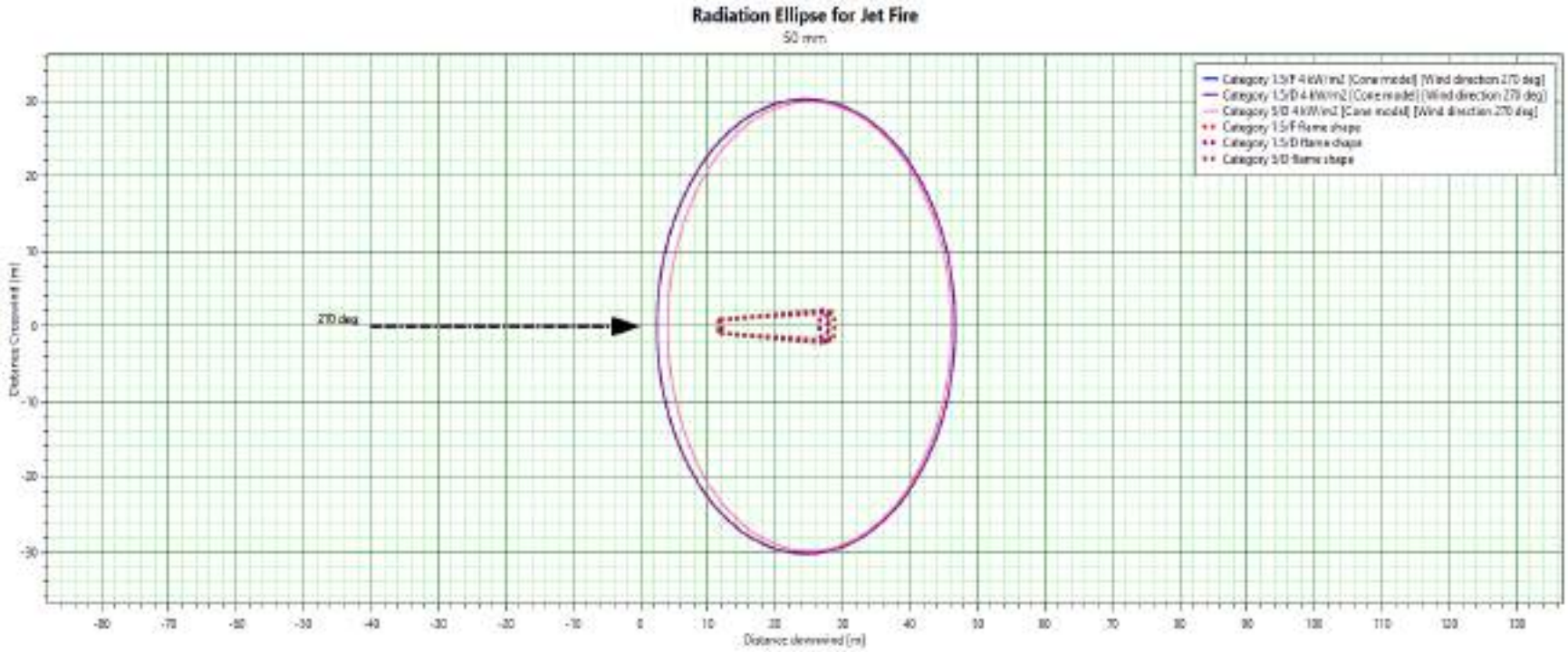


Figure 7.9 50 mm leak & 1.5D weather condition

❖ **Fireball Distance (m)**

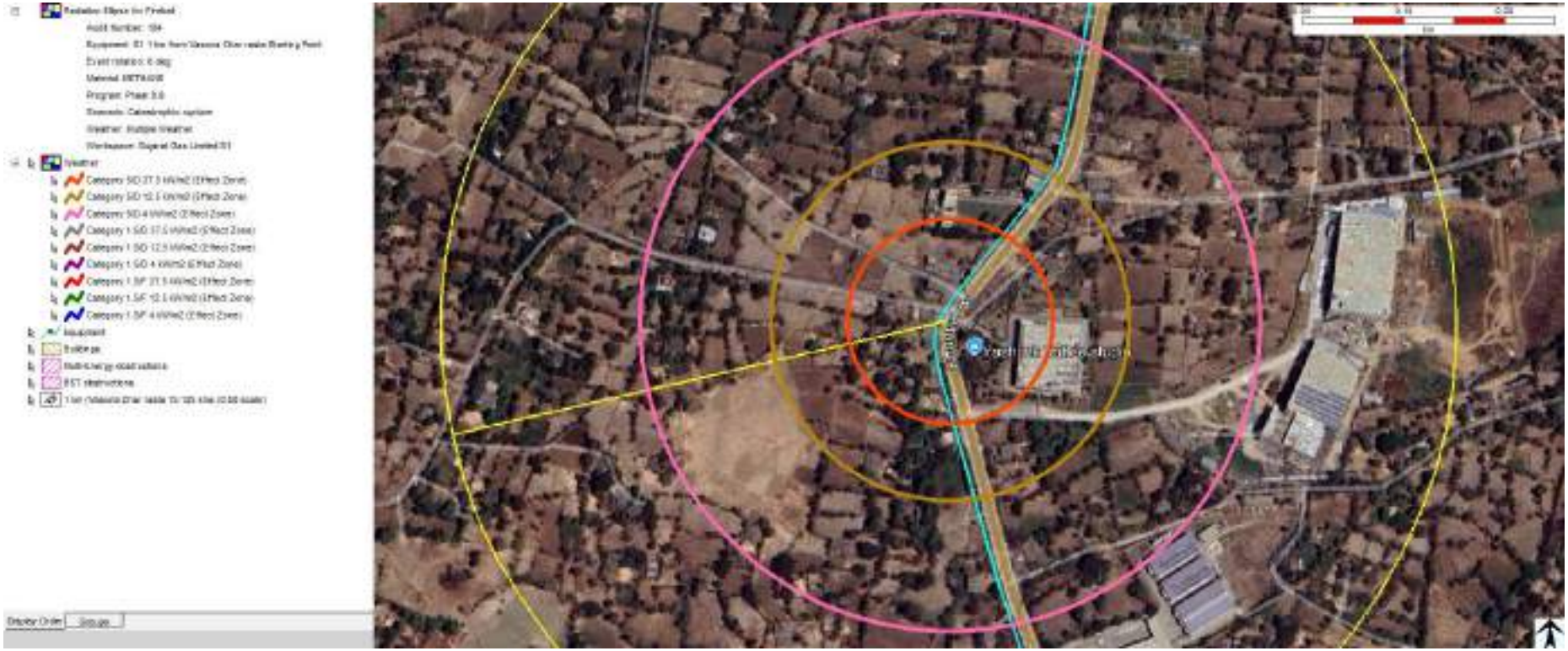


Figure 7.10 FBR & 1.5D weather condition

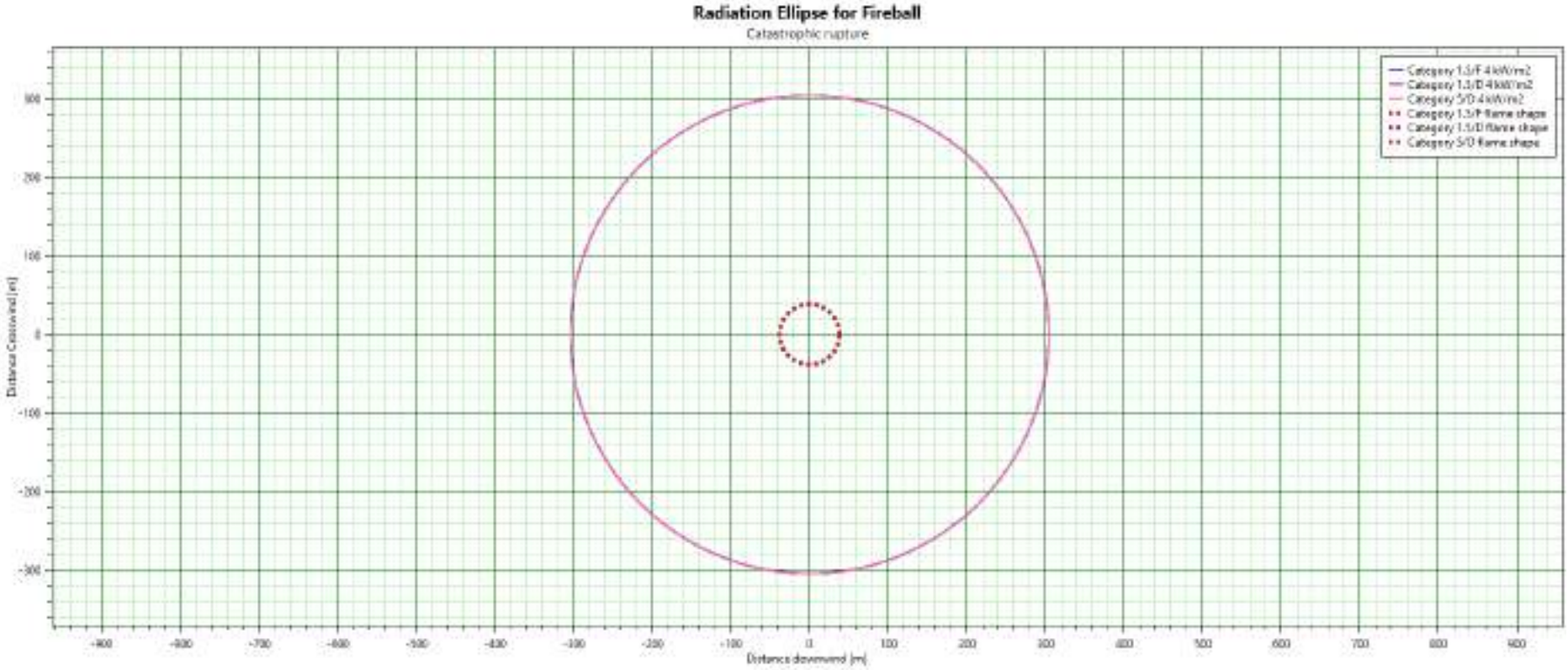


Figure 7.11 FBR & 1.5D weather condition

❖ **Maximum Distance at Overpressure Level (m)**

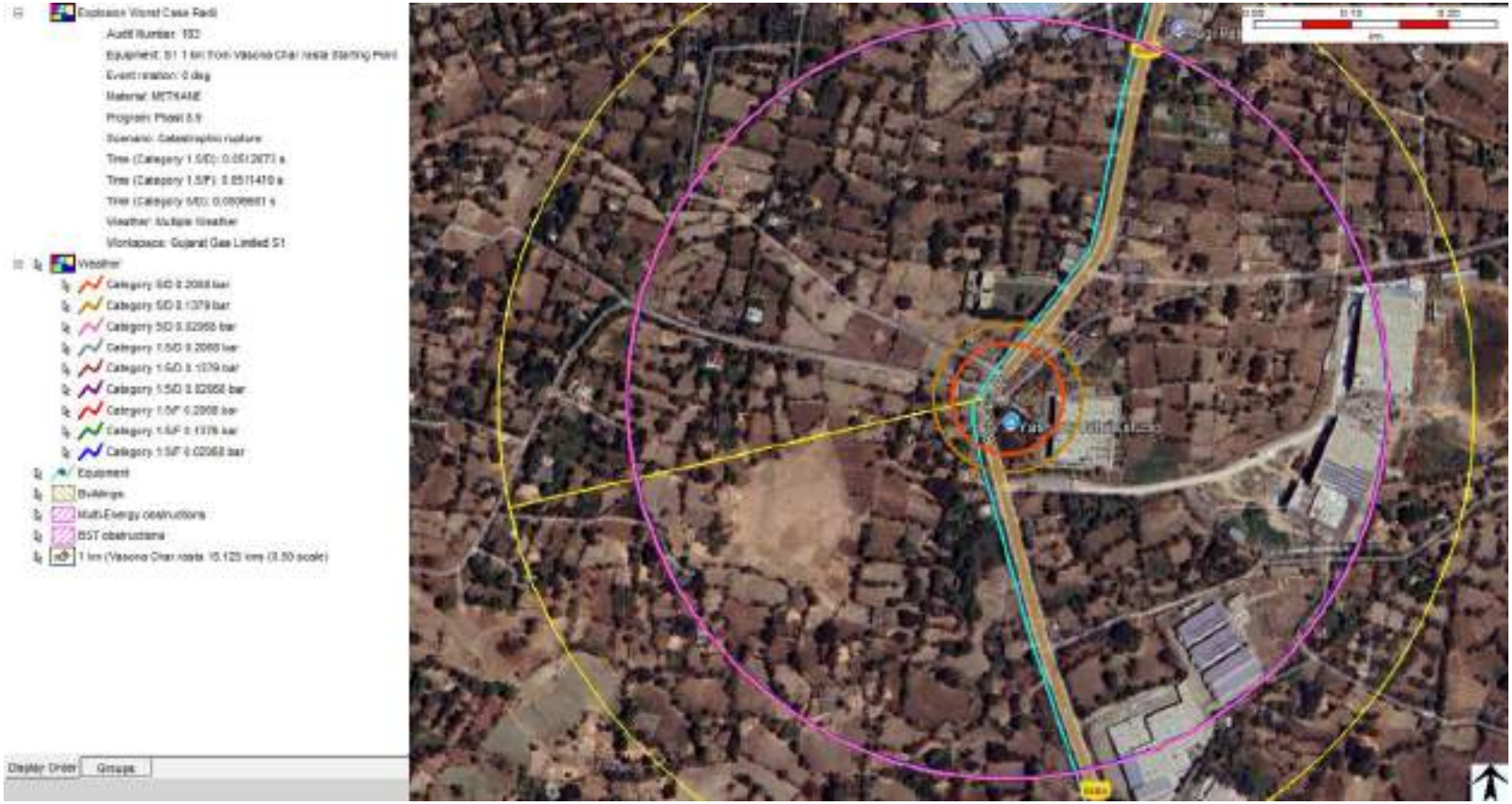


Figure 7.12 FBR & 5D weather condition

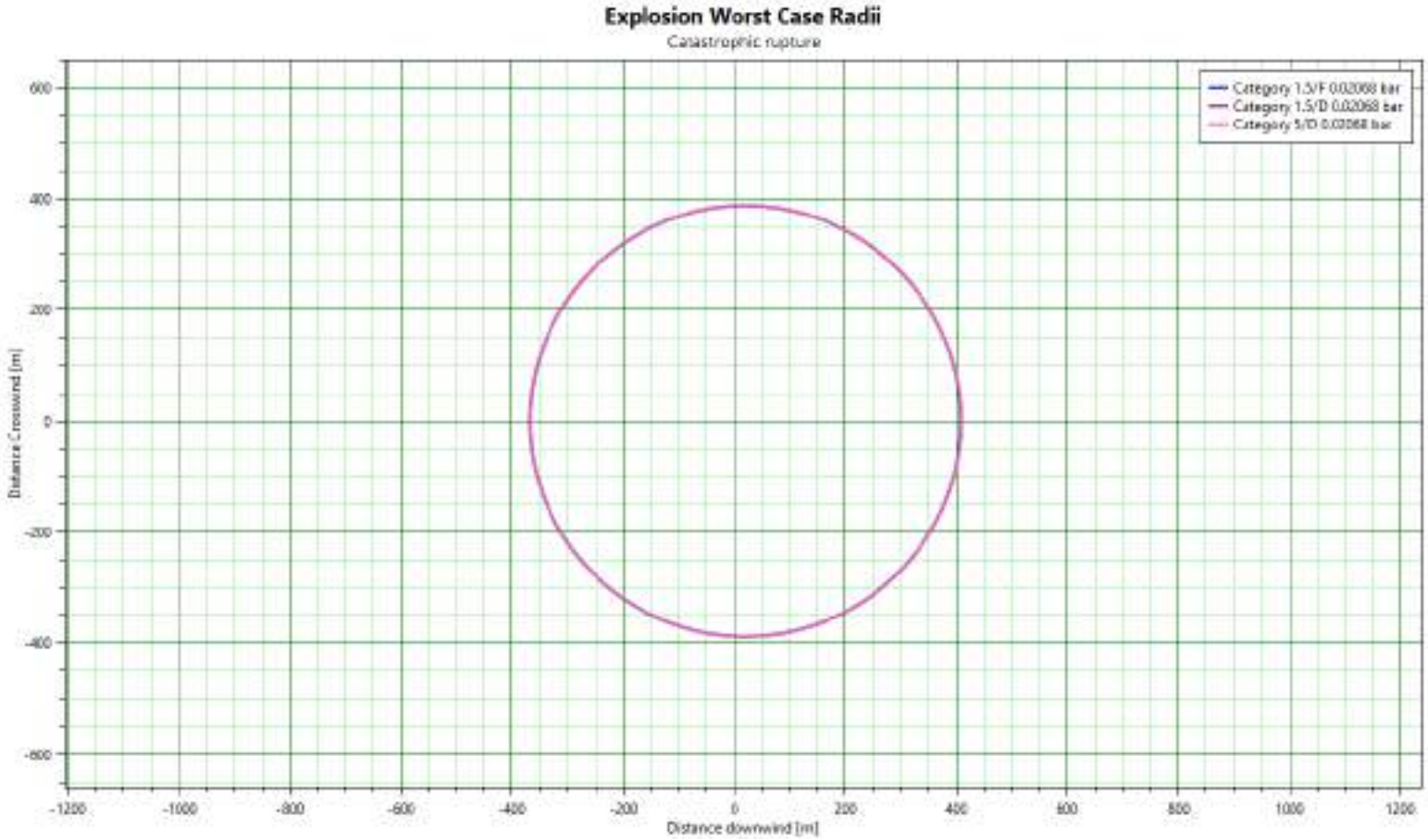


Figure 7.13 FBR & 5D weather condition

7.2.12.2 Dabur Industri Connectivity

For Dabur Industry Connectivity of Length 2.650Km & 125mm Dia. PE pipeline • 0.5 km from start point Dabur Industry Connectivity considered for for Jet fire, Flash fire, Overpressure(Vapour Cloud Explosion) analysis as furnished below:

Jet Fire (m)					
Scenario	**Weather**	**Flame length [m]**	**Distance downwind to intensity level 1 (4 kW/m2) [m]**	**Distance downwind to intensity level 2 (12.5 kW/m2) [m]**	**Distance downwind to intensity level 3 (37.5 kW/m2) [m]**
5 mm	Category 1.5/F	1.74225	NR	NR	NR
	Category 1.5/D	1.74225	NR	NR	NR
	Category 5/D	1.74205	NR	NR	NR
25 mm	Category 1.5/F	7.18974	8.82282	6.93629	NR
	Category 1.5/D	7.18974	8.82282	6.93629	NR
	Category 5/D	7.18123	8.49389	6.65697	NR
50 mm	Category 1.5/F	13.2256	18.9889	15.5099	12.5541
	Category 1.5/D	13.2256	18.9889	15.5099	12.5541
	Category 5/D	13.4918	18.5972	15.4948	12.7263

Flash Fire (m)			
Scenario	**Weather**	**Distance downwind to LFL [m]**	**Distance downwind to LFL Fraction [m]**
5 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
25 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
50 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
FBR	Category 1.5/F	11.5046	15.0729
	Category 1.5/D	11.5181	15.139
	Category 5/D	12.1368	19.1739

Fire Ball (m)					
Scenario	**Weather**	**Fire Ball diameter [m]**	**Distance downwind to intensity level 1 (4 kW/m2) [m]**	**Distance downwind to intensity level 2 (12.5 kW/m2) [m]**	**Distance downwind to intensity level 3 (37.5 kW/m2) [m]**
FBR	Category 1.5/F	76.3095	43.0344	130.503	74.2024
	Category 1.5/D	76.3095	43.0344	130.503	74.2024
	Category 5/D	76.3095	43.0344	130.503	74.2024

Overpressure (m)				
Scenario	**Weather**	**Overpressure level [bar]**	**Maximum distance [m]**	**Diameter [m]**
50 mm	Category 1.5/F	0.02068 0.1379 0.2068	31.1472 14.1101 13.0816	42.2943 8.22019 6.16318
	Category 1.5/D	0.02068 0.1379 0.2068	30.4266 13.97 12.9766	40.8532 7.9401 5.95318
	Category 5/D	0.02068 0.1379 0.2068	29.1195 13.716 12.7861	38.239 7.43201 5.57224
Full Bore Rupture	Category 1.5/F	0.02068 0.1379 0.2068	198.766 46.688 37.5072	377.532 73.376 55.0145
	Category 1.5/D	0.02068 0.1379 0.2068	200.257 46.9777 37.7245	380.514 73.9554 55.4489
	Category 5/D	0.02068 0.1379 0.2068	199.492 46.829 37.613	378.984 73.658 55.226

❖ **Flash Fire Envelope (m)**

Figure 7.14 FBR & 5D weather condition

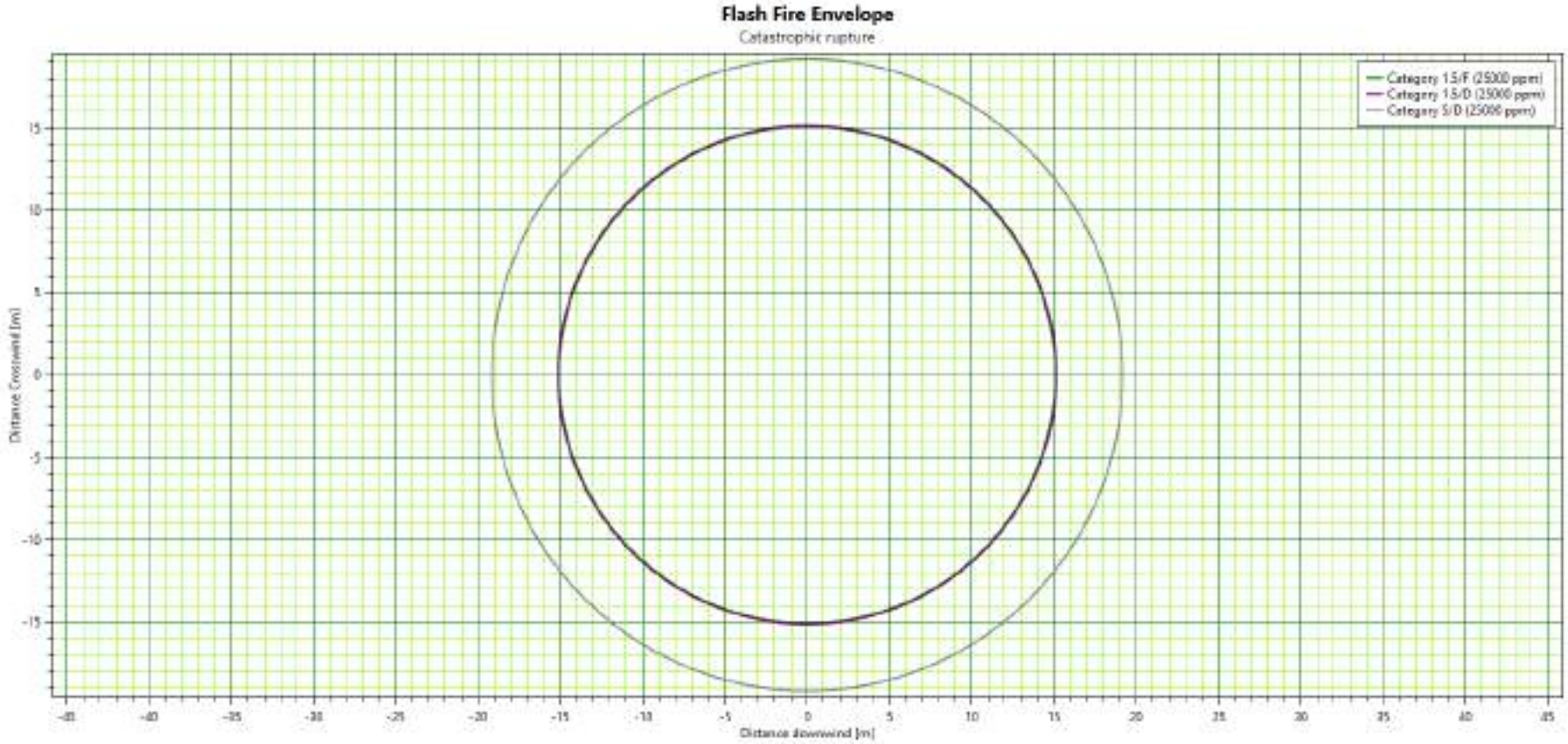


Figure 7.15 FBR & 5D weather condition

❖ **Thermal Damage Distance by Jet Fire (m)**

Figure 7.16 50 mm leak & 1.5D weather condition

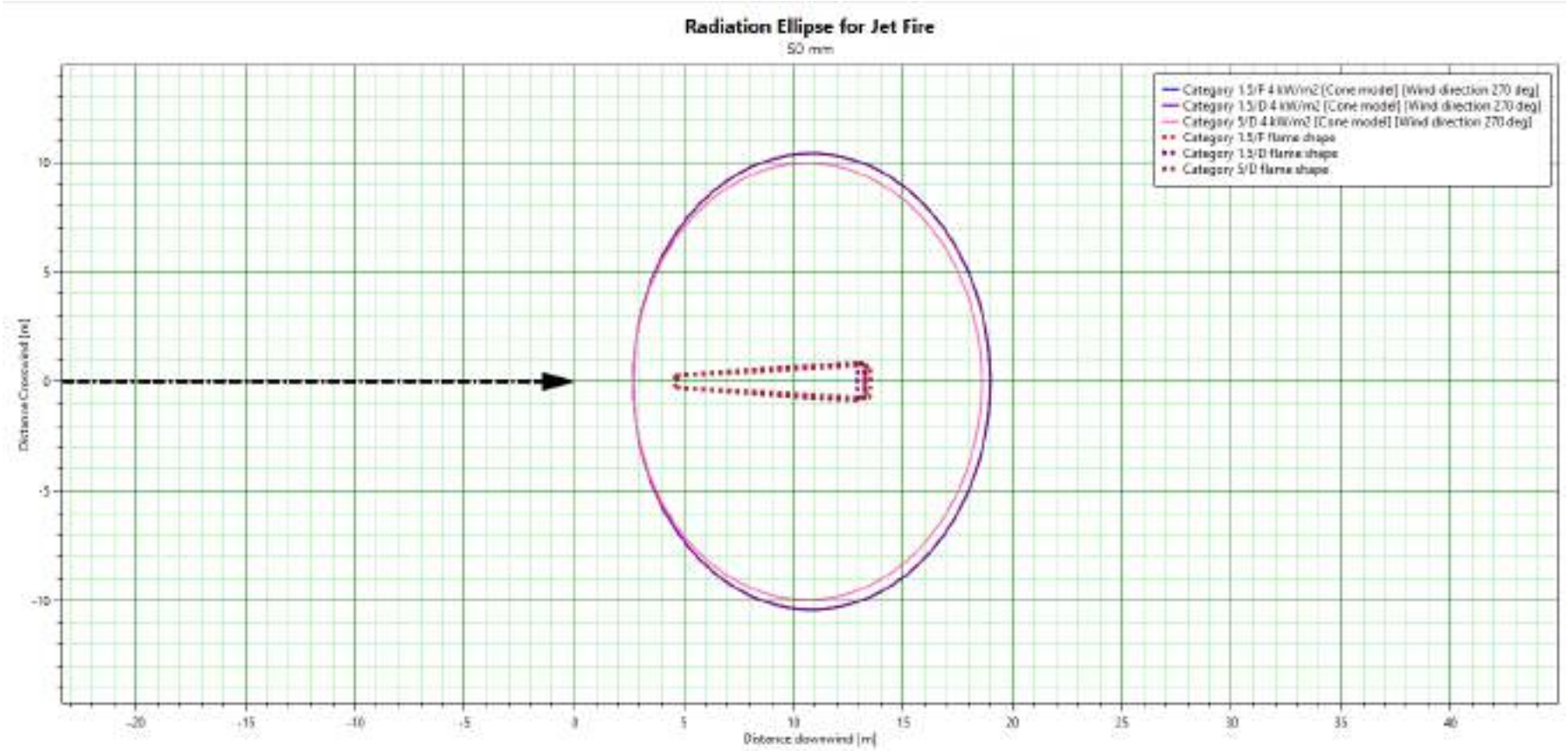


Figure 7.17 50 mm leak & 1.5D weather condition

❖ **Fireball Distance (m)**

Figure 7.18 FBR & 1.5D weather condition

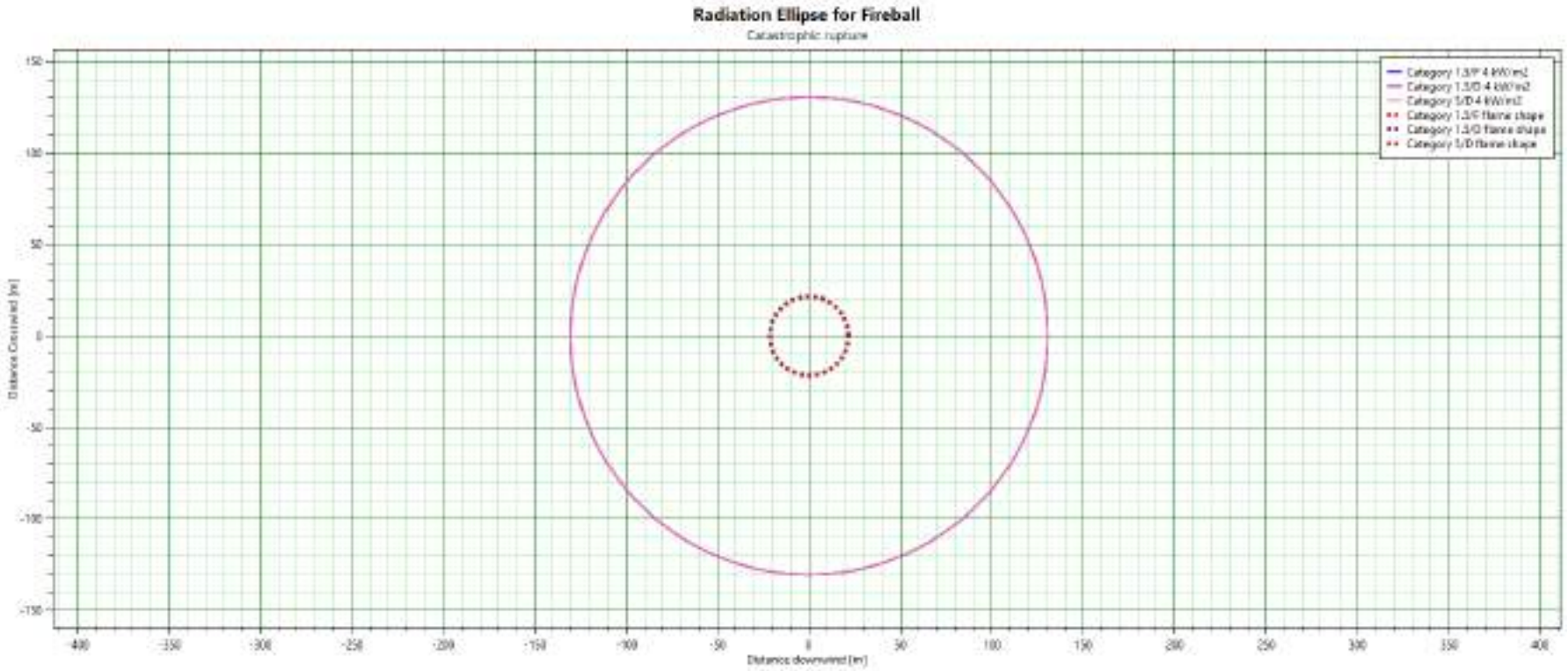


Figure 7.19 FBR & 1.5D weather condition

❖ **Maximum Distance at Overpressure Level (m)**

Figure 7.20 FBR & 1.5D weather condition

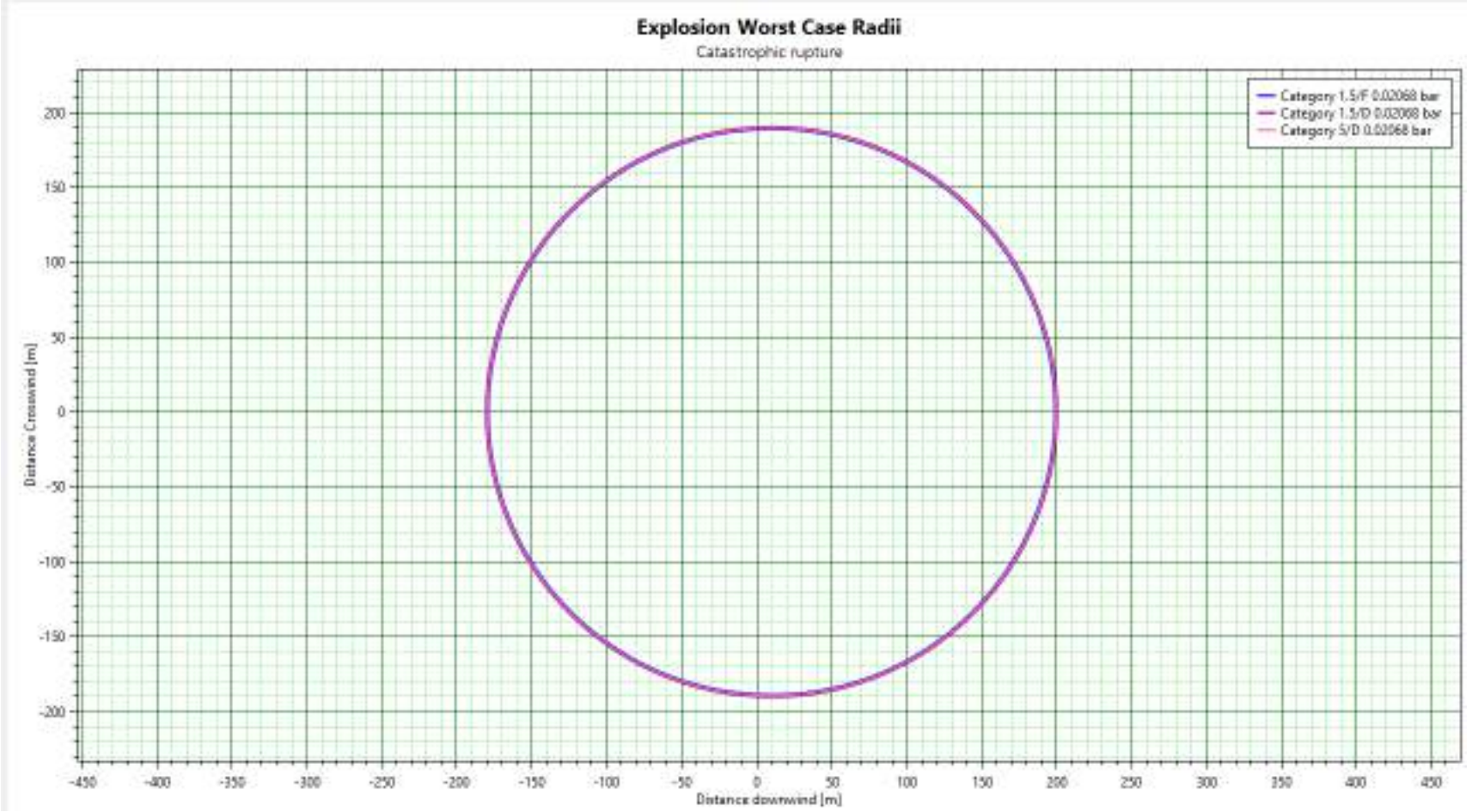


Figure 7.21 FBR & 1.5D weather condition

7.2.12.3 Kharadpada to Luhari Industrial Area(Jhaveri Flexo India Ltd.) Cononectivity

For Kharadpada to Luhari Industrial Area (Jhaveri Flexo India Ltd.) Connectivity of Length 4.515km & 125mm Dia. PE pipeline 1.11 kms from start point of Kharpada to luhari considered for Jet Fire, Flash Fir, Fire Boll and Overpressure analysis as furnished below:

Jet Fire (m)					
Scenario	**Weather**	**Flame length [m]**	**Distance downwind to intensity level 1 (4 kW/m2) [m]**	**Distance downwind to intensity level 2 (12.5 kW/m2) [m]**	**Distance downwind to intensity level 3 (37.5 kW/m2) [m]**
5 mm	Category 1.5/F	3.78534	NR	NR	NR
	Category 1.5/D	3.78534	NR	NR	NR
	Category 5/D	3.78434	NR	NR	NR
25 mm	Category 1.5/F	15.5118	23.0181	18.8643	15.5201
	Category 1.5/D	15.5118	23.0181	18.8643	15.5201
	Category 5/D	15.7168	22.4676	18.7189	15.639
50 mm	Category 1.5/F	28.489	48.5154	38.3039	31.194
	Category 1.5/D	28.489	48.5154	38.3039	31.194
	Category 5/D	29.5816	47.9286	38.6656	32.3687

Flash Fire (m)			
Scenario	**Weather**	**Distance downwind to LFL [m]**	**Distance downwind to LFL Fraction [m]**
5 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
25 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
50 mm	Category 1.5/F	NR	48.3829
	Category 1.5/D	NR	47.3958
	Category 5/D	NR	47.0177
FBR	Category 1.5/F	21.0461	27.7723
	Category 1.5/D	21.0199	27.663
	Category 5/D	22.079	33.444

Fire Ball (m)					
Scenario	**Weather**	**Fire Ball diameter [m]**	**Distance downwind to intensity level 1 (4 kW/m2) [m]**	**Distance downwind to intensity level 2 (12.5 kW/m2) [m]**	**Distance downwind to intensity level 3 (37.5 kW/m2) [m]**
FBR	Category 1.5/F	78.2267	311.201	179.906	102.91
	Category 1.5/D	78.2267	311.201	179.906	102.91
	Category 5/D	78.2267	311.201	179.906	102.91

Overpressure (m)				
Scenario	**Weather**	**Overpressure level [bar]**	**Maximum distance [m]**	**Diameter [m]**
25 mm	Category 1.5/F	0.02068 0.1379 0.2068	44.6676 24.7943 23.5946	49.3351 9.58862 7.18918
	Category 1.5/D	0.02068 0.1379 0.2068	43.8115 24.6279 23.4698	47.6231 9.25587 6.9397
50 mm	Category 1.5/F	0.02068 0.1379 0.2068	32.4166 14.3568 13.2666	44.8333 8.71365 6.53316
	Category 1.5/D	0.02068 0.1379 0.2068	103.946 60.4847 57.8611	107.892 20.9695 15.7221
	Category 5/D	0.02068 0.1379 0.2068	91.3957 49.9891 47.4894	102.791 19.9782 14.9789
Full Bore Rupture	Category 1.5/F	0.02068 0.1379 0.2068	98.6706 59.4595 57.0923	97.3412 18.9189 14.1847
	Category 1.5/D	0.02068 0.1379 0.2068	411.57 96.1042 77.06	783.139 152.208 114.12
	Category 5/D	0.02068 0.1379 0.2068	413.062 96.3943 77.2775	786.124 152.789 114.555

❖ **Flash Fire Envelope (m)**

Figure 7.22 FBR & 5D weather condition

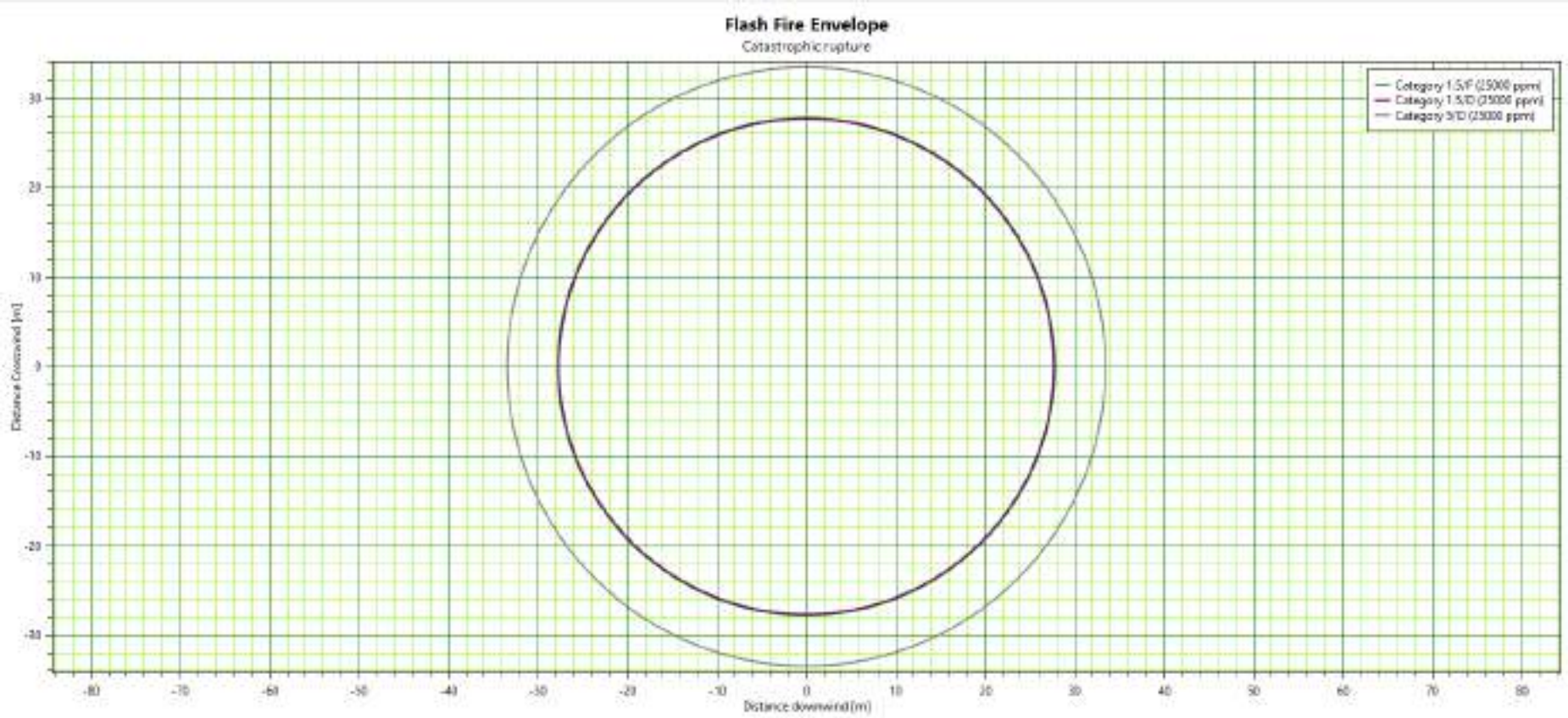


Figure 7.23 FBR & 5D weather condition

❖ **Thermal Damage Distance by Jet Fire (m)**

Figure 7.24 50 mm leak & 1.5D weather condition

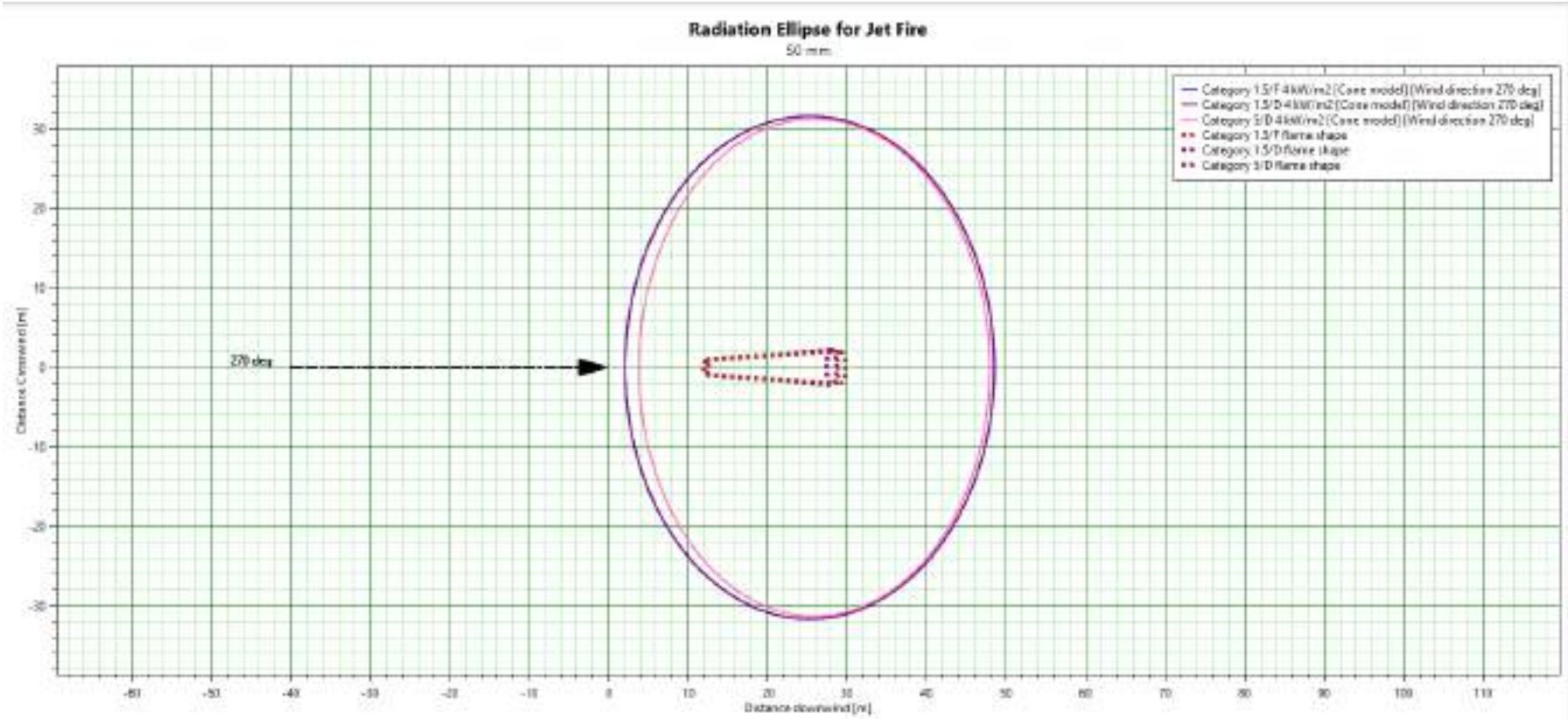


Figure 7.25 50 mm leak & 1.5D weather condition

❖ **Fireball Distance (m)**

Figure 7.26 FBR & 1.5D weather condition

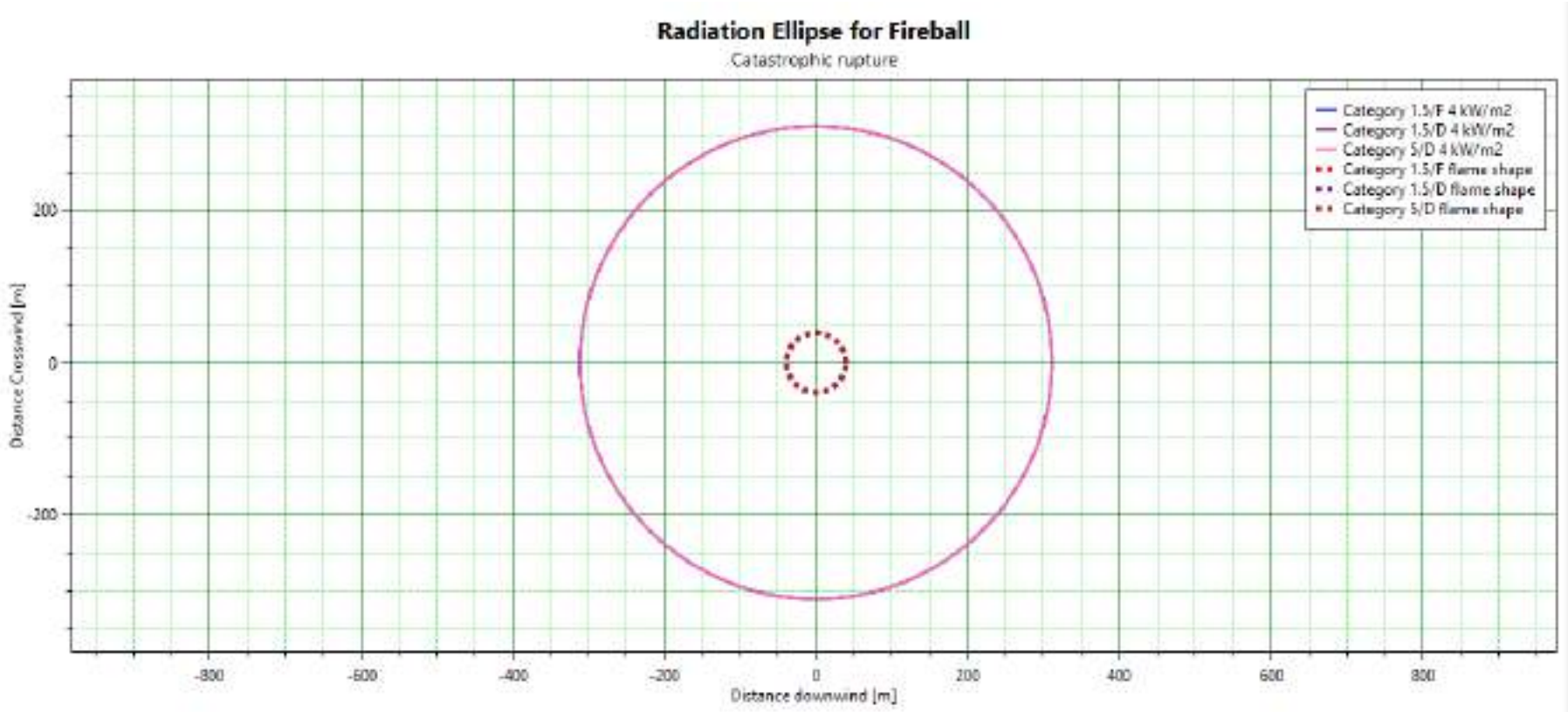


Figure 7.27 FBR & 1.5D weather condition

❖ **Maximum Distance at Overpressure Level (m)**

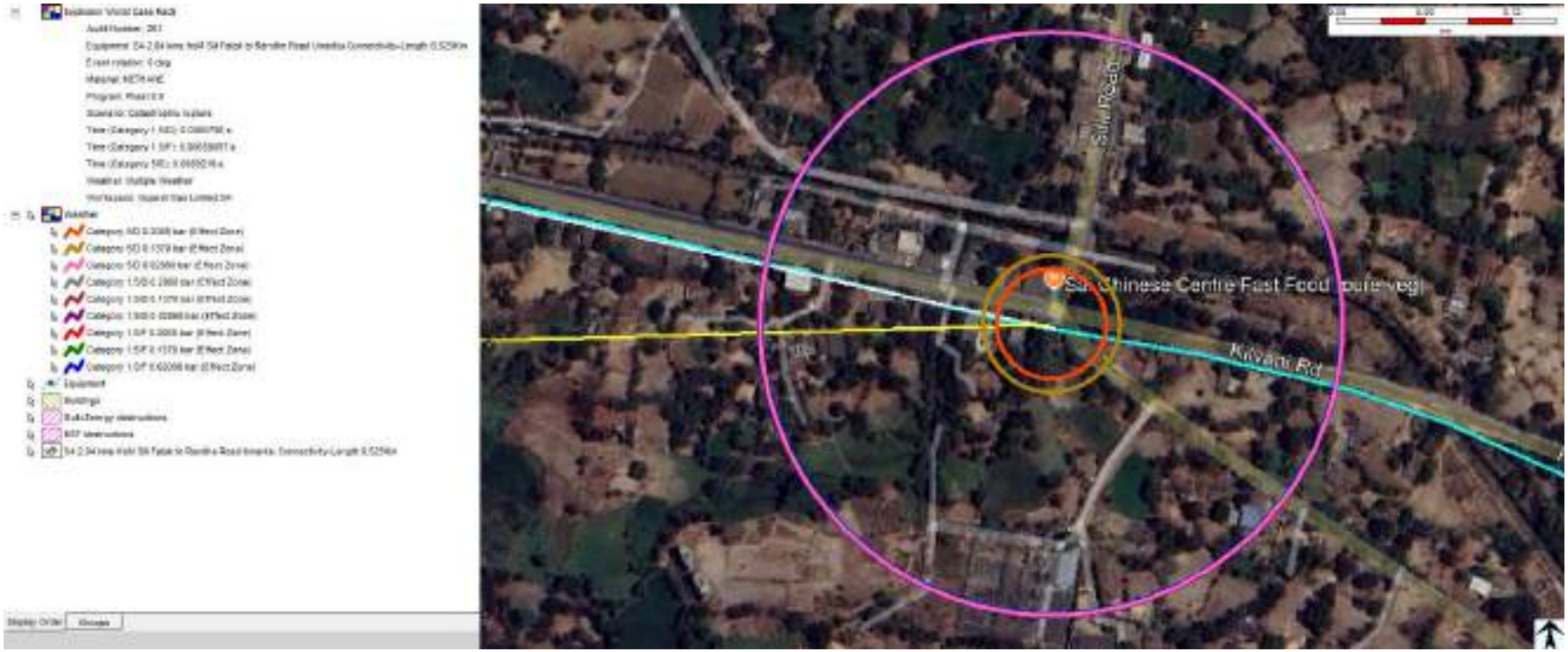


Figure 7.28 FBR & 5D weather condition

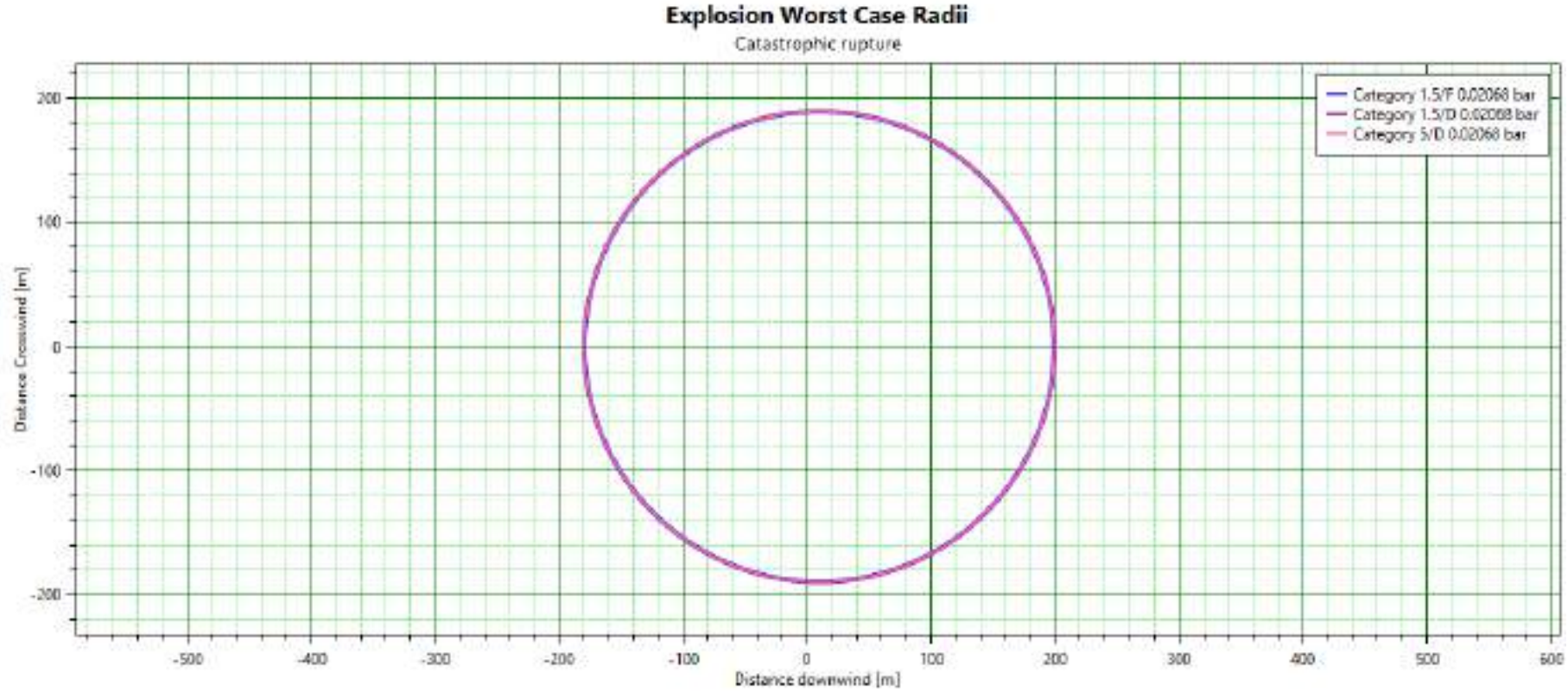


Figure 7.29 FBR & 5D weather condition

7.2.12.4 Sili Fatak to Randhe Road Umarkui Connectivity

For Sili Fatak to Randhe Road Umarkui Connectivity of Length 8.525Km & 6" Steel/125mm Dia. PE 2.04 kms from start point Sili Fatak to Randhe Road Umarkui considered for Jet Fire, Flash Fire, Fire Ball and Overpressure analaysis as furnished below:

Jet Fire (m)					
Scenario	**Weather**	**Flame length [m]**	**Distance downwind to intensity level 1 (4 kW/m2) [m]**	**Distance downwind to intensity level 2 (12.5 kW/m2) [m]**	**Distance downwind to intensity level 3 (37.5 kW/m2) [m]**
5 mm	Category 1.5/F	1.74225	NR	NR	NR
	Category 1.5/D	1.74225	NR	NR	NR
	Category 5/D	1.74205	NR	NR	NR
25 mm	Category 1.5/F	7.18974	8.82282	6.93629	NR
	Category 1.5/D	7.18974	8.82282	6.93629	NR
	Category 5/D	7.18123	8.49389	6.65697	NR
50 mm	Category 1.5/F	13.2256	18.9889	15.5099	12.5541
	Category 1.5/D	13.2256	18.9889	15.5099	12.5541
	Category 5/D	13.4918	18.5972	15.4948	12.7263

Flash Fire (m)			
Scenario	**Weather**	**Distance downwind to LFL [m]**	**Distance downwind to LFL Fraction [m]**
5 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
25 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
50 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
FBR	Category 1.5/F	11.5046	15.0729
	Category 1.5/D	11.5181	15.139
	Category 5/D	12.1368	19.1739

Fire Ball (m)					
Scenario	**Weather**	**Fire Ball diameter [m]**	**Distance downwind to intensity level 1 (4 kW/m2) [m]**	**Distance downwind to intensity level 2 (12.5 kW/m2) [m]**	**Distance downwind to intensity level 3 (37.5 kW/m2) [m]**
FBR	Category 1.5/F	78.2267	43.0344	130.503	74.2024
	Category 1.5/D	78.2267	43.0344	130.503	74.2024
	Category 5/D	78.2267	43.0344	130.503	74.2024

Overpressure (m)				
Scenario	**Weather**	**Overpressure level [bar]**	**Maximum distance [m]**	**Diameter [m]**
50 mm	Category 1.5/F	0.02068 0.1379 0.2068	31.1472 14.1101 13.0816	42.2943 8.22019 6.16318
	Category 1.5/D	0.02068 0.1379 0.2068	30.4266 13.97 12.9766	40.8532 7.9401 5.95318
	Category 5/D	0.02068 0.1379 0.2068	29.1195 13.716 12.7861	38.239 7.43201 5.57224
Full Bore Rupture	Category 1.5/F	0.02068 0.1379 0.2068	198.766 46.688 37.5072	377.532 73.376 55.0145
	Category 1.5/D	0.02068 0.1379 0.2068	200.257 46.9777 37.7245	380.514 73.9554 55.4489
	Category 5/D	0.02068 0.1379 0.2068	199.492 46.829 37.613	378.984 73.658 55.226

❖ **Flash Fire Envelope (m)**

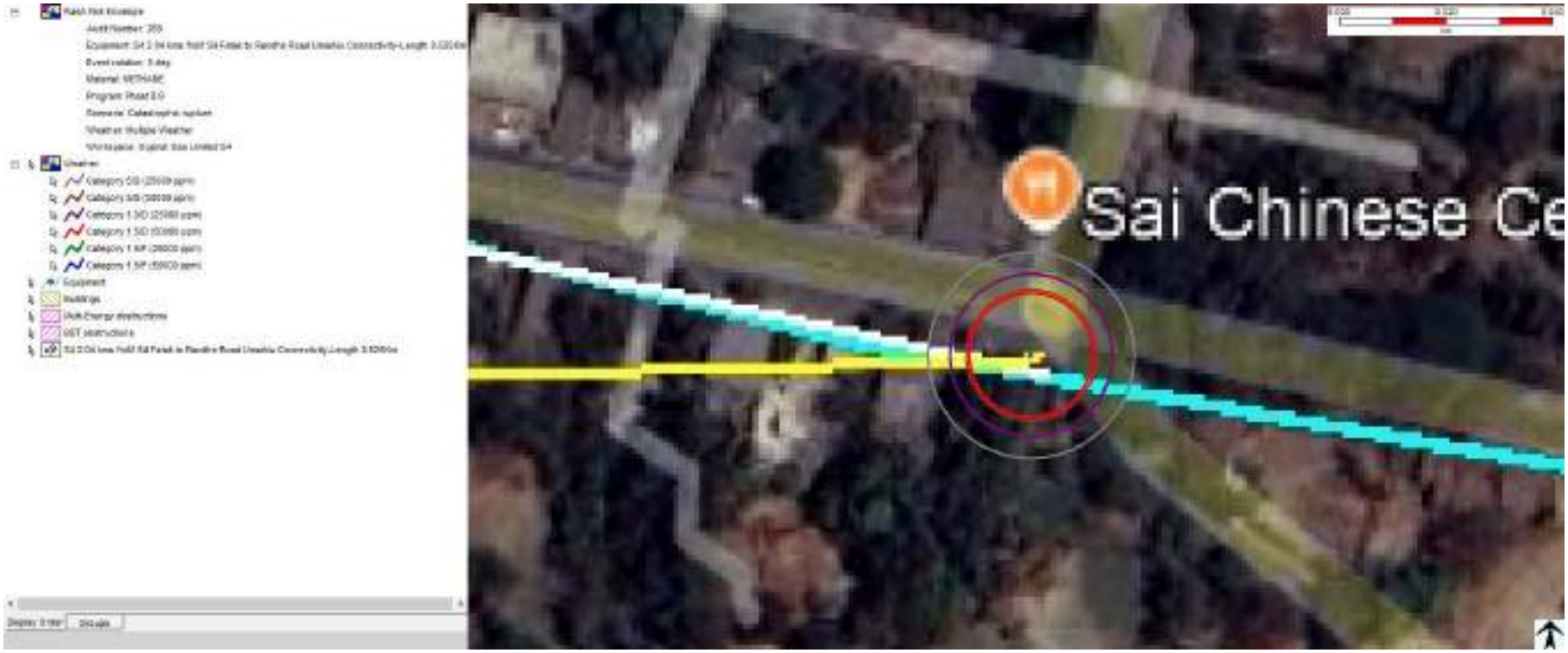


Figure 7.30 FBR & 5D weather condition

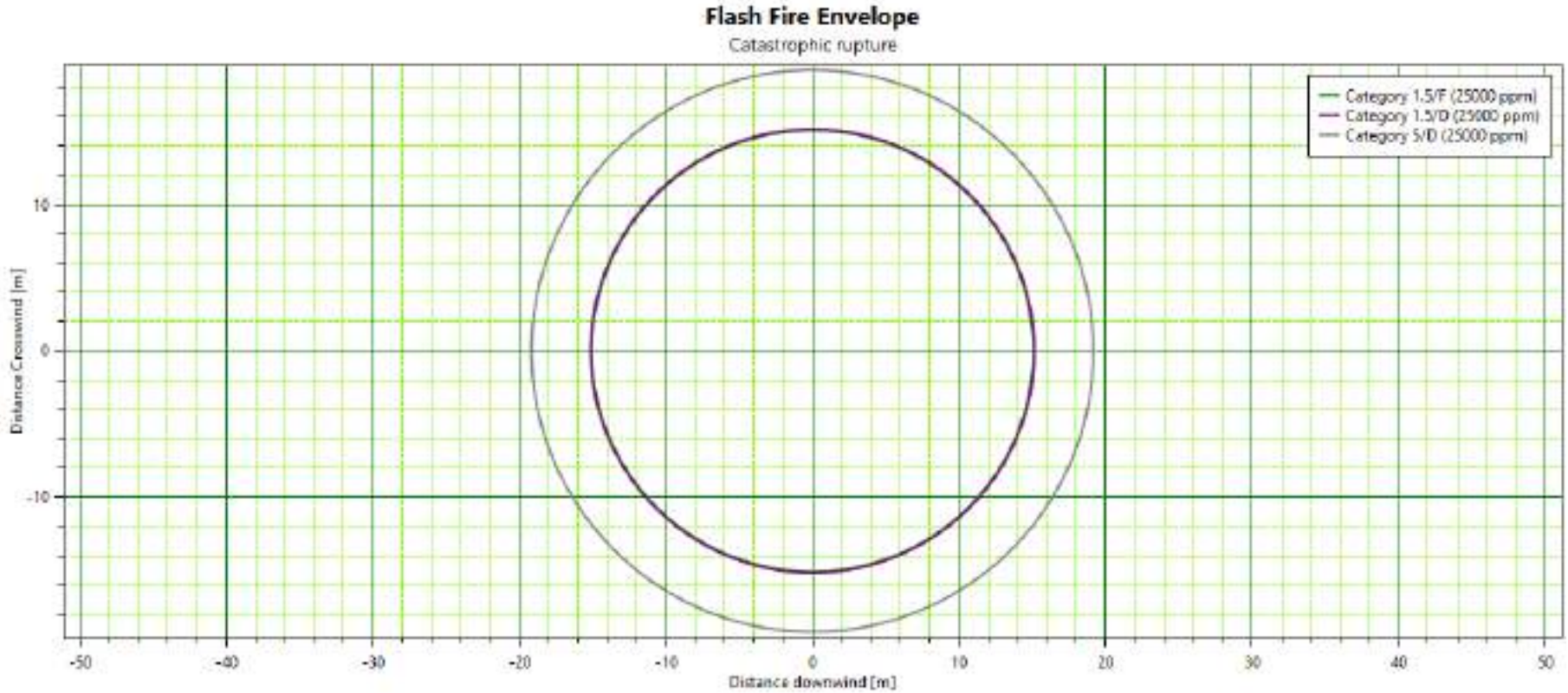


Figure 7.31 FBR & 5D weather condition

❖ **Thermal Damage Distance by Jet Fire (m)**

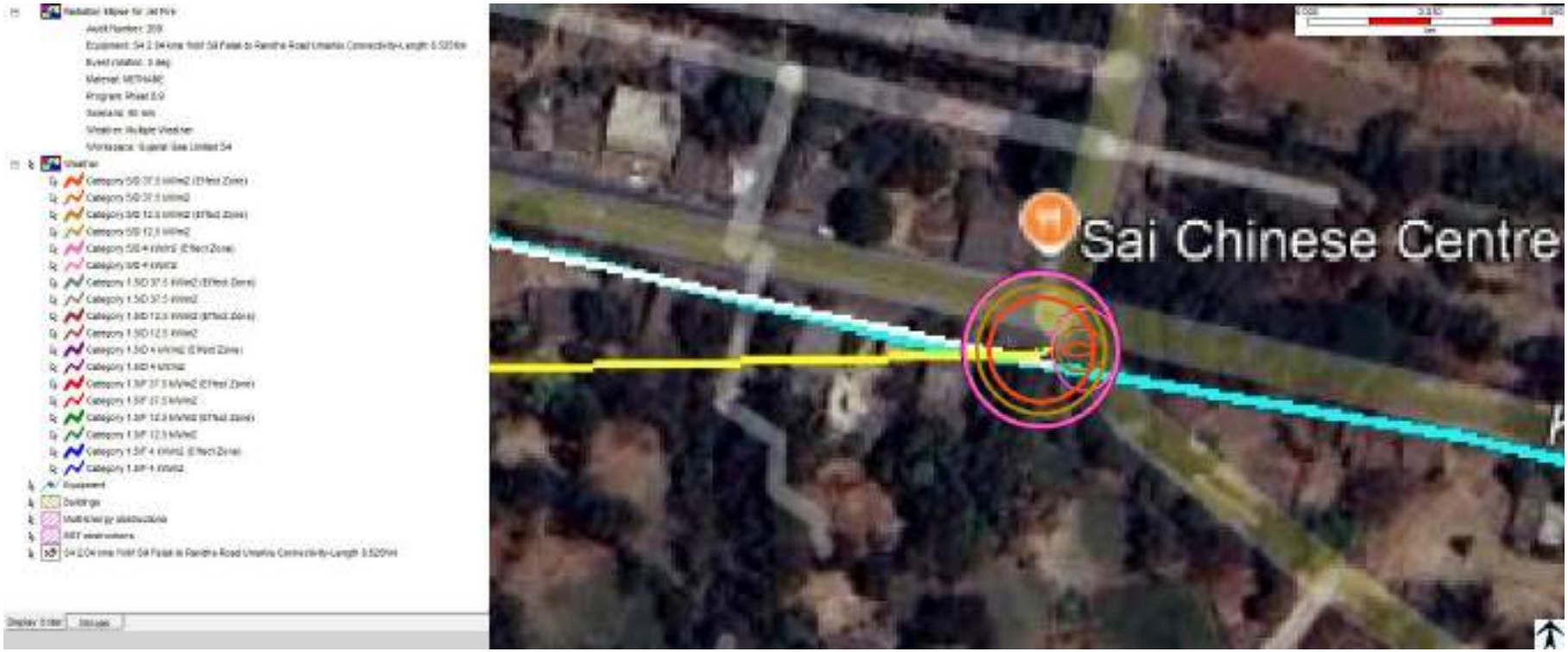


Figure 7.32 50 mm leak & 1.5D weather condition

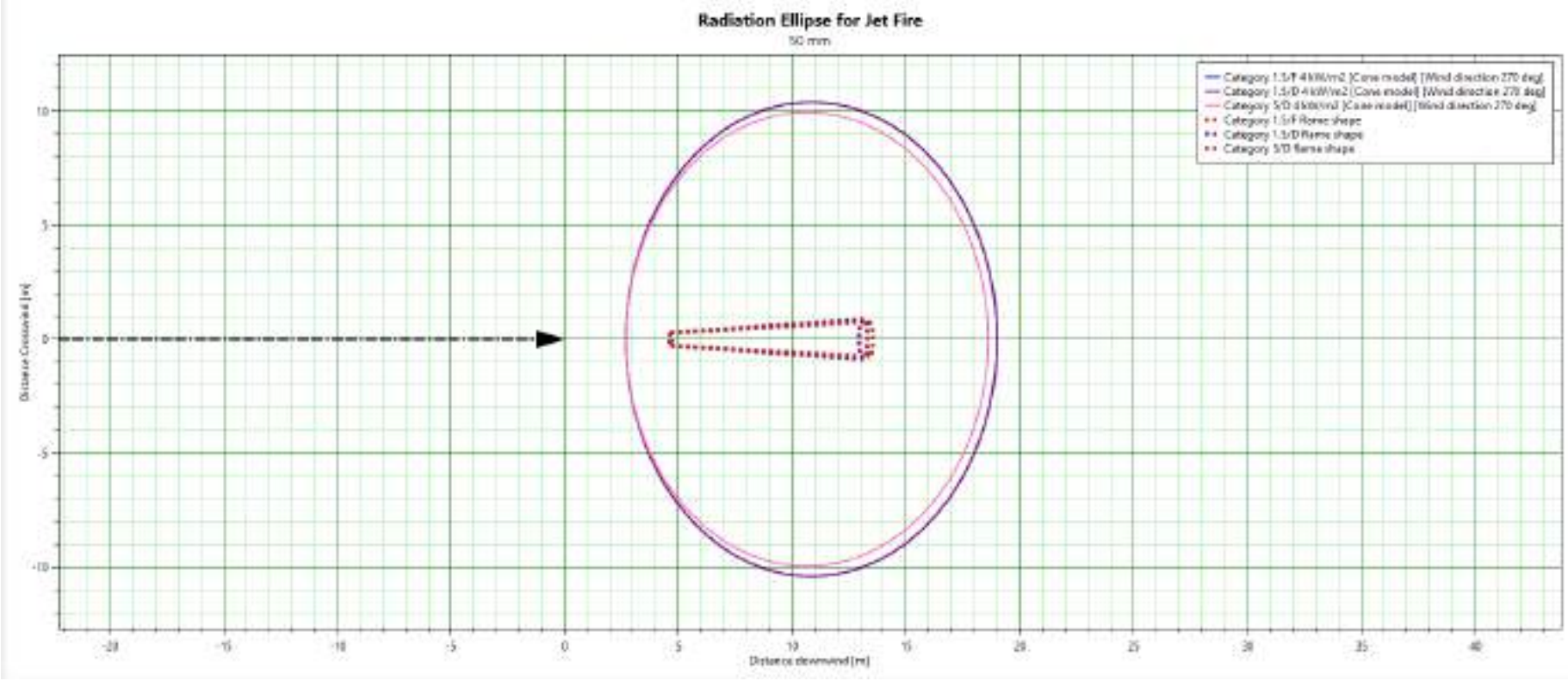


Figure 7.33 50 mm leak & 1.5D weather condition

❖ **Fireball Distance (m)**

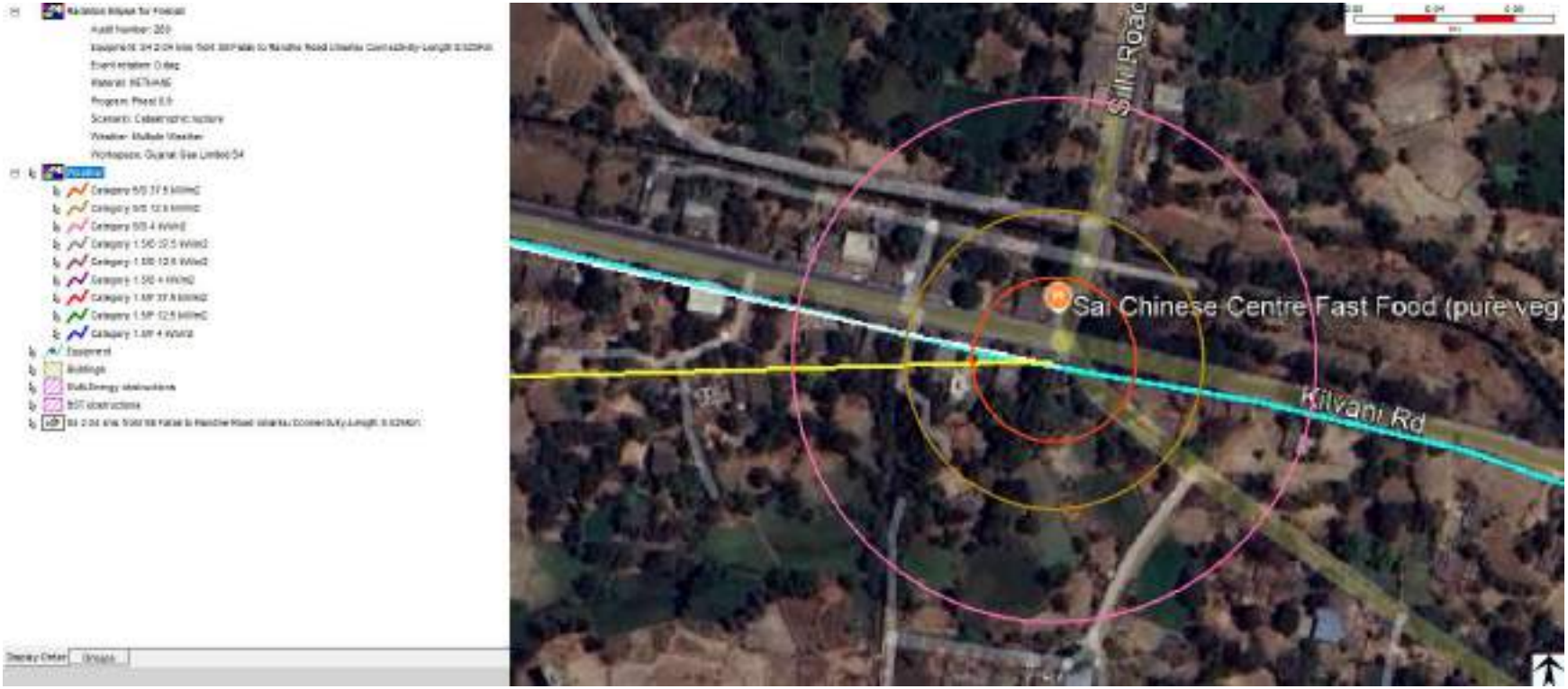


Figure 7.34 FBR & 1.5D weather condition

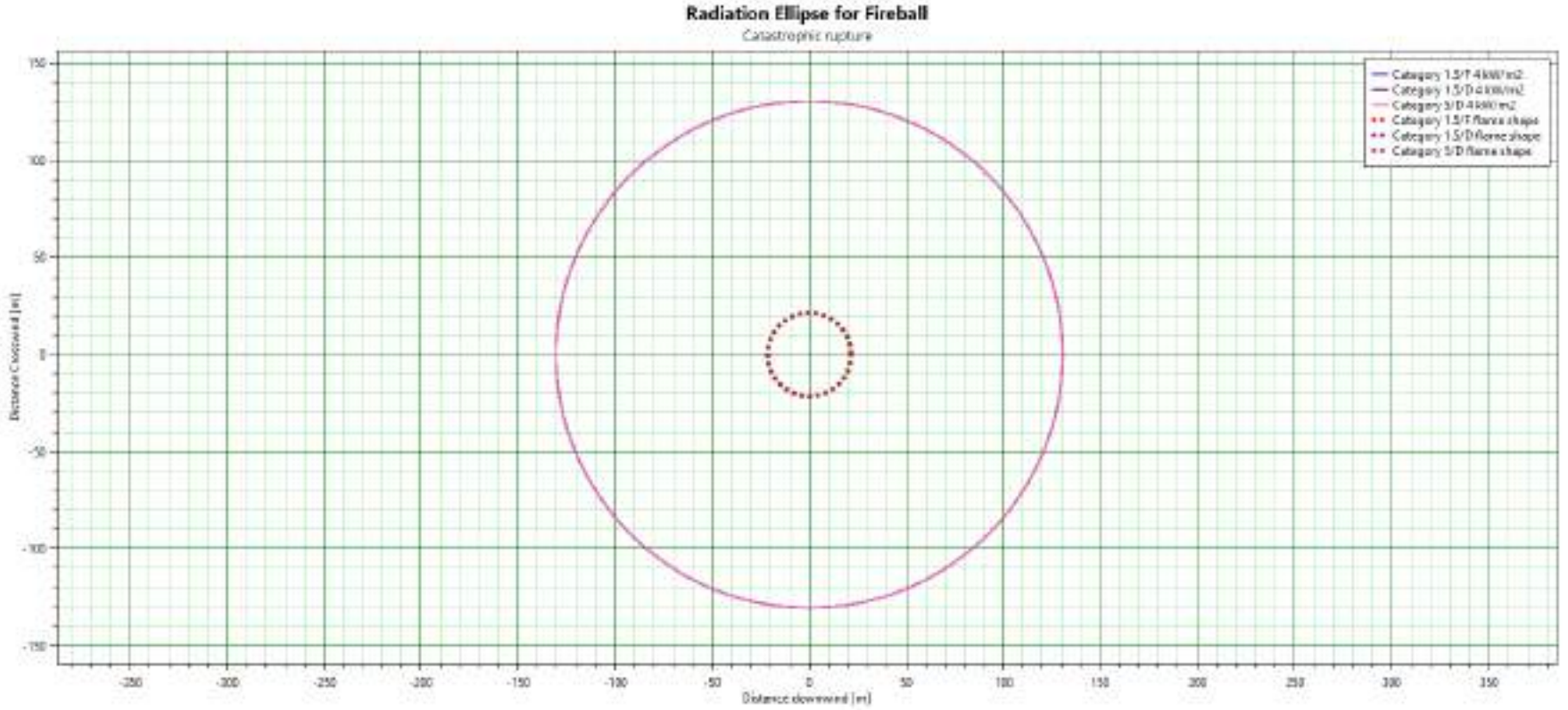


Figure 7.35 FBR & 1.5D weather condition

❖ **Maximum Distance at Overpressure Level (m)**

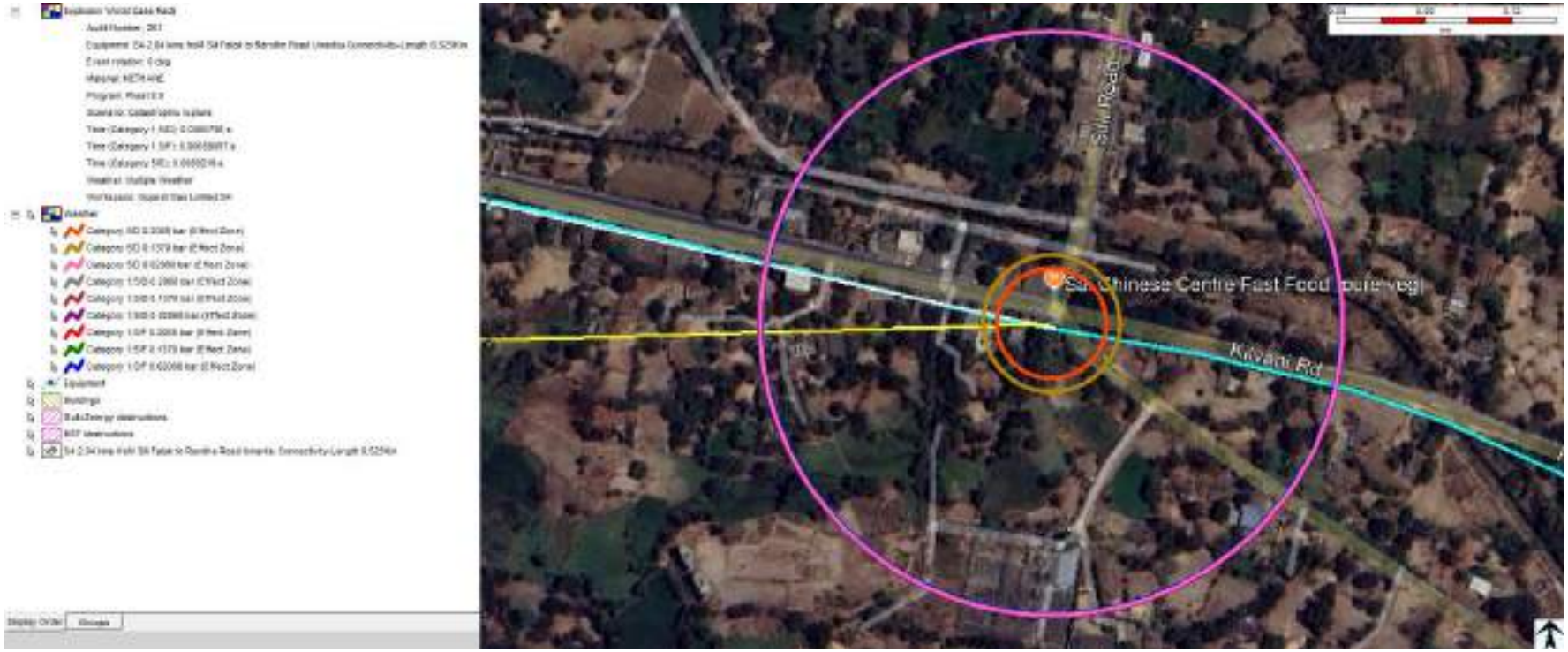


Figure 7.36 FBR & 1.5D weather condition

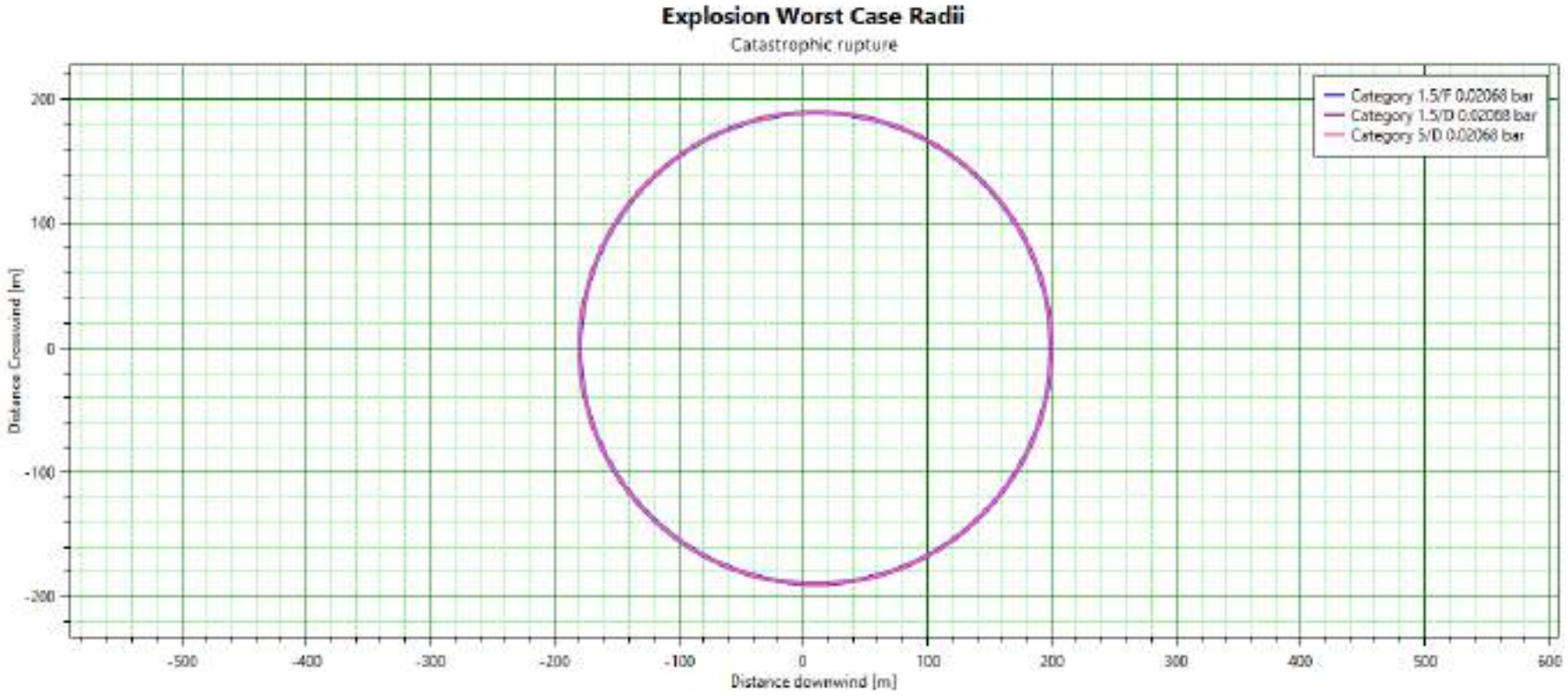


Figure 7.37 FBR & 1.5D weather condition

7.2.12.5 IMP Power Sayli & Siddhant Ispat Connectivity

For IMP Power Sayli & Siddhant Ispat Connectivity Project of Length 7.200Km & 6" Steel/125mm Dia. PE 2 kms from start point IMP Power Sayli & Siddhant Ispat Connectivity Project considered for Jet fire, Flash Fir, Fire Ball and Overpressure analysis as furnished below:

Jet Fire (m)					
Scenario	**Weather**	**Flame length [m]**	**Distance downwind to intensity level 1 (4 kW/m2) [m]**	**Distance downwind to intensity level 2 (12.5 kW/m2) [m]**	**Distance downwind to intensity level 3 (37.5 kW/m2) [m]**
5 mm	Category 1.5/F	1.74225	NR	NR	NR
	Category 1.5/D	1.74225	NR	NR	NR
	Category 5/D	1.74205	NR	NR	NR
25 mm	Category 1.5/F	7.18974	8.82282	6.93629	NR
	Category 1.5/D	7.18974	8.82282	6.93629	NR
	Category 5/D	7.18123	8.49389	6.65697	NR
50 mm	Category 1.5/F	13.2256	18.9889	15.5099	12.5541
	Category 1.5/D	13.2256	18.9889	15.5099	12.5541
	Category 5/D	13.4918	18.5972	15.4948	12.7263

Flash Fire (m)			
Scenario	**Weather**	**Distance downwind to LFL [m]**	**Distance downwind to LFL Fraction [m]**
5 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
25 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
50 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
FBR	Category 1.5/F	11.5046	15.0729
	Category 1.5/D	11.5181	15.139
	Category 5/D	12.1368	19.1739

Fire Ball (m)					
Scenario	**Weather**	**Fire Ball diameter [m]**	**Distance downwind to intensity level 1 (4 kW/m2) [m]**	**Distance downwind to intensity level 2 (12.5 kW/m2) [m]**	**Distance downwind to intensity level 3 (37.5 kW/m2) [m]**
FBR	Category 1.5/F	78.2267	43.0344	130.503	74.2024
	Category 1.5/D	78.2267	43.0344	130.503	74.2024
	Category 5/D	78.2267	43.0344	130.503	74.2024

Overpressure (m)				
Scenario	**Weather**	**Overpressure level [bar]**	**Maximum distance [m]**	**Diameter [m]**
50 mm	Category 1.5/F	0.02068 0.1379 0.2068	31.1472 14.1101 13.0816	42.2943 8.22019 6.16318
	Category 1.5/D	0.02068 0.1379 0.2068	30.4266 13.97 12.9766	40.8532 7.9401 5.95318
	Category 5/D	0.02068 0.1379 0.2068	29.1195 13.716 12.7861	38.239 7.43201 5.57224
Full Bore Rupture	Category 1.5/F	0.02068 0.1379 0.2068	198.766 46.688 37.5072	377.532 73.376 55.0145
	Category 1.5/D	0.02068 0.1379 0.2068	200.257 46.9777 37.7245	380.514 73.9554 55.4489
	Category 5/D	0.02068 0.1379 0.2068	199.492 46.829 37.613	378.984 73.658 55.226

❖ **Flash Fire Envelope (m)**

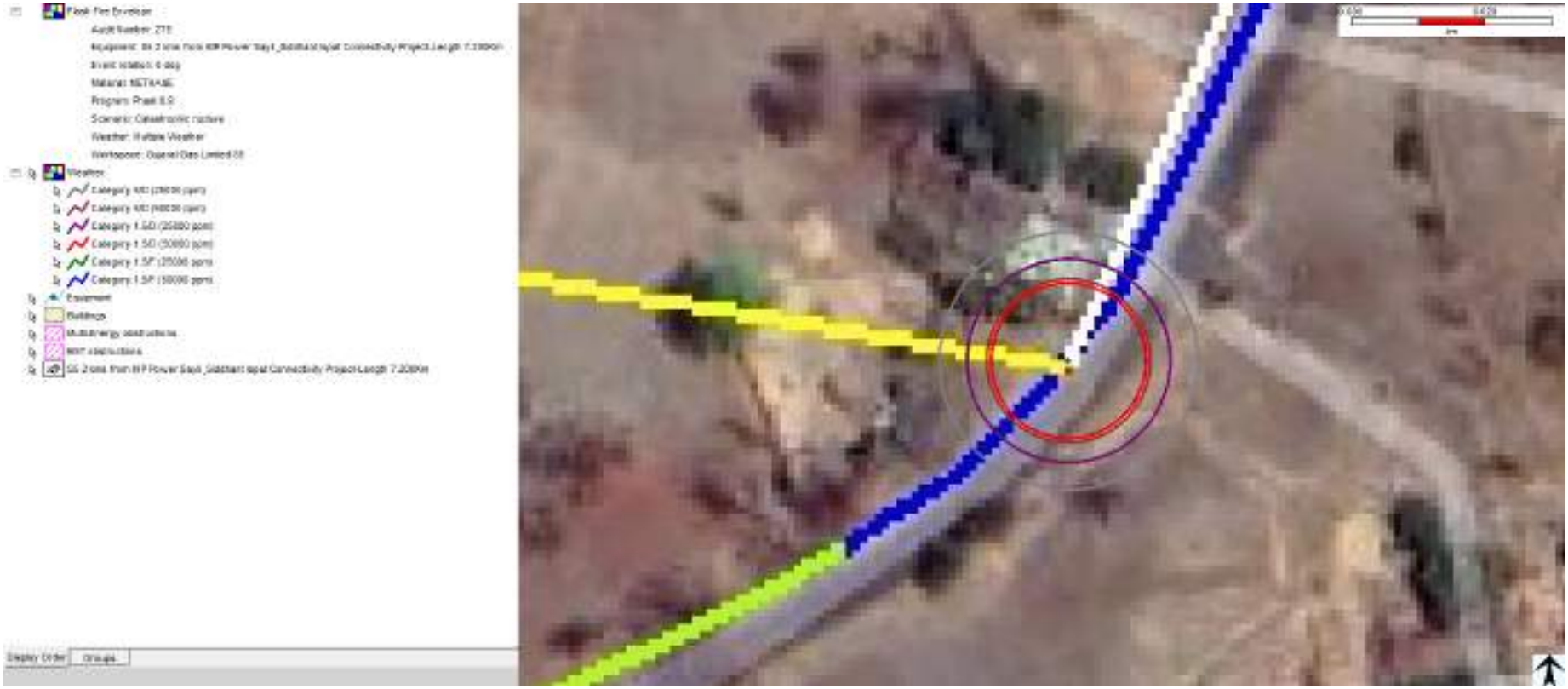


Figure 7.38 FBR & 5D weather condition

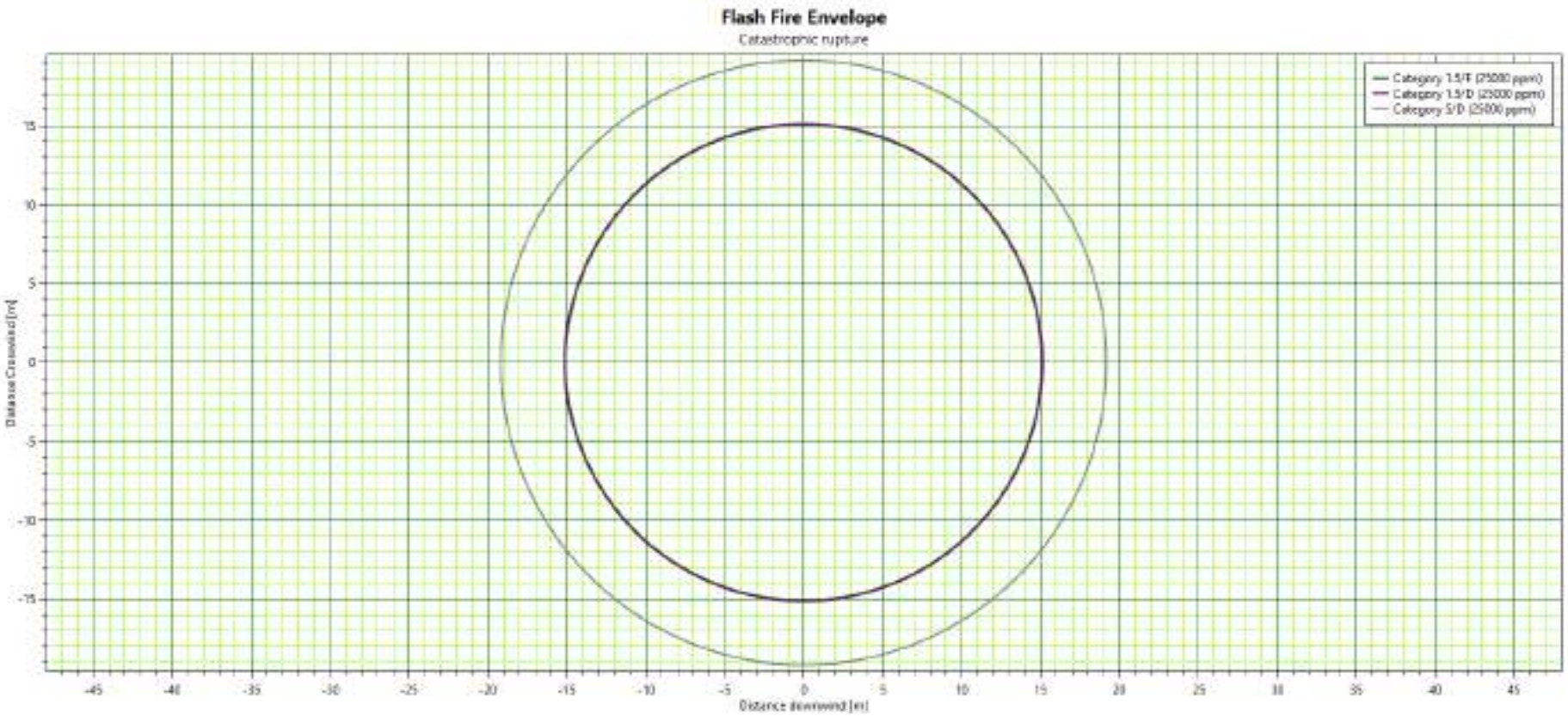


Figure 7.39 FBR & 5D weather condition

❖ **Thermal Damage Distance by Jet Fire (m)**

Figure 7.40 50 mm leak & 1.5D weather condition

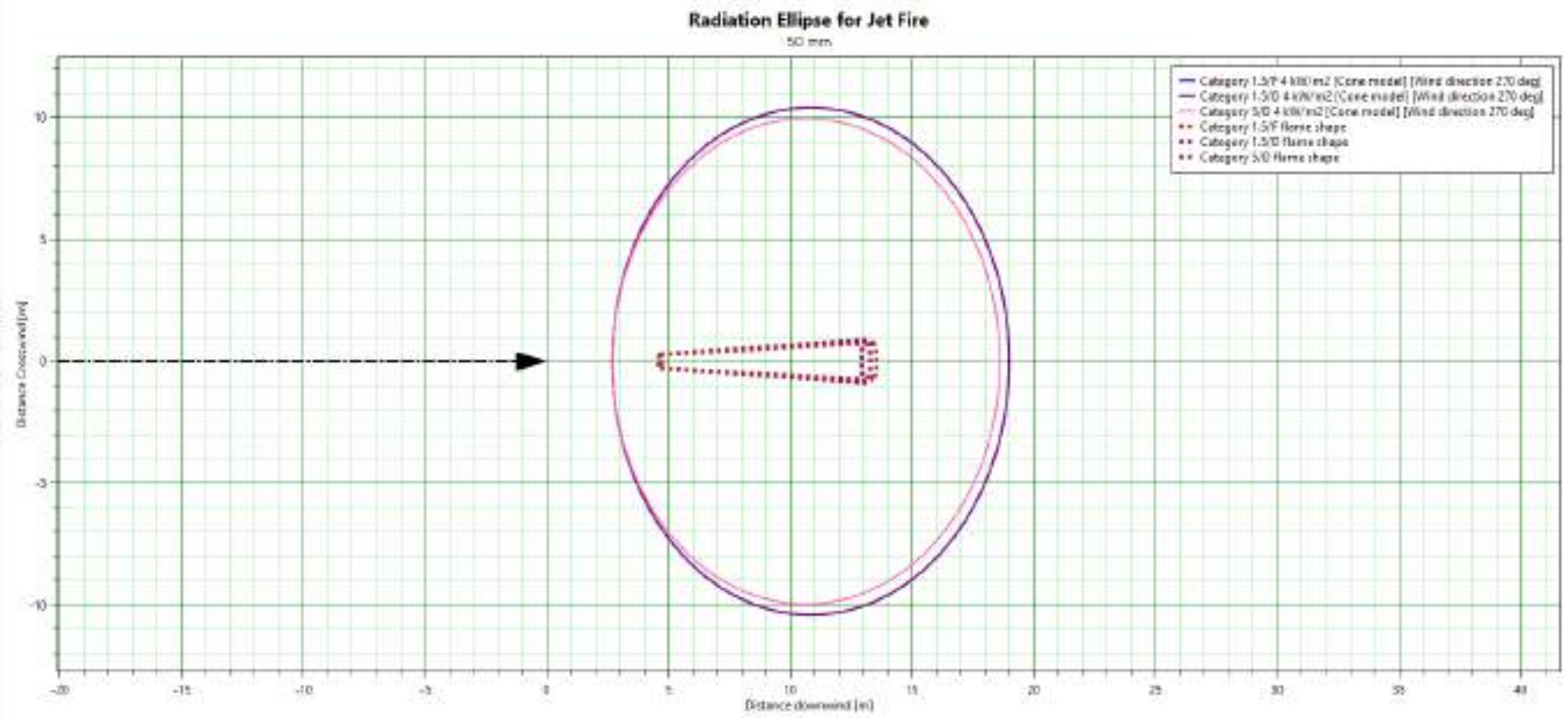


Figure 7.41 50 mm leak & 1.5D weather condition

❖ **Fireball Distance (m)**

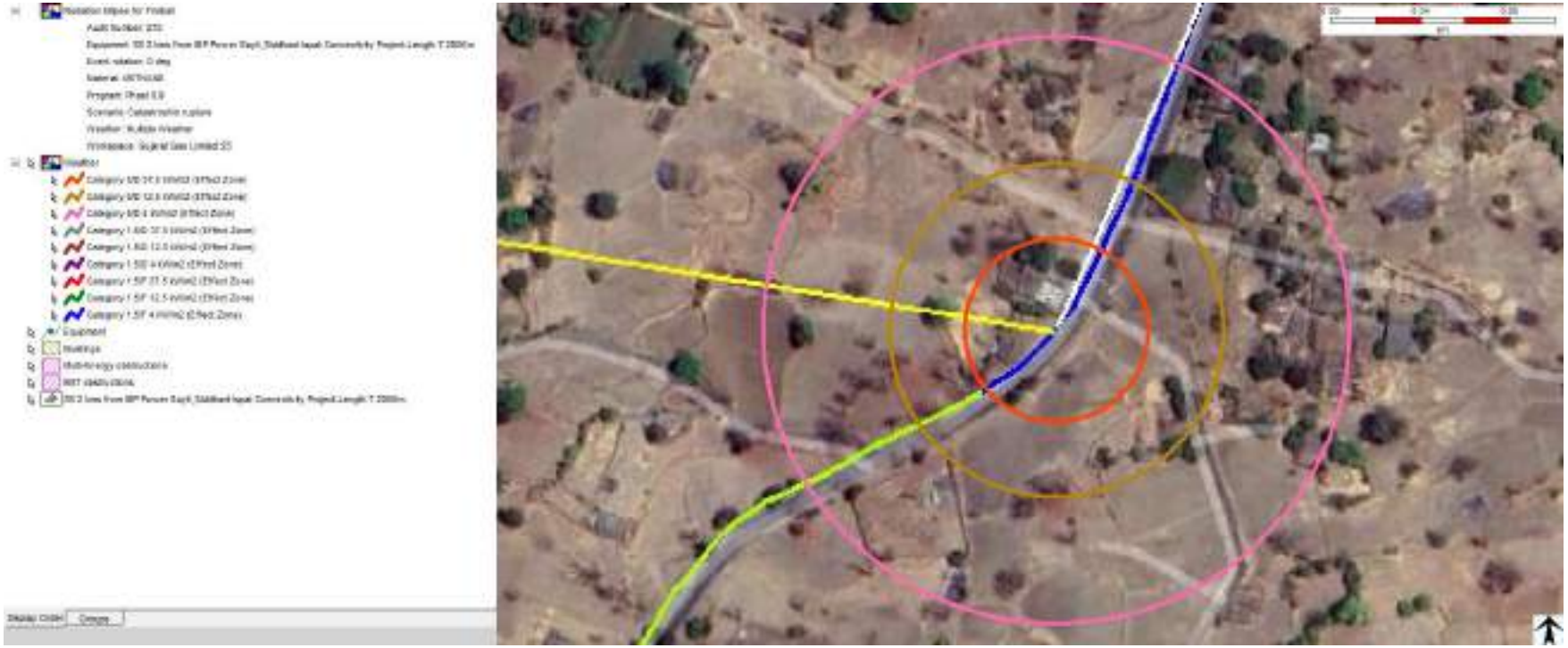


Figure 7.42 FBR & 1.5D weather condition

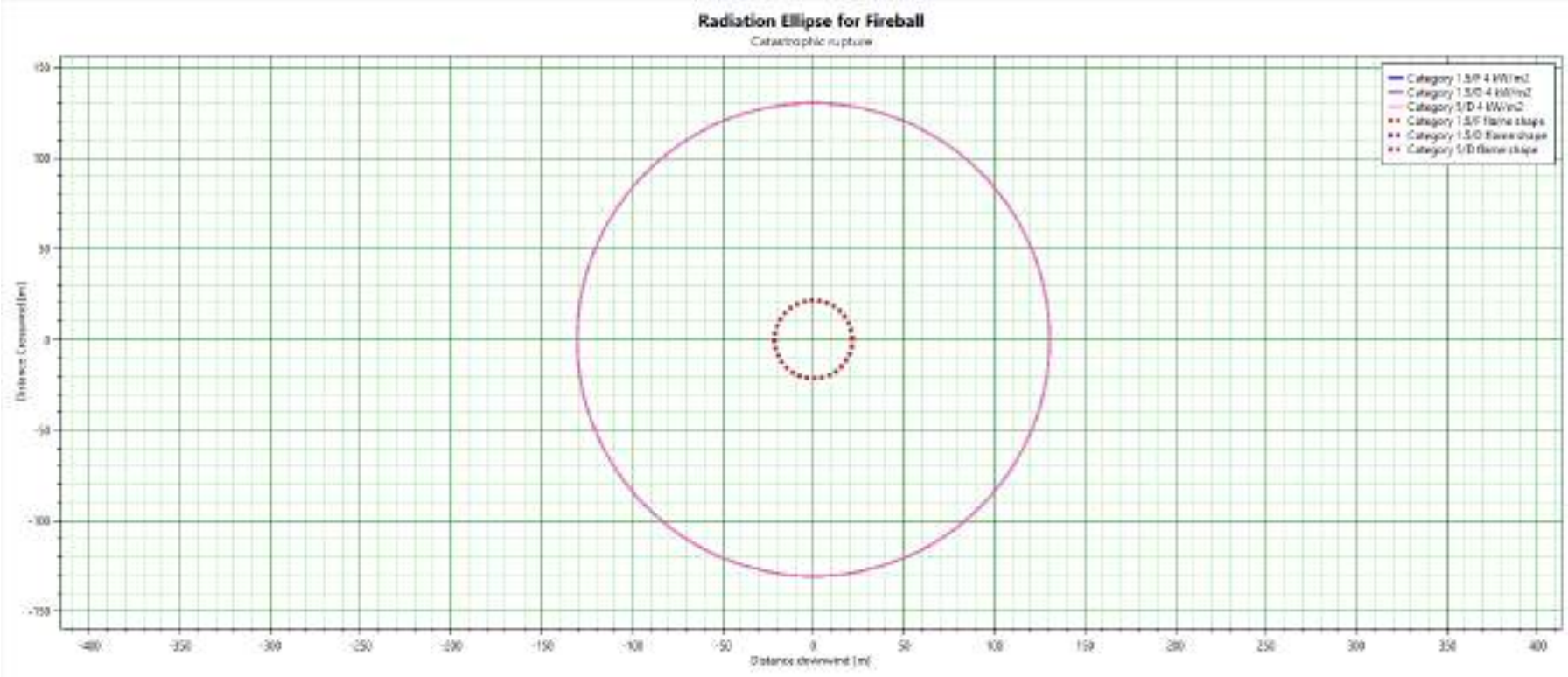


Figure 7.43 FBR & 1.5D weather condition

❖ **Maximum Distance at Overpressure Level (m)**

Figure 7.44 FBR & 1.5D weather condition

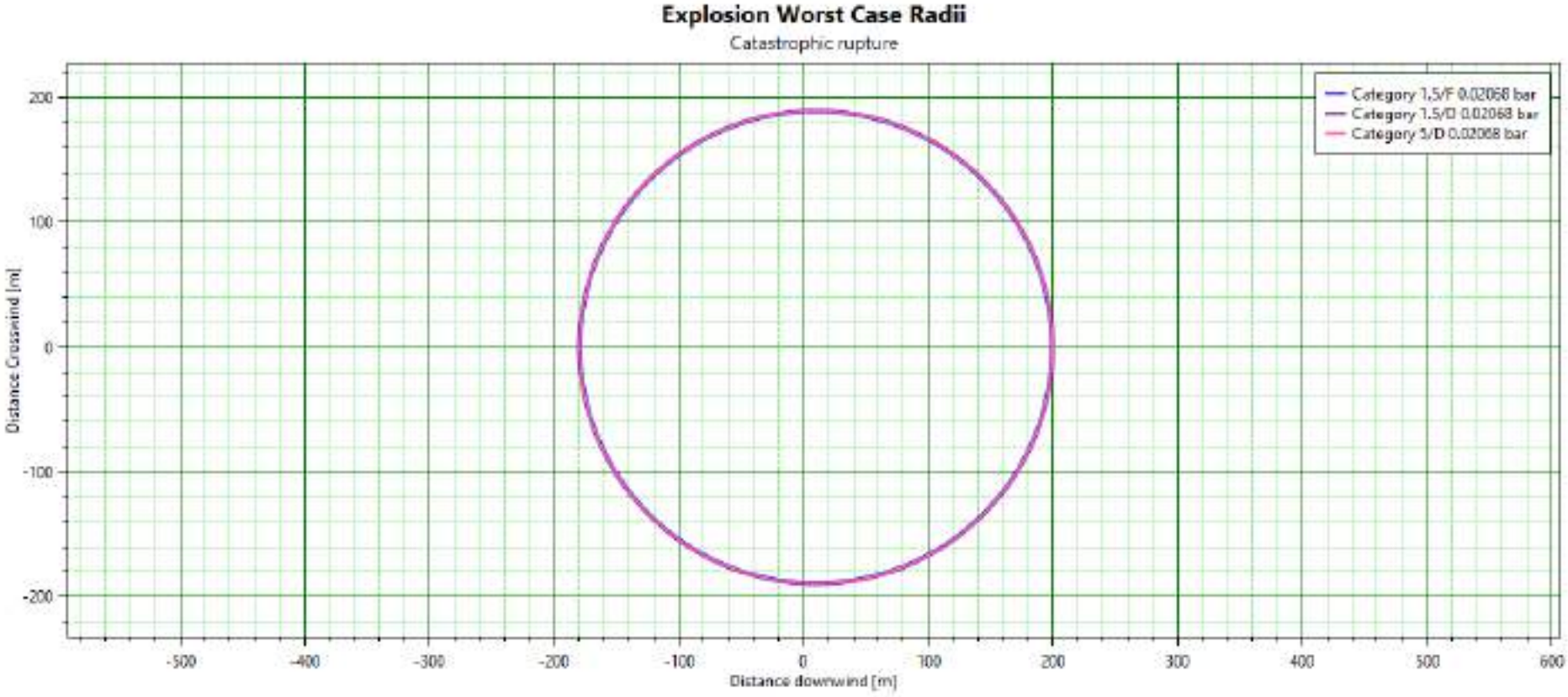


Figure 7.45 FBR & 1.5D weather condition

7.2.12.6 Jackson Industry Athola Connectivity

For Jackson Industry Athola Connectivity Project of Length 2.480Km & 125mm Dia. PE pipeline 1.11 kms from start point Jackson Industry Athola Connectivity Project considered for Jet Fire, Flash Fire, Fire Ball and Overpressure analysis as furnished below:

Jet Fire (m)					
Scenario	**Weather**	**Flame length [m]**	**Distance downwind to intensity level 1 (4 kW/m2) [m]**	**Distance downwind to intensity level 2 (12.5 kW/m2) [m]**	**Distance downwind to intensity level 3 (37.5 kW/m2) [m]**
5 mm	Category 1.5/F	1.74225	NR	NR	NR
	Category 1.5/D	1.74225	NR	NR	NR
	Category 5/D	1.74205	NR	NR	NR
25 mm	Category 1.5/F	7.18974	8.82282	6.93629	NR
	Category 1.5/D	7.18974	8.82282	6.93629	NR
	Category 5/D	7.18123	8.49389	6.65697	NR
50 mm	Category 1.5/F	13.2256	18.9889	15.5099	12.5541
	Category 1.5/D	13.2256	18.9889	15.5099	12.5541
	Category 5/D	13.4918	18.5972	15.4948	12.7263

Flash Fire (m)			
Scenario	**Weather**	**Distance downwind to LFL [m]**	**Distance downwind to LFL Fraction [m]**
5 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
25 mm	Category 1.5/F	NR	NR
	Category 1.5/D	NR	NR
	Category 5/D	NR	NR
50 mm	Category 1.5/F	NR	48.3829
	Category 1.5/D	NR	47.3958
	Category 5/D	NR	47.0177
FBR	Category 1.5/F	21.0461	27.7723
	Category 1.5/D	21.0199	27.663
	Category 5/D	22.079	33.444

Fire Ball (m)					
Scenario	**Weather**	**Fire Ball diameter [m]**	**Distance downwind to intensity level 1 (4 kW/m2) [m]**	**Distance downwind to intensity level 2 (12.5 kW/m2) [m]**	**Distance downwind to intensity level 3 (37.5 kW/m2) [m]**
FBR	Category 1.5/F	78.2267	43.0344	130.503	74.2024
	Category 1.5/D	78.2267	43.0344	130.503	74.2024
	Category 5/D	78.2267	43.0344	130.503	74.2024

Overpressure (m)				
Scenario	**Weather**	**Overpressure level [bar]**	**Maximum distance [m]**	**Diameter [m]**
50 mm	Category 1.5/F	0.02068 0.1379 0.2068	31.1472 14.1101 13.0816	42.2943 8.22019 6.16318
	Category 1.5/D	0.02068 0.1379 0.2068	30.4266 13.97 12.9766	40.8532 7.9401 5.95318
	Category 5/D	0.02068 0.1379 0.2068	29.1195 13.716 12.7861	38.239 7.43201 5.57224
Catastrophic rupture	Category 1.5/F	0.02068 0.1379 0.2068	198.766 46.688 37.5072	377.532 73.376 55.0145
	Category 1.5/D	0.02068 0.1379 0.2068	200.257 46.9777 37.7245	380.514 73.9554 55.4489
	Category 5/D	0.02068 0.1379 0.2068	199.492 46.829 37.613	378.984 73.658 55.226

❖ **Flash Fire Envelope (m)**

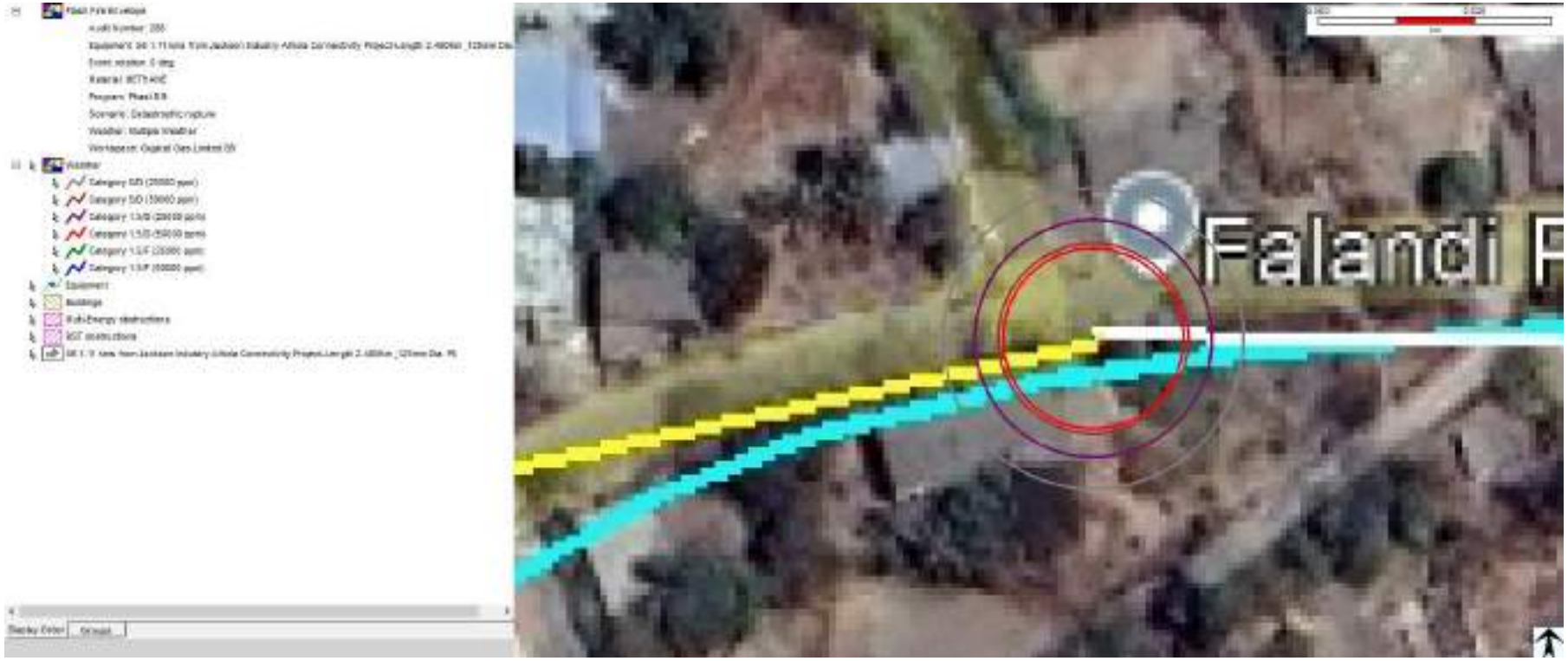


Figure 7.46 FBR & 5D weather condition

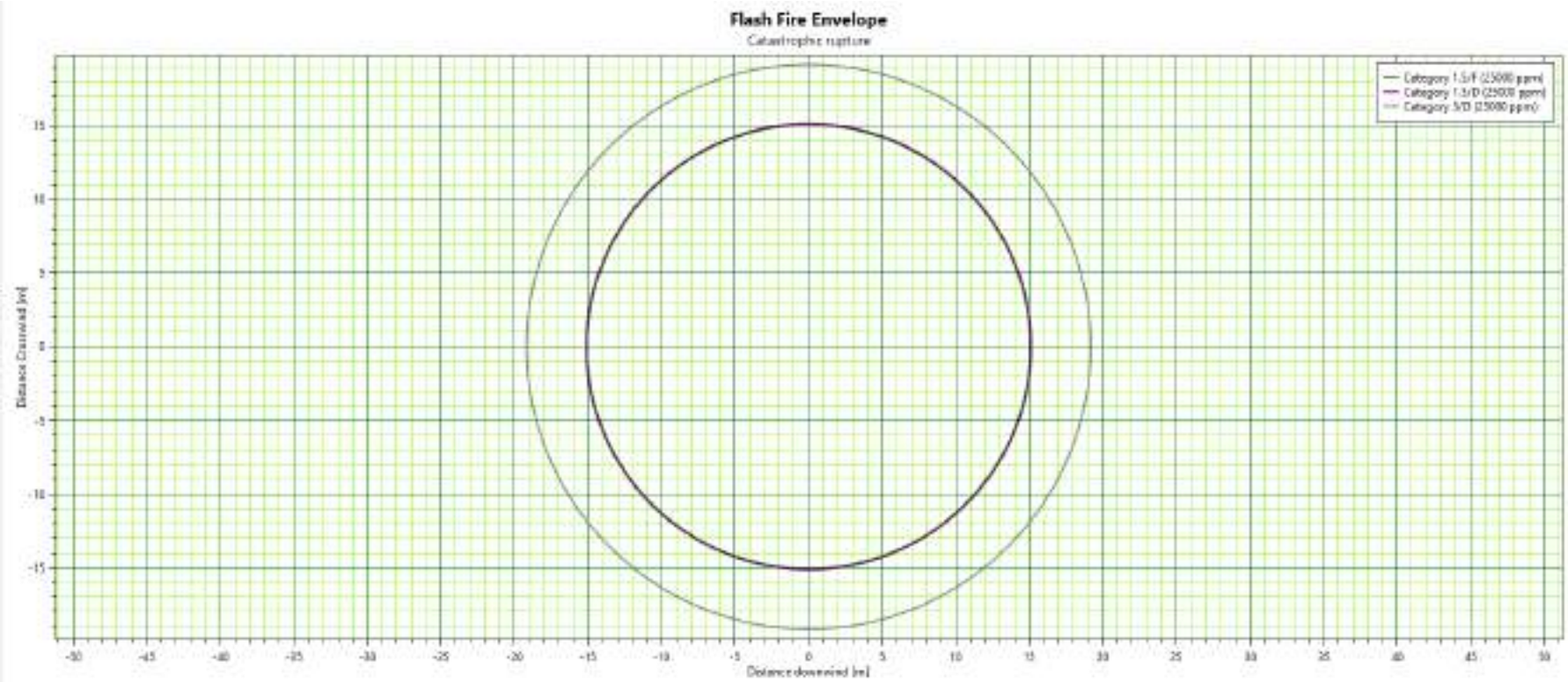


Figure 7.47 FBR & 5D weather condition

❖ **Thermal Damage Distance by Jet Fire (m)**

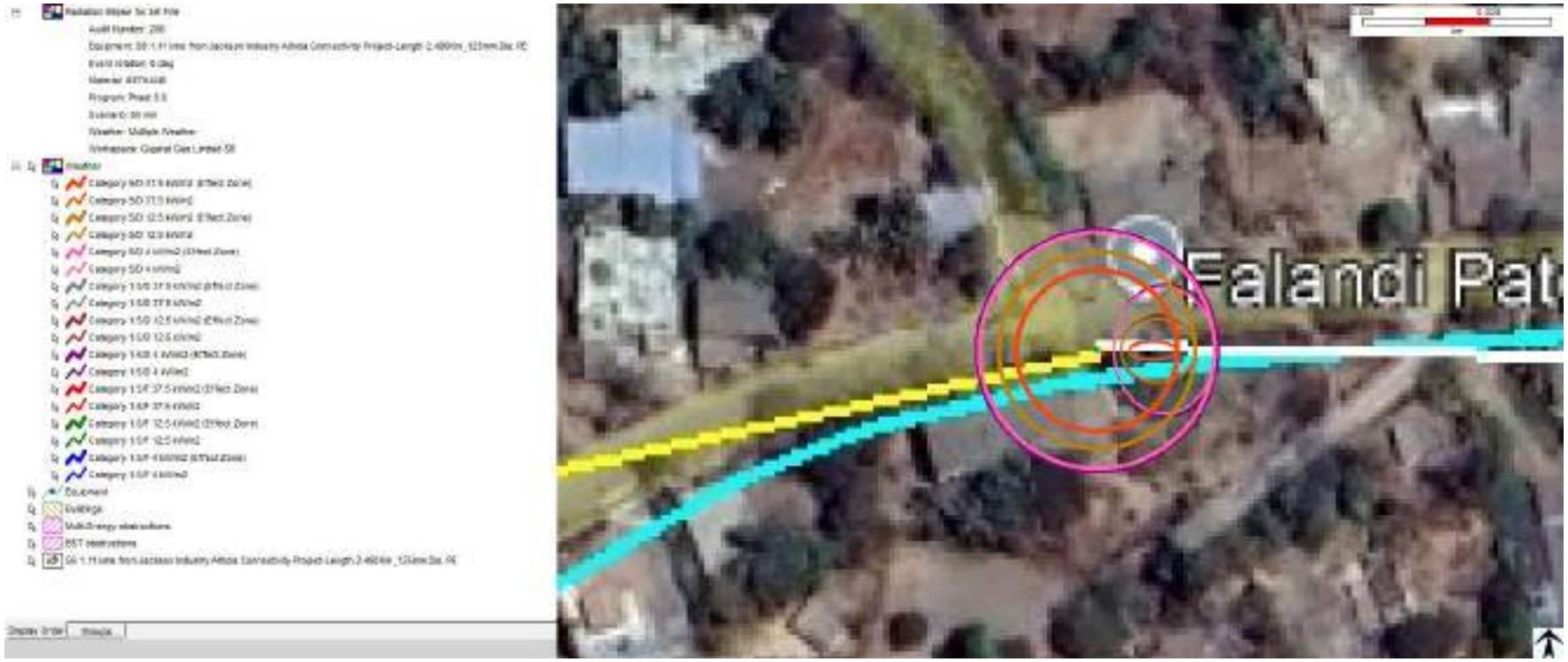


Figure 7.48 50 mm leak & 1.5D weather condition

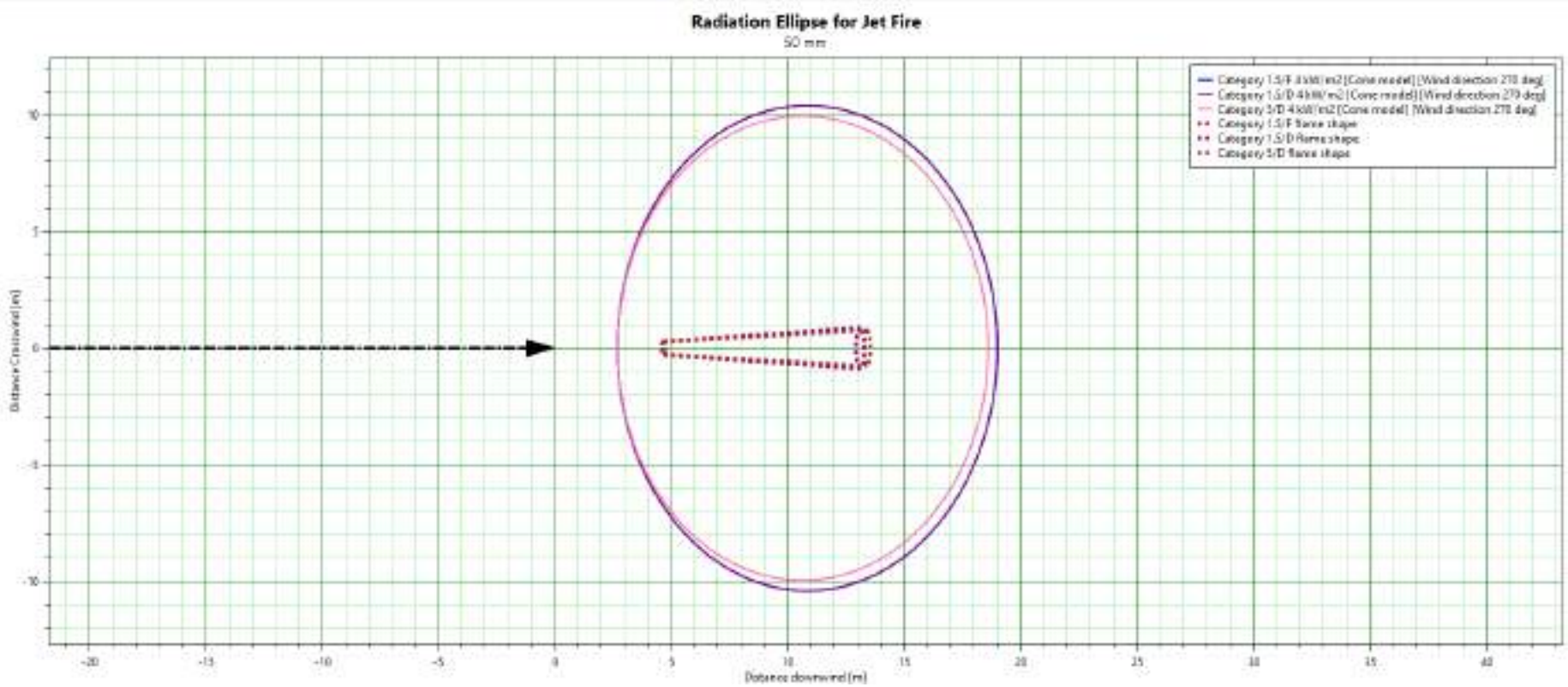


Figure 7.49 50 mm leak & 1.5D weather condition

❖ **Fireball Distance (m)**

Figure 7.50 FBR & 1.5D weather condition

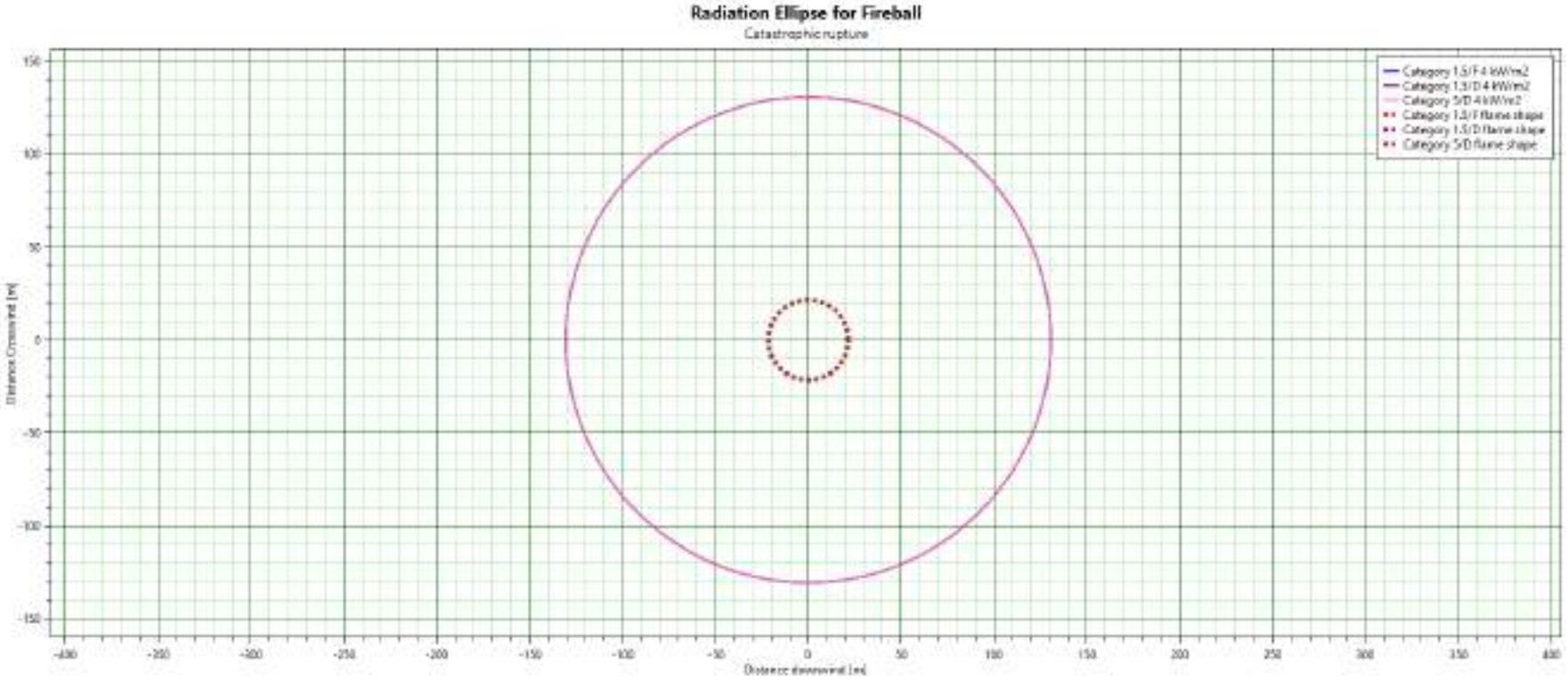


Figure 7.51 FBR & 1.5D weather condition

❖ **Maximum Distance at Overpressure Level (m)**

Figure 7.52 FBR & 1.5D weather condition

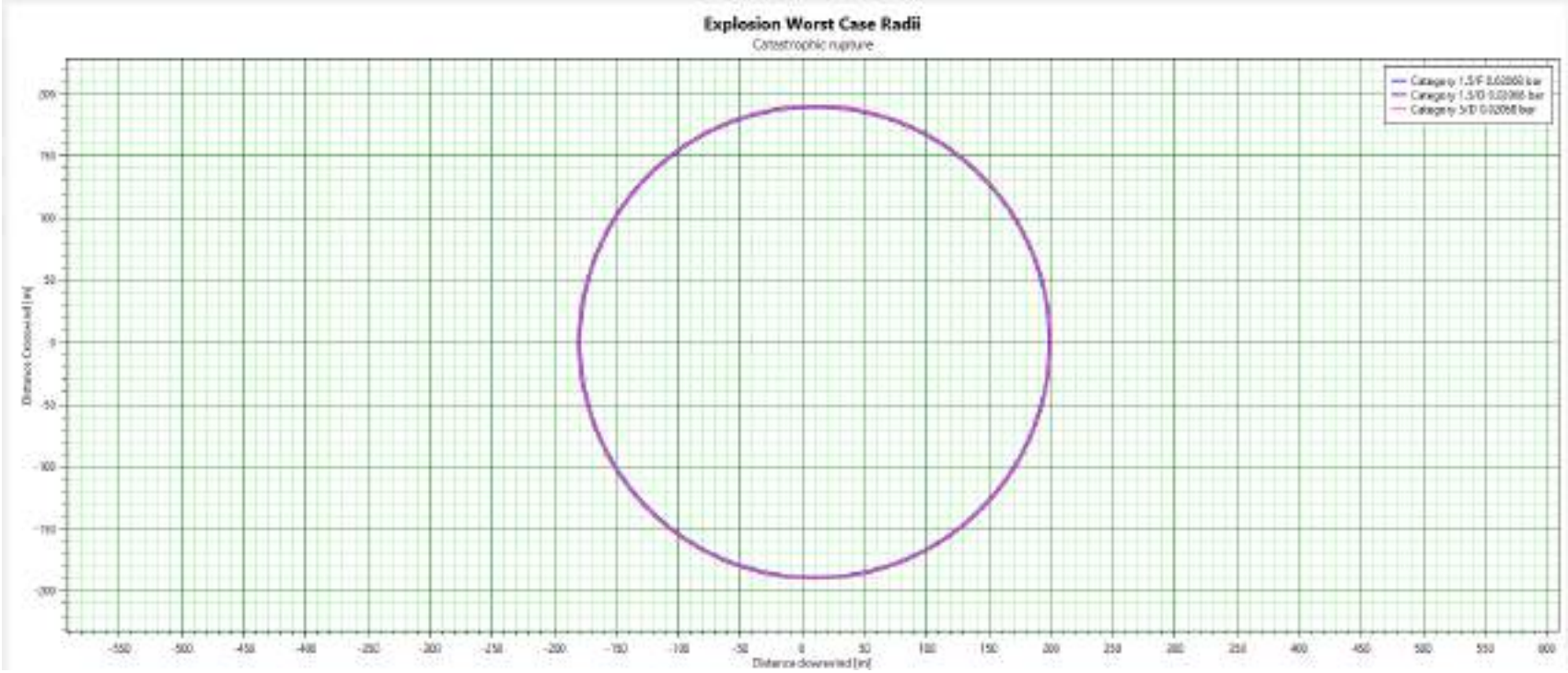


Figure 7.53 FBR & 1.5D weather condition

7.3 Conclusion

In above QRA study we found that Full Bore Rupture (FBR) is worst case scenario. In case of Line rupture the damage distance and affected area around 241 m from the object during worst case.

Follow disaster management plan/procedure in case of any release and fire of NG. Provide specific active and passive fire fighting system.

7.4 Estimation of Effect of Damage / Impact Identification

- Consequence analysis of hazardous chemicals stored in large quantities within premises shows that area prone to fire and explosion is mainly storage tanks of chemicals. The maximum intensity of heat radiation will be due to worst case scenarios.
- Above figures shows the map of threat zone corresponding to different chemicals as well as NG pipeline and its incident outcome cases. The reason for high individual risk at this location is due to considering BLEVE scenario as worst case scenario resulting from the catastrophic failure of barrel. A broadly acceptable level of individual risk as per the ALARP (As low as reasonably practicable) concept of HSE, UK is 10^{-6}/year.

7.5 Proposed Control Measures

Gas leakage:

Although gas leaks are not frequent, detection of gas leaks is simple. Here's how you can detect one

Smell

In its natural state, gas is odorless. To help customers detect leaks, company adds special odorant to the gas so that even small leaks can be detected quickly.

Sound

An unusual noise from your appliance, or a hissing sound from piping or connections may also indicate a gas leak.

Sight

A gas leak may also be detected by unusual flame behavior at an appliance burner. Although rare, a fire in or near a gas appliance or pipe is also signs of a leak. In some cases, vapour is also visible at times of leakage.

Usage

A sudden increase in your gas consumption as shown on your gas statement may be a possible cause of a leak in your gas lines (past your meter set)

Steps to follow in case of gas leak

The steps which required to be followed in case of gas leakage are given below with sign of picute and instruction to follow:

Step No.	Sign/Picture	Instruction to follow
1		**Turn off the gas knob (appliance valve) and control valves**
2		**Open windows and doors for ventilation**
3		**Do not operate any electrical Switches/appliances**
4		**Do not ignite matches, lighters, etc.**
5		**Keep people away from affected area**
6		**In case of Emergency, call our helpline**

To prevent fatalities, injuries and to reduce damage to buildings and contents follow Workplace Emergency Planning & Preparedness procedure:

- Prevailing OISD standards, petroleum rules and all other national & international standards/ codes and practices should be considered during design/ procurement and installation of pipeline.
- Only trained operator should be deployed for operation of the pipeline system.
- The pipeline should be coated and then provided with insulation in the upper layer.
- Monitor the pipeline 24 hours a day, 365 days a year from control centre and through regular aircraft and/or ground patrols that keep tabs on activity near pipeline. The gathering pipelines must be monitored during operation as some do not operate around the clock.
- PLC based leak detection systems for pipelines have to be provided.
- Design and construction of the pipe supports should be rigid to avoid failure of the pipe supports due to earthquake or other natural calamities.

7.6 Risk Reduction measures

I. Engineering design control measures

- Pipeline and associated facilities shall be constructed in accordance with ASME B31.8, PNGRB guidelines and other applicable standards.
- The pipeline shall be laid underground with minimum 1.2 meter cover.
- Additional cover, wherever required, shall be provided in accordance with OISD 226/ PNGRB guidelines.
- All welds shall be 100% radiographed. After the installation is completed, the entire pipeline shall be hydrostatically tested.

II. Instrumentation & control system

- Microprocessor based electronic Instrumentation & control system will be provided for safe reliable and efficient control of natural gas transportation
- in pipeline and to monitor and control of natural gas parameters viz, pressure, temperature, flow, % of LEL, AV Valve’s status, gas analysis, etc.
- The system will also be used for assessment of situations for local control as well as remote operation from the control room.

- SCADA System will be implemented to ensure effective and reliable control, management & supervision of the pipeline from centralized location using remote terminal units located along the pipeline at suitable locations.

III. Corrosion protection

- For external corrosion protection, 03 (three) layers of polyethylene coating will be provided with the minimum thickness of coating of 1.0 mm. This includes 180-micron thickness of epoxy, adhesive thickness of 200 micron.
- An impressed current type Permanent Cathodic Protection System shall be provided. During construction the pipeline shall also be protected by Temporary cathodic protection, till PCP commissioning.

IV. Inspection & maintenance

- The pipeline will be inspected and maintained regularly by reliable trained and qualified staff also for maintenance.
- Continual recording of data relevant for pipeline safety and its evaluation.
- Examination at regular intervals of all equipment serving safe operation.
- Monitoring of the effectiveness of cathodic corrosion protection will be done Regular inspection of pipelines to detect any non-acceptable & temporarily acceptable defects (corrosion, minimum wall thickness, cracks, etc.)

V. Fire and explosion protection

- Fire and gas detection system for field area are will be provided, which will primarily include fire detectors, monitor/ controllers, and annunciators in fire panel.
- Fire-fighting facilities such as static firefighting equipment, DCP type fire extinguisher at Dispatch Terminal, Sectionalizing Valve Stations, Intermediate Pigging station and Receiving Terminal shall be installed. CO2 flooding type extinguisher shall be installed as per requirement.
- Additionally, along the route manned/unmanned Firefighting posts will be created having portable fire-fighting facilities around habitations for ready access to fire-fighting facilities in case of emergency.

VI. Communication & warning systems

- Dedicated Telecommunication System is proposed to connect various attended and unattended stations along the pipelines.
- The system will also provide for voice communication from unmanned stations to the attended stations & also remote monitoring of the cathodic protection.
- Early warning and alarm systems will be installed at intermediate locations.

VII. Emergency management & Disaster Management Plant (DMP)

- Suitable Internal and external emergency plans will be developed with copies made available at the control rooms and dedicated emergency management team will be created and trained for taking actions during emergencies.
- DMP shall be designed as per PNGRB rule.

7.7 Mitigation Measures

General

Measures and Recommendations are asfollows:

- Fire fighting system should be designed as per codes and standards applicable like OISD 117, OISD 141,OISD 226 Industrial design best practices, PNGRB guideline and others regulatory guidelines etc
- Surrounding population (includes all strata of society) should be made aware of the safety precautions to be taken in the event of any mishap in the surrounding area of Pipelines. This can effectively be done by conducting the safety training programs.
- Buildings possibly subjected to external blast waves should be made of reinforced concrete. The windows should be made of blast resistant glass with strong frame.
- Critical switches and alarm should be always kept in line.
- Periodical mock drills should be conducted so as to check the alertness and efficiency of the Disaster Management plan (DMP) and Emergency Rescue Plan (ERP) and records should be maintained.
- Signboard including important phone numbers, no smoking signs, No mobile phones and type of siren to be operated during emergency should be installed at various locations for creating safety awareness at field.

7.8 General Recommendation

- Ensure implementation of inspection and maintenance programme to maintain integrity of the facility including shutdown system, instrumentation, equipment, pipeline, etc.
- Control of work procedure to be implemented in process areas to minimise the potential for human error and prevent incidents.
- Ensure ESD valve shall be designed for fire safe and fail safe type.
- Disaster management plan should be prepared / updated based on the identified scenarios and corresponding damage distances identified in this report.
- Ensure for early detection of gas and prevention of fire, fire & gas detectors system are installed at strategic locations
- To prevent fatalities, injuries and to reduce damage to buildings and contents follow Workplace Emergency Planning & Preparedness procedure:
- Prevailing OISD standards, petroleum rules and all other national & international standards/ codes and practices should be considered during design/ procurement and installation of pipeline.
- Only trained operator should be deployed for operation of the pipeline system.
- The pipeline should be coated and then provided with insulation in the upper layer.
- Monitor the pipeline 24 hours a day, 365 days a year from control centre and through regular aircraft and/or ground patrols that keep tabs on activity near pipeline. The gathering pipelines must be monitored during operation as some do not operate around the clock.
- PLC/SCADA based leak detection systems for pipeline have to be provided.
- Design and construction of the pipe supports should be rigid to avoid failure of the pipe supports due to earthquake or other natural calamities.

7.9 Natural Gas safety Guideline

The company maintains highest safety standards to ensure any accidents are avoided and problems find remedies on time.

Safety Guidelines for PNG

- Do not tamper with any component of the gas connection
- In case the gas flow in your house or area is stopped, inform the Company immediately
- Always close the main control valve if you are not going to be home for a day or more

- When you turn on your gas again after a long duration, make sure all the doors and windows of your house are opened
- Always use standard ISI mark stoves and burners
- Don't ever cover the rubber tubes and regularly clean them with a wet cloth
- Always ensure that the hot utensils or liquids are not in direct contact with your rubber tube
- When you are cooking, make sure that you do not leave the burner or stove unattended
- If you can smell gas or doubt a leakage, do not ignite a match or lighter
- Once you complete your cooking, make sure you close the burner knob and gas tap
- Gas leakage / gas escape can be easily detected due to its peculiar smell or odour
- If the gas supply stops suddenly, close the knob and open all doors and windows. Only once there is no smell of gas should you turn on the stove again
- It is safe to wear cotton apron or cotton clothes during cooking
- Never use a sari to lift any utensils from the stove
- It is always safer to ignite a match first, and then to switch on the gas supply
- Keep children away from the gas stove and gas connection
- Periodically keep checking the rubber tube for any cuts, damage
- Never store combustible or explosive/ flammable items in the kitchen
- When you are cleaning the burner

    - ✓ Close the main valve and gas tap
    - ✓ Allow the stove to cool down and then clean the burners with a cloth. Clean the burners with warm water and use soap or other cleaning agents if the burner is oily
    - ✓ Allow the burner to dry up. Clean the burner head in the similar way. Clean the burner head with a hard brush

Do's & Don'ts

Do's

- Before you turn on your gas stove every morning, make it a habit to open all doors and windows. Since gas is lighter than air, it would disperse immediately in case of any leakage. This will help avoid any incidents of fire or explosions
- In case you smell any leakage, close the main control valve and inform the Gas Company immediately

- If the leakage is observed in the PE (Poly-ethylene) line, inform the company immediately and do not allow any vehicles near the leakage point
- Inform the company for any digging/ construction work on a gas line by you or any other agency near or around your house
- Always close your gas tap before you go to bed at night
- For any changes in your gas pipeline, always ensure an authorized person makes the changes
- Always ensure your rubber tube is correctly fit
- Never use non-standard unauthorized tubes; always insist on rubber tube supplied/ approved by the gas company

Don’ts

- Do not allow any naked flame, spark or smoking near the leakage point
- In case you smell a gas leakage, do not operate any electrical switches and appliances around there
- Do not ignite a match, a bidi, cigarette or candle lamps etc if you smell a leakage
- STOP cooking immediately if you smell a gas leakage
- Do not carry-out/or allow any digging and construction on gas line. If required consult the gas company
- Never carry out any alteration by yourself and never tamper with any parts of the gas connection

Safety Guidelines for Geyser Usage

- Gas geyser is not to be installed in bathroom as being confined space may lead to accumulation of fumes and suffocation or asphyxiation.
- Gas Geysers should be installed at well ventilated areas like kitchen, utility rooms, halls, terrace and passageways.

7.10 References to additional studies

1. CPR 18E, Guideline for quantitative risk assessment, Purple book
2. Methods of the determination of possible damage, “Green Book”, CPR 16E, TNO 1992;
3. HSE’s Hydrocarbon Release Database, 2006/2007, www.hse.gov.uk
4. PHAST Risk Version 8.4 Technical Notes
5. Guidelines for Chemical Process Quantitative Risk Analysis, 2nd Edition.
6. Wind Rose https://www.meteoblue.com/en/weather/archive/windrose/Chennai)
7. OGP Risk Assessment Data Directory, Process Release Frequencies, Report no. 434-1 March 2010
8. Quantitative Risk Assessment-M.J Borysiewiez, M.A. Borysiewiez, L.Garanty, A. Kozubal
9. Guide to Manufacture, Storage and Import of Hazardous Chemicals Rules (MSIHC), 1989 issued by the ministry of environment and forests, (MoEF) Govt.of India as amended up to date.
10. Guideline for QRA from the- “PURPLE BOOK”
11. World Bank Technical papers relating to “Techniques for assessing Industrial Hazards”.
12. Major Hazard Control by ILO.
13. Risk Management Program guidelines by EPA (US).
14. World Bank Technical Paper no. 55 – Technical ltd. For assessing hazards – A Manual.

Chapter 8. Project Benefits

8.1 Improvement in the Physical Infrastructure and Social Infrastructure

As a consequence of the rapid rate of industrialization in India, fuel needs are increasing at an equally rapid rate and the supply-demand gap is widening and steps are being taken to address this issue.

- Pipelines are internationally recognized as the preferred alternative for transport of fuels from the point of view of safety, economy and relative environmentally friendliness.
- The project would enhance employment opportunities through contractors for the local people during construction phase.
- Presence of natural gas pipeline would contribute the growth of City Gas Distribution (CGD) networks in the cities along the pipeline route which would promote usage of CNG for transport sector and lead to reduction in pollution levels.
- There will not be any adverse impact on communication and transportation.
- One of the additional advantages of pipeline transportation is that the scope of economic offences like theft / pilferage and adulteration of products would be almost negligible.
- Residential/Built up area will not be acquired for the proposed project and hence there is no displacement of population. In fact, pipelines are buried underground (at a minimum depth of 1.0 – 1.2m), are controlled by periodic monitoring systems which allow continuous monitoring and rapid closure of valves etc. and that they are routed to avoid human settlements and ecologically sensitive areas.

8.2 Tangible Benefits / National Importance of The Project

One economist has said that energy security is an ink by which the success story of economic growth of country is written. India is no exception to it. In stride for faster economic development, CNG has proved itself a healthy and ecofriendly alternative for industrial uses, domestic use and as fuel for transportation platforms like auto, buses etc., in comparison to conventional fuels like Kerosene, Coal or Wood.

Very rightly Govt. of India has given due importance to development to infrastructural facilities for achieving fuel security. The oil and Gas pipeline being an important component of Natural Gas Supply is considered to be harmonized list of infrastructure sub sectors under energy category. A reference is made to the Govt. of India Extra Ordinary Gazette Dated: 28.03.2012 attached with File No. 13.06.2009-INF which is attached herewith as **Annexure IV**. As per this,

Cabinet Committee on infrastructure has included Oil pipeline, Gas pipeline & Oil /Gas/Liquefied Natural Gas (LNG) Storage facility in the harmonized list of infrastructure sub sectors. This shows the National importance and priority sector of the project.

Being underground buried pipeline of natural gas transportation, it falls under green category and is a clean gas.

8.3 Benefits of Natural Gas

Natural Gas is the preferred fuel. Here are some of the major benefits of using natural gas is as furnished below:

8.3.1 Convenience

Gas is continuously fed into the system so there is no hassles of refilling; it is piped, does not require any space to store, hence handling is easy, safe and secure.

8.3.2 Savings

Total cost of ownership per unit of energy generated is less than many other competitive fuels

8.3.3 Consistent, reliable supply

The very nature of its operations ensure continuous supply of gas to the system; there could be demand supply mismatch but those are very lean periods.

8.3.4 Easier, more affordable maintenance

Maintenance experts from the customer side, no storage requirements, less amount of equipments to handle; all of this makes the maintenance easier and affordable.

8.3.5 Versatility

It is easily transportable to various points of consumption in the house or plant with the help of proper structures.

8.3.6 Safety

High level of safety standards are followed in design of the system; various mechanisms like safety values are present to handle emergencies.

8.3.7 Environmental benefits

Unlike other liquid and solid fuels that generate lot of pollution on combustion compare to Natural Gas and create lot of issues while handling.

8.3.8 Increased resale value of your assets

As this fuel does not create any pollution, inside the plant or house, does not litter and does not cause damage in handling of all these points which ensures good condition of house, plant and equipment

Chapter 9. Environment Cost Benefit Analysis

9.1 Transportation by Pipeline

Transportation of Natural Gas by pipelines is more energy efficient compared to conventional mode by rail/road. It reduces air pollution as well as evaporation losses of precious petroleum products.

9.2 Comparison with other Mode of Transportation

Transportation by pipeline is comparatively less expensive than the other modes of transport, both in the capital and operating costs. A good network of pipelines in the country will ensure that the pipeline-transported products will be available to the consumers at a lower cost than alternate modes of transport.

Chapter 10. Environment Management Plan

10.1 Introduction

Environmental Management Plan (EMP) is the key to ensure a safe and clean environment. The present chapter on Environmental Management Plan envisages the management plan, which is going to be adopted for the Pipeline Project for the proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities.

The following issues have been addressed in this EMP:

- Mitigatory measures for abatement of the undesirable impacts caused during the constructions and operation stage.
- Details of management plans (Green belt development plan, Solid waste management plan etc.) institutional set up identified/recommended for implementation of the EMP
- Post project environmental monitoring programme to be undertaken after commissioning of the project
- Expenditures for environmental protection measures.

10.2 Mitigatory Measures

The major impacts due to different project activities and their mitigation measures have been identified in Chapter-4. These measures together constitute part of Environmental Management Plan (EMP). The environmental mitigation measures have been given below:

A. To control water pollution:

- The drainage from the premises due to storm water or routine cleaning and maintenance would be led to catch pit to arrest suspended solids clear treated effluent would be reused for gardening/washing purposes. Excess effluent, if any, would be let out of the premises, after satisfying the stipulated regulatory standards.
- Septic tank and soak pit for sanitary wastewater.

B. To control air pollution:

- Stack height and emission for the DG Set will be as per CPCB/SPCB stipulations.
- It will be ensured that all the vehicles have vehicular emission within the permissible limits, and engines turned off while standing/waiting.
- Regular monitoring of ambient air quality will be carried out at fixed interval.

C. To Control Pollution Due to Solid Wastes:

- Safe handling of used spent oil at a recommended place, reused as a lubricant in in-house plant and Excess quantity shall be sold to Registered Recyclers of MoEF, New Delhi.
- Suitable disposal of other domestic solid wastes from the plant

D. To Control Noise Pollution:

- Proper maintenance and acoustic enclosure for pumps, and DG sets
- Personal protective equipment for people working in high noise areas
- Blowing horns within the terminal area will be prohibited.

- Green belt will be maintained properly round the year including replacement of the decayed trees and raising of seasonal flowering plants.
- Adequate safety measures complying with the occupational safety manuals to prevent accidents/hazards to the workers.
- Providing suitable human resource management and stable working conditions in order to avoid socio-economic unrest.
- Undertaking appropriate periphery and community development programs in the vicinity.
- Undertaking all necessary pollution control measures to maintain the emissions and discharges within the prescribed/stipulated limits.

10.3 Details Of Management Plans

10.3.1 Greenbelt Development Plan

Green areas not only improve the floral status and land use as well as the aesthetic look of the area, but also serve the dual purpose of filtering any fugitive dust from unpaved or open areas and also help to abate the noise effects through dampening effects and replenish the oxygen and ameliorating the surrounding temperature. Therefore, development of green belt is nowadays imperative around industrial complexes. Forest Department**,** Government of Gujarat would provide guidance to the project proponent in green belt development.

As per environmental policy of MoEF, appropriate nos of trees will be planted against one tree cut for project development. 33% of the total area of each station would be covered by green belt.

Adequate plantation program in and around the project site have been planned and will be adopted in order to enhance the aesthetic look of the area as well as to compensate for any loss in flora during construction. Considering the inadequacy or limitation of space , a nominal green belt has been considered along the periphery in addition to few small patches of green belt has been considered in the unutilized open spaces. Development of green belt will include:

1) The peripheral green belt will vary in width to suit the plant design requirement (refer plot plans where green belt has been shown).
2) Plantation along approach road and pathways for protection against noise and vehicular emissions and for aesthetics.
3) Block plantation in some available open areas.
4) Landscaping and grass plantation on open unpaved areas to prevent erosion of soil.

The following general guidelines and measures will be adopted:

- Felling of existing trees will be minimized.
- The plantation of trees will be initiated with start of the construction stage so that substantial growth may be achieved when the project is completed.
- The greenbelt development program will be drawn to conform to natural climate conditions and adaptability of the species.
- Species involved in plantation should include indigenous, fast growing and sturdy plant species having economic value.
- Proper drainage system and proper plantation techniques should be adopted.
- Plantation should be properly maintained and protected by fencing from grazing and felling.

The plantations would consist of a mixture of carefully chosen locally available species of trees, shrubs and herbs, preferably evergreen and resistant to pollution. The plant species will be selected based on criteria such as being indigenous, fast growing, sturdy, perennial, evergreen and having economic, medicinal or ornamental values, morphological characteristics (height, crown and flowering) availability of local species, resistant to pollutants and adverse environmental conditions, plant layout, climate conditions, water availability etc. Due regard for reasons of fire hazard would be given to tree species which are less littering in nature.

Common indigenous tree species suggested for green belt development are *Azadirachta Indica* (Neem), *Acacia nilotica* (Babul), *Acacia catechu* (Kher), *Buteafrondosa* (Palas), *Cassia fistula* (Mahua).Besides this, ornamental trees such as *Bougainvillea glaba* (Bougainvillea), *Bougainvillea spectalis* (Bougainvillea),*Caesalpenaiapulchernima* (Gultura),*Tecomastans* (Yellow Bells), *Neriumindicum* (Kaner), *Musandaglabra* (Musanda), *Hibiscus rosasinesis* (Jaswand), *Delonixregia* (Gulmohar) *and Lagerstroemia flos-reginae* (Jarul) could be planted.

10.3.2 Solid Waste Management Plan

Solid waste from the proposed activity will be mainly domestic scraps.

- Domestic solid wastes in the form of scraps and papers would be disposed as per the prevailing practice in the area.

10.4 Institutional Set Up

The Ministry of Environment and Forest,(MoEF&CC) vide their O.M. no.J-11013/41/2006-IA.II(I) datd.26th April, 2011 has expressed that there is a need to integrate the environmental concerns including those related to forestry, wildlife and bio-diversity, wherever applicable, into the main stream of the Corporate Policies. It would, therefore, be appropriate that the Corporate Houses, major Public Sector Undertakings (PSUs) and Companies have in place Corporate Environment Policies for Protection of environment.

…..Further to this, it also states,

" Now the matter has been further reviewed and deliberated to bring into focus environmental commitment in the Corporate sector, so that all the proponents integrate environment concerns into their day – today – functioning especially the compliance with the conditions of the clearance.

(A) Corporate Environment Policy

In view of the above, it is felt appropriate that all the major PSUs and companies, as detailed in Section 'C' below, need to:

(i) Adopt well laid down Corporate Environment Policy;

(ii)Ensure, as a part of this Policy, adherence with the environmental clearances and forestry clearances wherever applicable, granted to the Company;

(iii) Ensure that inter-alia the Company functions in conformity with the Policy;

(iv) Ensure that deviations, if any, from this Policy and cases of violations of environmental and forestry clearances conditions that have been found by this Ministry or other public authorities should be duly reported to its Board of Directors and desirably reflected there after on its website and its Annual Report;

(v) Identify and designate responsible person(s) at all levels of their hierarchy for ensuring adherence to this Policy and compliance with Environmental laws and Regulations

These measures to promote environmental consciousness and secure compliance will surely protect the project's stakeholders just like financial systems and audit mechanisms protect the shareholders of a company. "…….

However, presently, the above stipulations are for limited category of industries (as mentioned in section C of above O.M.), understanding the soul and noble cause of the ministry, the GGL (also GSPC) is broadly in compliance of the same in general.

The GGL also conscience about **Corporate Social Responsibility** and has sincere commitment to the same as well.

Corporate Social Responsibility is becoming a very significant part for companies around the world. Over the years, the corporate world has started taking initiatives and supporting endeavors that will have positive effects on society. GGL proud to be a part of initiatives that add value to society. We constantly devote time and dedicate our resources to build meaningful co-existence with the environment. We understand the impact that industries have on society and environment and thus, are doing our little bit whenever we can.

GGL believe education and learning are very significant aspects of a nation's future.

The company has always tried to identify new trends and work towards pooling the right resources. We work towards new schemes and enterprises to involve communities and create an impact where and when we can.

CNG Mechanic Training programme

The company's CNG Mechanic Training programme at Surat provides formal training to mechanics on CNG vehicles thus helping them develop skill sets for a better livelihood.

Solar lamps at Gandhinagar garden

Solar lights adorn the Punit Van developed by the forest department in Gandhinagar. The solar lamp posts carry name of the Company on them.

Prakriti, Environment Education bus

An environment education bus named Prakriti is creating environment awareness among children and acts as a mobile resource centre. The project undertaken jointly with BG India imparts awareness about the environment using a number of games and audio-visual aids.

Safety Awareness Activity

One such initiative is the Safety awareness project. The company hired a competent company with several years of experience in the field of Events for this project. The endeavour is to further spread awareness amongst the people of 150 villages across Gujarat regarding the safe uses of Piped Natural Gas and Compressed Natural Gas.

The main aim of the awareness programme is to disseminate information regarding the safety measures and making sure that the villagers understand the safety tips and retain them.

Until now GGL have managed to cover 95 villages in total across the state of Gujarat. To make sure safety knowledge reaches all sections of the state, we are working on the project, divided into three routes. The first route covers villages of Saurashtra and Kheda. The second route covers Central Gujarat and the third route covers South Gujarat.

A film on Safety Measures of PNG/CNG is used as a media tool to make sure there is higher receptivity amongst the target audience. Film as a communication tool is interactive and sparks attention and interest, leading to desire of action. The film, 25 minutes long, talks about rules and safety measures to be followed related to when PNG/CNG are used daily by villagers in Gujarat. GGL CSR policy attached as **Annexure V.**

10.4.1 Key Players for Implementation of EMP

The responsibility for designing the mitigative measures are delegated to the **Gujarat Gas Limited (GGL),** whose role in present context, is to mobilize the appropriate expertise to mitigate the adverse impact.

Forest Department, Government of Gujarat would provide advice the project proponent in green belt development at the project site.

Department of Environment & Forests (DOEF), and **State Pollution Control Board,** would help for sorting out various environmental issues arising out of the different project activities.

The responsibility of environmental management of the project lies mainly with **Project In charge** who acts as a coordinator for environmental matters.

10.4.2 Safety & Environment Officer (SEO)

The responsibility of environmental management lies mainly with the **Safety & Environment Officer (SEO)** who acts as a coordinator for safety & Environmental matters and supervises the proper implementation of the EMP. The SEO acts as a nodal officer for various groups at project

and head quarters as well as outside agencies like State Pollution Control Board and other Govt. Departments.

Functions of SEO:

- Co-ordination with statutory bodies, various departments in the project site, head quarters, etc.
- Environmental compliance with statutory guidelines and statutory requirements at the project site during operation stages.
- Obtaining consent order from the State Pollution Control Board (SPCB)
- Testing/monitoring of functions of the pollution control systems and environmental field monitoring and analysis in and around the project during operation under post project environmental monitoring programme in house or through recognised third party agencies.
- Maintenance of environmental database, analysis of environmental data, preparation of report, and transmission of report to statutory authorities, head quarters etc.
- Interactions for evolving and implementation of modification programmes to improve the efficiency of pollution control devices/systems.
- Environmental appraisal (internal) and environmental audit through recognised third party agencies.
- Procurement of equipment for pollution control and their testing
- Landscaping and greenbelt development in the project area.
- Water supply and sanitation at the project site
- Looking after occupational safety and health aspects in absence of safety officer
- To strengthen the public image of the company in respect of social aspects and maintain good relationship with community in the vicinity.
- Organizing environmental training, workshops, seminars etc.

Regular training program will be organized to train up the project staff in various environmental and project related issues. Specialists from various fields of environment, health, and project would impart the training. The training would mainly focus on how to handle problem areas.

The monitoring and analysis of various environmental parameters and safety measures will be carried out as per the guidelines lay down by Govt. of Gujarat for the respective parts of the pipeline.

The SEO will regularly monitor the pollution during the construction and operation stages. The State Pollution Control Board (SPCB) may make occasional checks.

10.5 Post Project Environmental Monitoring

It is imperative that the Project Authorities set up regular monitoring stations to assess the quality of the neighboring environment after the commissioning of the project. An environmental monitoring programme is important as it provides useful information and helps to:

- Verify the predictions on environmental impacts presented in this study.
- Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures, and
- Identify the effectiveness of mitigative measures suggested in the EMP

10.5.1 Monitoring Program

Post Project Environmental Monitoring Program

Main purpose of the project is transportation of Natural Gas through pipeline. Impact due to pipeline section is envisaged during construction period/laying of pipeline. Whereas in case of operation phase of pipeline no significant impact is envisaged on soil, surface water, ground water, air, noise, flora, fauna etc. due to it is already buried pipeline below 1.0-1.2 meter.

Table 10.1 Monitoring of Pipeline during Operational Phase

Sr. No.	Particulars	Frequency	Remarks
1	Periodic Monitoring System and reviewing of it	As per standard practice	Continuous process
2	Regular Inspection	As prescribed protocol of the equipment/System	-

3	Manual line inspection	Twice in a Year(Pre-Monsoon and Post Monsoon)/ As per safety Protocol	Also inspect if • Burrowing animals, • Major roots of the trees if planted near the ROU • River crossing/ Change of river course • Maintenance of other pipelines / cables/other such underground utilities crossed during route • Manual damage to pipeline (intentional/ unintentional) are likely to Damage the health of pipeline • Check up for regeneration of fire extinguisher
4	Involve personnel of SV Station etc. in mock drill / training/awareness program etc.	As per Protocol	-
5	Disposal of Pigging waste	As required and guidelines of SPCB	-

10.5.2 Institutional Set-Up for Monitoring

The post project monitoring program will be under the supervision of the SEO at the location. Monitoring can be carried out by outside recognized laboratories/Agencies.

10.6 Other Related Aspects

10.6.1 Fire and Safety Management

Necessary firefighting facilities will be provided to tackle any fire contingency. Regular safety audits will be carried out for improving safety performance. On – site and off-site Disaster Management Plans (DMP) will be developed and mock drills will be conducted at regular intervals to keeps the disaster management team in a state of full preparedness. In addition,

refresher training programme will be conducted at regular intervals for employees and selected contractor employee to enhance their safety awareness and preparedness.

10.6.2 Legal and Statutory Compliance

All the environmental standards/ stipulation will be fully complied with. The plant has to obtain yearly Consent from the State Pollution Control Board for liquid and gaseous wastes disposal as per Water (Prevention & Control of pollution) Act and Air (Prevention & Control of Pollution) Act. It will be supervised that all requirements under these acts and rules are met, and if not met, the satisfactory explanations for it are sought. The officer in charge for environmental aspects will prepare these reports.

10.6.3 Documentation and quality assurance

All the monitoring data, environmental and safety and health related, will be stored in systematic manner so that the specific records are easily available as required. A quality assurance plan will be developed that includes all reference methods for monitoring, relevant analytical technique, calibration of equipment, standard of reagents, collection and presentation of results, frequencies of monitoring etc.

10.6.4 Information Dissemination and Public Relations

Everybody nowadays is concerned about environment. It is needed that people should be provided with environmental data related to the plant so that wrong apprehensions can be removed. This requires a well planned public relation and information dissemination process so that unnecessary public intervention is avoided. This can be done through community in environmental projects (like tree plantation) etc. The management in the project will be entrusted with all these responsibilities.

10.7 Occupational Health and Safety Measures

In large projects, pipeline project in particular, where multifarious activities are involved during construction, erection, testing, commissioning, operation and maintenance, the men, materials and machines are the basic inputs. Along with the boons, the industrialization has brought several problems like Occupational Health and Safety (OHS). The industrial planner, therefore, has to properly plan and take the steps to minimize the impacts of industrialization to ensure appropriate occupational health and safety including fire.

The occupational health problems envisaged in this case in construction stage can mainly be due to noise and accident. The problems of occupational health, in the operation and

maintenance phase are due to accidents. To overcome these hazards following occupation health and safety measures will be undertaken:

- Arrangements will be made to reduce noise levels within limit.
- Suitable personnel protective equipment shall be supplied to workers.
- First aid, ambulance service, and medical check up facilities will be provided.
- A qualified and experienced safety officer will be employed to ensure safety at site.
- Safety training will be provided regularly by the safety officer.

10.7.1 Personnel Protective Equipment

The workers will be given the following suitable personnel protective equipment while working in high noise and hazard prone areas:

1) Industrial safety helmets/ Crash helmets
2) Face shield/Welders equipment for eye and face protection
3) Goggles
4) Ear plug/Ear muffs
5) Gas mask/Breathing apparatus
6) Safety suits
7) Safety belts
8) Hand gloves
9) Gum boots/Safety shoes

10.7.2 Medical Facilities

First aid facilities with ambulance services will be provided to treat the affected people as and when need arises or to shift the injured to the nearby hospitals in case of any trauma. Nearby hospital facilities will also have to be available round the clock for attending emergency arising out of accidents, if any. All working personnel will be medically examined at least once every year and at the end of his term of employment. This is in addition to the pre-employment medical examination.

10.7.3 Safety Policy and Regulations

Keeping in view of the safety requirement during construction, operation and maintenance phase, the project authority will formulate its safety policy and rules in accordance with the

requirement of Factories Act and other standard guidelines. Duties and responsibilities of the safety officers shall be clearly defined.

10.7.4 Safety Officer

The project authority shall employ an officer to ensure safety at its site. The responsibilities of the safety officer shall include identification of the hazardous conditions and unsafe acts of workers and advice on corrective actions, conduct safety audit, organize training programmer and provide professional expert advice on various issues related to occupational safety and health. He shall also see compliance of safety rules/statutory provisions. The contractors will be forced to follow safety rules to ensure safety to all constructions workers.

10.7.5 Safety Training

Safety training will be provided by the safety officer with assistance of faculty members called from Professional Safety Institutions and Universities. In addition to regular employees, limited contractor laborers will also provided safety training. To create safety awareness safety films will be shown to workers and leaflets etc. will be distributed.

10.8 Critical Areas and Conclusion

Following an accidental loss of containment from the process routes or from the storage vessels while loading/unloading/transferring the Natural Gas due to hardware failure or operational errors, a range of generic hazards can occur. These hazards basically lead to fire following a release. This aspect has been elaborated in the Risk Assessment Report prepared separately.

Based on the findings of the EIA Study, following are deemed to be critical areas:

- Noise and dust during construction
- Chemical hazards and risks to workers during operation

It is understood that the plant management will implement necessary and appropriate Mitigatory measures, post project monitoring and safety assurance measures as discussed in the EMP throughout the life cycle of the project. Given that commitment the project should not pose significant intolerable impact to the environment.

Based on these aspects, it can be concluded that the terminal will not have significant adverse impacts on existing environment and ecology of the project area.

Chapter 11. Summary and Conclusion

Environmental impact checklists combine the assessment of individual impacts with a checklist of probable impacts for a project. The following five environmental components have been considered for the purpose of assessment and evaluation of the environmental impact due to the proposed project:

1. Air Environment
2. Noise Environment
3. Water Environment
4. Land Environment
5. Biological Environment
6. Socio Economic Environment

11.1 Air Environment

During the construction phase of pipeline, the air environment with respect to air quality and visibility is likely to be affected by activities like site grading, movement of construction equipment and vehicles etc.

The air quality in terms of concentrations of various criteria pollutants like PM_{10} & $PM_{2.5}$ is likely to increase temporarily.

The construction activities like digging along the pipeline route shall generate dust and deteriorate the visibility.

The impact on air quality during laying of pipeline will be marginal, temporary and reversible in nature.

11.2 Water Environment

- The sewage generated by construction workers at the base camps shall be disposed off suitably through septic tank and soak pit.
- The waste water generation during hydrostatic testing of equipment and pipeline is a temporary and one time activity. The same water will be reused for multiple tests in other sections. The residual hydrostatic testing wastewater at the end of the test will be non-toxic and disposed off suitably.

Hence, the impact on water quality during construction phase will be marginal and confined to use of water by workers and in construction/ testing activities.

11.3 Noise Environment

- Heavy construction traffic for loading and unloading of engineering equipment, materials and pipes are likely to affect the ambient noise level.

Hence the noise levels which will be affected during construction and operation phase shall have a localized change in ambient noise level as primary impact.

11.4 Land Environment

- The land acquisition followed by site grading and civil construction alters the topography of the acquired land.
- The construction of approach roads and laying of the proposed pipeline shall affect the topography.

Hence no impacts on land environment along the proposed pipeline RoU are expected.

11.5 Biological Environment

- The floristic component of the study area does not include any rare or endangered species.
- No rare or endangered species of fauna are reported to exist in the area.

Thus, any impacts on rare and endangered species of flora or fauna are ruled out.

11.6 Socio economic Environment

- The land values around the project site are likely to be increased after the operation of the project.
- The indirect employment to the local population during the construction and operation of the project.
- Once the pipeline is laid, development of other infrastructure facilities shall follow.

  The overall impact shall be positive and beneficial to local economy.

11.7 Summary of environmental impacts & mitigation measures.

The summary showing main issues during the various phases of the project, their specific locations, significance ratings and corresponding mitigation measures are presented in **Table: 4.1** in Chapter 4 Anticipated Environmental Impacts.

11.8 Recommendations for Proximity to Ecologically Sensitive Areas:

- Transport of equipment / material at construction site during this period might affect the movement and should therefore be avoided.
- To avoid influx of people from areas outside the proposed site, local people shall be preferably employed through contractors during construction and operation phase.

- Since the construction activity for the pipeline would be for a short period, the impact shall be temporary in nature.

11.9 Mitigation Measures for the Pipeline:

The following mitigative measures shall be undertaken during construction as well as operation:

1. The pipeline will preferably not install to cross water bodies during the rainy season so as to avoid the problem of soil erosion. Also during the dry weather the amount of water will decrease and many water bodies will become shallow or dry.
2. According to the importance of water bodies either open cut or HDD as per requirement could be used for crossing.
3. After installation of pipes the area shall be reinstated by leveling and filling with excavated soil.
4. To avoid the disturbance in crop pattern in the field the most suitable time for construction is from late Dec to Feb, which is suitable from forest and wild life point of view also.
5. Project information must be given to farmers at the project area before hand at the latest during soil preparation period.
6. Most of the impact on infrastructure will occur during construction, thus caution must be exercised in regard to existing infrastructure along the pipeline route such as telephone cables, water pipelines and highway etc.
7. There shall be sufficient facilities like camps, toilets and garbage dispensers to serve the workers in the project.
8. There should be a public awareness campaign to provide information about the project to people living along the proposed pipeline and to the local government agencies.
9. An emergency plan shall be prepared in advance to deal with firefighting, evacuation and local communication.
10. Compensation for any adverse impact for those who live and or work along the pipeline will be necessary.

11.10 Conclusion

During the environmental assessment study, all possible environmental aspects have been adequately addressed and necessary control measures have been suggested to meet with statutory requirements.

The proposed pipeline project will contribute to economic growth and will help in meeting the increasing demands of Natural Gas in the Union Territory of Dadara & Nagar Haveli

Chapter 12. Disclosure of the Consultants Engaged

12.1 Brief resume and Nature of Consultancy Rendered by SECON Pvt. Ltd. (GIS Driven Multidiscipline Design Consultancy)

SECON Private Limited is a CMMI Level 3, ISO 9001:2008 certified, NABL Accredited, GIS Driven Multidiscipline Engineering Company. SECON is a financially sound, stable, zero-debt Company that was established in 1981. SECON is one of the leading multidiscipline engineering consulting firms and the largest and oldest surveying and mapping firm in India.

12.2 Design Consultancy and Engineering Services Rendered

i. Water, Sanitation and Storm water Engineering (Public Health Engineering)
ii. Highway Engineering and Construction Supervision
iii. Irrigation, Flood Control and Water Management
iv. Electrical Network Distribution Engineering
v. Oil and Gas Pipeline Transportation Routing and Feasibility
vi. Web enabled GIS Driven Software Development and Database Creation for Infrastructure (Public Health Engineering, Highway, Irrigation, Pipeline, and Electrical) Networks and Assets. Also includes GIS for Topographic, Cadastral, Environmental and Urban Planning.
vii. Software development to improve productivity for Engineering Design and Drafting (CAD) fields.
viii. Civil and Structural Design
ix. Town Planning and Urban Development
x. Environmental Engineering and Environmental Impact Assessments and Permitting
xi. Assistance in Right of Use Acquisition and Permitting

12.3 Investigation and Services

i. Land Surveying for Topographic, Cadastral Mapping, Construction Supervision and Hydrographic Surveys
ii. Geotechnical Engineering and Soil Investigations
iii. Ground water and Resistivity Surveys
iv. Underwater Leak Detection and Turnkey Solutions
v. Photogrammetry, LiDar, Satellite Image Processing and Remote Sensing and generation of 3D Digital Terrain and City models.
vi. GIS Data Conversion and Maintenance

vii. Route Planning, 3D Corridor Mapping, Generation of GIS database
viii. Exploration, Mine Survey & Planning
ix. Terrain Evaluation and Geological Appraisal
x. Water Distribution System Leak Detection, Pressure Monitoring and GIS Based Asset Management Services
xi. Detection of Underground Utilities using Ground Penetrating Radar and Associated Tools.

12.4 EIA Team Members

Table 12.1 List of Team Members Involved in EIA Study from SECON PVT. LTD.

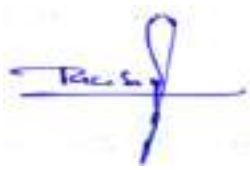
Name	Key Responsibility Area	Signature
Mr. R.K. Singh	Overall Project Incharge	
Mr. Sunny S. Surti	Planning of Site Activity for Environmental monitoring, Review and updating of overall EIA/RA report	
Mr. Ravi Upadhyay	Review of QRA & DMP report , preparation and review of land use/land cover data	
Mr. Ranjeet kumar	Preparation of Routemaps, alignment sheet, creation of GIS database, review of Baseline Report Preparation	
Mr. Manish Bhandari	Preparation of Routemaps, alignment sheet, creation of GIS database	

Table 12.2 List of Team Members Involved in EIA Study from Green Circle, Inc.

EIA coordinator

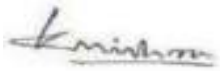
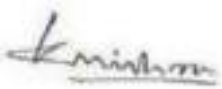
Project Name: Gujarat Gas Limited		
Name and address of the Consultant	Green Circle Inc., Green Empire Anupushpam, Above Axis Bank, Near Yash Complex, Gotri Main Road, Vadodara.	QCI-NABET Accredited NABET/EIA/24-27/IA 0138 Feb 13, 2027
Personnel involved in preparation of EIA/EMP report	Mr. Pradeep Joshi (EIA Coordinator)	
	Mr. Pradeep Joshi (FAE- SHW, NV, AQ, RH)	

Name	Mr. Pradeep Joshi
Signature & Date	
Involvement	• Obtaining information like the PFR that provides the essential project related information for EIA purpose • Ensuring the quality of baseline data through FAEs • Explaining the client the local environmental issues • Developing the environmental management plan including its implementation the monitoring plan • Finalization of EIA/EMP report • Time period [December 2024 to April 2025]

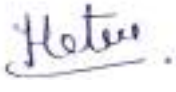
Functional area experts

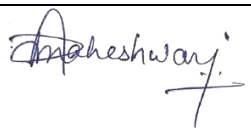
Functional Areas	**Name of the Expert**	**Involvement (Period & Task) [December 2024 to April 2025]**	**Signature & Date**
Meteorology, air quality modelling,and prediction (AQ)	Mr. Pradeep Joshi	Site visit, finalization of monitoring locations, checking air quality data, evaluation of results of Ambient Air Quality Monitoring (AAQM), supervision of air quality modeling and prediction, identification of impacts, suggestion and finalization of mitigation measures with client, and contribution to EIA documentation.	

Functional Areas	Name of the Expert	Involvement (Period & Task) [December 2024 to April 2025]	Signature & Date
Air pollution monitoring, prevention and control (AP)	Mr. Sumant Kuvar	Site visit, finalization of monitoring locations, checking air quality data, evaluation of results of Ambient Air Quality Monitoring (AAQM), supervision of air quality modeling and prediction, identification of impacts, suggestion and finalization of mitigation measures with client, and contribution to EIA documentation.	
Water Pollution (WP)	Dixshant Shastri	Finalization of sampling locations for water sampling, water balance for the project, evaluation of water pollution control management, identification of impacts, suggestion and finalization of mitigation measures, contribution to EIA documentation.	
Solid and Hazardous waste Management (SHW)	Mr. Pradeep Joshi	Identification of the waste generated from the project activity, studying its management and mitigation.	
Socio-Economic (SE)	Janvi Gandhi	Secondary data collection, site visit, evaluation of Socio-Economic status of the study area, assessment of the possible changes to socio- economic issues arising out of the proposed activity, contribution to the EIA documentation.	
Noise and Vibration (NV)	Mr. Ram Raghav	Supervision of noise sampling programme, analysis of data, identification of impacts and mitigation measures, contribution to EIA documentation.	
Ecology and biodiversity (EB)	Mrs. Pooja Sharma	Ecosystem analysis and evaluation, landscape ecology, assessment of impacts on ecological and biodiversity impact assessment on ecology/ biodiversity	

Functional Areas	Name of the Expert	Involvement (Period & Task) [December 2024 to April 2025]	Signature & Date
Ecology and biodiversity (EB)	Prashant Ashok Banne	Ecosystem analysis and evaluation, landscape ecology, assessment of impacts on ecological and biodiversity impact assessment on ecology/ biodiversity	
Hydrology and Water Conservation (HG)	Mr. Pravaranjan Mishra	Site visit, understanding and representing ground water conditions, finalization of survey findings, identification of impacts, suggestion of mitigation measures and contribution to the EIA documentation.	
Geology	Mr. Pravaranjan Mishra	Supervision in undertaking Geology and Geo morphological analysis, studying Stratigraphy/Lithology, Vibration analysis in relation to mining operations, Developing geological maps.	
Soil Conservation (SC)	Ms. Pooja Sharma	Supervision in sampling, analysis and characterization of soil, assessment of fertility/productivity of soil, nutrient availability, assessment and minimizing of impact of gaseous, liquid and solid pollutants on soil.	
Risk & hazard (RH)	Mr. Pradeep Joshi	Identification, finalization of DMP, contribution to RA / DMP documentation.	

EIA Team members of Green Circle Inc.

Sr. No.	Name	Signature
1.	Mr. Ruchit Jayswal	
2.	Ms. Hetvi Dani	

3.	Mr. Avnish Maheshwari	
4.	Mr. Nikunj Pranami	

Annexure I

Grant of PNGRB Authorization to M/s. Gujarat Gas Company Limited, for development of City Gas Distribution Network in the Union Territory of Dadara & Nagar Haveli

Schedule D

[see regulations 10 *(1)* and 18 *(7)*]

Grant of authorization for laying, building, operating or expanding CGD network

To,

M/s GSPC Gas Company Limited,
(Attn: Shri PPG Sarma, Chief Executive Officer),
I.T. Tower – 1, Infocity,
Gandhinagar - 382009
Gujarat

Subject: Grant of Authorization to M/s GSPC Gas Company Limited for development of City Gas Distribution Network in the Geographical Area of UT of Dadra & Nagar Haveli.

Sir,

With reference to your application-cum-bid for grant of authorization for laying, building, operating or expanding the CGD network in **UT of Dadra & Nagar Haveli**, it has been decided to grant you the authorization subject to the Petroleum and Natural Gas Regulatory Board (Authorizing Entities to Lay, Build, Operate or Expand City or Local Natural Gas Distribution Networks) Regulations, 2008 and the following terms and conditions:

1. The Authorized Area for laying, building, operating or expanding the proposed CGD Network shall cover an area of **493** square kilometers and as depicted in the enclosed drawing.

2. The activities of laying, building, operating or expansion of the CGD Network to commence within a period of **180** days from the date of this authorization.

PPG Sarma
Chief Executive Officer
GSPC GAS COMPANY LIMITED

3. The activities permitted above shall have to be completed as per the approved time schedule enclosed at Annexure 1. Any failure on the part of the entity in complying with the **milestones prescribed** in the time schedule shall lead to consequences as specified under regulation 16 of the Petroleum and Natural Gas Regulatory Board (Authorizing Entities to Lay, Build, Operate or Expand City or Local Natural Gas Distribution Networks) Regulations, 2008.

4. The entity shall design and install an optimal size of the infrastructure in terms of pipelines of various types including steel belting of the authorized area, online compressors of adequate capacity for compressing of natural gas into CNG, allied equipments and facilities in the CGD network as identified in its DFR depending upon the potential demand for natural gas. The infrastructure in the CGD network should be adequate to maintain uninterrupted flow of natural gas in the pipelines and be also able to maintain supplies at adequate pressure to online CNG stations.

5. The entity shall maintain an uninterrupted supply of natural gas to all categories of customers in the CGD network. In the event of any disruption in the supply of natural gas in the CGD Network, first priority shall be accorded to restoration of supplies to domestic PNG customers. In case of disruption of supply to domestic PNG customers for more than twelve hours, the entity shall compensate to the domestic customer on the following basis:-

   (a) the normative volume of natural gas consumption for the first domestic PNG connection for cooking requirements based on last three months weighted average consumption per day to be applied for each day's disruption and multiplied by ten;

PPG Sarma
Chief Executive Officer
CSPC GAS COMPANY LIMITED

(b) normative value of natural gas consumption shall be based on last three months' weighted average billing price of natural gas for supplies to the first domestic PNG connection for cooking requirements; and

(c) the value of compensation shall be equal to normative volume of natural gas consumption as per clause (a) multiplied by normative value as per clause (b) and shall be adjusted by allowing a credit to the domestic PNG Customer in the next billing cycle or in the next pre-paid smart card in case of smart card metering.

In case the disruption of supplies is attributed to any fault of the domestic PNG customer, no compensation shall be payable by the entity.

6. The entity is allowed an exclusivity period under the Petroleum and Natural Gas Regulatory Board (Exclusivity for City or Local Natural Gas Distribution Networks) Regulations, 2008, in respect of the following:

(a) **300** months from the date of issue of this communication for laying, building and expansion of the CGD network; and

(b) **60** months from the date of issue of this communication in terms of an exemption from the purview of common carrier or contract carrier for the CGD network:

Provided that the entity meets the obligations in line with the Petroleum and Natural Gas Regulatory Board (Exclusivity for City or Local Natural Gas Distribution Networks) Regulations, 2008:

Provided further that the period of exclusivity allowed under sub-clause (a) or sub-clause (b) may be terminated before the expiry of the period

PPG Sarma
Chief Executive Officer
GSPC GAS COMPANY LIMITED

mentioned above in line with the provisions under Petroleum and Natural Gas Regulatory Board (Exclusivity for City or Local Natural Gas Distribution Networks) Regulations, 2008.

7. The authorized entity shall be required to take prior approval from the Board for creation of any lien, charge or hypothecation of the CGD network to secure finances for the project and furnish details of utilization of funds. However, in case of raising funds from any financial institution or bank, the entity will be required to only inform the Board of the sanction of the funds within a period of seven days.

8. The entity shall submit a detailed and clear financial closure report to the Board within a period of one hundred and eighty days from the date of authorization issued by the Board under regulation 10 of Petroleum and Natural Gas Regulatory Board (Authorizing Entities to Lay, Build, Operate or Expand City or Local Natural Gas Distribution Networks) Regulations, 2008.

9. The entity shall publish the approved network tariff for transportation of natural gas as well as the compression charge for CNG in the CGD network in the authorized area which is also annexed to this schedule.

10. The entity shall publish the applicable retail selling price of PNG for all categories of customers and also for the purpose of invoicing in Rs./ MMBTU.

11. The entity shall publish and display the retail selling price of CNG for the purpose of invoicing to CNG customers in Rs./ Kg at all CNG dispensing stations.

12. The furnishing of performance bond of Rs 298 Crores (Rupees Two Hundred and Ninety Eight Crores Only) is a guarantee for timely commissioning of the project as per the prescribed targets in the bid and for meeting the service obligations during the operating phase of the project.

13. The entity shall abide by-

(a) the service obligations as specified under regulation 14 of the Petroleum and Natural Gas Regulatory Board (Authorizing Entities to Lay, Build, Operate or Expand City or Local Natural Gas Distribution Networks) Regulations, 2008;

(b) the service obligations specified under the Petroleum and Natural Gas Regulatory Board (Exclusivity for City or Local Natural Gas Distribution Networks) Regulations, 2008;

(c) the service obligations specified in Schedule-J to the Petroleum and Natural Gas Regulatory Board (Authorizing Entities to Lay, Build, Operate or Expand City or Local Natural Gas Distribution Networks) Regulations, 2008;

(d) the quality of service standards as specified under regulation 15 of Petroleum and Natural Gas Regulatory Board (Authorizing Entities to Lay, Build, Operate or Expand City or Local Natural Gas Distribution Networks) Regulations, 2008.

14. In case the authorization of the entity is terminated, the Board may assign the rights and obligations of the entity to any agency or another entity on such terms and conditions, as it may deem fit. Further, the entity may be required, as per the directions of the Board, to continue the operations of the CGD network at the same level till another agency or entity appointed by the Board takes over the full control of the CGD network.

PPG Sarma
Chief Executive Officer
GSPC GAS COMPANY LIMITED

15. The entity shall comply with the applicable provisions under the Petroleum and Natural Gas Regulatory Board (Authorizing Entities to Lay, Build, Operate or Expand City or Local Natural Gas Distribution Networks) Regulations, 2008, Petroleum and Natural Gas Regulatory Board (Determination of Network Tariff for City or Local Natural Gas Distribution Networks and Compression Charge for CNG) Regulations, 2008, Petroleum and Natural Gas Regulatory Board (Exclusivity for City or Local Natural Gas Distribution Networks) Regulations, 2008, relevant regulations for technical standards and specifications, including safety standards, any other regulations as may be applicable and the provisions of the Act.

16. The entity shall comply with any other term or condition which may be notified by the Board in public interest from time to time.

You are requested to confirm your acceptance by filling-in the acceptance of the grant of authorization provided below and return the same in original. (Please note that all pages along with the Annexure are to be initialed & stamped).

Yours faithfully,

K. Rajeswara Rao

OSD(R)

Dated: 1st April 2015

PPG Sarma
Chief Executive Officer
CSPC GAS COMPANY LIMITED

Acceptance of the Grant of Authorization

I/We hereby accept the grant of authorization issued by the PNGRB vide letter ref. **PNGRB/CGD/BID/4/2013/10/GA-Dadra & Nagar Haveli- Bid Evaluation** dated **1st April, 2015** and agree to comply with all the terms and conditions subject to which I/We have been granted the authorization for laying, building, operating or expanding city or local natural gas distribution in the authorized area of UT of Dadra & Nagar Haveli.

Date: 10th April, 2015

Place: Gandhinagar

Signature of the Entity or Authorized Signatory

ANNEX 1 - GA of UT of Dadra & Nagar Haveli

Minimum Work Programme as per BID

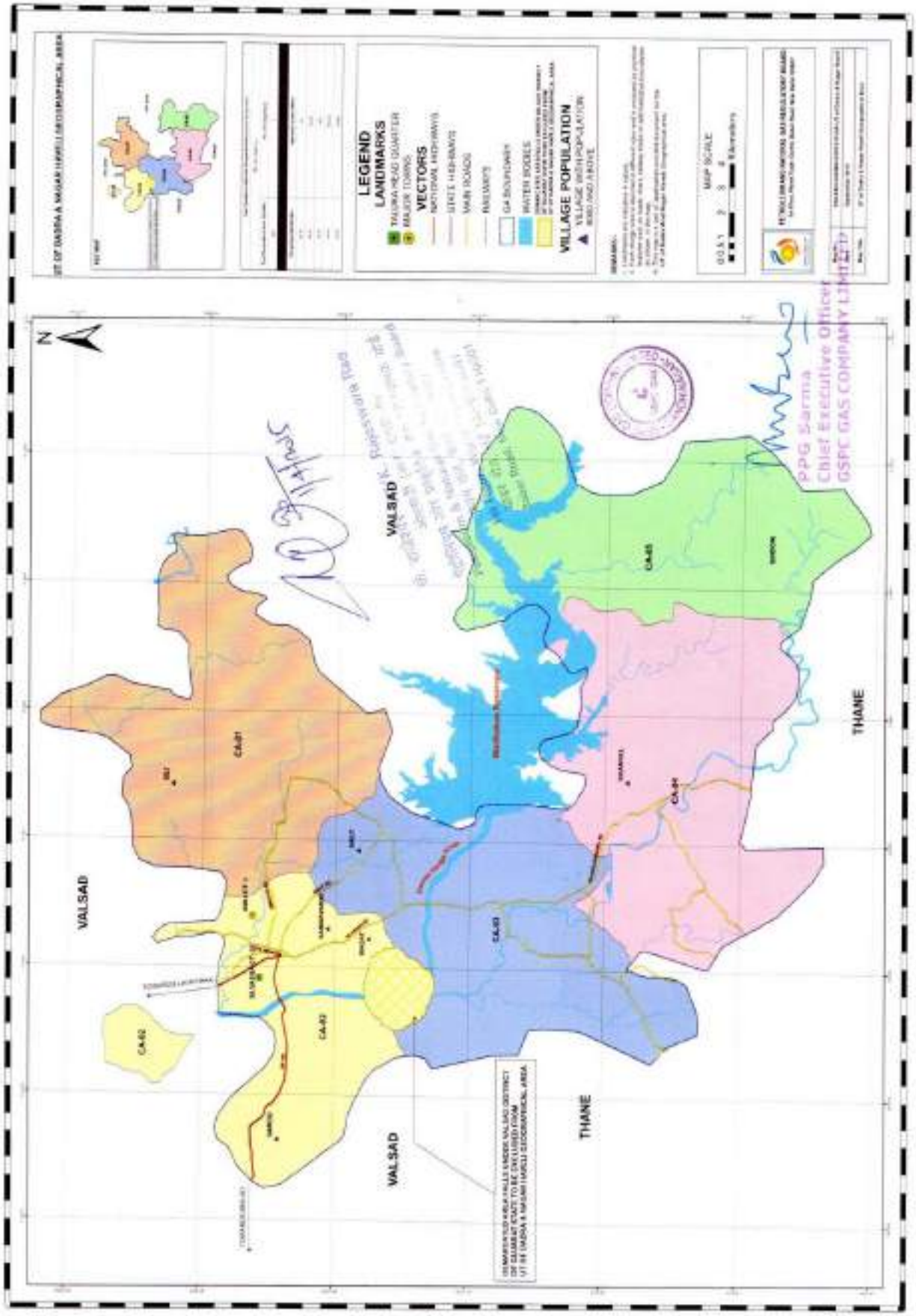
Minimum Work Program as per Regulations (to be completed during first five years of exclusivity)	
Inch- Kms of Pipeline to be Laid.	**No. of Domestic PNG Connections**
320.45	3823

Year wise Break Up of targets					
Total Inch- Kms of Pipeline to be Laid.	**Year1 (20%)**	**Year 2 (50%)**	**Year 3 (80%)**	**Year 4 (90%)**	**Year 5 (100%)**
320.45	64.09	160.23	256.36	288.41	320.45

Year wise Break Up of targets					
Infrastructure for PNG Domestic Connections.	**Year1**	**Year 2 (15%)**	**Year 3 (50%)**	**Year 4 (70%)**	**Year 5 (100%)**
3823	-	573	1911	2676	3823

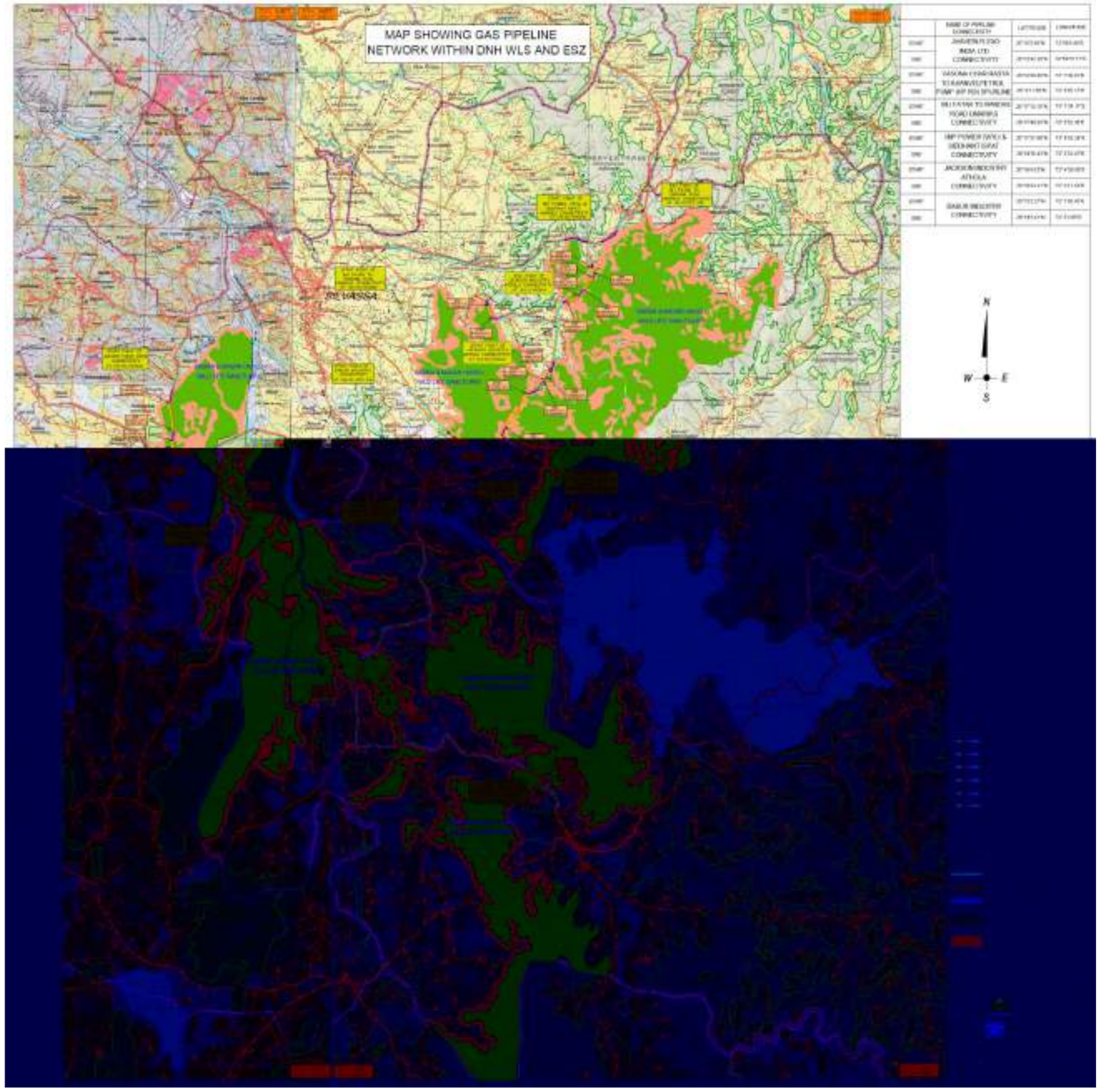
	Rate
Network Tariff (from 1-25 Years) Rs. per MMBTU	**0.01**
Compression Charge (from 1-25 Years) Rs. per Kg.	**0.01**

PPG Sarma
Chief Executive Officer
GSPC GAS COMPANY LIMITED


LEGEND
LANDMARKS
VECTORS
VILLAGE POPULATION
MAP SCALE
N
VALSAD
THANE
VALSAD
THANE
VALSAD
CA-01
CA-02
CA-03
CA-04
CA-05
CA-06
PPG Sarma
Chief Executive Officer
GSPC GAS COMPANY LIMITED

Annexure II

Route Map for Natural Gas Distribution Pipeline Network


MAP SHOWING GAS PIPELINE
NETWORK WITHIN DNH WLS AND ESZ
N
W
E
S

Annexure III

Environmental Standards

A - National ambient air quality standards

Sl. No	Pollutants	Time-weighted average	Concentration in ambient air		
			Industrial, Residential, Rural & other Areas	Ecologically Sensitive Area (notified by Central Government)	Methods of measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2) µg/m^3	Annual * 24 hours**	50 80	20 80	- Improved West and Geake Method - Ultraviolet Fluorescence
2	Nitrogen Dioxide (NO_2) µg/m^3	Annual * 24 hours**	40 80	30 80	- Modified Jacob & Hochheiser Modified (Na-Arsenite) Method - Chemiluminescence
3	Particulate Matter (size less than 10 µm) or PM_{10} µg/m^3	Annual * 24 hours**	60 100	60 100	- Gravimetric - TOEM - Beta Attenuation
4	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$ µg/m^3	Annual * 24 hours**	40 60	40 60	- Gravimetric - TOEM - Beta Attenuation
5	Ozone(O_3) µg/m^3	8 hours * 1hour**	100 180	100 180	- UV photometric - Chemiluminescence - Chemical Method
6	Lead (Pb) µg/m^3	Annual * 24 hours**	0.50 1.0	0.50 1.0	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter

7	Carbon monoxide (CO) mg/m^3	8 hours * 1hour**	02 04	02 04	- Non Dispersive Infra Red (NDIR) spectroscopy
8	Ammonia (NH_3) $\mu g/m^3$	Annual * 24 hours**	100 400	100 400	- Chemiluminescence - Indophenol blue method
9	Benzene (C_6H_6) $\mu g/m^3$	Annual *	05	05	- Gas Chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(α)Pyrene(BaP)-Particulate Phase only, ng/ m^3	Annual *	01	01	- Solvent extraction followed by HPCL/GC analysis
11	Arsenic (As), ng/ m^3	Annual *	06	06	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni) ng/ m^3	Annual *	20	20	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual Arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 8 hourly or 01 hourly monitored values as applicable, shall be complied with 98% of the time in a year, 2% of the time, it may exceed the limits but not on two consecutive days of monitoring.

B- Drinking Water Quality Standards (IS: 10500, 2012)

INDIAN STANDARD SPECIFICATION FOR DRINKING WATER IS: 10500 : 2012					
Sr.no	**Parameter**	**Requirement (Acceptable Limit)**	**Permissible Limit in the Absence of Alternate Source**	**Method of Test, Ref. to**	**Remarks**
1	Colour (Hazen Units), Max	5	15	IS 3025 (Part 4)	Extended to 15 only, if toxic substances are not suspected in absence of alternate sources
2	Turbidity (NTU), *Max*	1	5	IS 3025 (Part 10)	–
3	pH value	6.5 - 8.5	No Relaxation	IS 3025 (Part 11)	–
4	Total Hardness (as CaCO3) (mg/l), *Max*	200	600	IS 3025 (Part 21)	–
5	Calcium (as Ca) (mg/l), *Max*	75	200	IS 3025 (Part 40)	–
6	Magnesium as Mg (mg/l), *Max*	30	100	IS 3025 (Part 46)	–
7	Copper as Cu (mg/l), *Max*	0.05	1.5	IS 3025(Part 42)	–
8	Iron(as Fe) (mg/l),*Max*	0.3	No Relaxation	IS 3025 (Part 53)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3mg/l

9	Manganese (as Mn), (mg/l), *Max*	0.1	0.3	IS 3025 (Part 59)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
10	Chlorides (as Cl) (mg/l),*Max*	250	1000	IS 3025 (Part 32)	–
11	Sulphate (as SO4) (mg/l), *Max*	200	400	IS 3025 (Part 24)	May be extended up to 400 provided that Magnesium does not exceed 30
12	Nitrates (as NO3)(mg/l), *Max*	45	No Relaxation	IS 3025 (Part 34)	–
13	Fluoride (as F) (mg/l), *Max*	1	1.5	IS 3025 (Part 60)	–
14	Phenolic compounds (as C6H5OH) (mg/l), *Max*	0.001	0.002	IS 3025(Part 43)	–
15	Mercury (as HG) (mg/l), *Max*	0.001	No Relaxation	IS 3025 (Part 48/Mercury Analyzer	–
16	Cadmium(as Cd) (mg/l), *Max*	0.003	No Relaxation	IS 3025 (Part 41)	–
17	Selenium(as Se) (mg/l), *Max*	0.01	No Relaxation	IS 3025 (Part 56) or IS 15303*	–
18	Total Arsenic (as As)(mg/l), *Max*	0.01	0.05	IS 3025(Part 37)	–
19	Cyanide (as CN)(mg/l),	0.05	No Relaxation	IS 3025 (Part 27)	–

	Max				
20	Lead (as Pb)(mg/l), *Max*	0.1	No Relaxation	IS 3025 (Part 47)	–
21	Zinc (as Zn) (mg/l), *Max*	5	15	IS 3025 (Part 49)	–
22	Anionic Detergents (as MBAS) (mg/l), *Max*	0.2	1	Annex K of IS 13428	–
23	Total Chromium (as Cr)(mg/l), *Max*	0.05	No Relaxation	IS 3025 (Part 52)	–
24	Poly Nuclear aromatic Hydrocarbons (as PAH) (mg/l), *Max*	0.0001	No Relaxation	ASTM 6440	–
25	Mineral Oil (mg/l),*Max*	0.5	No Relaxation	Clause 6 of IS 3025 (Part 39) Infrared Partition Method	–
26	Residual Free Chlorine (mg/l),*Min*	0.2	1	IS 3025 (Part 26)	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l
27	Total Dissolved Solids, mg/l,	500	2000	IS 3025 (Part 16)	–

	Max				
28	Radio Active	--			–
	a) Alpha emitters Bq/l, *Max*	0.1	No Relaxation	IS 14194 Part 2	–
	b) Beta emitters Bq/l, *Max*	1	No Relaxation	IS 14194 Part 1	–

C- Applicable Noise Standards

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

Note 1 Day time is reckoned in between 6 am and 10 pm.

Note 2 Night time reckoned in between 10 pm and 6 am.

Note 3 Silence zone is defined as areas up to 10 meters around such premises as hospitals, education, institutions and courts. The silence zones are to be declared by the Component Authority.

Note 4 Mixed categories of areas should be declared as one of the four above-mentioned categories by the Component Authority and the corresponding standard shall apply.

Annexure IV

Extra ordinary Gazette

एजेन्सी मास्टर सूची से उन उप-क्षेत्रों को जिन्हें वह सहायता देने की इच्छुक है, के कारण बताते हुए तथा इस सूची में से डिमिटिड उप-क्षेत्रों को शामिल करने अथवा शामिल न करने का पर्याप्त औचित्य देते हुए अपनी सूची तैयार करने के लिए स्वतंत्र होगी।

4. यह संस्थागत तंत्र निर्णय हेतु वित्त मंत्री को सिफारिश करेगा।

5. आर्थिक कार्य विभाग इस संस्थागत तंत्र को सेवाएं प्रदान करेगा।

राजेश खुल्लर, संयुक्त सचिव

अनुबंध-I

अवसंरचना उप-क्षेत्रों की सुमेलित मास्टर सूची

क्र.संख्या	क्षेत्री	अवसंरचना उप-क्षेत्र
1.	परिवहन	• सड़क और पुल • पत्तन • अन्तर्देशीय जलमार्ग • एयर पोर्ट • रेलवे लाईन, सुरंग, सेतु, पुल[1] • शहरी लोक परिवहन (शहरी सड़क परिवहन के मामले में रोलिंग स्टाक के अतिरिक्त)
2.	ऊर्जा	• विद्युत उत्पादन • विद्युत पारेषण • विद्युत संवितरण • तेल पाईप लाईन • तेल/गैसाग्रभूत प्राकृतिक गैस (एलएनजी) संग्रहण सुविधा[2] • गैस पाईपलाईन[3]
3.	जल और स्वच्छता	• ठोस अपशिष्ट प्रबंधन • जल आपूर्ति पाईपलाईन • जल शोधन संयंत्र • सर्वेक्षण संधारण, प्रबंधन तथा निगरानी प्रणाली • सिंचाई (बांध, नहर, तटबंध आदि) • स्टोर्म वाटर निकासी प्रणाली
4.	संचार	• दूरसंचार (फिक्स्ड नेटवर्क)[4] • दूरसंचार टावर्स
5.	सामाजिक तथा वाणिज्यिक अवसंरचना	• शिक्षण संस्थान (कैपिटल स्टाक)

		• अस्पताल (कैपिटल स्टाक)[5] • 1 मिलियन से अधिक आबादी वाले शहरों से बाहर अवस्थित तीन-सितारा अथवा उच्चतर श्रेणी के होटल • औद्योगिक पार्कों, एसईजेड, पर्यटन सुविधाएं तथा कृषि बाजार हेतु सांझी आधारसंरचना • उर्वरक (पूंजी निवेश) • कृषि तथा बागवानी उत्पाद हेतु शीत भंडारण सहित कटाई उपरान्त भण्डारण अवसंरचना • टर्मिनल बाजार • मृदा-जांच प्रयोगशालाएं • शीत श्रृंखला[6]

[1] लोडिंग/अनलोडिंग टर्मिनलों, स्टेशनों तथा सड़कों जैसी सहायक टर्मिनल अवसंरचना शामिल है।
[2] कच्चे तेल का महत्वपूर्ण भंडारण शामिल है।
[3] शहरी गैस वितरण नेटवर्क शामिल है।
[4] [illegible] आप्टिक फाइबर नेटवर्क जो कि ब्राडबैंड/इन्टरनेट उपलब्ध कराते हैं, शामिल है।
[5] चिकित्सा कालेज, पैरा-चिकित्सा प्रशिक्षण संस्थान तथा नैदानिक केन्द्र शामिल है।
[6] कृषि तथा संबद्ध उत्पाद, जल उत्पाद तथा मांस के परिरक्षण अथवा भण्डारण हेतु खेत स्तर प्री-कूलिंग हेतु शीत कक्ष सुविधा शामिल है।

MINISTRY OF FINANCE
(Department of Economic Affairs
(INFRASTRUCTURE SECTION)
NOTIFICATION
New Delhi, the 27th March, 2012

Sub: Harmonized list of Infrastructure sub-sectors and Institutional Mechanism for its updation

F. No. 13/6/2009-INF.—In pursuance of the decision of the Cabinet Committee on Infrastructure (CCI) taken in its meeting held on 1st March, 2012 on the identification of the harmonized list of infrastructure sub-sectors, an Institutional Mechanism is hereby constituted consisting of the following:-

i.	Secretary, Department of Economic Affairs	- Chairman
ii.	Member-Secretary, Planning Commission	- Member
iii.	Secretary, Department of Revenue	- Member
iv.	Chief Economic Adviser, Department of Economic Affairs	- Member
v.	Representative of Reserve Bank of India	- Member
vi.	Representative of Securities and Exchange Board of India (SEBI)	- Member

vii. Representative of Insurance Regulatory and Development Authority (IRDA) - Member

viii. Representative of Pension Fund Regulatory and Development Authority (PFRDA) - Member

ix. Secretary of the concerned Administrative Ministry/Department - Member

2. The Terms of Reference of the Institutional Mechanism would be as under:

i. To update the Master List of infrastructure sub-sectors as enclosed at Annexure-I; and

ii. To revisit the infrastructure sub-sectors outside the Master List which are presently being supported by any agency after an appropriate period of time.

3. As per the decision of the CCI, the harmonised Master List of sub-sectors is meant to guide all the agencies responsible for supporting infrastructure in various ways. Each financing agency shall be free to spell out its reasons and draw its own list of sub-sectors out of the Master List, that it intends to support, with adequate justification for inclusion/non-inclusion of specific sub-sectors from the Master List.

4. The Institutional Mechanism will make recommendations to the Finance Minister for decision.

5. The Institutional Mechanism will be serviced by the Department of Economic Affairs.

RAJESH KHULLAR, It Secy

ANNEXURE-I

Harmonised Master List of Infrastructure sub-sectors

S No	Category	Infrastructure sub-sectors
1.	Transport	• Roads and bridges • Ports • Inland Waterways • Airports • Railway Track, tunnels, viaducts, bridges[4] • Urban Public Transport (except rolling stock in case of urban road transport)
2.	Energy	• Electricity Generation • Electricity Transmission • Electricity Distribution • Oil pipelines • Oil/Liquefied Natural Gas (LNG) storage facility[5] • Gas pipelines[6]
3.	Water & Sanitation	• Solid Waste Management • Water supply pipelines • Water treatment plants • Sewage collection, treatment and disposal system • Irrigation (dams, channels, embankments etc) • Storm Water Drainage System

4.	Communication	• Telecommunication (Fixed network)[4] • Telecommunication towers
5.	Social and Commercial Infrastructure	• Education Institutions (capital stock) • Hospitals (capital stock)[5] • Three-star or higher category classified hotels located outside cities with population of more than 1 million • Common infrastructure for industrial parks, SEZ, tourism facilities and agriculture markets. • Fertiliser (Capital investment) • Post harvest storage infrastructure for agriculture and horticultural produce including cold storage • Terminal markets • Soil-testing laboratories • Cold chain[6]

[1] Includes supporting terminal infrastructure such as loading/unloading terminals, stations and buildings
[2] Includes strategic storage of crude oil
[3] Includes city gas distribution network
[4] Includes optic fibre/ wireless networks which provide broadband services
[5] Includes Medical Colleges, Para Medical Training Institutes and Diagnostic Centres
[6] Includes cold room facility for farm level pre-cooling, for preservation or storage of agriculture and allied produce, marine products and meat

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Annexure V

CSR Policy of Gujarat Gas Limited

GUJARAT GAS LIMITED

(GGL)

CSR POLICY DOCUMENT

Title and applicability

1. Gujarat Gas Limited has developed its CSR policy in accordance with section 135 of the Companies Act 2013 and the Companies (Corporate Social Responsibility) rules 2014 thereof.
2. The Policy shall apply to all CSR projects/programmes undertaken by the Company across its working geographies. (In compliance with provisions of Schedule VII of The Companies Act, 2013)

Vision Statement : Corporate Social Responsibility

As a socially responsible corporate GGL will promote sustained and inclusive growth in the society, especially the communities it operates in, through its business practices and social initiatives. The Company shall strive to remain ahead of the law in pursuit of environment protection and natural resource conservation.

Corporate Social Responsibility Objectives

The Company will: contribute positively towards sustainable and inclusive growth of the society with a focus on tribal, vulnerable and marginalized populations by:

1. be committed to promoting livelihoods in the rural areas of it's operation
2. being committed towards enhancing the socio economic wellbeing of the local community around its operations
3. be committed to imparting skill trainings for making youth employable (especial focus to the rural tribal youth)
4. follow responsible business practices across its operations
5. promoting (crèche/ pre-school) education among migrant children in city migrant colonies
6. Environment and its conservation awareness in schools across its operational areas.
7. Build organizational capabilities and have an effective organization structure to ensure implementation of its CSR policy and programmes
8. Partner with Government, local NGOs, and business partners to achieve its CSR goals
9. Ensuring environmental sustainability, ecological balance, protection of flora and fauna and animal welfare

CSR Budget

1. The Board of Company shall ensure that in each financial year the Company spends at least 2% of the average net profit made during the three immediate preceding financial years.

2. As per section 135(5) and section 134(3) (0), the Company will report reasons for under spending of the allocated CSR budget of the current financial year.

Validity of CSR policy

1. The Company CSR Policy amended by the Board on 18/11/2016.
2. The CSR policy may be amended as required.

Thematic areas

The Company CSR programmes will be identified, implemented and modified as per the CSR policy.

The thematic areas of the Company's CSR programmes will include:

S. no.	Thematic area	Details	Location	Implementation mechanism
1	Community Development	• GGL is committed to raising/improving the standard of living of the local community by providing access to environmental education, health, sanitation, and environment care (green parks) in the areas around its operations. • GGL will identify needs of the people prior to developing and implementing the programmes.	Geographies where GGL works namely Ankleshwar, Bharuch, Surat Vapi and Bhavnagar	• Through support of NGO/ relevant Government agency • The work will be monitored by CSR Team • Direct contribution to implementing Government agency
2	Skill Training	• GGL is committed to strengthening the employment capabilities of marginalised populations across the country. • It will adopt ITIs and improve quality of training, strengthen course curricular, and provide infrastructure support. • GGL will promote the culture of safety. • GGL will enhance employment opportunities for those trained in automobile trade by linking them with its contractor network, wherever possible	Across the Geographical areas as above	• Through support of NGO/ relevant Government agency • The work will be monitored by CSR Team • Direct contribution to implementing Government agency
	Promoting	• GGL will focus on the	Across	• Through support of

	Education	migrant tribal labour communities and their children on education • Promoting environmental awareness in Gujarat	locations	NGO/ relevant Government agency • The work will be monitored by CSR Team • Direct contribution to implementing Government agency
	Preventive Health care/ Hygiene Education/ Nutrition		Across locations	• Through support of NGO/ relevant Government agency • The work will be monitored by CSR Team • Direct contribution to implementing Government agency
	Environment/ sustainability		Across locations	• Through support of NGO/ relevant Government agency • The work will be monitored by CSR Team • Direct contribution to implementing Government agency
	Culture Heritage		Across locations, Ahmedabad and Gandhinagar	• Through support of NGO/ relevant Government agency • The work will be monitored by CSR Team • Direct contribution to implementing Government agency
3	Community support & Environmental sustainability	GGL is committed to the standard of living of the local community by providing necessary support, including supply of gas at free of cost, to crematories and other social projects in the areas around its operations and other	Geographies where GGL works namely various districts in Gujarat, DNH, Thane and other cities	Through support of NGO / relevant Government agency The work will be monitored by GGL Team Direct contribution to implementing Government agency or to NGO

GGL CSR Governance Structure

Board

CSR Committee

PCA (CSR Team)

Implementing partners as decided by the CSR Committee from time to time

Roles and Responsibilities

The Board:

The Board of Company will be responsibile for:

- constituting the CSR Committee with defined composition and tenure through a Board resolution.
- approve the CSR policy as formulated by the CSR Committee through a Board resolution.
- ensure that every financial year funds commiteed by the Company for CSR activities are utlized effectively.
- disclouse in the Annual Report as per clause (0), sub section (3) of section 134 the Companies Act, the names of CSR Committee members, the content of the CSR policy and ensure annual reporting of its CSR activites on the Company's website.
- ensure yearly reporting of CSR activities to the Ministry of Corporate Affairs, Government of India, as per the prescribed format.

CSR Committee:

I. **Composition of the CSR committee**: The Board level committee on CSR consists of the following members.

S. No.	CSR Committee Member	Designation/Category
1	Mr. Sujit Gulati, IAS	Chairman
2	Ms. Manjula Shroff	Member
3	Mr. K. D. Chatterjee	Member
4	Mr. Jal Patel	Member

In case any of the Committee members are not able to continue in this role, prior to the close of his/her tenure, the Company shall instate another Board member in his/her place such that the composition of the Committee is not altered.

II. **Responsibility of the CSR committee:**

- approve activties to be undertaken in CSR as per Schedule VII of the Companies Act 2013.
- recommend to the Board the CSR expenditure to be incurred by the Company.
- regularly monitor the implemention of the CSR policy throught programmes and projects.
- review the CSR policy as need be to modify it.

CSR Team

I. **Composition of the CSR Team:** The Company's existing PCA department, will act as the CSR Coordinating Team. The team will be headed by the Director PCA.

II. **Responsibility of the CSR Team:**

- central coordinating point for documentation and reporting of all CSR activities.
- interface with various organisation units to ensure effective implementation CSR programmes, in line with the programme and budget targets of the year.
- reporting to the CSR committee.
- plan annual budgets for CSR activities.
- any other activities that may be required to effectively delivery of the CSR programmes.

GGL Monitoring and Reporting Framework

- The Company will enhance its monitoring and evaluation mechanism that will ensure every programme has:

1. Clearly defined objectives (developed out of existing societal needs that are determined through baselines/studies/research), targets and time lines.
2. a robust progress monitoring system
3. Undertake impact assessments as per the evaluation plan.
4. a reporting framework and system in aligned with the requirements of the Act.

Programme and Budget monitoring

- CSR spends will be closely monitored. Funds shall be released against verified utilizations as per programmes/projects approved at the beginning of the year. This may be done through monthly field visits, comprehensive documentation, and regular interaction with beneficiary communities.
- CSR spends will be audited.
- at the beginning of the year the expected outcomes, outputs and inputs will be clearly defined for each CSR programme.

- Internal and external agencies shall undertake periodic assessment of the programme while it is being implemented. At the end of the project a third party shall undertake an impact assessment of the project.

Documentation

- In compliance with section 134 of the Act, the Company shall undertake the following:
  - Documentation of CSR projects and programmes.
  - Create a repository of case studies and good practices.
  - Periodic reporting CSR Committee of the Board.
- External reporting on CSR will include:
  - Annual Business Responsibility Report following the SEBI Report format on annual basis.
  - Updated information on corporate website (quarterly basis).

Annexure VI

Quality Policy

GUJARAT GAS

QUALITY POLICY

Gujarat Gas Limited is India's largest City Gas Distribution company engaged in distribution of Piped Natural Gas (PNG) to Domestic, Commercial, Industrial segments and Compressed Natural Gas (CNG) to automobile segment.

Gujarat Gas Limited is committed to

- provide safe and uninterrupted supply of Natural Gas as a preferred energy solution
- provide cost effective high quality services within specified time frame to its valued customers
- undertake necessary efforts to reach out to every possible Natural Gas user in its area of operations
- expand its operations in new geographical areas across country

This is achieved by

- Ensuring long term & short terms contracts for supply of piped natural gas and also sourcing of alternate gas supply arrangements such as liquefied natural gas, biogas, etc.
- Establishing CGD network and CNG/LCNG retail outlets cost effectively and within time frame in all geographical areas
- Ensuring the availability of required resources
- Optimum maintenance and uptime of assets
- Minimising gas emission and loss
- Ensuring proper process control
- Establishing & implementing an effective system by catching business opportunities at right time and managing the risks and changes effectively
- Enhancing competency of people by way of identified training programs
- Compliance to applicable legal, statutory and regulatory requirements
- Understanding and monitoring needs & expectations of stakeholders
- Updating of this policy in line with contextual changes and continual improvement of Quality Management Systems

This policy shall be widely communicated to employee and stakeholders

October 2023

Milind Torawane, IAS
Managing Director

Annexure VII

Asset Integrity Policy

GUJARAT GAS

ASSET INTEGRITY POLICY

We at GGL are committed to ensure that PNG, CNG, LNG & LCNG assets are safe and fit for purpose over their life cycle of Design, Procurement, Construction, Operation, Maintenance and Disposal in order to protect personnel, public, property and environment.

Our commitments

- Compliance with applicable legislations, regulations and relevant national & international codes and standards
- Systematic evaluation of risks associated with operations of our assets
- Effective allocation of resources commensurate with the risks, for prevention, detection & mitigation activities to reduce the risk to As Low As Reasonably Practicable (ALARP) level
- Continual improvement by applying lessons learnt, adopting best practices and upgrading technology

Implementation

- Establish system to identify and comply with applicable legislations, regulations and relevant national & international standards
- Establish Asset Integrity Management Plan (AIMP) to collect, validate & update data, to identify relevant threats, to assess risk and to implement effective control measures for assurance & maintenance of asset integrity risk to ALARP level
- Establish performance evaluation mechanism to monitor effectiveness of Asset Integrity Management System
- Review at regular interval of our Asset Integrity performance against set targets (key performance indicators) to achieve continual improvement
- Implement Management of Change (MoC) process effectively to control system changes affecting the integrity of the asset through rigorous review & approval process
- Create a culture of continuous learning by: Root cause analysis of Asset Integrity failures, incidents & near miss, and sharing of lessons learned with all stakeholders
- Ensure the competency of the GGL workforce & Contractors in an enabling environment to achieve integrity of the assets
- Establish a communication plan to regulate & exchange the information to relevant internal & external stake holders pertaining to asset integrity management
- Engage effectively with other utilities, customers and general public in our operation areas
- Prepare and maintain documented procedures and records necessary to effectively manage the integrity of the assets and associated risks

October 2023

Milind Torawane, IAS
Managing Director

Annexure VIII

QHSE Objective

GUJARAT GAS

QHSE OBJECTIVES

Gujarat Gas Limited (GGL) shall pursue following SMART (Specific – Measureable – Achievable – Relevant – Time bound) objectives to improve the QHSE (Quality, Health & Safety and Environment) performance and fulfillment of needs & expectations of stakeholders:

- Set up/Enhance natural gas infrastructure and network to reach out to all potential customers
- Ensure uninterrupted supply of Natural Gas
- Ensure safe execution of projects and operations of assets
- Minimize ill effect on health & environment due to operations & business activities
- Ensure compliance to timeline for Domestic Connection
- Ensure delivery of the project within timeline
- Ensure highest level of performance by contractor and supplier
- Ensure promptness and effectiveness to improve customer satisfaction
- Improve job skills and capabilities of employees
- Provide suitable support facilities to improve work efficiency
- Enhance compliance through various audits and inspections

GGL shall ensure achievement of objectives through allocation of responsibilities, setting of targets, development of action plans, provision of adequate resources, effective monitoring and periodic management review.

October 2023

Milind Torawane, IAS
Managing Director

Annexure IX

GGL Annual Operation and Maintainance Plan

GUJARAT GAS	Annual Operation and Maintenance Plan (AOMP)	Format No.	AIM-F-15
		Rev. No.	7
		Effective Date	01.08.2023

AOMP - PNG O&M

Type of Asset/Equipment /System	Sl. No.	Name of Activity	Frequency	Ref. Documents: SOP/Guideline/Format	Remarks
City Gas Station / Tap-off Station including FMS	1	Monitoring of Pressure / Flow of CGS	Daily/Hourly		
	2	Testing of Emergency Siren	Weekly		GGL owned installation
	3	Calibration of Metering system Transmitters (PT/TT/DPT)	Quarterly		
	4	Environment monitoring & Noise level	Quarterly		Noise monitoring to be done at boundary of premises during day (6 A.M. to 10 P.M.) and night hours (10 P.M. to 6 A.M.) in each quarter to ensure Ambient Air noise levels within limits specified in the CCA issued by SPCB
	5	Leak Check of all Joints on CGS	Half Yearly	Doc. No.: MAI-P-16 & MAI-F-82	
	6	Valve Operation & Greasing	Half Yearly		
	7	Functional Test of PRV/SSV/CRV & stream change over	Half Yearly		
	8	Checking of Earth pit & Earthing electrodes	Half Yearly	Doc. No.: MAI-P-13 & MAI-F-73	
	9	External examination (visual) of filter & Knock out drum (KOD)	Half Yearly		Form 11 to be obtained for filter & Knock out drum installed inside Factory Licensed Premises
	10	Draining of condensate in Filter/KoD	Half Yearly		Checking Filter cartridge & cleaning based on DPG reading
	11	Thickness checking of filter & Knock out drum (KOD) and above ground piping	Yearly	Doc. No.: AIM-G-01 & AIM-F-14	Form 11 to be obtained for filter & Knock out drum installed inside Factory Licensed Premises
	12	Testing and Calibration of Fixed Gas detection System (OPD / PD)	Yearly	Doc. No.: IGM-P-05 & IGM-F-14	
	13	Functional testing of SRV	Yearly	Doc. No.: IGM-P-05 & IGM-F-16	
	14	Calibration of PT/TT	Yearly	Doc. No.: IGM-P-05 & IGM-F-10/17	PT/TT not related to metering system
	15	Calibration of all Pressure Gauges	Yearly	Doc. No.: IGM-P-05 & IGM-F-11	
	16	Illumination (Lux level) monitoring	Yearly		
	17	Overhauling of PRV	Once in 3 Years		
	18	Hydro testing of Filter and Knock Out Drum (KOD)	Once in 4 Years		Form 11 to be obtained for filter & Knock out drum installed inside Factory Licensed Premises
	19	Painting touch up of A/G piping	Need base / atleast Once in 5 years		Painting for entire gas installation to be done atleast once in 5 years
Odorant System	20	Monitoring of Odorant System Parameters	Daily	Doc. No.: MAI-P-08 & MAI-F-80	
	21	Monitoring of Odorant smell at defined network extreme ends	Fortnightly	Doc. No.: MAI-P-18	
	22	Leak Check of all Joints	Four Monthly	Doc. No.: MAI-P-08	
	23	Maintenance of Odorant system including solar panel, Battery & control panel	Four Monthly	Doc. No.: MAI-P-08	
	24	Monitoring of Scrubber & neutralizing agent	Four Monthly	Doc. No.: MAI-P-08	-replace scrubber as and when required -maintain adequate Qty. of neutralizing agent
	25	External examination (visual) of Odorant tank & Expansion tank	Half Yearly		Form 11 (by competent person) to be obtained for odorant tank and expansion tank
	26	Checking of Earth pit & Earthing electrodes	Half Yearly	Doc. No.: MAI-P-13 & MAI-F-73	
	27	Calibration of PG, PT	Yearly	Doc. No.: IGM-P-05	
	28	Functional test of SRV	Yearly		
	29	Ultrasonic Thickness test of Odorant tank & Expansion tank by competent person	Yearly		Form 11 (by competent person) to be obtained for odorant tank and expansion tank
Steel Distribution Network	30	Patrolling of steel distribution network (including Railway crossing & road crossing)	Monthly	Doc. No.: MAI-P-04 & MAI-F-35	
	31	Leak Detection Test within congested area	Quarterly	Doc. No.: MAI-P-01	
	32	Leak Detection Test in less congested area	Yearly		
	33	LPT Survey of steel distribution network	Yearly		Where LPT is not possible deviation approval for the same is required
Cathodic Protection System	34	Monitoring Readings at TRU	Daily	Doc. No.: MAI-P-09	
	35	Monitoring of ON PSP (TCP/PCP) at TLP & ON/OFF PSP at Polarization Coupon	Quarterly		
	36	Monitoring of Protective devices (Surge Diverter, Polarisation Cell, Interference bonds, Shunts, Resistors, etc.)	Quarterly		
	37	Monitoring of Isolating Joints (ON PSP)	Quarterly		
	38	Monitoring of Foreign Pipeline Crossings (ON PSP)	Quarterly		
	39	Monitoring of HT Crossings (ON PSP)	Quarterly		
	40	Monitoring of Minor/River Crossings	Quarterly		
	41	Monitoring of Sacrificial Anodes	Quarterly		
	42	Shorting Between Casing & Carrier Pipe	Half Yearly		(In wet and dry season)
	43	Monitoring & Maintenance of Anode Ground Bed and AIB/CJB	Half-Yearly		
	44	Maintenance of TRU	Half-yearly		

,Econnect Id : 108180 Approved by: Yogiraj Navathe on 28/07/2023
,Approval Note/Document Ref No:AIM-F-15/Rev 07/AOMP-PNG

GUJARAT GAS	Annual Operation and Maintenance Plan (AOMP)	Format No.	AIM-F-15
		Rev. No.	7
		Effective Date	01.08.2023

AOMP - PNG O&M

Type of Asset / Equipment / System	Sl. No.	Name of Activity	Frequency	Ref. Documents: SOP/Guideline/Format	Remarks
Cathodic Protection System	45	Calibration of TRU meters - Voltage & Amp meter	Yearly	Doc. No.: MAI-P-09	
	46	ON-OFF PSP at TLPs	Yearly		
	47	Current measurements at Type-B TLPs	Yearly		
	48	Monitoring of Isolating Joints (ON-OFF PSP)	Yearly		
	49	Monitoring of Foreign Pipeline Crossings (ON-OFF PSP)	Yearly		
	50	Monitoring of HT Crossings (ON-OFF PSP)	Yearly		
	51	CIPL ON/OFF PSP along the length of the pipeline	Once in Five Year		
	52	DCVG Survey along the length of the pipeline	Once in Five Year		
	53	CAT/CAT-A Frame- to check the condition of coating	As and when required		
	54	Preventive maintenance of TLPs, Painting, etc.	As and when required		
PRI Other than CGS (Combo skid, CPRS, IPRS,DRS,DPRC) and IMS	55	Maintenance of PRI (GGL Owned) including ... 1. Checking the Filter cartridge, cleaning and Draining of Condensate (Based on DPG reading) 2. Leak Detection 3. Functional Test of PRV/SSV/CRV (of stand by stream) & stream change over 4. Housekeeping 5. Valve Operation & Greasing of ball valve 6. Visual Inspection for painting condition	Half yearly	Doc. No.: MAI-P-16 & MAI-F-82	For Customer Owned PRI, Customer has to obtain Third Party Agency certification, as per PNGRB regulation at every three years
	56	Thickness assessment of pressure vessel and above ground piping (sections >=300# Class) at Combo skid & DRS/CPRS	Yearly	Doc. No.: AIM-G-01 & AIM-F-14	Form 11 to be obtained for filter & Knock out drum installed inside Factory Licensed Premises
	57	Checking of Earth pit & Earthing electrodes	Half Yearly	Doc. No.: MAI-P-13 & MAI-F-73	
	58	Functionall test of SRV	Yearly	Doc. No.: IGM-P-05 & IGM-F-16	
	59	Calibration of PG/TG/DPG/PT/DPT	Yearly	Doc. No.: IGM-P-05	
	60	Overhauling of PRV	Once in Three years		
De-Compression Skid (DCS) Station	61	Planned Maintenance of Decompression Skid including ... 1. Checking & cleaning of Filter/Strainer (based on DPG reading) 2. Leak Detection of entire skid 3. Functional Test of PRV/SSV/CRV (of stand by stream) & stream change over 4. Housekeeping 5. Valve Operation & Greasing 6. Visual Inspection for painting condition & correction if required	Half Yearly	Doc. No.: MAI-P-28	
	62	Planned Maintenance of Water bath heater including functional checks of all interlocks & alarms	Half Yearly		
	63	Calibration of Pressure Gauge, Temperature Gauge, Level Gauge, Temperature Element, Temperature Transmitter, Pressure Switch, Level Switch, Temperature Switch	Yearly	Doc. No.: IGM-P-05 & MAI-P-28	
	64	SS tubing and fitting maintenance	Quarterly	Doc. No.: CNG-P-01 & MAI-P-28	
	65	Stationary Cascade Maintenance	Quarterly		
	66	Stationary Cascade hydrotesting and Ultrasonic Examination	Once in Three years		
PE Distribution Network	67	Patrolling of MP PE network & Crossings	Monthly	Doc. No.: MAI-P-04 & MAI-F-35	
	68	LPT / UDT of PE Network	Quarterly	Doc. No.: MAI-P-01	
	69	Special Leak Survey during festival	Half Yearly		(before holi & diwali Festival)
Valve chambers (PE & Steel Network)	70	Maintenance of Valves and Valve chambers including 1. Leak test of joints, fasteners, gasket by Gas Detector as well as soap solution 2. Greasing and purging (for valves installed on steel pipeline network) 3. Check for ease of operation of valves 4. Cleaning, De-watering and General Housekeeping of Valve chamber	Half Yearly	Doc. No.: MAI-G-03 & MAI-F-104	
	71	Maintenance of Valves and Valve chambers including 1. White washing of valve chamber 2. Painting and coating of valve, pipe section & sleepers 3. Numbering (tagging) of valve chambers 4. Civil Repair of Valve Chamber /Sleeper ,if any	Yearly	Doc. No.: MAI-G-03 & MAI-F-105	Post Monsoon
	72	Pest control for rat and snake repellent (Post Monsoon)	As & When Required		
Service Regulator (SR)	73	Monitoring of Pressure (Inlet/Outlet)	Quarterly		
	74	General Maintenance of whole installation including 1. Leak Detection 2. Painting, if required	Quarterly	Doc. No.: MAI-P-16 & MAI-F-83	

,Econnect Id : 108180 Approved by: Yogiraj Navathe on 28/07/2023
,Approval Note/Document Ref No:AIM-F-15/Rev 07/AOMP-PNG

GUJARAT GAS	Annual Operation and Maintenance Plan (AOMP)	Format No.	AIM-F-15
		Rev. No.	7
		Effective Date	01.08.2023

AOMP - PNG O&M

Type of Asset/Equipment /System	Sl. No.	Name of Activity	Frequency	Ref. Documents: SOP/Guideline/Format	Remarks
DOM / COM / Non-COM / NDEC Connections	75	Inspection visit of each Crematorium connection	Half yearly	Doc. No.: HSE-G-14 & HSE-F-29	
	76	Preventive Maintenance / Annual Maintenance of each PNG DOM Connection	Yearly		
	77	Preventive Maintenance / Annual Maintenance of each commercial/non-commercial/NDEC connection up to meter	Yearly		
	78	Maintenance of GI Riser (Threaded Riser/Welded Riser) and horizontal header & welded basement approach	5 year		
	79	Replacement of Suraksha hose for single point -DOM connection	As per due date for replacement		Suraksha hose replacement to be done along with AMC of Domestic connection in case of Surakhsha hose damage/expired / validity expiring within next 11 months
Gas Meters (COM / IND / Custody Transfer)	80	Calibration of RPD meter (G16 to G65)	10 years	Doc. No.: IGM-P-02	
	81	Calibration of RPD meter (G100 to G250)	7 years		
	82	Calibration of RPD meter (G400 & G650)	3 years		
	83	Calibration of Turbine meter G65	10 years		
	84	Calibration of Turbine meter (G100 to G250)	7 years		
	85	Calibration of Turbine meter (G400 to G650)	3 years		
	86	Calibration of Turbine meter (G1000 to G1600)	1 year		
	87	Calibration of Orifice meter <7500 SCMD	1 year		
	88	Calibration of Orifice meter >7500 SCMD	Half Yearly		
	89	Calibration of USM Meter	Quarterly		
Fire Protection System	90	Fire Extinguishers visual inspection	Monthly		
	91	Fire Extinguishers Inspection & Maintenance	Quarterly		
	92	Function check and maintenance of fire alarm / public address system	Quarterly		
	93	Refilling / performance test of BC/ABC type fire extinguisher	Once in 3 Years		
	94	Hydro test of BC/ABC Foam type fire extinguisher cylinders	Once in 3 Years		
	95	Refilling / performance test of Mechanical foam type (Portable and or Cartridge type), CO_2 type	Once in 5 Years		
	96	Hydro test of CO_2 extinguisher cylinders / BA Set	Once in 5 Years		
Others	97	Calibration & Testing of Portable Ethyl Mercaptan Detector	Half Yearly	Doc. No.: IGM-P-05 & IGM-F-15	
	98	Calibration & Testing of Leak Surveyor/O2 Analyser/Multi Function/Portable Gas Detector	Half Yearly		
	99	Calibration of Master Calibrator (SCANDURA make)	Yearly	Doc. No.: IGM-P-02	
	100	Calibration of Searcher Bar	Yearly		(Used during LDT)
	101	Inspection of working at height (WAH) personal protective Equipment (e.g. Petzl make WAH equipment	Yearly		

	Revised by	Reviewed by	Recommended by	Approved by
Designation & Department	DM - HSE, AI & IMS	VP - HSE-AI & PR-ROU VP - Technical & CNG Projects	Head Ops - I Head Ops-II & III Head - GAs of Punjab & Haryana Incharge new GAs of MP & Rajasthan	EVP - Operations
Name	Pramath Shailesh	Naveen Sharma Upendra Sharma	Alkesh Desai Amitabh Ranjan Dipen Chauhan Mukesh Jashpara	Yogiraj Navathe

,Econnect Id : 108180 Approved by: Yogiraj Navathe on 28/07/2023
,Approval Note/Document Ref No:AIM-F-15/Rev 07/AOMP-PNG

Approval Note/Document : Revised AOMP - PNG
Approval Note/Document Ref. No. : AIM-F-15/Rev 07/AOMP-PNG
Proposed by : Pramath Shailesh
Proposed On: 26-Jul-2023

Approval details:

Action	Action By	Sign	Date	Notes
Review	Naveen Sharma		26/07/2023 1:22:20 PM	Reviewed, okay as per the change request.
Review	Upendrakumar Sharma		27/07/2023 10:54:09 AM	
Recommend	Alkesh Desai		27/07/2023 3:03:01 PM	
Recommend	Amitabh Ranjan		27/07/2023 3:19:28 PM	
Recommend	Dipen Chauhan		27/07/2023 3:20:11 PM	
Recommend	Mukesh Jashpara		28/07/2023 1:59:42 PM	
Approve	Yogiraj Navathe		28/07/2023 6:22:53 PM	

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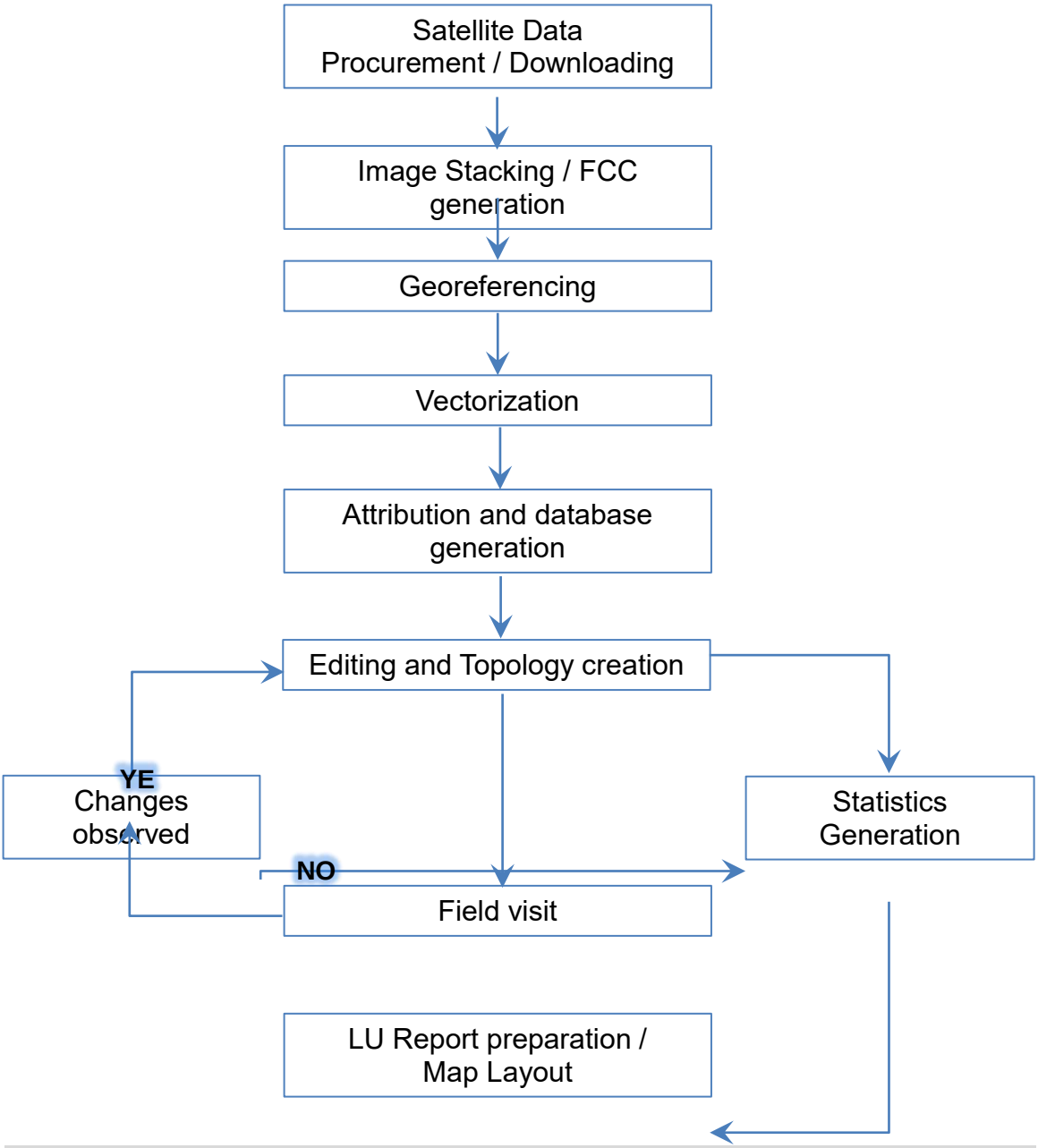
Ecomect Id : 108180 Approved by: Yogiraj Navathe on 28/07/2023
Approval Note/Document Ref No:AIM-F-15/Rev 07/AOMP-PNG

Annexure X

Land Use /Land Cover (LU/LC) Maps based on Satellite imagery for the study area

Methodology adopted for preparation of Land Use for Union Territory Dadara & Nagar Haveli project

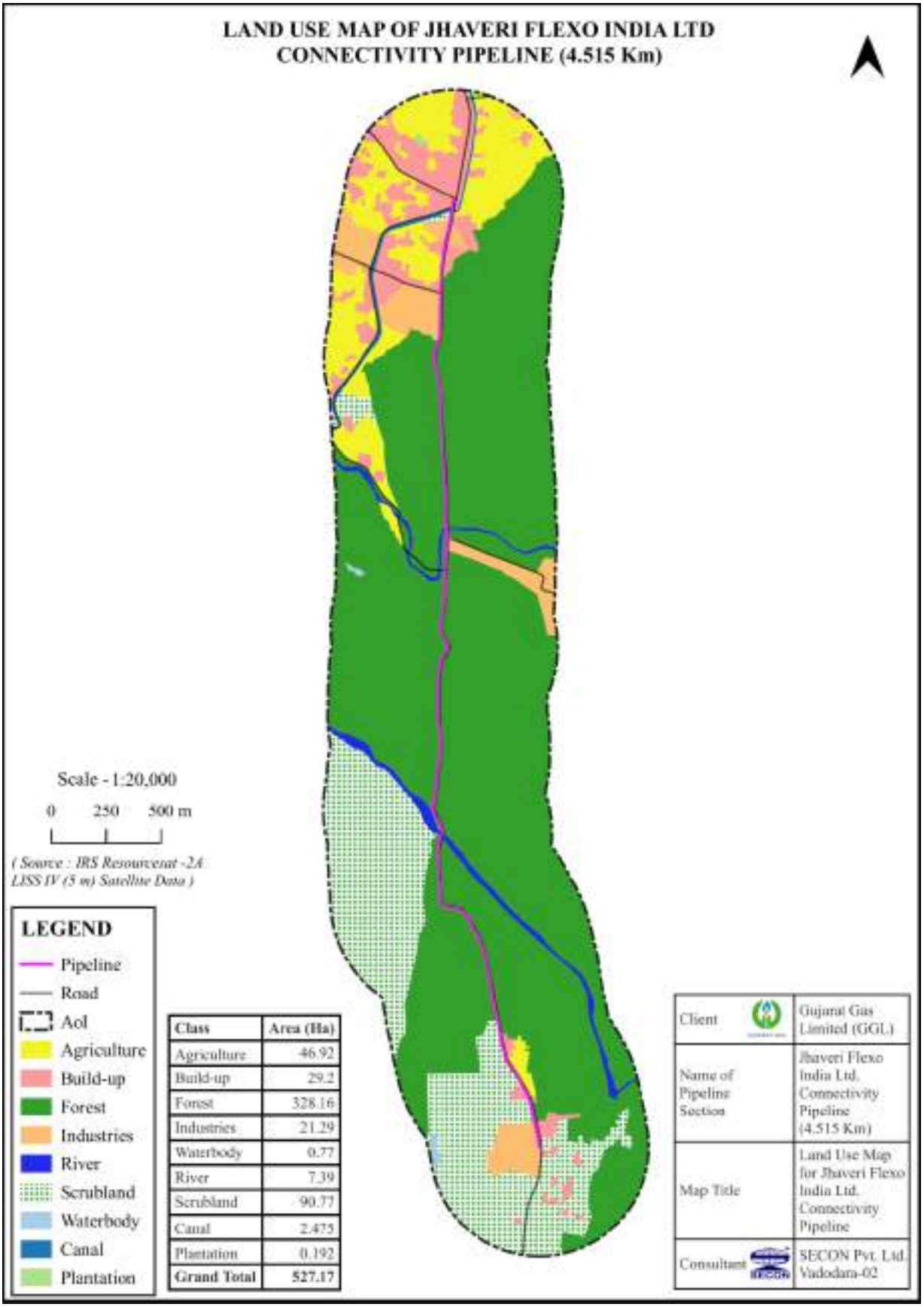
IRS Resourcesat – 2A LISS IV (fm) Satellite Data was used for the generation of Land Use for the Area of Interest (AOI) for Union Territory Dadara & Nagar Haveli Pipeline region. The raw data consists of 3 bands which were further stacked to generate False Colour Composite (FCC) Image. The FCC was georeferenced with the help of coordinates from the georeferenced toposheets.

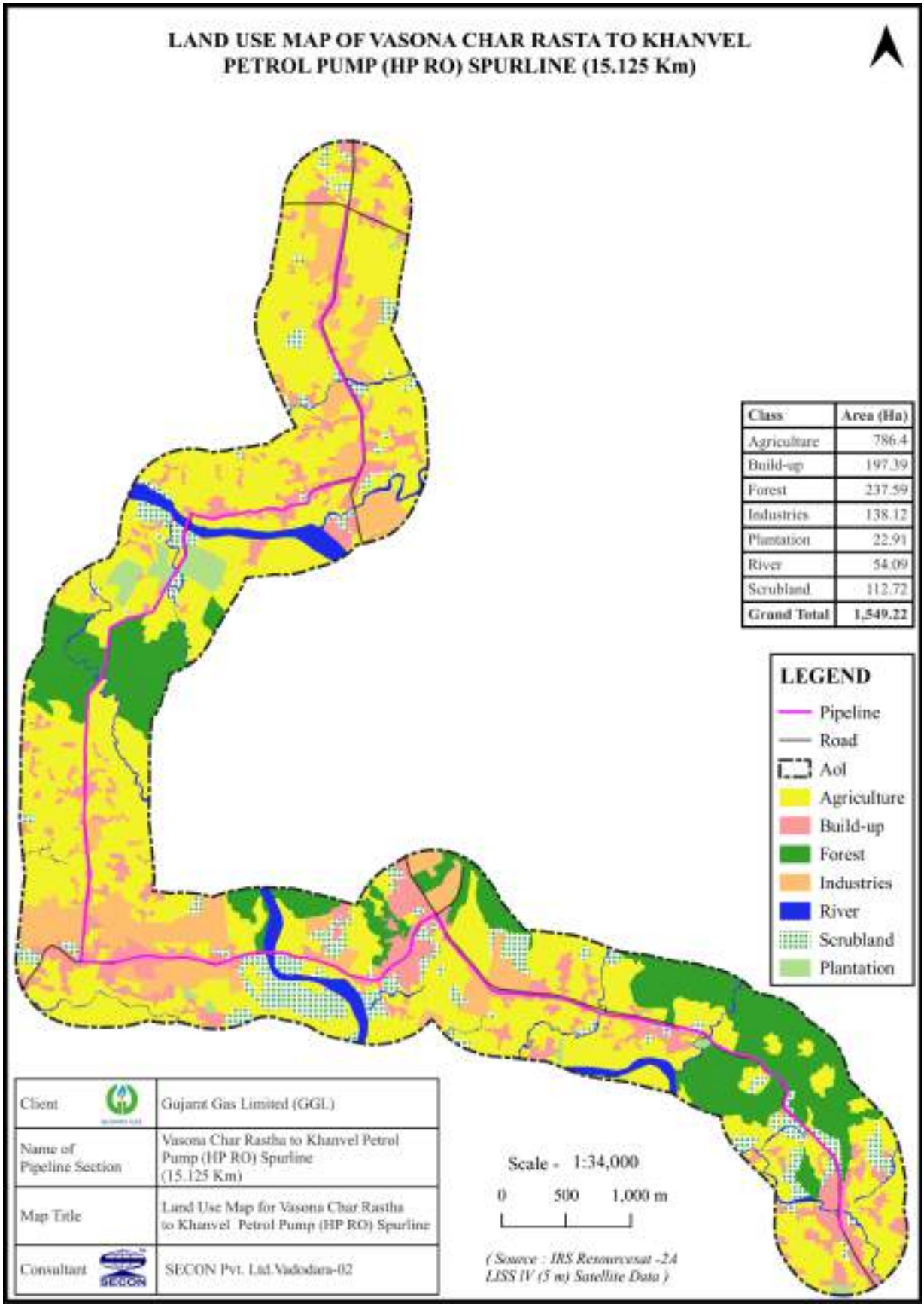


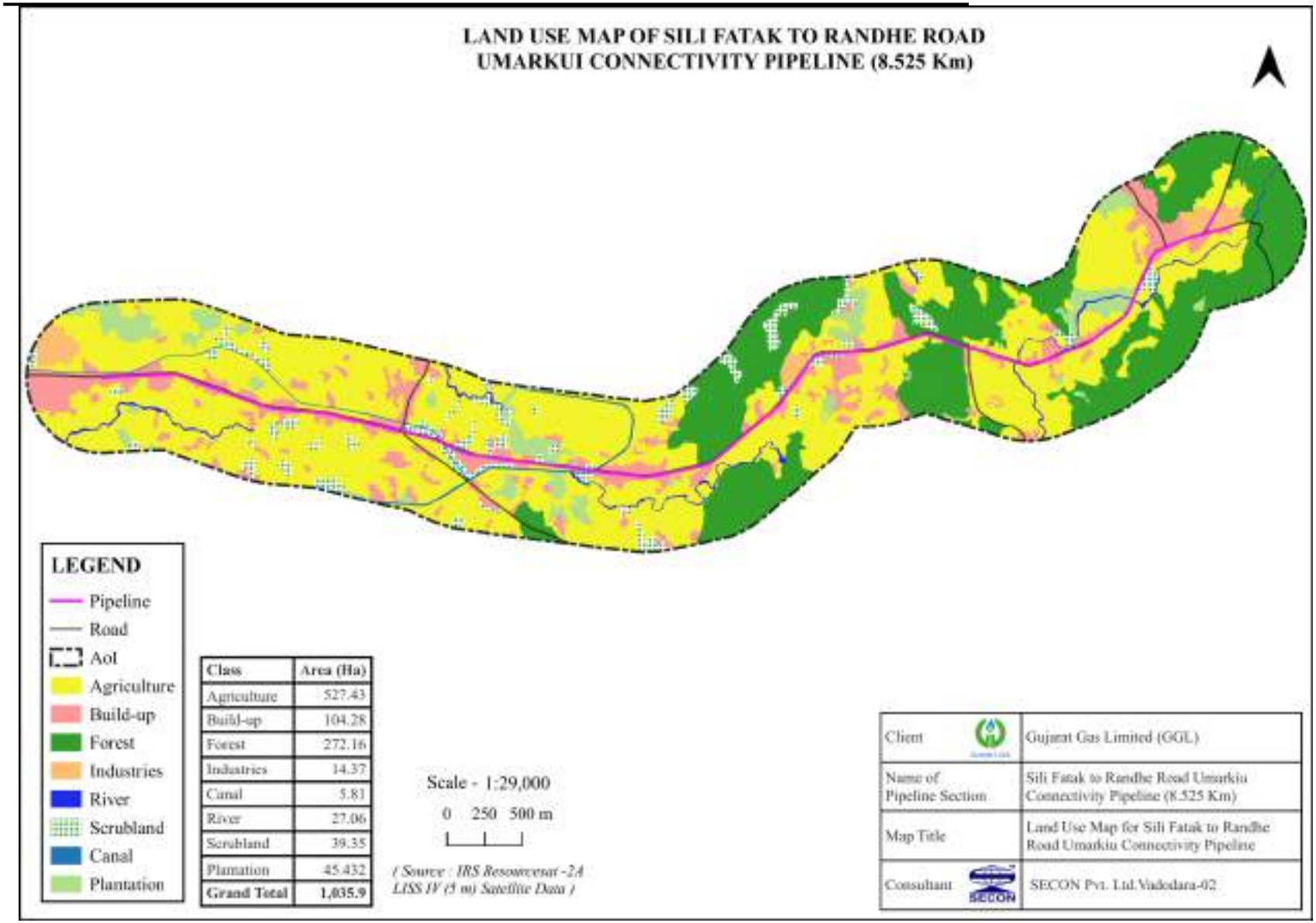
Flow chart for Land Use generation

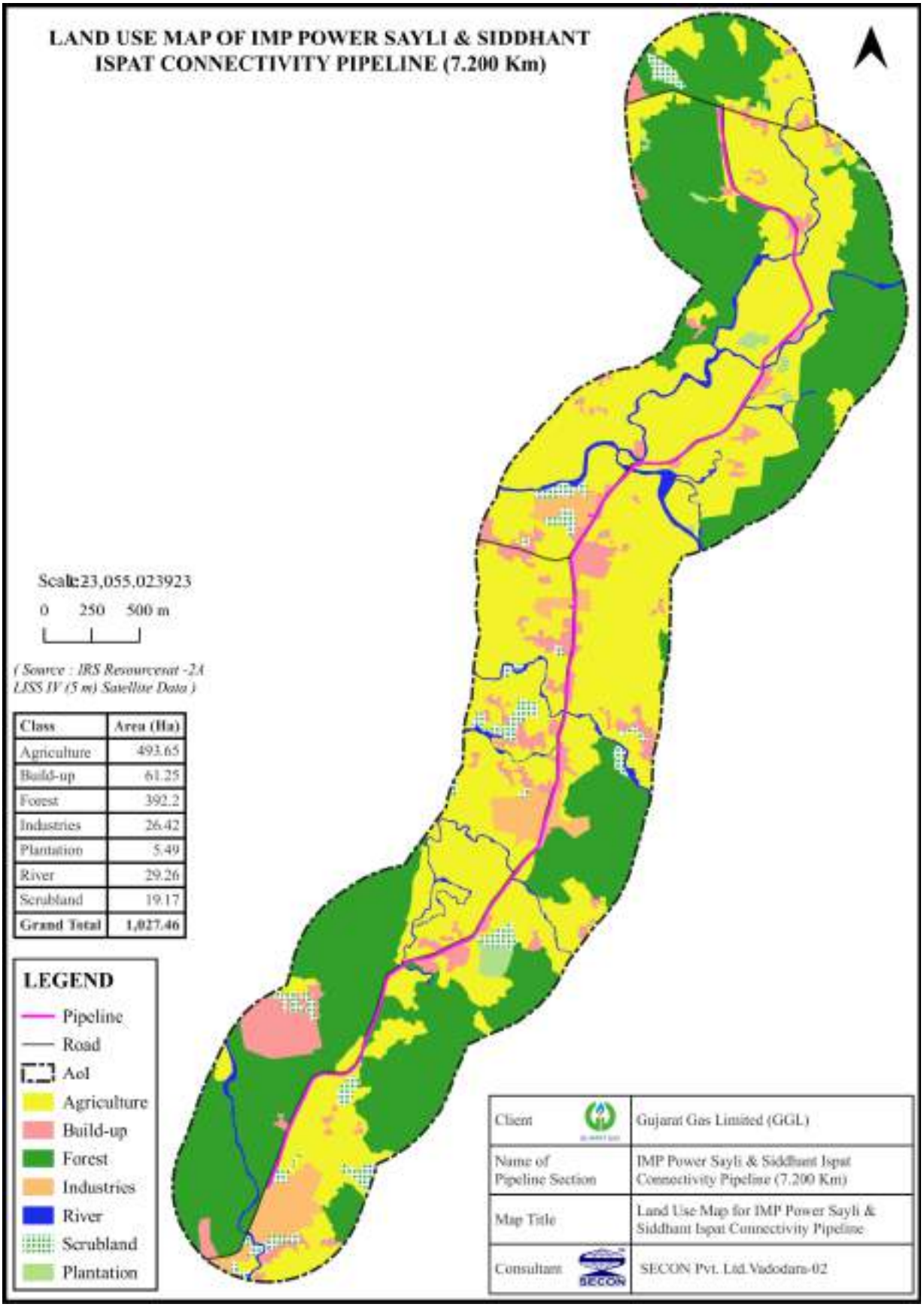
According to the MoEF guidelines for Oil and Natural Gas pipelines, a 500 m buffer around proposed pipeline route in Union Territory Dadara & Nagar Haveli was generated and superimposed on the satellite data. The forest boundaries were taken from the toposheet/s and was further superimposed on the satellite data. Based on the visual image interpretation, on-screen vectorization was performed to delineate various Land Use categories. Topology and attribution has been carried out to prepare draft LU maps for field checks. Certain areas and features were observed having ambiguity during visual image interpretation, which were further field checked and corrections were incorporated to increase the accuracy of the Land Use. Area calculation, Statistics generation as well as Map preparation was carried out after incorporating all the changes observed during field visits.

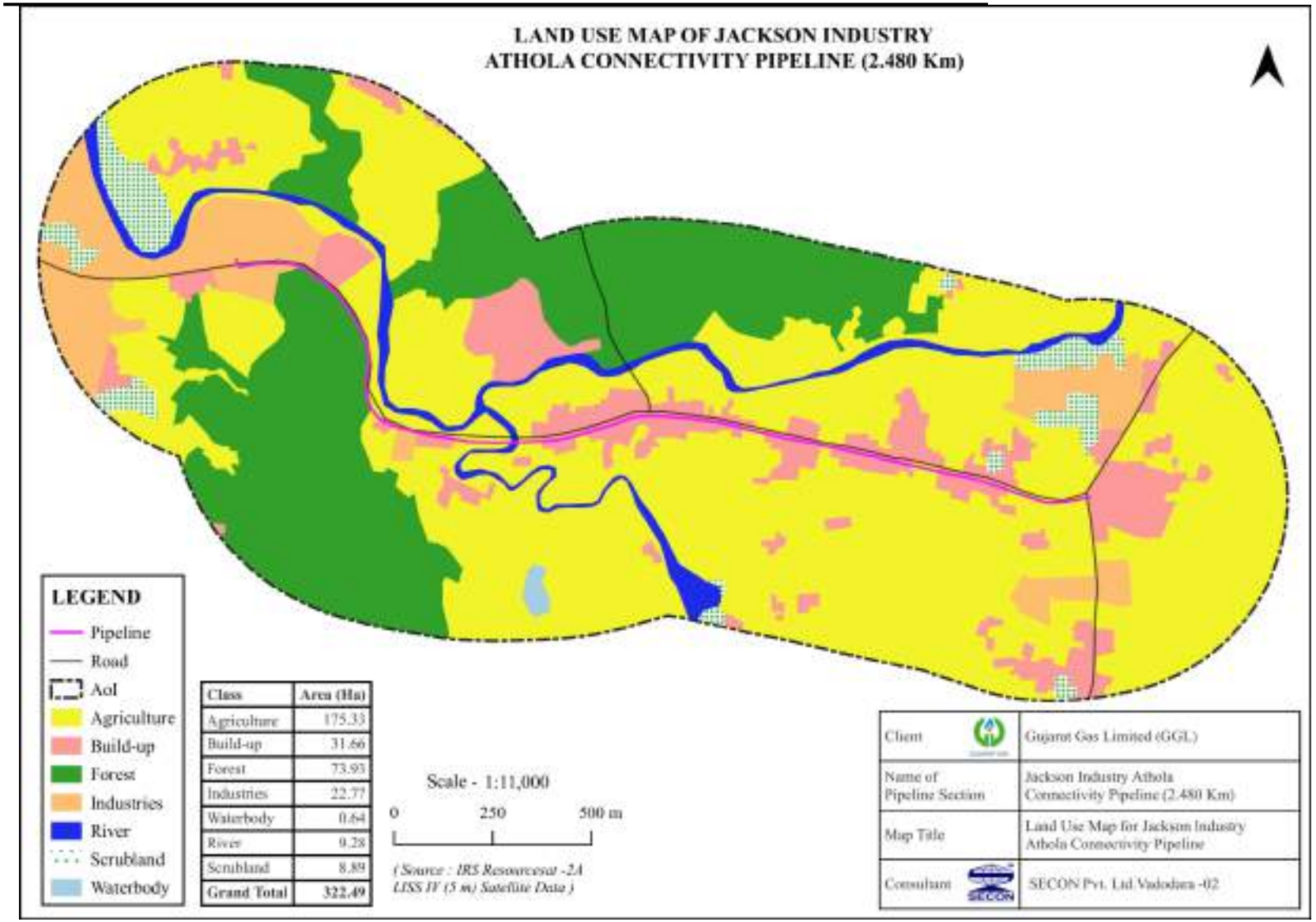
The Land Use area under each category for this pipeline was shown in each pipeline network with separate map.

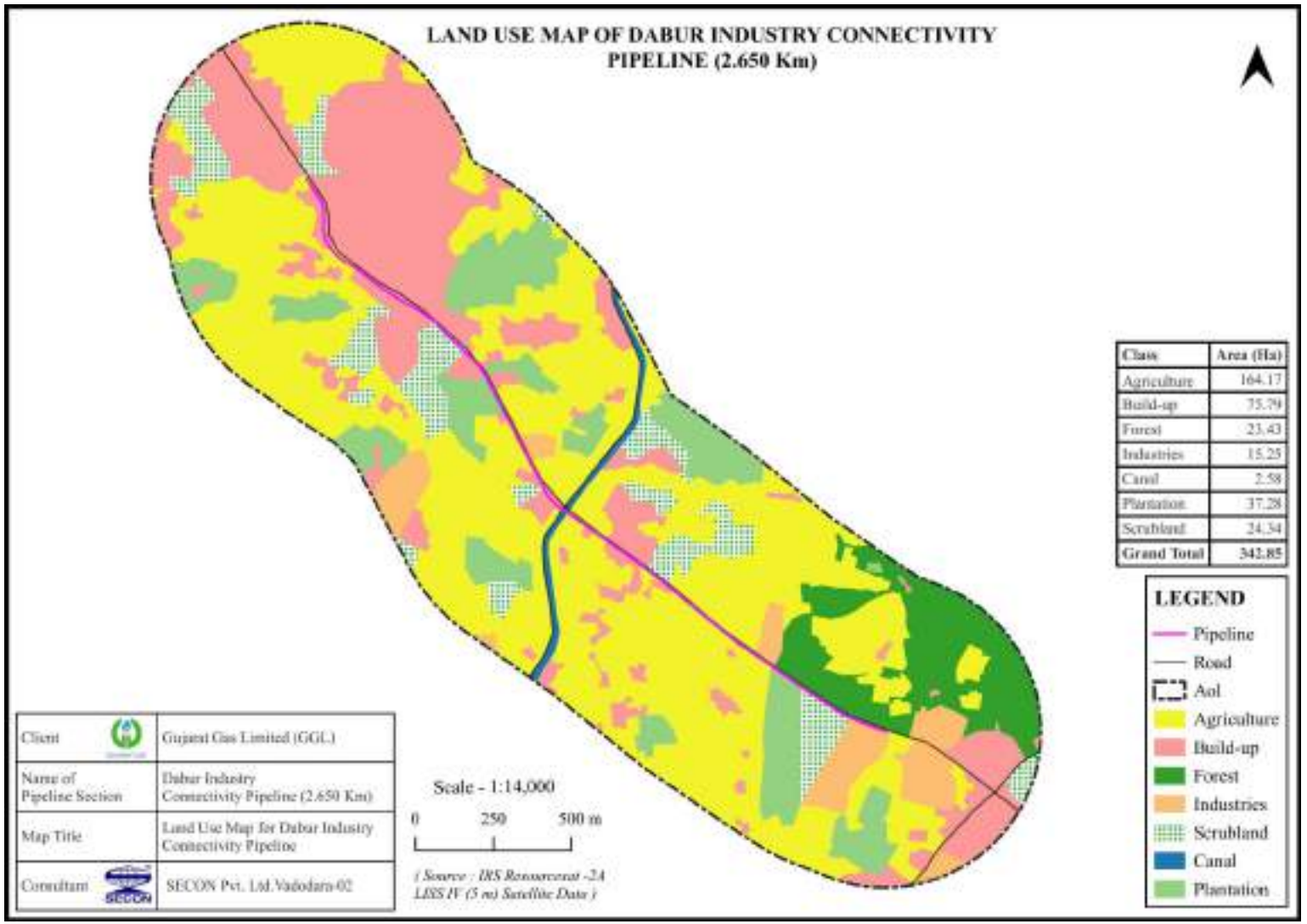

LAND USE MAP OF JHAVERI FLEXO INDIA LTD
CONNECTIVITY PIPELINE (4.515 Km)
Scale - 1:20,000
0 250 500 m
(Source : IRS Resourcesat -2A LISS IV (5 m) Satellite Data)
LEGEND
Pipeline
Road
AoI
Agriculture
Build-up
Forest
Industries
River
Scrubland
Waterbody
Canal
Plantation
Class | Area (Ha)
Agriculture | 46.92
Build-up | 29.2
Forest | 328.16
Industries | 21.29
Waterbody | 0.77
River | 7.39
Scrubland | 90.77
Canal | 2.475
Plantation | 0.192
Grand Total | 527.17
Client | Gujarat Gas Limited (GGL)
Name of Pipeline Section | Jhaveri Flexo India Ltd. Connectivity Pipeline (4.515 Km)
Map Title | Land Use Map for Jhaveri Flexo India Ltd. Connectivity Pipeline
Consultant | SECON Pvt. Ltd. Vadodara-02


LAND USE MAP OF VASONA CHAR RASTA TO KHANVEL
PETROL PUMP (HP RO) SPURLINE (15.125 Km)
Class | Area (Ha)
Agriculture | 786.4
Build-up | 197.39
Forest | 237.59
Industries | 138.12
Plantation | 22.91
River | 54.09
Scrubland | 112.72
Grand Total | 1,549.22
LEGEND
Pipeline
Road
Aol
Agriculture
Build-up
Forest
Industries
River
Scrubland
Plantation
Client | Gujarat Gas Limited (GGL)
Name of Pipeline Section | Vasona Char Rastha to Khanvel Petrol Pump (HP RO) Spurline (15.125 Km)
Map Title | Land Use Map for Vasona Char Rastha to Khanvel Petrol Pump (HP RO) Spurline
Consultant | SECON Pvt. Ltd Vadodara-02
Scale - 1:34,000
0 500 1,000 m
(Source : IRS Resourcesat -2A LISS IV (5 m) Satellite Data)


LAND USE MAP OF SILI FATAK TO RANDHE ROAD
UMARKUI CONNECTIVITY PIPELINE (8.525 Km)
LEGEND
Pipeline
Road
Aoi
Agriculture
Build-up
Forest
Industries
River
Scrubland
Canal
Plantation
Class | Area (Ha)
Agriculture | 527.43
Build-up | 104.28
Forest | 272.16
Industries | 14.37
Canal | 5.81
River | 27.06
Scrubland | 39.35
Plantation | 45.432
Grand Total | 1,035.9
Scale - 1:29,000
0 250 500 m
(Source : IRS Resourcesat -2A LISS IV (5 m) Satellite Data)
Client | Gujarat Gas Limited (GGL)
Name of Pipeline Section | Sili Fatak to Randhe Road Umarkiu Connectivity Pipeline (8.525 Km)
Map Title | Land Use Map for Sili Fatak to Randhe Road Umarkiu Connectivity Pipeline
Consultant | SECON Pvt. Ltd.Vadodara-02


LAND USE MAP OF IMP POWER SAYLI & SIDDHANT ISPAT CONNECTIVITY PIPELINE (7.200 Km)
Scale:23,055.023923
0 250 500 m
(Source : IRS Resourcesat -2A LISS IV (5 m) Satellite Data)
Class | Area (Ha)
Agriculture | 493.65
Build-up | 61.25
Forest | 392.2
Industries | 26.42
Plantation | 5.49
River | 29.26
Scrubland | 19.17
Grand Total | 1,027.46
LEGEND
Pipeline
Road
AoI
Agriculture
Build-up
Forest
Industries
River
Scrubland
Plantation
Client | Gujarat Gas Limited (GGL)
Name of Pipeline Section | IMP Power Sayli & Siddhant Ispat Connectivity Pipeline (7.200 Km)
Map Title | Land Use Map for IMP Power Sayli & Siddhant Ispat Connectivity Pipeline
Consultant | SECON Pvt. Ltd.Vadodara-02


LAND USE MAP OF JACKSON INDUSTRY
ATHOLA CONNECTIVITY PIPELINE (2.480 Km)
LEGEND
Pipeline
Road
AoI
Agriculture
Build-up
Forest
Industries
River
Scrubland
Waterbody
Class | Area (Ha)
Agriculture | 175.33
Build-up | 31.66
Forest | 73.93
Industries | 22.77
Waterbody | 0.64
River | 9.28
Scrubland | 8.89
Grand Total | 322.49
Scale - 1:11,000
0 250 500 m
(Source : IRS Resourcesat -2A LISS IV (5 m) Satellite Data)
Client | Gujarat Gas Limited (GGL)
Name of Pipeline Section | Jackson Industry Athola Connectivity Pipeline (2.480 Km)
Map Title | Land Use Map for Jackson Industry Athola Connectivity Pipeline
Consultant | SECON Pvt. Ltd Vadodara -02


LAND USE MAP OF DABUR INDUSTRY CONNECTIVITY
PIPELINE (2.650 Km)
Class | Area (Ha)
Agriculture | 164.17
Build-up | 75.79
Forest | 23.43
Industries | 15.25
Canal | 2.58
Plantation | 37.28
Scrubland | 24.34
Grand Total | 342.85
LEGEND
Pipeline
Road
AoI
Agriculture
Build-up
Forest
Industries
Scrubland
Canal
Plantation
Client | Gujarat Gas Limited (GGL)
Name of Pipeline Section | Dabur Industry Connectivity Pipeline (2.650 Km)
Map Title | Land Use Map for Dabur Industry Connectivity Pipeline
Consultant | SECON Pvt. Ltd.Vadodara-02
Scale - 1:14,000
0 250 500 m
(Source : IRS Resourcesat -2A LISS IV (5 m) Satellite Data)

Annexure XI

Baseline Enviornmental Monitoring Photographs

Air Quality Monitoring Photographs

		
Near Kilvani Gram Panchayat	Near Athola Branch Post office (Wasona)	Near K K Dhaba (Kilavani)
		
Near CPS Falandi Cummunity Class (Falandi)	Near Primary School Umerkoi (Umarkui)	Near UD Pharma rubber (Falandi)

		
Near Umarkoi Bhujadpada Primary School	Near Swaminarayan Mandir Sayli	Near Kendriya Vidhyalaya Salyli
		
Near Javeri Flexo (Kharadpada)	Near Bhavin container Naroli	Near Khanvel Road (Khanvel)

		
Near Sacred Heart English School Dapada	Near Amit Petroleum (Surangi)	Sahajanand Park 2 (Khanvel)

Noise Quality Monitoring Photographs

		
Near Kilvani Gram Panchayat	Near Athola Branch Post office (Wasona)	Near K K Dhaba (Kilavani)
		
Near Falandi	Near Umarkui	Near UD Pharma rubber (Falandi)

		
Near Umarkoi Bhujadpada Primary School	Near Swaminarayan Mandir Sayli	Near Kendriya Vidhyalaya Salyli
		
Near Javeri Flexo (Kharadpada)	Near Bhavin container Naroli	Near Khanvel Road (Khanvel)

		
Near Sacred Heart English School Dapada	Near Amit Petroleum (Surangi)	Sahajanand Park 2 (Khanvel)

Ground Water Quality Monitoring Photographs

		
Near Kilvani Gram Panchayat	Near Athola Branch Post office (Wasona)	Near Swaminarayan Mandir Sayli
		
Near CPS Falandi Cummunity Class (Falandi)	Near Primary School Umerkoi (Umarkui)	Near UD Pharma rubber (Falandi)

Near Kendriya Vidhyalaya Salyli

Near Javeri Flexo (Kharadpada)

Near Khanvel Road (Khanvel)

Near Sacred Heart English School

Surface Water Quality Monitoring Photographs

Near Amit Petroleum (Surangi)

Near Sayli Road

Near Kilavani Road

Near Dapada to Surangi bridge

Soil Quality Monitoring Photographs

		
Near Kilvani Gram Panchayat	Near Athola Branch Post office (Wasona)	Near K K Dhaba (Kilavani)
		
Near CPS Falandi Cummunity Class (Falandi)	Near Primary School Umerkoi (Umarkui)	Near UD Pharma rubber (Falandi)

		
Near Umarkoi Bhujadpada Primary School	Near Swaminarayan Mandir Sayli	Near Kendriya Vidhyalaya Salyli
		
Near Javeri Flexo (Kharadpada)	Near Bhavin container Naroli	Near Khanvel Road (Khanvel)

		
Near Sacred Heart English School Dapada	Near Amit Petroleum (Surangi)	Sahajanand Park 2 (Khanvel)

Annexure XII

Budget for CER as per Ministry's Circular along with Activities and its timelines for commitments

Estimated budget to be spent year wise (CER)

Industry will provide 1 % of the proposed project cost (i.e. ₹ 13.00 Lakh) towards the Corporate Environment Responsibility as per brownfield project. Socio-economic development activities will be planned based on the suggestions given by public as well as general necessities in villages.

S. No.	Planned activities under CER as per specific needs at nearest villages	Budget (Rs. Lakhs)					
		1st year	2nd year	3rd year	4th year	5th Year	Total
		(25-26)	(26-27)	(27-28)	(28-29)	(29-30)	
1	As per necessity of local community / areas projects such as education facility, heath check up camp, Health & Environment awareness campaign, Plantation, skill development programme, Environmental Monitoring, Mock drill, implementation of EMP and suggestions during public hearing etc.	2.6	2.6	2.6	2.6	2.6	13
	Grand Total						13

ABBRIVIATION

SCADA	Supervisory Control and Data Acquisition
LNG	Liquefied Natural Gas
CPPSM	Cathodic Protection Power Supply Module
BIS NACE	Bureau of Indian Standards National Association of Corrosion Engineers
BS	British Standard
IEEE	Institute of Electrical & Electronics Engineers
IER	The Indian Electricity Rules
IEA	The Indian Electricity Act
API	American Petroleum Institute
OISD	Oil Industry Safety Directorate
PNGRB	Petroleum & Natural Gas Regulatory Board
CCOE	Chief Controller Of Explosives
NFPA	National Fire Protection Agency
APHA	American Public Health Association
CHCs	Community Health Centers
PHCs	Primary Health Centers

References

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2. Census of India Year 2011
3. EIA Notification 14th September, 2006 – Appendix III – Generic Structure of Environmental Impact Assessment Document.
4. Ibid- amendments published in Gazette of India Extraordinary, Part-II, and Section – 3, Sub section (ii) .2009.
5. India Meteorological Department (IMD), Pune
6. Ministry of Environment and Forest (MoEF) – Environment (Protection Rules 1986) and EIA Notification dated 14th September 2006.
7. Ministry of Environment and Forest, & Comate Change Terms of Reference received on 08.02.2019 for preparing Environment Impact Assessment and Risk Assessment studies.
8. National Remote Sensing Agency (NRSA) for supply of satellite data for pipeline route and map preparation.
9. Oil Industry Safety Directorate (OISD) Guidelines 141 & 226 Design and Construction Requirement for Cross Country Hydrocarbon pipelines
10. Petroleum & Mineral Pipeline Act (PMPA), 1962
11. Petroleum Act, 1934 and Rules 2002.
12. "PNGRB Act": Petroleum And Natural Gas Regulatory Board Act.
13. Railways./ Forest/NH/Other pipeline – Terms and conditions applicable (Internal Communication)
14. The" Rules of good practice" commonly used worldwide OIL industry.
15. CGWB, Ministry of Water Resources, River Development & Ganga Rejuvenation, Govt. of India