DRAFT ENVIRONMENTAL IMPACT ASSESSMENT

FOR

EXPANTION FROM 2500 TO 9000 TCD SUGAR UNIT AND ESTABLISH 36 MW COGENERATION POWER PLANT IN EXISTING SUGAR INDUSTRY

AT

M/S CANE AGRO ENERGY INDIA LTD. (CAEIL),
AT RAIGAON, POST HINGANGAON,
TAL. KADEGAON, DIST. SANGLI
MAHARASHTRA, INDIA

PROJECT PROPONENT

M/s. Cane Agro Sugar & Power Limited (CASPL)
105, Siddhi Vihar, Near Tanishk Heritage,
College Road, Vidhyanagar, Karad, Dist: Satara-415 124

CONSULTANT

Saitech Research & Development Organization
Flat no.301,3rd floor,Ganesh Plaza,
Saneguruji Vasahat, Kolhapur,
Kolhapur 416001

Website- www.saitechindia.net

CONTENTS

“मे.केन अग्रो एनर्जी इंडिया लिमिटेड,”
रायगाव ता.कडेगाव ,जि.सांगली
साखर कारखाना व सहवीज निर्मिती
प्रकल्प क्षमतेविषयी माहिती.

सारांश

प्रस्तावना

केन अग्रो एनर्जी इंडिया लिमिटेड रायगाव ता.कडेगाव जि.सांगली महाराष्ट्र हा कारखाना प्रतिदिन २५०० टन गाळप क्षमतेने चालू आहे.

कारखाण्याचे संचालक मंडळ हे शेती उद्योग आणि औद्योगिक कारखाने क्षेत्रामध्ये अनुभवी असून ते सध्या या कारखान्याच्या गाळप क्षमता प्रतिदिन २५०० टन असून ९००० टन व सहवीजनिर्मिती प्रकल्प ३६ मेगावॉट निर्मिती क्षमतेचा करीत आहोत.

२२ डिसेम्बर २०१४\ रोजी झालेल्या पर्यावरण समिती मध्ये सदर प्रस्ताव विचारात घेतला होता. त्यामध्ये टी.ओ.आर मंजूर करण्यात आला.

कारखान्याच्या प्रत्येक हंगामामध्ये 2500.टन/दिन इतका उसाचा भुसा तयार होतो. ज्यामध्ये चांगले औश्निक मूल्य असते. सध्याच्या गाळप क्षमतेने कारखाना चालवण्यासाठी २५०० मे.टन प्रतिमहिना हा उसाचा भुसा इंधन म्हणून वापरला जातो.

शासन नियमानुसार पर्यावरण ना हरकत प्रमाणपत्र मिळवनेसाठी केन अग्रो एनर्जी इंडिया लिमिटेड कारखान्याने पर्यावरण व वनमंत्रालयाकडे साखर कारखान्याची सहवीजनिर्मिती प्रकल्प क्षमता ३६ मेगावॉट चालू करणेसाठी प्रस्ताव सादर केला आहे. त्यानंतर पर्यावरण आघात मुल्यांकन अहवाल तयार करण्यात आला.

पर्यावरण आघात मुल्यांकन अहवाल बनवण्याचा उद्देश फक्त पर्यावरण ना हरकत दाखला मिळविणे हा नाही तर प्रतेक्षात प्रकल्पामुळे होणाऱ्या पर्यावरणातील परिणाम समजून घेऊन त्यावर प्रतिबंधक उपाय करून पर्यावरण पूरक योजना करणे हा आहे.

प्रकल्पाविषयी माहिती:-

केन अग्रो एनर्जी इंडिया लिमिटेड रायगाव ता.कडेगाव जि.सांगली चे संस्थापक पृथ्वीराज देशमुख हे आहेत आणि डॉ.जयकर पाटील मुख्यकार्यकारी अधिकारी म्हणून काम पाहत आहेत. सध्याची कारखाण्याची गाळप क्षमता प्रतिदिन २५०० टन असून ९००० टन व सहवीजनिर्मिती प्रकल्प ३६ मेगावॉट निर्मिती क्षमतेचा करीत आहोत

कार्यस्थळ:-

१	प्रकल्प	केन अग्रो एनर्जी इंडिया लिमिटेड रायगाव ता.कडेगाव जि.सांगली महाराष्ट्र हा कारखाना प्रतिदिन २५०० टन गाळप क्षमतेने चालू आहे.
२	अक्षांश	१७° २४' ४६.१०३" N
३	रेखांश	७४° ९' ११.२४ " E
४	कारखाना नोंदणी क्र.	CIN 001115PN2007PLC130211 dated 25/05/2007
५	जवळचे शहर	सांगली ५० कि.मी.
६	नजीकचा राज्यमार्ग	पंढरपूर-कराड महामार्ग ०.५ कि.मी.
७	नजीकचे रेल्वेस्थानक	ओगलेवाडी रेल्वेस्थानक १५ कि.मी.
८	जवळचे विमानतळ	कराड विमानतळ ३० कि.मी.
९	भौगोलिक स्थिती	हा प्रकल्प सपाट भागात असून समुद्रसपाटीपासून 565....मी. उंचीवर आहे. हवामान समशीतोष्ण आहे.
१०	परिसर	प्रकल्प कृष्णा नदीपासून २२ कि.मी. व सागरेश्वर अभयारण्यापासून १८ कि.मी. अंतरावर आहे.

प्रकल्पाविषयी तांत्रिक माहिती

अ.नं.	घटक	सविस्तर माहिती
१	गाळप क्षमता	२५०० TCD वरून ९००० TCD
३	सहवीजनिर्मिती	३६ मेगावॉट. सध्याची ऊस भुसा निर्मिती (बग्यास) १३५८.टन प्रती हंगाम.

प्रक्रिया पद्धती:-

शेतातून आणलेला घाण्यामध्ये गाळला जातो. त्यापासून निघालेला रस तापवून त्यावर प्रक्रिया टाकीमध्ये सल्फारडाय ऑक्साईड व चुनकळी बरोबर प्रक्रिया करू रस तापविला जातो. नंतर त्यापासून मळी वेगळी करून काकवी निर्माण केली जाते.त्या काकविवर प्रक्रिया करून त्यामधून मोल्यासीस वेगळा करून शुद्ध साखर बनविली जाते.

पाणी:-

नवीन २८ मेगावॉट सहवीजनिर्मिती क्षमतेसाठी ४९५घनमीटर जड पाणी दररोज लागणार आहे. म्हणजेच एकूण १२६७..घनमीटर पाणी दररोज गरजेचे आहे. जे कारखाना परिसरातून उपलब्ध केले जाणार आहे.

इंधन:-

प्रकल्पामध्ये १३५८. टन प्रती दिन ऊस भुसा मुख्यतः इंधन म्हणून वापरला जातो. इंधन बाष्प संयंत्रामध्ये वाफ तयार करण्यासाठी वापरले जाते.

इंधन वैशिष्टे:-

१	औश्निक मूल्य	कोरडा-४४००कि.कॅ./कि. ओला-२२५०कि.कॅ./कि
२	आर्द्रता	४५-५५%
३	राख	२-२०%
४	ऊस भुसा	३०-३५%

उत्पादने:-

अ.नं.	घटक	चालू	नियोजित
१	मुख्य उत्पादने		
अ	साखर	२५०० मे.टन/दिवस	९००० मे.टन/दिवस
ब	वीज	-	३६ मेगावॉट

पर्यावरण सध्यस्थिती:-

या प्रकल्पाचा पर्यावरण आघात मुल्यांकन करण्यासाठी खालील घाटकांचे तपशीलवार सर्वेक्षण करण्यात आले आहे. पाणी, हवा, माती, ध्वनी, हवामान, जमिनीचा वापर, प्राणी, पशु, पक्षी सामाजिक व आर्थिक जनसाखाली रचना इ.

पर्यावरण आघात मुल्यांकन करण्यासाठी वरील सर्व घटकांच्या माहितीची गरज असते. ज्याच्या आधारावरती मुल्यांकन करता येते म्हणून पर्यावरण साध्यस्थितीचा अभ्यास केलेला आहे.

सुक्ष्म-हवामान:-

या जिल्ह्याचे वातावरण वर्षातून जास्त वेळ सुखकर आणि साधारण कोरडे असते या भागामध्ये डिसेंबर ते फेब्रुवारीच्या मध्यापर्यंत ह्विाळा असतो तसेच उन्हाळा हा मे महिन्याच्या अखेरपर्यंत असतो आणि जून ते सप्टेंबर मध्ये दक्षिण पश्चिम भागातून येणाऱ्या मान्सून मुले पाऊस पडतो व ऑक्टोबर आणि नोव्हेंबर हे महिने परतीचा पाऊस म्हणून ओळखले जातात.

जिल्ह्यात सरासरी ४९ दिवस पाऊस पडतो (म्हणजे २५ मि.मी. ते १०० मि.मी. किंवा जास्त पडलेल्या पावसाचे दिवस) जिल्ह्यातील वर्षाचे सरासरी पर्जन्यमान हे ६९२.४ मि.मी आहे. या जिल्ह्यातील पश्चिम भागातील पावसाचे प्रमाण जिल्ह्यातील इतर भागापेक्षा त्यापैकी जास्त आहे. या जिल्ह्यातील हवामान परीक्षण विभाग मिरज येथे आहे. हिवाळा ऋतुमध्ये या जिल्ह्याचे तापमान जास्तीत जास्त २९.५° सें. व कमीत कमी १४.३° सें असते.

या भागातील आकाश नोव्हेंबर ते मार्च या दरम्यान साधारण स्वच्छ, हलके व ढगाळ असते. ढगाळ वातावरण एप्रिल पासून जास्त प्रमाणात वाढते व ते सकाळपेक्षा दुपारी जास्त प्रमाणात दिसून येते. व पावसाळ्यामध्ये येथे जास्त ढगाळ वातावरण असते.

हवा:-

कारखान्यापासून १० कि.मी त्रिज्येतील, पारगाव, हिंगणगाव, कोरेगाव, चोराडे, शाळगाव, शामगाव आणि कारखान्याचा पूर्ण भाग येथील हवेचे नमुने घेऊन ते प्रयोगशाळेत तपासणी पाठविले त्याच्या पृथःकरण खालील बाबींकरिता करण्यात आले.

- कार्बन मोनक्साइड
- नायट्रोजन डायक्साइड
- सल्फर डायक्साइड
- धुलीकरण १० व २.५

ध्वनी:-

अभ्यास क्षेत्रामध्ये असणाऱ्या ध्वनी प्रदुषनाचे माध्यम शोधण्यासाठी प्राथमिक सर्वेक्षण केले गेले यामध्ये गावामध्ये कामाची जागा, प्रकल्पक्षेत्र, वाहतूक रहदारी व शाळा आणि वैद्यकीय जागा यासारखे संवेदनशील भाग यांची ध्वनी चाचणी करण्यासाठी निवड करण्यात आली. यांचे सर्व्हेक्षण केले असता यांची ध्वनी मर्यादित आहे असे आढळले.

पाणी:-

प्रकल्पाच्या १० कि.मी. त्रिज्येतील पाण्याचा अभ्यास केला गेला. यामध्ये अभ्यासासाठी चार गावातील भूजल नमुने घेण्यात आले. ते पुढीलप्रमाणे प्रकल्पभाग पारगाव, चोराडे, गोरेगाव, शाळगाव इ. या पाण्याचे परीक्षण प्रामाणिक पद्धतीने करण्यात आले. या प्रकल्पासाठी लागणारे पाणी हे कुपनलिका व जवळ असणाऱ्या तलावापासून मिळवले जाईल. व हि संस्था महाराष्ट्र प्रदूषण मंडळाच्या नियमाप्रमाणे पाण्याची गुणवत्ता राखेल.

३.५ जमीन :-

रबी काळाची उपग्रह माहितीचे सुपरनाइज़्ड क्लासिफिकेशन टेक्निकच्या आधारे वर्गिकरण करण्यात आहे याचे पृथ:कीकरण करण्यासाठी "मक्सिमम लाईकली हूड अल्गोरिदम क्लासिफाईड" वापरण्यात आले. प्रकल्पाच्या १० कि.मी. त्रिज्येमध्ये ८ प्रकारच्या जमिनीची ओळख झाली आहे.

३.६ जैवविविधता :-

प्राणी व पक्षी हे पर्यावरणाचे मुख्य घटक आहेत. पर्यावरण आघात मुल्यांकनाचा अभ्यास करताना प्राणी व पक्षी, जैविक चक्र त्यांचे प्रकार व कार्य यांचा अभ्यास करणे महत्वाचे असते.

मानवी कृतीपासून प्राणी व पक्षी यांचा कोणतेही हानी होऊ नये कारण त्यापासून मानवालाच त्याचा फार धोका असतो यामुळे त्यांचे रक्षण करणे खूप गरजेचे आहे. प्रकल्पापासून १० कि.मी. क्षेत्रामध्ये जैव विविधता सर्वेक्षण करण्यात आले व या अभ्यास क्षेत्रामध्ये आढळणारे प्राणी व झाडे याची माहिती पर्यावरण आघात मुल्यांकन अभ्यासामध्ये दिली आहे.

३.७ सामाजिक :-

उत्तम हवामान, मुबलक पाणी उपलब्धता, कसदार जमीन, राज्य महामार्ग क्र. .... यामुळे साखर कारखाना आणि सहवीजनिर्मिती तसेच इतर क्षेत्रात संचार व संघर्ष यंत्रणा पूर्णपणे विकासित झाली आहे. आरोग्य सेवा, शैक्षणिक संकुले, पोस्ट तार व दूरध्वनी केंद्र यांचीपण वाढ झाली आहे. यांचा परिणाम म्हणून येथील कामगार व इतर लोकांचे राहणीमान उंचावले असून त्यांची सर्वांगीण प्रगती उत्तरोत्तर होत आहे.

४.० पर्यावरण आघात तपशील :-

४.१ उभारणी आणि चालू काळातील आघात :-

उभारणीच्या काळात प्रामुख्याने जमीन सपाटी करणामुळे, झाडे झुडुपे स्वच्छ करण्यामुळे व बांधकामामुळे काही प्रमाणात पर्यावरणावर परिणाम होत असतो. चालू काळात प्रकल्पामधून काही दुषित पाणी व घनकचरा तयार होत असतो . त्यासाठी खालील घटकांची योग्य ती चाचणी करून त्यावर योग्य ती उपाययोजना सुचवले आहे.

अ) हवा :-

उभारणीच्या काळात वाहनांची ये-जा वाढल्याने तसेच बांधणीसाठी लागणारी उपकरणांमुळे हवेवरती परिणाम होतो. प्रकल्प चालू असताना मुख्यता बाष्प संयांत्रामधून वेगवेगळे वायू हवेत मिसळल्याने हवा दुषित होण्याची शक्यता आहे.

उपाययोजना :-

उभारणीकाळात हवेत उडणारी धूळ ही पाणी फवारणी करून थांबविता येते. आपण वापरीत असणारी वाहने चांगल्या प्रतीची ठेवून त्यांची वेळोवेळी देखभाल करून हवा प्रदूषणावर आळा बसविता येतो.

ब) ध्वनी :-

उभारणीकाळात वापरली जाणारी वाहने तसेच बांधणीसाठी लागणारी साधने यांच्यामुळे होणारुया ध्वनीमुळे ध्वनी प्रदूषण होते. उभारणीसाठी लागणाऱ्या साधनांचा आवाजाची मर्यादा ८० ते ८५ डेसिबल पर्यंत असेल.

उपाययोजना :- उभारणीकाळात होणारा आवाजाचा दुष्परिणाम टाळण्यासाठी सुरक्षा टोपी व इयर प्लग वापरली जातात व वेळोवेळी साधनांची दगडूजी करून घेतली जाते. तसेच अतिरिक्त आवाज होणारी कामे ही फक्त दिवसाची केली जातील.

क) पाणी :-

दुषित पाणी योग्य ठिकाणी न सोडल्याने तसेच पावसाच्या पाण्याचे प्रवाह योग्य दिशेने कडून न दिल्याने पाणी प्रदूषण होण्याची शक्यता आहे.

उपाययोजना :-

कामगारांसाठी चांगल्या प्रतीची प्रसाधन गृहे बांधून दिली आहेत तसेच पावसाच्या पाण्यासाठी नाल्याची बांधणी करून पाणी प्रदूषण थांबवले जाईल.

ड) जमीन :-

प्रकल्प उभारणीचे वेळी जमीन सपाटीकरण तात्पुरती कार्यालये, साधने साठविण्यासाठी बांधलेली गोदामे यामुळे थोडासा परिणाम जमिनीवर दिसून येतो.

भौगोलिक स्थिती :-

प्रकल्पासाठी वापरलेली जमीन ही बहुदा सपाट आहे. पावसामले वाहणाऱ्या नाल्यांची योग्य व्यवस्था असल्यामुळे माती विदारण होत नाही.

सामाजिक - आर्थिक पर्यावरण :-

प्रकल्प उभारणीमुळे तेथील रहिवाशी लोकांवर रोजगार संधी उपलब्ध होणार आहे.

४.२ कामगार सोयी सुविधा :-

अ) प्रथमोपचार :-

प्रकल्पक्षेत्रामध्ये कामगारांसाठी वैद्यकीय सुविधा व रुग्णवाहिकेची व्यवस्था केलेली आहे.

ब) पाणी प्रत :-

प्रकल्पक्षेत्रामध्ये कामगारांसाठी स्वच्छ व निर्जंतुक पाण्याची व्यवस्था केली आहे.

क) उपहारग्रह :-

प्रकल्पक्षेत्रामध्ये कामगारांसाठी स्वच्छ आणि सोयीस्कर उपहारगृहाची निर्मिती केली आहे.

ड) सुरक्षा :-

प्रकल्पाच्या सुरक्षिततेसाठी पुरेशा सुरक्षारक्षकांची नियुक्ती केलेली आहे.

४.३ दुषित पाणी निर्मिती :-

प्रकल्पाच्या प्रक्रियेतून २३५ घन मीटर प्रतिदिन एवढे दुषित पाणी निर्माण होते. हे पाणी प्रदूषित पाणी शुद्धीकरण प्रकल्पामध्ये शुद्धीकरणासाठी पाठवले जाते. नंतर शुद्ध झालेले पाणी ऊस शेती हरित पट्ट्यांसाठी वापरले जाते.

४.४ राख :-

बाष्प संयंत्रामधून निघालेली राख जमीन सपाटीकरणासाठी वापरली जाते.

४.५ परिस्थितीकी परिणाम :-

सदर प्रकल्प आरक्षित वनापासून दूर असल्याने परिस्थितीवर यांचा परिणाम होत नाही त्याच बरोबर प्रकल्पामधून निघणाऱ्या उत्सर्जनावर योग्य तो प्रतिबंधक उपाय केला आहे.

४.६ हरितपट्टा :-

२५ एकर क्षेत्रावर हरित पट्टा निर्माण केला आहे. त्याच्यामध्ये तेथे आढळणाऱ्या वनस्पतींचीच निवड केली आहे.

४.७ आरोग्य :-

आरोग्याच्या दृष्टीने योग्य त्या उपाययोजना केलेल्या आहे. उदा. वैद्यकीय सुविधा, रुग्नावाहिका, सुरक्षा साधने तसेच स्वच्छ पाणी, इ.

५.० पर्यावरण परिक्षण :-

भारतीय उत्सर्जन नियमावलीनुसार धुलीकण मर्यादा तसेच धुराड्याची उंची बनविलेली आहे.

५.१ हवा परिक्षण :-

प्रकल्पामधून उत्सर्जित होणारया धुलीकानांची संख्यात्मक आणि गुणात्मक चाचणी सतत केली जाते. पुढे भविष्यात तापमान आर्द्रता वारयाची दिशा, गती पर्जन्यमान इ. हवामान, परिणामे प्रतिदिन तपासण्याची सुविधा उपलब्ध करणार आहे.

६.० धोका मुलयांकन आणि व्यवस्थापन :-

प्रकल्पामध्ये येणारे संभाव्य धोके आणि आपत्ती ओळखून आपत्ती व्यवस्थापन करणे. उपलब्ध असणारया साधनांचा योग्य तो वापर करणे गरजेचे आहे.

६.१ कार्यपद्धती :-

आपत्ती व्यवस्थापन खालील मुद्द्यांच्या आधारे केली जाईल.

प्रक्रिया अभ्यास :-

प्रकल्पामध्ये चालणाऱ्या पूर्ण प्रक्रियेचा अभ्यास करून साधन साठे इंधन हाताळणी, रासानायाचा वापर योग्य प्रकारे केला जाईल.

६.२ आवश्यक उपाययोजना :-

ज्वालाग्राही पदार्थ सुरक्षित व दूर ठिकाणी ठेवले जातील व त्यांची वारंवार काळजी घेण्यात येईल, कि जेणे करून ते खराब होणार नाही व गैरवापर होणार नाही. तसेच या पदार्थाचा प्रमाणापेक्षा जास्त साठा ठेवला जाणार नाही. सदर पदार्थ ठेवलेली टाकी जमिनीपासून उंचीवर राहील व ती चांगल्या प्रतीची असेल. या पदार्थासाठी वापरलेल्या टाक्या हवाबंद व सुरक्षित ठिकाणी असतील या प्रकारचा साठा केलेली खोलीचे छप्पर लाकडी असणार नाही.

७.० प्रकल्पाचे कायदे :-

या प्रकाल्पापुढे प्रकल्प क्षेत्रात सामाजिक व आर्थिक विकास होईल.

अ) भौतिक विकास :-

- ❖ नवीन रस्ते
- ❖ शैक्षणिक सुविधा
- ❖ पाणी आणि आरोग्याची सुविधा

ब) सामाजीक विकास

- * शैक्षणीक सुविधा
- * बँक सुविधा
- * डाकघर व संभाषण सुविधा
- * वैद्यकिय सुविधा
- * नाविन्यपूर्ण सुविधा
- * उद्योग धंदे

८.0 पर्यावरण व्यवस्थापन:-

प्रकल्पाची वाढीव क्षमता विचारात घेता हवा,पाणी,जमीन ,परिस्थितीकी ,सामाजीक आणि आर्थीक परिणाम विचारात घेण्यात येईल.

८.१ हवा व्यवस्थापन:-

प्रकल्पामध्ये धुलीकण उत्सर्जन होते ते कमीत कमी कसे होईल त्यादृष्टीने प्रकल्पाची बांधणी योग्य साधनांचा वापर करू .धुराडयामधून निघनाऱ्या धुलीकनाची संख्या ५० मी.ग्रांम/नानो घन मिटर पेक्षा कमी राखण्यात येईल.त्याच बरोबर धुराडयाची उंची ६० मी.पर्यंत असेल. धुराड्यामधून सल्फर डायऑक्साईड उत्सर्जन कमीत कमी केला जाईल.उत्सर्जन कमी करण्यासाठी वापरलेल्या साधनांची क्षमता वारंवार तपासली जाईल .

प्रकल्पामध्ये तयार झालेल्या राखेची वाहतूक किंवा साठा असलेल्या ठिकाणाची गळती वारंवार तपासली जाईल आणी त्यावर प्रतिबंधक उपाय केला जाईल.

८.२ ध्वनी व्यवस्थापन :-

प्रकल्पामध्ये कमीत कमी आवाज करणारे या यंत्राचा वापर करू.

यंत्रामुळे कमीत कमी कंपने आवाज होईल याची दक्षता घेऊ व

ध्वनी नियंत्रकाचा वापर करू.

हरित पट्टा चांगल्या प्रकारे निर्माण करू जेणेकरून आवाजाची तीव्रता कमी करण्यास मदत होईल.प्रकल्पामध्ये वापरलेल्या यंत्रांना वेगवेगळी वंगण करून त्यांची योग्य देखभाल करू.

८.३ दुषीत पाणी व्यवस्थापन :-

प्रकल्पामधील दुषीत पाणी प्रक्रिया न करता प्रकल्पाबाहेर सोडणार नाही.

थंड पाणी बंद पाईप मधून सोडले जाईल जेणे करून बाष्पीभवन कमी होईल.

सांडपाणी प्रक्रीया प्रकल्पामध्ये सांडपाण्यावर प्रक्रिया केली जाईल.

पाण्याची तपासणी वारंवार करून पाण्याची प्रत चांगली ठेवली जाईल.

८.४ पावसाचे पाणी साठवण :-

पावसाचे पाणी इमारतीच्या छतावरून एकत्र करून तसेच रिकाम्या पृष्ठ भागावरील पाणी भविष्यामध्ये वापरासाठी साठवून ठेवू.

८.५ आरोग्य आणि सुरक्षा :-

प्रकल्प चालू असताना उत्सर्जित होणाऱ्या धुलीकणामुळे आरोग्यावर परिणाम होण्याची शक्यता असते .तसेच धातुकापने ,जोडणे या सारखी कामे करीत असताना होणारा आवाज,अति उष्ण ठिकाणी काम करत असताना होणारे उष्णतेचे परिणाम इ.गोष्टी विचारात घेऊन त्यावरती योग्य त्या साधनांचा वापर करून हे परिणाम कमी केले जातील.

८.६ हरित पट्टा निर्मिती:-

प्रकल्पाला एकून वापरलेल्या जागेपैकी ३३% जागेमध्ये हरीत पट्टा निर्माण करण्यात येईल.

* निष्कर्ष *

पूर्ण प्रकल्पाचा अभ्यास करता असे आढळून आले की या प्रकल्पामुळे पर्यावरणावर होणारा परिणाम नगण्य असून प्रकाल्पाक्षेत्रामध्ये सामाजिक, आर्थिक, शैक्षणिक विकास चांगल्या प्रकारे होणार आहे. त्याच बरोबर या प्रकल्पामुळे परिसरातील लोकांना रोजगार संधी उपलब्ध होणार आहेत.

* धन्यवाद *

EXECUTIVE SUMMARY

Contents of this Chapter shall be :

This chapter is intended to give overview of this report as introduction, justification, location details, resources required, process details, pollution control , and background study. It also underlines the benefits.

Introduction :

This is a proposal for Expansion from 2500 TCD to 9000 TCD Sugar Unit and to establish 36 MW capacity bagasse based cogeneration power plant in existing Sugar Unit. This is a baggase based Co-gen plant from 36 MW capacity of power will be generated which will reduce the load of MSEDCL. The Proponents is at **M/s Cane Agro Energy (India) Ltd. (CAEIL)** At Raigaon, Post Hingangaon, Tal. Kadegaon, Dist. Sangli, Maharashtra, India, referred as **This Industry TI** for brevity. The proposed products (main & attendant) are –

#	Product	Production	Unit
1	Sugar	Expansion from 2500 to 9000	TCD
2	Co-gen power	36	MW

The Notification no S. O. 1533 promulgated on 14th September 2006 has covered this No.1 Product and is at Entry 1(d).Product No.2 is 5 (g) which already received Environmental clearance on dated 11th March 2004, **E. C. No. J-11011/101/2003-IA-II**. The proposal is acknowledged by Government of India, Ministry of Commerce and Industry, Entrepreneurial Assistance Unit, New Delhi. Attendant product 3 is covered in SPCB consent, but does not need EC.

Justification for the project

Justification of this Project can be submitted in many ways, namely –

- How this Project is economically strong by converting waste baggasse of surrounding Sugar Mills to serve as raw material for this unit,
- How this Project is economically strong by converting its own waste in useful product and power generation.
- How the pollution generated from this unit can be successfully managed through EMP implementation, or in fact
- How the pollution generated from this unit can be converted to useful irrigation water with nutrients, and

- How the pollution generated from this unit can be converted to Electricity.

• Saves Petrol (additives) • Foreign Exchange Saver-Earner • Condensate water for Boiler / process • Irrigation water with nutrients for crop • Consumes baggasse, which otherwise is an environmental risk • Consumes spent wash concentrate, which otherwise is an environmental risk

Table No. 11.1: Justification of Project

Various Government Departments will also be examining **Justification** and propriety of this venture and permissions will be obtained to establish this unit. Many are already in hand.

1. IEM, Govt. of India
2. Central Excise, Govt. of India
3. Water permission, Govt. of Maharashtra
4. Power connection, Electricity Board under Govt. of Maharashtra
5. VAT Registration
6. Town Planning Department, Layout approval
7. Building Permission
8. District Commissioner. NA order for Industrial purpose
9. Maharashtra State Udyog Mitra Order (Single window clearance)
10. Incorporation of Company

Location and Boundaries

The government has a desire to improve status of this District and has encouraged Tax incentives, subsidies, interalia. In order to have a sustainable development, the pollution generation from this industry is finally made insignificant having taken all the precautions right from raw material selection up to low or no waste generation and more over conversion.

This site of about 30 Acres has a connecting road and has approachability. This site is connected with Maharashtra State Electricity Board power. When various sites were seen, this site appeared to be environmentally best as also from the business angle and therefore this option was finally adopted.

The site is located at rural surroundings and is about 15 km from Railway Station (karad) and 60 km from Sangli, 22 km from river Krishna. It is geographically located in latitudes 17°24'46.103" N and longitudes 74°19'11.24"E. The premises is about 30 acres and as much as about 1/3 of which is already planned to be brought under the honest green-belt and landscaping. It is bounded by rural area. The premises is about 25 acres and as much as about 1/3 of which is already planned to be brought under the honest green-belt and landscaping. The site is on the Old Karad -Pandharpur Road axis. It is bounded by rural area.

There is no sensitive establishment in the vicinity such as health resort, hospital, archaeological monuments, sanctuaries, etc. The normal wind direction is found to be favorable at this site. All villages are away. All are provided with drinking water from wells or Government Water Supply Schemes RWS. Hence **TI** does not encroach upon their supply.

With all this consideration, this site was ranked first and adopted. The features

#	Feature	Particulars
1.	Location	M/s Cane Agro Energy India Limited (CAEIL)**, At Raigaon, Post Hingangaon, Tal. Kadegaon, Dist. Sangli, Maharashtra**
2.	Latitude / Longitude Altitude	17°24'46.103" N 74°19'11.24 E 565m, AMSL
3	Present use of land	Plant will be in premises of existing Sugar Unit
4	Daily average temp. in ^{0}C	Max.:27-36, min.:14-21
5	Average relative humidity	46 to 82 %
6	Annual rain fall in mm	664
7	Predominant wind directions	3 to 12 km/h, predominantly SW-NE and E-W
8	Soil type	Sandy loam, reddish-brown
9	Topography	Moderately undulated, only shrubs without trees, no streams at the site.
10	Nearest highway	Kolhapur-Pune (NH-4), 18 km
11	Nearest railway station	Karad Railway Station, 15km
12	Nearest airport	Kolhapur: 75 Km
13	Nearest village	Raigaon Village, 5 Km
14	Nearest City	Kadegaon, 12Km

15	Nearest industry	Dongrai Sahakari Dudh Utpadan Sangh 1
16	Nearest water body	Krishna river,22 Km
17	Environmentally sensitive?	None with in 25 km.
18	Seismic characteristics	Safe as per Indian Seismological Institute.

Table No.11.1 Details

Resources:

Plant Capacity: We have proposed a unit expansion from 2500 TCD to 9000 TCD and establish of 36 MW Co-gen. As composting is not involved, we will convert the waste mechanically/ thermally in closed shed, it may run for net crushing season days. During off-season the plant will operate for 33 days.

Raw Materials:

Sugarcane availability-

M/s Cane Agro Energy (India) Ltd. (CAEIL), factory is located at-Raigaon, Post: Hingangaon, Tal: Kadegaon, Dist: Sangli Raigaon is one of the pioneering Private Limited sugar factory of Maharashtra, registered in the year 2007 under the Companies Act, 1956.

The factory is having connectivity with Karad railway station about 17 kms away from factory. The existing installed capacity of the sugar factory is 2500 TCD. The plant is fully electric driven. Expansion of unit For sugar is from 2500 TCD to 9000 TCD.

Total Sugar cane requirement for 9000 MT/day capacity will be estimated to 14.40 Lack MT/Season with 100% capacity utilization. This site of about 25 acres has a connecting road and has approachability. CAEIL has been allotted additional 43 villages in the area of operation of CAEIL . This has brought additional 2000 Ha area under sugar cultivation. The net sugar cane availability together from old & new area has increased. The expected net cane availability since 2011-12 crushing season will be over 7.00 lakh MT. The excess sugarcane is being left uncrushed & hence CAEIL management has decided to increase the crushing rate to take care of the additional sugarcane cultivated in the area of operation. The proposed installed capacity of the plant will be increased to 9000 TCD.

Bagasse availability

The capacity of the proposed Bagasse based Co-gen plant shall be 36 MW. For this the main and sole raw material is Baggase, bagacillo and Coal. Coal will be used during of season.

Cogeneration power plant operation for 160-180 net crushing season days with 29.5% bagasse generation on cane, 0.8% bagacillo & handling losses and 28% bagasse on cane as fuel. During off-season the plant will operate for 33 days on saved bagasse and 107 days on biomass and coal. Coal up to 15% of annual heat input is considered as exigency and to retain steam generation parameters. Major process steam consumption will be 40% on cane for sugar processing during season. The following raw materials will be used.

Raw Material Availability

We have many sugar factories in the district from where the availability of baggase is possible. Survey is made. The raw material will be required for co-gen power at 100% capacity utilization. The landed cost of raw material has been assumed based on prevailing market prices. The bagasse transfer price has been considered as per PDA/MOU between HSF & BOOT Developer.

Utilities

In addition to the raw material, utilities are also required. These are:

- Power: Available through Govt. Electricity Board and own generation. As emergency back-up we have DG sets.
- Fuel: Available baggasse as agro- residue.
- The proposed project has envisaged 110-125 kg/cm² pressure and 580^{0}C temperature parameters.
- The capacity of the boiler and turbine will be 160 TPH and 28 MW respectively.
- Total Cost for project will be Rs. 180 Crore.
- Man Power : Staff, skilled and unskilled totally 114 persons will be required, and will be available.(And indirectly also)
- Water: the sugar mill has permission for lifting the required water quantity from the existing source. CAEIL will ensure that the Karkhana will provide this water for operation of the cogen plant, as per agreement. CAEIL may also review the capacity and health of the water transfer system from the river to the site and carry out required strengthening, if any.
- Building materials: This is not a heavy construction, and majority is in fabrication from Mild steel structural. The orientation is so kept as to balance nearly the cutting and filling. The small requirement is available systematically. The construction –erection time will be small and will be done in daytime. Labor camp is not necessary.
- As the treatment scheme is of composting route, Filler material and composting with press mud is involved and quantitatively it is available.

- **Storage:** Baggasse storage facilities shall be provided as per the rules of (1) Excise Department, (2) Factory Inspectorate and (3) MoEF/ SPCB.

POLLUTION CONTROL
Water Environment
Raw Water:

The water used for this Unit plant is already available, assured and dependable. Our source is granted by Govt. of Maharashtra from Reservior which is mainted by their own about 2 kms from the site. This is treated to a reasonable extent by us, and it has good characteristics. As it is earmarked for this industry, we are not encroaching on anybody else's water source.

Sr. No.	Purpose	Water Intake M^3/Day	Losses M^3/Day	Effluent M^3/Day
1	Process	1200	250	950
2	Industrial (Cooling)	495+21	21	* 495 M^3 Recirculation after cooling and adding 21M^3 make up water for losses
3	Domestic a) Factory b)Guest House	67 5	16 Nil	51 5
TOTAL		**1291**	**287**	**1004**

In addition to this water is needed for domestic use (worker's personal hygiene and canteen / colony), Greening drive and partly power plant. The recovered waste water is treated and recycled

Segregation:

As MoEF desires, **TI** has decided to bring the segregation principle in practice. Now, the industrial waste water streams are segregated first in three branches as (A) Sober, (B) Moderately Polluted and (C) High BOD polluted. The first two are then combined. It shall help in many ways for ease of treatment.

AIR POLLUTION:

Emission Control Equipments (ECE):

The air pollution caused by this industry is mainly from dust as SPM from fuel. The dust is not predominantly due to the composition and handling of raw materials because those are largely controlled.

The efforts taken by the Industry in this respect, are also indicated. Further, regarding the product looking to the description of manufacturing operations and the corresponding flow sheet, **TI** knows from which unit operation or process, air pollutants are expected. For the purpose of arresting and capturing the pollutants, measures are proposed and designed.

#	Source	Pollutant	In-plant Measures	Control Equipment
1	Proposed Boiler	SPM	Feed Bagasse more dry, also will be used methane. Improved quality of water	Dampers, ID Fan, CO_2 meter, Fly-ash arrestor ESP (*), Light ash through very tall stack.

Table No.11.4: Emission Control Equipments

(*) = The Dust Collector of suitable capacity, with hopper bottom. The dust-free air is sucked and thrown into stack through duct by I.D. Fan. The length of duct is kept very small. Instead of cyclone, ESP will be provided.

Solid Waste

Based on above working, the summary is per day

#	Waste	Quantity	Treatment	Disposal	Remark
1	Canteen	2.0 CuM	Compost	Own garden	Organic
2	Colony	4 CuM	Compost	Own garden	Mixed
3	ETP	60 kg	Treated already	Own garden	Organic, Non-Haz
4	Office	2 CuM	--	Sales	Non-Haz.
5	Packing Sec.	1 CuM	--	Sales	Non-Haz.
6	Ash	30 TPD	Silos	Sales	Takers available
7	Lube oil	25 Kg/day	Floatation	Carts/ boiler	In season

Table 11.5: Solid Waste per Day

Guest House is very small (only nominal) and the labor strength attends in shifts. The municipal waste from the colony and canteen is thus controllable. This will be composted and used in due course on own land as manure. Plastic use is discouraged. Thus after dewatering can be used on land for conditioning. This will be so done. Office and packing trash is kept minimum and disposed by sales or reuse.

In addition to above plantation is done for mitigation.

Background Study:

This is important part of study.

(A) **Natural Environment :** We have undertaken to do the sampling as –

#	Media	Stations	Parameters	Frequency
1	Surface Water	4	25	2
2	Ground Water	5	25	2
3	Ambient Air	7	5	3 months
4	Ambient Noise	6	2	3
5	Soil	5	12	1
6	Micromet	1	3	3 months

Table No.11.6: Summary of Sampling

The stations are selected in all the directions from the factory and in 10 km radius. The Environmental quality is generally found satisfactory.

(B) Manmade environment

This includes existing land-use, demography, employment, socio-economic aspects and community development needed and proposed. This is for entire area both rural and urban in this study zone.

- Socio-Economic Status in Influence Zone will include the study of Non-Workers percentage whether high, from the percentage employed population on Agricultural, how far is the scope for other

avenues of livelihood like Live Stock, Forestry, Fishing, Hunting, Orchards, Mining, Trade Commerce.

- Further out of Total Land what percentage is already under Cultivation and Out of Total Land what percentage is already under Irrigation.
- If the land is not likely to support more people, then whether Industrialization is necessary to improve the situation. All this is studied as cost benefit ratio.

  It was found that industrialization is the only solution.

Safety

Safety and Occupational Health will be dealt carefully. A disciplined approach is natural to this industry. Safety policy will be in place. The unit will be registered under Factory Act and are bound by State Factory Rules. Thus, First aid trained and Fire-fighting trained person will be available in every shift. Safety Officer will be appointed, as also the competent person retained. Where necessary, provisions of other Acts, where required like Petroleum act, Explosive Act, etc. will be obeyed. Fire fighting system is kept as per norms of Insurance Company and CIF.

DMP (Disaster Management Plan) and off-site emergency plan will be in place. Accordingly, Personal protection equipment will be given and use will be insisted. Consulting Physician is retained to attain the factory.

Benefits

This industry will generate 36 MW power generation from which (17.75 MW (Avg. exportable power, Season 160 days) 22.89 MW (Avg. exportable power, Off Season140 days)
).This will not disturb the present land use because our area occupied is already sanctioned by Government for industrial purpose, with only small % of Influence zone 10 km and already is in possession. Compatible Architecture will be adopted and No Prime Agriculture Land will be put to this industrial use. Trees will be maintained and not razed down. No Rehabilitation is involved because the land is already in possession of the Industry. The problematic waste materials like solid waste will be reused or taken care of, Wastewater will be reused to grow greenery, and air pollutants will be arrested. Water harvesting will be done and greenery will be increased. People will get some jobs here. Some incidental small employment like eatery, canteen, tyre repairs, garage too will become available to genuine people.

In the final analysis, it is the endeavor of the Proponents to give benefits --

- To keep transparent relations with the neighbors in the area
- To strengthen the Grampanchayat democratic set up by assistance to community
- Not to disturb any prime agricultural land
- Not to encroach on others' existing water source
- Not to overload the existing power supply, causing load-shedding to the villagers
- To remove the barren-ness of the land and prevent wasting of rainwater.
- To Recharge the groundwater
- To strengthen the physical infrastructure
- To create greenery within our premises and even outside to some extent
- To reduce the wastewater pollution created by this new activity by utilizing it in our own fields as water to grow plantation and landscaping.
- To reduce the solid waste pollution created by this new activity by utilizing it in the fields of our own community land development..
- This could be a win-win situation with benefit to Proponents, benefit to the Public and no (or low) harm to the environment.
- All this is possible for which Environment Management Plan as worked out in next Chapter is scrupulously obeyed.

EIA Study Report

This is finally prepared and submitted as per guidelines given by MoEF as --

Chapters	Contents	
I	Proponents, ToR, Purpose	
II	Project explained. Why this, Why needed, Why here, What priorities, What options	
III	Environment Setting	Natural & Man-made
	Material, Method, Approach	Delphi technique
IV	High Significant Impact → Low Insignificant Impact & Shield	
	Proper Site → Prevention → Abatement → Treatment → Mitigation → Smooth Disposal	
V	Alternate Analysis	

	Selection of Raw Materials, Site, Process, Machinery- Hardware, Collaborators, Staff & Team	
VI	Monitoring = Stations, Parameters, Frequency, Statistics, Rectify	
VII	Risk	To Environment, To Health, To Bankers
	Public	Community, Rehabilitation, Others- Assistance
VIII	Benefits = Physical, Social, Employment, Other Tangible. Sustainable??	
IX	Cost-Benefit. If Project Done? If No-Project??	
X	EMP = Plan, Cell, Schedule, Watch-dog, Monitoring, Documentation, Reporting	
XI	Summary, Conclusion, Justification, Mitigation.	
XII	EIA Team = Proponent, Consultant, Associates, Future	

Table No. 11.7: EIA Study Report

The preparatory drill for above was on the background of our thinking –

Conclusion:

This industry will manufacture Power which are in good demand for growing infra-structural facilities in India and abroad. This will not disturb the present land use because our area occupied will be only small % of Influence zone 10 km and is already permitted for industrial use. No Prime Agriculture Land will be put to this industrial use. Trees will be maintained and not razed down. No Rehabilitation is involved. There will be no problematic waste materials as all will be utilized.

- This project is very necessary in view of making useful material available to Indian developmental activity for community, defense and as a foreign exchange saver / earner product.
- The local people desire that industries should come here on existing plot.
- The candidate site is suitable from general MoEF expectations.

- Water, power, Raw material, and Market is assured and found available with ease.
- Full precautions will be taken for Pollution Control, Resource Conservation and Environmental Protection.
- This is cost effective and Sustainable Development.

The Report gives the details and finds that the impact overall is favorable to the country, to the people and to the environment as a sustainable development.

CHAPTER 1
INTRODUCTION

Contents of this Chapter shall be:

Purpose of the Report, Identification of Project & of Project proponent, Brief description of nature, size, location of the Project and its importance to the region and to the country, Scope of the study or TOR.

1.1 Introduction

This is a proposal for expansion of sugar unit from 2500 TCD to 9000 TCD and to establish 36 MW capacity baggase based Cogeneration Power Plant in Existing sugar industry and 45 KLPD Distillery plant. The Proponents are **M/s Cane Agro Sugar & Power Limited (CASPL).** CAEIL has selected M/s. Cane Agro Sugar & Power Limited as the BOOT developer. The project is at **M/s Cane Agro Energy (India) Ltd. (CAEIL)** At Raigaon, Post Hingangaon, Tal. Kadegaon, Dist. Sangli, Maharashtra, India referred as **This Industry TI** for brevity. The proposed products (main & attendant) are –

#	Product	Production	Unit
1	Co-gen power	36	MW
2	Ethyl Alcohol	45	KLPD (Existing EC)
3	Sugar	9000	TPD (Existing 2500)

The Notification no S. O. 1533 promulgated on 14th September 2006 has covered this No.1 Product and is at Entry 1(d).Product No.2 is 5 (g) which already received Environmental clearance on **dated 11th March 2004, E. C. No. J-11011/101/2003-IA-II.** The proposal is acknowledged by Government of India, Ministry of Commerce and Industry, Entrepreneurial Assistance Unit, New Delhi. Attendant product 3 is covered in SPCB consent, but does not need EC.

1.2 Purpose of the Report

Purpose of this Report is to examine whether our efforts address all the published requirements of Ministry of Environment and Forests, New Delhi; such as

- All options to be explored, not merely the site.
- Land to be Minimum, Load-bearing, Level, and without Rain-wash pollution possibilities.
- Water consumption to be Minimum, no encroachment on others existing source, and recovery-recycling to be practiced.
- Wastewater to be segregated and accordingly treated.
- Land should not come in the migration route of wildlife and transitory birds.
- Consideration of aesthetics (odour and noise nuisance) is necessary.
- Proper Green Belt to be designed (CPCB Guidelines are available).
- Transportation risk to be minimized.
- In all above efforts, transparent approach must be maintained.

This is attempted here by keeping the following objectives:

1. To know the existing environmental status.
2. To estimate the future pollution load.
3. To design preventive and curative steps so that any probable significant impact can be turned insignificant first by control measures and inconsequential next by further mitigation measures.
4. To superimpose the future resultant pollution load on existing environmental conditions due to the proposed activity.
5. To understand the views of other departments and incorporate measures to fulfill the statutory requirements.
6. To prepare an environmental management plan (EMP) including monitoring schedule to serve as "Watch-dog"
7. To make this Report available to all stake-holders so as to be useful.

The logic is as explained in the Figure No.1.1 below:

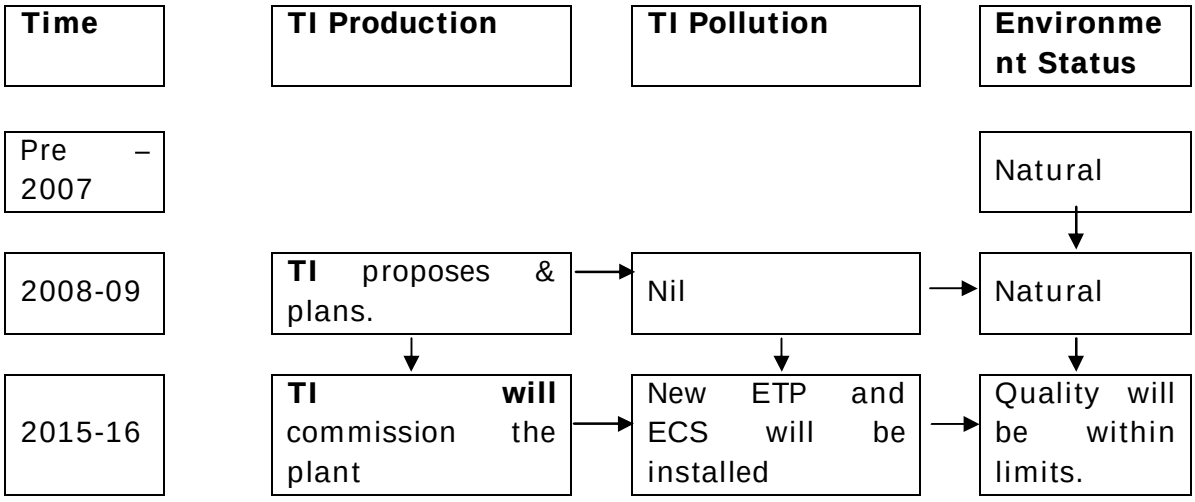

Figure No. 1.1 Logic

1.3 Intended Use of this EIA:

This EIA is not undertaken as an idle exercise. It is not intended to be just a plan on paper to satisfy the statutory requirement. **TI** desires to use this work as a tool that can become handy for many decisions making processes.

Legend:

SPCB = State Pollution Control Board
CIF = Chief Inspector of Factories
CCI = Chamber of Commerce, Industries and agriculture
NGO = Non Government Organization
MoEF = Ministry of Environment, Central Government
ED = Environment Department, State Government
TI = This Industry.

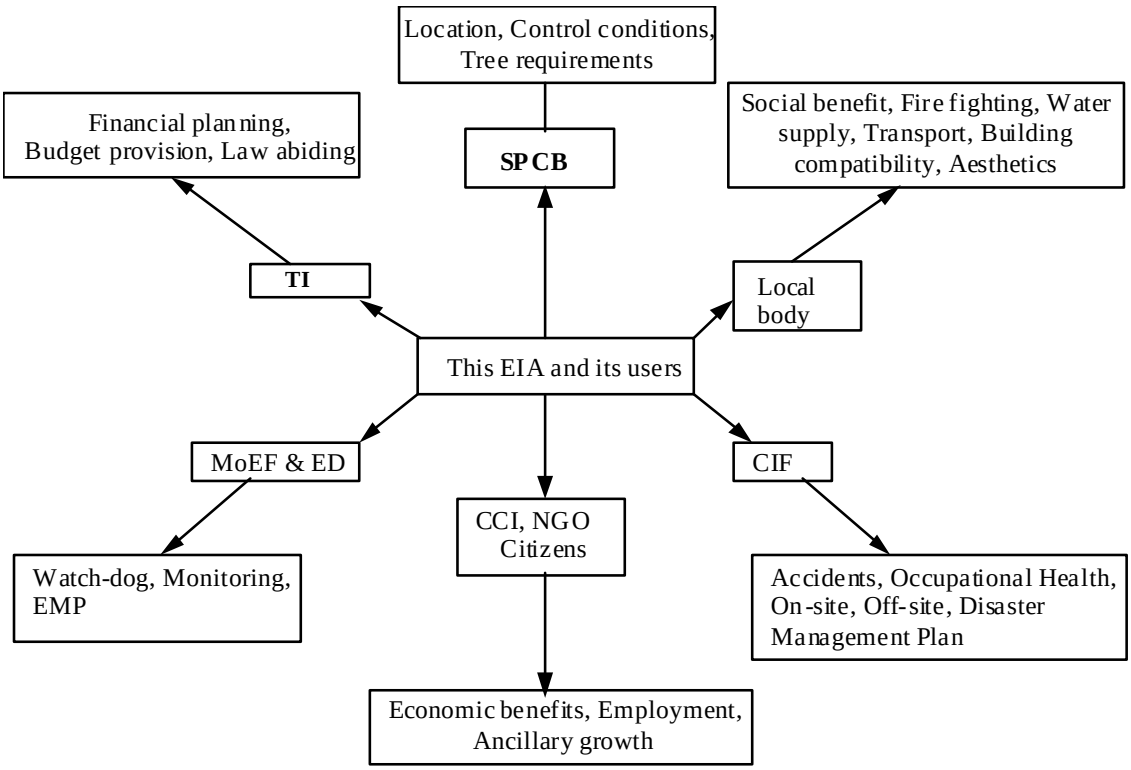

Figure No. 1.2: EIA – Users

This EIA is aimed at fulfilling the requirements of all these possible users.

1.4 Identification of the Project

This is a proposal for expansion of sugar unit from 2500 TCD to 9000 TCD and to establish 36 MW capacity bagasse based cogeneration power plant in Existing sugar industry on BOOT basis. The Proponents are M/s Cane Agro Sugar & Power Limited (CASPL) at M/s Cane Agro Energy India Ltd. (CAEIL), At Raigaon, Post Hingangaon, Tal. Kadegaon, Dist. Sangli, State-Maharashtra, India referred as **This Industry TI** for brevity. The proposed products (main & attendant) are –

#	Product	Production	Unit
1	Co-gen power	36	MW
2	Ethyl Alcohol	45	KLPD (Existing EC)
3	Sugar	9000	TPD (Existing 2500)

Table No. 1.1: Proposed Production

The target production quantity will not be manufactured from day one, but will be smoothly taken up, keeping environmental aspects in mind simultaneously. Justification of the project is submitted before Authorities. Though Co-gen Power , Distillery unit and expansion of sugar unit needs EC.

The Form I is submitted generally covering Justification, Nearby Land Use, Resources, Process, Pollution Control, Aesthetics, Risk Involved, Consequent Developments and Environmental Sensitive Issues. The significant chronology so far is:

- ToR scoping finalized by MoEF on 22.12.2014
- P.C. held by District Collectorate & SPCB after Submitting EIA
- Appraisal meeting attended After Public Hearing and submission of Final EIA

Final EIA (this) Prepared rechecked & now ready for submission to MoEF.

Cane Agro Energy (India) Ltd. (CAEIL) have proposed to expansion of sugar & establish of co-generation project, for expansion of changing in production capacity of sugar plant from 2500 TCD to 9000 TCD & co-generation capacity 36MW.

The site is well connected by Road, so that both the raw materials and finished goods can be conventionally handled. The road is neither too busy, so as to have a fear of accidents, nor is too away from network. For transportation of sugarcane several transport facilities provided (i)Bullock cart-for distance 5-10km. (ii)Tractor-for medium distance 10-25km. (iii)Truck- for long distance. No heavy construction is required and the majority is in fabrication from mild steel structural. The construction-erection time will be small and will be done in day time. The impact during construction phase is mostly temporary and localized. The impact will not be felt at the end of the construction phase. The existing unit of 2500TCD capacity of sugar plant plants is to be constructed on the plain barren land. There is not required of new construction activities for expanding plant.

Production of sugar from sugar unites generates waste products as bagasses, press and molasses which creates pollution load on environment. The molasses has a tendency of auto combustion and has BOD as high as 9 lakh ppm. The bagasse can become wind borne causing SPM. However it is possible to put by products of sugar mill to useful purpose by producing power generation i.e. electricity. , Bagasse is used as raw material. Press Mud as a filler material in composting for effluent pollution control.

The cogeneration of electrical power is generated by passing high pressure steam trough high pressure turbines. The exhaust steam from is further used for sugar production process. This is most energy efficient system of electrical energy generation called as cogeneration of power. This cogeneration of power will help to cope up the need of the state & nation to some extent &will be help to generate revenue for company & to the member cane growers. As the proposed Co-gen Project at Kundal will use in-house bagasse for majority of the operating period, the CO2 emissions for equivalent power generation from fossil fuels will get reduced.

The proposed Sugar and Co-generation project will really help integration of Karkhana's operations and will enable instil long term viability and profitability. The equipment proposed in the project will also reduce overall emissions in the surrounding area.

The proposed location is rural, agro-based and economically back word. The proposed project will generate direct and employment potential to the local population in terms of employment in the industry, transportation and vehicle maintenance activity and

housing activity. This will also cause better price to the molasses and in turn to sugar cane grown in the region.

Project Proponent has (A) already obtained various permits/NOCs and (B) Project Proponent has made SWOT Analysis and finds the overall summation, encouraging. The SWOT (Strength, Weakness, Opportunity and Threat) analysis is made and all this goes to suggest that the Project Proponents have made a serious homework and have seen that the environmental impact will be minimal. We submit:

(A) Various permissions obtained and obtainable from:

1. IEM, Govt. of India
2. Central Excise, Govt. of India
3. Water permission, Govt. of Maharashtra
4. Power connection, Electricity Board under Govt. of Maharashtra
5. VAT Registration
6. Town Planning Department, Layout approval
7. District Commissoner. NA order for Industrial purpose
8. Incorporation of Company

(B) SWOT Analysis

1. Strengths :

- Background and experience of the promoters
- Existing sugar factory & infrastructure
- Project location in potential sugarcane area
- Experienced, willing and committed farmers
- Ensured cane availability and enhanced potential due to additional irrigation
- Demand supply gap in power in Maharashtra
- Demand supply gap in ENA/ethanol in India & Maharashtra
- Conducive policy / regulatory frame work
- Sustained availability of raw materials
- Substantial socio-economic and environmental benefits
- Latest technology equipment with highest efficiency and
- Sound techno commercial viability
- The design philosophy will be to generate optimum levels of power from high pressure steam, supply steam and power requirements of the sugar complex and auxiliaries, and export optimum level of power to MSETCL substation.

2. Weakness :

- Moderate recovery due to feed quality, occasionally
- May not be able to get quality material in lean months, occasionally.
- Sugar unit cannot run for full year, as season is to be kept closed for four to six months.

3. Opportunities :

- Bringing a new type of project for benefit of local people.
- The design philosophy will be to generate optimum levels of power from high pressure steam, supply steam and power requirements of the sugar complex and auxiliaries, and export optimum level of power to MSETCL substation.
- Use of waste residuals for reuse benefits.

4. Threats :

- Changes in Government policy.
- Non-availability of raw material, a possibility due to drastic water shortage occasionally.
- Volatile international and domestic prices.
- Compliance with stringent environment norms.
- High attrition rate, at all levels
- Reluctance of suppliers and end users to compensate for increasing costs.

1.5 Identification of the Proponent

This enterprise is a legal entity, registered under Companies Act 1956 with due registration. The main driving force for this venture is the vision of the CMD Mr. Prithviraj Deshmukh, He also has corresponding industrial background with his Textile Mills, Fiber Industry and as a social responsibility, he has undertaken work for Pulse Polio Programme, T.B. Programs and helping the schools. He will continue his CSR at this place also.

He is supported by his Director's Team who have (1) Exposure to handle Worlds Bank Projects, (2) Running a fabric Industry, (3) Operating educational Institutions (including Engineering discipline) and (4) Working in cooperative financial fields

The Promoters, Proponents and present members on the Board of Directors are

#	Name	Designation
1	Shri Prithviraj Deshmukh	Chairman and Managing Director
2	Shri Dattatraya Dadu Suryavanshi	Director
3	Shri Shnakrrao Anantrao Patil	Director
4	Shir Bhanudas Daji Shinde	Director
5	Shri Ramchandra Dadaso Ghare	Director
6	Shri Laxmanrao Jaysingh Kanase	Director
7	Dr. Jaykar Ramchandra patil	Chief executive Officer

The Project Proponents are known for their **track record** of honest and transparent businesses. The team is law abiding, and goes much beyond mere obedience to the letters. They go to the spirit of law. The track record of merit and honesty is evident from the working of existing activities.

The company will continue their efforts in making the proposed plant ideal with state of art hardware and same responsible working as other enterprises of the proponents individually. The company is well aware about energy crisis and takes various steps for

Conservation of energy, such as

- electrical load management to restrict maximum demand
- optimum utilization of fuel
- power factor improvement
- energy management and monitoring
- improving thermal efficiency of boiler and columns
- change to more energy efficient motors
- variable frequency drive application for motors
- energy conservation awareness training

The proponents will attempt hard to keep the same track record as per earlier units namely

#	Organization	Merit
1	The local bodies	Is run professionally and has shown service to the people by cutting red tapes. All the environmental obligations are brought to the notice.
2	The Educational Institutes	Has maintained an excellent teaching quality and is a center of attraction to students and parents.
3	The Credit Society	Is receiving repeatedly good remarks from Government Auditors
4	Agricultural Produce Market	Farmers are trained by special efforts with newer bio-technological inputs. The yield of sugarcane, cotton, rice, milk is explained by audio-visual aids. Not a formal organization.

This industry is committed to

- Prevent pollution in its activities associated with manufacturing and supply of rectified spirit and power.
- Continually improve environmental performance
- Comply with environmental legislations and regulations

These shall be implemented by

- Reducing the spillages and fugitive pollutants emissions through extensive monitoring
- Conserving energy and other resources through optimum utilization and waste minimization

- Training and involving the employees for development of Clean and Green Environment

1.6 Location and its importance

Nature: This is an Agro - based unit. This needs baggase and quality molasses as its raw material. This place is ideally placed in this District, connected with other parts by road conveniently. The material (both raw and finished) is not hazardous or sensitive, with reasonable care.

1.6.1 Location and Boundaries

The government has a desire to improve status of this District and has encouraged Tax incentives, subsidies, interalia. In order to have a sustainable development, the pollution generation from this industry is finally made insignificant having taken all the precautions right from raw material selection up to low or no waste generation and more over conversion.

This site of about 30 acres has a connecting road and has approachability. This site is connected with Maharashtra State Electricity Board power (MSETCL). When various sites were seen, this site appeared to be environmentally best as also from the business angle and therefore this option was finally adopted.

The site is located at rural surroundings and is about 15 km from Railway Station (karad) and 60 km from Sangli, 22 km from river Krishna. It is geographically located in latitudes 17°24'46.103" N and longitudes 74°19'11.24"E latitudes. The premises is about 30 acres and as much as about 1/3 of which is already planned to be brought under the honest green-belt and landscaping. It is bounded by rural area.

There is no sensitive establishment in the vicinity such as health resort, hospital, archaeological monuments, sanctuaries, etc. The normal wind direction is found to be favorable at this site. All villages are away but connected. All are provided with drinking water from Government Water Supply Schemes RWS. Hence **TI** does not encroach upon their supply.

With all this consideration, this site was ranked first and adopted. The features

#	**Feature**	**Particulars**
1.	Location	**M/s Cane Agro Energy India Limited (CAEIL)**, At Raigaon, Post Hingangaon, Tal. Kadegaon, Dist. Sangli, Maharashtra
2.	Latitude / Longitude Altitude	17°24'46.103" N 74°19'11.24 E
3	Present use of land	Plant will be in premises of existing Sugar Unit
4	Daily average temp. in ^{0}C	Max.:27-36, min.:14-21
5	Average relative	46 to 82 %

	humidity	
6	Annual rain fall in mm	664
7	Predominant wind directions	3 to 12 km/h, predominantly SW-NE and E-W
8	Soil type	Sandy loam, reddish-brown
9	Topography	Moderately undulated. No streams at the site.
10	Nearest highway	Bangalore-Pune (NH-4), 24 km
11	Nearest railway station	Karad Railway Station, 15km
12	Nearest airport	Kolhapur :85 km
13	Nearest village	Kadegaon Village, 15.0 Km
14	Nearest City	Sangli, 60Km
15	Nearest industry	Dongrai Sahakari Doodh Sangh
16	Nearest water body	Krishna river, 22Km (as crow flies)
17	Environmentally sensitive?	None with in 25 km. River as above.
18	Seismic characteristics	Safe as per Indian Seismological Institute.

The site layout is fixed on this land of about 30 Acres, with green-belt designed with trees and shrubs. This includes area for production as well as pollution control activity. In the production side, Main factory shed, transformer foundation, control panel room, laboratory, water complex, tank farm, store shed, utilities will occupy 30 % leaving open space and space for expansion. The final layout is selected based on the technical considerations and flow pattern of the material. For greenery large area and for ETP adequate area is earmarked. Parking arrangement will be provided for 2-wheelers and for 4-wheelersas 5 % of land, with roads about 10 %. This being in rural area is surrounded by rain-fed near barren land only.

Sub-soil is moderately coarse and partly fertile with some top cover of soil at places useful for the purpose of greenery and using the treated effluents for greening and agricultural use. The site is located at rural surroundings and is 15 km from Kadegaon, and is in the midst of rural area and not itself a prime agricultural land;

1.6.2 Importance to the country, region

Some part of this and adjoining districts have a developed Irrigation facility though rains are scanty. The farmers are hard working with Mutual Corporation for livelihood. The Agro-industries, however, are not yet developed to that scale and therefore this attempt. This industry can use some local persons for activities. Many persons who have migrated away for livelihood may return back home if they have skilled useful to our venture.

India is the second largest producer of sugar over the globe. With more than 45 millions of sugar cane growers in the country, the bulk of the rural population in India depends on this industry. One of the agro-based industries in India, the sugar industry is the second largest agricultural industry followed after the textile industry.

Maharashtra Sugar Industry is one of the most notable and large-scale sugar manufacturing sectors in the country. There are few major reasons for the expansion of the sugar factory and increasing availability of cane and pressing demand of the local share holder farmers to crush all the cane they grow is the foremost reason.

The current potential for exportable power generation through bagasse based cogeneration projects in Maharashtra is around 1800 MW compared to National potential of 5000 MW. In Maharashtra most of the above capacity of the power generation through bagasse-based cogeneration falls with the co-operative sector. But the contribution from these sources of generation towards the state requirement remains low. The reason being, the co-operative nature of the sugar mills leading to minimum accruals and paucity of capital or equity required for diversification.

Suppliers are mandated by MERC (Maharashtra Electricity Regulatory Commission) to increase the quantities of renewable energy in their overall supply by 1% every year. The quantum will go upto 9% by 2015-16. MERC has made it mandatory for utilities to procure 0.25 to 0.5 % solar power and the rest from other renewable sources.

This is precisely the main objective of this project, which will be supported by low or no discards and conservation of resources. This type of plant is likely to be more viable in view of present situation, when the Organic Chemicals have demand in the particular market and global inflow of money is permissible. This has a foreign-exchange saving/ earning potential.

1.7 Scope of Study (TOR)

Keeping in mind, the Scope of this Document is given herein below:

1. The present lands are already non-agricultural and have a NOC from the District Collector for industrial purpose.
2. Raw material requirement, water requirement, water balance, process details, technology, product storage, etc. is complied
3. Ambient Air Quality Monitoring for three months except monsoon covering 10 km radius around Industry and its impact.
4. Mathematical Modeling for calculating the dispersion of air pollutants and ground level concentration.
5. Ground water quality around.

6. Treatment scheme to achieve Zero/ minimal discharge.
7. Soil quality monitoring, permeability and other details.
8. Scheme of Treatment, mode of disposal
9. Inventory of medium or large scale similar industries present.
10. Information of solid waste, no. of working days, etc.
11. Employment generation, Benefits of project.
12. The only raw material used is Molasses and the same is not covered under MSI rules. Chemicals and oil used in process/ utilities is in very small quantity. However, Risk Assessment will be done and submitted.
13. Water Harvesting details will be submitted.

1.7.1 Scope of this Document

This is an attempt where environment information is used for planning, development and decision making. Every step is required to be systematically documented. In short, the scope of document will entirely synchronize the planning program. The logic is given in Figure No. 1.2 below as voluntary scoping.

Planning Process for this Project	**Environmental Inventory** ⇨	**Future** ⇨	**Alternatives for TI** ⇨	**Impact Around in the region** ⇨	**Management Action**
Scope of Corresponding Documents	• Environment natural • Environment manmade • Environmental goals • Indian Laws • Local compulsions	• Future load on existing environment • Control • Mitigation • Future needs	• Technical • Collaborators • Environmental engineering • Economics • Constructions • Siting • No-project	• Selection • Project description • Significant load, but insignificant impact.	• Obey Consent conditions. • EMP, Self-discipline • Monitoring • Watch-dog efforts

Figure No. 1.3: Planning Programme

1.7.2 ToR framed by MoEF

MoEF has given 50 ToR points for cogen of capacity 36 MW which are briefly mentioned below, all are attended in this EIA and the details their of submitted in Appendix '**A' (TOR 50)**

Sr. No.	**TOR**

1.	Vision documents specifying prospective longterm plan of the site
2.	Executive Summary of the project
3.	Harnessing solar power within the premises of the plant available at Roof tops and other available
4.	Land use pattern
5.	Layout plan indicating break-up of plant area, ash pond area of green belt, infrastructure, roads etc. shall be provided.
6.	Land requirement of the project site
7.	Present land use pattern as per revenue records
8.	The issues relating to land acquisition and R&R Scheme with time bound action plan
9.	CWC Clearance for drawl of water from the river for the proposed TPP shall be submitted
10.	Satellite Imagery
11.	Sensitive area within 10 Km
12.	Topography of the study area
13.	Study of Land use pattern
14.	A mineralogical map of the proposed area
15.	Firm availability of running the plant and availability of Raw material
16.	Detail of fuel availability
17.	Details of 100% fly ash utilization plan as per latest fly ash utilization notification of GOI along with firm agreement /MOU
18.	Water requirement details
19.	Water body / nallah (if any) passing across the site should not be disturbed as far as possible.
20.	It shall be ensured that a minimum of 500 m distance of plant boundary is kept from the HFL of rivers systems / streams
21.	Hydro geological study of the area shall be carried out
22.	Detailed studies on the impacts of the ecology including fisheries
23.	Source of water and its sustainability
24.	Rain water harvesting details
25.	Zero Discharge concept
26.	Optimization of COC along with water conservation
27.	Water quality monitoring
28.	Socio economic study
29.	Action plan for identification of local employment
30.	Tribal issues under the various provisions of the law of the land
31.	Detailed CSR plan along with activities
32.	CSR activities
33.	R&R plan
34.	Occupational Health and Safety details
35.	Occupational Health and Safety issues
36.	Meteorological and AAQM details
37.	A list of industries existing and proposed
38.	AAQM Details
39.	Fuel analysis details

40.	Quantity, source and characteristic of fuel
41.	Detail of transportation of fuel
42.	Other trans
43.	Other Transportation details
44.	Infrastructure facility details
45.	Detailed Environment Management Plan (EMP)
46.	Disaster Management Plan (DMP)
47.	Disaster Management Plan (DMP) against likely for natural disaster, onsite and offsite plan
48.	Landscape Details
49.	District Forest Department
50.	Corporate Environment Policy

1.8 Chapter Conclusion

This is an introductory Chapter, submitting a brief summary of our thought process, need of the project, relevancy at this site, capability of Proponents, environmental record of good behavior and delineating Scope of this study and documentation.

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CHAPTER 2 - PROJECT DESCRIPTION

Contents of this Chapter shall be:

Vision of the Proponents, Peculiarities of the Project, Responsible Care, Type and Need of Project, Location, Project boundaries, Project layout, Magnitude of Operation, Permissions obtained, Implementation schedule, Sensitive Issues and Condensed Corresponding Mitigation measures.

2.1 Introduction (Justification and Sensitivity)

Justification for the project

Justification of this Project can be submitted in many ways, namely –

- How the pollution generated from this unit can be successfully managed through EMP implementation, or in fact
- How the pollution generated from this unit can be converted to useful irrigation water with nutrients, and
- How the pollution generated from this unit can be converted to Electricity.
- The Electricity Act, 2003 encourages efficient utilisation of resources. The Act provides for the encouragement for renewable energy and cogeneration, while determining the regulatory tariff structure.

- Sugar manufacturing
- Power generation
- Reduce the load of MSEDCL
- Foreign Exchange Saver-Earner
- Condensate water for Boiler / process
- Irrigation water with nutrients for crop
- Consumes bagasse, which otherwise is an environmental risk
- Consumes spent wash concentrate, which otherwise is an environmental risk

Table No. 2.1: Justification of Project

Sensitivity

Any proposed human activity is never a simple straightforward matter. When production is done, the side effect of pollution takes place though the degree may vary as per alertness of the Project Proponent. There are many facets of environment, and which is more sensitive depends both on the industrial process involved as well as on the location characteristics. This must be considered in that hierarchy, and is so considered during the scoping exercise.

The site is well connected by Road, so that both the raw materials and finished goods can be conventionally handled. Total land available with sugar factory is

about 30 acres. Bagasse is available from the sugar plant will be utilized as inputs in the proposed project. Land required for the project is available in the existing industry. Procurement of additional land for the project is not needed. Water requirement will be managed within the available limits.

These aspects are required to be attended on priority in industrial sector and done so in this study. Various Govt. departments are also keeping a control on this activity and permissions are sought from all the departments. Unless these are in hand, the proponents will not commence the production.

Certificate of incorporation of the company

- Environmental Clearance from MoEF Govt. of India
- Consent to Establish from Maharashtra Pollution Control Board
- Industrial Entrepreneurs Memorandum (IEM), New Delhi for Alcohol
- Industrial Entrepreneurs Memorandum (IEM), New Delhi for Co-gen Power
- Single Window Agency of State Govt.
- State Excise Registration
- NOC from Local body
- Land Registration, NA permission and Industrial purpose
- Water drawl permission
- NOC is establish co-gen plant from State
- Power purchase agreement by State
- On site emergency plan approval
- Central Excise Registration

2.2 Location

The project site is located in the Sangli District and the 10 km study area falls within the Kadegaon taluka of the Sangli District and Karad and Khatav talukas of the Satara district. There are 43 villages in the study area and there are no towns or cities in the study area. The location is essential rural with moderate in habitation. The nearest town Sangli is 76 km from the project site towards south.

The pollution generation from this industry is finally made insignificant having taken all the precautions from raw material selection upto low or no waste generation and conversion. This site has a connecting road and has approachability. This site is connected with Maharashtra State Electricity Board power. When various sites were seen, this site appeared to be environmentally best as also from the business angle and therefore this option was finally adopted.

There is no sensitive establishment in the vicinity such as health resort, hospital, archaeological monuments, sanctuaries, etc. The normal wind

direction is found to be favorable at this site. All villages grow rice and cane these villages have road network connected. These villages will have fully satisfactory amenities like medical facilities education, employment, transportation, communication by having a running industry nearby. They would like to have this through media of this industry. All are provided with drinking water from wells or Government Water Supply Schemes RWS. Hence **TI** does not encroach upon their supply.

With all this consideration, this site was ranked first and adopted.
The site layout is fixed on this land of 30 Acres with additional land possible. This includes area for production as well as pollution control activity. The final layout is selected based on the technical considerations and flow pattern of the material and is

Land Utilization	**Land Area, acre**	**%**
Built up area	15.0	50
Green belt area	6.0	20
ETP/ESP	2.0	6.66
MSEB/ yard	7	23.33
Total	**30**	**99.99 say 100%**

Table 2.2 Land Utilization

Key Maps:

1. The location is shown in Figure 2.1 **index map (political)**.
2. The location is shown in Figure 2.2, a map with **TI** as center, (Google image)
3. The location is shown in Figure 2.3, a map with **TI** as center, (Toposheet)
4. The **TI** premises are shown in figure 2.4 and 2.5 with boundaries layout **map**, with all the shops/sheds, roads, and open spaces shown on it, not to scale.

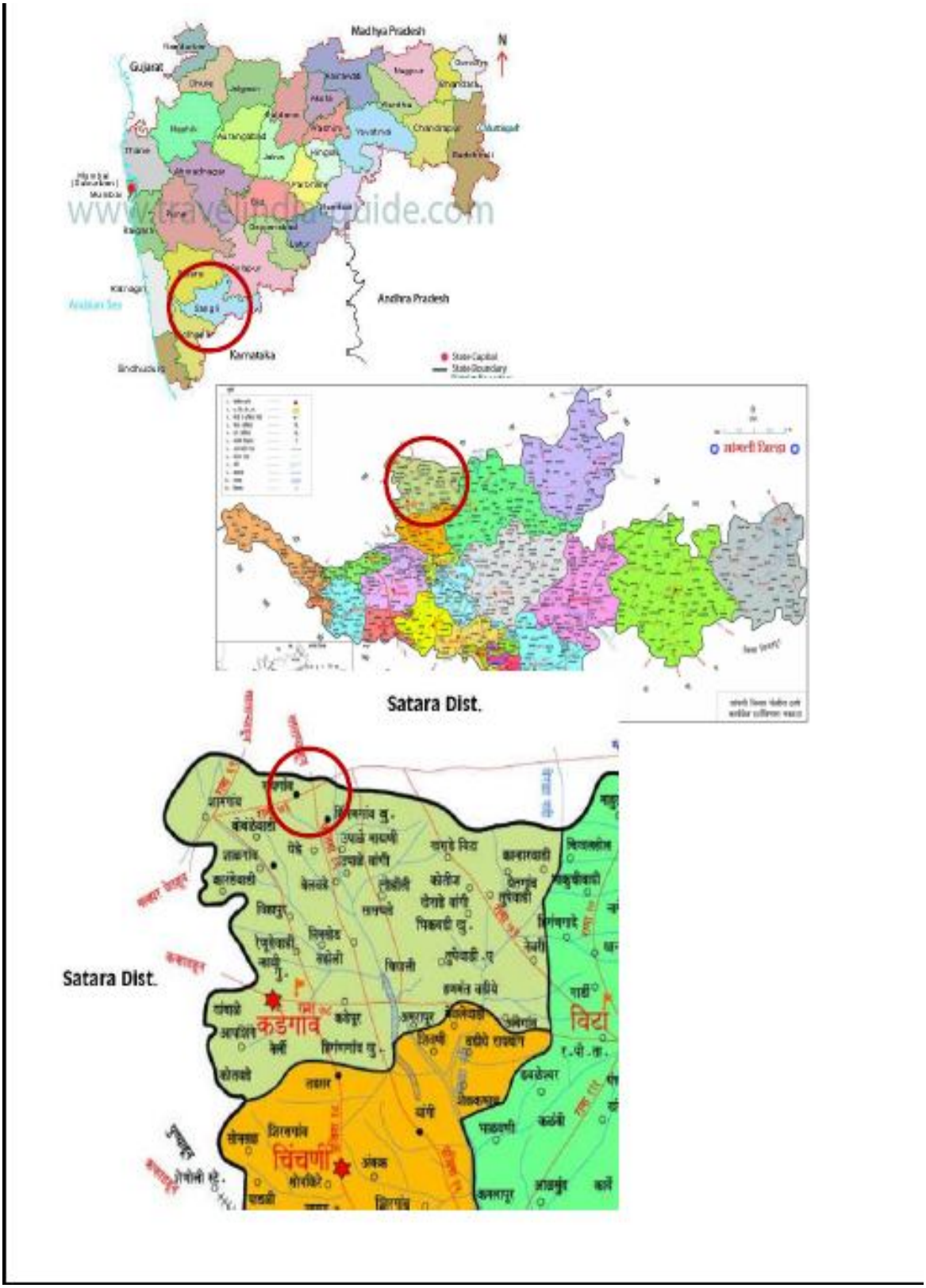

Madhya Pradesh
Gujarat
Andhra Pradesh
Karnataka
Satara Dist.
Satara Dist.
कडगाव
चिंचणी
विटा

Figure 2.1 **Index map (political)** of District Sangli

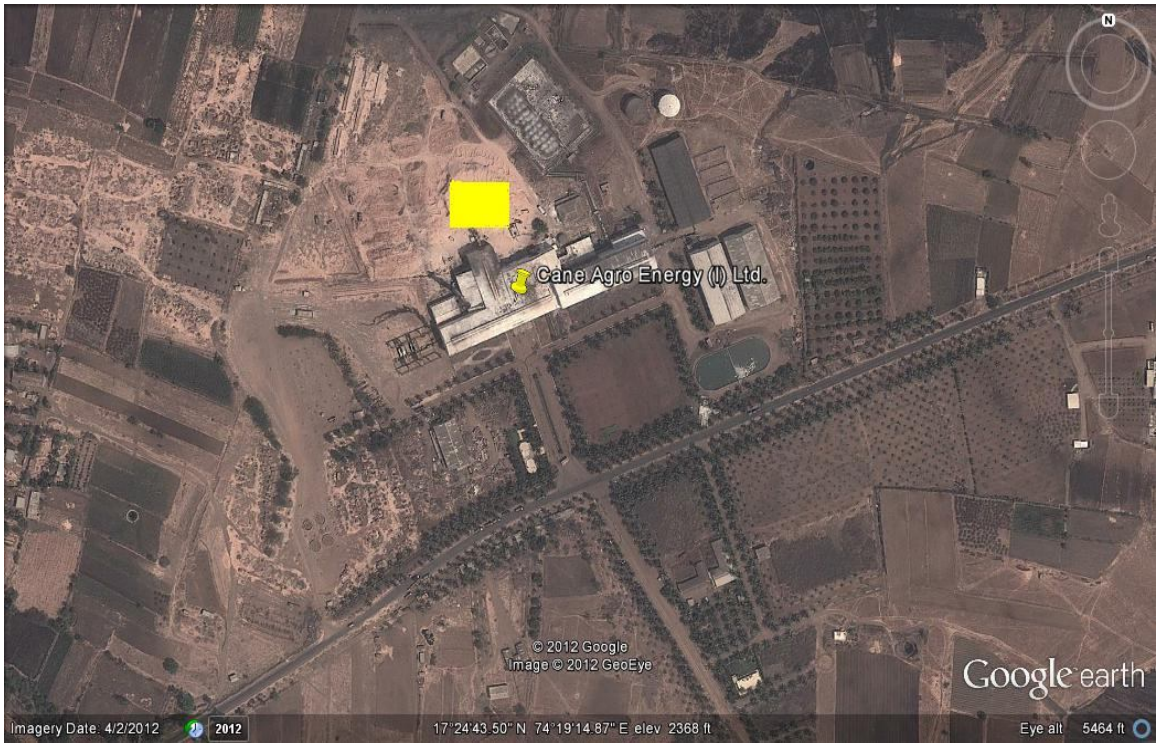
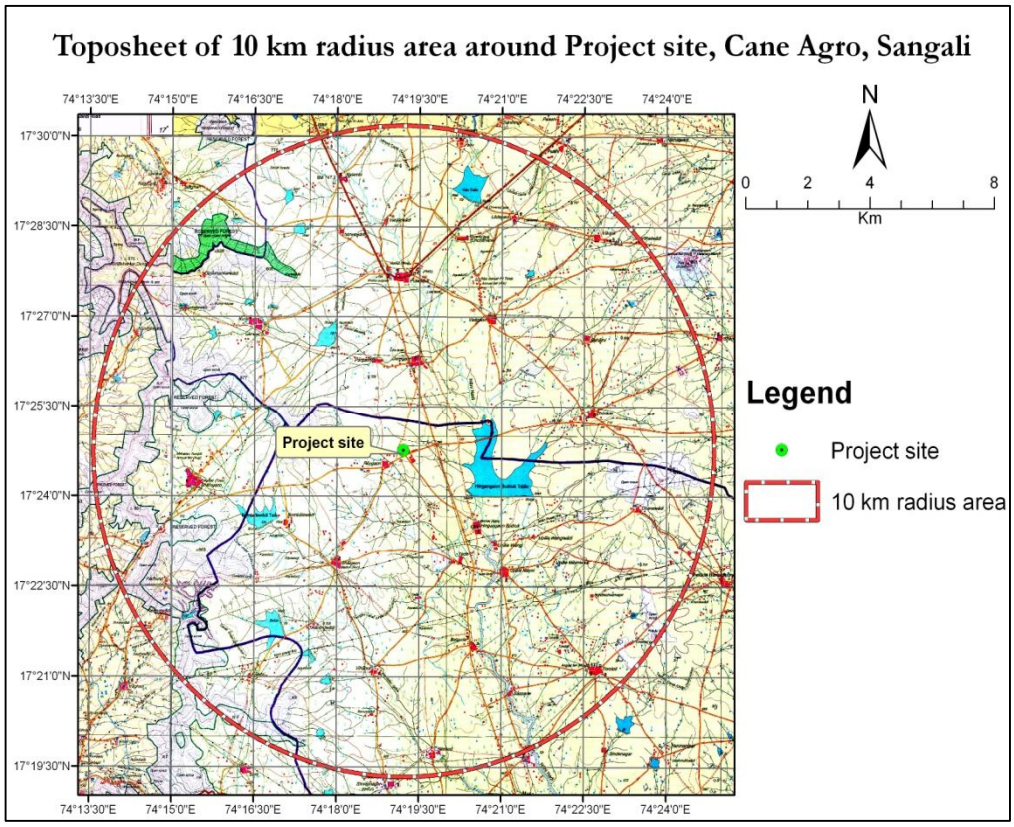


Figure 2.2b, a map with **TI** as center, (Google image) Around 2 of the Project Site



Figu2.3, Map with **TI** as center, (Toposheet)

2.3 Components of Project

2.3.1 Product:

M/s Cane Agro Energy (India) Ltd. (CAEIL) proposes to enhance from 2500 TCD to 9000 TCD of sugar unit and 36 MW of cogeneration power plant at At Raigaon, Post Hingangaon, Tal. Kadegaon, Dist. Sangli, Maharashtra. The raw material of sugar cane is available in the vicinity of the project site and the bagasse will be used as fuel for cogeneration power plant. The project involves:

a. Sugar Unit

- Modernization of Sugar unit to 9000 TCD by capacity addition 2500 TCD in existing 2500 TCD sugar mill
- Installed capacity of sugar factory will be 9000TCD @ 230TCH.
- Double Sulphitation process with 3 massecuite boiling scheme shall be adopted for production of plantation white sugar.
- Number of days of operation of sugar factory is 180 days.
- Capacity utilization of sugar factory considered for first year 85% and second year onwards 92%.
- 100% of total sugar produced as free sugar sale
- Recovery of sugar considered for sugar production is 11.75% and recovery of molasses sent to Distillery is 4.0%.

b. Co-Gen Power Plant

- The boiler will be fired with agro waste bio-mass fuel such as Bagasse and cane thrash.
- Boilers are provided with Wet Scrubber and 72 m ht chimney as pollution control facility.
- Surplus power available from the industry will be exported to public grid.
- Operation of existing 3.0 MW T.G set will discontinue.
- The plant will be designed to produce 36 MW Co-gen plant. Electricity will reduce the load of MSEDCL.

Justification of Plant Capacity: We have proposed to enhance sugar unit from 2500 TCD to 9000 TCD of sugar unit and 36 MW of cogeneration power plant. The proposed project has envisaged 110-125 kg/cm² pressure and 540^{0}C temperature parameters for steam, which will give optimum efficiency and power generation, when extracted through a matching turbo generator set. The capacity of the boiler and turbine will be 160 TPH and 36 MW respectively.

2.3.2 Raw Materials:

The capacity of the proposed Co-gen plant shall be 36 MW. For this the main and sole raw material is baggase. The landed cost of raw material has been assumed based on prevailing market pricees. The bagasse price has been considered as per PDA/MOU between HSF Thus, the following raw materials will be used.

Item	Quantity	Unit	Particulars
Sugar Cane	14, 40,000	MT for 180 days	Available in District and in premises
Bagasse	4,32,000	MT for 180 days	Self Generation from cane crushing at the full capacity

Table No. 2.3: Raw Materials

Raw Material Availability

Sugarcane availability

- Sugar cane cultivation land is available as;
  - Kadegaon Tahshil -Tembu Irrigation project has sugar cane cultivation land 26554.71 Hector
  - Kadegaon Tehshil- Takari Irrigation project has sugar cane cultivation land 28954.96 Hector
  - Khatav Tehshil- Urmodi Irrigation project has sugar cane cultivation land 22784 Hector
  - Total sugar cane land available 78274.67 Hector
- This site of about 30 acres has a connecting road and has approachability. CAEIL has been allotted additional 43 villages in the area of operation of CAEIL. This has brought additional 2000 Ha area under sugar cultivation near the factory .
- The net sugar cane availability together from old & new area has increased. The expected net cane crushing availability since 2012-13,/ 13-14 crushing season is over 6.00 lakh MT. The excess sugarcane is being left uncrushed & hence CAEIL management has

decided to increase the crushing rate to take care of the additional sugarcane cultivated in the area of operation.

Baggase availability

- The maximum bagasse generation achieved in last five years is 30.30% on cane. The basis for bagasse generation is taken at 30% on cane for the proposed Cogen Project. Mill bagasse and cane trash will be main fuel for the proposed Cogen Project during crushing season and saved bagasse and cane trash will be the main fuel during the off season period. Imported coal will be used as auxiliary fuel for exigency and retaining power cycle parameters.
- Cane trash, which is available in the cane fields will be utilized both during season and off season up to 10% by weight, to extend the operation days in particularly in the off season period. Coal can also be used up to 15% as per the MNRE guidelines.
- The design and guarantee fuel for the Cogen Project will be bagasse generated from the sugar mill, during the season operation of the sugar plant. However, the plant will be suitable for operation with fuels like saved bagasse, cane trash & coal. The extent of usage of the fuels will be depending upon the availability.
- Due to availability of variety of fuels, the boiler will have to be designed for the multi fuel firing type for the proposed Cogen Project.
- In this District alone there are 18 running Sugar Mills and 13 under erection, with a total crushing of 68,000 TCD.
- Sugar Mill normally crushes 15-20 % more than the capacity, runs for 160-180 days and produces molasses at 4.00 % on cane. However, for safe calculation we presume no over crushing, only 180 days and only 4 % molasses on cane.

Surplus Biomass for CASPL‟s Project after Considering a Collection Efficiency of 75 % for Biomass Procured from Outside

Sr. no	Tehsil	Maize cobs	Tur Stems	Cane Trash	G Nut Shells	Firewood	Total
Reg 1	**0 - 25 km**						
1	Kadegaon	926	765	26033	908	0	28631
2	Karad	2689	762	66396	2473	0	72320
3	Khatav	254	59	6353	0	10742	17408
	Sub Total	**3869**	**1586**	**98782**	**3380**	**10742**	**118358**
Reg 2	**26 - 50 km**						
4	Khanapur	5754	2978	16384	1191	0	26306
5	Tasgaon	3869	828	7510	780	0	12987
6	Shirale	2737	155	16494	1190	0	20576
7	Walva	810	402	79823	1154	0	82189
8	Palus	890	287	30889	350	0	32415
9	Patan	1039	449	16884	2927	4355	25652
10	Satara	497	406	27849	1631	0	30382
11	Koregaon	342	482	29736	192	7989	38741
12	Mann	124	0	2974	0	35015	38113
	Sub Total	**16060**	**5985**	**228542**	**9413**	**47359**	**307360**
	Grand Total	**19929**	**7572**	**327324**	**12794**	**58100**	**425718**

2.3.3 Utilities

In addition to the raw material, utilities are also required. These are:

In addition to the raw material, utilities are also required. These are:

- Power: Available through Govt. Electricity Board and own generation. As emergency back-up we have DG sets.
- Fuel: Available baggasse as agro- residue.
- The proposed project has envisaged 110-125 kg/cm² pressure and 580⁰C temperature parameters.
- The capacity of the boiler and turbine will be 160 TPH and 36 MW respectively.
- Total Cost for project will be Rs. 250 Crore.
- Man Power : Staff, skilled and unskilled totally 114 persons will be required, and will be available.(And indirectly also)
- Water: the sugar mill has permission for lifting the required water quantity from the existing source. CAEIL will ensure that the Karkhana will provide this water for operation of the cogen plant, as per agreement. CAEIL may also review the capacity and health of the water transfer system from the river to the site and carry out required strengthening, if any.
- Building materials: This is not a heavy construction, and majority is in fabrication from Mild steel structural. The orientation is so kept as to balance nearly the cutting and filling. The small requirement is available systematically. The construction –erection time will be small and will be done in daytime. Labor camp is not necessary.

- As the treatment scheme is of composting route, Filler material and composting with press mud is involved and quantitatively it is available.
- **Storage:** Baggasse storage facilities shall be provided as per the rules of (1) Excise Department, (2) Factory Inspectorate and (3) MoEF/ SPCB.

Particulars		Rs. Lakh
Site Development	:	140.00
Civil Work	:	1403.4
Equipment	:	12873.8
Miscellaneous Fixed Assets	:	380.00
Preliminary & Pre-operative Expenses	:	300.00
Interest during construction	:	540.00
IDC on intuitional loans	:	1128.44
Contingencies	:	206.46
Stock level & Working capital Assessment	:	592.71
Total	**:**	**18000.00**

Table-Detailed Cost

For Environmental care funds are earmarked as –

#	Environmental Aspect	Capital Expenditure Rs in Crores	Recurring Expenditure Rs in Crores
1	Emission control Engineering	2.00	0.25
2	Water & Wastewater management	4.00	0.5
3	Solid Waste	1.00	0.16
4	Greening Drive	0.5	0.15
5	Monitoring	0.01	0.09
6	Environmental Cell & PR	0.02	0.09
7	Other aspects like Rain Water Harvesting, Safety, Security etc	0.2	0.04
	Total	7.73	1.28

Table 2.6: Funds for Environmental Care

In addition to this for occupational health & CSR additional funds are earmark about 15 lakhs per year

Source and Requirement of Fuel

The boiler is designed to operate on multi fuels consisting of spent wash concentrate, bio-gas and bio-mass. Bio-mass is based on agro waste such as bagasse, sugar cane or maize stack depending on their availability in the area.

The bio-gas and spent wash concentrate available from captive source. The fuel shortage will be met from agro wastes and biomass procured from external source.

Power generation capacity in some of the sugar industries in the region is limited. Surplus bagasse available from these units will be procured and used as fuel in the present industry.

The proposed fuels are based on bio-mass and these are obtained from renewable source. Hence, these fuels will not cause net addition of CO_2. The source and availability of fuels is given in Annexure. The characteristics of fuel are given in Table-2.8

Sl. No.	Parameter	Fuel		
		Bagasse	**SWC**	**Bio-gas**
1	Heat value,	2200	1600	4500
2	S content,	0.4 kg/T	1.00 kg/T	25 kg/T
3	Ash content	20 kg/T	180 kg/T	Nil
4	Steam/fuel ratio	2.2 kg/kg	1.6 kg/kg	5.0 kg/kg
5	Requirement	144 T/d (alternate to rice husk)	60 T/d	24000 Nm^3/d

Table-2.8 Characteristics & Requirement of fuels

Calorific value wise the Agro-based residue and spent wash based is:

#	Particulars	SWC	Biogas
1	Qty/day	60 TPD	24000 Nm^3
2	Heat value, GCV,	1600 kcal/kg	4500 kcal/Nm^3
3	Heat value, Kcal x 10^4	9600	10800
4	Percent	40.73	45.83

Thus all the resources are available and will be used economically and judiciously.

Project Layout

The site is well connected by Road and by Transmission lines so that both the raw materials and finished goods can be conveniently handled. The Road is neither too busy, so as to have a fear of accidents, nor is too away from network.

The photographs of the land are enclosed for visualization.

Photograph No.1

Photograph No.2

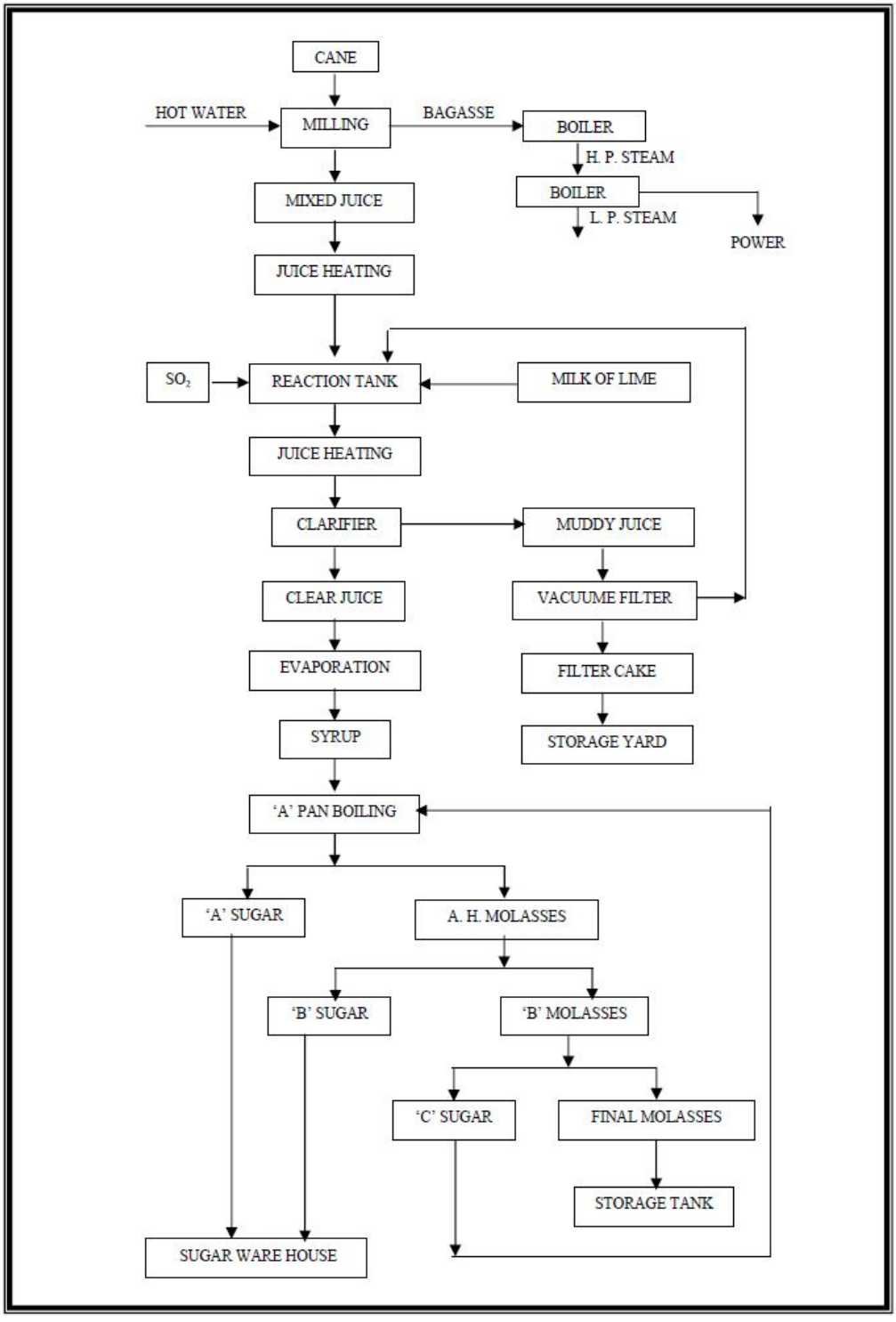
.4 Manufacturing Process:

Sugar Unit

The flow diagram and operating parameters of sugar co-gen power plant are given in

Figure-2.3 and Table- 2.3,

respectively.



Sugar Plant Brief Description Of Process To Manufacture White Sugar By Double Sulphitation Process

The process of manufacturing involves the following steps:

I. Extraction of cane juice from cane

II. Purification of cane juice

III. Evaporation of cane juice to facilitates crystallisation
IV. Crystallisation of Sugar
V. Separation of sugar and liquid by Centrifugal force
VI. Re-Boiling of Liquid
VII. Drying

Brief Description of The Above Process Steps Are Given Below:

I. Extraction of Cane Juice from Cane

The cane which is brought from fields by carts/trucks/tractors, weighed and unloaded in the cane carrier for extraction of juice from sugarcane. The unloaded cane will pass through preparatory devices (Chopper, leveller and fibrizer). The preparatory devices will cut the cane stalks into pieces.

The prepared cane enters mills consist of multiple units of three roller combination through which the prepared cane. To aid in the extraction of juice spraying thin juice from previous mills and water before last mill, directed on the blanket of Bagasse as it emerges from each mill help to leach out the sugar.

Use of Bagasse

The residue that leaves the last mill is called bagasse contains un-extracted sugar, woody fibre and water. The bagasse will be used as fuel to produce steam and power as co-generation. The generated steam will be used to run turbines for power generation. The outlet of the turbine i.e., low pressure steam will be used for mill juice processing. The condensed water will be sent back to boiler for steam generation during crushing season.

II. Purification of Cane Juice – Clarification

The extracted juice from mills is strained to remove bagasse particles before sending for process. This juice is sent through a mass flow meter and the quantity automatically recorded. The dark green juice from mills is acidic and turbid. The universal process employed to remove both

soluble and insoluble impurities is called Sulphitation process. The juice will be heated up to 70^0C to 75^0C to avoid inversion. In sugar plant as a measure of steam economy primary heating will be done by tubular heat exchanger using heat energy available from the condensates of evaporators and pans.

Liming and Sulphitation

The process in whichmilk of lime(Ca(OH)2) is added to the juice simultaneously in juice sulphiter, thereby pH of juice will be increased to 6.9 to 7.2.

$$CaO+H2O \longrightarrow Ca(OH)2 + Colour$$

The aim of this neutralization is to remove colourants from the juice, and to neutralize organic acids. The formation of tri-calcium phosphate and sulphate, which are products on sedimentation and carry impurities present in the liquid. Lime consumption (Cao) ranges from 0.18 to 0.25 % on cane according to the treatment strength required. The absorption of the SO2 gas (sulphurdioxide) by the juice takes place in juice sulphitor. The SO2 gas is produced in the unit by burning sulphur in the presence of air, in special furnace and the reaction is given below.

$$S+O2 \longrightarrow SO2$$

The main objectives of Sulphitation are;

- Sulphitation is the practice of adding sulphur dioxide (SO2) to process streams in a sugar factory. This is done for one of three reasons :

1. **pH control** - the SO2 in aqueous solution forms sulphurous acid H2SO3(aq) which reduces the pH of the process stream. An example of this would control of diffusion water pH in a beet factory, where keeping the pH below 5.5 reduces the extraction of pectin from the beet cell walls which helps pulp pressing.
2. **Biocide** - used in sufficient quantities the SO2 inhibits the life cycle of bacteria, reducing the quantity of sugar lost by bacterial degradation to lactic acid. This is similar to the use of

sodium metabisulphite for sterilising home brewing equipment. The efficiency of SO2 as a biocide is sometimes challenged in the literature.

3. **Colour blocking** - SO2 reacts with the carboxyl groups of invert sugars (glucose and fructose) to inhibit their participation in the colour forming Maillard reaction with amino compounds. By adding SO2 to juice before evaporation the increase in colour through the evaporators is kept to a minimum, protecting the juice from excessive colour formation at high temperature in the evaporators.

- Decreasing the viscosity of the juice and consequently of the syrup, to reduce viscosity and remove the colouring matters present in the juice. This ultimately facilitates better evaporation and crystal development.

Average consumption of Sulphur can be estimated in between 0.05% to 0.06% on cane. The sulphited juice is heated to approximately 101 to 103^0C to accelerate and facilitate the coagulation and flocculation of colloids and non –sugar proteins, emulsify fats and waxes, or in other words accelerate the chemical process, increasing decanting efficiency and also enabling removal of gas from the juice. The juice purification by removing the flocculated impurities from the previous treatments. This process is carried out continuously in equipment called a claifier. The clarified juice is removed from the upper part of Clarifiers and sent to the evaporation section for concentration. The mud will be withdrawn from the bottom of the Clarifiers and sent to rotary vacuum filter. In rotary vacuum filters, juice and filter cake will be separated by vacuum. The cake that is discharged are applied to fields as fertilizer and in some countries cane wax is extracted from this cake.

III. Evaporation

The clarified juice obtained in the clarifiers constitutes 75% water. The first stage of concentration is carried out in equipment called the evaporator, which operates continuously. The evaporator consists of five bodies, connected in series so that the juice undergoes progressive

concentration from the first effect to the last effect to evaporate 75% of water which is present in the juice for that we require steam. Hence exhaust steam from turbines at a pressure of 1.5 kg/cm2 at 125^{0}C will be fed to the effect of evaporator. Subsequently due to the evaporation of the water in the first effect will yield the same amount of vapour, which will be fed to the succeeding bodies. Due to the difference in the pressure and the vacuum in the bodies the evaporation of juice will takes place in all the evaporators. Initially clarified juice will have a brix of 14-16^{0}C, reaching 55-65^{0}C Brix from the outlet of the V body. This syrup is passed through a tower consists of absorption of the SO2 (Sulphurdioxide) by the syrup, lowering its original pH from 6.4 -6.8 to 4.6 -5.2. The water vapour generated from 1st evaporator will be used in subsequent bodies and the generated condensate will be utilised for cane juice extraction at mills, muddy juice filtration at vacuum filters, milk of lime preparation, pan washing and centrifuge. The excess condensate will be cooled and used for plant utilities and on land irrigation.

IV. Crystalisation

Crystallisation takes place in single effect vacuum pan. The syrup obtained from the evaporator will be boiled until saturated with sugar. At this point “seed grain” is added to serve as nuclei for the sugar crystals and more syrup is added as the water evaporates. Continuing the above process the pans are filled up till the desire size crystals are built up and dropped in mixers called crystallisers. The sugar and syrup forms a dense mass known as Massecuite.

V. Separation of sugar and liquid by centrifugal force

From the crystallizers, the massecuite will be cured in the centrifugal machines. In centrifugals the sugar and molasses will be separated. In centrifugals there are two types of machines

I. Continuous centrifugal Machines

II. Batch Type centrifugal machine

The continuous centrifugal machines will be used for low grade massecuites like B and C Massecuites. The separated molasses will be

taken back to the process for extracting the dissolved sugar which is present in molasses. The separated sugar having low purity is made as a magma minglers and it will be melted in the sugar melter and will be taken back to the A massecuite boiling. High grade massecuite i.e., A-Massecuite will be cured in the batchtype centrifugals. The sugar discharged from the batch centrifugal has a high moisture level with temperature of around 60 to 65 degree centigrade.

VI. Re-boiling of Liquid

The aim of sugar boiling is to recover more sugar and send less purity of molasses (Final Molasses) as by product. 'A' Massecuite from Syrup and second grade used as 'seed' nuclei and high purity washings from high grade sugar (AL Molasses) high grade or 'A' Massecuite is boiled. From this 'A' Massecuite we get white sugar, 'A' Heavy Molasses and AL molasses. This AL light molasses will be sent back for 'A' Massecuite boiling. The AH molasses is being sent for 'B' Massecuite

"B" Massecuite

The AH Molasses is taken in to batch pan and boil till the super saturation stage. At this point 'seed slurry' is added to serve as nuclei for the sugar crystals. Continuing the boiling by feeding AH till the crystals size reaches to 160 to 180 µm. The grain will be transferred to vacuum crystallisers, futher boiling takes place in continuous vacuum pans. The continuous pan outlet massecuite size will be 250 to 300 microns. The 'B' grade Massecuite separation we will get B seed and B heavy molasses. The part of B seed will be sent for A graining and balance for melting. B heavy molasses sent for „C" Boiling.

"C" Massecuite or Low Grade Massecuite

As this is the important massecuite from which mother liquor goes out as Final Molasses must be of low purity. Hence, more number of small crystals must be present to have larger area to deposit or de-sugar the mother liquor. Here the crystals are smallest to achieve our aim.

Graining is done using 'C' light and AH molasses in batch pan and boiled till the super saturation stage. At this point seed slurry of 3 to 4 microns is added to serve as nuclei for the sugar crystals. Continuing the boiling by feeding C light and BH molasses till the crystals size reaches to 70 to 90 microns. The grain will be transferred to C vacuum crystalliser. Further boiling takes place in continuous pans by feeding BH molasses. The crystals size of pan outlet is 150 to 180 microns. The massecuite dropped to Mono Vertical crystalliser for cooling. During cooling of the massecuite the temperature brings down to 42 to 43 degree centigrade to achieve maximum sugar recovery. The cooled massecuite fed to continuous centrifugals for separation. The separated mother liquor termed Final Molasses will sent to distillery industry. The sugar separated from first curing is mixed with water and sent for second curing. During second curing we will get C seed and C light molasses. C seed will be sent for 'A' Boiling and C light molasses sent for C boiling.

VII. Drying

The separated sugar from 'A' centrifugals cooling and drying of the sugar is carried out in a multi tray hopper, in the hopper the cold and hot air will be pass in co-current direction to bring down the moisture and temperature of the marketable sugar. From the drier, the sugar passes through grader where the separation of sugar of various grades depending on the size and colour like: L-30, M-30, S-30 and SS-31 will takes place. The graded sugar will be collected in bins. The sugar from the bins will be weighed in automatic weighing scale, stitched and will be sent to the sugar godown. Sugar is stored in 50 kg PP bags and 50kgs "A" twill gunny bags in sugar godown.

Cogeneration Power Plant Brief Description of Process

The manufacture of Co-gen through Bagasse consists of following operations.

- The co-generation power Plant will have installed capacity of 28 MW and will employ 110 kg/cm2 and 540 0C configurations. Bagasse generated from cane crushing, excluding handling losses and bagacillo requirements will be available for operation of the high pressure boiler during season of 160 days.

- The design philosophy will be to generate optimum levels of power from high pressure steam, supply steam and power requirements of the sugar complex and auxiliaries, and export optimum level of power to MSETCL substation. All the equipment shall be designed to achieve best possible efficiencies under the specified operating conditions. Modern distributed control system will be employed for monitoring the plant performance. The layout will be so designed to reduce the capital cost for interface piping / cabling, and ensure ease of maintenance and material handling
- The auxiliary steam consumption for the power plant will be for soot blowing and other auxiliary consumptions like steam jet Air Ejector (SJAE) & Gland steam condenser (GSC) at high pressure, for twin HP heater at medium pressure and for de-aerator at low pressure. The auxiliary power consumption for the power plant will be about 7.95 % of generation during seasons.
- The colony power requirement will be met by the co-generation power plant, during season.

The brief design parameters for the cogeneration power plant will be as follows:

Boiler capacity, TPH	160 TPH
Pressure kg/cm^2	110 125
Temperature ^{0}C	580
Turbine capacity, MW	36 MW
Turbine type	Back Pressure
Season operation, days	160 -180
Fuels used for season operation	Mill Bagasse
Boiler efficiency %	70.00 ±2.0
On Bagasse/cane crash	70.00 ±2.0
Feed water temperature ^{0}C	70-80 ^{0}C
Captive power consumption % of generation	28
Turbo-generator efficiency %	90.00
Utilization level %	80 in 1st year , 90 in 2nd year, 95 in 3rd year and onward

Bagasse / Fuel Balance

Bagasse Balance for season and off season operations are provided in the Following Table :

Power Balance

- Following table gives the power balance for the season and off season

Sr.No.	Item	Value MW
1.	Design crushing rate, TCH	375 TCH
2.	Average bagasse % cane	28
3.	Bagasse available as fuel, % after deducting bagacillo & handling loss of 0.8%	28
4.	Season days	180
5.	Season hours per day	22
6.	Annual design cane crushing, tons	1440000MT
7.	Capacity utilization	100%
8.	Actual cane crushed, tons	1440000
9.	Bagasse available as fuel, tons	432000
10.	Cane trash collected, tons	99360
11.	Equivalent bagasse to above cane trash, tons	37155
12.	Total equivalent bagasse availableas fuel per season, tons	334228
13.	Off-season days	140
14.	Off-season hours per day	24
15.	Equivalent bagasse needs for cogen boiler during season, TPH	56.60
16.	Equivalent bagasse needs for cogen during off season, TPH	43.83
17.	Equivalent bagasse needs for cogen boiler during season, tons	199232
18.	Equivalent bagasse saved for off season, tons	30368
19.	Equivalent bagasse needs for cogen during off season, tons	134996
20.	Total bagasse needs for cogen, tons	334228

		Season
1	Power generation MW	36 MW

17.75 MW (Avg. exportable power, Season 160 days) 22.89 MW (Avg. exportable power, Off Season140 days)

Power to Sugar Mill, Colony, Distillery & Ethanol	5230
Power to cogen auxiliary	2410
Power export in season	17750
Power generation in Off Season, KW	28000
Power to Sugar Mill, Colony, Distillery & Ethanol	150
Power to cogen auxiliary	2660
Power export in season	23790

Co generation Manufacturing Process:

- Sugar cane is crushed in the milling tandem, after crushing Bagasse is produced, which is utilized as a fuel in the boilers. In boiler super

saturated stem is produced, this steam is used for moving the power turbine to generate power and generated power is given to the grid.

- Power export of 17.75 MW during crushing season of the sugar mill and 22.89 MW during off season, will be fed to MSETCL substation by stepping up from 11 KV to 132 kV or through LILO arrangement.

2.4 Mitigation Measures (Brief)

Every human activity creates some side-effects. This can make significant adverse impact if left unattended. It is proposed to reduce the impact by prevention, abatement, control and mitigation mechanism. These are described in details later in **Chapter Four**. Brief resume can be indicated as follows.

#	Facets of Environment	Mitigation & Impact Thereafter
1.	Air	The emissions from Boiler only. DG Set as stand by. Stack with 50 meter height provided as per guideline with Dust catcher ESP. The CO_2 from fermentation will be converted to liquid CO2. The effluent treatment will be fully aerobic.
2.	Fugitive	Internal roads paved, leveled, no undulations, no sharp curves, slow speed. Press-mud, compost yard and compost not involved. Tree plantation on surrounding available area.
3.	Water and Waste Water	The waste water generated will be treated through methane bio-digester and evaporators. Spent wash will be converted to Fuel and moderate will be treated aerobically with disposal on seed/ demonstration plot or recycled.
4.	Solid Waste	Collection 100% every day. Segregated and treated/ disposed per SPCB norms.
5.	Odour	Limited source of odour. Controlled by keeping closed regime during initial treatment. Use of heat exchanger for cooling. Small capacity ETP for moderate and sober BOD effluent will be aerobic and away with a barrier. No cess pools in disposal area. Bio-digester is fully covered.
6.	Noise	Smooth roads. Sturdy foundation. No Vibrations. Acoustic enclosures to all DG Set as per manufacturers' design. Use as standby only. Trees are planted around. Side cladding. Large No. of tree barriers. Factory placed away from boundary

Table No. 2.12: Mitigation in Brief

2.4.1. Measures Built In the Process:

Built in measures for resource conservation and pollution control in the industry are discussed along with project details. The main objective is to follow

environments friendly process, with efficient utilisation of resources, minimum waste generation and built in waste treatment and operation safety. The measures adopted are,

i. Use of live steam is avoided by employing re-boiler in distillation columns. This reduces the generation of wastewater.
ii. Multi pressure distillation system is used to reduce the consumption of steam and quantity of effluent.
iii. Use of pumps with mechanical seals to avoid liquid leakages.
iv. Scrubbing of fermenter vent gases containing CO_2 to recover traces of alcohol present in it.
v. Water utilization reduced by 1. Evaporation of spent wash with recovery condensate water used in cooling tower. 2. Re boiler reduces water utilization 3. Recycle of lees water for dilution of molasses 4. Decanter centrifuge and recycle of thin yeast slurry saves water and improves alcohol recovery.
vi. Bio recovery from spent wash for use as fuel.
vii. Concentrated spent wash is used as fuel in boiler.

2.5 Assessment of new and untested technology for the risk of technological failure

The technology of manufacturing of this consortium has been developed over the years, and refined indigenously in well equipped Research and Development NSI, National Sugar Institute, Kanpur, and Private Vendors etc., in which devoted scientists, engineers, skilled and experienced staff is working, to find the best alternatives, addressing the above enquiries.

Engineering & Hardware Options:

The process development and engineering designing of this project has been done in such a way that the whole operation of manufacturing can be carried out in a controlled system with no or low gaseous emissions, effluents, and minimum waste generation. The material handling and transfer of raw materials are also carried out in controlled and supervised system. Thus, the technology is not only cost-effective but also environment friendly.

2.6 Cascading Pollution

There is no further downstream industry based on alcohol here, as all will go for industrial or potable purposes outside. It may also go as additive to vehicle fuel.

Thus we do not foresee any cascading pollution load by this industry. What may be the coming up ancillaries will be small motor workshops, eating places and sundry retailers.

2.7 Proposed schedule for approval and implementation

The Project proponents are law abiding people and will commence the implementation only after approval of all permits, consents from various departments, under laws of the land. They have already commenced the work in this direction and Project Proponent have already obtained various permits/NOCs such as

- Industrial Entrepreneurial Memorandum from Govt. of India, Ministry of Industry, New Delhi. Letter of Intent.
- Sale Deed of Land.
- Building Plan from Village Panchayat.
- Certificate of Incorporation of Company.
- Memorandum and Bye Laws approval.
- NOC from Grampanchayat.
- Power sanction from MSEB

It is anticipated that all the permissions will be in hand within three months and thereafter the implementation and operation will be commenced. This unit does not involve very heavy and time consuming construction and manufacturing process is also less complicated. Thus quick implantation is possible, with already having the infrastructure in this particular case.

2.8 Chapter Conclusion

After introducing the subject of study in Chapter One, in this Chapter Two additional points are covered. Type and need of the project is underlined. The location is described after mentioning what criterion of selection was kept before eyes. The Process is fully described and it may be seen that best environmental option is selected. All alternatives having considered, it is seen that “No Project” option or abandoning the project is not proper. Complete treatment and mitigation measures are described to get the Environmental Protection with sustainable development. Chapter Four will give more details.

CHAPTER 3

BASELINE ENVIRONMENT

3.1 INTRODUCTION

Information is first assembled for the Region-District and then narrowed down to 10 km radius with the Project as Centre. In both the areas, both the components of Environment (i.e. Natural and Man-made) are covered. The baseline environmental quality has been assessed as per the TOR and all the studies have been conducted from month of March 2015 to May 2015**.** The standard methodology is adopted and discussed in this chapter.

Table No.3.1: Summary of Sampling

No.	Media	Stations	Parameters	Frequency
1	Surface Water	4	24	1
2	Ground Water	4	24	1
3	Ambient Air	7	12	Twice a week
4	Ambient Noise	7	2	1
5	Soil Study	7	12	1

All the samples were collected by Standard Practices and analyzed as per Indian Standard Specifications or by APHA (USA).

3.1.1 Materials:

The work involves three activities viz. (1) collection of dry data and statistics by literature survey, interviewing resource institutes and general public, (2) wet studies by sampling and laboratory analysis of ambient air, surface water, ground water, noise, soil, etc. and (3) logically analyzing the findings of dry and wet studies for interpretation, extrapolation and inference.

A number of officers/offices were contacted in the course of this study. Samples were collected in the month of March 2015 to May 2015; as follows, vide Table No.3.1

3.1.2 Approach

For a streamline work, a standard six-step model of working is adopted for this Project study. The six generic steps associated with environment impacts are:

(1) Identification of pollutant emissions and impact concerns related to the construction and operation of the development project.,

(2) Description of the environmental setting in terms of existing environmental quality, emission inventory, and natural data in the project study area.,

(3) Procurement of relevant laws, regulations or criteria related to environmental quality and/or pollution emission effluent standards.,

(4) Conduction of impact prediction activities, including the use of simple dilution calculations, qualitative predictions based on case study and professional judgments,
(5) Use of pertinent information from step 3, along with professional judgment
and public input to assess the significance of anticipated beneficial/ detrimental impacts, and
(6) Identification, development and incorporation of appropriate mitigation measures for the adverse impacts.

3.2 THE REGION

The base line data has been collected within the **10 km** radius surrounding the project site of **M/s Cane Agro Energy (India) Ltd** The Google image of the study area showing **5 Km** & **10 km** radius area is given below as **Plate**.

Sangli district is in Maharashtra state. The city of Sangli is the district headquarters. As of 2011, the district had a population of 2,820,575 of which 33% were urban. This gives it a ranking of 137th in India (out of a total of 640). The district has a population density of 329 inhabitants per square kilometer (850 /sq mi) Its population growth rate over the decade 2001-2011 was 9.18%. Sangli has a sex ratio of 964females for every 1000 males and literacy of 82.62% The district is 24.51% urban. Sangli and Miraj are the largest cities

Plate- 3.1 Google Image showing project site and 10km circle considering project site at centre

3.2.1 Geographical Location and area

Sangli District is located in the western part of Maharashtra. It is bounded by Satara and Solapur districts to the north, Bijapur District of Karnataka to the east, Kolhapur andBelgaum district of Karnataka to the south, and Ratnagiri District to the west.

Sangli district is situated in the river basins of the Warna and Krishna rivers. Other small rivers, such as the Warana and the Panchganga, flow into the River Krishna. Land in the region is suitable for agriculture.

The topography is hilly, with gentle slope and some area is undulating and rolling. The project area is having undulating and small hillocks and rolling topography which limits the agricultural production due to small pockets of land available for cultivation. Thus the part is plain along the Krishna River and the part near to factory site is having undulating with slightly sloppy, very gently sloping to gently sloping occurring on lower piedment and lower piedment plains. Shallow and very shallow soils are generally sloping to moderately slopes occurring on lower piedments upper piedment slopes.

3.2.2 Physical Setting

The Physical Setting of the Sangli district can be best appreciated in the background of its geology relief and drainage. It may be noted, in general, that over a major portion of the district the Deccan 'trap' influences the landscape; only in the southern extremities the rocks of the Dharwar and Lower Kaladgi series introduce a change in the topography. The physical settings of Sangli District shows a contrast of immense dimensions and reveals a variety of landscapes influenced by relief, climate and vegetation.

3.2.3 Rivers

Within the limits of the Sangli district the Krishna forms the main river system, though the Shirala taluka in the west may be described as belonging to the Varna and the eastern part of the district as belonging to the Bhima drainage.

The Krishna is one of the three great rivers of Southern India. Like the Godavari and the Kaveri it rises to the east of the Western Ghats almost within sight of the Arabian Sea and falls into the Bay of Bengal traversing the entire breadth of the peninsula. In length it is less than the Godavari, but its drainage area, including the drainage of its two great tributaries, the Bhima and the Tungabhadra is larger than that of either the Godavari or the Kaveri. "Within the district it flows for a distance of about 108 kilometres and is joined by the Warana; and the Yerla, while the Agrani river, with a greater part of its course within the district, joins it just outside. The Krishna is unfit for navigation.

3.2.4 Climate

The climate ranges from the rainiest in the Chandoli (Shirala) region, which has an average annual rainfall of over 4000 mm, to the driest in Atpadi and Jath tehsils where the average annual rainfall is about 500 mm. The vegetal cover too varies from the typical monsoon forest in the western parts to scrub and poor grass in the eastern parts. The Sangli district comes under Deccan plateau geographic region.

Sangli has a semi-arid climate with three seasons, a hot, dry summer from the middle of February to the middle of June, a monsoon from the middle of June to late October and a mild cool season from early November to early February. The total rainfall is about 22 inches (580 mm).

The project area falls under the semi-arid tropical climatic zone with normal rain fall, temperature, relative humidity and wind velocity. The area is pronged to frequent occurrence of drought. Wind velocity ranging from 5 km/hr to 20 km/hr during may to September. Relative humidity varies from 70% to 80%. The average rainfall in the area is from 441mm. The maximum rain fall is recorded in 1998-99 is 900 mm. The minimum is 186.4 mm in 1972-73. The climate is healthy. The rainfall is regular during June to September. The year may be divided into four seasons, summer from March to May, monsoon from June to September, post monsoon from October to November and winter from December to February.

3.2.5 Forest

Sangli forests belong to four groups, viz., evergreen forests on the Sahyadri hills, wet and dry deciduous forests on the slopes of the hills that run east and form the catchment area of the Varna river, forests with bushy and stunted tree growth on the hills to the east of the Krishna and grassy area with sparse tree growth in Jath.

Sahyadri ghats and their slopes in the extreme west of the Sangli district are subject to heavy precipitation of rain and frost in this area. The forest is of evergreen type, consisting of stunted growth of Eugenia jambulana (jambhul), Actino-
daphnehookeri (Pisa), Glochidion lanceolarium (Bhoma), Memecylonedul e (Anjani) Terminaliachebula (Hirda), Flacourtia sopiaria (Tambat), etc. This type of forest is found in the extreme west of Sangli district on the crest of the Sahyadri in the villages extending from Chandoli Kh. in the north to Bhogir in the south adjoining the Kolhapur district. They form compact forests and are not much broken by tillage and are found in Rundir, Sidheshwar, Bhogir villages in the extreme west of Shirala mahal.

3.2.6 Soil Profile

Soil formations in Sangli district have been predominantly influenced by the climate. The district has three distinct climatic zones. The western zone, which receives very heavy rainfall, has lateritic soils on up-ghats and reddish brown soils on hill slopes, the latter being developed on parent material of trap rock. The transition zone of Krishna valley has deep black soils of alluvial origin. The third is the eastern drier zone, which consists largely of granular black soils and poor shallow soils. Saline-alkaline soils are met with in the low-lying patches in the areas of low rainfall.

3.3 MICRO - METEOROLOGY

Micro-meteorological data within the study area during the air quality survey period is an indispensable part of air pollution studies as the micro-meteorological parameters regulate the transport and diffusion of pollutants released into the atmosphere. The meteorological data recorded during the monitoring period is useful for the interpretation of the baseline condition and it can be compared with the historical data in order to identify changes, which may have taken place in the area.

3.3.1 Secondary Meteorological Data

The secondary data w.r.t. wind speed, wind direction, Special weather phenomena, Temperature, Relative humidity and Rainfall collected from climatological table of IMD, Pune for Miraj (Sangli) station and the same is presented in the below given tables.

Table: 3.2 Mean Wind Speed

Month	Mean Wind Speed Km/Hour
January	7.4
February	7.7
March	8.9
April	10.6
May	14.2
June	16.3
July	18.0
August	15.4
September	12.2
October	8.4
November	8.5
December	8.4
Annual	11.3

Winds are light to moderate except in the south-west monsoon season when they are stronger. In the south-west monsoon season, winds are from directions between south-west and north-west, the westerlies being more frequent. In the post-monsoon season they are predominantly from the north-east or east. Easterlies and south-easterlies are common in the cold season. By February westerlies and north-westerlies appear and these predominate in the summer.

Table: 3.2 Special Weather Phenomena (Miraj Station)

Mean No. of days with	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Thunder	0.0	0.0	1.7	4.4	6.1	3.1	0.1	0.9	2.0	4.0	0.9	0.4	23.6
Hail	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Dust-Storm	0.1	0.0	0.1	0.2	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Thunderstorms occur in the hot season and in the post- monsoon season. In the beginning and end of the south-west monsoon season rainfall is often associated with thunder. The climate of this district is on the whole agreeable and is characterised by general dryness in the major part of the year. The cold season is from December to about the middle of February. The hot season which follows, lasts till the end of May. June to September is the south-west monsoon season and the two

months, October and November, constitute the post-monsoon or retreating monsoon season.

The only meteorological observatory in the district is at Miraj. The records of this observatory may be taken as representative of the climatic conditions over the district in general. The cold weather starts by about the end of November and lasts till about the middle of February, December being the coldest month. In this month the mean daily maximum temperature is 29.5^{0}C, while the mean daily minimum is 14.3^{0}C. The minimum temperature may sometimes go below 7^{0}C. The period from about the middle of February to the end of May is one of continuous increase of temperature. In May, the hottest month, the mean daily maximum temperature is 37.5^{0}C and the mean daily minimum 22.7^{0}C. The heat is intense and the maximum temperature may sometimes go up to 42.0^{0}C. Afternoon thundershowers bring welcome relief from the heat on some days.

Table: 3.3 Mean Daily Maximum and Minimum Temperature and Relative Humidity (Miraj Station)

Month	Mean daily maximum temperature (^{0}C)	Mean Daily minimum temperature (^{0}C)	Highest maximum ever recorded (^{0}C)	Lowest maximum ever recorded (^{0}C)	Relative Humidity (%)	
					0830	1730
January	30.5	14.1	33.9	5.0	62	35
February	32.8	15.2	37.2	6.7	56	31
March	36.1	18.5	40.6	11.1	54	27
April	37.9	21.5	42.2	15.0	64	30
May	37.5	22.7	42.2	18.9	73	40
June	31.5	22.3	42.2	19.4	82	66
July	27.9	21.7	35.0	17.2	86	79
August	28.2	21.2	34.4	17.8	87	76
September	29.2	20.2	35.6	15.6	86	68
October	31.0	20.1	36.1	12.2	74	51
November	30.1	17.3	34.4	8.3	65	45
December	29.5	14.3	34.4	7.2	61	37
Annual	31.9	19.1	--	--	62	35

The highest maximum temperature recorded at Miraj was 42.2^{0}C and the lowest minimum temperature recorded at this station was 5.0^{0}C. In the south-west monsoon months the air is highly humid. In the post-monsoon, summer and cold seasons the air is dry particularly in the afternoons. Skies are generally clear or lightly clouded during the months November to March. Cloudiness begins to increase progressively from April and afternoons are more clouded than the mornings. During the monsoon months the skies are heavily clouded to overcast.

Table: 3.4 Normals and Extremes of Rainfall

Station	Number of years of data	Jan		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual	Lowest annual rainfall as %of	Heaviest rainfall in 24
Sangli	50	*a*	3.8	0.5	5.3	22.1	48.3	71.1	108.7	79.8	99.6	88.9	33.5	6.9	568.5	175 (1932	47 (1918)	177.8
		b	0.2	0.0	0.5	1.8	3.1	6.0	11.1	7.9	6.6	5.3	2.0	0.4	44.9			
Miraj	20	*a*	4.1	0.5	3.8	32.0	56.4	70.4	110.0	110.7	105.2	95.8	41.1	5.1	635.1	167 (1932	62 (1941)	162.8
		b	0.2	0.1	0.7	2.3	3.4	5.8	9.7	8.7	5.9	6.1	2.4	0.5	45.8			
Jath	50	*a*	2.0	2.0	4.8	18.8	31.5	68.8	65.8	63.3	152.9	77.2	33.0	8.1	528.2	193 (1916	43 (1920)	198.6
		b	0.2	0.2	0.6	1.4	2.8	5.3	5.3	4.5	8.0	4.9	2.1	0.6	35.9			
Islampur	50	*a*	4.1	0.8	4.3	24.4	43.9	89.1	149.3	82.8	101.6	94.0	35.6	8.9	638.8	202 (1932	53 (1911)	140.7
		b	0.2	0.1	0.5	1.7	2.9	6.6	11.7	7.8	6.5	5.9	2.1	0.6	46.6			
Shirala	50	*a*	4.1	0.5	6.3	20.8	41.4	123.9	270.5	149.1	103.9	97.0	39.6	5.1	862.2	169 (1946	52 (1918)	261.6
		b	0.2	0.1	0.5	1.7	2.6	8.6	17.5	13.5	7.3	6.2	2.3	0.4	60.9			
Vita	50	*a*	4.6	0.5	3.3	15.2	34.3	77.2	98.0	68.8	124.5	78.0	30.2	6.9	541.5	178 (1944	48 (1905)	146.1
		b	0.3	0.0	0.3	1.2	2.5	6.3	8.9	6.4	7.4	4.6	1.8	0.4	40.1			
Tasgaon	50	*a*	6.1	0.8	4.1	23.1	47.2	86.9	107.2	78.0	116.3	88.4	34.0	6.9	599.0	162 (1915	55 (1926)	156.0
		b	0.2	0.1	0.4	1.8	3.2	6.9	10.3	7.1	7.3	5.3	2.1	0.5	45.2			
Budhgaon	15	*a*	4.6	0.0	3.8	26.4	50.3	81.8	121.2	94.2	113.5	105.2	23.6	6.9	631.5	197 (1944	61 (1940)	165.1
		b	0.1	0.0	0.5	1.6	2.3	5.7	9.9	6.9	5.9	5.2	1.2	0.3	39.5			
Madhavpur (Vadgaon)	15	*a*	3.6	0.3	6.1	48.5	62.2	189.2	411.7	216.1	99.8	133.9	44.5	9.9	1225.	151 (1946	73 (1935)	152.4
		b	0.1	0.1	0.5	3.3	3.5	12.1	22.7	18.0	8.5	7.3	3.1	0.8	80.1			
Sangli (District)	--	*a*	4.1	0.7	4.6	25.7	46.2	95.4	160.3	104.8	113.0	95.4	35.0	7.2	692.4	140 (1932	57 (1918)	--
		b	0.2	0.1	0.5	1.9	2.9	7.0	11.9	9.0	7.0	5.6	2.1	0.5	48.7			

Records of rainfall in the district are available for nine stations for periods ranging from 15 to 83 years. The average annual rainfall in the district is 692.4 mm (27.26"). The rainfall in the western portion of the district, near the Western Ghats is considerably higher than in the rest of the district. The rainfall generally decreases from the Western Ghats towards the eastern portions of the district; Madhavpur (Vadgaon) near the western border of the district getting 1,225.8 mm (48.26") and Jath in the eastern part getting only 528.2 mm (20.80"). Some rainfall in the form of thunder-showers occurs in May but the main rainy season is from June to September. The rainfall in the south-west monsoon months is about 68% of the annual total. July is the month with the heaviest rainfall.

About 19% of the annual rainfall is received in the post-monsoon season. The rainfall at individual stations shows considerable variations from year to year. It will be seen from table 3.4 that at some stations the rainfall has been as much as double the normal in some years while in some other years rainfall has been about half the normal. In the fifty year period 1901—1950 the annual rainfall in the district was the highest in 1932 when it amounted to 140% of the normal. Both 1918 and 1923 were years with the lowest rainfall which was only 57% of the normal. In the same fifty year period, the annual rainfall was less than 80% of the nomal in 14 years. There were three occasions when consecutive two years had rainfall less than 8/% of the normal. Consecutive four years of such low rainfall occurred during the period 1923—1926. It will be seen from table 3.4 that in 33 years out of fifty the rainfall in the district was between 500 and 800 mm (19.69" and 31.50").

3.3.2 Primary Meteorological Data

Site-specific primary meteorological data was collected in the project site for the month of March 2015 to May 2015. Meteorological station was installed at Sugar Factory site 10 meters from the ground level to monitor parameters of wind speed, wind direction, temperature, relative humidity and rainfall. The data is recorded as the maximum, minimum, instantaneous value. Monitoring was done as per IS: 8829: Micro-meteorological Techniques in Air Pollution.

The details of parameters monitored, equipment used and the frequency of monitoring are given in Table.

Table 3.5 Meteorological Parameters monitored at Site

SR. NO.	PARAMETERS	INSTRUMENTS	FREQUENCY
1.	Wind Speed	Counter Cup Anemometer	Hourly/Continuous
2.	Wind Direction	Wind Vane	Hourly/Continuous
3.	Temperature	Thermo-sensor	Hourly/Continuous
4.	Relative Humidity	Thermo-hygro sensor	Hourly/Continuous
5.	Rainfall	Rain gauge (automatic)	Hourly/ Continuous

i) Wind Speed/ Wind Direction

The wind roses are prepared from site meteorological data in order to assess the wind pattern i.e. direction, speed and frequency. The monthly wind rose is represented in Figure 3.2 to 3.5.

The analysis of the recorded site data revealed that the prevailing wind velocity is between 1-5 km/ hr throughout the study period. Calm days found in the range of 8.75 to14.03% of total time during March to May 2015.

- Wind Pattern

March 2015

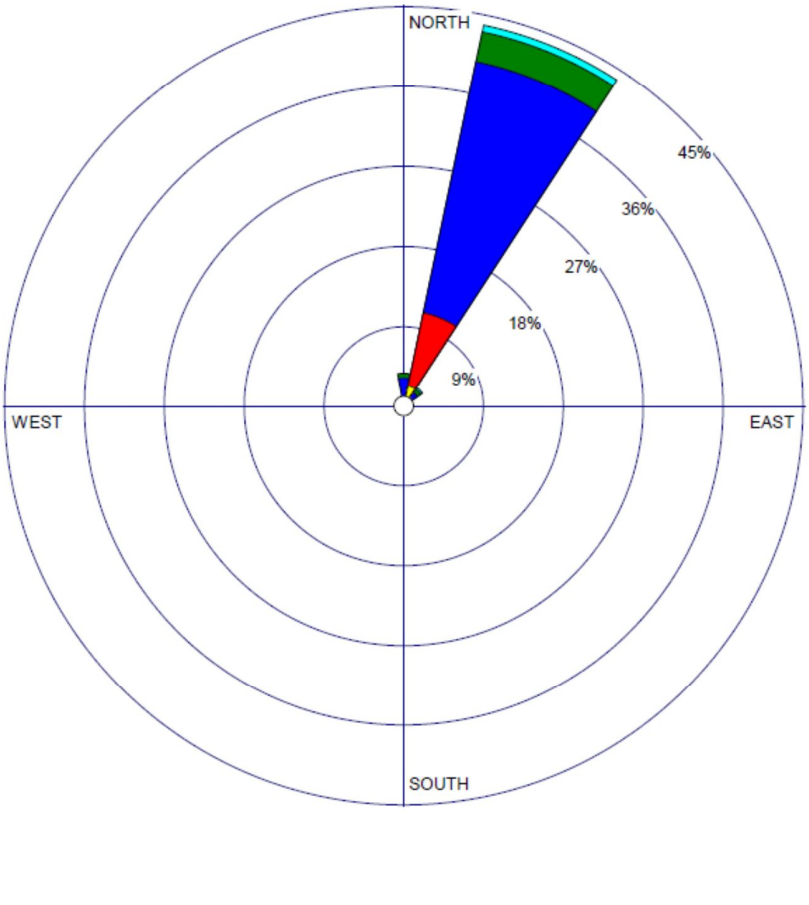
Predominant wind direction in this month was North with the frequency of 12.25% followed by NE with a frequency of 8.75%. Calm conditions prevailed for 19.38%. It is depicted in the form of wind roses as Figure - 3.2

WIND ROSE PLOT:

Stability Class -M/s Cane Agro Energy India Ltd

DISPLAY:

Stability Class



COMMENTS:	DATA PERIOD: Start Date: 3/1/2015 - 00:00 End Date:5/30/2015 - 23:00	M/s Cane Agro Energy (India) Ltd. (CAEIL) At Raigaon, Post Hingangaon, Tal. Kadegaon, Dist. Sangli 415305	
	CALM WINDS: 49.09%	TOTAL COUNT: 2208 hrs.	
	AVG. WIND SPEED: 4.07 m/s	DATE: 25/10/2015	PROJECT NO.:

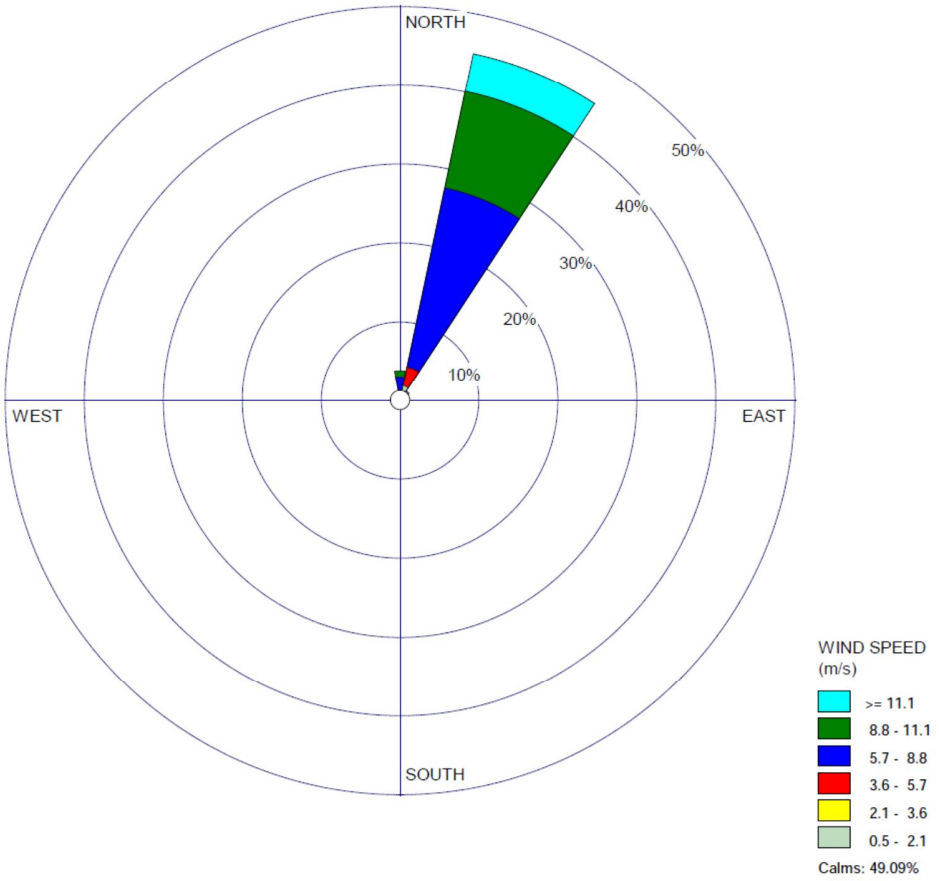
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Wind Rose -M/s Cane Agro Energy India Ltd

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 3/1/2015 - 00:00 **End Date:5/30/2015 - 23:00**	**GMC Engineers and Environmental Services**	
	CALM WINDS:	TOTAL COUNT:	
	49.09%	**2208 hrs.**	
	AVG. WIND SPEED:	DATE:	PROJECT NO.:
	4.05 m/s	**25/10/2015**	

WRPLOT View - Lakes Environmental Software

April 2015

The predominant winds are mostly from NE followed by North. These are found to be 18 % and 10% respectively of the month and are presented Calm conditions prevailed for 14% of the times.

May 2015

Major winds are blowing from NE direction with the frequency of 27% followed by West with a frequency of 15.99%. Calm conditions subsist for 10%. This wind pattern is illustrated in the form of wind roses

Seasonal Wind Pattern

The predominant wind direction during Pre-monsoon season was from NE direction with the frequency of 7 followed by West with a frequency of 9%. Calm conditions subsist for 14%. This wind pattern is illustrated in the form of wind roses

(ii) Temperature

The atmospheric temperature data has been recorded throughout the study period. The average temperature was found in the range of 17.4°C and 42.2°C throughout the study period. The maximum temperature of 42.2°C has been recorded in the month of May where lowest temperature of 17.4 °C was recorded in the month of May 2015.

The monthly variations in temperature

(iii) Relative Humidity.

The maximum relative humidity recorded during the study period was 55%, which is observed during monsoon season in the month of May 2015. The observed mean value ranges between 26-28%. The monthly maximum, minimum and mean values are presented in Table - 3.6

(iv) Rainfall

Though it is pre-monsoon season however the rainfall was experienced during the month of March, April & May 2015.

Table - 3.6 Meteorological Data Recorded at Site

Sr. No.	Parameters		Unit	March 2015	April 2015	May 2015
1	Wind speed	Avg	Km/hr	3.3	3.5	4.7
2	Wind Direction	Pre dominant		N	NE	NE
3	Temperature	Max	^{0}C	39.0	41.4	42.2
		Min	^{0}C	17.4	23.6	22.2
		Avg	^{0}C	29.2	32.9	32.4
4	Relative Humidity	Max	%	35	50	55
		Min	%	18	21	22
		Avg	%	26	28	28
5	Atmospheric Pressure	8:30	mb	1014.6	1010.6	1008.5
		17:30	mb	1002.5	1000.4	995.1
6	Rain Fall	Total	mm	8	14	118

3.4 AIR ENVIRONMENT

Air pollution has long term and short term impact on the biotic and abiotic component of the environment. The ambient air quality with respect to the core zone of 10 km radius around the periphery of proposed unit of M/s Cane Agro Energy (India) Ltd was monitored. The study area represents both rural and industrial environment. The chief sources of air pollution in the study area are mainly due to existing sugar factory unit of M/s Cane Agro Energy (India) Ltd and vehicular activities and domestic firewood burning, fuel burning etc. The major pollutants released in the atmosphere will be SPM, PM_{10}, SO_2, and NO_x etc.

This section describes the selection of sampling locations, methodology adopted for sampling, analytical techniques and frequency of sampling.

3.4.1 Methodology

- Selection of sampling locations

Selection of ambient air quality monitoring stations is based on following factors

- Meteorological conditions of the area;
- Topography of the study area;
- Representative ness of regional background air quality for obtaining baseline status; and
- Likely impact areas.

Ambient Air Quality Monitoring (AAQM) stations were establish at Seven locations with due consideration to the above mentioned points and help of mathematical model was rendered to establish the suitability of this locations for the proposed expansion sugar unit. These AAQM locations are depicted in Figure - 3.6 while Table - 3.7 details about the location with reference to the proposed site.

Figure 3.6 Air Monitoring Locations Map

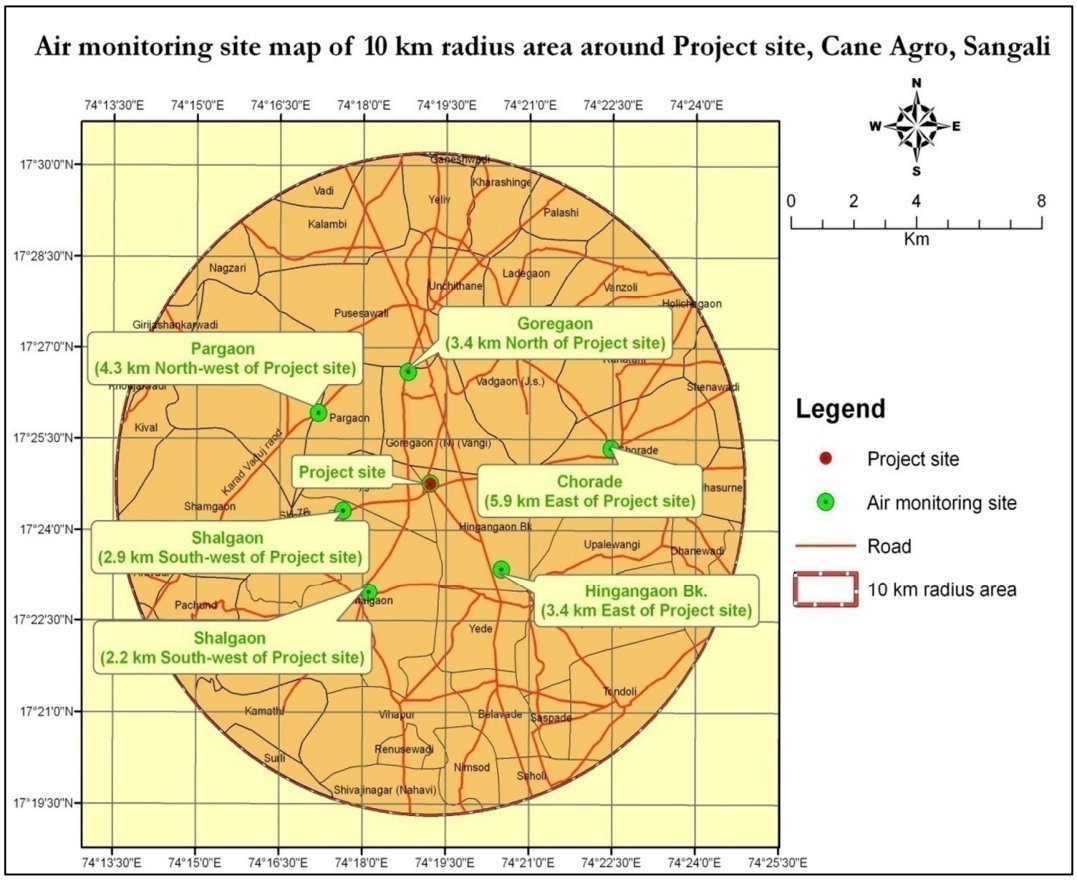


Table- 3.7 Ambient Air Quality Monitoring Locations

Sr. No.	Code No.	Station Name	Direction w.r.t. site	Distance w.r.t. site km	Description
1.	AAQ1	Project Site	--	--	Industrial
2.	AAQ2	Pargaon	North-West	4.3	Residential / Rural area

3.	AAQ3	Goregaon	North	3.4	Residential / Semi urban area in d/w direction
4.	AAQ4	Chorade	South-West	2.9	Residential / Rural area
5.	AAQ5	Shalgaon	East	5.9	Residential area
6.	AAQ6	Shalgaon	East	3.4	Residential area in u/w direction
7.	AAQ7	Hingangaon	West	2.5	Residential / Rural area

The ambient air quality monitoring has been done twice in week for every location.

The baseline data of air environment is generated for the following parameters:

- Total Suspended Particulate Matter (TSPM);
- PM10 : Respirable Particulate Matter (RPM);
- Sulphur dioxide (SO_2); and
- Oxides of Nitrogen (NO_x)
- Carbon monoxide (CO);
- Lead (pb); and
- Hydrocarbons (HC)

3.4.2 Sampling Duration

- Twenty-four hourly samples, twice a week at all air-monitoring stations.

3.4.3 Instruments Used

Respirable Dust Samplers (APM-451) of "Envirotech" make are used for sampling SPM, PM10 and gaseous pollutants like SO_2, NO_x. The gases are collected in a sampling tray attached to the Respirable Dust Sampler.

3.4.4 Methodology for Analysis

The air samples are analyzed as per IS: 5182 "Method for Measurement of Air Pollution".

- SPM/ PM10: Gravimetric Method (IS: 5182, Part IV)
- SO_2: Modified West and Gaeke Method (IS: 5182, Part II)
- NO_x: Jacobs and Hochheiser Method (IS: 5182, Part VI)
- CO: NDIR spectroscopy method
- pb: Atomic Absorption Spectroscopy (AAS) method

3.4.5 Presentation of Results

The ambient Air quality monitoring data analysed and tabulated in the **Table - 3.3.3** which is compared with National Ambient Air Quality Standards as tabulated in **Table - 3.3.2**.

Table- 3.8 Ambient Air Quality Monitoring Results

Village (Location)	Parameters	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM 2.5 ($\mu g/m^3$)	PM10 ($\mu g/m^3$)	CO (ppm)
Project Site A1	Minimum	4	4	31	42	0
	Maximum	10	17	48	69	1.89
	Average	6.45	8.37	37.62	60.29	0.43
	Std. Deviation	1.79	2.96	4.33	6.12	0.75
	98^{th} percentile	9.54	14.7	46.62	69	1.85
Bhairav Nath Mandir, Pargaon A2	Minimum	4	6	25	50	0.73
	Maximum	10	15	40	69	0.96
	Average	6.95	10.41	31.25	57.66	0.86
	Std. Deviation	1.96	2.32	4.53	5.74	0.079
	98^{th} percentile	10	14.54	39.54	68.54	0.95
Chandrakant Gawali House, Goregaon, Sangli Village A3	Minimum	2	5	39	62	1.48
	Maximum	9	12	48	88	1.93
	Average	4.83	8.41	43.45	71.5	1.66
	Std. Deviation	1.99	2.01	2.93	5.95	0.18
	98^{th} percentile	8.54	12	48	86.16	1.92

Charode Village A4	Minimum	2	4	25	42	1.46
	Maximum	6	9	40	62	1.81
	Average	3.7	6.33	32.45	55.25	1.61
	Std. Deviation	1.36	1.71	4.03	4.44	0.13
	98^{th} percentile	6	9	40	61.08	1.80
Shalgaon Village A5	Minimum	4	9	42	53	1.28
	Maximum	13	15	49	69	1.64
	Average	7	11	45	63	1.64
	Std. Deviation	1.63	1.88	2.53	3.41	0.16
	98^{th} percentile	6.54	10	34	57	1.24
Shalgaon A6	Minimum	1	4	26	47	0.81
	Maximum	7	10	34	57	1.26
	Average	3	7	30	52	1.01
	Std. Deviation	2.40	2.38	1.70	4.30	0.09
	98^{th} percentile	13.08	16	38.08	74	1.13

Ambient air quality analysis results for the six monitoring locations which were selected to represent baseline conditions of the region are given below.

Project Site (A1)

The location comes under Industrial zone. The concentration of PM 2.5 ranged from 31-48 $\mu g/m^3$ while that of PM10 was in the range of 42- 69 $\mu g/m^3$, SO_2 and NOx were in the range of 4-10 $\mu g/m^3$ and 4-17 $\mu g/m^3$ respectively. The CO values were observed in the range of 0-1.89 ppm.

Pargaon Village (A2)

The location comes under Non-Industrial zone. The concentrations of PM 2.5 and PM10 at this location were in the range of 25-40 $\mu g/m^3$ and 50-69 $\mu g/m^3$ respectively. While the values of SO_2 and NO_X were observed in the range of 4-10 $\mu g/m^3$ and 6-15 $\mu g/m^3$ respectively. The CO values were observed in the range of 0.73-0.96 ppm.

Goregaon Village (A3)

The location comes in the residential /semi urban zone. Here the PM 2.5 and PM10 concentrations were in the range of 39-48 $\mu g/m^3$ and 62-88 $\mu g/m^3$ respectively. The concentrations of SO_2 and NO_X were observed in the range of 2-9 $\mu g/m^3$ and 5-12 $\mu g/m^3$ respectively. The CO values were observed in the range of 1.48- 1.93 ppm.

Charode Village (A4)

This location comes within the residential zone. The concentrations of PM 2.5 and PM10 at this location were in the range of 25-40 $\mu g/m^3$ and 42-62 $\mu g/m^3$ respectively. While the values of SO_2 and NO_X were observed in the range of 2-6 $\mu g/m^3$ and 4-9 $\mu g/m^3$ respectively. The CO values were observed in the range of 1.46-1.81 ppm.

Shamgaon Village (A5)

This location comes within the residential zone. The concentrations of PM 2.5 and PM10 at this location were in the range of $\mu g/m3$ 42-49 and 53-69 $\mu g/m^3$ respectively. While the values of SO_2 and NO_X were observed in the range of 4-13 $\mu g/m^3$ and 9- 15 $\mu g/m^3$ respectively. The CO values were observed in the range of 128- 164 ppm.

Shalgaon Village (A6)

This location comes within the residential zone. The concentrations of PM 2.5 and PM10 at this location were in the range of 26-34 $\mu g/m^3$ and 47-57 $\mu g/m^3$ respectively. While the values of SO_2 and NO_X were observed in the range of 1-7 $\mu g/m^3$ and 4-10 $\mu g/m^3$ respectively. The CO values were observed in the range of 0.81-1.26 ppm..

The summary of the monitoring results including minimum, maximum and average levels along with the 98th percentile values are presented in Table 3.8. The results obtained were compared for 24 hrs average standards for residential areas prescribed by the National Ambient Air Quality Standards (NAAQS). The National Ambient Air Quality Standards are presented in **Table 3.9**.

Table 3.9: National Ambient Air Quality Standards (NAAQS)

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air (µg/m³ except indicated)		
			Industrial Area	Residential, Rural and Other Areas	Sensitive Area
1	Sulphur Dioxide (SO_2)	Annual Average *	80	60	15
		24 Hours**	120	80	30
2	Oxides of Nitrogen (NO_x)	Annual Average *	80	60	15
		24 Hours**	120	80	30
3	Suspended Particular Matter (SPM)	Annual Average *	360	140	70
		24 Hours**	500	200	100
4	Respirable Particular Matter (RPM)	Annual Average *	120	60	50
		24 Hours**	150	100	75
5	Carbon Monoxide (CO)	8 Hourly Average*	5.0 mg/m³	2.0 mg/m³	1.0 mg/m³
		1 Hour Average**	10.0 mg/m³	4.0 mg/m³	2.0 mg/m³

* Annual arithmetic mean of minimum 104 measurements in a year
taken twice a week 24 hourly at uniform interval

** 24 hourly/8 hourly values should be met 98% of the time in a year.
However, 2% of the time it may exceed but not on two consecutive
days

3.5 NOISE ENVIRONMENT

The noise levels measurements were carried out using precision noise level meter. The noise level survey was carried out at six locations, located within the 10 km radius of the mining site. The major source of noise identified in the study area has been predominantly the vehicular movement, construction activities and the transportation activities.

Ambient noise levels have been also monitored in residential and commercial areas.

3.5.1 Selection of Locations for Monitoring

Noise monitoring has been undertaken for the duration of 24 hrs at each location to cover up all the periods of the day to establish the baseline noise levels and assess the impact of the total noise generated by the operation of the proposed project. The environment setting of each noise monitoring location is given in **Table 3.10** and depicted in **Figure 3.7**

Figure 3.7 Noise Level Monitoring Locations Map

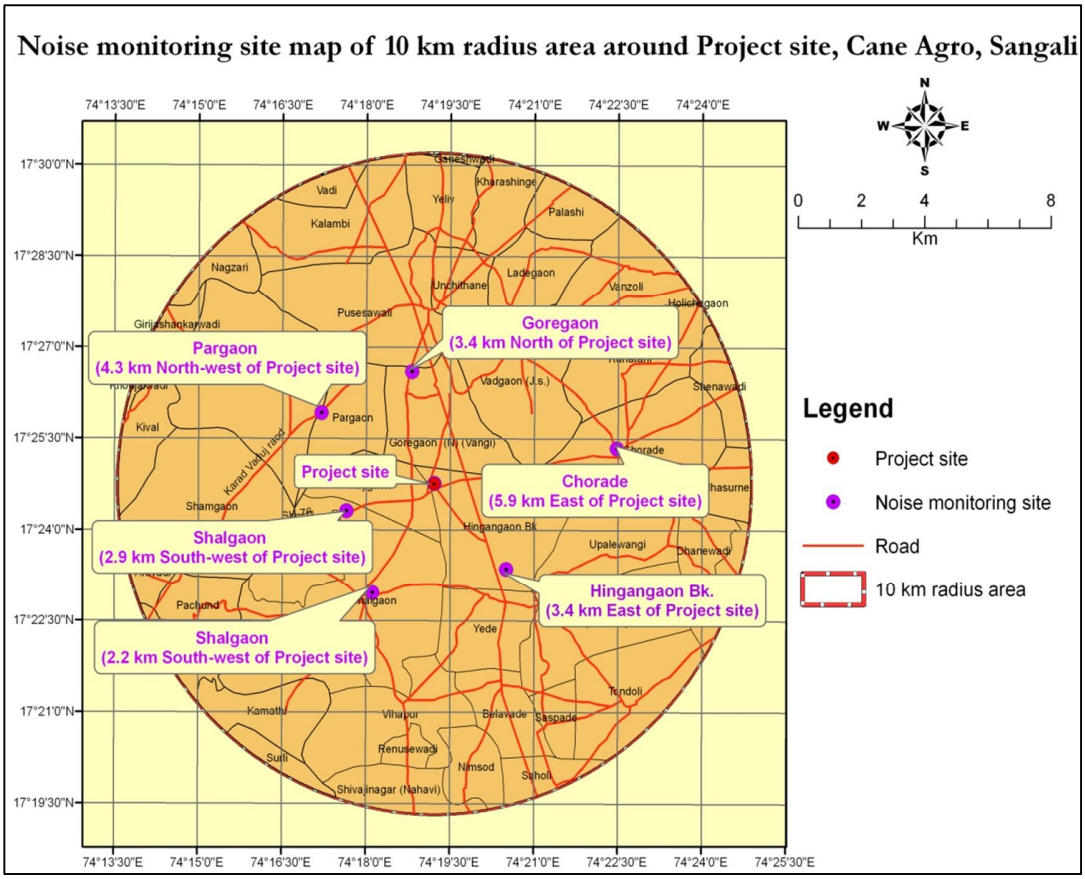


Table 3.10: Details of Noise Monitoring Locations

Location Code	Monitoring Location	Distance from Site (km)	Direction w.r.t. Site	Criteria
N1	Project Site	--	--	Industrial
N2	Pargaon	North- West	4.3	Residential / Rural area

N3	Goregaon	North	3.4	Residential / Semi urban area in d/w direction
N4	Chorade	South-West	5.9	Residential / Rural area
N5	Shalgaon	East	2.9	Residential area
N6	Shalgaon	East	2.2	Residential area in u/w direction
N7	Hingangaon Bk	South- East	3.4	Residential / Rural area

3.5.2 Instrument Used for Monitoring

Sound pressure level (SPL) measurements were automatically recorded with the help of an Integrated Sound Level Meter to give the equivalent noise level for every hour continuously for 24 hours in a day

3.5.3 Results

Equivalent noise levels viz., L_{day} and L_{night}, at the noise monitoring locations are provided in **Table 3.11** while noise standards are given in **Table 3.12.**

Table 3.11: Noise Monitoring Results in the Study area

Location	Day Time		Night Time	
	Leq dB(A)	Limit dB(A)	Leq dB(A)	Limit dB(A)
Project Site	61.7	75	48.5	70
Pargaon	58.8	55	46.6	45
Goregaon	60.7	65	54.6	55
Chorade	49.7	55	44.8	45
Shalgaon	51.4	55	42.7	45
Shalgaon	56.8	55	45	45

From the monitoring survey of noise levels it was observed that the day time noise levels were observed in the range of 49.7-61.7 dB(A). The day time noise shows the values confirming to the standards. The night time noise levels observed at all the 6 locations were found to be in the range

of 42.7-54.6 dB(A), which are found to be within the night time standards prescribed for residential, commercial and industrial zone.

Table 3.12: Ambient Noise Quality Standards

Category of Area/Zone	Limits in dB(A) Leq*	
	Day Time	Night Time
Industrial area	75	70
Commercial area	65	55
Residential area	55	45
Silence Zone	50	40

Day time shall mean from 6.00 a.m. to 10.00 p.m.
Night time shall mean from 10.00 p.m. to 6.00 a.m.

- ✓ Silence zone is defined as an area comprising not less than 100 meters around hospitals, educational institutions and courts. The silence zones are zones, which are declared as such by the competent authority.
- ✓ Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.

3.6 WATER ENVIRONMENT

Water quality of surface and ground water resources in core and buffer zone of the study area has been studied for assessing the water environment. Understanding of the water quality is essential in preparation of environmental impact assessment and to identify critical issues with a view to suggest appropriate mitigation measures for implementation.

The purpose of this study is to:

- Assess the water characteristics for critical parameters;
- Evaluate the impacts on agricultural productivity, habitat conditions, recreational resources and aesthetics in the vicinity; and
- Prediction of impact on water quality by this project and related activities.

The quality and quantity of ground water differ over area, as these depend on the physical and chemical parameters and also on topographical and hydro geological characteristics of the area.

3.6.1 Methodology

- Reconnaissance survey was undertaken and monitoring locations were finalized based on:
- Drainage pattern;
- Likely areas, which can represent baseline conditions

Ground water samples were examined for physico-chemical and bacteriological parameters in order to assess the effect of mining and other activities on surface and groundwater. The samples were collected and analyzed as per the procedures specified in 'Standard Method for the Examination of Water and Wastewater' published by American Public Health Association (APHA).

Samples for chemical analysis were collected in polyethylene carboys. Samples for bacteriological analysis were collected in sterilized glass bottles. Selected physico-chemical and bacteriological parameters have been analyzed for projecting the existing water quality status in the study area. Parameters like Temperature, Dissolved Oxygen (DO) and pH were analyzed at the time of sample collection.

Surface Water sample was collected at Two locations within the study zone these samples were taken as grab samples and were analyzed for various parameters and compared with the standards IS: 10500. Details of Surface and Ground water sampling locations are mentioned in Figure 3.8 and Table 3.13

Figure 3.8 Ground Water Sampling Locations Map

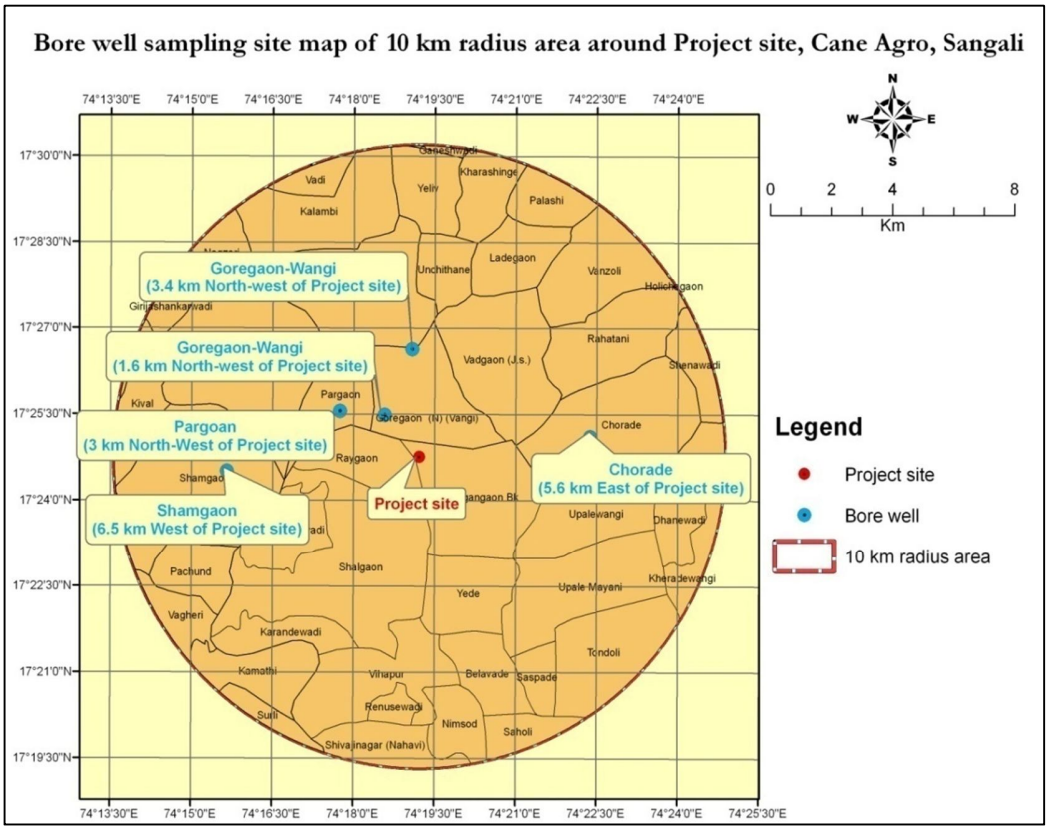


Figure 3.9 Ground Water (Open Well) Sampling Locations Map

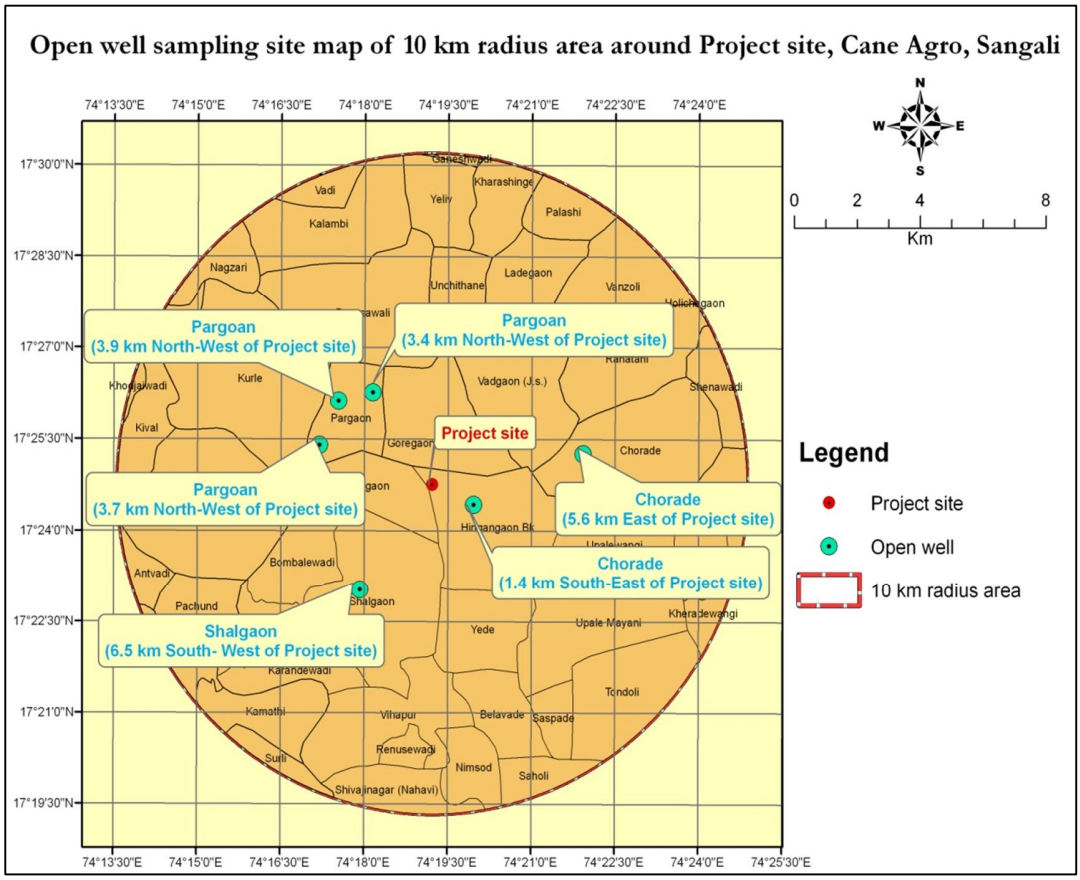


Figure 3.10 Surface Water Sampling Locations Map

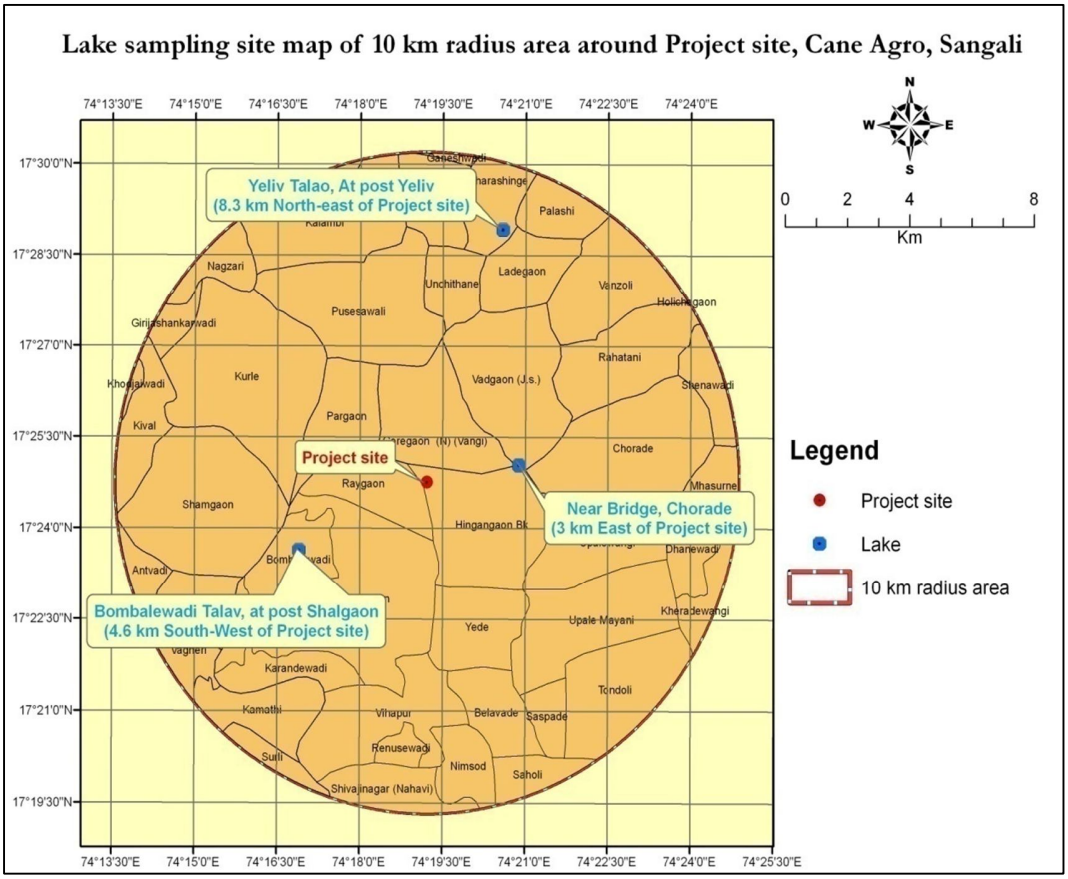


Table 3.13: Details of Ground & Surface Water Sampling Locations

Sr. No.	Locations	Description
1.	GW – 1	Sample was collected from the Open well at the factory site premises
2	GW – 2	Sample was collected from the Bore well- At Project site,Cane Agro, Raygaon village
3	GW – 3	Sample was collected from the Bore well-Prakash S Gore Hingangaon(BK), Kadegan, Sangli village
4	GW – 4	Sample was collected from the Bore well at Maruti Tukaram Pawar, Paragaon village
5	GW – 5	Sample was collected from the Open well- Dadaso Ramchandra Karbhal
6	GW – 6	Sample was collected from the Open well Jitendra Nath Pawar
7	GW – 7	Sample was collected from the Open well Shankar Manaso Sarkale
8	GW – 8	Sample was collected from the Bore well-Near Dalit Wash
9	GW – 9	Sample was collected from the Bore well-Near Mahadev Mandir
10	GW-10	Sample was collected from the Bore well Near Bhairaonath Mandir
11	GW-11	Sample was collected from the Open well-From govt.Scheme, Near Talav, Chorade, Satara
9	SW – 1	Sample was collected from Lake-Near Bridge, Chorade, Satara
10	SW - 2	Sample was collected from Lake-Bombalewadi Talav, at post Shalgaon Tal: Kadegaon, Dist: Sangli
11	GW-12	Sample was collected from Open well Near Maruti Mandir, At post Shalgaon Tal: Kadegaon, Dist: Sangli

Table 3.14: Ground Water analysis Results

Sr. No.	Location Name / Parameters	Units	Reservoir water- At Project site, CaneAgro ,Raigaon	Bore well- At Project site, Cane Agro, ,Raigaon	Bore well- Prakash S Gore Hingangaon(BK), Kadegan, Sangli	Standards IS - 10500
1	Colour	Hazen	1	1	1	5
2	Temperature	OC	26	26	26	--
3	Turbidity	NTU	0.8	--	--	1
4	pH	---	7.3	7.11	7.04	6.5-8.5
5	Conductivity	mS/cm	0.258	0.654	0.947	--
6	Total Dissolved Solids	mg/l	170	340	535	500
7	Dissolved Oxygen	mg/l	3.8	--	--	--
8	Total Hardness	mg/l	100	260	370	200
9	Ca-Hardness	mg/l	70	190	250	--
10	Calcium as Ca2+	mg/l	28	76	100	75
11	Magnesium as Mg2+	mg/l	7.29	17.01	29.16	30
12	Chlorides	mg/l	20	15.68	85	250
13	Total Alkalinity	mg/l	110	280	250	200
14	Phenolphthalein Alkalinity	mg/l	Absent	Absent	Absent	--
15	Ammonical Nitrogen	mg/l	Absent	--	--	--
16	Sulphate	mg/l	14.04	25.11	51.26	200
17	Nitrates	mg/l	0.11	0.32	0.87	45
18	Phosphate	mg/l	0.03	0.03	0.03	--

19	Fluoride	mg/l	0.25	0.39	0.48	1.00
20	Sodium	mg/l	20	15	12	--
21	Potassium	mg/l	9	2	6	--
22	Chemical Oxygen Demand	mg/l	54.88	15.68	15.66	--
23	Biochemical Oxygen Demand	mg/l	21.92	--	--	--
24	Total Coli form	Org/100 ml	14	--	--	0
25	F. coli.	Org/100 ml	Absent	--	--	0

Table 3.14: Ground Water analysis Results

Sr. No.	Location Name / Parameters	Units	Bore well- Maruti Tukaram Pawar, Paragaon	Open well- Dadaso Ramchandra Karbhal	Open well Jitendra Nath Pawar	Standards IS - 10500
1	Colour	Hazen	1	1	1	5
2	Temperature	OC	26	26	26	--
3	Turbidity	NTU	--	--	--	1
4	pH	---	7.88	7.26	7.89	6.5 - 8.5
5	Conductivity	mS/cm	0.092	0.952	0.701	--
6	Total Dissolved Solids	mg/l	495	510	350	500
7	Dissolved Oxygen	mg/l	--	--	--	--
8	Total Hardness	mg/l	370	340	270	200
9	Ca-Hardness	mg/l	220	180	160	--
10	Calcium as Ca2+	mg/l	88	72	60	75

11	Magnesium as Mg2+	mg/l	86.45	38.88	29.16	30
12	Chlorides	mg/l	50	65	30	250
13	Total Alkalinity	mg/l	280	300	250	200
14	Phenolphthalein Alkalinity	mg/l	Absent	20	Absent	--
15	Ammonical Nitrogen	mg/l	--	--	--	--
16	Sulphate	mg/l	20.57	42.39	20.34	200
17	Nitrates	mg/l	0.39	0.33	0.87	45
18	Phosphate	mg/l	0.04	0.04	0.0.5	--
19	Fluoride	mg/l	0.12	0.19	0.21	1.00
20	Sodium	mg/l	40	42	20	--
21	Potassium	mg/l	6	9	4	--
22	Chemical Oxygen Demand	mg/l	7.84	7.84	15.68	--
23	Biochemical Oxygen Demand	mg/l	--	--	--	--
24	Total Coli form	Org/100 ml	--	--	--	0
25	F. coli.	Org/100 ml	--	--	--	0

Table 3.14: Ground Water analysis Results

Sr. No.	Location Name / Parameters	Units	Open well Shankar Manaso Sarkale	Bore well- Near Dalit Wash	Bore well- Near Mahadev Mandir	Standards IS - 10500
1	Colour	Hazen	1	1	1	5
2	Temperature	OC	26	26	26	--

3	Turbidity	NTU	--	--	--	1
4	pH	---	7.71	7.46	7.39	6.5-8.5
5	Conductivity	mS/cm	0.84	1.045	1.69	--
6	Total Dissolved Solids	mg/l	400	650	1130	500
7	Dissolved Oxygen	mg/l	--	--	--	--
8	Total Hardness	mg/l	300	360	630	200
9	Ca-Hardness	mg/l	150	240	470	--
10	Calcium as Ca2+	mg/l	60	96	188	75
11	Magnesium as Mg2+	mg/l	36.45	29.16	38.88	30
12	Chlorides	mg/l	45	80	185	250
13	Total Alkalinity	mg/l	260	210	320	200
14	Phenolphthalein Alkalinity	mg/l	20	20	Absent	--
15	Ammonical Nitrogen	mg/l	--	--	--	--
16	Sulphate	mg/l	25/03	29.84	66.2	200
17	Nitrates	mg/l	0.81	1.5	2.22	45
18	Phosphate	mg/l	0.04	0.04	0.22	--
19	Fluoride	mg/l	0.24	0.31	0.42	1.00
20	Sodium	mg/l	24	58	69	--
21	Potassium	mg/l	2	15	21	--
22	Chemical Oxygen Demand	mg/l	15.68	7.84	15.68	--
23	Biochemical Oxygen Demand	mg/l	--	--	--	--
24	Total Coli form	Org/100 ml	--	--	--	0
25	F. coli.	Org/100 ml	--	--	--	0

Table 3.14: Ground Water & Surface water analysis Results

Sr. No.	Location Name / Parameters	Units	Bore well- Near Bhairaonath Mandir	Open well- From govt. Scheme, Near Talav,Chorade, Satara	Standards IS - 10500
1	Colour	Hazen	1	1	5
2	Temperature	OC	26	26	--
3	Turbidity	NTU	--	--	1
4	pH	---	7.98	7.79	6.5-8.5
5	Conductivity	mS/cm	0.861	1.398	--
6	Total Dissolved Solids	mg/l	475	755	500
7	Dissolved Oxygen	mg/l	--	--	--
8	Total Hardness	mg/l	280	500	200
9	Ca-Hardness	mg/l	180	290	--
10	Calcium as Ca2+	mg/l	72	116	75
11	Magnesium as Mg2+	mg/l	24.3	51.03	30
12	Chlorides	mg/l	60	175	250
13	Total Alkalinity	mg/l	240	270	200
14	Phenolphthalein Alkalinity	mg/l	20	10	--
15	Ammonical Nitrogen	mg/l	--	--	--
16	Sulphate	mg/l	37.5	52.47	200
17	Nitrates	mg/l	1.05	0.59	45
18	Phosphate	mg/l	0.04	0.03	--
19	Fluoride	mg/l	0.39	0.31	1.00
20	Sodium	mg/l	66	20	--
21	Potassium	mg/l	20	3	--

22	Chemical Oxygen Demand	mg/l	7.84	15.68	--
23	Biochemical Oxygen Demand	mg/l	--	--	--
24	Total Coli form	Org/100 ml	--	--	0
25	F. coli.	Org/100 ml	--	--	0

Table 3.14: Ground Water analysis Results

Sr. No.	Location Name / Parameters	Units	Open Well- Near Maruti Mandir, At post Shalgaon Tal: Kadegaon, Diast: Sangli	Standards IS - 10500
1	Colour	Hazen	1	5
2	Temperature	OC	26	--
3	Turbidity	NTU	--	1
4	pH	---	7.15	6.5-8.5
5	Conductivity	mS/cm	0.72	--
6	Total Dissolved Solids	mg/l	385	500
7	Dissolved Oxygen	mg/l	--	--
8	Total Hardness	mg/l	230	200
9	Ca-Hardness	mg/l	160	--
10	Calcium as Ca2+	mg/l	64	75
11	Magnesium as Mg2+	mg/l	17.01	30
12	Chlorides	mg/l	25	250
13	Total Alkalinity	mg/l	270	200
14	Phenolphthalein Alkalinity	mg/l	20	--
15	Ammonical Nitrogen	mg/l	--	--
16	Sulphate	mg/l	19.81	200
17	Nitrates	mg/l	0.18	45
18	Phosphate	mg/l	0.03	--
19	Fluoride	mg/l	0.29	1.00
20	Sodium	mg/l	62	--

21	Potassium	mg/l	19	--
22	Chemical Oxygen Demand	mg/l	15.68	--
23	Biochemical Oxygen Demand	mg/l	--	--
24	Total Coli form	Org/100 ml	--	0
25	F. coli.	Org/100 ml	--	0

The results of the ground water samples collected at four different sites are given in Table 3.13**.** The results for the ground water samples collected with the study area and compared with standard limits as this well water is used for drinking purposes as well as other recreational purposes.

As per IS 10500 standards the pH value are within the limits and varies from 7.1 to 7.4. Total dissolved solids were found between 309.1 to 420.7 mg/l and Calcium and Magnesium are observed to be in the range of 76.9 to 135.5 mg/l and 30.7 to 100.4 mg/l respectively.

The Fluoride, Iron, Copper parameter analysis results were slightly more and it was revealed that the parameters like Phenolic Compounds, Mercury, Barium, Cadmium, Selenium, Salinity, Oil-Grease, Zinc, Nitrate, Chlorides values of the various locations are within the prescribed limits. MPN values are found between the range of 2-9 numbers per ml and it is within the prescribed limits.

Table 3.15: Surface Water analysis Results

Sr. No.	Location Name / Parameters	Units	Lake- Bombalewadi Talav, at post Shalgaon Tal: Kadegaon, Dist: Sangli	Lake- Near Bridge, Chorade, Satara	Standards IS - 10500
1	Colour	Hazen	1	2	5
2	Temperature	OC	26	26	--
3	Turbidity	NTU	0.8	1.2	1
4	pH	---	7.05	7.26	6.5-8.5
5	Conductivity	mS/cm	0.23	0.215	--
6	Total Dissolved Solids	mg/l	160	135	500
7	Dissolved Oxygen	mg/l	5.7	5	--
8	Total Hardness	mg/l	100	90	200
9	Ca-Hardness	mg/l	60	50	--
10	Calcium as Ca2+	mg/l	24	20	75
11	Magnesium as Mg2+	mg/l	9.72	9.72	30
12	Chlorides	mg/l	10	15	250
13	Total Alkalinity	mg/l	100	100	200
14	Phenolphthalein Alkalinity	mg/l	10	Absent	--
15	Ammonical Nitrogen	mg/l	Absent	Absent	--
16	Sulphate	mg/l	18.48	14.87	200
17	Nitrates	mg/l	0.13	0.15	45
18	Phosphate	mg/l	0.03	0.03	--
19	Fluoride	mg/l	0.24	0.31	1.00
20	Sodium	mg/l	20	20	--

21	Potassium	mg/l	6	3	--
22	Chemical Oxygen Demand	mg/l	7.84	15.68	--
23	Biochemical Oxygen Demand	mg/l	--	--	--
24	Total Coli form	Org/100 ml	8	--	0
25	F. coli.	Org/100 ml	Absent	--	0

The results for the surface water samples collected within the study area of 10 km radius and are compared with standard limits of IS: 2490. The data presented in Table 3.15.

The pH was found to be 7.06, Dissolved solids were 135-160 mg/l, Calcium and Magnesium are found 20 to 24 mg/l and 9.72 mg/l respectively, MPN value was more than standard prescribed limits and Dissolved oxygen in that sample was 5 to 5.7 mg /l. All the remaining parameters including trace elements were within the limits or below detectable limits.

3.7 LAND ENVIRONMENT

3.7.1 Soil Environment

The term soil refers to the loose materials composed of weathered rock and other minerals and also partly decayed organic matter that covers large parts of the earth's surface. Soil is an essential component of the terrestrial ecosystem. Soil also acts as a medium of transport of various dissolved materials to the underlying ground water. Hence the impact of the proposed activities on soil needs to be understood for proper mitigation measure wherever required.

Soil formation is influenced mainly by climate, geology, relief and other biotic interactions. Agriculture is the main occupation of the people in the study area. Hence it is essential to identify the impacts in the study area on the soil characteristics, which would affect the agricultural and afforestation potential.

Six locations as described in Table 3.16 were selected for soil sampling within the study area of 10 km. At each location, soil samples were collected at a depth of 30 cm. Samples were then packed in a polythene plastic bag and sealed. Samples were transferred to laboratory for analysis and the results are presented in Annexure VII. The map showing soil sampling locations in study area is depicted in Figure 3.9

Figure 3.9 Soil Sampling Locations Map

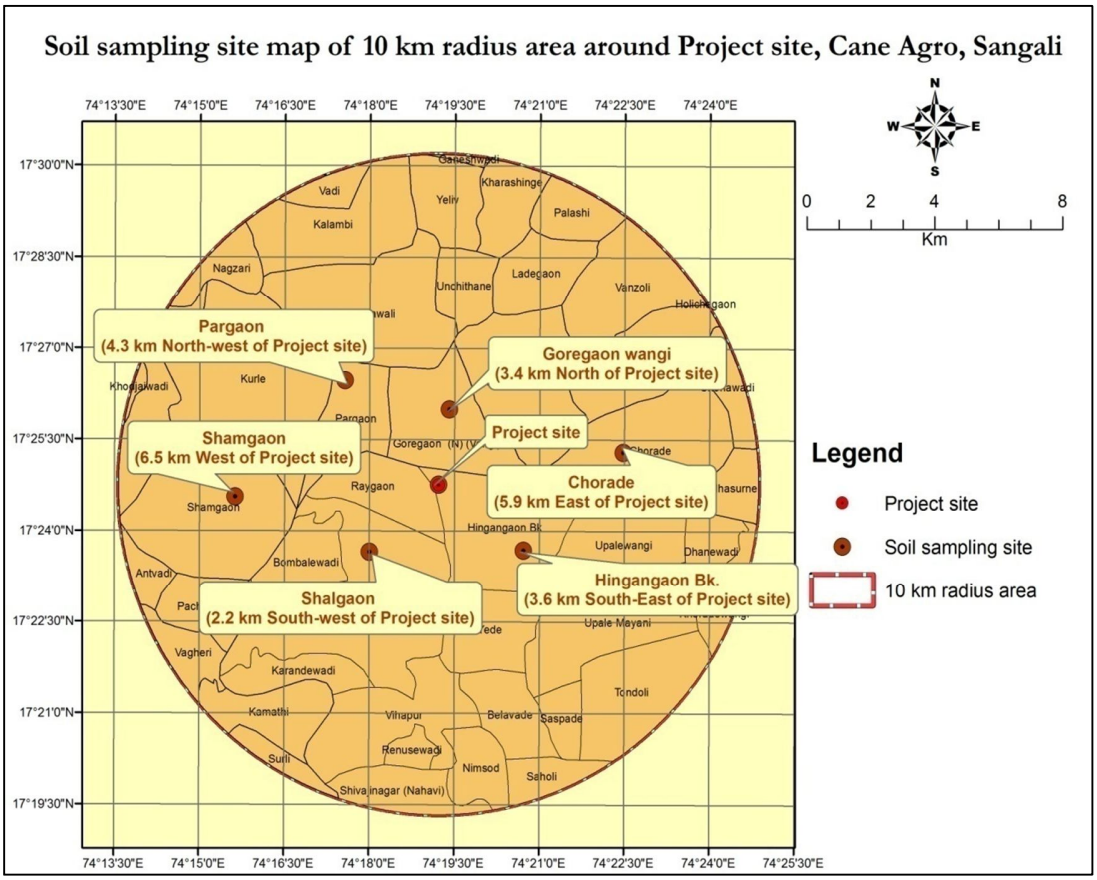


Table 3.16: Details of Soil Sampling Locations

Sr. No.	Locations	Soil type	Distance w. r. t. project site	Direction w. r. t. project site
1	Project Site	Non Agriculture	0.0	--
2	Pargaon	Non Agriculture	4.3	North- West
3	Shamgaon	Agriculture	6.5	West
4	Shalgaon	Agriculture	2.2	South-west
5	Goregaon Wangi	Agriculture	3.4	North
6	Chorade	Non Agriculture	5.9	East
7	Hingangaon Bk	Agriculture	3.6	South-East

Table 3.17: Soil Analysis Results

	CANE AGRO_SOIL COMPILE REPORT							
Parameters → / Locations ↓	Near Paragaon Farm	Uttam Bansole farm	Chorade Farm	At Sambhaji Malik Farm	At Anant Sampat Pol	At Baburao Shankar Kadam farm	Near ETP, Project site	UNITS
pH	7.05	6.70	6.48	7.18	7.23	7.19	7.02	--
Colour	Dark Brown	Dark Brown	Light Brown	Blackish Brown	Brown	Blackish Brown	Blackish Brown	--
Conductivity	0.70	0.077	0.62	0.068	0.073	0.069	0.072	mS
Moisture Content	11.35	11.35	6.15	10.25	9	10.3	5.82	%
Organic Matter	1.15	1.19	0.86	1.32	1.12	1.32	1.32	%
Chlorides	85	170	85	85	85	85	170	mg/kg
Sulphates	86.41	95	103	90.53	131.68	127.56	69.95	mg/kg
Phosphates	2.5	5	5	5	5	11.25	11.25	mg/kg
Calcium Hardness	100	50	100	100	50	50	100	mg/kg
Calcium as Ca^{2+}	40	20	40	40	20	20	40	mg/kg
Magnesium as Mg^{+2}	7.25	21.87	7.29	7.29	14.58	7.29	14.58	mg/kg
Sodium	50	75	75	50	75	50	50	mg/kg
Potassium	25	25	50	25	50	25	25	mg/kg
Iron	115.187	117.840	110.260	9.138	110.204	118.386	118.386	mg/kg
Copper	2.942	0.227	4.256	5.675	4.650	4.546	3.171	mg/kg
Manganese	14.365	14.365	14.156	14.144	14.206	14.291	14.217	mg/kg
Chromium	1.123	1.187	1.132	0.087	0.080	1.141	0.753	mg/kg
Cobalt	1.840	2.548	1.525	1.872	1.442	1.668	2.086	mg/kg
Cadmium	0.052	0.016	0.012	0.020	0.011	0.022	0.010	mg/kg
Zinc	2.506	2.035	2.877	1.140	2.757	2.805	2.881	mg/kg
Lead	39.819	1.044	1.054	3.169	1.034	BDL	1.044	mg/kg
Nickel	1.767	2.298	1.425	1.099	1.545	2.536	1.437	mg/kg

The soil pH was observed in the range of 6.48-7.23, suggesting that the soil in this area is normal. The soil appeared light brown to blackish Brown in colour and all soil samples have slit loam structures. Water holding capacity of soils was seen in the range between 6.15 to 11.35 %.

Soil Electrical Conductivity (EC) assessments measure the soluble salts in the soil. EC of soil depend upon the porosity, water content, salinity level, cation exchange rate and temperature. The EC of soils was observed in the range of 0.068-0.70 mmhos/cm. Heavy metals are found in less amount in the soil samples.

The Cation Exchange Capacity (CEC) of a soil refers to the amount of positively charged ions which can be held by soil. When dissolved in water, the nutrients are either positively charged or negatively charged. Examples of positively charged ions (cations) include: calcium (Ca^{++}), magnesium (Mg^{++}), potassium (K^{+}), sodium (Na^{+}), hydrogen (H^{+}) and ammonium ($NH4^{+}$). Soils contain slightly excessive negative charge sites on it due to the presence of organic matter.

Good concentration of Nitrogen, Phosphorus and Potassium like elements present in the soil is indicating good soil.

3.7.2 Remote Sensing and GIS Study

Remote Sensing is a process of identification and demarcation of various earths' objects from a distance without directly coming into contact with them. Remote sensing is largely concerned with the measurement of electromagnetic radiation from the sun, which is reflected, scattered, and emitted by the objects on the surface of the earth. Different objects on the surface of the earth reflect different amounts of the electromagnetic spectrum. The potential of remote sensing in natural resources mapping basically depends on spatial, radiometric and temporal resolution of the sensor. Thus the satellite remote sensing with its capability of repetitive coverage, multi-spectral imaging, synoptic view and low cost can play an important role in the delineation of various landuselandcover classes.

Land cover is a fundamental parameter describing the Earth's surface. This parameter is a considerable variable that impacts on and links many parts of the human and physical environments. Remote sensing technique has ability to represent of land cover categories by means of classification process. With the availability of multispectral

remotely sensed data in digital form and the developments in digital processing, remote sensing supplies a new prospective for land-cover/land-use analysis. Geographical Information Systems have already been used for assessing environmental problems, since they provides a flexible environment and a powerful tool for the manipulation and analysis of spatial information for land cover feature identification and the maps of all variables were combined to extract information to better understand analyzing. Satellite remote sensing, in conjunction with geographic information systems, has been widely applied and been recognized as a powerful and effective tool in analyzing land cover/use categories This study made use of remotely sensed data and GIS technologies; to evaluate qualitatively and quantitatively outcome of part of Sangali district land cover/use distribution. Obtained results were compared, visualized and analyzed, in Geographic Information System.

The project site is having latitudes 17°24'46.103"Nand longitudes 74°19'11.24"E. The 10 km radius area around project site is having latitudes17°19'19.678"Nto 17°30'13.829"Nand longitudes 74°13'32.478"E to 74°24'52.519"E.

Software and Hardware

Satellite Data: **RESOURCESAT-2** cloud free data has been used for Landuse / landcover analysis.

Satellite Sensor – **RESOURCESAT-2**LISS- III

Path and Row – Path 96, Row 60 Resolutions - 23.5 m.

Date of Pass: 18 MAY 2015

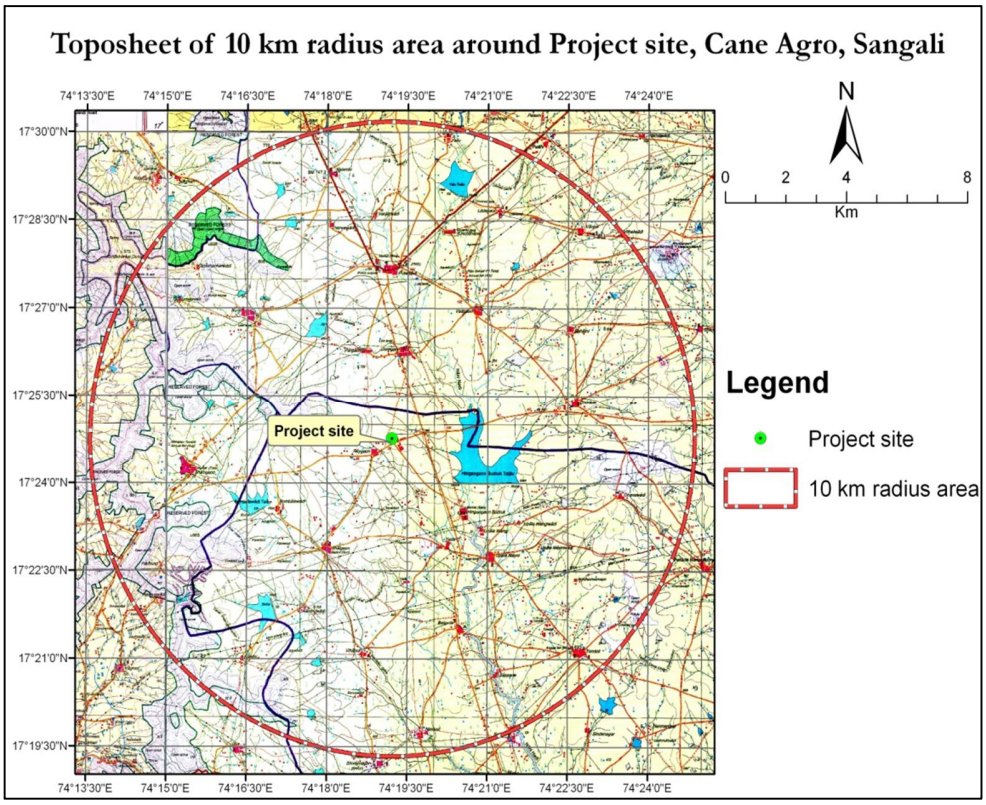
Ancillary Data:

PC based GIS and image-processing software's are used for the purpose of image classification and for delineating drainage and other features in the study area. Number of peripheral devices such as scanner, plotter, printer etc. has also been interfaced with the system.

Objectives:

- Delineation of Landuse/ Landcover categories at 10 km radius area around Project site.
- Generation of digital cartographic database using secondary data sources.

Toposheet of 10 km radius area around Project Site.



Methodology:

The multispectral data obtained from sensors, due to its synoptic view and revisit capability, can effectively be used for continuous monitoring of land surface. The spatial, spectral and radiometric resolutions are the three primary factors in the estimation of various landuse/landcover classes.

The satellite data is then taken into a hard disk and then converted in the standard false colour composite by assigning blue, green and red to green, red and near infra red band respectively. Image enhancement has been done by the technique called histogram stretching between the ranges of 0-255, as the data content is 8-bit. Applying formulae derived by modeling the sources of distortions in order to correct the systematic

distortions such as earth curvature ca rried out rectification and registration of satellite data. The random distortions were corrected using well distributed ground control points occurring in raw data. To achieve planimetric accuracy, the remote sensing scene was rectified with respect to SOI maps on 1: 50,000 scales. The GCP's in the scene such as railroad intersections, corners of water reservoirs, bunds, etc. were identified on the image as well as on the reference map. Third order model was constructed and finally registration of image was carried out with nearest neighborhood resampling taking map as reference and one map registration was achieved.

Then the subset of image has been taken according to the boundary of the study area. The digital classification technique has been used for the extraction of the landuse/landcover information from the imagery. Eight different landuse/landcover classes have been identified in the area under study. Table shows the information about the extent of landuse/landcover classes in the study area.

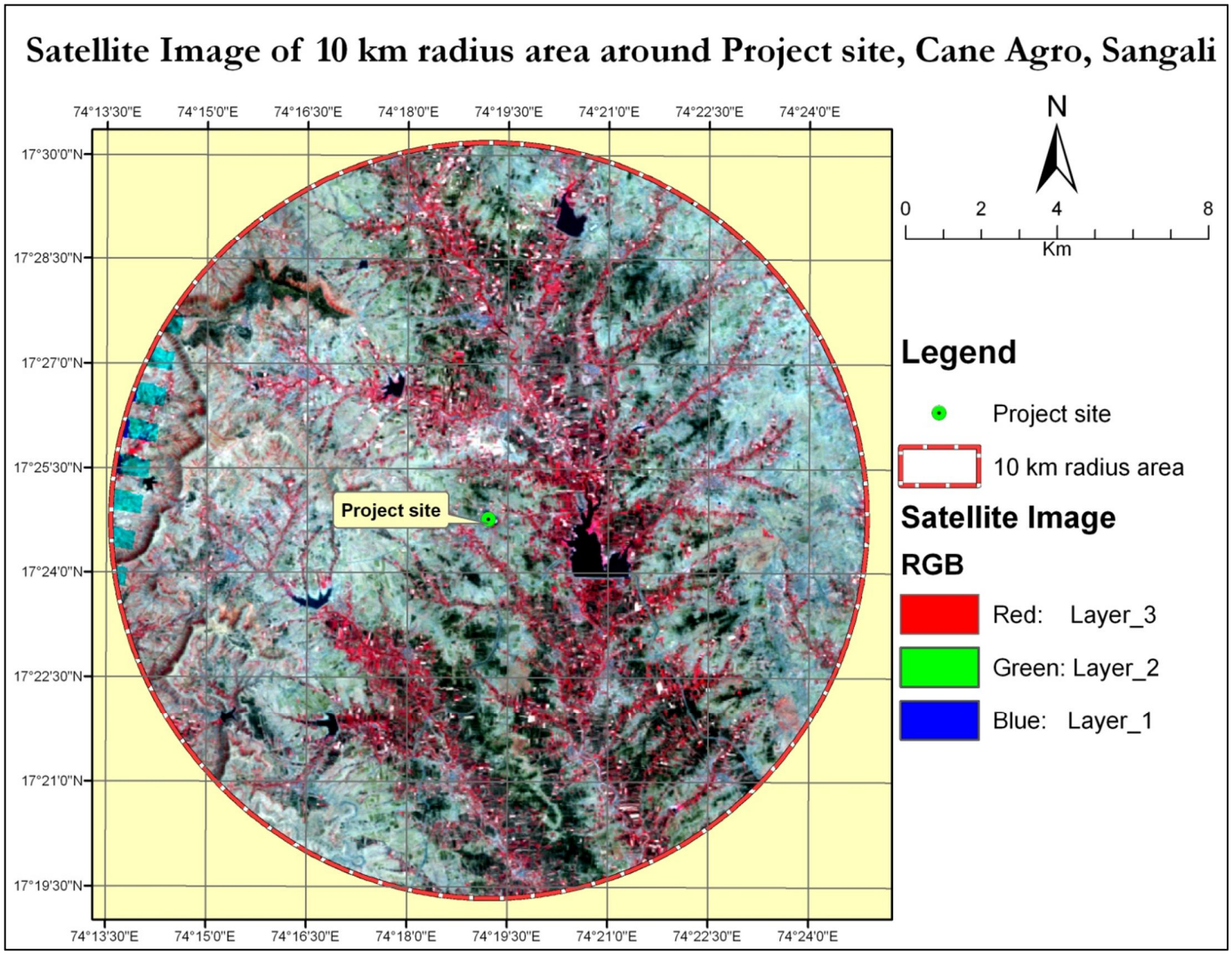


Fig.3.10. Satellite Image of 10 km radius area around Project Site.

Landuse/ Landcover Classes Details:

Satellite data for Rabi season was classified using supervised classification technique. Maximum likelihood algorithm classifier was used for the analysis. The scenes were individually classified and then were integrated to get a composite classified output where information from Rabi season is available. A truth table was generated taking 0.95 as the conversion threshold. After aggregation, the final classified output was converted in raster format. The image was then converted in raster format, which is understood by GIS. Eightlanduse/landcover classes identified in total 10 km radius area around Project Site. The area under each class has been calculated and given below.

Table 3.18: Landuse/ Landcover Statistics of the Ten Km radius Area.

Sr. No.	Landuse/landcover	Area (Ha)	% Area
1	Irrigated crop land	4212.36	13.41
2	Land without scrub	2429.24	7.73
3	Fallow land	6837.39	21.74
4	Land with scrub	14020.12	44.58
5	Vegetation	1834.15	5.83
6	Water bodies	305.19	0.97
7	Built up land	227.61	0.72
8	Forest	1579.75	5.02
	Total	**31445.81**	**100.00**

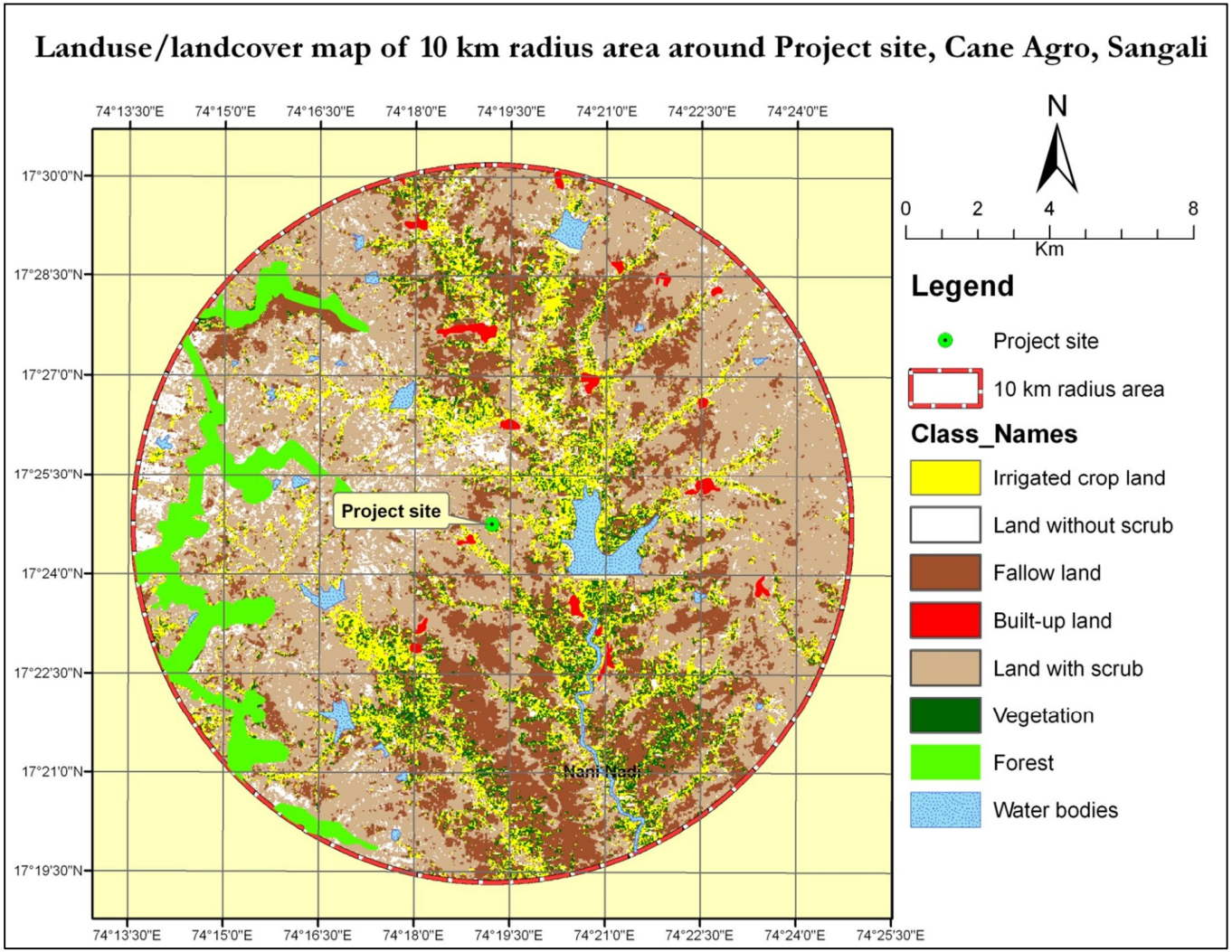


Fig.3.11 Landuse/landcover map of 10 km radius area around Project Site.

Digital Cartographic Database preparation in GIS

GIS is an integrated information system having capability to capture, store, edit, manipulate, analyze and retrieve all types of spatial and non-spatial information about a particular area. The advent of electronics and computing techniques coupled with the development of GIS has increased the potential of creating and maintaining databases using geographical space as the key field. The database can be used for speedier monitoring, assessment, planning, and management of various aspects of natural resources.

Comprehensive GIS based database was generated for the study area that comprises of the following data sets. Resource data such as landuse from remote sensing data, soil map, geology, water bodies, surface and ground water sampling locations, drainage, contour. The methodology used for database preparation involves the following steps

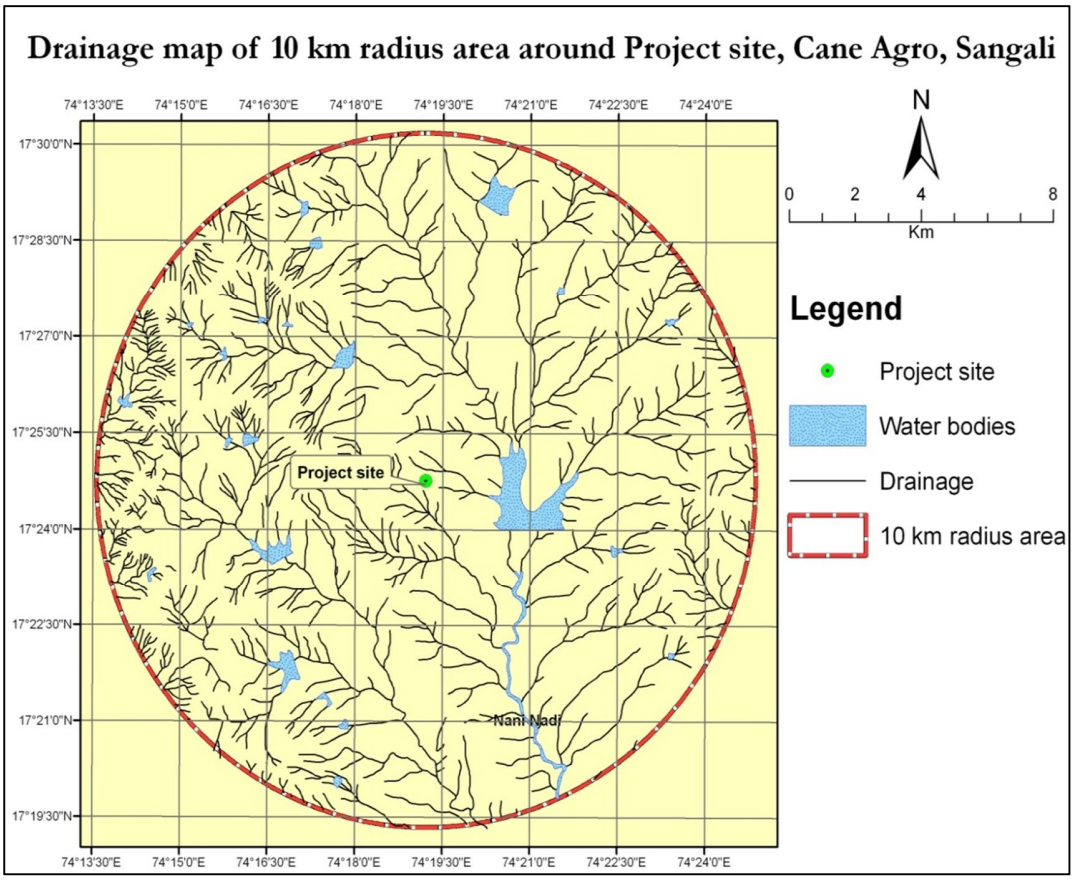
Data Input:
The function of data input is to convert the existing data from one into another that can be used in GIS. Georeferenced data are commonly provided as maps, satellite images, and associated attributes.

3.7.3 Drainage

Drainage Map: Drainage layer, which was generated after scanning the thematic manuscripts, was edited for line the errors. Two different layers were made separately for line drainage. Drainage order was given to all the drain lines in the layer's. **Strahler**method of ordering was used for giving order to drainage. Whenever two drains of any order joined the order of next drain was increase by one. The study area has an order of fourth. River name also attached as attribute to drainage layer. All the water bodies and river with sufficient width were put in polygon layer.

The area shows not much of undulating topography thus it shows the Dendritic drainage patterns.

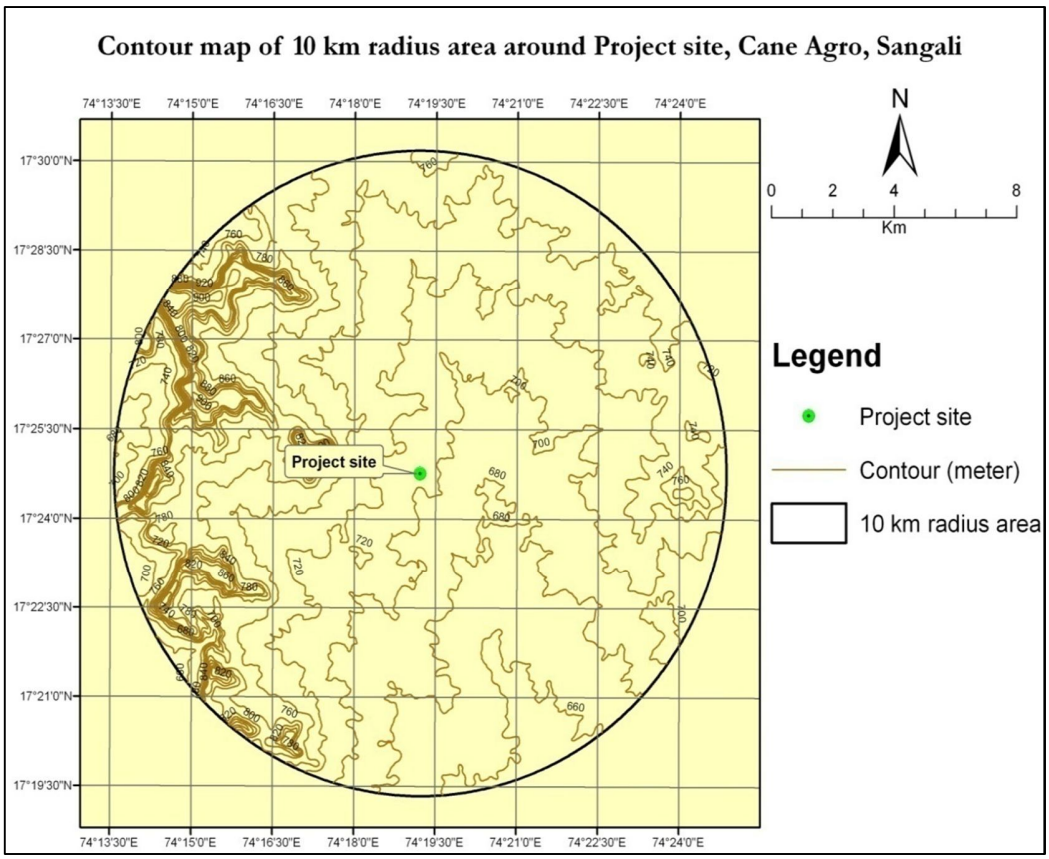
Fig. 3.12: Drainage map of 10 km radius area around Project Site.



3.7.4 Contour

Thematic manuscript for contour layer was generated from Survey of India toposheet at 1:50,000 scale. After scanning coverage was generated. Coverage was edited to remove all errors of dangle. Attribute value was given to each contour in the coverage.

Fig.3.13: Contour map of 10 km radius area around Project Site.



3.8 BIOLOGICAL ENVIRONMENT

3.8.1 Preamble

Assessment of biological environment provides information on the floral and faunal assemblages present within the proposed site & surrounding areas and enables assessment of impacts of proposed project on these components. Further, based on the type and severity of the impact, suitable mitigation measures can be delineated.

3.8.2 Objectives

The present study was undertaken with the following objectives:

- To assess the nature and distribution of flora & fauna in and around the project site
- To ascertain whether the proposed project will have any adverse impact on the ecology (Terrestrial and Aquatic ecosystems) of surrounding areas, and suggest mitigation measures, if needed.

3.8.3 Methodology:

To achieve the above objectives, general ecological survey covering an area of 10km surrounding the proposed project site was carried out. The survey included:

Terrestrial

Flora:

- Selection of sampling locations within the study area using GIS map and physically survey of representative sites with reference to floral diversity and measurement of importance value indices of trees.
- Provide ecological insights in terms of rare species, endemism and seasonality.

Faunal:

- Document different types of animals, including butterflies, avifauna etc. available in this area.
- Delineate probable impact, if any, due to project activity on biota and suggest mitigation measures

Aquatic

Identified surface water bodies within the study area and collected water samples for phytoplankton and zooplankton

enumeration. While water samples for phytoplankton were unfiltered, about 50-L water was filtered through specific net having 75µ pore size for zooplankton. Standard Van veen grab was used for collecting benthic sediments, which were passed through 500µ sieve to retain macrobenthos.

3.8.4 Study area

As per guidelines of MoEF for Environmental Impact Assessment, the study area is restricted upto10 km periphery of the project site (**Fig. 1)**.The data were collected with reference to topography, land use, vegetation pattern, animals etc.

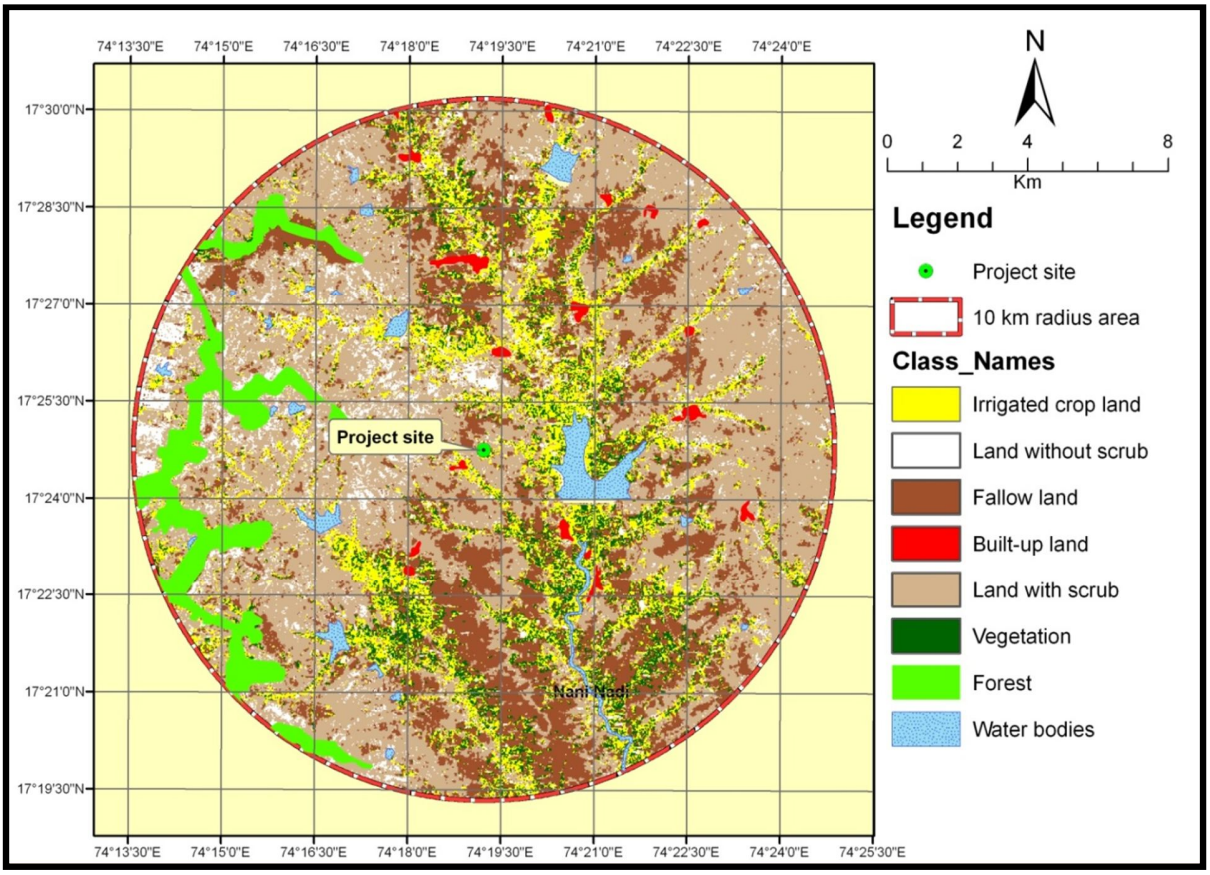


Fig.1: Locations of field survey within 10km around of project site: vegetation, A-H; Avifauna, 1-6

A: Shamgaon

B: Atvadi

C: Vaghire

D: Kival

Plate 1: Select Forests (A - D) within the study area.

3.8.4 Biodiversity

3.8.4.1 Project site

Flora:

Presently the project site is open and barren land with some seasonal grasses and herbaceous species like *Cassia tora*, *Alternanthera sessilis, Acanthospermum hispidum,Cynadon dactylon* etc.

Fauna:

In project site some species of butterflies like lime butterfly, blue mormon, small leopard, lime butterfly etc. were found, while mammals like common dog and squirrel were observed. Dragonfly species like *Ictinogomphus rapax, Orthetrum sabina* and *Trithemis aurora* were commonly seen. Common birds like Indian myna, house crow, small green bee eater, common babbler etc. were dominant. A comparative account of the types of birds available in project site has been delineated in following section **3.8.4.2**.

3.8.4.2 Area between project site and 10km surroundings:

A) Terrestrial

a) Flora:

Based on field survey and land use map, 8 locations within project site (Site A), Nagzari forest (site B), Kival forest (C), Shamgaon forest (sites D), Antvadi forest (site E), Vaghire forest (site F), Kamathi forest (site G) and Surli forest (site H) were selected to evaluate the floral diversity (Fig.1). The study shows over all 110 genera and 154 species from 47 families, of which the most dominant taxa was Dicotyledons followed by Monocotyledons.The diversity of plants was observed to be more at forest site i.e. Sites B,C,D,F and G while site A exhibited less diversity of plants.

Table 1: List of plant species documented at project site and 10Km surroundings (Source: Working plan of Satara Forest Division and discussion with Forest Dept officials).

Sr. no.	Botanical Name	Local name	Family	Status
Trees				
1	**Acacia auriculiformis*	Austrialian Babhul	Mimosaceae	Cultivated
2	**Acacia catechu*	Khair	Mimosaceae	Common
3	**Acacia chundra*	Lal-Khair	Mimosaceae	Common

3	*Acacia nilotica ssp. astringens*	Vedi-Babhul	Mimosaceae	Common
4	**Acacia nilotica ssp. indica*	Babhul	Mimosaceae	Common
5	**Anogeissus latifolia*	Dhavda	Combretaceae	Common
6	**Azadirachta indica*	Neem	Meliaceae	Common
7	*Bauhinia racemosa*	Aapta	Caesalpiniaceae	Common
8	**Bauhinia variegata*	Kanchan	Caesalpiniaceae	Common
9	**Cassia fistula*	Amaltash	Caesalpiniaceae	Common
10	**Dalbergia sisoo*	Shisvi	Fabaceae	Frequently
11	**Delonix regia*	Gulmohar	Caesalpiniaceae	Cultivated
12	**Emblica officinalis*	Aavla	Euphorbiaceae	Cultivated
13	*Ficus benghalensis*	Vad	Moraceae	Frequently
14	*Ficus racemosa*	Umbar	Moraceae	Frequently
15	**Ficus religiosa*	Pimpal	Moraceae	Common
16	**Flacourtia latifolia*	-	Flacourtiaceae	Endemic
17	**Gliricidia sepium*	Undirmari	Fabaceae	Cultivated
18	**Grewia asiatica*	-	Tiliaceae	Frequently
19	*Limonia acidissima*	Kavath	Rubiaceae	Scarce
20	**Madhuca latifolia*	Moha	Sapotaceae	Frequently
21	**Mangifera indica*	Aamba	Anacardiaceae	Cultivated
22	**Morinda tinctorea*	Bartondi	Rubiaceae	Common
23	**Moringa oleifera*	Shevga	Moringaceae	Cultivated
24	*Lannea caromadelica*	-	Anacardiaceae	Frequently
25	**Santalum album*	Chandan	Santalaceae	Common
26	**Tamarindus indica*	Chinch	Caesalpiniaceae	Common

27	**Terminalia bellirica*	Beheda	Combretaceae	Common
28	**Terminalia tomentosa*	Sadada	Combretaceae	Common
29	**Ziziphus mauritiana*	Bor	Rhamnaceae	Common
30	**Ziziphus xylopyra*	Ghot-bot	Rhamnaceae	Common
Shrubs				
31	**Abutilon indicum*	Mudra	Malvaceae	Common
32	**Acacia torta*	Chilar	Mimosaceae	Common
33	**Agave americana*	Ghaypat	Agavaceae	Cultivated
34	**Agave sisalana*	Ghaypat	Agavaceae	Cultivated
35	**Aloe vera*	Korphad	Liliaceae	Cultivated
36	**Annona squamosa*	Sitaphal	Annonaceae	Cultivated
37	**Calotropis gigantea*	Rui	Asclepiadaceae	Common
38	**Calotropis procera*	Rui	Asclepiadaceae	Common
39	**Carissa congesta*	Karvand	Apocynaceae	Common
40	**Cassia auriculata*	Tarvad	Caesalpiniaceae	Common
41	**Clerodendrum serratum*	--	Verbenaceae	Common
42	*Euphorbia ligularia*	Sabar	Euphorbiaceae	Common
43	**Ipomoea carnea*	Besharam	Convolvulaceae	Common
44	**Lantana camara*	Ghaneri	Verbenaceae	Common
45	**Malachra capitata*	Ran-Bhendi	Malvaceae	Common
46	**Opuntia elatior*	Nivdung	Cactaceae	Common
47	*Phyllanthus reticulatus*	-	Euphorbiaceae	Common
48	*Securinega leucopyrus*	Pithuni	Euphorbiaceae	Common

49	*Vitex negundo*	Nirgudi	Verbenaceae	Common
50	**Woodfordia fruticosa* (L.) Kurz.	Dhayti	Lythraceae	Common
51	**Ziziphus oenoplea*	Jangli-bor	Rhamnaceae	Common
52	*Ziziphus rugosa*	Toran	Rhamnaceae	Common
Herbs				
53	**Abutilon ramosum*	Mudrika	Malvaceae	Common
54	**Acanthospermum hispidum*	Shingada Kata	Asteraceae	Common
55	**Achyranthus aspera*	Aghada	Amaranthaceae	Common
56	*Alternanthera pungens*	-	Amaranthaceae	Common
57	**Alternanthera sessilis*	Chubukata	Amaranthaceae	Common
58	*Amaranthus blitum*	Tandulja	Amaranthaceae	Common
59	*Amaranthus spinosus*	Kate-math	Amaranthaceae	Common
60	**Argemone mexicana*	Pivla-dhotra	Papavaraceae	Common
61	**Bidens biternata*	Kusal	Asteraceae	Common
62	*Biophytum sensitivum*	-	Oxalidaceae	Common
63	*Blainvillea acmella*	-	Asteraceae	Common
64	**Cassia tora*	Takla	Caesalpiniaceae	Common
65	**Cassia uniflora*	Takla	Caesalpiniaceae	Common
66	**Celosia argentia*	Kurdu	Amaranthaceae	Common
67	*Cleome gynandra*	Pandhri-Tilvan	Cleomaceae	Common
68	*Cleome viscosa*	Pivli-Tilvan	Cleomaceae	Common

69	**Commelina benghalensis*	Kena	Commelinaceae	Common
70	**Commelina forskii*	Kena	Commelinaceae	Common
71	**Crotalaria calycina*	Kesal Tag	Fabaceae	Common
72	*Crotalaria hebecarpa*	Godhadi	Fabaceae	Common
73	*Crotalaria pallida*	Jangli-tag	Fabaceae	Common
74	*Datura metal*	Dhotra	Solanaceae	Common
75	*Desmodium gangeticum*	Salvan	Fabaceae	Common
76	*Desmodium ritchiei*	-	Fabaceae	Common
77	*Desmodium triflorum*	Ran-methi	Fabaceae	Common
78	**Euphorbia geniculata*	Dudhi	Euphorbiaceae	Common
79	*Euphorbia heyneana*	Dudhi	Euphorbiaceae	Common
80	*Indigofera cordifolia*	Godadi	Fabaceae	Common
81	*Indigofera glandulosa*	Borupdi	Fabaceae	Common
82	*Indigofera linifolia*	Lal-godhadi	Fabaceae	Common
83	**Ocimum canum*	Ran-Tulas	Lamiaceae	Common
84	**Ocimum sanctum*	Tulas	Lamiaceae	Cultivated
85	*Pentanema indicum*	Sonkadi	Asteraceae	Common
86	*Persicaria barbata*	-	Polygonaceae	Common
87	**Phyllanthus fraternus*	Bhuiavali	Euphorbiaceae	Common
88	*Physalis minima*	Popati	Solanaceae	Common
89	**Portulaca oleracea*	Ghol	Portulacaceae	Common

90	*Sida acuta*	Bala	Malvaceae	Common
91	*Sida rhombifolia*	Bala	Malvaceae	Common
92	**Solanum indicum*	Kamoni	Solanaceae	Common
93	**Solanum nigrum*	Kangni	Solanaceae	Common
94	**Solanum surretensis*	Bhu-ringni	Solanaceae	Common
95	**Sonchus asper*	Mhatara	Asteraceae	Common
96	*Sonchus oleraceus*	Mhatara	Asteraceae	Common
97	*Sopubia delphinifolia*	Dudhali	Scrophulariaceae	Common
98	*Spermacoce pusilla*	Tarakadal	Rubiaceae	Common
99	*Striga densiflora*	-	Scrophulariaceae	Common
100	**Tridax procumbens*	Dagdi-pala	Asteraceae	Common
101	**Typha angustata*	Pan-kanis	Typhaceae	Common
102	*Vernonia cinerea*	Sahadevi	Asteraceae	Common
103	**Vigna angularis*	Mung	Fabaceae	Common
104	**Xanthium indicum*	Landga	Asteraceae	Common
Climbers				
105	*Abrus precatorius*	Gunj	Fabaceae	Frequently
106	**Asparagus racemosus*	Shatavari	Liliaceae	Frequently
107	**Cardiospermum helicacabum*	Phatakdi	Sapindaceae	Common
108	*Clematis gouriana*	Morvel	Ranunculaceae	Common
109	*Clitoria ternatea*	Gokarna	Fabaceae	Common
110	**Cocculus hirsutus*	Vasan-vel	Menispermaceae	Common
111	*Combretum albidum*	Madvel	Combretaceae	Common
112	*Convolvulus*	Chandvel	Convolvulaceae	Common

	arvensis			
113	*Cryptolepis buchanani*	Kavali-vel	Periplocaceae	Common
114	*Cryptostegia grandiflora*	Kavali-vel	Periplocaceae	Common
115	**Cuscuta hyalina*	Amarvel	Cuscutaceae	Common
116	*Cuscuta reflexa*	Amarvel	Cuscutaceae	Common
117	**Ipomoea cairica*	Garvel	Convolvulaceae	Common
118	**Ipomoea indica*	-	Convolvulaceae	Common
119	*Momordica dioica*	Kartoli	Cucurbitaceae	Common
120	*Pergularia daemia*	Utaran	Aracaceae	Common
121	**Tinospora cordifolia*	Gulvel	Menispermaceae	Common
122	**Vigna sublobata*	Welmoog	Fabaceae	Common
123	*Wattakaka volubilis*	Hirandodi	Asclepiadaceae	Frequently
Grasses				
124	**Andropogon pumilus*	-	Poaceae	Common
125	**Andropogon tricticeus*	Bhslekusal	Poaceae	Common
126	*Andropogon muricatus*	Vala	Poaceae	Common
127	*Aristida funiculata*	Pandhri-Kusal	Poaceae	Common
128	*Aristida redacta*	Kusal	Poaceae	Common
129	*Brachiara distachia*	-	Poaceae	Common
130	*Brachiara miliformis*	-	Poaceae	Common
131	*Brachiara ramosa*	-	Poaceae	Common
132	*Chloris barbata*	Goshya	Poaceae	Common
133	*Chloris virgata*	Gholshep	Poaceae	Common

134	**Chrysopogon fulvus*	Agiva	Poaceae	Common
135	**Cynadon dactylon*	Durva	Poaceae	Common
136	*Dactyloctenium aegyptium*	-	Poaceae	Common
137	*Eleocharis atropurpurea*	-	Poaceae	Common
138	*Eleocharis geniculata*	-	Poaceae	Common
139	*Eleusine indica*	-	Poaceae	Common
140	**Eragrostis ciliaris*	Undir punjo	Poaceae	Common
141	**Eragrostis gangetica*	-	Poaceae	Common
142	**Eragrostis japonica*	Chiksi	Poaceae	Common
143	**Eragrostis tenella*	Waya	Poaceae	Common
144	*Eragrostis tenuifolia*	-	Poaceae	Common
145	*Eragrostis unioloides*	Chimandara	Poaceae	Common
146	*Eragrostis viscosa*	-	Poaceae	Common
147	*Heteropogon contortus*	Kusal	Poaceae	Common
148	**Ischaemum indicum*	Bherda	Poaceae	Common
149	**Ischaemum pilosum*	Kunda	Poaceae	Common
150	*Iseilema laxum*	Tambit	Poaceae	Common
151	*Setaria barbata*	-	Poaceae	Common
152	**Setaria glauca*	-	Poaceae	Common
153	*Setaria verticillata*	-	Poaceae	Common
154	*Themeda quadrivalvis*	-	Poaceae	Common

Note: * ***Observed by team.***

Forest:

According to Champion and Seth (1967), forest type within the study area is classified as Southern tropical dry deciduous forest. As per discussion and records from Range Forest Offices of Karad & Koregaon, and land use map, the study area is having forest patches primarily towards South West and North West directions of project site **(Plate 1)**. There are 7 forests within the 10 km study area and all are designated as Reserved forests (**Table 2).** All the forests show abundance of *Gliricidia sepium, Azadiricta indica, Ziziyphus mauritiana* and *Lannea cormanhdelica* etc. It was observed that all the forests were having planted *Gliricidia sepium,* besides rest of the plant species.

Table 2: Reserved Forests located within the study area

Sr. No.	Name of the forest	Distance from project site	Direction from project site	Total area of forest (ha)	Area of forest within study area (ha)
1	Atvadi	9.5	WSW	370.25	31.0
2	Kival	8.5	WNW	489.43	16.80
3	Kamathi	9.0	SSW	53.0	93.11
4	Vaghire	10.0	SW	389.90	129.27
5	Shamgaon	6.0	W	382.46	17.50
6	Surli	9.5	SSW	312.5	93.72
7	Nagzari	10.0	NW	537.95	115.74

Importance value Index:

This index is used to determine the overall importance of each species in the community structure. In calculating this index, the percentage values of the relative frequency, relative density and relative dominance are summed up together and this value is designated as the Importance Value Index or IVI of the species (Hanes 1980). Considering fairly good diversity, based on visual observations, the survey was restricted to Vaghire and Atvadi forests only for estimating IVI **(Plate 1, Table 2).** Based on IVI, it appears that the forest Atvadi shows dominance of,

Gliricidia glauca (20.60%) and *Azadiricta indica* (18.67%), while *Buchanania lanzan* (0.96%), *Phyllanthus emblica* (2.78%) etc. are less important plants. (**Table 3).** Further, Vaghire forest also shows importance of *Gliricidia glauca* (18.44%) and *Azadiricta indica* (17.91%) while *Ziziyphus mauritiana* (4.54%) and *Terminalia bellerica* (4.98%) are less important plants (**Table 4**).

Table 3: Importance value calculations at Atvadi forest

Sr. no.	Botanical name	Relative dominance	Relative Frequency	Relative density/ha	IVI
1	*Acacia Chundra*	1.87	11.36	7.50	6.91
2	*Acacia catechu*	1.90	7.95	5.00	4.95
3	*Azadiricta indica*	32.14	11.36	12.50	18.67
4	*Bahunia racemosa*	0.79	2.27	4.00	2.35
5	*Buchanania lanzan*	0.75	1.14	1.00	0.96
6	*Dalbergia latifolia*	2.85	5.68	7.50	5.34
7	*Flacourtia latifolia*	1.71	11.36	12.50	8.53
8	*Gliricidia glauca*	30.43	11.36	20.00	20.60
9	*Madhuca indica*	3.08	7.95	2.50	4.51
10	*Lannea cormanhdelica*	9.20	5.68	5.00	6.63
11	*Phyllanthus emblica*	0.15	5.68	2.50	2.78
12	*Terminalia bellerica*	6.16	2.27	5.00	4.48
13	*Tectona grandis*	7.61	4.55	5.00	5.72
14	*Ziziyphus mauritiana*	1.37	11.36	10.00	7.58

Table 4: Importance value calculations at Vaghire forest

Sr. no.	Botanical name	Relative dominance	Relative Frequency	Relative density	IVI
1	*Acacia Chundra*	6.44	9.72	7.30	7.82
2	*Acacia catechu*	9.27	6.94	7.30	7.84
3	*Azadiricta indica*	25.25	13.89	14.60	17.91
4	*Dalbergia latifolia*	4.12	6.94	7.30	6.12
5	*Flacourtia latifolia*	3.72	11.11	7.30	7.38
6	*Gliricidia glauca*	23.19	13.89	18.25	18.44
7	*Madhuca indica*	4.12	6.94	7.30	6.12
8	*Lannea cormanhdelica*	13.73	8.33	12.41	11.49
9	*Terminalia bellerica*	2.89	6.94	5.11	4.98
10	*Tectona grandis*	6.44	8.33	7.30	7.36
11	*Ziziyphus mauritiana*	0.82	6.94	5.84	4.54

b) Fauna:

Methodology

Field observations of fauna around Cane Agro, Sangli were carried out during September 2015. The commonly available fauna i.e. mammals, amphibians, reptiles, butterflies, dragonflies and damselflies were enumerated.

Observations

Vertebrates

The domestic animals in the study area mostly comprised of goat, buffalo, dog and cow. The survey revealed that 6 species of common mammals were recorded around project site, while no wild mammal was observed in this area. Besides avifauna, which has been addressed separately, 2 species of amphibians and 4 species of reptiles were recorded. Availability of fauna in the vicinity of the site is presented in **Table 5**. None of these animals are endangered (Schedule I) as per Wildlife (Protection) Act 1972.

Avifauna

Thirty two species of birds were noticed during the survey (**Table 6)**. It has been observed that the majority of birds were insectivorous in habit preferring insects, worms and arachnids. None of these birds are endangered (Schedule I) as per Wildlife (Protection) Act 1972.

Invertebrates

Butterflies

Study area comprised of 11 species of butterflies, dominated by *Danaus chrysippus, Eurema hecabe, Melanitis leda* and *Ionolyce helicon*. Butterfly diversity and community composition are dependent on plants, as their caterpillars are highly specific to host plants, on which they feed and metamorphose into the adults. Therefore, richness of host plant diversity contributes to butterfly diversity. None of these is endangered (Schedule I) as per Wildlife (Protection) Act.

Dragonflies and Damselflies

Seven species of dragonflies and one species of damselfly were recorded **(Plate 2)**. Species like *Orthetrum sabina* and *Tramea basilaris*

were commonly seen in sites 4 and 5 while damselfly *Ischnura aurora* was common in the periphery of the project site.

Table 5: Fauna recorded in the study area up to 10km periphery

Sr. No.	Common Name	Scientific Name	Conservation status as per Wildlife (Protection) Act 1972
Domestic and wild mammals			
1	*Common dog	*Canis lupus familiaris*	Not enlisted
2	*Cow	*Bos primigenius*	Not enlisted
3	*Domestic buffalo	*Bubalus bubalis*	Not enlisted
4	*Goat	*Capra hircus aegagrus*	Not enlisted
5	*Squirrel	*Funambulus palmarum*	Sch- IV
6	*Indian grey mongoose	*Herpestes edwardsii*	Sch - II
7	Spotted deer	*Axis axis*	Sch-III
8	Panther	*Panthera pardus*	Sch- I
9	Hyena	*Hyaena hyaena*	Sch-III
10	Barking deer	*Muntiacus muntjak*	Sch-III
11	Indian hare	*Lepus nigricollis*	Sch-IV
12	Indian Crested Porcupine	*Hystrix indica*	Sch-IV
13	Large brown flying squirrel	*Petaurista philippensis*	Sch-II
Amphibians			
1	*Common Indian toad	*Bufo melanostictus*	Not enlisted
2	*Indian bullfrog	*Rana tigrina*	Not enlisted
Reptiles			
1	*Common garden lizard	*Calotes versicolor*	Not enlisted
2	*Common Indian toad	*Bufo melanostictus*	Not enlisted
3	*Common tree frog	*Polypedates leucomystax*	Not enlisted
4	*Indian bullfrog	*Rana tigrina*	Not enlisted
5	Cobra	*Naja naja*	Sch-II
6	Common krait	*Bangarus caeruleus*	Not enlisted
7	Russell's viper	*Vipera russelli*	Sch-II
8	Rat snake	*Ptys mucosus*	Sch-II

Butterfly			
1	*Blue mormon	*Papilio polymnestor*	Not enlisted
2	*Common evening brown	*Melanitis leda*	Not enlisted
3	*Common grass yellow	*Eurema hecabe*	Not enlisted
4	*Common Indian crow	*Euploea core*	Sch – IV
5	*Common leopard	*Phalanta phalantha*	Not enlisted
6	*Common mormon	*Papilio polytes*	Not enlisted
7	*Lime butterfly	*Papilio demoleus*	Not enlisted
8	*Plain tiger	*Danaus chrysippus*	Not enlisted
9	*Pointed line blue	*Ionolyce helicon*	Not enlisted
10	*Small grass yellow	*Eurema brigitta*	Not enlisted
11	*Small leopard	*Phalanta alcippe*	Not enlisted
Dragonflies and Damselflies			
1	*Crimson marsh glider	*Trithemis aurora*	Not enlisted
2	*Green marsh hawk	*Orthetrum sabina*	
3	*Red marsh trotter	*Tramea basilaris*	Not enlisted
4	*Ditch jewel	*Brachythemis contaminata*	Not enlisted
5	*Ground skimmer	*Diplocodes trivialis*	Not enlisted
6	*Common clubtail	*Ictinogomphus rapax*	Not enlisted
7	*Yellow bush dart	*Copera marginipes*	Not enlisted
8	*Senegal golden dartlet	*Ischnura senegalensis*	Not enlisted

Source: Working plan of the Forest Division and discussions with Forest department officials and local people

*** Observed by field team**

Table 6: Availability of avifauna within the study area during September 2015

Sr. No.	Common name	Scientific name	Observation around different sites					Conservation status as per Wildlife (Protection) Act 1972	Status in IUCN Category
			1	2	3	4	5		
1	Baya weaver bird	*Ploceus philippinus*	-	-	-	+	++	Sch – IV	Least concern
2	Black ibis	*Pseudibis papillosa*	-	-	+	+	-	Not enlisted	Not enlisted
4	Blue rock	*Columba*	-	+	+	+	+	Sch – IV	Least

	pigeon	*livia*				+			concern
5	Cattle egret	*Bubulcus ibis*	-	+	+ +	-	+	Sch – IV	Least concern
6	*Common babbler	*Turdoides caudatus*	+	+	-	+	-	Sch – IV	Least concern
7	*Common swallow	*Hirunds rustica*	+	+ +	-	+ +	-	Sch – IV	Least concern
8	Crested serpent eagle	*Spilornis cheela*	-	-	+ +	-	-	Not enlisted	Least concern
9	Crow pheasant	*Centropus sinensis*	-	+	-	-	+	Sch – IV	Least concern
11	*House crow	*Corvus splendens*	+ +	+ +	-	+ +	+ +	Sch – V	Least concern
12	*House sparrow	*Passer domesticus*	+ +	-	-	+ +	-	Sch – IV	Least concern
13	House swift	*Apus affinus*	-	+ +	-	+ +	-	Sch – IV	Least concern
14	*Indian black drongo	*Dicrurus adsimilis*	+	-	-	-	-	Sch – IV	Least concern
15	Indian cuckoo	*Cuculus micropterus*	-	+		+	+	Sch – IV	Least concern
16	*Indian myna	*Acridotheres tristis*	+ +	-	-	-	-	Sch – IV	Least concern
17	Indian robin	*Saxicoloides fulicata*	-	+	+	-	+	Sch – IV	Least concern
18	Indian roller	*Coracias benghalensis*	-	+	-	-	+	Sch – IV	Least concern
19	Koel	*Eudynamys scolopacea*	-	-	+	-	+	Sch – IV	Least concern
20	Long-tailed shrike	*Lanius schach*	-	+	-	-	-	Sch – IV	Least concern
21	Magpie robin	*Copsychus saularis*	-	-	-	-	+	Sch – IV	Least concern
22	Pond heron	*Ardeola grayii*	-	-	+	-	+	Sch – IV	Least concern
23	*Purple sunbird	*Nactarinia asiatica*	+	-	-	-	-	Sch – IV	Least concern
24	Red wattled lapwing	*Vanellus indicus*	-	+ +	-	+ +	+	Sch – IV	Least concern
25		*Pycronotus*	+	-	-	+	+	Sch – IV	Least

	*Redvented bulbul	*cafer*	+			+			concern
26	Redwhiskered bulbul	*Pycnonotus jocosus*	-	+	-	+	-	Sch – IV	Least concern
27	Roseringed parakeet	*Psittacula krameri*	-	+	-	-	+	Sch – IV	Least concern
28	Red munia	*Amandava amandava*	-	+ +	-	-	+ +	Sch – IV	Least concern
29	Small blue kingfisher	*Alcedo atthis*	-	+	-	+	-	Sch – IV	Least concern
30	*Small green bee eater	*Merops orientalis*	+ +	+	-	+ +	+	Sch – IV	Not enlisted
31	White breasted kingfisher	*Halcyon smyrnensis*	-	+	-	-	+	Sch – IV	Least concern
32	Woolly-necked stork	*Ciconia episcopus*	-	-	+	-	+	Sch – IV	Least concern

Note: +++: Found in flocks, ++: frequently found, +: rarely found, -: Absent, *-: Also recorded in project site

Plate 2: Flocks of aquatic birds like black ibis, redwattled lapwing, bar-headed geese and wooly necked stork observed in the study area

Hingangaon BK dam

Nani river

Kharshinge lake

Karandewadi lake

Bombalewadi lake

Kurle lake

Plate 3: General views of certain surface water bodies within 10 km periphery of the project site in September 2013

Methodology

Sampling

To enumerate phytoplankton, unfiltered surface waters were colleced from the water bodies (**Plate 4**). Phytoplankton samples were immediately fixed in Lugols iodine solution so as to prevent adverse effects of light and temperature which might cause rapid decay of organisms. Further, microscopic analysis was undertaken in laboratory (**APHA 2005)**. For zooplankton, desired volume of water was filtered through plankton net having mesh size of 75µ to represent all the available groups. The samples were fixed immediately with 5 % buffered formalin and subsequently analysed under microscope in the laboratory with the help of Sedgwick rafter cell. The bottom mud was collected by Van veen grab sampler, having the area 0.02 m^2. The sediment was sieved through 500 µ mesh sieve and the macrobenthos retained in the sieve were preserved immediately with 5% buffered formalin.

Indices

Shannon Wiener Diversity Index and Palmer Index were used for enumeration of plankton. The Shannon Wiener index values in the range of 3 and above are generally considered to represent healthy conditions of water. The values between 1 and 3, and below 1 are believed to indicate semi and poor productive waters respectively. According to Palmer (1969), a total score of 20 or more in a sample is an indicator of organic pollution.Certain genera like *Chlamydomonas, Ankistrodesmus, Chlorella, Nitzschia, Navicula, Phacus, Scendesmus, Oscillatoria* etc. are indicators of high organic pollution. However, *Closterium, Melosira, Cyclotella* are indicators of low organic pollution.

Phytoplankton

Count : Phytoplankton counts, recorded at different sampling stations, are presented in **Table 6**. Total algal population during two seasons varied between 4852 and 12264 algal cells ml^{-1} .Total 19 genera of phytoplankton were recorded. The scores of PPI varied in the range of 18-25, indicating high organic pollution. The SWI values varied between 0.80 and 1.42 which suggest poor productive water. The phytoplankton population comprises of 3 major groups, namely Chlorophyceae, Bacillariophyceae and Cyanophyceae. Cyanophyceae followed by Chlorophyceae, dominated all the samples. The most common genera, which are commonly available in partially polluted waters included

Oscillatoria, *Chlamydomonas*, *Scendesmus*, *Ankistrodesmus*, *Chlorococcum*, *Chlorella*, *Navicula* and *Synedra*.

Zooplankton

Count : Zooplankton counts, recorded at different sampling stations, are presented in **Table 6**. Density of zooplankton varied between 8653 and 20730 N/m^3. Total 6 genera of zooplankton were recorded. Copepoda followed by Cladocera dominated all the samples. *Cyclops* & *Diaptomus*, from Copepoda and *Brachionus* & *Keratella* from Rotifera were dominant. The SWI values varied between 0.45 and 1.41 which also suggest medium productive water.

Benthos

Bottom sediments were collected from Karandewadi and Kurle lake during September 2015 (**Plate 5**).No organism was found as benthic fauna in Hingangaon BK dam, Nani river, Kharshinge lake and Bombalewadi lake. Total five species from three different families were observed. The highest count (850 No/m^2) was observed in Kurle lake where only Chironomus larva was observed as benthic fauna (**Table 8 & Plate 6**). The SWI values were observed to vary from 0.75-0.91. Chironomidae dominated all the samples. Chironomidae are often associated with degraded or ecosystems with low biodiversity because they are adapted to virtually anoxic conditions and are dominant in polluted waters.

Plate 4: Collection of plankton samples from different water bodies

Plate 5: Collection of Benthos from Karandewadi lake

Plate 6: Only Chironomus larva was observed as benthic fauna in Kurle lake

Table 8: Enumeration of plankton and benthos in different ponds

Phytoplankton							
Sample No.	Name of sampling locations	Phyto-plankton (No/ml)	Percent composition of algal groups			SWI	PPI
			Cyano-phyceae	Chloro-phyceae	Bacillario-phyceae		
1	Hingangaon BK dam	5327	75	10	15	1.24	21
2	Nani river	9567	65	23	12	1.42	20
3	Kharshinge lake	8453	72	13	15	0.80	19
4	Karandewadi lake	4852	58	30	12	1.65	18
5	Bombalewadi lake	9065	75	10	15	0.89	21
6	Kurle lake	12264	85	10	5	1.12	25

Zooplankton						
Sample No.	Name of sampling locations	Zooplankton (No/m³)	Percent composition of zooplankton in groups			SWI
			Rotifera	Cladocera	Copepoda	
1	Hingangaon BK dam	11235	15	10	75	0.45
2	Nani river	17520	10	25	65	1.15
3	Kharshinge lake	8653	30	16	54	0.89
4	Karandewadi lake	14256	10	16	74	1.15
5	Bombalewadi lake	17852	10	8	82	1.41
6	Kurle lake	20730	9	21	70	0.87

Benthos						
Sr. No.	Name of sampling locations	Macro-benthos (No/m²)	Percent composition of Macrobenthos			SWI
			Bithyniidae	Chironomidae	Terebridae	
1	Karandewadi lake	250	40	50	10	0.75
2	Kurle lake	850	-	100	-	0.91

Ranges of Palmer's Pollution index (PPI)

<15: Indicate absence of organic pollution

15 - 20: Indicate presence of organic pollution

>20: Indicate presence of high organic pollution

Ranges of Shannon Wiener Diversity Index (SWI)

<1: Indicate poor productive water

1-3 Indicate medium productive water

>3 Indicate good productive water

3.8.5 Conclusion

The major conclusions are as follows.

1. The survey illustrates that there are no rare plant species in the site.
2. The vegetation is significantly disturbed.
3. Major factors responsible for disturbance are anthropogenic activities.
4. Birds represent dominant group among the faunal composition.
5. Among birds majority of species are carnivorous, omnivorous or insect eater.
6. The green belt around the existing factory is in good condition; however it needs to be improved.

3.9 SOCIO-ECONOMIC ENVIRONMENT

Introduction

The study of socio-economic component incorporating various facets related to socio-economic conditions in the area is an integral part of EIA. Demographic structure, population dynamics, basic amenities, infrastructure resourcesand economic attributes are being incorporated in socio-economic environment study.

Background of the Project:

The site is located in Village: Raigaon, Post: Hingangaon, Tal: Kadegaon, Dist: Sangli

Sangli District: Basic Information

Sangli district is located in south-west Maharashtra and has geographical area of 8572 sq. km. and is administratively divided into 3 sub divisions and 10 talukas. As per 2011 census Sangli had a population of 2.82 million persons and it constitutes. The district has a rural population of 2.10 million and urban population of 7.19 lakhs. The district has a population density of 329 persons per sq. km. Its population growth rate over the decade 2001-2011 was 9.24%. Sangli district has a sex ratio of 966 females for every 1000 males, and literacy rate of 81.48%. There are around 725 villages and 7 towns in the district.

Table 1: Demographic Attributes for Sangli District

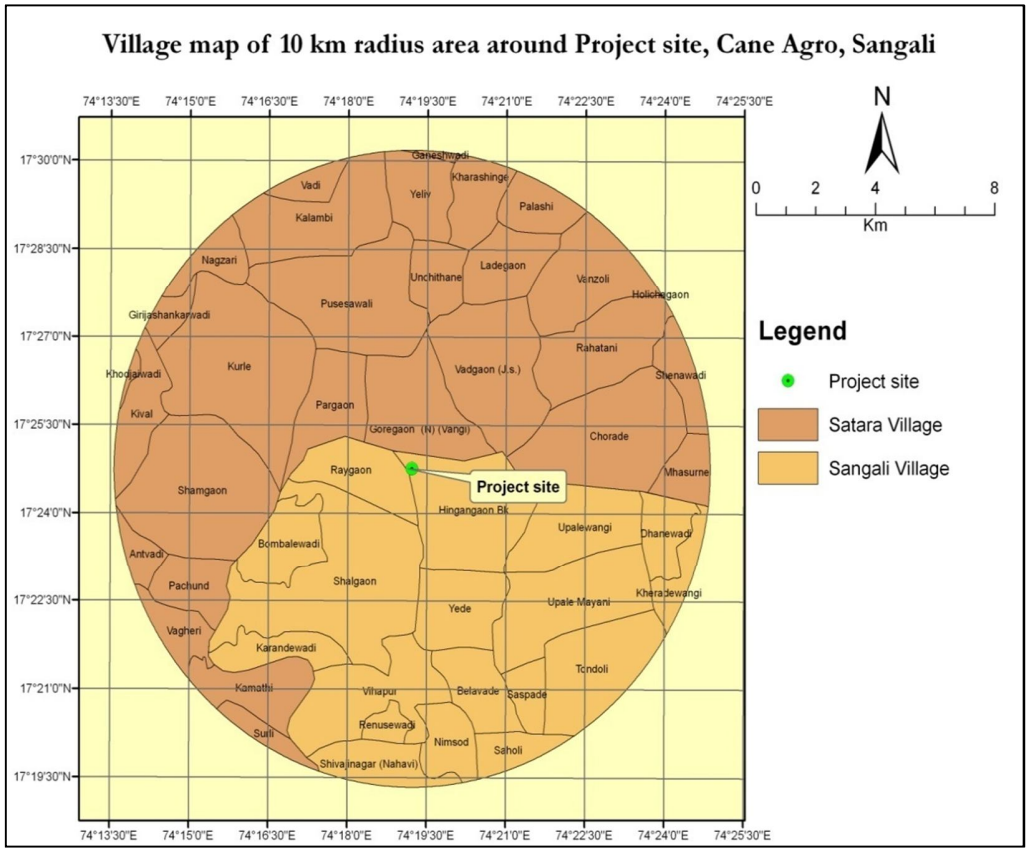
1.	Area	8572 sq. km.
2.	Population	2.82 million
3.	Decadal Growth rate	9.24%
4.	Male population	1.43 million
5.	Female population	1.38 million
6.	Density of population (persons per sq. km.)	329 persons
7.	Sex Ratio (females per 1000 males)	966
8.	Literacy	81.48%
9.	Male literacy	88.22%
10.	Female literacy	74.59%
11.	Urban Population	25.49%

Source: State Primary Census Abstracts, 2011

Study area

The study area for socio economic assessment was defined as an area within 10 km radius around the proposed project site as per the statutory requirement of the Ministry of Environment & Forest. Designation of impact zone is based on the EIA guidance manual.

As mentioned earlier, the project site is located in the Sangli District and the 10 km study area falls within the Kadegaon taluka of the Sanglidistrict and Karad and Khatav talukas of the Satara district. There are 43 villages in the study area and there are no towns or cities in the study area. The location is essential rural with moderate in habitation. The nearest town Sangli is 76 km from the project site towards south. Figure 1 shows the study area covering 10 km around the proposed project site.



Demographic Profile

Summary of demographic structure with reference to population, household, literacy, community structure and employment are presented in this section.

As per 2011 Census, the total population of the 10 km radius study area is 86,682persons living in 19,431 households. This indicates an average of 4-5 persons per household in the study area. The dependent population below 6 years is 8,993 (10.37% of the total population) in the study area. The total population of the study area is 86,682persons with 42,942 males and 43,740 females and the gender ratio is 1019females per 1,000 males. The gender ratio of the study area is better than the ratio of the state and many parts of India. The one reason for this gender balance may be because of high male migration to the urban centres. The total population in the study area is rural in nature as Sangli district also is predominantly rural in nature with three fourth of the district population rural in nature and remaining one fourth as urban.

SC & ST Population

As per 2011 census, the ratio of scheduled caste population in the study area to the total population is 10.29% which is lower than the proportion of scheduled caste in Sangli district i.e. 12.51%.

The ratio scheduled tribe population to the total population is 0.61%, which is equal to the proportion of scheduled tribe population in Sangli district i.e. 0.65%. The proportion of scheduled caste population is high in the study area as compared to the proportion of scheduled tribe population. The overall percentage is scheduled caste and scheduled tribe population of the study area is low. Together they constitute about 10.61%oftotalpopulationofthestudyarea.

Literacy Rate

The overall literacy rate of the study area is 80.17% which is below the literacy levels of Sangli district (81.48%). The male literacy rate in the study area is 87.91%, which is lower than the male literacy rate of Sangli district i.e. 88.22%. The female literacy rate of the study area is 72.66% which is lower than the female literacy rate of the district i.e. 74.59%.

Occupational Structure

In occupational structure, the total population is divided into total workers and non workers. Total workers can be classified into two types, viz. main workers and marginal workers. The work participation rate for total workers is defined as percentage of total workers to total population. The occupational structure signifies the total no. of workers and non-workers and types of workers in the area. The occupational scenario reflects the economic condition of the study area.

Out of the total population of 86,682 persons, the total number of workers is 42,149.The worker participation rate of the total study area is high i.e.48.62%. The work participation rate for male workers is 59.33% and the female workers 38.12%.

Table 2: Work Force Distribution

NAME	Total Population	Total Workers	Main Workers	Marginal Workers	WPR (%)
Study Area	86,682	42,149	38,877	3272	48.62
Sangli	2,822,143	1,215,104	1,074,948	140,156	43.06
Maharashtra	1,123,743,33	49,427,878	4,3762,890	20,224,577	43.99

Of the total workers, main workers are 38,877 which are92.24% of the total working population, subsequently; marginal workers are mere 3272 which are only 7.76% to the total working population in the study area.

Table 3: Work Force Participation

NAME	Total Workers	Cultivators (%)	Agricultural Labourers (%)	Household Workers (%)	Others (%)
Study Area	42,149	60.42	22.25	1.63	15.70
Sangli	1,215,104	39.55	23.92	3.36	33.17
Maharashtra	49,427,878	25.43	27.28	2.48	44.81

The relative importance of the main spheres of economic activity is the gauged from the pattern of distribution of total workers according to broad fourfold classification namely, cultivators, agricultural labour, household industry workers and other workers. In the study area,

cultivators (60.42%) and agricultural labour (22.25%) together constitute 82.67% of the total workers. It reflects that agricultural sector has absorbed most of the workers thus farming is the main source of livelihood for the majority of population in the study area. Besides, agriculture sector, the proportion of workers in other economic categories is second highest at 15.7% as they are engaged in servicing and repairs, trade and commerce etc.

Infrastructure facilities

The Project Influence Area or the study area consists of 43 villages within the 10 km radius area. The area with 100% of rural population and far from urban area is not that back ward inter ms of basic amenities such as education facilities, health care facilities and infrastructure facilities like drinking water supply, transportation, approach roads, banks, post offices, and power supply. Most of these facilities are available or about0-5 km away from the study area.

Educational Facilities: Educational facility at the minimum level of primary education is available in all the villages of the study area. There are 55 primary schools, 19secondary schools and 3 junior colleges in the study area. There are eight villages with 2 or more primary schools. Colleges are available at a distance of 5-10 km or more than 10 km in some cases.

Medical facility: Medical facilities of one or the other type are available in 23 villages in the study area. The primary health centres, sub-centres and dispensaries serve not only the resident population of the concerned village but also those residing in the surrounding villages. The population in the case of emergency and critical cases visit the nearest urban centre for treatment.

Post and Telegraph: In the study area the facility of post and telegraph is available in 38 villages. Other villages have post office in the range of 0-5 km and 5-10 km away from their village. Mobile phone connections are also available in most of the villages.

Drinking water: Drinking water is not a problem here. Tap water and well water is the main source of drinking water in the study area followed by Hand pump and tube well as the main source. Tap water is available in 41 villages and well water in 37 villages.

Road and Rail connectivity: State Highways pass through the study area in all directions of the site. The Pune- Miraj railway also passes on the western side of the study area. In the study area, all the 43 villages are accessible by pucca road. Bus service is available in 41 villages of the study area.

Others: The proportion of electrified villages for the study area is impressive. Electricity for all purposes is available in all the 43 villages of the study area. In the study area,8 villages have credit societies or any other form of banking.

Impacts on Socio-Economic

Any development project has the potential to have impacts on socio-economic environment of the area which may be adverse or beneficial. The impacts are:

- The project will offer some employment potential during construction phase and during operation phase which will have beneficial impact to the local people.
- There will be secondary employment opportunities for providing different kinds of services involving the operation of the plant.
- There will be migration of labour during the construction phase which will put stress on existing infrastructure and sanitation.
- Significant impact of dust emissions during the project operation will occur.

Mitigation

- Employing local people for construction work to the maximum extent possible.
- Providing proper facilities for domestic supply, sanitation, domestic fuel, education, transportation etc. for the construction workers.
- Barricades, fences and necessary personnel protective equipment such as safety helmet, hoes, goggles, harness etc. will be provided to the workers and employees.
- Control dust pollution from the construction

* * * * *

CHAPTER 4
ANTICIPATED ENVIRONMENTAL IMPACT and MITIGATION MEASURES

Contents of this Chapter shall be:

Part A: Details of measures for minimizing and/or offsetting adverse impacts) like all prevention-abatement-treatment-disposal-reuse-control and the mitigation strategy. Facets covered are Air, Water, Solid waste, and Aesthetics. .

Part B: These measures will minimize the possible Impacts. It is proposed to cover the investigated environmental impacts due to project location, possible accidents, project design, project construction and regular operation of a completed project subsequently. Standard Techniques are used.

PART "A" MITIGATION

4.1 Introduction:

Careless working may result in making significant adverse effect on environment.

Any activity making a significant effect is not permissible. This "***significant effect***" is required to be neutralized to a level of "***insignificance***". This can be brought about by various tools like: in plant measures, segregation, environment friendly process and collectively termed as pollution control say by providing Effluent Treatment Plant (***ETP***) and Emission Control Equipments (***ECE***) etc. and neutralize the situation further to a "low or no consequences". Thus logic Figure No.4.1:

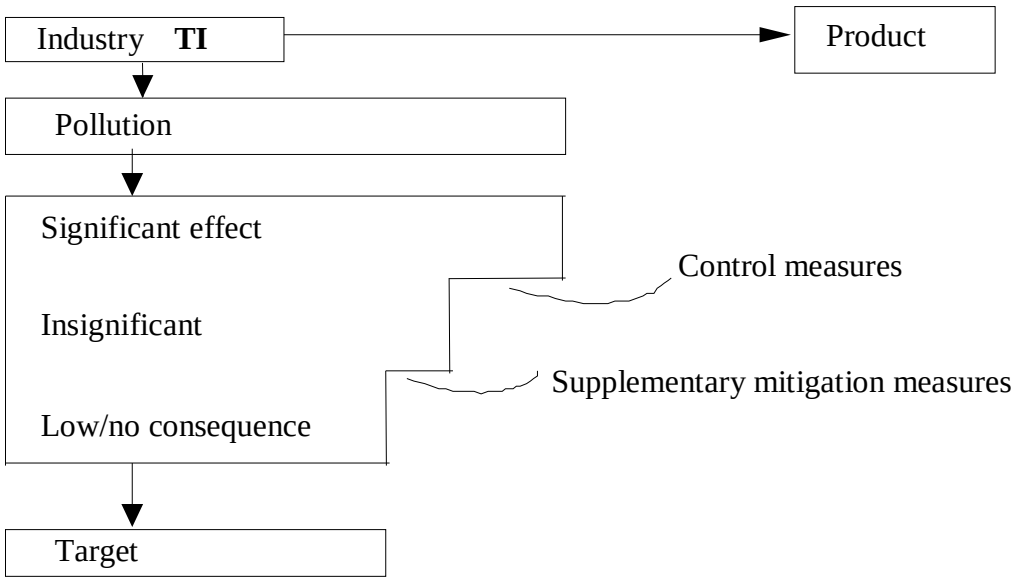


Figure No. 4.1: Mitigation Logic

4.2 Control Measures (Natural Environment):

4.2.1 Air Environment:

Air quality criteria given by Central Pollution Control Boards are:

Pollutant	**Particulate Matter (size ≤ 10 μm)or PM 10μgm³**		**Particulate Matter (size ≤ 2.5μm) or PM25μgm³**		**Sulphur Dioxide (SO_2)**		**Oxides of Nitrogen (NO_X)**	
Time Weighted Average	Annual Average	24 hours Average	Annual Average	24 hours Average	Annual Average	24 hours Average	Annual Average	24 hours Average
Industrial Area	60	100	40	60	50	80	40	80
Residential, Rural and other area	60	100	40	60	50	80	40	80
Sensitive area	60	100	40	60	20	80	30	80

Table No. 4.1: National Ambient Air Quality Standards, 2009, in ug/m³

(This is now changed with more emphasis on RSPM rather than on SPM)

4.2.2 Emission Control:

Emission Control Equipments (ECE):

The air pollution caused by this industry is mainly from dust as SPM from fuel. The dust is not predominantly due to the composition and handling of raw materials because those are largely controlled.

The efforts taken by the Industry in this respect, are also indicated. Further, regarding the product looking to the description of manufacturing operations and the corresponding flow sheet, **TI** knows from which unit operation or process, air pollutants are expected. For the purpose of arresting and capturing the pollutants, measures are proposed and designed.

. #	Source	Pollutant	In-plant Measures	Control Equipment
1	Proposed Boiler	SPM, CO	Feed Bagasse/ more dry, also will be used methane. Improved quality of water	Dampers, ID Fan, CO_2 meter, Fly-ash arrestor ESP (*), Light ash through very tall stack.
2	Other effluents	H_2O, CO_2	Closed transfer	Fully Aerobic regime.

Table No.4.2: Emission Control Equipments

(*) = The Dust Collector of suitable capacity, with hopper bottom. The dust-free air is sucked and thrown into stack through duct by I.D. Fan. The length of duct is kept very small. Instead of cyclone, ESP will be provided.

As co-gen is of small size and Boiler uses three types of fuels, for / baggasse long distance haulage is not required.

ToR 13: The care of emission is taken through by employing ESP. (As also in para 2.3.3)

SALIENT FEATURES OF THE PROPOSED ESP

The proposed ESP is a Two Field ESP with outlet emissions of 100 mg/Nm3.

Hoppers shall be pyramidal with valley angle shall be 60 deg & discharge opening of 400X400 size to avoid dust build up and aid in easy dislodging of dust from the hopper.

Hopper level switches (both high, high-high) are provided to detect the high dust level in the hoppers.

Hopper heaters are provided to avoid dust accumulation in the hoppers and consequently resulting in fire in the hopper.

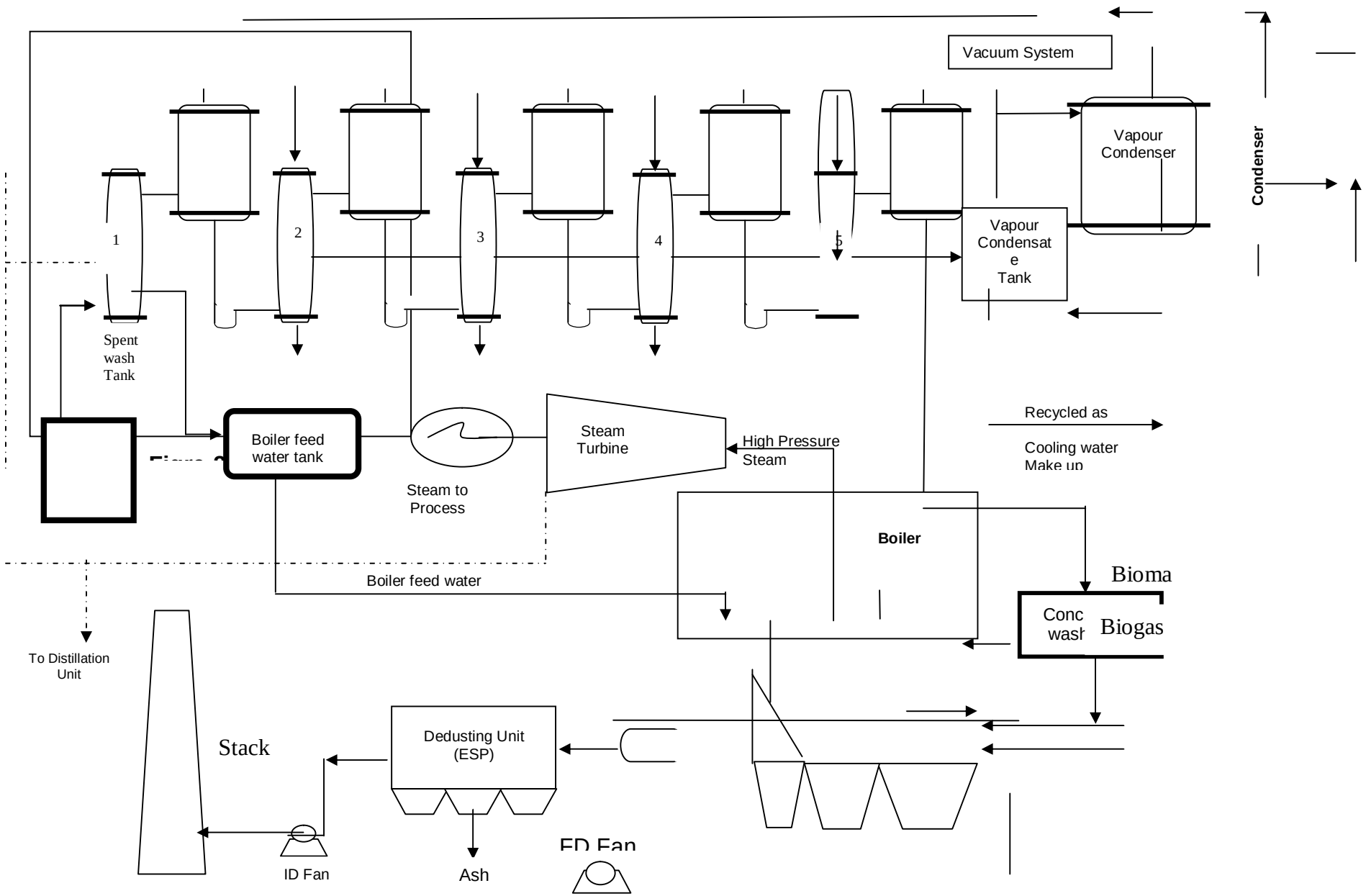
Boiler (ToR 18) The boiler is based on combination of Bio-mass, Agro – residue. TPH Boiler is selected with good features. The construction of the boiler is such that the fouling potential is minimized through suitable design, and is easily maintainable. The convective section of the main boiler is of vertical tubes. The total assembly is of gas tight construction. Air Pre-heater is provided to preheat combustion air. The furnace with economizer and super heater ensures complete combustion.

The operating parameters of Boiler are

Table-4.3 Operating Parameters of Boiler (with APC Measures)

#	Parameter	Data
1	Boiler capacity	160 T/h at 110-125 kg/cm^2 Pr. and 540 ^{0}C Temp.
3	Chimney, ht	75 m
4	APC device in boiler	ESP

High pressure steam 110-125 kg/cm^2 from the boiler is fed to back pressure turbine to generate electric power for captive use in the industry (36 MW). The exhaust steam from the boiler will be utilized in distillation and evaporation plants respectively as 57 and 43 %.


Vacuum System
Vapour Condenser
Condenser
1
2
3
4
5
Vapour Condensate Tank
Spent wash Tank
Boiler feed water tank
Steam to Process
Steam Turbine
High Pressure Steam
Recycled as
Cooling water Make up
Boiler
Boiler feed water
Bioma
Conc wash
Biogas
To Distillation Unit
Stack
Dedusting Unit (ESP)
ID Fan
Ash
FD Fan

Estimation of Chimney Height for Boiler

Chimney is fired with a mixed fuel consisting of bagasse.

Diesel Generator

Diesel generators are used only during the emergency of power failure from the regular source to run essential services for a limited period. A maximum of utilization of gen set is about 30 hours per month. The performance of diesel generator will meet CPCB/MOEF specification with regards to noise and emission.

DG set will have a fuel consumption of 100 kg/hr. and stack height will be 8 mtrr. above roof. DG set of 250 KVA will have a fuel consumption of 50 kg/hr. and stack height will be 6 mtr. above roof. For both muffler and acoustic enclosures will be provided.

In addition, other attendant efforts like water spraying, tree plantations and covered storage; etc shall be adopted, wherever feasible and needed.

Fugitive: A number of mitigation measures are taken to control fugitive emissions, the presence of which will be noticeable by plain vision if not controlled. The measures are thus taken seriously and continuously such as:

- Rubber wheel carts / tractors/ trucks to bring in cane, not filled high, sides cladded, slow speed travel, avoiding vibrations en-route.
- Engineering the plant layout in such a way so as to virtually eliminate need of using heavy equipment for material handling in the main plant
- Internal roads paved, levelled, no undulations, no sharp curves, slow speed
- No open storage of baggasse, molasses involved. Provided closed godowns, warehouses, transmission lines and steel tank for finished.
- Tree plantation on surrounding available area.
- Bagasse where excess is baled and used off-season.

The Industry proposes to continue the efforts of air pollution control and remain inside the limits. Mathematical modeling is done. Prediction is reported and is satisfactory even with incremental values enclosed in annexture no .

4.2.2a Ground Level Concentration (GLC) Of Air Pollutants By Mathematical Modeling

The quality of ambient air after the proposed capacity enhancement is estimated by mathematical modeling. The dispersion and ground level concentration of suspended solids, sulphur dioxide and nitrogen oxides

in ambient air due to the emissions from boiler stack is estimated. The estimation of impact due to project activities on air environment was based on

- Pre project ambient air quality
- Source, quantity and quality of emissions
- Air quality modeling

The concentration of suspended solids, sulphur dioxide and nitrogen oxides in ambient air in the region will be enhanced due to the presence of the proposed industry. The maximum ground level concentration of pollutants under worst operation and environmental scenario in down wind direction is estimated by Gaussian point dispersion equation.

- The maximum concentration of these parameters in ambient air under slightly unstable conditions is estimated by Guassian model relations as per CPCB guide lines and the results are furnished below.
- Mathematical modeling has been done for predicting short term ground level incremental concentrations of pollutants based on post monsoon site data to predict the maximum incremental contributions over the existing pollutant levels due to the proposed expansions in the plant.
- Maximum values of incremental ground concentrations of pollutants are estimated. The quality of air is calculated for the locations of highest concentrations, which shall be present in downwind direction from the chimney. The calculations are done for 200 m to 5000 m from the source. Model Options used for Computations

The options used for short-term computations are:

- The plume rise is estimated by Briggs formulae, but the final rise is always limited to that of the mixing layer.
- Stack tip down wash is not considered.
- Buoyancy Induced Dispersion is used to describe the increase in plume dispersion during the ascension phase.
- Calm /near neutral condition is assumed.
- Wind profile exponents are used by 'Irwin'.
- Flat terrain is used for computations.
- It is assumed that the pollutants do not undergo any physico-chemical transformation and that there is no pollutant removal by dry deposition.
- Washout by rain is not considered.
- Cartesian co-ordinate system has been used for computations.
- The model computations have been done for up to 5 km.

INPUT DATA

Gaseous Emissions From Boiler

The gaseous emission generated from boiler is given.

Meteorological Data

The meteorological data available from secondary source and monitored at plant site during pre-monsoon. The data has been used for the modeling. The meteorological data used for modeling is given below:

Data recorded at the weather station on wind speed, direction and temperature (has been used for computations. This data has been used for establishing the hourly stability class. The Sigma theta method (USEPA) based on frequency distribution of wind direction in conjunction with wind speed has adopted for the establishing the hourly stability class. The mixing height data at the nearest IMD Bangalore station is given in Table-4.5. As the site specific mixing height is not available, EPA approved general mixing heights as applicable for Industrial Source Complex model has been considered for modeling to establish the worst-case scenario. The data on ambient air quality is given in Table-4.4. The mixing heights considered for modeling is given below in Table

Table No. 4.4 - Data on Ambient Air quality

Parameter	Value
Ambient air temperature, Ta	303 K
Atmospheric pressure, P	940 mb
Dry ambient lapse, T	-1.6 K/100m
Wind direction,	From WWN & E
Wind velocity at 10 m/height, ua	1 m/sec
Pasquill stability category of the Atmosphere,	C (slightly unstable)
Exponential factor for wind velocity Profile for rural conditions, p	0.15 for atmospheric stability of C category

Table No. 4.5 -Mixing Heights Considered For Computations

Stability Class	Mixing Height (m)
A	1300
B and C	900
D	750
E and F	400

From IMD data it is noted that the weather in the region is slightly unstable and for wind velocity 1 cm/s the Pasquill atmospheric stability criteria is class C.

ESTIMATION OF DOWNWIND GROUND LEVEL SPM CONCENTRATION

Ground level concentrations directly downwind at a distance of x meter from source is given by the Gaussian Plume source dispersion equation as

$$Cx\ \text{distance} = \left(\frac{Q}{\pi u \delta y \delta z} \right) \exp \left(\frac{-H2}{2\delta z2} \right)$$

Where,

Cx = Concentration at ground level at a distance x meter from the bottom of chimney the downwind direction, μg/s

x = Down wind distance along plume mean centre from source (200m to10000m)

Q = Emission rate, μg/s

H = (h + Δh), effective height, m

Δh = Plumb rise, m

h = Height of the chimney, m

σy = standard deviations plume concentration (dispersion co-efficient) in horizontal direction, m.

σz = standard deviations plume concentration (dispersion co- efficient) in Vertical direction, m

The value of dispersion co-efficient depends on distance x, wind speed and stability conditions of atmosphere. The isolation is selected as moderate based on Cloud cover and solar angle data. The stability classification is identified as C class based on meteorological data of atmosphere and wind speed obtained from nearest meteorological station at Belgaum. The identified Dispersion coefficients for the same are given below. Dispersion co-efficient σy and σz for stability class 'C'

Dispersion co-eff.	**Distance from source, m**						
	400	700 m	1000 m	2000 m	4000 m	7000 m	10000 m
δy	44 m	74 m	105 m	200 m	370 m	610 m	840 m
δz	26 m	43 m	61 m	115 m	220 m	360 m	510 m

(Source: D.B. Turner, 1969)

The analytical procedure for estimation for of GLC is presented bellow.

Q = Pollution load, μg/s

= (g/s of SPM) (10)6, μg/s

F = Buoyancy flux parameter, m4/s

= gd2vs (Ts-Ta)/4Ts, m4/s

u = Wind speed at emission discharge, m/s

u is calculated by Irvins wind scaling law.

u = ua x (H/10)p , m/s

Where,

p = 0.15 for 'C' class stability and rural conditions

Δh = Plume rise, m

Plume rise is estimated from Briggs formulae and the relation is indicated bellow.

$\Delta h = Exb/ua$, m

Where, E=1.6 F1/3, a=1 and b=2/3 for the conditions F > 55 and x < 119F0.4

E=38.7 F0.6, a=1 and b=0 for the conditions F > 55 and x >119F0.4

H = (h +Δ h),

Predicted GLCs at different distances from the source are given in Table–4.4.

Incremental due to Boiler	Distance from source, m					
	400 m	1000 m	2000 m	4000 m	7000 m	10000 m
Incremental Max. SPM, µg/m3	0.02	2.23	1.75	0.66	0.26	0.14
Incremental Max. SO2, µg/m3	0.13	15.88	12.45	4.72	1.88	0.98

Table No. 4.6 - Predicted GLC of SPM, & SO2 (For Boiler emissions)

ESTIMATED GROUND LEVEL CONCENTRATIONS

The monitored air quality data at different locations is given in Table. The short-term ground level concentrations have been computed for pre-monsoon season. The estimated values of ground level concentrations at different locations are presented in above Tables

Season	Pollutants	Max. Incr. GLC and distance forstack attached to Boiler	
		GLC, µg/m3	Dist. km
Pre monsoon	SPM	2.23	1.0
	SO2	15.88	1.0

Table – 4.7 Short Term Maximum Incremental Concentrations

Sl. No	Locations	AQ1 Project Site	AQ2	AQ3	AQ4	AQ5	AQ6
Baseline level (µg/m3)							
	SPM10	64.6	69.1	68.7	69.4	67.6	66.7
	SO2	13.4	18.2	14.2	14.3	15.4	15.6
Incremental due to Boiler							
	SPM10	2.23	2.23	2.23	2.23	2.23	2.23
	SO2	15.88	15.88	15.88	15.88	15.88	15.88
Resultant Level							
	SPM10	66.83	71.33	70.93	71.63	69.83	68.93
	SO2	29.28	34.08	30.08	31.18	31.28	31.48

Conclusions

SPM and SO2 are the major gaseous pollutants from the industry. The estimated GLC of pollutants due to gaseous emissions from boiler are given in Table-4.6. The maximum incremental GLC of SPM and SO2 in the region is expected to be 2.23 and 15.88 µg /m3 respectively, occurring at 1.5 km from source. The base line ambient air quality data for different locations is given in Chapter-3.3. The maximum values of ambient air quality in the region for SPM and SO2 is 69.4 µg /m3 and 18.2 µg /m3, respectively. After establishment of the proposed project the maximum values of SPM and SO2 in ambient air under worst condition is expected to be 71.63 and 34.08 µg/m3, respectively. The total concentration of SPM10 and SO2 in ambient air (24 hrly) after establishment of the proposed project will be well within the permissible limits of 100 µg/m3 and 80 µg/m3, respectively for residential area. In view of air pollution control measures adopted in the industry the impact of proposed project activities is not likely to cause significant impact on the existing ambient air quality in the region.

SO2, SPM and NOx precautions are taken as above
Carbon Di-oxide Emission:

There are three sources of CO2 namely, (1) burning of fuel in proposed boiler, and (2) Generation in fermentation step and (3)ETP on biological principle. The emissions are controlled as follows

1. In the boiler indicators are provided to have proper air-fuel ratio for maximum combustion efficiency. Thus CO2 will be found but not CO. the emissions are liberated at a stack height designed as per MoEF. In the surrounding, greenery is provided to absorb the residual CO2.

At this location there is no other CO2 liberating activity.

4.2.3 Water Environment

Introduction

It will be a logical analysis of any situation if a study is undertaken in following way:

- Incoming water quality.
- Water budgeting to estimate effluent quantity and quality.
- STP/ETP and its performance evaluation.
- Expected impact.

Key Central Legislation:

A comprehensive statute viz. Water (Prevention and Control of Pollution) Act stands promulgated in 1974 (amended twice in 1978 and 1988). The Statement of Object and Reasons annexed to the Bill, interalia states:

"Having considered the relevant local provisions existing in the country and recommendations of the aforesaid Committee, the Government came to the conclusion that the existing local provisions are neither adequate nor satisfactory. There is, therefore, an urgent need of introducing a comprehensive legislation which will establish unitary agencies in the Center and States to provide for the prevention, abatement and control of pollution of rivers and streams, for maintaining and restoring wholesomeness of such water courses and for controlling the existing and new discharges of domestic and industrial wastes".

The scope of the Act is quite wide. The object of this Water Act, 1974 is (1) to prevent and control of pollution of water as defined therein and (2) to maintain or restore wholesomeness of water.

The objective also appears to provide penalties after conviction that it will be deterrent to others who might indulge or tend to indulge in polluting the waters. The definition of water pollution, therefore, is kept quite wide and encompasses welfare of not only human beings but also the plants, animals and aquatic organisms. The definition is too comprehensive to allow anyone to escape the hands of this Act on pure technicalities. This Act considers the principle of vicarious liability in Section 47, and thus where the offense has been committed by a company (a body corporate, a firm or association of individuals), every person who at the time of offense was committed, was in-charge of and was responsible to the company, as well as the company, shall be deemed to be guilty of the offense. Furthermore, if it is proved that the offense has been committed with consent or connivance of or is attributable to any neglect on the part of any director, manager, secretary or other officer of the company then such person also shall be deemed to be guilty of the offense and shall be liable to be proceeded against.

The Scope of this Act is kept quite wide as to cover in Section 48, the offenses by the Government departments or undertakings and the head of the department shall be in normal course deemed to be guilty of offence, where an offense under this Act is committed. With the sole object to empower the Pollution Control Boards, (establishment of which is yet another object of this enactment), to keep the waters wholesome, the legislature have offered a wide scope under Section 60 which sanctions an over-riding status viz. “The provisions of the Act shall have effect not-with-standing anything inconsistent therewith contained in any other enactment other than this Act.”

Therefore, in conclusion it can be said that in order to prevent and control pollution of water, to avoid nuisance, harm, injury to public health and safety and to maintain or restore quality of water, this Act confers a number of powers on Pollution Control Boards and expects specific functions from them. To protect a guilty person against double jeopardy, the Act puts a bar by Section 49 on cognizance of offence, that no Court shall take cognizance of any offense under this Act except; (1) on a complaint made by or (2) on a complaint made with previous sanction in writing of the State Board. By a recent amendment public participation is encouraged and prior sanction is not insisted.

Water Quality:

Raw Water:

The water used for this Unit plant is already available, assured and dependable. This is treated to a reasonable extent by us, and it has good characteristics. As it is earmarked for this industry, we are not encroaching on anybody else's water source.

Water is used at various stations like heating, cooling, process, floor washing, vessel washing, laboratory, scrubbing etc.

Water Budgeting:

Water Balance		
	Cogen Plant	
Total make up water, M3 per day	2505.63	601.45
Process	**Water Reuired**	**Effluent**
	M3/Hr	**M3/Hr**
Cogen		
1. Boiler make up	19.36	
2. Boiler blow-down	0	1.85
3. Cooling Tower Make up (1.5 % of Cir. Water)	70.44	
4. Cooling Tower Blow Down	0	17.61
5. WTP back wash From Neutralising Pit	3	3
6. Laboratory	0.3	0.3
7. Ash pond	0.3	0.3
8. Gardening	1	0
9.Service water	8	2
10.Miscellenious	2	0
11. Evaporation loss from Reservoir		

Table No.4.8: Details of water balance

Input side **(Industrial):**

a. Fresh Water for Industry - 495 cum/d
b. Recycle Condensate - 477 cum/d
c. Recycle Sober and Mod. - 235 cum/d
d. Water from Feed - 60 cum/d

Total Input - 1267 cum/d

In addition to this water is needed for domestic use (worker's personal hygiene and canteen / colony), Greening drive and partly power plant.

The recovered waste water is treated and recycled. 20 m3 as domestic for workers hygiene and 100 m^3 fresh for greening.

If we consider only industrial water, the fresh water is only is 40 % of the requirement. If we add greening and domestic it becomes 44 % and the input respectively becomes 7,07 & 8.9 lit./lit.

Output side :

a.	Loss from Industrial Use	-	336 cum/d
b.	Effluent sober nature sent for garden	-	142 cum/d
c.	Effluent Moderately polluted	-	93 cum/d
d.	Effluent Highly polluted spent wash	-	560 cum/d
e.	Moisture in product	-	4 cum/d
f.	Steam spare for Concentration	-	132 cum/d
	Total Output	-	**1267 cum/d**

Internal recycling is Condensate water, CO2 scrubbing, steam, and spent lees.

In addition to this water is needed for domestic use (worker's personal hygiene and canteen / colony), Greening drive and partly power plant. The recovered waste water is treated and recycled. 20 m3 as domestic for workers hygiene and 100 m3 fresh for greening.

Effluent Domestic

Figure 4.3 Flow Chart for waste water treatment

Mitigation:

As additional mitigation measures, **TI** proposes to take-up following:

- To spread awareness to the workers about the importance of water quantity measurements and resource conservation.
- Shop-floor supervisors are encouraged for mopping up, dry collection and good house-keeping by arranging lectures, and by conscious supervision.
- The treated domestic and industrial sober waste water will be applied judiciously on land for gardening so that there will not be any flooding of excess water either to migrate to ground water table or get away as runoff to join surface water drains.
- Documentation shall be maintained and submitted in annual Environmental Statement.

Summary:
From the foregoing it may be seen that the industry is without any such effluent which is hazardous, poisonous or non-biodegradable. It is not likely to create pollution from the point-of-view of water phase of environment, once used on land.

Action Plan
The action plan is prepared to ensure that there is no discharge of effluent anywhere during anytime.

- There will be no storage of effluent in the lagoon in the rainy season.
- Pre-monsoon inspection shall be carried out to ensure that garland drains are dry and pumps are working in the eventuality of rain run on or rain runoff.
- Two down gradient and one up gradient well will be monitored regularly during rainy season.
- The ETP and Digester sludge also will be taken care off during pre-monsoon inspection.

4.2.4 Rain Water Harvesting

This is designed as per CPCB Publication. The site has 664 mm rainfall with wet month as July (30 %) and wet days are about 15. Thus, the maximum wet day with a factor of safety as 2, we have rains on that day as 27 mm. The rain water harvesting is planned, on Q= CIA basis.

It may be seen that though there is an equimental rain run off, it is only nominal due to our efforts for vegetation. Further when once roof water will be collected and used for ground water recharging through 10 soak pits of size 3x6.5x3 lit.
The storm water is collected by garland built in gutters and led to two ponds suitably placed.

4.2.5. Storm Water Management

The annual rainfall in the region is about 600 mm and is spread from May to October. Annual rainy days are about 45. Strom water gutters are constructed in the premise as per the standards. The storm water drains are lead to rain water reservoirs constructed at the lowest level of the premise as shown in the layout plan. The rain water thus collected is used for greenery development in the industry. The storm water thus collected can also be used as a source of water for the industry. The storm water collected from different locations of the factory premise is given below.

Storm water storage capacity is provided for about 20 % of the annual storm water collected from the factory premises. Rain water reservoirs (2 nos.) of following specifications are constructed in earthen work as per standard practices.

4.2.6 Soil and Biological Environment

Introduction:

Every industrial activity brings in some change to soil environment. The land-use pattern changes, eyesore buildings may come up, excavation and filling with borrow-pits gets involved, the soil gets paved by roads, buildings (terraces/roofs) and platforms. All this, reduces areas for percolation into soil and increases storm run-off that leads to erosion of soil in channels down stream. Sometimes the rapid congregation of water becomes too high for the carrying capacity of channels/ nallas giving rise to build-up of back waters.

Borrow Pits:

The present plot for development of **TI** has sober undulations. By good architectural practices, the flow of activities will be planned so as to make maximum use of gravity for the traffic of material. The buildings and the plinths will be so adjusted as the cutting should balance the embankments or filling. Indeed very little murum or any other material will be required to be borrowed from outside.

The fear of erosion, nalla back-water, need of soil stabilization etc. are thus of no cause for anxiety by this proposal and hence no effect is expected on biological environment in developing this unit.

4.2.7 Solid Waste Management:

Introduction:

Following mitigation practice is the policy for future:

- Minimization at all levels need be attempted for discarded products, empty containers, packing surpluses, incoming raw material unloading spillages and fugitives. The factory has very little scrap materials. All these, however, be carefully stored on raised platform with dwarf toe walls all around, and a roof over-head. The contents should not be held in the premises for more than a fortnight.
- The solid in process generate only as ETP sludge, spent catalyst and boiler ash. Ash is non-hazardous and in fact a good building material. Even can be used in Cement mills and for soil enrichment.
- Other will be empty drums which can be used for refill or may be disposed to original vendors. The colony is very small and its organic portion will be composted and inert sent for low land filling.
- These measures can easily be taken by **TI** because (1) they have no discards or off-specification products, (2) the waste is fully recycled and (3) they have experience in the line for the same type of product.

(a) Non Hazardous Solid Waste:

Based on above working, the summary is per day

#	Waste	Quantity	Treatment	Disposal	Remark
1	Canteen	2.0 CuM	Compost	Own garden	Organic
2	Colony	4 CuM	Compost	Own garden	Mixed
3	ETP	60 kg	Treated already	Own garden	Organic, Non-Haz
4	Office	2 CuM	--	Sales	Non-Haz.
5	Packing Sec.	1 CuM	--	Sales	Non-Haz.
6	Ash	30 TPD	Silos	Sales	Takers available
7	Lube oil	25 Kg/day	Floatation	Carts	In season

Table 4.13: Solid Waste per Day

For ash handling system engaged is:

1) Submerged Belt Conveyor:
   It includes Idlers, Pulleys with bearing and Plummer block ,skirting, complete drive assembly ,Belting of all conveyor, Structures such as stringer with short Supports Head, Tail, Drive Base Frame, Take up Frames, Drive Base Frame, connecting chutes, both side walkways ,safety switches ,water inlet and outlet drain Nozzles.
2) Ash Belt Conveyor
   It includes Idlers, Pulleys with bearing and plummer block, skirting, complete drive assembly, Belting of all conveyor, Structures such as stringer with short Supports ,Head ,Tail, Drive Base Frame ,Take up Frames, Discharge chute, connecting chutes.
3) Screw Belt Conveyor
   It includes complete drive assembly, screw flight pipe shaft, trough, trough cover, end seals, Structures, drive Base Frame, inlet chute, Discharge chute, connecting chutes.

(B) Hazardous Waste:

The relevant summary of above reads as :

S. No.	**List of Processes Generating Hazardous Waste**	**Waste stream**		**Remark Please vide Note**
18	Production of acids and fertiliser	18.1	Acid-conaining Residue	No. 1 below
		18.2	Spent catalyst	
		18.3	Sulfur Containg Residue	
38	Cleaning of barrels which have held chemical substances	38.1	Chemicals containing residues from barrel cleaning	No. 2 below
		38.2	Sludge from waste-water purification	
41	Waste treatment processes e.g. distillation, separation and concentration technique.	41.4	Distillation residue from the work-up of contaminated halogen-free organic solvents	No. 3 below
44	Every action	44.1	Spent oil	No. 4

	relating to and every use of lubricating and system oil	44.2	Other spent lubricating and system oil	below

Table 4.14: Summary of Hazardous Waste

Note 1: In the proposed case, spent wash wastewater is converted into Power. Thus there is no Compost making or Fertilizer-making and none of the three sub streams 18.1, 18.2 or 18.3 of wastes are applicable.

Note 2: The number of barrels containing Turkey Red Oil are only few, as the substance is not a raw material. It is merely an anti-foam agent. These are on returnable basis to suppliers. So also can be said for the yeast supplement substances, like nutrients, which comes in bags only.

Note 3: The activity is bound to remain inside, as no organic solvents are involved anywhere in the line of process reaction or work-up.

Note 4: Not being an Engineering Industry, use of oil-grease, lubricants, or hydraulic/ system oil is extremely limited. The steps like fermentation, distillation do not involve any rotating machines, hence it is not applicable. Recovered and used for lubricating carrying carts.

4.2.8 Noise

NOISE SOURCE AND CONTROL MEASURES

1. SOURCES OF NOISE

The source and quality of noise in the distillery are given bellow.

i. Steam turbines : 85-90 dB (A)
ii. Diesel Generators : 75-80 dB (A)
iii. Fans, blowers and compressors : 80-85 dB (A)

The sound intensity appears to be at moderate level in distillery plants. In general at the locations of turbines, compressors, fans etc, the sound intensity generally exceeds the limit. Necessary measures as indicated below are taken to reduce the sound intensity below the allowable limits at the source itself. The workers engaged in such locations are provided with earmuffs to have additional safety against noise nuisance. These units will be manufactured to meet the noise levels as per MOEF/ CPCB guide lines.

2. NOISE CONROL MEASURES

Workers at these equipments are provided with ear muff and ear plug as personnel protective appliances against noise. They are installed on vibration proof foundation and base. Steam turbine and diesel generators are located in isolated and acoustic building.

i. Diesel Generator

Diesel generator capacity : 500 KVA and 250 KVA

Diesel generators will meet the Specification of MoEF. They are with low noise engine supplied with vibration free base frame and acoustic enclosure. Efforts shall be done to bring down the noise level of the D. G. set with in the allowable limits of about 70 dB(A) by sitting and control measures.

ii. Steam Turbine

Diesel generator capacity : 2.5 MW

iii. Fan. Blower and Compressor

Water sealed vacuum pump and air blowers are used in fermentation, distillation and evaporator plants. Air fans are used at boiler house

In addition to above plantation is done for mitigation.

4.3 Traffic Management

Traffic Density And Its Impact

Raw materials (molasses), fuels (Bagasse) will be procured from various locations of Belgaum and adjacent districts in Karnataka state and transported to the factory through lorry transport. Similarly alcohol produced in the factory is transported to various consumers in and out of the state through lorry tankers. The vehicles will move mainly through district roads from Kenganur to Kittur and from there through N.H. 4. District roads are tarred. Presently, the traffic on these roads is meagre. The additional traffic due to the proposed activity is not likely to affect the environment.

Traffic Due To Project Activities

During operation a maximum of about 200 persons (inclusive of employees and others) are attending the industry but majority of them will be sons of soil from vicinity villages. Visitors are very less because it is done mostly from the Belgaum office and not from site. Only nominal few vehicles (say 10 per day) are expected. In addition 2 night duty vehicles provided for emergency movement.

Traffic Survey:

Traffic survey is the study of flow of traffic/vehicles, designing and operating traffic system to achieve safe and efficient movement of vehicles, persons and goods. Survey was conducted to assess the present volume of the vehicles passing on the road adjacent to the village. The volume was found very low on this two lane road. The surface is good to serve our new traffic, as estimated above.

The transportation density on the road presently is much less and hence we accommodate easily our traffic of about 48 vehicles (one way) on this road which is tarred and wide with two lanes.

The road passes through villages and adjacent to agriculture lands. Lorries carrying solid material such as and Bagasse will be covered with tarpaulin. The industry will take measures to additional plantation on road sides. Bell mouth shape geometry will be provided at entry and gates to the industry. Considering the facilities as above the impact of additional transportation on road will be insignificant.

4.4 Greening Drive -:

Objective:

To provide a measure of air pollution mitigation, fugitive dust control, shed for men and bullocks, cooler atmosphere, camouflage the land-use, aesthetics of the region, absorption of green-house gas, utilization of NPK

of the wastewater after treatment, as also Noise Barrier and Erosion prevention.

Methodology:

Design of Plantation will be such as:

- Not to get disturbed in future expansions
- Be nearer to source of water and supervision.
- Be where the need is
- Capability of securing maximum survival rate with an aim of 100%

Selection of species will be done by detailed considerations:

- A large variety of species selected to have bio-diversity
- Indigenous local species have a more chance of survival. So will be surveyed.
- Species of origin outside of India, but subsequently found established too shall be encouraged.
- Species that will grow rapidly under local dominant stress of soil salinity, high wind, water needs, sustainability in dry months
- Species that have more foliage area, absorbing gasses.
- Rapid growth and evergreen type of species.
- Tolerance to water stress and extreme climatic conditions.
- Difference in height and growth habits
- Aesthetic and pleasing appearance
- Large bio-mass to provide fodder and fuel
- Ability to efficiently fixing carbon and nitrogen.
- Improving waste land
- To suit specific climate and soil characteristics.
- Sustainability with minimum maintenance.

Sections

Will be at least four for greening drive:

- Three row curtain on periphery
- Block of trees near temple
- Avenue trees near approach road and internal roads
- Ornamental trees in the garden
- Bushes on slopes of roads
- Fruit trees in the colony.

Logistics

Provision is made in advance for:

- Securing plants from nearby Nursery

- Water distribution arrangement
- Staff earmarked for the purpose having trained in the respect
- Agricultural implements, pesticides and manures necessary
- Fire protection.

Selection: Central Pollution Control Board **(CPCB)** has divided India in 15 different regions. CPCB has further divided this region in sub-zones. The peculiarities of this subzone is identified as follows

- Rainfall
- Climate Semi Arid
- Soils BC to coarse

CPCB has recommended more than 150 species which can be attempted in this subzone of the region. Selection is therefore based further on availability of species in the nearby nurseries. Biodiversity is also kept in view. Trees, shrubs, dwarf trees and vegetative cover/ lawn is proposed. For biodiversity we propose ten verities of species as out of Mango, Ashok, Wad, Nariyal/coconut, Nilgiri, Sitafal, Badam/Almond, Gulmohar, Pimpal, Chinch, Umbar, Babhul, Papaya, Lemon, Jamb/Guava, Sag, Aavla.

Occupational Health Care

Safety officer will be appointed in the industry. He will co-ordinate and manage occupational health management. A medical facility with qualified doctor and clinical facilities will be created in the industry to meet the factory requirement of the health services. Health care aspects to be practiced in the industry are indicated bellow.

- Health and safety related displays will be exhibited at strategic locations in the industry.
- Workers will be educated and trained in occupational health safety.
- Regular health check up of the workers will be carried out and health records of individual workers will be maintained.
- Spirometry, Pulseoxyeometry, X-rays and other routine and specific tests will be conducted and submitted to authorities
- Utility rooms provided will be provided with facilities and properly maintained.
- First aid facilities will be provided at different locations. Further first aiders will be trained.
- Housekeeping in the industry, sanitation in utility rooms, canteen, Rest rooms and other places will be given top priority.

PART "B" MITIGATION

Environmental Impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project

It is our endeavor to minimize the impact. Impact can normally be caused due to various reasons namely (1) by wrong site selection, (2) by accidents during construction, (3) by accidents during operation, (4) by accidents during decommissioning or (5) by accidents during rehabilitation of the project.

Location is so selected as should not create environmental issues much on downstream and downwind directions. The area involved is moderate in size, and already made NA and obtained NOC from District Collector. Public acceptability is also ascertained by discussions in advance. The target is shielded, and normal mitigation measures will prove adequate.

Construction phase is of moderately small duration. Heavy civil construction is not involved, it is more of a fabrication needing less building materials to be borrowed from nature. Existing infrastructure of local body, and Government will serve the purpose. Large labour camp is not necessary, because skilled and unskilled people are available in the nearby villages. All due precautions will be taken for noise, dust and wastewaters. Commensurate with small-volume, day-time, machinery-assisted, expert-handled construction involved there are very low/no chances of accidents. No significant long range impact will be felt and normal mitigation measures will prove adequate.

Operation phase shows a relatively safe expectation, as compared with many other types of chemical industries. Only one Raw Material, simple three steps manufacturing process and only one finished product, makes this aspect easy and devoid of apprehended accidents. The raw material is brought on JIT (Just In Time) principle from this District adjoining and neighboring Mills, largely, and there will be a tank farm to store it. There is a cladding to main shed and temperature of this location does not go very high. The finished product is much in demand in market and hence no need of having over-storage. Usual precautions as per Factory Act shall be taken. Fire protection system will be in place as per Acts and Insurance Companies. Normal precautions will prove adequate.

If ever it becomes necessary to **Decommission or Rehabilitate** the Industry, the experience gained by this industry here and elsewhere will be able to handle this without aftermaths of accidents.

Low incidences are possible because many measures for minimization are designed.

Measures Built In the Process

Built in measures for resource conservation and pollution control in the industry are discussed along with project details in Chapter-2. The main objective is to follow environments friendly process, with efficient utilisation of resources, minimum waste generation and built in waste treatment and operation safety. The measures adopted are,

i. Use of live steam is avoided by employing re-boiler in distillation columns. This reduces the generation of wastewater.
ii. Use of pumps with mechanical seals to avoid liquid leakages.
iii. Water utilization reduced by Re-boiler reduces water utilization.

This can be analyzed by (1) first identifying the various affectable facets of environment,
(2) measures for minimizing the cause of impact, (3) measures for minimizing the impact in general, (4) measures for minimizing the impact in particular that are irreversible and irretrievable and (5) finally assessing its significance.

Impact on Environment can happen by many ways as –

A. Modification of Regime B. Land Transformation and Construction
C. Resource extraction D. Processing
E. Land alteration F. Resource renewal
G. Changes in Traffic H. Waste Replacement and Treatment
I. Chemical Treatment J Accidents, and
K. Others

The above eleven attributes can be further subdivided for better analysis. As an example the first attribute “Modification of Regime” can be sub-divided in twelve consideration aspects as –

a. Exotic fauna introduction, b. Biological controls,
c. Modification of habitat, d. Alteration of ground cover,
e. Alteration of groundwater hydrology, f. Alteration of drainage,

g. River control and flow modification, h. Canalization,
i. Irrigation, j. Weather modification,
k. Burning, l. Surface paving

Similarly for other attributes also subdivisions are made for better analysis. This follows.

The degree of impact as well as the nature of Impact (i.e. direct/ indirect, adverse/ beneficial, tangible/ intangible, reversible/irreversible, local/global retrievable/retrievable) will be dependent on the success of our pollution control and mitigation practices.

4.5 Measures for minimization

The principles of minimization or off-setting mal-effects are based on the principle of prevention, abatement, treatment, reuse, and smooth disposal of wastes. These are indicated herein below and dealt in details later in this Chapter.

#	Regarding	Measure/ effort	Remark
1	Raw Material	Obtained clean	Less loss, less load to environment.
		Dependable source	Continuity assured. No shock load to environment by make and break.
		Inventory	Only small as assured source. No fear of degrading.
2	Land	Limited. Already industrial.	No rehabilitation pending. No leveling necessary. No prime agricultural land. Not used previously general public. Already in possession.
3	Water	Safe, reliable dependent source	No encroachment on source of others. Not a process stoppage risk. Own efforts of recharging and reusing..
4	Groundwater	Available.	In fact by rain harvesting, recharging is made. Wells are existing and usable. No new tapping.
5	Air pollution	No gas as raw material, no gas generated in process (except CO2, SPM)and effluent treatment	Not likely to increase over routine. Satisfactory monitoring schedule. ESP and stacks scientifically provided.

		(except CH4)	
6	Wastewater	Though of moderate BOD, both the Domestic and Industrial effluents fully taken care of making zero discharge outside	Water use minimized. Harsh industrial Wastewater is used for power generation. Domestic effluent reasonably low in quantity. No discharge to any surface water, nor any percolation to groundwater.
7	Soil	MSW, Haz Waste, attended.	Soil is not spoilt. Landscaping is done. Organic solid waste is locally garden composted. Inorganic segregated. Saleable to fixed authorized vendors. Remaining either for sanitary or secured landfill. No hospital to create bio-medical waste.
8	Aesthetics	Noise	No big machinery kept near boundary, shed at central part of plot, sturdy foundations, no vibrations. Greenery maintained. In closed, covered sheds.
		Odour	Various measures are taken as – • Water use minimized. Wastewater minimum. • No evaporation solar ponds • No disposal on land with cess pools.
9	Community	Acceptability	The economic situation is very harsh for the local neighbors. Very low livelihood. Lands only rain-fed. People are anxious to have at least some development. Assistance offered.
10	Track record	Social work and Law-abiding	Project proponents are keen on matters environmental and have good past record. They wish to continue the same. The society has respect for them.

Table No. 4.15: Minimization Efforts

With the mitigation measures proposed above with subsequent efforts of implementation, the potential impact (especially irreversible and irretrievable) should become very low / insignificant / nominal or none.

4.6 Irreversible and irretrievable commitments of environmental components.

Assessment of environmental components is done.

#	Component	Discussion on potential Impact	Whether is it relevant from point of irreversible/ irretrievable effect?
1	Land	Area is compact and Limited. It is already an industrial one (NA). Thus there is no change in land-use pattern.	Not relevant
2	Water	No encroachment on source of others. Not a process stoppage risk. Own efforts of recharging and reusing. Water use minimized. No harsh industrial Wastewater after treatment. Domestic effluent very low in quantity. No discharge to any surface water, or any percolation to groundwater.	Not relevant
	Groundwater	Available. In fact by rain harvesting, recharging is made. No new tapping. Surface water available.	Not relevant. In fact improved.
3	Ambient Air Quality	Not likely to increase over routine. Satisfactory monitoring schedule. ESP and stacks scientifically provided.	Not relevant.
4	Soil	MSW, Non Haz. and Haz Waste, attended. Soil is not spoilt. Landscaping is done. Organic solid waste is garden-composted. Inorganic segregated. Saleable to fixed authorized vendors. Remaining either for sanitary or secured landfill. No hospital to create bio-medical waste.	Not relevant. In fact improved.
5	Aesthetics	Noise. No big machinery kept near boundary, shed at central part of plot, sturdy foundations, no vibrations. Greenery maintained. In closed, covered sheds, with cladding	Not relevant.

6	Community	Acceptability. The economic situation is very harsh for the local neighbors. Very low livelihood. Lands only rain-fed. People are anxious to have at least some development.	Not relevant

Table No. 4.16: Potential Impacts

It may thus be seen that the potential impact is neither *Irreversible nor irretrievable* to any degree of significance. It may be adverse on some consideration and even beneficial in some other. This is discussed in details later in this Chapter in ten levels of Hierarchy.

4.7 Assessment of significance of Impacts

For such assessment of significance of Impacts, Magnitude and Importance of 100 impact potential considerations (Grouped in 11 categories A to K) are considered taking Guidance from **Leopold Interaction Matrix**, (Source: Handbook of EIA, Scientific Publishers (India), Jodhpur), and modified to suit the present purpose. The categories A to K are

A. Modification of Regime	B. Land Transformation and Construction
C. Resource extraction	D. Processing
E. Land alteration	F. Resource renewal
G. Changes in Traffic	H. Waste Replacement and Treatment
I. Chemical Treatment	J Accidents, and
K. Others	

The above eleven attributes are further subdivided for better analysis, totaling to 100 consideration aspects. For the scenario of this present proposal, this is worked out in details and presented below.

	Description	**Impact Potential**	**Explanation**
Category A. Modification of Regime			
a.	Exotic fauna introduction	Nominal, nearly nil	This is a compact area and is already permitted for industrial use.
b.	Biological controls	Nil	There is no discharge of untreated effluent or of watery sludge from the premises

c.	Modification of habitat	Nominal, but beneficial	This is a nearly barren land, with no trees or greenery. We already planned about 9000 trees. No release of liquid effluents, nor any excessive air pollutants after ECE. So, habitat will improve for avifauna.
d.	Alteration of ground cover	Nominal, but beneficial	Barren area is now being converted to greenery. Previous rain run-off now collected and used for Groundwater recharge.
e.	Alteration of groundwater hydrology	Nominal, but beneficial	We do not draw any groundwater. Required water is available from irrigation deptt (Government Dam) and part recycled with treatment. (our effort of Roof rainwater harvesting in fact may give some recharging beneficial effect)
f.	Alteration of drainage	Nil	This is a plain level land. The built-up area requirement is very small. The natural drain pattern is not disturbed.
g.	River control and flow modification	Nil	We do not release any wastewater into river. Hence no flow modification by us either.
h.	Canalization	Nil	Neither the topography is disturbed for bringing water, or for sending wastewater or for erecting buildings, or for constructing any new roads-culverts.
i.	Irrigation	Nil	We do not release any raw wastewater on irrigated land or canal. Hence no irrigation effect by us either. We shall developed our own greenery inside
j.	Weather modification	Nominal, but adverse.	This activity is temperature oriented but only to limited heating to a level. This thermal activity is likely to modify the weather to a small extent. This will be in the work zone. As the shed is fully claded and as the shed is centrally placed in a 25 acre plot, the micro-climate of outside the premises however may not get significantly moderated.
k.	Burning	Nominal, but adverse.	Explained as above, and kept controlled.
l.	Surface paving	Nominal, but beneficial	Within the already industrial area. The footprint plinth is very limited. Paving is done to arrest any possibility of groundwater percolation/ pollution. Thus beneficial. With RWH, Rain runoff is not increasing.
Category B. Land Transformation and Construction			

a.	Urbanization	Nil	This is a reasonably small plot. This is located in a village background. The labour force is divided in shifts.
b.	Industrial sites and buildings	Nominal but marginally beneficial	This is an Agro-based industry. As such sheds with few warehouse and store will be needed. Other infrastructure like office, guesthouse, time office can be common and small facility. Hence not a substantial impact. In fact, by our presence, safety, law and order, facilities and rise in land-prices will increase .
c.	Airports	Nil	Once streamline with steady state production, only local traffic by surface will be undertaken. No air traffic.
d.	Highways and Bridges	Nominal and adverse	The traffic will be increased (majority with about average 80 kilometer each). However precautions taken for good wide roads, guarded junctions, parking and illumination
e.	Roads and trails	Nominal and adverse	The traffic will be increased (majority with about average 80 kilometer each). However precautions taken for good wide roads, guarded junctions, parking and illumination
f.	Railroad	Nominal nearly Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go by rail, as they prefer road.
g.	Cables and lifts	Nil	Neither the raw material, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go cables or lift.
h.	Transmission lines, pipelines and cowherds	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go by or disturb or overload the transmission lines, pipelines or cowherds. KSEB (Govt.) as permitted use of their power transmission lines.
i.	Barriers including fencing	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go by or disturb or overload the barriers and fencing.
j.	Channel dredging and straighte ning	Nil	Neither the raw materials, nor finished products, nor by-products,nor waste, nor passenger traffic related to this activity use any channel and hence neither dredging nor straightening involved.

k.	Channel reverting	Nil	Neither the raw materials, nor finished products nor by-products nor waste nor passenger traffic nor water supply related to this activity use any channel and hence no channel reverting is involved.
l.	Canals	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic nor wastewater release related to this activity use canal and hence not involved.
m.	Dams and impoundments	Nominal but beneficial	This is small activity with small area involved. There are small undulations and rain is medium. However it is decided to create some impoundment for water harvesting. This will recharge the groundwater hence beneficial.
n.	Piers, seawalls, marinas and sea terminal	Nil	This is located in landlocked area.
o.	Offshore structures	Nil	This is located in landlocked area.
p.	Recreational structures	Nil	This is located in landlocked area.
q.	Blasting and drilling	Nil	This is located in landlocked area.
r.	Cut and fill	Nominal and beneficial on 2 counts	This is small activity with small area involved in a plot. There are no undulations and site is plain. Care is taken to orient the buildings such as to balance the cutting and filling. No borrowing of material from outside needed. Some surplus cutting material of top soil will be used for greening landscaping as good soil not to be imported. Hence doubly beneficial.
s.	Tunnels and underground structures	Nil	There is neither a tunnel nor any underground structure involved
Category C. Resource extraction			
a.	Blasting and Drilling	Nil	This is an Agro-based industry and not engaged in any activity like Blasting and Drilling (even during construction).

b.	Surface excavation	Nominal nearly Nil	This is an Agro-based industry. As such sheds with few tanks and store will be needed. Other infrastructure like office, guesthouse, time office can be common. Hence not a substantial impact. Nominal excavation to reach foundation will be made, but will be internal not sending any impact outside the premises. Hence nominal nearly nil.
c.	Sub Surface excavation and retorting	Nil	For foundation only surface excavation as covered above. No any other. Sub Surface excavation and retorting
d.	Well dredging and fluid removal	Nil	This is an Agro-based industry and not engaged in any activity like Well dredging and fluid removal
e.	Dredging	Nil	This is an Agro-based industry and not engaged in any activity like Dredging
f.	Clear cutting and other lumbering	Nil	This is an Agro-based industry and not engaged in any activity like Clear cutting and other lumbering. There is no much use of timber except door frames. No trees are coming in construction area. In fact about 9000 trees are already planted by us.
g.	Commercial fishing and hunting	Nil	This is an Agro-based industry and not engaged in any activity like Commercial fishing and hunting
Category D. Processing			
a.	Farming	Nil	This is an Agro-based industry and not engaged in any activity like Farming of our own.
b.	Ranching and Grazing	Nil	This is an Agro-based industry and not engaged in any activity like ranching and grazing
c.	Feedlots	Nil	This is an Agro-based industry and not engaged in any activity like feedlots
d.	Dairying	Nil	This is an Agro-based industry and not engaged in any activity like feedlots.
e.	Energy generation	Highly Beneficial	This is an Agro-based industry and engaged in producing energy. This is much beneficial to the State.
f.	Mineral processing	Nil	This is an Agro-based industry and not engaged in any activity like mineral processing
g.	Metallurgical industry	Nil	This is an Agro-based industry and not engaged in metallurgical industry

h.	Chemical industry	Nominal nearly Nil	This is an Agro-based industry and not engaged in any harsh chemicals, but kept in control.
i.	Textile industry	Nil	This is an Agro-based industry and not engaged in any activity like textile industry
j.	Auto and aircraft	Nil	This is an Agro-based industry and not engaged in any activity like auto and aircraft industry
k.	Oil refinery	Nil	This is an Agro-based industry and not engaged in any activity like oil refinery
l.	Food	Significantly Beneficial	This is an Agro-based industry and engaged in activity useful in food. Care taken. CO2 is food preservative.
m.	Lumbering	Nil	This is an Agro-based industry and not engaged in any activity like lumbering
n.	Pulp and paper	Nil	This is an Agro-based industry and not engaged in any activity like pulping-papering..
o.	Product storage	Nominal nearly Nil	This is an Agro-based industry and product will be in good demand thus stored for short time. Full precautions taken as per factory Act. Hence no impact.
Category E. Land alteration			
a.	Erosion control and terracing	Marginal but beneficial	This is an Agro-based industry and not engaged in any activity that will create land erosion or there will be any need demanding controlling it. However for rainwater harvesting, we have planned terracing contour bunding etc. which will benefit halting any erosion. There is no incremental rain run off by our development.
b.	Mine sealing and waste control	Nil	This is an Agro-based industry and not engaged in any activity like mine or its waste
c.	Strip mining rehabilitation	Nil	This is an Agro-based industry and not engaged in any activity like mine or its rehabilitation, remediation
d.	Landscaping	Marginal but beneficial	This area under this unit and is already in the possession of industry. Thus there will be no change in land use pattern or on landscape. However, we shall be growing additional trees and lawns, and landscape will be more aesthetically pleasant
e.	Harbour dredging	Nil	This is a land-locked industry and not engaged in any activity like Harbouring or dredging

f.	Marshfill and drainange	Nil	This is a land-locked industry in dry climate land with low to moderate rainfall. Thus marshafiling and drainange not involved.
Category F. Resource renewal			
	Description	Impact	Explanation
a.	Reforestation	Marginally beneficial	This is a moderate sized area, and is already an industrial land. No forest is involved, nor even cutting or disturbing any trees or greenery. In fact we shall plant a commensurate number of trees and lawns.
b.	Wildlife stocking and management	Marginally beneficial	This is an area away from forests, and is already an industrial land. No forest is involved, nor any fauna met here. However, birds will be attracted to our greenery.
c.	Groundwater recharge	Significant magnitude	Special efforts are taken for rain harvesting, hence significant magnitude
d.	Fertilization application	Nominal nearly Nil	This is an Agro-based unit with commensurate small gardening. Thus any fertilization application has no much potential.
e.	Waste recycling	significant and beneficial magnitude	The raw material itself is supplied by neighboring Sugar Mills. The waste generated by them is used to produce this product for reusing again. Our own waste too is recycled by our self.
Category G. Changes in Traffic			
	Description	Impact	Explanation
a.	Railway	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity give preference to road rather than rail.
b.	Automobile	Nominal but adverse	The traffic will be increased (majority with about average 80 kilometer each). However precautions taken for good wide roads, guarded junctions, parking and illumination
c.	Trucking	Nominal but adverse	The traffic will be increased (majority with about average 80 kilometer each). However precautions taken for good wide roads, guarded junctions, parking and illumination

d.	Shipping	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go by shipping.
e.	Aircraft	Nil	Once streamline with steady state production, only local traffic by surface will be undertaken. No air traffic.
f.	River, Canal traffic	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic nor wastewater release related to this activity use canal and hence not involved.
g.	Pleasure Boating	Nil	This is located in landlocked area.
h.	Traits	Nil	This is located in plain land area.
i.	Cables and lifts	Nil	Neither the raw material, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go cables or lifts.
j.	Communication	Nominal nearly nil	The proposal is an Agro-based industry with local base. Its infrastructure is small for communication. Hence no new burden except nominal. In fact, we shall extend our facilities to the people as well.
k.	Pipeline	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go by or disturb or overload the existing ,pipelines..
Category H. Waste Replacement and Treatment			
	Description	Impact	Explanation
a.	Ocean Dumping	Nil	This is a land-locked industry and not engaged in any activity like Ocean Dumping
b.	Landfill	Nominal nearly Nil	Landfill in a small way only, because Solid Waste is nearly fully recycled.
c.	Emplacement of tailings, spoils and overburden	Nil	This is an Agro-based industry and not engaged in any activity like Emplacement of tailings, spoils and overburden
d.	Underground storage	Nil	This is an Agro-based industry and not engaged in any activity like Underground storage

e.	Junk disposal	Nominal nearly nil	This is an Agro-based industry and nominally involved with ferrous scrap. If it occurs it is in small quantity and is recycled forthwith. This is only in initial construction phase.
f.	Oil well flooding	Nil	This is an Agro-based industry and not engaged in any activity like Oil well flooding
g.	Deep well emplacement	Nil	This is an Agro-based industry and not engaged in any activity like Deep well emplacement
h.	Cooling water discharge	Nil	This is an Agro-based industry and though engaged in activity like Cooling water, the discharge is absorbed locally for greening
i.	Municipal waste discharge including spray irrigation	Nil	This is an Agro-based industry and not faced with high Municipal waste. Taken precautions. Locally absorbed.
j.	Liquid effluent discharge	Nil	This is an Agro-based industry. Converts the liquid waste into usable farming water and power. Thus zero outside discharge and not engaged in any activity like Liquid effluent discharge
k.	Stabilization and oxidation pond	Nil	There is no such Stabilization and oxidation pond.
l.	Septic tank, commercial and domestic	Nil	There is well designed septic tank with proper sub-soil irrigation. .
m.	Stack and exhaust emission	Nominal but nearly nil	The plant has moderately sized boilers. The emissions are captured in a duct and lead to ESP followed by tall stack as per KPCB Consent.
n.	Spent lubricants	Nominal but nearly nil	Spent lubricants will be collected. As the quantity is not significant, it will be used internally with SPCB consent.
Category I. Chemical Treatment			
	Description	Impact	Explanation
a.	Fertilization	Nil	This is an industry not engaged in any activity like using of harsh Fertilizer
b.	Chemical deicing of highways	Nil	This is an industry and not engaged in any activity like using of Chemical deicing of highways. In any case this is not relevant to this part of the country.

c.	Chemical stabilization of soil	Nil	This is an industry and not engaged in any activity like using of Chemical stabilization of soil
d.	Weed control	Nil	This is an industry and not engaged in any activity like using of Weed control. Greening is only attendant activity.
e.	Insect control (Pesticides)	Nil	This is an Agro-based industry and not engaged in any activity like using of Insect control (Pesticides)
Category J. Accidents			
	Description	Impact	Explanation
a.	Explosions	Nil	This is an Agro-based industry and not related to any potential explosion from distillery and co-gen unit
b.	Spills and leaks	Nil	This is an Agro-based industry and not engaged in any handling of fluids and so not related to any uncontrolled spills.
c.	Operational failure	Nil	This is simple few step process. No operational failures are foreseen as to create any accidents. If at all it may give less production by lower efficiency.
Category K. Others			
	Description	Impact	Explanation
a.	Fire Hazard	Nil	Raw material or finished goods can catch fire. Full precautions taken.
b.	Public acceptability	Significant and beneficial	The economic situation is very harsh for the local neighbors. Very low livelihood. Nearby lands only rain-fed. People are anxious to have at least some development.
c.	SPCB acceptability	Significant and beneficial	The industry will be working with consent to operate and generally obeys all the conditions. Hence, SPCB has accepted the application for an Agro-based industry for favorable consideration.
d.	Salability of product	Significant and beneficial	The product Alcohol is a desirable substitute and a speciality chemical needed in many industries like pharmaceutical, food, petrol-substitute etc. and hence much in demand. This also means that there will not be any need of unnecessary undue long storage of these products in this premise. Early dispatch without storage is environmentally beneficial and less risky. The products are useful to the society. Power is transmitted to KSEB and liquid CO2 is useful for food preservation.

Table No. 4.17: Impact Attributes

Having done above exercise for a matrix with 100 considerations, marks are allotted depending on the hierarchy of impact potentiality. The hierarchy starts from *"Totally Adverse irreversible"* impact with minimum marks as 1 and ranging up to maximum of 10 for *"High with beneficial magnitude and importance",* being –

Where the impact potential is this	**Allot marks**
Totally Adverse irreversible	1
Totally Adverse reversible	2
Nominal but adverse	3
Nominal, nearly nil	4
Nil	5
Nominal, but Marginally beneficial	6
Nominal, and beneficial	7
Nominal, and beneficial on two counts	8
Significant beneficial impact	9
High beneficial in magnitude and importance	10

Table No. 4.18 : Yardstick for Mark – Giving

The marks allotted to these 11 attributes for total 101 considerations are tabulated below -

#	Attribute → / Impact ↓	A	B	C	D	E	F	G	H	I	J	K	Total no.	Marks	
														Per No.	Total
1	Adverse irreversible	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2	Adverse reversible	0	0	0	0	0	0	0	0	0	0	0	1	2	2
3	Nominal but adverse	2	2	0	0	0	0	2	0	0	0	0	6	3	18
4	Nominal, nearly nil	1	1	1	2	0	1	1	4	0	0	0	10	4	40
5	Nil	5	13	6	11	4	0	8	10	5	3	1	66	5	330
6	Nominal, but marginally beneficial	1	1	0	0	2	2	0	0	0	0	0	6	6	36
7	Nominal but beneficial	3	1	0	0	0	0	0	0	0	0	0	4	7	28
8	Nominal, but beneficial on more counts	0	1	0	0	0	0	0	0	0	0	0	1	8	8
9	Significant beneficial impact	0	0	0	1	0	2	0	0	0	0	3	6	9	54
10	High beneficial magnitude and importance.	0	0	0	1	0	0	0	0	0	0	0	1	10	10
	Items considered	12	19	7	15	6	5	11	14	5	3	4	101		526

Table No. 4.19: Impact Matrix

Legend of attributes –

A. Modification of Regime B. Land Transformation and Construction C. Resource extraction D. Processing E. Land alteration F. Resource renewal Changes in Traffic H. Waste Replacement and Treatment I. Chemical Treatment J. Accidents K. Others

Thus, the marks obtained are **526**. Acceptability of a Project or a decision of "No Project" depends on the marks obtained as --

Score 750 to 1000	=	Environmental Acceptability is Very High
Score 600 to 750	=	Environmental Acceptability High
Score 450 to 600	=	Environmental Acceptability Moderate
Score 300 to 450	=	Environmental Acceptability Low
Score Below 300	=	Environmental Acceptability Very Low

Table No. 4.20: Yard-Stick for Ranking

This yard stick is the same as is approved by MoEF in Delphi Technique made applicable for Hazardous Waste site selection. With the methodical working of network matrix, considering both magnitude and importance of one hundred attributes, the environmental impact at this Site is expected to be in the middle bracket of "**moderate"**. Below 450 marks will have some anxiety.

This Site selection is also based on another accredited practice. This is discussed below.

1. (a)The Delphi Technique considers the following 34 attributes and four weight-ages i.e.:
   7 attributes, receptor related
   10 attributes, pathway related
   8 attributes, pollutant related
   9 attributes, waste management related.

   (b) The modified Technique used here considers 23 attributes and four weight-ages i.e.:
   7 attributes, receptor related
   5 attributes, pathway related
   5 attributes, water pollution and waste management related
   4 attributes, air pollution and waste management related
   2 attributes, solid waste management related.

2. Four types of marks for each attribute like 0 to 0.25, 0.25 to 0.5, 0.5 to 0.75 and 0.75 to 1.0 depending on facts of situations, chemical properties of pollutants and quantification are considered. These marks are known as **Sensitivity Index** (**SI**).

3. Combined consideration of (1) and (2) together gives attribute-wise weight-ages. These are the negative marks out of 1000 and ranking of candidate sites is based on comparison of these marks.

   Finding the sensitivity index (SI) shall be first task and is done in the table below.

   The attribute measurements or values or description are known as the team has traversed the area. The sensitivity index is awarded based on attribute properties in above table. The attribute wise score is arrived at by multiplying the sensitivity index and the weight-age of each attribute and is given in Table No. 6.25.

Attribute	**Sensitivity Index**			
	0.0 - 0.25	**0.25 - 0.5**	**0.5 - 0.75**	**0.75 - 1.0**
Receptor Related				
Population within 500 meters	0 to 100	100 to 250	250 to 1000	> 1000
Distance to nearest drinking water well	> 5000 m	2500 to 5000 m	1000 to 2500 m	< 1000 m
Use of site by nearby residents	No used	Occasional	Moderate	Regular
Distance to nearest off site building	> 3000 m	1500 to 3000 m	500 to 1500 m	< 500 m
Presence of major transportation routes	Airport	Internal road	Highway	Rail
Land use/ Zoning	Completely remote (Zoning	Agricultural	Commercial or industrial	Residential

	not applicable)			
Critical environments	Not a critical environmental element	Pristine natural areas	Wetlands, flood plains, and preserved areas	Major habitat or endangered or threatened species
Pathway Related				
Distance to nearest surface water	> 8000 m	1500 to 8000 m	500 to 1500 m	< 500 m
Ground water depth	> 30 m	15 to 30 m	5 to 15 m	< 5 m
Type of contamination	No Contamination	Soil Contamination only	Biota contamination	Air, Water or food contamination
Precipitation effectiveness index	Semi arid	Semi humid	Humid	Wet
Susceptibility to erosion and run-off problem	0 - 0.25 not susceptible	0.25 - 0.50 Potential	0.50 - 0.75 Moderate	0.75 - 1 Severe
Waste Related				
Water				
BOD generation level	< 250 mg/l	250- 500 mg/l	500-1000 mg/l	Above 1000 mg/l
Treatability COD-BOD	< 2.5	2.5 – 3.5	3.5 - 5	Above 5
Treatment	Tertiary	Secondary	Primary	No
Disposal	Land assured and crop perennial	Land seasonal	Stream up to 5km	Riparian
pH	6 - 8	5- 6 or 8 -	3 - 5 or	<3 or

		9	9- 11	>11
Air				
Industrial mix Fuel	Electricity	Oil	Bagasse	Coal
Control equipment	All including ESP or wet scrubber	Bag filter	Cyclone, Fly ash arrestor	None though required
Stacks heights	As per Act	30	< 30	None though required
Noise at boundary	upto 55 dB(A)	55 to 70 dB(A)	70 to 85 dB(A)	Above 85 dB(A)
Solid Waste				
Industrial mix (waste type)	None	Non-hazardous	Hazardous and Non-hazardous	Hazardous
Treatment - • Non hazardous • Hazardous	Recycle/ sale Recycle/ Incinerator	Secured landfill Secured landfill	Low landfill Sanitary landfill	None though required None though required

Table No. 4.21: Integration Consideration

Ranking:

Attribute	Attribute Measurement	Sensitivity Index	Weight-age	Attribute Score
Receptor Related				
Population within 500 meters	15 (nominal)	0.05	80	4
Distance to nearest drinking water well, m	2.0 km	0.58	60	24.80
Use of site by nearby residents	No	Zero	50	0
Distance to nearest off site building	1.5 km	0.5	40	20

Land use/ Zoning	Industrial	0.63	30	18.9
Presence of transportation routes	State Highway	0.37	30	11.10
Critical environments	No	Zero	30	0
Sub total			320	**88.80**
Pathway Related				
Distance to nearest surface water	2.75 km	0.44	55	24.20
Depth of ground water	30 m	0.25	45	11.25
Type of contamination	Air, water	0.75	45	33.75
Precipitation effectiveness index	Semi Arid/ Arid	0.12	25	3
Susceptibility to erosion and runoff problems	Not susceptible	0.12	25	3
Sub total			195	**75.20**
Waste related				
BOD, mg/l	> 1000	1	40	40
PH	6-8	0.1	20	2
Treatability (COD:BOD)	About 2.5	0.05	40	2
Treatment	Thermal and III	0.1	50	5
Disposals	Secured	0.05	50	2.5
Air				
Industrial mix (Fuel)	Mixed	0.25	70	17.5
Control equipment	ESP	0.1	50	5
Stacks	As per Consent	0.05	50	2.5
Noise at boundary	70-85	0.67	30	21
Solid Waste				
Mix	Non-Hazardous	0.25	45	11.25
Facilities	Sale	0.10	40	4
Sub total			485	**147.75**
Total				**331.75**

From the above considerations we have to place our present Project site at appropriate level as per following slabs.

Score 750 to 1000 = Pollution Potential Very High
Score 600 to 750 = Pollution Potential High
Score 450 to 600 = Pollution Potential Moderate
Score 300 to 450 = Pollution Potential Low
Score below 300 = Pollution Potential Very Low

Table No. 4.22: Yard-Stick for Ranking

Since with the methodical working of sensitivity index and weight-ages, the total scope of pollution potential has come to **331.75**, the site fits into "**LOW**" Pollution Potential.

4.9 Chapter Conclusion

On the background of known Environmental Status of the area, and having known the pollution potential of the manufacturing process, efforts are now made to minimize the pollution to such an extent that the impact on environment will be most minimum. This is done methodically with accredited methods and found a satisfactory situation in this particular case.

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CHAPTER 5
ANALYSIS OF ALTERNATIVES
(TECHNOLOGY & SITE)

Contents of this Chapter shall be:

Various alternatives for various considerations, Pros and Cons, Environmental Significance, ranking and Selection
Or "No Project" Option

5.1 Introduction

It is necessary that one should try to find various alternatives and what is environmentally best be preferred. There can be many points for which alternatives must be found. This is attempted here, irrespective of whether scoping has asked so or not. This is done voluntarily and submitted herein below.

5.2 Alternatives:

Any proposed human activity is never a simple straightforward matter. A number of decisions are required to be taken and for each step a number of alternatives are available. Selection is thus all the more critical in an industrial development where time, money, environment and natural resources are at stake.

This Industry decided to undertake an "Alternative Analysis (AA)" for this project. The various alternatives are (1) Product (2) Raw materials, (3) Technology, Engineering & Hardware, (4) Site, and (5) 'No-Project'.

Highlights of the final selection can be summarized as:

- Large quantity of condensate water will be recovered from integrated-evaporators which will be utilized in the plant itself for dilution molasses and make up of cooling water.
- Boiler ash contains plant nutrients such as potash and phosphate. This will be given to farmers as plant nutrients.

5.3 Product

The industry has plan to expand the sugar unit from 2500 TPD to 9000 TPD and to establish 36 MW capacity baggase based Cogeneration Power Plant, for which already permission is available from Government of India, by way

of Acknowledgement from Ministry of Commerce and Industries, Government of India, New Delhi (IEM).
The plant will be designed to produce 36 MW Co-gen plant. Electricity will reduce the load of MSEDCL.

Justification of Plant Capacity: We have proposed expand the sugar unit from 2500 TPD to 9000 TPD and to establish 36 MW capacity baggase based Cogeneration Power Plant. The proposed project has envisaged 110-125 kg/cm² pressure and 580⁰C temperature parameters for steam, which will give optimum efficiency and power generation, when extracted through a matching turbo generator set. The capacity of the boiler and turbine will be 160 TPH and 36 MW respectively

5.4 Raw Material Area Alternative:

The capacity of the proposed Co-gen plant shall be 36 MW. For this the main and sole raw material is baggase. The estimated parameters will be form on the the basis of BOOT Agreement. The landed cost of raw material has been assumed based on prevailing market prices. The bagasse price has been considered as per PDA/MOU between HSF & BOOT Developer brings about the change.. Thus, the following raw materials will be used.

Item	Quantity	Unit	Particulars
Bagasse	1358	T/d	Available in District

Table No. 5.1: Raw Materials

These raw materials are available with us and additional as well to us from assured vendors in this and adjoining district where much sugarcane based agro-industries are working. There is also good road and rail connectivity. Some other helping substances also will be needed in minor quantities on occasions such as acid etc., as also lubricating oil. The choice of source, as mentioned above was adopted because there the materials are in purer forms. If raw material is purer and is in the desirable form, it avoids a probability of discards or non-specification outcome. It also obeys the mass balance more faithfully than when impurities are involved. No problem of any empty containers or bags is encountered.

Raw Material Availability

The capacity of the proposed Co-gen plant shall be 36 MW. For this the main and sole raw material is baggase. The estimated parameters will be form on the the basis of BOOT Agreement. The landed cost of raw material has been assumed based on prevailing market prices. The bagasse price has

been considered as per PDA/MOU between HSF & BOOT Developer brings about the change.. Thus, the following raw materials will be used.

Item	Quantity	Unit	Particulars
Sugar Cane	14.40	M.ton/seson	Available in District and in premises
Bagasse	4.32	M.ton/seson	Self-generation from cane crushing

Table No. 5.3: Raw Materials

Raw Material Availability

Sugarcane availability

- Sugar cane cultivation land is available as;
  - Kadegaon Tahshil -Tembu Irrigation project has sugar cane cultivation land 26554.71 Hector
  - Kadegaon Tehshil- Takari Irrigation project has sugar cane cultivation land 28954.96 Hector
  - Khatav Tehshil- Urmodi Irrigation project has sugar cane cultivation land 22784 Hector
  - Total sugar cane land available 78274.67 Hector
- This site of about 30 acres has a connecting road and has approachability. CAEIL has been allotted additional 43 villages in the area of operation of CAEIL. This has brought additional 2000 Ha area under sugar cultivation.
- The net sugar cane availability together from old & new area has increased. The expected net cane availability since 2011-12 crushing season will be over 7.00 lakh MT. The excess sugarcane is being left uncrushed & hence CAEIL management has decided to increase the crushing rate to take care of the additional sugarcane cultivated in the area of operation.

Baggase availability

- The maximum bagasse generation achieved in last five years is 30.30% on cane. The basis for bagasse generation is taken at 30% on cane for the proposed Cogen Project. Mill bagasse and cane trash will be main fuel for the proposed Cogen Project during crushing season and saved bagasse and cane trash will be the main fuel during the off season period. Imported coal will be used as auxiliary fuel for exigency and retaining power cycle parameters.
- Cane trash, which is available in the cane fields will be utilized both during season and off season up to 10% by weight, to extend the operation days in particularly in the off season period. Coal can also be used up to 15% as per the MNRE guidelines.

- The design and guarantee fuel for the Cogen Project will be bagasse generated from the sugar mill, during the season operation of the sugar plant. However, the plant will be suitable for operation with fuels like saved bagasse, cane trash & coal. The extent of usage of the fuels will be depending upon the availability.
- Due to availability of variety of fuels, the boiler will have to be designed for the multi fuel firing type for the proposed Cogen Project.
- In this District alone there are 18 running Sugar Mills and 13 under erection, with a total crushing of 68,000 TCD.
- Sugar Mill normally crushes 15-20 % more than the capacity, runs for 200 days and produces molasses at 4.69 % on cane. However, for safe calculation we presume no over crushing, only 180 days and only 4 % molasses on cane.

Bagasse availability

Our requirement of Bagasse for the generation of 36 MW Co-gen plant.

- List of existing sugar and distillery unit in dist. Is as follows;
- In this District alone there are 20 running Sugar Mills and 13 under erection, with a total crushing of 132,200 TCD.
- Sugar Mill normally crushes 15-20 % more than the capacity, runs for 200 days and produces molasses at 4.69 % on cane. However, for safe calculation we presume no over crushing, only 180 days and only 4 % molasses on cane.
- With these safe assumptions, the molasses available will be
- 132,200 X 180 X 0.04 = 951,840 TPY
- In this District there are nine running Distilleries and three are under erection with a total capacity of 679 KLPD, all attached to their respective Sugar Mills and non as stand alone.
- These twelve Distilleries (679 KLPD) will need molasses as 2716 TPD as raw material. As these are compost- makers, they are permitted to run for 270 days and thus molasses requirement annually will be 733, 320 TPY.
- Thus, this District has 218,520 TPY excess availability of molasses.
- Our need is (280 TPD with 330 running days) 92400 TPY, which is only a fraction of excess available molasses in the District. (say as 42.28 %)
- In addition to this, in nearby Bagalkot, Kolhapur Districts there are more Sugar Mills.
- Thus adequacy of main raw material and we have a choice to select best one which is not deteriorated.
- The Acid, Nutrients, Anti-forms TRO, Culture are required in small quantities and only occasionally. These can be had from Belgaum, Kolhapur, Bangalore or Mumbai

5.5 Technology Alternatives:

Sugar manufacturing

The process of manufacturing involves the following steps:

I. Extraction of cane juice from cane
II. Purification of cane juice
III. Evaporation of cane juice to facilitates crystallisation
IV. Crystallisation of Sugar
V. Separation of sugar and liquid by Centrifugal force
VI. Re-Boiling of Liquid
VII. Drying

Brief Description of The Above Process Steps Are Given Below:

I. Extraction of Cane Juice from Cane

The cane which is brought from fields by carts/trucks/tractors, weighed and unloaded in the cane carrier for extraction of juice from sugarcane. The unloaded cane will pass through preparatory devices (Chopper, leveller and fibrizer). The preparatory devices will cut the cane stalks into pieces.

The prepared cane enters mills consist of multiple units of three roller combination through which the prepared cane. To aid in the extraction of juice spraying thin juice from previous mills and water before last mill, directed on the blanket of Bagasse as it emerges from each mill help to leach out the sugar.

Use of Bagasse

The residue that leaves the last mill is called bagasse contains un-extracted sugar, woody fibre and water. The bagasse will be used as fuel to produce steam and power as co-generation. The generated steam will be used to run turbines for power generation. The outlet of the turbine i.e., low pressure steam will be used for mill juice processing. The condensed water will be sent back to boiler for steam generation during crushing season.

II. Purification of Cane Juice – Clarification

The extracted juice from mills is strained to remove bagasse particles before sending for process. This juice is sent through a mass flow meter and the quantity automatically recorded. The dark green juice from mills is acidic

and turbid. The universal process employed to remove both soluble and insoluble impurities is called Sulphitation process. The juice will be heated up to 70^0C to 75^0C to avoid inversion. In sugar plant as a measure of steam economy primary heating will be done by tubular heat exchanger using heat energy available from the condensates of evaporators and pans.

Liming and Sulphitation

The process in whichmilk of lime(Ca(OH)2) is added to the juice simultaneously in juice sulphiter, thereby pH of juice will be increased to 6.9 to 7.2.

$$CaO+H2O \longrightarrow Ca(OH)2 + Colour$$

The aim of this neutralization is to remove colourants from the juice, and to neutralize organic acids. The formation of tri-calcium phosphate and sulphate, which are products on sedimentation and carry impurities present in the liquid. Lime consumption (Cao) ranges from 0.18 to 0.25 % on cane according to the treatment strength required. The absorption of the SO2 gas (sulphurdioxide) by the juice takes place in juice sulphitor. The SO2 gas is produced in the unit by burning sulphur in the presence of air, in special furnace and the reaction is given below.

$$S+O2 \longrightarrow SO2$$

The main objectives of Sulphitation are;

- Sulphitation is the practice of adding sulphur dioxide (SO2) to process streams in a sugar factory. This is done for one of three reasons :

1. **pH control** - the SO2 in aqueous solution forms sulphurous acid H2SO3(aq) which reduces the pH of the process stream. An example of this would control of diffusion water pH in a beet factory, where keeping the pH below 5.5 reduces the extraction of pectin from the beet cell walls which helps pulp pressing.
2. **Biocide** - used in sufficient quantities the SO2 inhibits the life cycle of bacteria, reducing the quantity of sugar lost by bacterial degradation to lactic acid. This is similar to the use of sodium metabisulphite for sterilising home brewing equipment. The

efficiency of SO2 as a biocide is sometimes challenged in the literature.

3. **Colour blocking** - SO2 reacts with the carboxyl groups of invert sugars (glucose and fructose) to inhibit their participation in the colour forming Maillard reaction with amino compounds. By adding SO2 to juice before evaporation the increase in colour through the evaporators is kept to a minimum, protecting the juice from excessive colour formation at high temperature in the evaporators.

- Decreasing the viscosity of the juice and consequently of the syrup, to reduce viscosity and remove the colouring matters present in the juice. This ultimately facilitates better evaporation and crystal development.

Average consumption of Sulphur can be estimated in between 0.05% to 0.06% on cane. The sulphited juice is heated to approximately 101 to 103^{0}C to accelerate and facilitate the coagulation and flocculation of colloids and non –sugar proteins, emulsify fats and waxes, or in other words accelerate the chemical process, increasing decanting efficiency and also enabling removal of gas from the juice. The juice purification by removing the flocculated impurities from the previous treatments. This process is carried out continuously in equipment called a claifier. The clarified juice is removed from the upper part of Clarifiers and sent to the evaporation section for concentration. The mud will be withdrawn from the bottom of the Clarifiers and sent to rotary vacuum filter. In rotary vacuum filters, juice and filter cake will be separated by vacuum. The cake that is discharged are applied to fields as fertilizer and in some countries cane wax is extracted from this cake.

III. Evaporation

The clarified juice obtained in the clarifiers constitutes 75% water. The first stage of concentration is carried out in equipment called the evaporator, which operates continuously. The evaporator consists of five bodies, connected in series so that the juice undergoes progressive concentration from the first effect to the last effect to evaporate 75% of water which is

present in the juice for that we require steam. Hence exhaust steam from turbines at a pressure of 1.5 kg/cm2 at 125^0C will be fed to the effect of evaporator. Subsequently due to the evaporation of the water in the first effect will yield the same amount of vapour, which will be fed to the succeeding bodies. Due to the difference in the pressure and the vacuum in the bodies the evaporation of juice will takes place in all the evaporators. Initially clarified juice will have a brix of 14-16^0C, reaching 55-65^0C Brix from the outlet of the V body. This syrup is passed through a tower consists of absorption of the SO2 (Sulphurdioxide) by the syrup, lowering its original pH from 6.4 -6.8 to 4.6 -5.2. The water vapour generated from 1st evaporator will be used in subsequent bodies and the generated condensate will be utilised for cane juice extraction at mills, muddy juice filtration at vacuum filters, milk of lime preparation, pan washing and centrifuge. The excess condensate will be cooled and used for plant utilities and on land irrigation.

IV. Crystalisation

Crystallisation takes place in single effect vacuum pan. The syrup obtained from the evaporator will be boiled until saturated with sugar. At this point "seed grain" is added to serve as nuclei for the sugar crystals and more syrup is added as the water evaporates. Continuing the above process the pans are filled up till the desire size crystals are built up and dropped in mixers called crystallisers. The sugar and syrup forms a dense mass known as Massecuite.

V. Separation of sugar and liquid by centrifugal force

From the crystallizers, the massecuite will be cured in the centrifugal machines. In centrifugals the sugar and molasses will be separated. In centrifugals there are two types of machines

I. Continuous centrifugal Machines

II. Batch Type centrifugal machine

The continuous centrifugal machines will be used for low grade massecuites like B and C Massecuites. The separated molasses will be taken back to the process for extracting the dissolved sugar which is present in molasses. The separated sugar having low purity is made as a magma minglers and it will

be melted in the sugar melter and will be taken back to the A massecuite boiling. High grade massecuite i.e., A- Massecuite will be cured in the batchtype centrifugals. The sugar discharged from the batch centrifugal has a high moisture level with temperature of around 60 to 65 degree centigrade.

VI. Re-boiling of Liquid

The aim of sugar boiling is to recover more sugar and send less purity of molasses (Final Molasses) as by product. 'A' Massecuite from Syrup and second grade used as 'seed' nuclei and high purity washings from high grade sugar (AL Molasses) high grade or 'A' Massecuite is boiled. From this 'A' Massecuite we get white sugar, 'A' Heavy Molasses and AL molasses. This AL light molasses will be sent back for 'A' Massecuite boiling. The AH molasses is being sent for 'B' Massecuite

"B" Massecuite

The AH Molasses is taken in to batch pan and boil till the super saturation stage. At this point 'seed slurry' is added to serve as nuclei for the sugar crystals. Continuing the boiling by feeding AH till the crystals size reaches to 160 to 180 µm. The grain will be transferred to vacuum crystallisers, futher boiling takes place in continuous vacuum pans. The continuous pan outlet massecuite size will be 250 to 300 microns. The 'B' grade Massecuite separation we will get B seed and B heavy molasses. The part of B seed will be sent for A graining and balance for melting. B heavy molasses sent for „C" Boiling.

"C" Massecuite or Low Grade Massecuite

As this is the important massecuite from which mother liquor goes out as Final Molasses must be of low purity. Hence, more number of small crystals must be present to have larger area to deposit or de-sugar the mother liquor. Here the crystals are smallest to achieve our aim.

Graining is done using 'C' light and AH molasses in batch pan and boiled till the super saturation stage. At this point seed slurry of 3 to 4 microns is added to serve as nuclei for the sugar crystals. Continuing the boiling by

feeding C light and BH molasses till the crystals size reaches to 70 to 90 microns. The grain will be transferred to C vacuum crystalliser. Further boiling takes place in continuous pans by feeding BH molasses. The crystals size of pan outlet is 150 to 180 microns. The massecuite dropped to Mono Vertical crystalliser for cooling. During cooling of the massecuite the temperature brings down to 42 to 43 degree centigrade to achieve maximum sugar recovery. The cooled massecuite fed to continuous centrifugals for separation. The separated mother liquor termed Final Molasses will sent to distillery industry. The sugar separated from first curing is mixed with water and sent for second curing. During second curing we will get C seed and C light molasses. C seed will be sent for 'A' Boiling and C light molasses sent for C boiling.

VII. Drying

The separated sugar from 'A' centrifugals cooling and drying of the sugar is carried out in a multi tray hopper, in the hopper the cold and hot air will be pass in co-current direction to bring down the moisture and temperature of the marketable sugar. From the drier, the sugar passes through grader where the separation of sugar of various grades depending on the size and colour like: L-30, M-30, S-30 and SS-31 will takes place. The graded sugar will be collected in bins. The sugar from the bins will be weighed in automatic weighing scale, stitched and will be sent to the sugar godown. Sugar is stored in 50 kg PP bags and 50kgs "A" twill gunny bags in sugar godown.

Cogen manufacturing

The manufacture of Co-gen through Bagasse consists of following operations.

- The co-generation power Plant will have installed capacity of 36 MW and will employ 110 kg/cm2 and 540 0C configurations. Bagasse generated from cane crushing, excluding handling losses and bagacillo requirements will be available for operation of the high pressure boiler during season of 160 days.
- The design philosophy will be to generate optimum levels of power from high pressure steam, supply steam and power requirements of the sugar complex and auxiliaries, and export optimum level of power to MSETCL substation. All the equipment shall be designed to achieve best possible efficiencies under the specified operating conditions. Modern distributed

control system will be employed for monitoring the plant performance. The layout will be so designed to reduce the capital cost for interface piping / cabling, and ensure ease of maintenance and material handling.

- The auxiliary steam consumption for the power plant will be for soot blowing and other auxiliary consumptions like steam jet Air Ejector (SJAE) & Gland steam condenser (GSC) at high pressure, for twin HP heater at medium pressure and for de-aerator at low pressure. The auxiliary power consumption for the power plant will be about 7.95 % of generation during seasons.
- The colony power requirement will be met by the co-generation power plant, during season.

The brief design parameters for the cogeneration power plant will be as follows:

Boiler capacity, TPH	160 TPH
Pressure kg/cm^2	110-125
Temperature ^{0}C	580
Turbine capacity, MW	36 MW
Turbine type	Back Pressure
Season operation, days	160-180
Fuels used for season operation	Mill Bagasse
Boiler efficiency %	70.00 ±2.0
On Bagasse/cane crash	70.00 ±2.0
Feed water temperature ^{0}C	70-80 ^{0}C
Captive power consumption % of generation	36
Turbo-generator efficiency %	90.00
Utilization level %	80 in 1st year , 90 in 2nd year, 95 in 3rd year and onward

Bagasse / Fuel Balance

- The Bagasse and fuel balances are indicated in the following table

Sr. No.	Item	Value
		Season
1	Crushing rate TCH	113.60
2	Bagasse generation at 30.0 % on cane TPH	34.00
3	Bagacillo / handling loss at 1.0 % on cane TPH	0.34
4	Bagasse available as fuel at 29.0 % on cane TPH	32.95
5	Total equivalent Bagasse available MT	130482
6	Bagasse consumed by new boilers TPH (MT)	31.25
7	Bagasse saved / available for off season	1.7

	operation TPH (MT)	

Power Balance

- Following table gives the power balance for the season and off season

Sr.No.	Item	Value MW
1	Power generation MW	36 MW

17.75 MW (Avg. exportable power, Season 160 days) 22.89 MW (Avg. exportable power, Off Season140 days)

Co generation Manufacturing Process:

- Sugar cane is crushed in the milling tandem, after crushing Bagasse is produced, which is utilized as a fuel in the boilers. In boiler super saturated stem is produced, this steam is used for moving the power turbine to generate power and generated power is given to the grid.
- Power export of 17.75 MW during crushing season of the sugar mill and 22.89 MW during off season, will be fed to MSETCL substation by stepping up from 11 KV to 132 kV or through LILO arrangement..

Engineering & Hardware Options:

The process development and engineering designing of this project has been done in such a way that the whole operation of manufacturing can be carried out in a controlled system with no or low gaseous emissions, effluents, and minimum waste generation. The material handling and transfer of raw materials are also carried out in controlled and supervised system. Thus, the technology is not only cost-effective but also environment friendly.

The industry proposes to employ following specialty in their manufacturing

The peculiarities of the distillery units are as follows

- The first peculiarity is this, that the Project Proponent has made a provision of about 20-25% of their capital outlay for pollution control and greening drive in the outset itself.
- Selection of correct quality bagasse is possible because in addition to our own district Mills, there are a number of other in reachable distance in other neighboring District.
- When the weighing is done, the sucrose contents also will be recorded, which keeps an eye on recovery, resource conservation and waste minimization. This is prevention of pollution.
- Waste heat (exhaust steam) and wastewater (hot condensate) too is reused fully.

5.6 Site Alternatives:

The criteria kept for candidate sites included:

- Nearness of raw materials
- Purity of raw materials

- Ease of conveyance of raw materials
- Desire of Government for industrialization in that area
- Nearness of market
- Dispatch facilities
- Less Undulation of site
- Power and water supply, without encroaching on need of others
- Remoteness of target
- Not Destroying prime agricultural lands
- Maximizing infrastructure capacity utilization
- No forest land is involved
- No Revenue land is involved
- No tribal land is involved
- No R & R dis-satisfaction.

Existing site is passed by local body office for establishing this unit. It was our endeavor to strike such a balance that the environmentally best should also have acceptability commercially. Study of many existing units brought out an interesting point that they are required to haul raw materials from long distances to keep it running. This ends up in delay and vehicular pollution. In this unit the material flow is so kept to get an advantage that the requirement is fulfilled by quick haulage.

The site should be well connected by Road, so that both the raw materials and finished goods can be conveniently handled. The Road is neither too busy, so as to have a fear of accidents, nor is too away from network. Area requirement and built-up area requirement in this industry is only moderate. We have made a survey of a few existing units to find the “Use Factor” of their built-up area. Accordingly the Architects have designed a least- plinth outlay. Less buildings and less roads means saving of rubble, sand, bricks, etc, which otherwise has to be procured by robbing nature.

Some part of this District is socio-economically backward and the government has a desire to improve its status. The land of the District as a whole cannot be said to be of a prime agricultural importance. The pollution generation from this industry is finally made insignificant having taken all the precautions from raw material selection up to low or no waste generation and conversion. This site has a connecting road and has approachability. This site is connected with State Electricity Board power. When various sites were seen, this site appeared to be environmentally best as also from the business angle and therefore this option was finally adopted.

On the four sides of this particular site we have only open fields. There is no habitation within one km. There is no sensitive establishment in the vicinity

such as health resort, hospital, archaeological monuments, sanctuaries, etc. The normal wind direction is found to be favorable at this site. It is found that:

1. Majority of the villages are engaged in agriculture.
2. All these villages have road network connected.
3. None of these villages have fully satisfactory amenities like medical facilities. education, employment, transportation, communication. They would like to have this through media of industry.
4. All are provided with drinking water from wells or Government Water Supply Schemes RWS. Hence **TI** does not encroach upon their supply.
5. The population is limited.

With all this consideration, this site was ranked first and adopted.

5.7 'NO-PROJECT' Option:

In this option, it is required to be considered as to whether it is more advantageous to the Nation; not to commence at all the production proposed.

The district statistical Census report and Gazetteer of the District clearly states that the socio-economic conditions in this district are very low. They will, therefore, need a reasonable industrialization.

On this background in order to support the national requirement, **TI** has proposed this activity to produce best quality steel that is in major demand. Wasted steel is an environmental risk if not consumed quickly. On the other hand the resultant product bars or structural is a substitute supportive to infrastructure development of the Nation. In other words if a "No Project" option is selected the repercussions will be widely felt around. Therefore, No Project option cannot be entertained.

It is noteworthy that the activity now proposed will support this cause of National productivity, of saving the foreign exchange, of providing employment and in an environmentally friendly manner.

This project, as it will be soon shown, keeps an aim of sustainable development. 'No-Project' option is adopted only in an extreme last step of negative listing and is not warranted at all in the present case.

5.8 Chapter Conclusion:

In any human activity there are always possibilities of finding various options. **TI** decided to examine and adopt one such option that will be both environment friendly and best suited for production. Various alternatives in terms of product, raw material selection, technology, engineering and equipment are considered. A final selection is thus arrived.

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CHAPTER 6
ENVIRONMENTAL MONITORING PROGRAMME

Contents of this Chapter shall be :

Managerial and Technical aspects of monitoring the effectiveness of mitigation measures (incl. measurement methodologies, frequency, location, data analysis, reporting schedule, emergency procedure. Detailed budget and procurement schedules).

6.1 Introduction

The Objective of this Study is to minimize or off-set the adverse impacts that might be created due to this project. Various mitigation measures are designed and described. In operation phase we shall have to check continuously as to (1) whether our measures are being taken as per design and (2) whether the resultant impacts are coming inside the tolerance limits. This can happen only if we have a specialized cell, higher management support for the cell, adequate funding, support of library-laboratory, open dialogue corridor with all the stake-holders and authorities, and if the success indicators are in agreement with our findings. As no job is complete unless paper work is complete, documentation will be necessary along with periodic Reporting to MoEF.

6.2 What will be Monitored

It is seen that the ultimate aim is to have the congenial environment. Hence the environment is required to be monitored. The stations will be the same as where the samples are taken while preparing this EIA, or as may be by SPCB

No.	**Media**	Stations	**Parameters**	**Frequency**
1	Surface Water	3	6	Half- Yearly
2	Ground Water	3	6	Half- Yearly
3	Ambient Air	3	3	Half- Yearly
4	Ambient Noise	3	2	Half- Yearly

Table No.6.1: Summary of Sampling

The above shows only the natural environment. For assessment of impact on manmade environment, statistics will be assembled especially about literacy, employment and wages for the people of this village. For this purpose Public opinion will be assessed by our PRO, whose study will also include smoothness of traffic, parking problems outside, and need of any other assistance to villages.

Environmental Protection will be met only if the pollution control units work with capability. For this, performance efficiency of each unit of ETP and ECE (effluent treatment plant and emission control equipments) will be assessed. Help of laboratory is necessary to run a plant. CPCB has published many booklets related to various industries and have given certain monitoring schedule. Here is one example from book **COINDS/9/1980-81.**

#	Station	Frequency	Examine (*)
1	Screen	Weekly	SS
2	Oil-Grease Trap	Weekly	Oil & Grease
3	Anaerobic Lagoon	Every third day	BOD, SS
4	Activated Sludge	Daily	DO, pH, MLSS
		Every third day	BOD, SS
		Fortnightly	Microscopy
5	Trickling Filter	Every third day	BOD, SS
		Fortnightly	Microscopy
6	After final treatment	Monthly	All consented
7	Disposal land	Monthly	% Sodium, pH, Dissolved Solids

(*) Whatever applicable to our ETP units will be taken up with suitable frequency.

Table No.6.2: ETP Units operation monitoring

The ETPs and ECEs must be maintained properly and this too must be monitored. Instead of emergency maintenance, preventive maintenance is better. The modern concept is predictive maintenance. Suggested schedule is :

#	Part	See (*)	Frequency
1	Bearings	See temperature	Daily
		Change grease	2-monthly
2	Gland	Change packing	2-monthly /as reqd
3	Indicators	Pressure gauge, vacuum gauge calibration of	3-monthly
4	All type valves	Change packing	6-monthly
5	Impellor	Check all blades, sleeves, bearing, impel nut check	Yearly, change if reqd
6	Electric motor	Open side doors, blow dust, check air gap	Monthly
7	Motor winding	Blow off dust, test insulation	2- Yearly
8	All hand carts, wheel barrows	Grease wheels	Monthly
		Change rubber tyres	6-monthly if reqd
9	Gear box	Oil level	Check every week, replenish 3-monthly
10	Scraper shoe	Tighten nut bolts, change broken-bent members, change leather-rubber shoes	3-monthly
11	Central turn table	See oil level	Weekly
		Check chain of sprocket, steel balls, gear	Yearly
12	Aerator	See oil and grease	Weekly
		Painting-coating blades	Yearly

(*) Whatever applicable to our ETP units will be taken up with suitable frequency.

Table No.6.3: ETP units Maintenance Monitoring

The above table may be readjusted according to the catalogues of the suppliers.

Reports of the findings will be useful for rectification internally. The same will be submitted in the format as may be asked by MoEF and SPCB with due frequency.

6.3 Special Cell & Funds

Environmental organization will have an environmental cell responsible for pollution control and also for self-examination through monitoring. Such massive work cannot be conceived unless a framework of men, material and money is specially earmarked. This is done by establishing a Environment Monitoring Schedule first and then an Environment Management Cell. The cell shall be backed by the highest person of the Organization.

The structure:

#	Level	Designation	Purpose
1	Highest	Managing Director	Policy
2	Top	Gen Manager	Guide
3	Overview	Watch Dog Committee	Super-Check
4	Manager	Chief Engineer/ Chief Chemist/ Environmental Scientist	Job (*)
5	Executive	Shift-in-charge	Implement

Table No.6.4: Environment Management Cell

(*) The Jobs are described below:

#	Facet	Aspects
1	Construction Phase	Material waste minimisation, labour camp sanitation, Noise, oil-grease and vibration nuisance control, accident prevention.
	Post-construction	Remediation of ugly sites, if any
2	Air	Car/ truck census, PUC control, Noise & Odour mitigation, Dust control
	Water	Water budget, O & M of Water Purification and Wastewater Treatment Plants.
	Solid waste	Segregation, Collection, Composting, Carting
	Greening	Tree Census, Tree Planting, Lawn Development, RWH and Storm water, Agri. Return water, Control on use of pesticides, nursery
	Monitoring	Field observations, laboratory tests, interpretation & Reporting
	Public relations & Press	Documentation, Updating, rehabilitation, training, Meetings, Rapport
3	Occupational Health	Routine surveillance, prevention, accident relief, Snake bite remedies.

Table No.6.5: Job (*) of Environment Management Cell

The Cell working under Chief Engineer/ Chief Chemist /Environmental Engineer shall fulfill these jobs.

The personnel required to man this cell as stated above, may be tailored according to need. As long as the activity is of smaller scale the jobs can be combined and entrusted to lesser number of people.

Investment on Matters Environmental

For the purpose of Pollution Control, Resource Conservation and Environmental Protection, the Project Proponents PP has decided to set aside suitable amount as capital expenditure, with a due provision for likely recurring expenditure per year. The work on Project will continue over years and the amount of total capitalization will be released**,** in due course without delay.

#	Environmental Aspect	Capital Expenditure Rs in Crores	Recurring Expenditure Rs in Crores
1	Emission control Engineering	2.00	0.25
2	Water & Wastewater management	4.00	0.5
3	Solid Waste	1.00	0.16
4	Greening Drive	0.5	0.15
5	Monitoring	0.01	0.09
6	Environmental Cell & PR	0.02	0.09
7	Other aspects like Rain Water Harvesting, Safety, Security etc	0.2	0.04
	Total	**7.73**	**1.28**

Table 6.6: Funds for Environmental Care

6.4 Stake-holders & Stakes

Generally there can be many stake-holders to whom a project may either give comfort or may give nuisance. These issues are identified first and then discussed as –

#	Aspect needing monitoring	Stake for
1	Water source encroachment	Villages
2	Power load shedding	Villages
3	Construction phase disturbances	Villages & Government
4	Rehabilitation	Villages
5	Storm-water	Villages & Government
6	Transparency	All. Villagers, Our staff & Colony Residents, Government

Table no. 6.7: Environmental ramification points

- **Sources of Water:**

Issue can be whether **TI** is robbing someone else's water for its own benefit and encroaching on right of others. The Answer is No.

For **TI**, there is assured and dependable source of fresh and recycled water source and sumptuous water is available from Government. We do not need much water for process as such, and hence we are not encroaching on anybody else's water source. In addition we are going to do harvesting of rain on roof waters. This is reserve force. Our own treated wastewater is another source and is reused to a substantial extent.

- **Construction Phase Disturbances**

On many occasions it is seen that there can be a ramification at construction phase, in case proper precautions are neglected at this early phase. In this particular case, more anxiety is not there because construction phase is going to be a limited and short-lived matter. This is given due thought, as it deserves. Cutting- filling nearly balances. Construction debris may be recycled. Local people and material will be encouraged.

- **Compensation Package**

There is a peculiar situation here, where there acquisition of land is a smooth matter. It may be seen that

- No forest land is procured
- No Revenue land is procured
- Private land is not procured from tribal
- No person was actually required to vacate his dwelling and shift away.
- Extra precaution taken to see that the Scheduled Tribes and Scheduled Cast brethren are not facing any forcible evacuation or unwilling compromise, but there was none
- This land is owned by nine land holders being in the range of 3.5 to 20 acres. These nine land owner were previously taking only one rain-fed crop. None of them is completely deprived as they still have other land for cultivation. In fact, this group themselves had approached us with their proposal to take this land and commenced an industrial activity, where they will get a livelihood. Their interest for employment is supported by this management. The transaction is thus completed with golden hand- shake. The procedure was maintained exactly as per Government Acquisition Act, in their presence. There is also a provision that if they are aggrieved, they could approached the Collector. No such compliant is ever made. Thus satisfactory completion.

  As full precautions are taken as above there cannot be any cause for restlessness of any sort, and is not.

- **Transparent Public Relations**

In this particular case, the PP is signing as an Occupier on the Application for Consent to establish and hence is answerable to the SPCB, Government and all concerned for a very long tenure, almost perpetually. We, therefore, will have to have sustainable relations with all levels of Government Departments on one hand and the local sons of the soil and the work-force, on other. We have given a thought to this balancing act and hence have established a Public Relations Office (PR) already. Matters are proposed to be handled smoothly.

Industry shall have four major wings viz. Administration, Technical, Legal and Public Relations. A person of high caliber shall be heading each of these for cells, and work with imagination.

- The conditions laid in all the permits, licenses, consents, N.O.C.s shall be minutely studied and compliance shall be commenced.
- Periodically Reports shall be submitted
- The inspectors of various Departments shall be periodically invited to examine the status of our compliance and guidance shall be obtained.
- Corridors of dialogue and communication shall be kept open with the people, peoples' representatives, NGOs, Public Interest Groups, so that any social suffering grievance shall not become a complaint, a conflict and end up in litigation.
- Various departments with whom rapport will be kept are --

Deals with Sector of	**#**	**Deptt/ Organisation**
Government	1	Forest Deptt
	2	Irrigation Deptt
	3	Agriculture Deptt
	4	Revenue Deptt
	5	Urban Development Deptt
	6	Town Planning Deptt
Semi-Government	7	Zillah Parishad
	8	State Road Development Corporation
	9	State Pollution Control Board
	10	Gram Panchayats
Non-Government	11	Non-Government Organisations
	12	Peoples' representatives MLA, MP
	13	Tribal & Local Community
	14	Clients

Table No.6.8: Interface – This New Industry's Administration.

6.5 Action

6.5.1 Environmental Monitoring Schedule:

The monitoring schedule is decided as under (or as may be specified by Authorities):

#	Facet	Stations at	Parameters	Frequency
1	Surface water	One upstream One downstream One nalla	BOD, pH, SS, TDS, Colour	H-Y
2	Groundwater	One up-gradient Two down-gradient	BOD, pH, SS, TDS, Colour	H-Y
3	AAQ (Ambient Air Quality)	Three directions @ 120 degrees	RSPM, SO2, NOx	H-Y
4	Noise	Three directions @ 120 degrees	Decibel	H-Y day and night

Table No. 6.9: Monitoring Schedule

Legend: D = Daily, W = Weekly, M = Monthly, H-Y = Half-Yearly, Y = Yearly

6.5.2 Action Schedules:

There will be three facets to design and follow the schedules viz.: (A) for compliance of responsibilities, (B) for day-to-day operation and management of ETP and ECE, and (C) for routine environmental monitoring, to assess the impact and take timely warning. First two are already explained above by **CPCB Publications**. The schedule, for third aspect is:

Daily Compliance:

1. Take the meter readings - initial and final, for checking the water consumption.
2. Maintain the electricity consumption record for pollution control.
3. Monitor ambient air periodically as per Consent.

Monthly Compliance:

1. Monitor the emission sources through the competent authority and submit the analysis reports to the board.
2. Monitor ambient/work zone noise levels & ensure conformance to standards.

Quarterly Compliance:

1. Monitor the ambient air quality at upwind and downwind locations of the factory.
2. Review the Water Reuse performance.

Yearly Compliance:

1. Carryout "Environmental Audit Statement" of various environmental aspects, review the environmental policies with the help of experts and make the up gradation /changes accordingly.
2. Submit the "Environmental Statement" to the State Pollution Control Board in Form V under Rule 14 of the Environment (Protection) Second Amendment Rules 1992 of the Environment (Protection) Act, 1986.
3. Renew the Consent to Operate under the Water and Air Acts.
4. File the Cess returns to the State PCB under the Water (Prevention and Control of Pollution) Cess Act, 1977.
5. Renew the Hazardous Waste Authorization under sub-rule 3 of the Hazardous Waste (Management and Handling) Rules, 1989.

6.6 Success Indicators

The success of the sincere and honest efforts the PP is putting in, will be judged by various indicators, such as –

- There is no complaint of the villagers/ neighbors
- There is no complaint of the customers regarding quality of product and delivery schedule.
- No complaints from Government, semi-Government or Non Government Departments or Organizations
- Statistics of Health, Safety and Environment will be maintained and will be without blemish.
- Other Industries come to seek our advice.
- Demonstration to others for Rainwater harvesting, Groundwater Recharging, sand-substitute ash, building materials from ISO 14001 certified units, care for beet-growing etc.

6.7 Environment Monitoring Hierarchy:

TI is aware that environmental monitoring is not a job, which can be handled without a careful planning. The success lies if three components are simultaneously present viz. (1) management support, (2) efficiency of the environment management cell and (3) acceptability of resulting environmental quality, both by SPCB and by public. A structure of this plan and hierarchy of process flow for environmental management is prepared and enclosed as logics, which is self-explanatory. **TI** will adopt this structure and hierarchy, which is akin to principles and practice.

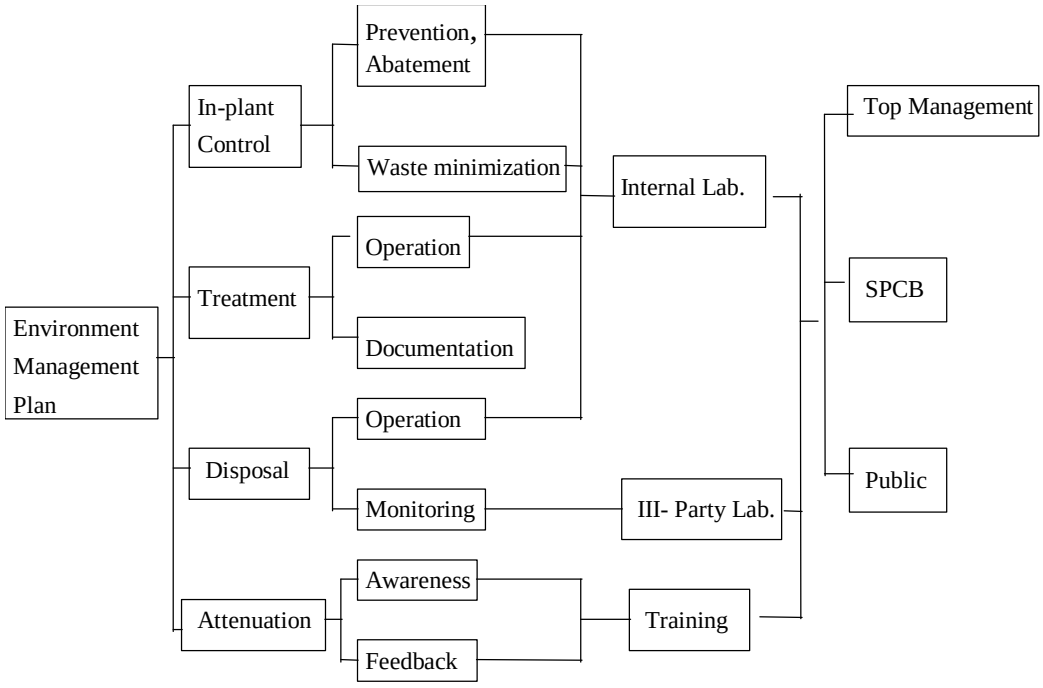

Figure No. 6.1: Structures

The ultimate aim is that the Proponents and Public make a combined effort in the same direction of **Sustainable Development.**

6.8 Chapter Conclusion

It is proposed to frame an Environmental Monitoring programme both in Construction and Operational stages to monitor the effectiveness of the mitigation measures by judging the impact on environment. A separate budget is proposed for the same as also a dedicated Cell. A transparent approach will be kept with documentation and Reporting with statistical treatment to the data. **Checklist of Statutory Obligations** will be maintained and compliance with it will be monitored.

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CHAPTER 7

ADDITIONAL STUDIES

7.1 Risk Assessment

7.1.1 Introduction:

Risk assessment is a methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing conditions of vulnerability that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend.

Risks are inherent in proposed thermal power plant operations since they involve working with

- High pressure super-heaters, re-heaters, economizer units exchanging heat with the hot flue gases.
- Turbines that utilize the HP steam to generate power
- Switchyard including transformers, isolators.

Nevertheless, a properly designed and operated plant will have a very low probability (to a level of acceptable risk) of accident occurrence. Subsequently, a properly designed and executed management plan can further reduce the probability of any accident turning into an onsite emergency and/or an offsite emergency.

The three main goals of risk assessment are

- Identify risks,
- Quantify the impact of the potential threats
- Provide an economic balance between the impact of risk and the cost of the safeguard.

7.1.2 Salient Feature of Risk Mitigation

- Design, manufacture and construction of buildings, plant and machineries will be as per National and International Codes as applicable in specific cases and laid down by statutory authorities.
- Provision of adequate access ways for movement of equipment and personnel will be made.
- Minimum of two numbers of gates for escape during disaster will be provided.
- In the vicinity of main plant entrance, there will be an emergency assembly point where plant personnel will assemble in the event of any disaster.

- Adequate numbers of fire Fighting equipments & Fire extinguishers will be installed in the work places for emergency purpose and the Supervisors/Workers will be trained to use the equipments.
- An ambulance will be provided in the factory premises.
- A qualified Doctor and a compounder will be employed for attending to any emergency.

7.1.3 Identification of Risks

For identification of risk due to proposed expansion of sugar unit and establish of cogen power plant, it requires in depth study of

- Raw material
- Process Risk
- Storages
- Operations
- Maintenance
- Safety
- Fire protection
- Effluent disposal

a) Risk: Raw material

Particulars: Availability of Sugar cane for crushing

The viability of sugar unit depends on availability of sugarcane. We have analyzed the availability of sugarcane and its potential in the area of operation of the proposed Sugar factory.

b) Risk: Boiler, turbine , generator and associated areas

Particular: Failure of safety devices, including pressure relief valves and interlocks

Ensuring pressure relief valves and interlocking arrangements as per standard design of equipment. Regular inspection and periodic safety certification of all safety devices. Compliance with required rules and regulations for safety systems.

c) Risk: Potential exposure to electricity

Particular: Entire power Plant, specifically the generator area, distribution panel and control rooms.

Follow up of standard operating procedures and regular training on electrical safety. Ensure suitability and adaptability of electrical equipment with respect to classified hazardous areas and protection against lightening protection and static charges. Adopting preventive maintenance practices as per testing and

inspection schedules. Ensure all maintenance and repair jobs with prior work permit system. Use of personal protective equipment and ensuring compliance of the Indian Electricity Rules 2003. Ensure all electrical circuits designed for automatic remote shut down.

d) Risk: Fire incident

Particular: Entire power plant, specifically the storage area, electrical wearing and fuel handling area.

Follow up of standard operating procedures and regular training on firefighting Mock drills of firefighting. Installation of fire alarm & proper fire extinguisher. Ensure suitability and adaptability of electrical equipment with respect to classified hazardous areas and protection against lightening protection and static charges. Adopting preventive maintenance practices as per testing and inspection.

e) Risk Effluent Disposal :

Particular: Ash generated from cogeneration plant, solid and effluent generated from sugar and Distillery Unit.

Standard operating procedures for disposal of ash need to follow like isolated disposal of hot ash inside the plant premises use ash for land filling, brick & cement manufacturing. Effluent will be treated as per regulatory norms and treated water will be reused. Solid organic waste will be used bio-composting. Regular monitoring will be carried out as per schedule to avoid any kind of pollution.

f) Risk: Health Risk

Particular: Exposure to toxic and corrosive chemicals

Provision of secondary containment system for all liquid corrosive chemicals fuel and lubricating oil storages. Constructing storage tanks and pipes for toxic chemicals and fuel oil as per the applicable standards. Inspection and radiography will follow to minimize risk of tank or pipeline failure. Provision of protective equipment such as protective clothing and goggles, safety shoes and breathing masks for workers working in chemical storage and handling areas. Provision of emergency eyewash and showers in the working area.

g) Risk: Safety risk

Particular: Ensure Worker Safety

Periodical EHsS training of staff and contractor. Ensuring special training to develop competent persons to manage specific issues such as safety from the system, risk assessment, scaffolding, fire protection, Training will include the proper use of all equipment operated, safe lifting practices the location and

handling of fire extinguishers and the use of personal protective equipment. Ensure good housekeeping practices (e.g. keeping all walkways clear of debris, cleaning up oil spots and excess water as soon as they are noticed and regular inspection and maintenance of all machinery). Daily collection and separate storage of hazardous and non-hazardous waste.

h) Risk: Force Majeure and Insurance coverage to the Project

Particular: Natural calamities like flood, earthquake, fire and other act of God and Act of Man etc.

Mitigation: Complete plant need to be insured and also care has been considered while designing and construction of the plant to minimize the impact.

Third party Liability, Workers compensation, Employers Liability, Legal and contractual liabilities, Loss of profit due to interruption due to fire machine, break down and related perils, loss of profit due to loss of generation are some of the other risk against which the mitigation measures has been considered in the project by the way of insurance.

7.1.4 Additional Risk & Mitigation

a) Risk: Performance risk

Particular: Ensured sugar cane & fuel availability

Mitigations: Sound cane development program planned, with appointment of experienced senior professionals and staff for the purpose. Biomass depots, trash bailers and entrepreneurship development/ contracts with biomass traders proposed. A full time fuel manager and dedicated staff has been proposed for the co-gen power plant & Sugar plant.

b) Risk: Marketing risk

Particular: Sugar / export power trade

Mitigates: Firm marketing tie ups in offing for sugar & export power sale. Alternative marketing channels explored. Urgent follow up & securing permissions from Government of Maharashtra for export power trade to be initiated.

c) Risk: Regulatory risk

Particular: Conversion/ clearances /tariff order

Mitigates: No difficulty envisaged, as various governmental agencies have already expressed their willingness to issue approvals/ consents. All the approvals in pipeline.

7.2 Disaster Management Plan (DMP)

7.2.1 Disasters

A disaster is a catastrophic situation in which suddenly, people are plunged into helplessness and suffering and as a result, need protection, clothing, shelter, medical and social care and other necessities of life.

Disasters can be divided into two main groups. In the first, are disasters resulting from natural phenomena like earthquakes, volcanic eruptions, storm surges, cyclones, tropical storms, floods, avalanches, landslides, forest – fires. The second group includes disastrous events occasioned by man or by man's impact upon the environment. Examples are armed conflict, industrial accidents, radiation accidents, factory fires, explosions and escape of toxic gases or chemical substances, river pollution, mining or other structural collapses, air, sea, rail and road transport accidents and can reach catastrophic dimensions in terms of human loss.

There can be no set criteria for assessing the gravity of a disaster, since this depends to a large extent on the physical, economic and social environment in which it occurs. However, all disasters bring in their wake similar consequences that call for immediate action, whether at the local, national or international level, for the rescue and relief of the victims. This includes the search for the dead and injured, medical and social care, removal of the debris, the provision of temporary shelter for the homeless, food clothing and medical supplies and the rapid re-establishment of essential services.

7.2.2 Objectives of DMP

The DMP is aimed at ensuring safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of the DMP, it should be widely circulated and personnel training should be provided through rehearsals/drills.

The DMP should reflect the probable consequences of the undesired event due to deteriorating conditions or through 'Knock on ' effects. Further the management should be able to demonstrate that their assessment of the consequences uses good supporting evidence and is based on currently available and reliable information, incident data from internal and external sources and if necessary the reports of outside agencies.

To tackle the consequences of a major emergency inside the factory or immediate vicinity of the factory a DMP has to be formulated.

The objective of the industrial DMP is to make use of the combined resources of the plant and the outside services to achieve the following:

1. Effect the rescue and medical treatment of casualties.
2. Safeguard other people.
3. Minimize damage to property and the environment
4. Initially contain and ultimately bring the incident under control .
5. Identify any dead;
6. Provide for the needs of relatives;
7. Provide authoritative information to the news media;
8. Secure the safe rehabilitation of affected area;
9. Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the Emergency.

In effect, it is to optimize operational efficiency to rescue, rehabilitate and render medical help and to restore normalcy.

7.2.3 On site Emergency Plan

7.2.3.1 General, Industrial, Emergencies

The emergencies that could be envisaged in the plant are as follows:

1. A situation of fire at the storage areas involving chemical storages.
2. Structural failures
3. Sabotage/social disorder.

7.2.4 Specific Emergencies Anticipated and Their Possible Mitigation Measures

- **Safety Equipment**
  1. Fire extinguisher
  2. Fire detectors
  3. Fire Alarm

The detailed on-site precautions to be taken while handling different emergency situations have already been depicted in PHA.

7.2.5 Off-Site Emergency Preparedness Plan

The task of preparing the off-Site Emergency Plan lies with the District Collector. However the off-site plan could be prepared with the help of the local district authorities. The proposed plan would be based on the following guidelines.

7.2.5.1 Introduction

Off-site emergency plan follows the on-site emergency plan. When the consequences of an emergency situation go beyond the plant boundaries, it becomes an off-site emergency. Off site emergency is essentially the responsibility of the public administration. However, the factory management

should provide the public administration with the technical information relating to the nature, quantum and probable consequences on the neighboring population.

The off-site plan in detail should be based on those events, which are most likely to occur, but other less likely events, which have severe consequence, should also be considered. Incidents which have very severe consequences yet had a small probability of occurrence should also be considered during the preparation of the plan. However, the key feature of a good off-site emergency plan is flexibility in its application to emergencies other than those specifically included in the formation of the plan.

The roles of the various parties who will be involved in the implementation of an off-site plan are described below. Depending on local arrangements, the responsibility for the off-site plan should either rest with the works management or with the local authority. Either way, the plan should identify an emergency co-ordination officer, who would take the overall command of the off-site activities. As with the on-site plan, an emergency control centre should be set-up within the emergency co-ordination officer can operate.

An early decision will be required in many cases on the advice to be given to people living within the range of the accident.

a) In the case of a major fire but without explosion risk, houses close to the fire only are likely to need evacuation, although a severe smoke hazard may require this to be reviewed periodically.

b) If a fire is escalating and in turn threatening a store of hazardous material, it might be necessary to evacuate people nearby, but only if there is time ;if insufficient time exists, people should be advised to stay indoors and shield themselves from the fire. This latter case particularly applies if the installation at risk could produce a fireball with severe thermal radiation effects.

c) For release or potential release of toxic materials, limited evacuation may be appropriate downwind if there is time. The decision would depend partly on the type of housing “at risk”. Conventional housing of solid construction with windows closed offers substantial protection from the effects of a toxic cloud, while shanty house, which can exist closed to factories, offer little or no protection.

Although the plan will have sufficient flexibility built in to cover the consequences of the range of accidents identified for the on-site plan, it will

cover in some detail the handling of the emergency to a particular distance from each major hazard works.

7.2.6 Aspects Proposed to consider in off-site Emergency Plan

The main aspects, which should be included in the emergency plan, are:

- **Organization**

Details of command structure, warning system, implementation procedures, emergency control centers.

Names and appointments of the incident controller, site main controller, their deputies and other key personnel.

- **Communications**

Identification of personnel involved, communication centre, call signs, network and list of telephone numbers.

- **Specialized knowledge**

Details of specialist bodies, firms and people upon whom it may be necessary to call e.g. those with specialized chemical knowledge, laboratories.

- **Voluntary Organizations**

Details of organizers, telephone numbers, resources etc.

- **Chemical information**

Details of the hazardous substances stored or procedure on each site and a summary of the risk associated with them.

- **Meteorological information**

Arrangements for obtaining details of whether conditions prevailing at the time and whether forecasts.

- **Humanitarian Arrangements**

Transport, evacuation centers, emergency feeding treatment of injured, first aid, ambulances and temporary mortuaries.

- **Public Information**

Arrangements for a) dealing with the media press office, b) informing relatives, etc.

- **Assessment**

Arrangements for : a) Collecting information on the causes of the emergency

b) Reviewing the efficiency and effectiveness of all Aspects of the Emergency plan

7.2.7 Role of the Emergency Co-ordination officer (ECO)

The ECO should co-ordinate various emergency services. The ECO should co-ordinate closely with the site main controller. Again depending on local arrangements, for very severe incidents with major or prolonged off-site consequences, the external control should be passed to a senior local authority administrator or even an administrator appointed by the central or state government.

7.2.8 Role of the Local Authority

The duty to prepare the off-site plan lies with the local authorities. The emergency planning officer (EPO) appointed should carry out his duty in preparing for a whole range of different emergencies within the local authority area.

It will be the responsibility of the EPO to ensure that all those organizations which will be involved off site in handling the emergency, know of their role and are able to accept it by having for example, sufficient staff and appropriate equipment to cover their particular responsibilities. Rehearsals for off-site plans should be organized by the EPO.

7.2.9 Role of Police

Formal duties of the police during an emergency include protecting life and property and controlling traffic movements.

Their functions should include controlling bystanders, evacuating the public, identifying dead, dealing with casualties and informing relatives of death or injury.

7.2.10 Role of Fire Authorities

The control of a fire should normally be the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer should also have a similar responsibility for other events, such as explosions and toxic release. Fire authorities in the region should be appraised about the location of all stores of flammable materials, water and foam.

Supply points and fire-fighting equipment. They should be involved in on site emergency rehearsals both as participants and on occasion, as observers of exercises involving only site personnel.

7.2.11 Role of Health Authorities

Health authorities, including doctors, surgeons, hospitals, ambulances and so on should have a vital part to play following a major accident and they should form an integral part of the emergency plan. For major fires, injuries should be

the result of the effects of thermal radiation to a varying degree and the knowledge and experience to handle these in all but extreme cases may be generally available in most hospitals. Injuries should be the result of the effects of thermal radiation to a varying degree and the knowledge and Experience to handle this in all but extreme cases may be generally available in most Hospitals For major toxic releases the effects vary according to the chemicals in question. The health authorities should be appraised about the likely toxic releases from the plant, which will enable them in dealing with the aftermath of a toxic release.

Major off-site incidents are likely to require medical equipment and facilities additional to those available locally and a medical "mutual aid" scheme should exist to enable the assistance of neighboring authorities to be obtained in the event of an emergency.

7.2.12 Role of Government Safety Authority

There will be the factory inspectors available in the region. They may wish to see well documented procedures and evidence of exercise undertaken to test the plan.

In the event of an accident, local arrangements regarding the role of the factory inspector will apply. These may vary from keeping a watching brief to a close involvement in advising on operations. In cases where toxic gases may have been released the factory inspectors may be the only external agency with equipment and resources to carry out tests.

CHAPTER 8
PROJECT BENEFITS

Contents of this Chapter shall be:

Improvements in the physical infrastructure, Improvements in the social infrastructure, Employment potential – skilled, semi-skilled and unskilled And other tangible benefit from this Project

It is seen that the Project is aimed to fulfill the objective of Sustainable Development. It will certainly improve social status. In what way and to what extent this will reach is submitted herein below.

8.1 Improvements in the physical infrastructure

This Project will improve the physical infrastructure of this area.

- It will not disturb the existing pattern of drainage, because the building construction is not massive. It is more a steel structure not preventing the natural flow of rain water. There will neither be any inundation nor any erosion. As roof rain harvesting is proposed, there will not be any incremental run-off causing floods downstream.
- Rain harvesting will improve the groundwater table. On the other hand no groundwater is consumed by us as we are either dependent on authorized surface water source or on recycled wastewater after full treatment. The enhanced groundwater will be indeed useful to the surrounding farmers who are down gradient. The green crops in their fields on such groundwater will improve the physical infrastructure.
- The industry is dependent on raw materials and helping chemicals, which arrives by road. The finished goods too is dispatched by goods. All the labour force will come by road. Thus we shall have to maintain the roads in good conditions. Road connectivity thus will improve. This improved physical infrastructure will be an added facility to the community for surface transport.
- Greening drive in the premises will give a pleasant look to the land. It will absorb some portion of the CO2 produced by fuel burning (utilities). For greening fresh water is not proposed to be used. The treated wastewater will be recycled and its CNPK contents will be useful as nutrients. Canopy of trees will arrest dust fugitive SPM as well as the noise.
- When we are developing our own tree plantation, concept of bio-diversity will be kept in mind. This will need many species. These will be made available to us only through nursery. Nursery once so established will be useful in turn for others too who need. The nursery available with us may inspire others to plant more trees in this area in their compounds. This physical infrastructure will available to them.

- Whether by a particular activity the physical infrastructure is improving or deteriorating is best judged by the change in prevailing land prices. Generally the land prices get appreciated based on two factors namely (1) the comfort that it offers and (2) the occupation that it serves. On both these counts, this distillery activity downstream of nearby sugar units is desirable. This consideration is also reflected when the people are contacted to know about their opinion on the new venture here.

8.2 Improvements in the social infrastructure

This Project will improve the social infrastructure of this area.

- It will not disturb the existing pattern of social relations and democratic set up. In the District similar industries are already running their units over the years. These are not only running with efficiency but are running with no disturbance from the local people. Local people have even encouraged the expansion of such mills for production. The same is the case for diversification. This mainly because they are accepted by local culture, without any disturbance to the existing pattern of social relations or hierarchy. Likewise the same Gram Panchayat continues with same members and it gets support from this unit and the unit gets encouragement from the Panchayat. The peoples' democratic set up is undisturbed.
- It is evident from a short history of last 5-6 years that the Zilla Parishad has become somewhat stronger since the inception of similar units in the district here. The proponent's management consists of good-meaning people. They will employ proper sons of the soil without discrimination, wherever feasible. The buildings of the unit have significant ratable value and substantial raw material comes into the premises of local body. The Proponent's management keeps the transparent account. This will further enhance with diversification and the Panchayat will have a continued benefit of taxes and cess.
- Time management is of importance especially in industrialized community though may not be so in agriculture oriented society. In rural background much of the time and energy is wasted in reaching from one place to another. This is due to lack of swift mode of transport. By the presence of this industry, number of vehicles in this area will generally improve (both private and public-owned). This will help shorten the time reaching destination and utilize it for some fruitful productive work. As people will more know about the importance of time, more vehicles will come on the roads.
- Society and this Industry are interdependent. Industry gets strength from the villagers and they get livelihood and amenity support. Both of them can get better future. To maintain this continuity, this is based on "Symbiosis", as also timely funds.
- The rural economy is found generally dwindling because farmers depend only on one single source of livelihood namely conventional agriculture.

With support of funds and amenities by our help, perhaps they will have more purchasing power and more use of domestic animals. The increased greenery and farming with support of the grass production can increase and animal husbandry will enhance. Buffalos, sheep and poultry can be a good business and work for ladies and elderly persons.

- Upliftment of rural sector is slow because of lack of amenities and facilities. If there is a nucleus of industry or steady support of money-flow, such utilities can come to that area and sustain. By presence of similar units, already we are seeing the availability of Banking services and Government Post Office. With the advent of unit like ours, these services will be used more and more advance facilities will come to the horizon. Fire fighting tenders will be now more easily available as also the Police Protection.
- In the study zone of 10 km radius, there was previously hardly any purchasing power and people had hardly any materials for sale. As a result even weekly bazaar markets were very scanty. It is now foreseen that there will be a well disciplines bazaar in the vicinity either to sell or purchase the needed commodities, without waiting for weekly bazaar or walking over there. The agricultural implements, agro-chemicals and vehicles will be in more demand and village grown milk products, vegetables and agricultural proceeds can be for sale.
- Education level goes along with flow of funds and avenue of livelihood. Dependence on Government subsidy also goes along with political stability of the area. The level of education and literacy (especially rural and women) is very poor, needing improvement. This activity by this Proponent will certainly play a catalytic role in this.
- Likewise the health level goes along with flow of funds and avenue of livelihood. Dependence on Government institutes like PHC (Primary Health Centre) also goes along with political stability of the area. The level of health and medication (especially children and women) is very poor, needing improvement. This activity by this Proponent will certainly play a catalytic role in this.
- Health awareness and economic independence may also help in Family Planning decision-making.
- What is stated above about the human health is equally true about animal husbandry and veterinary assistance. This may improve now.
- Living in harmony is an important aspect of the society. This can happen only if all the components are comfortably placed. Persons engaged in their respective vocation and accruing job satisfaction leads to this. This will become possible by this venture.
- It may not be out of place if we point out that the sister concerns of **TI** have already demonstrated their interest in community development. The group is associated with local social bodies, educational institutes, credit societies and developmental societies. The corporate social responsibility

initiatives are focused on employees, the community around its facilities and the environment. Running of the activities include

- running of community centres which employ the wives of the employees, where they are provided vocational training to make them self-sufficient and uniforms and hand gloves stitched by them can be used here.
- activities conducted by the employees focus on three groups: women, senior citizens and underprivileged children wherein each department in the company adopt an institution around here. These are schools, old age homes and remand homes.
- Unit will actively support the efforts of primary education to children of economically weaker section of society.
- On the environment front active drives of tree plantations across villages and training lectures in-house undertaken

8.3 Employment potential – skilled, semi-skilled and unskilled

The industry and its supporting activity need many types of people right from manual to managerial strength, in a pyramid. The raw material carting may need unskilled workers with people on tractors tankers, trucks and tractor repairers as skilled ones. So in manufacturing activity all three types i.e. skilled, semi skilled and unskilled people are required. The overall potential including the garages, loading-unloading actions, eateries, small shop owners is substantial. The local people can get a good share out of this. In the factory, science and technology prevails and there some outsiders will have to be engaged at least for the time being. If the second generation local people acquire that skill, they too will be able to fill the gap and accrue benefit of higher jobs. If the activity becomes stable by that time, perhaps expansion may become possible further and then employment availability may further enhance.

It can be stated that by this activity employment potential is certainly increasing in all walks of life – skilled, semi-skilled and unskilled

8.4 Other tangible benefits

Both tangible and non-tangible benefits will result from this activity and many of those are described above. Apart from direct employment, many other benefits will accrue like

- Flood control by rain-water arresting, and harvesting
- Groundwater level enhancing by recharging
- Time saving by quicker transport
- Aesthetics improvement by general greening with emphasis on biodiversity
- Availability of nursery facilitates plantation
- Developed economy strengthens democratic set-up.
- Strengthened democratic set-up will bring weightage to secure better school-subsidy and health-institutes
- Developed economy brings with it literacy and healthful living.

- Improved safety-security in surrounding with better Law and Order.
- Symbiosis and sustainable development will be the ultimate objective.

8.5 Chapter Conclusion

All these social benefits will come in reality by Project like this. With regards to the people sentiments expressed during the Public Hearing, the management PP adds the following

#	Thoughts
A	Industry appreciates that majority of the speakers have welcomed the unit. Industry promises to work with bona fide intention here.
B	Problems arising from Industry promises to work as per norms laid by (1) Government of India's Environmental Clearance and (2) Government of Maharashtra State Pollution Control Board's Consent; and thereby no problem will arise.
C	Employment will be given to the people who have given land and others, to the maximum extent possible and this is already conveyed.
D	As CSR Corporate Social Responsibility, industry will provide Education and health facilities as well as for women empowerment, through good offices of Zilla Parishad / local MLA.
E	The Industry will offer its potash-rich ash for soil additive to the villagers. Nursery will be made available in the initial stage.
F	Shares will be given as per common Rules, but our desired is to pass benefits to all.
G	Our industry is an ago-based unit producing material of human consumption. There is nothing poisonous or toxic element in this as pesticide unit (as mentioned) has. There is no heavy engineering-like machinery with potentiality of fear like body disabilities, or ill-health. We shall have standing vehicle to serve as ambulance and first aid for the workforce 24 x 7; with emergency arrangements with best private and civic hospitals in Sangli, Miraj and Karad cities. As the work progresses, we shall especially invite these particular two speakers and explain the working.
H	• ESP and tall stack to control flue gas emissions • Process emission controlled by scrubbing • Boiler ash and sludge with nutrition value will be useful to local farmers.

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CHAPTER 9
ENVIRONMENTAL COST-BENEFIT ANALYSIS

Contents of this Chapter shall be :

If recommended at the Scoping stage and By Voluntary Submission

9.1 Introduction

Industry while making production also generates pollution. Production is beneficial to the Industry. Pollution is a diseconomy to the general public, by way of mal-effect on health and well-being. Industry is asked to internalize this external diseconomy by designing pollution mitigation measures. Then this is an extra cost to the Industry. However, if this cost is supported by the Industry then benefit will go to the public around. This is a cost-benefit relation. Cost and benefit are in inverse proportion. More mitigation cost to Industry is more benefit to society. Less mitigation cost to Industry is benefit saving to Industry but adverse to society. Best solution is Industry gets the production (albeit with lesser margin due to spending on environmental protection) and society gets the benefit (from employment and reasonably safe environment). This also comes under overall justification for the project.

9.2 If recommended at the Scoping stage

MoEF in its Scoping stage has not asked the Proponents to dwell on the cost-benefit aspect. However, briefly this can be mentioned that this study has taken full responsible care to see that the Industry does not wish to gain profit at the cost of comfort of the society. In fact it is the endeavor of the Proponents

- To reduce the pollution created by this new factory by utilizing it in the boilers, and to recycle as usable matter.
- This could be a win-win situation with benefit to Proponents, benefit to the Public and no (or low) harm to the environment. More of this finds place in Chapter Ten.
- All this is possible for which Environment Management Plan as worked out is scrupulously obeyed.

9.3 Voluntary Submission:

However, briefly this can be mentioned that this study has taken full responsible care to see that the proponent group does not wish to gain profit at the cost of comfort of the society.

In fact it is the endeavor of the Proponents

- To keep transparent relations with the neighbors in the area
- To strengthen the Gram Panchayat democratic set up, by paying taxes.
- Not to disturb any prime agricultural land
- Not to encroach on others' existing water source
- Not to overload the existing power supply, causing load-shedding to the villagers
- To remove the barrenness of the land and prevent wasting of rainwater.
- To Recharge the groundwater
- To strengthen the physical infrastructure
- To create greenery within our premises and even outside to some extent
- To reduce the wastewater pollution created by this new activity by utilizing it (1) as boiler feed after concentration, (2) as recycled water for other purposes, and (3) organic solid waste as manure in our own fields as water to grow plantation and landscaping.
- To reduce the solid waste pollution created by this new activity by utilizing it in the fields of our own community land development.
- In the final analysis society to get pollution-free environment, farmers to get cash payment to their sales proceeds (whether crop, vegetables, milk etc) and Proponent getting comfortable peaceful neighbors for his residents.

9.4 Chapter Conclusion:

Pollution control is nothing but internalizing external diseconomy. This is in line with Polluter to Pay principle adopted by Supreme Court. This cost-benefit work, though not asked specifically in scoping, is discussed. Though this many look ideal on paper, it will not serve the purpose unless Environmental Management Plan is prepared and got approved. To support the Plan, administrative set up is necessary and the same is described.

The immediate earlier Chapter had indicated as to what steps are designed in the working of new project. This, however, is required to be manned properly. Unless an EMP is prepared in advance, as like production campaign the environmental protection will not automatically happen. For such EMP, fixing of objectives is the first step and ensures its implementation is the last step. This is designed in this Chapter and we have a commitment from the higher management to stick to this design. This will meet the objectives of fulfilling the legal requirements and not causing any hardships to people, whether it is only formulation extension or a technical grade manufacture.

With due respect to what transpired in the Public Hearing, the PP will pass the benefits duly to the local development

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CHAPTER 10
ENVIRONMENT MANAGEMENT PLAN (EMP)

Contents of this Chapter shall be:

Environment Management:
Need, Objective, Components, Legal Obligations, Compliance, Watch-dog, Construction Phase

10.1 Need:

Environmental management is a crucial segment of Industrial Management, in view of the global concept of sustainable development. Apart from the social obligation, the industries are liable to suffer a series of drastic actions by statutory authorities, if the former ignore the above said aspect. At its worst, the running factories may be brought to a grinding halt by the pollution control authorities that possess the requisite powers.

Therefore, preparation of Environmental Management Plan is a must to fulfill bifocal aspect of the statutory compliance as well as that of social concern.
Water needs of **TI** may be small or reasonably low, but generally this resource is dwindling. Thus, on one hand one should use it less and on the other the source should not be left polluted for others. Air environment needs to be continuously managed, because man needs inhalation every moment, so also is Flora and Fauna dependent on it. The biological aspects, soil and ground water are all interdependent. Thus need of proper environmental management and conscious plan for it.

To draw a rigid EMP is especially important for us because India has to support 16.1% of the world's population only on 2.3 % of the global area with 0.4% only of energy reserve. This point of Low Energy Reserve is especially taken note by the PP Project Proponents. In this respect here efforts are oriented towards:

- Effluent of moderate BOD is aerobically treated and used for trees under our supervision for distribution or for utilities as recycle.
- The solid waste boiler ash itself serves as building material.
- The high BOD effluent will serve to give calorific value to the boiler as biogas and SW concentrate.
- The yeast sludge will be useful as manure.

10.2 Objectives:

a. To define the components of environmental management.
b. To prepare an environmental hierarchy.
c. To prepare a checklist for statutory compliance.
d. To prepare environmental organization.
e. To prepare a schedule for monitoring and compliance.
f. To establish a watchdog committee voluntarily with an ultimate aim to get ISO 14000 certification.

10.2.1 Environment Components:

TI is aware that environmental management is not a job, which can be handled without a careful planning. The success lies if three components are simultaneously present viz. (1) management support, (2) efficiency of the environment management cell and (3) acceptability of resulting environmental quality, both by SPCB and by public. A structure of this plan and hierarchy of process flow for environmental management is prepared and enclosed as logics, which is self-explanatory. **TI** will adopt this structure and hierarchy, which is akin to principles and practice.

Air Environment:

a) Monitor the consented parameters at ambient stations.
b) Monitor the work zone at various stations to satisfy the corporate requirements for health and environment.
c) Maintain a record of running of DG (diesel generating) sets
d) Monitor the stacks or vents fitted to sections of raw material, manufacture, thermal and DG power plants.

Water Environment:

a) Keep record of input water every day for quantity and periodically of quality..
b) Measures are taken to segregate the sub-streams of effluent as per their characterization.
c) Water conservation is accorded high priority in every section of the factory.
d) Keep record of wastewater returned back to process, to utilities and to gardening, both the quantity and quality details.

Aesthetic (Noise & Odour) Environment:

a) Monitor the ambient noise level and work zone noise level to conform the stipulated norms.
b) Creation of awareness for noise attenuation and mitigation program.
c) Monitor the ambient Odour level and work zone Odour level by sensing.
d) Creation of awareness for Odour attenuation and mitigation program

Biological Environment:

a) Special attention is planned to maintain green belt in and around the factory premises.
b) Adequate provisions are made to facilitate daily watering of all plants and lawns. Special attention provided during summer to ensure that the green belt does not suffer from water shortage.
c) Development & maintenance of green belt to be considered as a priority issue.
d) No outside soil is brought for any building/ greenery developments.

Work-zone Comfort Environment:

a) Monitor the work zone temperature levels.
b) Monitor the work zone humidity.
c) Examine the health of workers and keep record.

Socio- Economic Environment:

a) The operators and workers are trained in various aspects of ESH (Environment, Safety and Health).
b) The managers and officers involved in Environment Management Cell shall undergo refresher workshop and up gradation of information on various environmental issues.
c) The industry shall help in promoting the activities related to environmental awareness in nearby villages/ neighbors.
d) The industry shall help in promoting local people for livelihood commensurate with their will, skill and abilities.

10.2.2 Environmental Monitoring Schedule:

A judgment can become truncated if it is not scientifically supported. This work is done by an appropriate monitoring which is a technique of drawing a sample and deriving inferences from the same for knowledge and improvements.

A scheme for this is already prepared and presented in chapter Six above. Watch-dog committee will also help in examining this physically for organolyptic tests.

Monitoring is a technique of drawing a sample and understanding from it the universe. The sampling station, the parameters and frequency is of extreme importance as also the careful analysis, reporting and interpretation. The schedule decided for a small activity like that of **TI** is as given in chapter six:

10.2.3 Schedules:

There will be three facets to design and follow the schedules viz.: (A) for compliance of responsibilities, (B) for day-to-day operation and management of ETP and ECE, and (C) for routine environmental monitoring, to assess the impact and take timely warning. The schedule:

Daily Compliance:

1. Take the meter readings - initial and final, for checking the water consumption.
2. Maintain the electricity consumption record for pollution control.
3. Monitor ambient air periodically as per Consent.

Monthly Compliance:

1. Monitor the emission sources through the competent authority and submit the analysis reports to the board.
2. Monitor ambient/work zone noise levels & ensure conformance to standards.

Quarterly Compliance:

1. Monitor the ambient air quality at upwind and downwind locations of the factory.
2. Review the Water Reuse performance.

Yearly Compliance:

1. Carryout "Environmental Audit Statement" of various environmental aspects, review the environmental policies with the help of experts and make the upgradation /changes accordingly.
2. Submit the "Environmental Statement" to the State Pollution Control Board in Form V under Rule 14 of the Environment (Protection) Second Amendment Rules 1992 of the Environment (Protection) Act, 1986.
3. Renew the Consent to Operate under the Water and Air Acts.
4. File the Cess returns to the State PCB under the Water (Prevention and Control of Pollution) Cess Act, 1977.
5. Renew the Hazardous Waste Authorization under sub-rule 3 of the Hazardous Waste (Management and Handling) Rules, 1989.

Consent Compliance

TI undertakes to comply the conditions prescribed by the Consent. In this direction, the following discipline will be followed:

#	Condition Regarding	Mode of Compliance
1	Validity Period	Keeping a watch, Application for renewal will be submitted in advance
2	Production Quantity	Not to exceed the permitted quantity.
3	Quantity of Effluent	To be measured daily and in-plant control. Not to exceed any time
4	Quantity of Sewage	To be measured periodically. Not to exceed
5	Total water input	To be measured daily. Repair meters. Not to exceed. Make break-up as per usages. Fill monthly Cess returns. Pay as per assessment
6	Quality of Effluents	By running ETP in correct fashion. Monitor. Report
7	Disposal of treated effluent	Not over application. No percolation, no spillages. Monitor.
8	Fuel Quantity	Not to exceed permitted quantity
9	Emission System	Control Boiler dampers, ID/FD fans, CO_2 %, Monitor
10	Ambient	Keep monitoring.
11	Noise levels	Check foundation for vibrations, Tree plantation
12	Solid Waste	Quantity to be measured & record kept. Bagasse to be baled. Molasses not in open pits. Press Mud to be carted out every day
13	Environ. Audit	To be complied every year before 30th sept.
14	Inspections	Inspection Book to be opened. Instructions given by SPCB visiting officer to be complied and reported.

Table No.10.1: Consent Compliance

For above compliance Action will be taken by the Cell under the Managing Director himself.

10.2.4 Watch-dog Committee:

A high power watch dog committee will be set up which will have a power of sudden spot inspections, checking of documents and listening to complaints if any. This committee will supervise over the monitoring and environmental management cell as may be necessary, generally over the following facets of works:

1. Permit management
2. Construction management
3. Treatment and emission management
4. Transport management
5. Disposal management
6. Monitoring
7. Documentation
8. Law enforcement

10.2.5 Construction Phase Management:

Site Preparation:

The clearance of site may involve the movement of soil. No major leveling operations are envisaged. During dry weather conditions it is necessary to control dust nuisance created by excavation and transportation activities. However, because the proposed built-up area is of considerable low requirement, this problem should not be insurmountable or else some water sprinkling will be resorted to.

Sanitation:

The construction site shall be provided with sufficient and suitable toilet facilities for construction workers to allow proper standards of personal hygiene. These facilities shall be connected to a septic tank and maintained to ensure minimum or no environmental impact.

Noise:

Though the noise effect on the nearest inhabitants due to construction activity will be negligible (being away) it is advisable that on site workers using high noise equipment adopt noise protection devices like earmuffs.

Construction Equipment and Waste:

It shall be ensured that both gasoline and diesel powered construction vehicles are properly maintained to minimize smoke in the exhaust emissions. The vehicle maintenance area shall be located in such a manner to avoid sources by accidental spillage of oil. Unauthorized dumping of waste oil should be prohibited. Wastes shall be disposed off at an approved site.

Storage of Hazardous Material:

The following hazardous materials if used for site preparation and construction activity, shall be stored as per international standards.

1. Explosives for rock blasting (This will not be permitted)
2. Petrol and diesel
3. LPG
4. Painting materials
5. Asbestos products

Site Security:

Construction site is a potential hazardous environment. To ensure that the local inhabitants and stray cattle are not exposed to these hazards, the site shall be secured by fencing and manned entry points. It will be fully illuminated.

Land Environment:

An inventory shall be prepared of standing trees and bushes of significance. To prevent unauthorized felling of trees by construction workers for their fuel needs it will be ensured that the contractor provides fuel to them.

10.3 Chapter Conclusion:

Commencing from Introductory, this EIA study has reported the details on Proponents, Project, natural and Manmade facets of background environment, how and how much residual pollution will be added after prevention, abatement, control and mitigation. Whether the overall impact will be adverse, beneficial or marginal is found out by two accredited systems. Justification of the Project or "No Project" is also considered. This, however, is required to be manned properly. Unless an EMP is prepared in advance, as like production campaign the environmental protection will not automatically happen. Such EMP, and its implementation with commitment from the higher management is stated. This Study when scrupulously followed, will meet the objectives of fulfilling the legal requirements and not causing any hardships to people.

All the norms laid by MoEF in Environmental Clearance and by SPCB in Consent to Operate will be sticky followed as is promised to the people in the neighborhood.

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CHAPTER 11

DISCLOSURE OF CONSULTANT

SAITECH Research and Development Organisation

11.1 General Information

Name of organization	:	SAITECH Research and Development Organisation
Address	:	Flat no. 301, Ganesh Plaza, Near Saneguruji Vasahat Bus Stop, Radhanagari Road, KOLHAPUR
Telephone Nos	:	9921190356, 9604213615
Website	:	www.saitechindia.net
Email	:	saitech.kolhapur@gmail.com, gmcpl.kop@gmail.com

MISSION

We aim at contributing to better living and working conditions for people and developing a sustainable environment for society. We are committed to provide services of high quality and value to our clients through adaptability, innovation and knowledge upgradation using a qualified, motivated and committed workforce. We look for opportunities to reduce the environmental effects of our operations, and support activities that promote the protection of human health and a sustainable global environment.

VISION

SAITECH is the premier Environmental consultancy, working with its clients to manage their most challenging environmental, health and safety issues and attain their sustainability goals.

SERVICES

- Environmental & forest clearances,
- Preparation of EIA-EMP reports, Post project monitoring reports,
- Consent to Establish, Operate and Renewal,
- Offering Environmental Status Report,
- Consultancy on Pollution Control,
- Environmental monitoring and all Laboratory Services,
- Designing & Commissioning of Treatment plants like ETP, STP & WTP,
- Audits related to Environment, ISO & Safety
- SAITECH is engaged in providing support in all aspects of Environment like Air, Water, Land, Soil, Noise, Solid Waste, Risk assessment studies, Socio-Economic, Statutory Compliances,

Training, Environmental awareness programme and liaisoning / legal services also.

Table No 10.1 EIA TEAM:

S/ No.	Person Name	Qualification	Key Responsibility Area	Experience (Years)
1	Dr. Prashant Banne	M.Sc. (Env. Sc), Ph.D.	EIA Coordinator	13
2	Mr. Ashwini Jagtap	M.Sc. M.Tech.	Team Leader	6
3	Mr. Sundarrao Jagadale	M.Sc.	Team Leader	18
3	Mrs. Runa Patil	M. Sc. (Env)	SW, HW, Safety, Land use	8
4	Mr. Amod Ghamande	M.E. Mechanical	Water and Waste Water	25
5	Mr. Sushant Mahajan	M.A. (Sociology)	Socio-Economics	4
6	Mr. Kuldeep Gurav	M.Sc. (Env)	Ecology and Biodiversity	4
7	Mr. Chandrakant Patil	M.Sc. (Env. Sc)	Report Preparation & Monitoring	8
8	Mr. Sandeep Patil	M.Sc. M.Tech.	Air pollution and Noise	3
9	Ms. Dipali Chavan	M.Sc. (Env. Sc)	Report Preparation Air and Noise	5
10	Mrs. Pratibha Salunkhe	M.Sc. M.Tech.	Water and Waste Water	

Recognition and Accreditation

As per circular of MoEF, Govt. of India for Environmental clearance: EIA consultant should be accredited by NABET, Quality Council of India in their scheme of 'Accreditation for EIA Consultant organization' and SAITECH was accredited for below given sectors:

1) Sugar Industry
2) Distillery
3) Thermal Power plants
4) Building Construction

SAITECH is associated with Ministry of Environment and Forest (MoEF) recognized laboratory of M/s. Aavanira Laboratory, Pune and AGMARK certified laboratory of M/s. Nikhil Analytical and Research Laboratory, Sangli for Environmental Monitoring, Baseline data collection etc.

* * * * *

मे. डोंगराई सागरेश्वर स.सा.का.लि.
रायगांव, ता.कडेगांव जि. सांगली
यांचे नावे वर्ग असलेली एम-१
अनुज्ञप्ती मे. केन ॲग्रो एनर्जी
(इंडिया) लि. रायगांव ता.कडेगांव
जि. सांगली यांचे नावे वर्ग करण्यास
मा. आयुक्तांचे पत्र क्रमांक मद्य ११०९/
४२३३/५-अ दि. ११ जुलै २००८
नुसार परवानगी देण्यात आलेली
आहे. त्याबाबतचे १००% शुल्क रु.
७५००/- व दुरुस्ती शुल्क रु. १०/-
एकूण रु. ७५१०/- च.क्र. २२५ दि.
१७/७/२००८ अन्वये शासकीय कोषागारात
जमा करण्यात आले आहे.

COLLECTOR STATE EXCISE DN. SANGLI.

For Collector of Sangli.

Licence in form M-I/12/2009-2010 is renewed 31.3.2010. on payment of proprotionate licence fees Rs. 75500/- paid under chalan no 28 dated 19/3/09.

जिल्हाधिकारी राज्य उत्पादन शुल्क विभाग, सांगली.

For Collector, Sangli.

MAHARASHTRA POLLUTION CONTROL BOARI

Tel : 2402 0781 / 2401 0437
Fax : 2402 4068
Visit us at :
Website : http://mpcb.mah.nic.in
E-mail : mpcb@vsnl.net

Kalpataru Point,
2nd , 3rd & 4th floor,
Opp. Cineplanet,
Near Sion Circle, Sion (E
Mumbai - 400 022.

No. MPCB/Amendment/Sangli/B -3697

Date : 23/07/07

Sub : Amendment to the consent to operate to M/s.Dongrai-Sagreshwr Shetkari SSK Ltd., A/P Rayegaon, Tal.Kadegaon, Dist.Sangli

Ref : 1] Board's consent No.MPCB/PCI-III/EIC-KP-0900-06/04 dated 4.1.2007 valid upto 31.12.2007
2] Industry's letter No.CAEIL/Environment/2007-08/37 dated 1.6.2007

....

Consequent upon change in name of the company from M/s.Dongrai-Sagreshwr Shetkari SSK Ltd., A/P Rayegaon, Tal.Kadegaon, Dist.Sangli as communicated by the industry vide letter dated 1.6.2007 the original consent to operate granted under Section 26 of the Water (Prevention & Control of Pollution) Act. 1974; under Section 21 of the Air (Prevention & Control of Pollution) Act,1981 and Hazardous Wastes (M & H) Rules, 1989 & Amendment Rules, 2003 vide reference (1) above is hereby amended and the name and address of the industry shall be read as under:

M/s.Cane Agro Energy (India) Ltd.,
At Raigaon, Post Hingangaon Bk.
Tal.Kadegaon, Dist.Sangli

(All other conditions of the consent shall be remain unchanged.)

For & on behalf of the
Maharashtra Pollution Control Board,

Exec. Officer

4/8

(R.G. Pethe)
Water Pollution Abatement Engineer

To

M/s.Cane Agro Energy (India) Ltd.,
At Raigaon, Post Hingangaon Bk.
Tal.Kadegaon, Dist.Sangli

CANE AGRO ENERG
(INDIA) LTD., RAIGAO
INWARD NO. 1159
DATE - 09/8/07
Sing.

Copy to - Regional Officer, MPCB, Kolhapur (2) SRO, MPCB, Sangli

4. (1) The licensee shall not use the molasses removed from the storage tanks of receptacles for any purpose except for the following purposes in quantities not exceeding ____________________

[(Quintals)] in the aggregate during the licence period :-

(i) Distiliation of spirit in a distillery established or licensd under the Bombay Prohibition Act, 1949

(ii) Manufacture of power alcohol in a distillery established or licensed under the Bombay Prohibition Act, 1949

(iii) Any Government purposes, viz 10 किलो

(iv) The bona fide scientific purpose of ____________________

(here state the Purpose)

(v) The bona fide industrial purpose of ____________________

(here state the purpose)

(vi) The bona fide agricultural purpose of ____________________

(here state the purpose)

(vii) The bona fide educational purpose of ____________________

(here state the purpose)

(viii) Any medicinal purpose viz ____________________

(bere state the purpose)

(ix) Sample purpose 10 किलो

(x) Cattle-feed मळी उत्पादन मर्यादा 20,000/- टन. वर्षात

मा. आयुक्त, राज्य उत्पादन शुल्क म.रा मुंबई यांचे पत्र क्रमांक मकी 1/2000/5/5 अ दिनांक 3/1/2001 नुसार मंजुर करण्यात आलेली आहे.

sd-

For Collector of Sangli.

FORM M-1

(See rule 3)

सत्यमेव जयते

Licence No. 12/2000-2001

Licence for possession and sale of molasses by a molasses

Licence is hereby granted under and subject to the provisions of the Bombay Prohibition Act, 1949 and the rules, regulations and orders made thereunder, to * कार्यकारी संचालक, डोंगराई सागरेश्वर स.सा.का लि कडेपूर ता खानापूर residing at (hereinafter called "the licenaee') on payment of a fee of Rs. 41500/- च.क्र.6 दि. 10/1/2001 in advance into the Government Treasury at स्टेट बँक, शाखा - सांगली authorising him to possess and sell molasses at his sugar/gur factory situated at कडेपूर ता. खानापूर (hereinafter referred to as "the licensed premises") in the district of सांगली. during the period from दिले तारखेपासून to 31/3/2009 subject to fhe following conditions, namely :–

For Collector of Sangli

CONDITIONS*

1. The licensee shall not, except with the written Permission of the Commissioner keep or sell molasses at any place other than the licensed premises.

2. Except with the written permission of the Commissioner the licensee shall not receive or keep at his licensed premises.

3. (1) The licensee shall not sell molasses —

(i) except to a person who hold a licence in form M-II, M-III-A or

(ii) exceeding the permitted quantity prescribed under rule 41 of the Bombay Molasses Rules, 1955, to a person requiring it for a domestic purposes.

(2) The licensee shall not sell molasses at a price in excess of the maximum selling price which may be fixed by the State Government from time to time under any law for the time being in force

(3) Notwithstanding anything contained in sub-conditions (1) and (2) the licensee shall when directed by the State Govt, under any law for the time being in force sell molasses held by him in accordance with the terms of the direction.

* Cane Agro Energy (India) Ltd.
Raigaon post- Hingangaon (BK) Tal. Kadegaon
Dist - Sangli.

(2) Nothing in sub-condition (1) shall supply to molasses removed from storage tanks or receptacles for purposes of sale.

5. The licensee shall pay to the State Government in advance at the beginning of each quarter commencing from the date of the licence such cost of the State Excise staff as may be fixed by the Commissioner.

6. (1) licensee shall provide suitable office accommodation. with sanitary arrangement, fee the State Excise Officer or such staff as may be the Commissioner within the licensed premises and shall supply such furniture and other articles for the use of the officer as the Collector may consider necessary, The licence shall afford the officer all reasonable facilities and assistance as may be required by him for carrying out his duties of supervision and inspection.

(2) The licensee shall provide the State Excise staff so appointed residential quarters as approved by the Collector in this behalf near the licensed premises and shall also provide the following subsidiary services if available, sanitary, electric and water-supply, and may charge rent not exceeding ten percent of the pay of the staff for the quarters, and also reasonable charges for the water supply, sanitary and electric supply services provided by the licence. In case of dispute as to whether the charges are reasonable or not, the Commissioner shall decide the question and his licensee and the staff.

7. This licence may be suspended or cancelled in accordance with the provisions of section 54 or 56 of the Bombay Prohibition Act, 1949.

Granted this 17th day of January ~~19~~ 2007

COLLECTOR STATE EXCISE DN. SANGLI.

सन 2007-2008 अखेर सदर अनुज्ञप्तीचे नुतणी-करण करण्यात आले आहे. सदर अनुज्ञप्ती जिर्ण आकाराने अनुज्ञप्तीची दुबार प्रत देण्यात येत आहे. दुय्यम शुल्क रु. १०/- च.क्र. २२८ दि १७/०१/०८ ने वसूल.

For Collector of Sangli

सदर प्रस्तावाच्या एकूण बिगर सिंचन मागणीसह एकूण बिगरसिंचन पाणी वापर प्रकल्पीय पाणीसाठयाच्या तुलनेत १८.३१ टक्के दतकी दिसून येते. तथापि, शासन पत्र क्र संकीर्ण १०११/२७१/११ सिं.व्य. (धो) दि. १२/०५/११ नुसार सदर प्रस्तावास शासन स्तरावर मा. मंत्री मंडळाची मान्यता घेणेकामी प्रस्ताव २ प्रतीत सादर करण्यात येत आहे.

हे आपले माहितीसाठी व पुढील कार्यवाहीसाठी सविनय सादर

सोबत :- प्रस्ताव धारिका २ प्रतीत

(र.भि.काराजंगे)
सहाअधीक्षक अभियंता,
सांगली पाटबंधारे मंडळ सांगली.

स्थळ प्रत मा.अ.अ.यांना मान्य.

प्रत :- कार्यकारी अभियंता सांगली पाटबंधारे विभाग सांगली यांना माहितीसाठी रवाना.

भारत सरकार
Government of India

Contact Address in State
Shri S.P Mahajan
Superindenting Industries
Officer (Licensing)
Directorate of Industries
New Administrative Bldng.
Opposite Mantralaya
Mumbai - 400 032
Telephone : 2023912
Fax : 2026826

वाणिज्य और उद्योग मंत्रालय
Ministry of Commerce & Industry
औद्योगिक सहायता सचिवालय
Secretariat for Industrial Assistance
जन सम्पर्क एवम् शिकायत अनुभाग
Public Relation & Complaints Section

प्राप्ति सूचना

संख्या.....1299/SIA/IMO/2004 नई दिल्ली, दिनांक

No. ..... ACKNOWLEDGEMENT New Delhi, Date 15/04/2004

एतद्द्वारा निम्नलिखित का विनिर्माण करने संबंधी आपका ज्ञापन प्राप्त होने की सूचना दी जाती है:–
The receipt of your memorandum for the manufacture of following is hereby acknowledged:-

Item Code

Proposed Item: STEAM AND POWER FOR CAPTIVE USE AND EXPORT TO M.S.E.B
of Manufacture GREED

falling under NIC - broad description
4006 GENERATION AND TRANSMISSION OF ELECTRIC ENERGY
Proposed Capacity : 260.00 MILL.KWH

********* No More Items *********

This acknowledgement is subject to the provisions of Press Note No 6 dated 29th July 1993 and Press Note No 17 dated 28th November 1997 regarding the significance, implications and legal status of filing of Industrial Entrepreneur Memorandum

M/S CANE AGRO ENERGY INDIA LTD.
KADEPUR, SANGLI
MAHARASHTRA - 415305

स्थापना–स्थल Located at: RAIGAON, PO-HINGAN-GAON(BK), KADEGAON
स्थान/कस्बा Place/Town: SANGLI
तहसील/ताल्लुक Tehsil/Taluk: MAHARASHTRA
जिला District:
राज्य

डी० सी० शर्मा
D.C. SHARMA
अवर सचिव
Under Secretary

E11121247

दाखला

गावकामगार तलाठी मौजे रायगाव, ता. कडेगाव, जि- सांगली यांचेकडून दाखला देणेत येतो कि.

मौजे रायगाव येथील शेतजमिन गट नं ११८, ११९, १२०, १२१, १२२, १२३, १३५, १३७, १३८, १३९, १४०, १४१, १४२, १४३, १४५, १४६, १४७, १४८, १४९, १५०, १५१, १५२, १५३ यासर्व गटातील शेतजमिनी वतन, कुळ-कायदा व इनामी जमिनी नाहीत म्हणून मागणीवरुन लिहून दिला दाखला असे.

दि - ११/६/२०१२

श्री व्ही. सी. देशमुख
तलाठी शिरगांव बु॥
ता. कडेगाव, जि. सांगली

प्रारुप 1

पंजीकरण प्रमाण-पत्र

कार्पोरेट पहचान संख्या : U01115PN2007PLC130211 2007 - 2008

मैं एतदद्वारा सत्यापित करता हूँ कि मैसर्स

CANE AGRO ENERGY (INDIA) LIMITED

का पंजीकरण, कम्पनी अधिनियम 1956 (1956 का 1) के अंतर्गत आज किया जाता है और यह कम्पनी लिमिटेड है।

यह निगमन-पत्र आज दिनांक पच्चीस मई दो हजार सात को मेरे हस्ताक्षर से पूणे में जारी किया जाता है।

Form 1

Certificate of Incorporation

Corporate Identity Number : U01115PN2007PLC130211 2007 - 2008

I hereby certify that CANE AGRO ENERGY (INDIA) LIMITED is this day incorporated under the Companies Act, 1956 (No. 1 of 1956) and that the company is limited. L Pvt Ltd of

Given under my hand at Pune this Twenty Fifth day of May Two Thousand Seven.

कम्पनी रजिस्ट्रार की मोहर Seal of the Registrar of Companies पुणे, महाराष्ट्र PUNE, MAHARASHTRA सत्यमेव जयते

(KATKAR VISHNU PANDURANG)

कम्पनी रजिस्ट्रार / Registrar of Companies

महाराष्ट्र, पूणे

Maharashtra, Pune

कम्पनी रजिस्ट्रार के कार्यालय अभिलेख में उपलब्ध पंजीकृत का पता :

Mailing Address as per record available in Registrar of Companies office:

CANE AGRO ENERGY (INDIA) LIMITED

AT RAIGAON, POST HINGANGAON (BUDRUK), TAL - KADEGAON,

SANGLI - 415403,

Maharashtra, INDIA

TRUE COPY

CHIEF EXECUTIVE OFFICER

CANE AGRO ENERGY (INDIA) LTD.

AT. RAIGAON, PO. HINGANGAON (BK.)

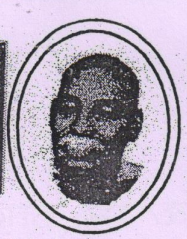
TAL. KADEGAON, DIST. SANGLI

PIN CODE - 415 305

ग्रामपंचायत कार्यालय, रायगांव

ता. कडेगांव, जि. सांगली (महाराष्ट्र)

स्थापना :- १९६९



जा.क्र./ग्रा.पं.रा./१/२०१२

ग्रामपंचायत कार्यालय, रायगांव
ता. कडेगांव, जि. सांगली
दिनांक: २८/५/२०१२

दाखला

मा. ग्रामसेवक/सरपंच
ग्रामपंचायत रायगांव ता. कडेगांव
यांजकडून दाखला देणेत येतो की
केन अॅग्रो एनर्जी (इं) लिमिटेड रायगांव या
कारखाने कारखान्यास वीज विद्युत निर्मिती
(को जनरेशन) व डिस्टिलरी प्रकल्पाची उभारणी
कारखाना साईटवर करणेस व चालविणेस
रायगांव ग्रामपंचायतीची काहीही हरकत
नाही म्हणून दिला दाखला

ग्रामसेवक
ग्रामपंचायत रायगांव
ता. कडेगांव, जि. सांगली

सरपंच
ग्रामपंचायत रायगांव
ता. कडेगांव, जि. सांगली

महाराष्ट्र शासन
जलसंपदा विभाग
अधीक्षक अभियंता, सांगली पाटबंधारे मंडळ, सांगली
विश्रामबाग वारणाली सांगली
कार्यालयीन दुरध्वनी क्र. ०२३३/२३०२७०९ फॅक्स नं. ०२३३/२३०२६४३
ई-मेल : san_sicsli@sancharnet.in

जा.क्र.सांपामं/सिंचन/ ६५२१ /२०१२ दिनांक :- २३/१२/१२

प्रति,

मुख्य अभियंता, (जसं)
जलसंपदा विभाग,
पुणे-११.

विषय :- केन ॲग्रो एनर्जी (इं) लि. रायगांव ता. कडेगांव जि. सांगली ल.पा. तलाव हिंगणगावमधून पिण्यासाठी व औद्योगिक कायमस्वरुपी पाणी परवाना मिळणे बाबत

संदर्भ :- १) कार्यकारी अभियंता सांगली पाटबंधारे विभाग सांगली यांचे पत्र जा.क्रं.सांपावि/प्रशा-२/१७५६/१७५६/ दि. ०३/०३/१२.

संदर्भिय पत्रान्व्ये, लघु पाटबंधारे हिंगणगाव मधून पिण्यासाठी व औद्योगिक पाणी परवाना मिळणे बाबतचा केन ॲग्रो एनर्जी (ई) लि. रायगांव तालुका कडेगांव जि. सांगली यांचा प्राप्त प्रस्ताव मंजुरीसाठी खालील प्रमाणे सादर करण्यात येत आहे.

प्रस्तुत प्रकरणी, हिंगणगाव, लघु पाटबंधारे तलाव हा उदभव निश्चित केलेला आहे. सदर प्रकल्पावर बिगर सिंचनासाठी तरतूद नाही. तथापि यापुर्वी प्रदेश कार्यालयाने दिलेल्या मंजूर योनजांचा तपशिल खालील प्रमाणे

(दलघमीमध्ये)

अ.क्र.	तपशिल	पिण्यासाठी	औद्योगिक	एकूण
१	यापुर्वीचा मंजूर योजना	०.८९००	--	०.८९००
२	मंजुरीस सादर योजना	--	--	--
३	प्रस्तुत प्रस्तावाची मागणी	०.०२७३	०.०३६२	०.०६३५
४	कमी करण्याची मागणी	--	--	--
५	प्रस्तावित योजनेसह एकूण बिगर सिंचनासाठी वर्ग होणारा पाणीसाठा (१+२+३-४)	९१७३.००	०.०३६२	०.९५३५

हिंगणगांव ल.पा. तलावाची प्रकल्पीय सिंचन क्षमता ११९० हे आहे. आतापर्यंत बिगर सिंचन पाणी वापर मंजुरीमुळे २०३ हे. सिंचन कपात झालेली आहे. उपरोक्त पाणी मागणीमुळे १५ हे. सिंचन कपात होते. अशी एकूण २१८ हे. सिंचन कपात होते. सदरची सिंचन कपात १८.३२ टक्के होते.

हिंगणगाव ल.पा. प्रकल्पाचा प्रकल्पीय उपलब्ध पाणीसाठा ५.२०७० दलघमी असून प्रस्तावित योजनेसह ०.९५३५ दलघमी पाणीसाठा बिगरसिंचनासाठी वर्ग होणार आहे.

सदर संस्था सिंचन पुर्नस्थापनेच्या खर्चाचे भांडवली अंशदान प्रतिहेक्टरी १.००.००० रु. प्रमाणे १५ लाख रुपये भरणेचे हमीपत्र १०० रु. मुद्रांक प्रतीवर सादर केलेले आहे.

शासन पत्र क्रमांक बीकेएस २०११ (२७१/११)सिं.व्य. (धो) दि. १३/१२/११ अन्वये प्राप्त सुचनानुसार हिंगणगाव लघु पाटबंधारे प्रकल्पाचा गेल्या ९ ते १० वर्षाचा पाणीसाठा याबाबतची माहिती सादर करण्यात आलेली आहे.

सत्यमेव जयते

व्यापार प्रारंभ करने का प्रमाण–पत्र

कम्पनी अधिनियम 1956 की धारा 149(3) के अनुसरण में

कॉर्पोरेट पहचान संख्या : U01115PN2007PLC130211

मैं एतदद्वारा सत्यापित करता हूँ कि मैसर्स
CANE AGRO ENERGY (INDIA) LIMITED

जिसका निगमन, कम्पनी अधिनियम, 1956(1956 का 1) के अंतर्गत दिनांक पच्चीस मई दो हजार सात को किया गया था और जिसने निर्धारित प्रपत्र में घोषणा प्रस्तुत की है या विधिवत सत्यापित किया है कि उक्त कम्पनी ने, अधिनियम की धारा 149(2) (क) से (ग) तक की शर्तों का अनुपालन कर लिया है और व्यापार करने के लिए हकदार है।

यह प्रमाण–पत्र आज दिनांक उन्नीस मार्च दो हजार आठ को मेरे हस्ताक्षर से पूणे में जारी किया जाता है।

Certificate for Commencement of Business

Pursuant of Section 149(3) of the Companies Act, 1956

Corporate Identity Number : U01115PN2007PLC130211

I hereby certify that the CANE AGRO ENERGY (INDIA) LIMITED which was incorporated under the Companies Act, 1956(No. 1 of 1956) on the Twenty Fifth day of May Two Thousand Seven , and which has this day filed or duly verified declaration in the prescribed form that the conditions of the Section 149(2)(a) to (c) of the said act, have been complied with and is entitled to commence business.

Given under my hand at Pune this Nineteenth day of March Two Thousand Eight.

(KATKAR VISHNU PANDURANG)
कम्पनी रजिस्ट्रार / Registrar of Companies
महाराष्ट्र, पूणे
Maharashtra, Pune

कम्पनी रजिस्ट्रार के कार्यालय अभिलेख में उपलब्ध पंजीकृत का पता :
Mailing Address as per record available in Registrar of Companies office:
CANE AGRO ENERGY (INDIA) LIMITED
AT RAIGAON, POST HINGANGAON (BUDRUK), TAL - KADEGAON,
SANGLI - 415403,
Maharashtra, INDIA

TRUE COPY

CHIEF EXECUTIVE OFFICER
CANE AGRO ENERGY (INDIA) LTD.
AT. RAIGAON, PO. HINGANGAON (BK.)
TAL. KADEGAON, DIST. SANGLI
PIN CODE - 415 305

जा.क्र./ग्रा.पं.हिं./ /
ग्रामपंचायत कार्यालय, हिंगणगांव बुद्रुक
ता. कडेगांव, जि. सांगली
दिनांक: / /२००

ग्रामपंचायत हिंगणगाव बु ।। ता. कडेगांव जि. सांगली

दाखला

सरपंच ग्रामपंचायत हिंगणगाव बु" ता. कडेगाव जि. सांगली यांजकडुन दाखला देणेत येतो की.

केन ॲग्रो एनर्जी इंडिया ली. यांचा नियोजित सहविद्युत निर्मिती (को-जनरेशन) व आसवणी प्रकल्पाच उभारणी कारखाना साईटवर करण्यास ग्रामपंचायतीची काहीही हरकत नाही चालविण्यास सामग्री संमती आहे म्हणुन दिला हा दाखला.

सरपंच
ग्रामपंचायत हिंगणगाव बु।।;
ता. कडेगांव, जि. सांगली

ग्रामसेवक
ग्रामपंचायत हिंगणगांव बु।।;
ता. कडेगांव, जि. सांगली