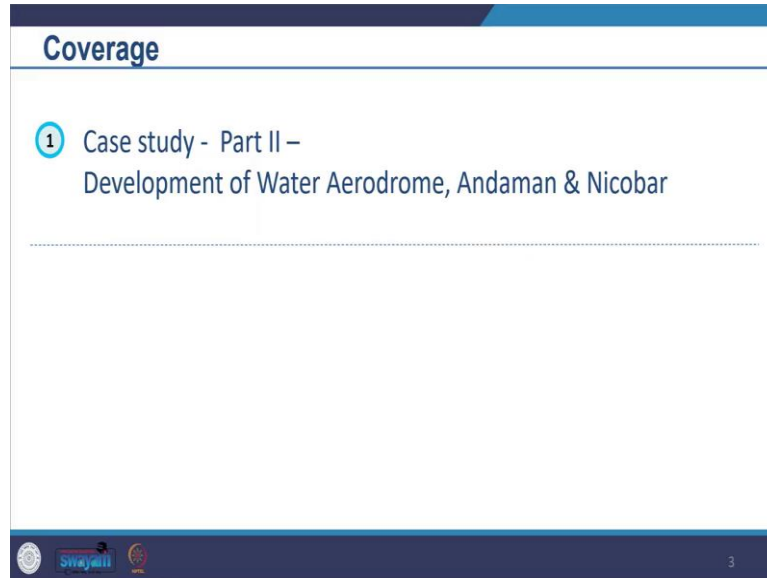


Environmental Impact Assessment
Professor. Harshit Sosan Lakra
Department of Architecture and Planning
Indian Institute of Technology, Roorkee
Lecture - 60
EIA Case Study – Development of Water Aerodrome,
Andaman and Nicobar (Part II)

Welcome to the course Environmental Impact Assessments and today is the last lecture of this particular course.

(Refer Slide Time: 0:32)



We are going to take part 2 of the case study which we are already doing, we are looking at the Water Aerodrome of Andaman and Nicobar. So, we are looking at that particular case. In this particular session, while you are looking at this case, you review all the aspects, culminate all the aspects that you have learned in this particular course beginning from the environmental status to how we evolved in the understanding of EIA, and then what different legislations standards are involved, and different methods which are involved in the process and about the public participation, and what kind of issues we are still facing.

So, while we are looking at this EIA, you also see red as the CIA stands, and then you try to see how advanced or what are the areas where improvements can be made with this particular case. So, this case also had certain kinds of observations and obstructions that were there related to its adequacy and inadequacy. So, you can also reflect on it and think with the wider exposure which you have now.

(Refer Slide Time: 1:46)

Environmental Impact Assessment (EIA) Report
of
“Development of Water Aerodrome”
Located at Swaraj Dweep (erstwhile Havelock Island), Village – Govind
Nagar, Taluka – Port Blair, District – South Andaman, Andaman & Nicobar

Part II

<http://environmentclearance.nic.in/writesadddata/EIA/03042021U2NB1MVFInaEIAReport/ShahedIslandWaterAerodrome.pdf>

CHAPTER 5: ANALYSIS OF ALTERNATIVES

5.1 Introduction

The consideration of alternatives of the proposed aerodrome project site is one of the more proactive sides of environmental assessment – enhancing the project design through examining options instead of only focusing on the more defensive task of mitigating adverse impacts of a single design. This calls for the systematic comparison of feasible alternatives for the proposed project site, including and operational observations. Feasible alternatives are compared in terms of their potential environmental impacts, capital and recurrent costs, suitability under local conditions and institutional, training and monitoring requirements.

5.2 Alternative of Project Site

A multi-disciplinary team from IAC, conducted a pre-feasibility survey for each proposed location of water aerodrome. Following five sites were considered (Figure 5.1) for aerodrome as follows.








Figure 5.1: Photographs of Alternative Sites considered for Proposed Project

Prepared by M. S. Easwari Reddy Page 107

Accordingly, Site No. 1, 2 & 3 was not be feasible as per visual inspection as they are exposed to action by open sea which is undesirable. Moreover, the beaches are rocky in nature and water retreats to a great extent during low tide exposing the rocks. Such rocky terrain and tidal variations are not recommended for safe Water Aerodrome Operations.

As per visual observation, Site No. 4 at Laxmi Harbour is best suited for Water Aerodrome Operations as it falls in protected waters. Further the minimum water depth requirement of -1.5 m is available and has been confirmed with the Hydrography Studies at the proposed runway location site.

Andaman & Nicobar Administration has earlier successfully conducted regular operations from the same site for 3 years from Jan 2011 to Jan 2014. It was unattended operation and temporary arrangements made for floating jetty. The water landing site was earlier incorporated in Naval Navigation Charts.

5.3 Alternative for Energy & Water Conservation

- 1) Solar energy is proposed to utilize to reduce energy consumption load on local electric supply authority.
- 2) Use of energy efficient building material & glass to be utilized.
- 3) Use of 5 star BEE energy efficiency rating electrical equipment.
- 4) Treated sewage will be utilized for flushing activity, which will reduce water consumption rate.
- 5) Provision of rain water harvesting system with 8000L storage tank of 30 KL will be done as a water conservation measure.

<http://environmentclearance.nic.in/writesadddata/EIA/03042021U2NB1MVFInaEIAReport/ShahedIslandWaterAerodrome.pdf>

Prepared by M. S. Easwari Reddy Page 110

So, in this part 2, we are going to continue with where we had stopped. So, we are going to look at chapter 5 from the CIA report, where we are looking at the analysis of alternatives, so, how different alternatives were looked into for this particular project. So, while looking at the alternatives, in this particular case, the team looked into alternative project sites.

So, you see, different project sites, which they looked into, they have identified those projects site, site 1, site 2, site 3 and site 4, and then they evaluated for its feasibility, and what kind of impact it would have. So, you see that in the narrative, the right side numbers 1, 2, and 3 may not be feasible as per visual inspection, as they are exposed to action by the open sea which is undesirable.

Moreover, the beaches are rocky in nature and water retreats to a great extent during low tide acts causing the rocks, such rocky terrain and tidal variation are not recommended for safe water aerodrome operations. So, the alternatives that were taken here were not considered safer options for the purpose for which the project had to be undertaken. So, think about what kind of alternatives are being evaluated here for comparison purposes.

So, looking at the next alternative, which they looked into was alternative for energy and water conservation. So, for this, they looked into the solar energy option for supplying electricity, and then also the use of energy-efficient, building materials and then also looking at what kind of rating they would have in their functioning and how they would also recycle salvage for production of, like what kind of sewage treatment they would undertake to reduce the consumption of water and then also how they would harvest rainwater for protection or conservation of water.

So, that was about the alternative. So, you can discuss things on how the alternatives have to be dealt with to what intensity, and what choices should be covered.

(Refer Slide Time: 4:25)

The image displays two pages from an EIA report, specifically Chapter 6: Environmental Monitoring Programme. The left page (Page 171) details the Environmental Monitoring Plan (4.1), the monitoring program during the construction phase (4.2), and air and noise monitoring (4.2.1). The right page (Page 172) covers water management (4.2.2), biotic environment (4.2.3), soil monitoring (4.2.4), and monitoring during the operation phase (4.3), including air and noise monitoring (4.3.1). Both pages include a URL to the EIA report and a page number of 171.

Further, they present the environmental monitoring program here. So, how are they going to monitor the performance environmental performance of the project? So with that, phase-wise, they are giving a proposal where they look into the construction phase, so during the construction phase, how they would look at the air and noise monitoring, how they are going to look at the water management, how they are going to look at the biotic environment, and how they are going to undertake soil monitoring.

So, they have mentioned during the construction period, they are going to monitor all that to avoid impact on the environment here. Then during the operation phase again they would be monitoring all these air and noise, water, wastewater, and then biotic environment soil monitoring and then also they have allocated funds for environmental monitoring plan. So, they have allocated funding for that. So, you can see what range of funding it has.

(Refer Slide Time: 5:33)

EIA Report for "Development of Water Aerodrome" located at Swanj Dweep, Village - Govind Nagar, Tabala - Port Blair, District - South Andaman, Andaman & Nicobar

CHAPTER 6: ENVIRONMENTAL MONITORING PROGRAMME

Table 6.1: Environmental Monitoring Plan during Construction Phase

SN	Item	Parameters	Frequency	Location	Total (Rs. lakhs/year)
1	Ambient Air Quality	PM ₁₀ , PM _{2.5} , CO, SO ₂ & NO _x	Monthly	Near construction of proposed Terminal Building	1.94
2	Noise Level	Equivalent Noise Level dB(A)	Daily	Near construction of proposed Terminal Building	
3	Drinking Water Analysis	Physical, Chemical and Bacteriological Parameters	Monthly	At Source	0.40
4	Biotic Environment	Marine & Terrestrial environment	Quarterly	Around Project Area	0.10
5	Marine Water and Marine Sediment	pH, colour, odour, DO, BOD, TDS, hardness, Cl, F, SO ₄ , Alkalinity, NO ₃ , Ca, Mg, Na, K, Cu, Cr, Cd, CN, Phenols, Pb, Zn, O&G, Total Coliforms	Pre & Post Monsoon Period	Two Samples (One at proposed Jetty and one at proposed floating dock construction area)	0.70
6	Soil Quality	Soil Fertility and Salinity	Pre & Post Monsoon Period	Near construction of proposed Terminal Building	0.20
Total					3.34

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<http://environmentclearance.nic.in/writer/readdata/EIA/03042021U2NB1MV1FinalEIAReportShahedIslandWaterAerodrome.pdf>

EIA Report for "Development of Water Aerodrome" located at Swanj Dweep, Village - Govind Nagar, Tabala - Port Blair, District - South Andaman, Andaman & Nicobar

CHAPTER 6: ENVIRONMENTAL MONITORING PROGRAMME

Table 6.2: Environmental Monitoring Plan during Operation Phase

SN	Item	Parameters	Frequency	Location	Total (Rs. lakhs/year)
1	Ambient Air Quality	PM ₁₀ , PM _{2.5} , CO, SO ₂ & NO _x	Monthly	One location at upwind and two at downwind	7.46
2	Noise Level	Equivalent Noise Level dB(A)	Monthly	Exhaust from DG Sets Near Terminal & Utility Building	
3	Drinking Water Analysis	Physical, Chemical and Bacteriological Parameters	Quarterly	At Source	0.40
4	Biotic Environment	Marine & Terrestrial environment	Quarterly	Around project area	1.5
5	Marine Water and Marine Sediment	pH, colour, odour, DO, BOD, TDS, hardness, Cl, F, SO ₄ , Alkalinity, NO ₃ , Ca, Mg, Na, K, Cu, Cr, Cd, CN, Phenols, Pb, Zn, O&G, Total Coliforms	Half Yearly (pre and post monsoon)	Three Samples (One at Jetty, one at floating dock and one at Runway Strip area)	0.70
6	STP	pH, BOD, COD, TSS, TDS	Monthly	Influent and Effluent	1.2
7	Soil Quality	Soil Fertility and Salinity	Half Yearly	Project Site and one location, preferably agricultural area	0.20
Total					11.46

Prepared by M/s Enviro Resources Page 175

<http://environmentclearance.nic.in/writer/readdata/EIA/03042021U2NB1MV1FinalEIAReportShahedIslandWaterAerodrome.pdf>

So, you can see the total funding you can see 3.34 lakhs per annum year they would spend somewhere around 3 lakhs every year for all kinds of air quality checks, noise level checks, drinking water boiling, check marine water, checks during the construction phase, and then likewise, they have the monitoring plan for operation phase so which has like 11 lakh 11 plus lakh for every year they would be spending on monitoring all these environment.

(Refer Slide Time: 6:09)

EIA Report for "Development of Water Aerodrome" located at Swaraj Dweep, Village - Govind Nagar, Taluka - Port Blair, District - South Andaman, Andaman & Nicobar

CHAPTER 6: ENVIRONMENTAL MONITORING PROGRAMME

6.5 Environmental Monitoring Agency

NABL accredited 3rd party laboratory also having ANPCC / MoEF&CC approval shall be hired to carry out the environmental monitoring as per the above mentioned plan. There will be one record section for recording all the sampling frequencies and analysis reports.

Details of the in-house EMS for the management of environmental aspects during construction and operation phases of the proposed jetty are provided in Section 10.4, Chapter 10.

<http://environmentclearance.nic.in/writerereaddata/EIA/03042021U2N81M/V1/FinalEIAReport/ShahedIslandWaterAerodrome.pdf>

The environmental monitoring agency that will be involved has mentioned that they would be using a certified laboratory which will be approved by MoEF&CC. So, approved by them, they would be pointing them to monitor the environmental parameters in and around the project site as per their proposal.

(Refer Slide Time: 6:39)

EIA Report for "Development of Water Aerodrome" located at Swaraj Dweep, Village - Govind Nagar, Taluka - Port Blair, District - South Andaman, Andaman & Nicobar

CHAPTER 7: ADDITIONAL STUDIES

CHAPTER 7. ADDITIONAL STUDIES

7.1 Public Consultation

As per recommended ToR by EAC, Ministry of Environment, Forest & Climate Change vide Letter No. F.No. 10-53/2019-IA-III dated 16th December, 2019, Public Hearing had been conducted for the proposed Water Aerodrome Project at Swaraj Island dated 25th September, 2020 at around 12.30 PM. The Public Hearing was carried out at the Panchayat Bhavan, Govind Nagar Panchayat, Swaraj Dweep, South Andaman District.

The issues raised/comments by public, commitments made by Project Proponent on the same along with budgetary allocation are given in tabular chart below.

<http://environmentclearance.nic.in/writerereaddata/EIA/03042021U2N81M/V1/FinalEIAReport/ShahedIslandWaterAerodrome.pdf>

So, in this project, you will see that they had also undertaken additional studies because you understand the unique nature of the project here. So, in the public consultation part, you see that as per the ToR, they had to undertake a public hearing to be conducted for the proposed project. And when and where they did it they documented that and public hearing was carried out in the following places Panchayat Bhavan, Govind Nagar Panchayats, Swaraj Dweep, South Andaman district.

(Refer Slide Time: 7:18)

EIA Report for "Development of Water Aerodrome" located at Swaraj Dweep, Village - Govind Nagar, Taluka - Port Blair, District - South Andaman, Andaman & Nicobar					
CHAPTER 7: ADDITIONAL STUDIES					
Table 7.1: Issues raised/comments by public, Commitments made by Project Proponent on the same along with budgetary allocation					
SN	Attendee Name	Detail	Issue/Comment/Query	Commitment by Project Proponent	Financial budget for complying the Commitment
1	Shri. Prem Singh Merua	Assistant Commissioner (Genl) Office of DC South Andaman	--	--	--
2	Shri Rohitkesh	Senior Scientific Officer, ANPCC	--	--	--
3	Aparbha Ch Roy	Local Resident & Pramukh	Appreciated the initiative of the Administration for development of Water Aerodrome in the Island, which will help in the development of the Swaraj Dweep. He thanks the Administration for organizing the public hearing to obtain the suggestion and views of the local public. He suggested for proper approach road to be developed. He enquired about the timeline and also about the employment generation from the project. He suggested that the local people may be considered first for employment in this project.	Project Proponent committed that opportunity of local people in terms of direct & indirect employment will be there. Expected timeline for completion of the project is 4-6 months after EC is obtained.	Budgetary allocation of Rs. 1.50 Crore has been made for development of approach & internal roads.
4	Alok Modha	PSM, SNGP	Welcomes the project of Water Aerodrome at Swaraj Dweep. He wants to know that who is going to manage the operation of Sea Plane. Whether local people will get job? And if there will be subsidy for islander.	Project Proponent informed that the Andaman & Nicobar Administration is going to manage the entire operation of sea plane.	--
Prepared by M/s Enviro Resources				Page 178	

<http://environmentclearance.nic.in/writer/readdata/EIA/03042021U/2NB1MV1FinalEIAReportShahedIslandWaterAerodrome.pdf>

So, all the issues that were raised and the comments raised by the public, the commitments by the project proponents on the same have been aligned with the budgetary allocation. So, whatever input came, they incorporated and also made budgetary allocations for that. So, you can see the list of issues that are raised, and the comments of the project proponent here. So, given the demographic profile, it is, you can see who all are the attendees.


(Refer Slide Time: 7:54)

EIA Report for "Development of Water Aerodrome" located at Swaraj Dweep, Village - Govind Nagar, Taluka - Port Blair, District - South Andaman, Andaman & Nicobar					
CHAPTER 7: ADDITIONAL STUDIES					
SN	Attendee Name	Detail	Issue/Comment/Query	Commitment by Project Proponent	Financial budget for complying the Commitment
				The local people will get job opportunity directly & indirectly from the proposed project. Project Proponent further informed that the proposed project is the part of UDA,AN Scheme of Government of India.	
5	Ajit Kumar Roy	Local Resident & Pradhin Grampanchayat, Govindnagar	Has welcomed the proposal of Water Aerodrome at Swaraj Dweep which is going to support and intensify the tourism activities since operation of the Sea Plane will increase the connectivity from Port Blair to Swaraj Dweep.	It is a positive comment for implementation of proposed project.	--
6	Smt. Shikha Rama Misry	Local Resident & SNGP	Has appreciated and welcome the proposal of Water Aerodrome at Swaraj Dweep. She expresses her gratitude to the Administration for taking the suggestions and views of the public by organizing public hearing. She further added that the operation of Sea Plane from Port Blair to Swaraj Dweep will be attraction for the tourist as well as local people.	It is a positive comment for implementation of proposed project.	--
7	Daniel	Local Resident & Parwarj	--	--	--
8	Mohamad	Local Resident	--	--	--
Prepared by M/s Enviro Resources				Page 179	

<http://environmentclearance.nic.in/writer/readdata/EIA/03042021U/2NB1MV1FinalEIAReportShahedIslandWaterAerodrome.pdf>


So, we do not get to see the male and female participants here as well as indigenous peoples' participation here, but then that is given here. So, you can think about it, when you look at the demographic profile, how the participants could be but prior there are a lot of practical limitations which come in but you can always review how the participation has been undertaken.

(Refer Slide Time: 8:22)

 EIA Report for "Development of Water Aerodrome" located at Sunny Dweep, Village - Govind Nagar, Tabala - Port Blair, District - South Andaman, Andaman & Nicobar CHAPTER 7: ADDITIONAL STUDIES					
SN	Attendee Name	Detail	Issue/Comment/Query	Commitment by Project Proponent	Financial budget for complying the Commitment
	Wassem				
9	Sandeep Dhanne	Principal Consultant - Feedback Infrastructure Pvt. Ltd.	--	--	--
10	Timir Shah	Environmental Consultant - Enviro Resources	--	--	--
11	Anil Kumar Mondra	Local Resident	--	--	--
12	Chandra Kanta Biswas	Local Resident	--	--	--
13	M Vallapa Rao	Local Resident	--	--	--
14	Jiten Gharami	Local Resident	--	--	--
15	Bikash Das Naha	Local Resident	--	--	--
16	Kumar Biswas	Local Resident	--	--	--
17	Sakanta Baskar Das	Local Resident	--	--	--
18	Jalpa Elna Renuka Mondal	Local Resident	--	--	--
19					

Prepared by M/s Enviro Resources Page 180

<http://environmentclearance.nic.in/write/readdata/EIA/03042021U2N81MV1FmaEIAReport/ShahedSlandWaterAerodrome.pdf>


 EIA Report for "Development of Water Aerodrome" located at Sunny Dweep, Village - Govind Nagar, Tabala - Port Blair, District - South Andaman, Andaman & Nicobar CHAPTER 7: ADDITIONAL STUDIES					
SN	Attendee Name	Detail	Issue/Comment/Query	Commitment by Project Proponent	Financial budget for complying the Commitment
20	Probin Bawali	Local Resident	Wants to know whether due to operation of the Sea Plane the fishermen of Swaraj Dweep will be affected.	Project Proponent informed that due to the operation of the sea plane services neither fishing activity nor any fishermen is going to be affected.	--
21	Sandeep Baran	Local Resident	--	--	--
22	Shiba Pada Mondal	Local Resident	--	--	--
23	Manish Kr. Bala	Local Resident	--	--	--
24	Mamona	Local Resident	--	--	--
25	Tulu Raha	Local Resident	--	--	--
26	Manoranjan Mondal	Local Resident	--	--	--
27	Deepzala Joykhar	Local Resident	--	--	--
28	Sameer Misra	Local Resident	--	--	--
29	Deepankar Chakraborty	Local Resident	--	--	--
30	Kartick Mondal	Local Resident	--	--	--
31	Sandeep Sarkar	Local Resident	--	--	--
32	Tapash Kr	Local Resident	--	--	--

Prepared by M/s Enviro Resources Page 181

<http://environmentclearance.nic.in/write/readdata/EIA/03042021U2N81MV1FmaEIAReport/ShahedSlandWaterAerodrome.pdf>

So, you can see different attendees who have attended here and then what kind of inputs they have got. So, mostly, you see that there are a lot of positive reviews which they have got.

(Refer Slide Time: 8:38)


 EIA Report for "Development of Water Aerodrome" located at Swaraj Dweep, Village - Govind Nagar, Tahsil - Port Blair, District - South Andaman, Andaman & Nicobar CHAPTER 7: ADDITIONAL STUDIES					
SN	Attendee Name	Detail	Issue/Comment/Query	Commitment by Project Proponent	Financial budget for complying the Commitment
				The local people will get job opportunity directly & indirectly from the proposed project. Project Proponent further informed that the proposed project is the part of UDAAN Scheme of Government of India.	
5	Ajit Kumar Roy	Local Resident & Pradhan Grampanchayat, Govindnagar	Has welcomed the proposal of Water Aerodrome at Swaraj Dweep which is going to support and intensify the tourism activities since operation of the Sea Plane will increase the connectivity from Port Blair to Swaraj Dweep.	It is a positive comment for implementation of proposed project.	--
6	Smt. Shikha Rani Mishra	Local Resident & SNGP	Has appreciated and welcome the proposal of Water Aerodrome at Swaraj Dweep. She expresses her gratitude to the Administration for taking the suggestions and views of the public by organizing public hearing. She further added that the operation of Sea Plane from Port Blair to Swaraj Dweep will be attraction for the tourist as well as local people.	It is a positive comment for implementation of proposed project.	--
7	Daniel	Local Resident & Patwari	--	--	--
8	Mohamad	Local Resident	--	--	--

<http://environmentclearance.nic.in/writesaddata/EIA/03042021U2N81M/V1/FinalEIAReport/ShahedIslandWaterAerodrome.pdf>

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As you can see Ajit Kumar Roy, a resident, and Pradhan, so, he has welcomed the proposal for the Water Aerodrome it is going to support and intensify tourism activity, and the operation of seaplane will increase the connectivity of Port Blair to Swaraj Dweep, so it was a positive comment which has been documented here. So, we can see here one of the comments from Praveen Baba Ali.

(Refer Slide Time: 9:12)

 EIA Report for "Development of Water Aerodrome" located at Swaraj Dweep, Village - Govind Nagar, Tahsil - Port Blair, District - South Andaman, Andaman & Nicobar CHAPTER 7: ADDITIONAL STUDIES					
SN	Attendee Name	Detail	Issue/Comment/Query	Commitment by Project Proponent	Financial budget for complying the Commitment
20	Prabin Biswali	Local Resident	Wants to know whether due to operation of the Sea Plane the fishermen of Swaraj Dweep will be affected.	Project Proponent informed that due to the operation of the sea plane services neither fishing activity nor any fishermen is going to be affected.	--
21	Sandeep Baran	Local Resident	--	--	--
22	Shibu Pada Mondal	Local Resident	--	--	--
23	Manish Kr Bala	Local Resident	--	--	--
24	Mamona	Local Resident	--	--	--
25	Tulu Raha	Local Resident	--	--	--
26	Manoranjan Mondal	Local Resident	--	--	--
27	Deepankar Joythar	Local Resident	--	--	--
28	Sameer Mishra	Local Resident	--	--	--
29	Deepankar Chakraborty	Local Resident	--	--	--
30	Karick Mondal	Local Resident	--	--	--
31	Sandeep Sarkar	Local Resident	--	--	--
32	Tapash Kr	Local Resident	--	--	--

<http://environmentclearance.nic.in/writesaddata/EIA/03042021U2N81M/V1/FinalEIAReport/ShahedIslandWaterAerodrome.pdf>

Prepared by M's Enviro Resources Page 181


 EIA Report for "Development of Water Aerodrome" located at Swaraj Dweep, Village - Ground Naga, Tahisa - Port Blair, District - South Andaman, Andaman & Nicobar CHAPTER 7: ADDITIONAL STUDIES					
SN	Attendee Name	Detail	Issue/Comment/Query	Commitment by Project Proponent	Financial budget for complying the Commitment
	Beawas				
33	Deepankar Mondal	Local Resident	--	--	--
34	Bhadranshu Bisu	Local Resident	--	--	--
35	Geta Beawas	Local Resident	--	--	--
36	Deepali Saha	Local Resident	--	--	--
37	Amarak Roy	Local Resident	--	--	--
38	Anil Kumar Saha	Local Resident	--	--	--
39	Mrityanjoy Saha	Local Resident	--	--	--
40	Biju Mallick	Local Resident	--	--	--
41	Dipankar Saha	Local Resident	--	--	--
42	Rakha Das Saha	Local Resident	--	--	--
43	Sarkar, Sea Shell	Local Resident	--	--	--
44	Anjoy	Local Resident	--	--	--
45	Sabotmans Kumar	Local Resident	--	--	--
46	Sukhodan	Local Resident	--	--	--

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<http://environmentclearance.nic.in/writeresdaha/EIA/03042021U/2NB1MVFineEIAReport/ShahedIslandWaterAerodrome.pdf>

Baba Ali, here resident wants to know whether due to the operation of the seaplane, the fisherman of Swaraj Dweep will be affected. So, the project proponent informed us that due to the operation of the seaplane service, neither fishing activity nor any fisherman is going to be affected. So, that was the comment of the project proponents. Though, we are not aware of the details of it, that is what the concerns of the local people came to and how that has been responded to. Those details are not here at this moment, what we can see from here so that not many comments have been raised by the Look Will residents.

(Refer Slide Time: 10:00)

 EIA Report for "Development of Water Aerodrome" located at Swaraj Dweep, Village - Ground Naga, Tahisa - Port Blair, District - South Andaman, Andaman & Nicobar CHAPTER 7: ADDITIONAL STUDIES					
SN	Attendee Name	Detail	Issue/Comment/Query	Commitment by Project Proponent	Financial budget for complying the Commitment
	Mallick				
47	Manick Chakraborty	Local Resident	--	--	--
48	Manotosh Mridha	Local Resident	--	--	--
49	Ajay Kumar Mondal	Local Resident	--	--	--
50	Dhananjay Mondal	Local Resident	--	--	--
51	Naugopal Singh	Local Resident	--	--	--

Local people have shown a positive attitude towards proposed project & have welcomed the proposed project in anticipation of direct, indirect employment to be generated, better connectivity to Port Blair & boost to local tourism activity.

The proceedings and minutes of the Public Hearing are as provided as *Annexure 5*.

<http://environmentclearance.nic.in/writeresdaha/EIA/03042021U/2NB1MVFineEIAReport/ShahedIslandWaterAerodrome.pdf>

So, you also see where the public participation is happening, how mature the people are to raise those concerns and arguments or concerns of their people. So, that also you as a learner of this course need to understand that. So, public participation is what we have seen here.

(Refer Slide Time: 10:24)

EIA Report for "Development of Water Aerodrome" located at Swayam Deep, Village - Gendal Negeri, Tabaka - Pur Batas, District - South Indragiri, Indragiri & Nias

CHAPTER 7: ADDITIONAL STUDIES

7.2 Risk Assessment

7.2.1 Risk Assessment Methodology

Risk assessment Methodology is in part the "Hazard Identification and Hazard Analysis Techniques of Hazard Identification and Risk Analysis - Code Of Practice No 1506/2006."

Where:

- Goal: Goal for carrying out risk analysis is required as a part of safety equipment, emergency planning, etc. depending on the nature of facility.
- Location, Layout, Process Parameters: The information on plant location, the layout of equipment, the process conditions, etc. is required for the Risk Analysis.

- Hazard Identification: Hazard identification is done by comparative and/or fundamental methods leading to qualitative or quantitative results.
- Quantification of Hazard: The indices method for hazard identification can assess the hazard potential for the identified scenarios and can be used as a tool for screening.
- Select Most Credible Scenario: The credible scenarios which are vulnerable are on accident out of several major and minor scenarios, possible for the release of material and energy.
- Select Worst Case Scenario: The incident which has the highest potential to cause an accident of maximum damage is selected for further analysis.
- Estimate Consequences: The consequences of scenarios in the plant in the form of fire, explosion and toxic effects have to be estimated and presented.
- Estimate Frequency of Occurrence: The probability or frequency of an occurrence of any accident is to be found out by reliability analysis, which includes fault tree, event tree, etc.

While identifying the hazard(s) a filtering process is carried out only portions with potential risk are identified for risk analysis. Hazard is not considered for further analysis, if it is:

- Undetectable and
- Not very significant.

Prepared by M/S. Swajani Resources Page 163

<http://environmentclearance.nic.in/writereaddata/EIA/03042021U2NB1MV1FinalEIAReportShahedIslamdWaterAerodrome.pdf>

So, next we see is the risk assessment, so, risk assessment methodology, what they have adopted here. So, we have also studied the risk assessment methodology. So, you can see the flowchart here, for risk analysis, how they are identifying the hazard, what is how they are doing the quantification of the hazard, and what is the credible scenario, worst scenario, and estimation of consequences and frequency of occurrence, so, all that has been done here.

(Refer Slide Time: 10:55)

EIA Report for "Development of Water Aerodrome" located at Swayam Deep, Village - Gendal Negeri, Tabaka - Pur Batas, District - South Indragiri, Indragiri & Nias

CHAPTER 7: ADDITIONAL STUDIES

7.2.2 Classification of Emergency/Disaster

Source: Author based on Bogardi/ Behrman (2004) and Cardesa (1999/ 2001)
Figure 7.1: Vulnerability the BBC - Conceptual Framework

In the present study the reliable data in this regard is not available. Also the study doesn't take in to account category of human factor because of the absence of the human failure data. However, the risk is as low as broadly acceptable region likelihood of such an incident is considered as being extremely low. It should be noted it depends heavily upon the maintenance of the hardware and of the management procedures, neglect of either will lead to loss of protection and the rating will rise to the higher level.

Table 7.2: Disaster Category

SN.	INCIDENCE	VULNERABILITY						CATEGORY LEVEL OF EMERGENCY
		Personnel		Property		Environment		
		Before	During	After	Before	During	After	
1.	Fall of structures.	Low	High	Moderate	Low	High	Low	1
2.	Trapped in lift.	Low	Moderate	Moderate	Low	Low	Low	1
3.	Fire/ Explosion	Low	High	Moderate	Low	High	Low	3
4.	Bomb threat.	Low	High	Moderate	Low	High	Low	3
5.	Flooding	Low	Low	Low	Low	Low	Low	1
6.	Cyclone.	Low	High	Low	Low	High	Low	3
7.	Earthquake.*	Low	High	Moderate	Low	High	Moderate	3

Where:

- Category 1: Events can be controlled by Fire/ Security department with local resources.
- Category 2: Events action plan requires additional help from local fire brigade and evacuation.
- Category 3: Events action plan requires mobilization of external agencies, resources and evacuation.

<http://environmentclearance.nic.in/writereaddata/EIA/03042021U2NB1MV1FinalEIAReportShahedIslamdWaterAerodrome.pdf>

EIA Report for "Development of New Aerodrome" located at Shree Durg, Village -
Gandhi Nagar, Taluka - Por-Ban, District - South Kanara, Andhra & Nagar
CHAPTER - ADDITIONAL STUDIES

Category 7: Emission action plan requires mobilization of external agencies, resources and excavation

Table 7.3: Preliminary Hazard Analysis

IDENTIFICATION OF HAZARD CHECK LIST		PHASE OF THE PROJECT		
Hazard		Construction	Operation	Decommissioning
Natural Hazard	Cyclone	✓	✓	✓
	Earth quake	✓	✓	✓
	Land slide	✓	✓	✓
	Thunder heavy rain, Hail, Hailstorm	✓	✓	✓
	Tsunami	✓	✓	✓
Physical Hazard	Noise	✓	✓	✓
	Radioactive (UV) radiation materials	✓	✓	✓
	Explosion susceptibility	✓	✓	✓
	Vibration	✓	✓	✓
	Lightning	✓	✓	✓
Bio Hazard	Explosion - communicable diseases by pests, insects, rodents etc.	✓	✓	✓
	Toxic organic vapours and residual vapours	✓	✓	✓
	Bioary heavy metals/ metal ions	✓	✓	✓
	Occupational health hazards at ETP, Diesel tank	✓	✓	✓
	Translucent fire explosion	✓	✓	✓
Electrical Hazard	Power transmission tower line wire usage up existing tower as support tower	✓	✓	✓
	Lightning strike	✓	✓	✓
	Fire due to short circuit	✓	✓	✓
	Power outage	✓	✓	✓
	AC Refrigeration, Air conditioning units, fire explosion	✓	✓	✓
Hazardous substances	Diesel fire at D/E jet	✓	✓	✓
	Fire due to ETP	✓	✓	✓
	Batteries were recommended disposal - batteries, Adhesives containing	✓	✓	✓
	Batteries were recommended disposal - a waste battery.	✓	✓	✓
	Inertial residues, toxic gas release, fire explosion	✓	✓	✓
	Smoke in fire, acid gases in fire, changing acid	✓	✓	✓
	Thermal residues at engine unit	✓	✓	✓
	Volatiles residues, fire	✓	✓	✓
	Toxic gas release Carbon Monoxide at parking lot	✓	✓	✓
	Fire due to machinery and equipment	✓	✓	✓

Prepared by M/S Enviro Resources Page 181

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So, you can see the disaster category they have created the table here and they have also identified the vulnerability here. So, you see here the primarily hazard analysis that they have done here, so, which has also been presented here. So, natural causes, physical hazards, biohazards, electrical hazards, hazardous substances, and waste. So, the phase of the project in which that is likely to happen, so, that all has been ticked here. So, that's very relevant here for this particular case. So, that study has been undertaken here.

(Refer Slide Time: 11:34)

EIA Report for "Development of New Aerodrome" located at Shree Durg, Village -
Gandhi Nagar, Taluka - Por-Ban, District - South Kanara, Andhra & Nagar
CHAPTER - ADDITIONAL STUDIES

Pre-Construction Activities	Lack of safety guards in machines	✓	✓	✓
	Poor maintenance of machinery and equipment	✓	✓	✓
	Poorly stored tools, parts, greases and oil and other cutting materials	✓	✓	✓
	Facilities - Road and parking lot	✓	✓	✓
	Structural failure	✓	✓	✓
Pre-Construction Activities During Construction Activities	Track and transport vehicles	✓	✓	✓
	Being struck by falling objects	✓	✓	✓
	Crane lift or equipment	✓	✓	✓
	Cranes, tractors, hoisting and loading equipment malfunction	✓	✓	✓
	Slipping	✓	✓	✓
	Electricity (electrocution)	✓	✓	✓
	Fall from height	✓	✓	✓
	Fire and explosion - Explosives, Blasting chemicals uncontrolled	✓	✓	✓
	explosion being demolished land development	✓	✓	✓
	Hit by stray objects	✓	✓	✓
	Explosive being handling heavy objects	✓	✓	✓
	Lack of PPE, housekeeping practices, safety signs	✓	✓	✓
	Obstruction in road/traffic	✓	✓	✓
	Poorly stored - chemicals, pesticides, waste oil, flammable combustible materials fire at site	✓	✓	✓
	Poor observation	✓	✓	✓
Slipping on wet surfaces	✓	✓	✓	
Slipping while carrying items, chairs, things, tools, chains	✓	✓	✓	
Struck by moving objects	✓	✓	✓	
Working hours and conditions	✓	✓	✓	
Pre-Construction Activities	Repetitive and strenuous work, excessive workload, stress	✓	✓	✓
	equipment	✓	✓	✓
	Miscellaneous human relations	✓	✓	✓
	aggressive behavior alcohol and drug abuse, violence	✓	✓	✓
	Poorly low wages, lack of education	✓	✓	✓
Others	Long working hours, shift work, night work, irregular employment	✓	✓	✓
	Drinking	✓	✓	✓
	High safety hazard stresses such as heat	✓	✓	✓
	The operation, cost and exposure to human activity	✓	✓	✓
	Facilities for disposal of waste during track work	✓	✓	✓
Others	Poor change to emergency equipment, cable failure	✓	✓	✓
	excessive idling times at site and some parts of terminal	✓	✓	✓
	Building system failure	✓	✓	✓
	Change in design construction of assembly plant	✓	✓	✓
	Spreading materials	✓	✓	✓
Others	Operational control system governed during fire fighting operation, operation, operation, spill flow working any site	✓	✓	✓
	Operational control system governed during fire fighting operation, operation, operation, spill flow working any site	✓	✓	✓

Prepared by M/S Enviro Resources Page 181

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So, you see how they are looking at all the aspects of what possibilities are there of his risk, what risks are there in this particular case. So, you can see all that during the operation construction and post-operation phase.

EIA Report for 'Development of Water Aerodrome' located at Sweeny Deep, Village -
 General Nages, Taluka - Por-Bhar, District - South Andhra Pradesh & Neighboring
 CHAPTER 7: ADDITIONAL STUDIES

DIESEL SAFETY INFORMATION SHEET

NOT REQUISITE FOR TRANSPORT OF DANGEROUS GOODS

IDENTIFICATION

HAZARD IDENTIFICATION

PREVENTION

REACTIVITY

STABILITY

TOXICITY

ENVIRONMENTAL HAZARD

ENVIRONMENTAL PROTECTION

ENVIRONMENTAL IMPACT

ENVIRONMENTAL MONITORING

ENVIRONMENTAL RESTORATION

ENVIRONMENTAL CLOSURE

ENVIRONMENTAL EMERGENCY

ENVIRONMENTAL RECORD

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021U/2N81MV1FinalEIAReport/ShahedIslamdWaterAerodrome.pdf>

So, they also created a safety information sheet and how they are going to keep a record of that. So, further, you see they have also created all kinds of information about what diesel they are using ingredients and diesel and so on.

(Refer Slide Time: 12:47)

EIA Report for 'Development of Water Aerodrome' located at Sweeny Deep, Village -
 General Nages, Taluka - Por-Bhar, District - South Andhra Pradesh & Neighboring
 CHAPTER 7: ADDITIONAL STUDIES

Figures 7.2: Hazard & Hazard Potential Location Map

Figures 7.2: Hazard & Hazard Potential Location Map

DIC: Nil (No backup during power failure) 3000 NVA
 577 gms (Maximum) 4 KL.D.-80LD Phase 2)

LEVEL	MEASURE	DESCRIPTION	TIMEFRAME
A	Will Occur	Issue will occur as currently a problem is expected to occur in most circumstances.	Weekly
B	Likely to occur	Issue has been a common problem in the past and there is a high probability it will occur in most circumstances.	Once per month
C	Should Occur	Issue may have arisen in the past and there is a high probability that it should occur at some time.	Once in 6 months
D	Could Occur	Issue may have occurred in the past and there is a moderate probability that it could occur at some time.	Once per 10 years
E	Rare	Issue has not occurred in the past and there is a low probability that it may occur in exceptional circumstances.	Once per life of facility

The combination of the likelihood and consequence ratings was then compared to the qualitative risk analysis matrix, providing an indication of the magnitude or significance of the impact (ranging from low high to priority). The adjusted risk assessment matrix is presented in the following table.

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021U/2N81MV1FinalEIAReport/ShahedIslamdWaterAerodrome.pdf>

EIA Report for 'Development of Water Aerodrome' located at Sweeny Deep, Village -
 General Nages, Taluka - Por-Bhar, District - South Andhra Pradesh & Neighboring
 CHAPTER 7: ADDITIONAL STUDIES

Table 7.6: Risk Assessment Matrix

LIKELIHOOD	CONSEQUENCE				
	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastroph
A - Will Occur	S	S	H	H	H
B - Likely to Occur	M	M	S	H	H
C - Should Occur	L	M	S	H	H
D - Could Occur	L	L	M	S	S
E - Rare	L	L	M	S	S

H = High = Detailed research and management planning required at senior levels. Immediate action required.
 S = Significant = Senior management attention needed.
 M = Moderate = Management responsibility and integration into management plans required.
 L = Low = Manage by routine procedures.

MCA Worst Possible Scenario

The major concern of the assessment is to identify the activities falling in a matrix of high to low frequencies at which the failures occur and the degree of its impact. The high frequency, low impact activities can be managed by regular maintenance i.e. LDAR (Leak detection and repair) program. Whereas, the low frequency, high impact activities (accidents) are of major concern in terms of risk assessment. As the frequency is low, often the required procedures are not reduced or maintained. However, the risk assessment identifies the areas of major concern, which require additional preventive measures. Likely consequence distances considering domino effects, which will give the possible casualties and ecological loss in case of accidents.

This risk assessment exercise for the site under consideration establishes the significance of impacts first and proceeds to delineate the associated mitigation measures. So the significance here reflects the "worst case scenario" before mitigation is applied, and therefore provides an understanding of what may happen if mitigation fails or is not as effective as predicted.

Based on this exercise the following table gives identified events having potential of fire/explosion/ toxic gas release at site operations. Following accident scenarios are considered for further analysis.

SN	EVENTS HAVING SIGNIFICANT CONSEQUENCES
Event 1	High Speed Diesel truck accidental spill followed by pool fire
Event 2	Vehicle at parking lot release followed by fire
Event 3	Sea plane engine followed by fuel fire, explosion

7.2.3 Consequence Analysis

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021U/2N81MV1FinalEIAReport/ShahedIslamdWaterAerodrome.pdf>

EIA Report for "Development of Water Aerodrome" located at Swayy Dweep, Village - Gerind Nagar, Tabaka - Port Blair, District - South Andaman, Andaman & Nicobar

CHAPTER 7: ADDITIONAL STUDIES

7.2.3.1 Likely Accident Scenarios

1	Flammable Fuel spill followed by fire.
2	Flammable gas cylinder fire during construction.
3	Fire gas release.

These accident scenarios are divided in two categories considering the consequence seriousness and occurrence frequency.

- Maximum Credible Loss Scenario (MCLS)
- Worst Possible Scenario

Maximum Credible Loss Scenario (MCLS)

Maximum Credible Loss Scenario (MCLS) is one of the methodologies evolved to assess the events in realistic and practical way. An MCLS can be described as the worst "credible" accident or as an accident with a maximum damage distance, which is still believed to be probable. The analysis, however, does not include a quantification of the probability of occurrence of an accident.

7.2.4 Vulnerability & Impact Assessment

7.2.4.1 Tsunami

Tsunami velocity is dependent on the depth of water through which it travels, and is equal to the square root of depth times the gravitational acceleration. Tsunami Waves travel at a speed of approximately 700 Km/hr in 4000 m of water. In 10 m of water the velocity drops to about 36 Km/hr.

Tsunami Flooding - Vulnerable Zone Tsunami Early Warning System

<http://environmentclearance.nic.in/writereaddata/EIA/03042021U/2N81MVFmaEIAReport/ShahedIslandWaterAerodrome.pdf>

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CHAPTER 7: ADDITIONAL STUDIES

Figure 7.3: Tsunami Flooding

Hazard Zone	1	2	3	4
Maximum Water Depth	0 to 3 m	3 to 6 m	6 to 9 m	>9 m

Multi Hazard Data for East Coast of India - Andaman & Nicobar

Seismic Zone	Design Cycloic Wind UT [IS:875 (III)] m/sec	Probable Maximum Storm Surge Heights (m)	Astronomical High Tide above Mean Sea Level (m)	Flood Proneness
V	44	**	1.0	-

Tsunami on 26 December 2004.

** Storm surge occurrence in Andaman & Nicobar Islands has not been documented however storms originating over these areas are not intense enough to cause significant surge.

<http://environmentclearance.nic.in/writereaddata/EIA/03042021U/2N81MVFmaEIAReport/ShahedIslandWaterAerodrome.pdf>

And then they have done all kinds of hazard potential location mapping, so, which we had seen, so, they have undertaken that kind of mapping here, you can also see risk assessment matrix here. So, you see the likelihood of any kind of risk happening. So, A to E, you can see will occur likely to occur, should occur, could occur, the likely consequences, insignificant minor moderate major catastrophic.

So, you see how they have analyzed it here and then all likely accident scenarios and then also they have analyzed the vulnerability and impact assessments are related with tsunami and all kinds of flooding which can happen. So, that has been seen.

(Refer Slide Time: 13:41)

7.2.4.2 Flooding

Vulnerability: Heavy rain coinciding with high tide timing. The annual total rainfall is 2968.1 mm.

Table 7.7: Long Term Meteorological Data Of Port Blair
(30 Years Average 1981-2010)

Month	Temperature (°C) Daily		Relative Humidity (%)		Rainfall (mm)	Predominant Wind Direction (From)	Calm Period		Cloud Amounts (Out of 10)		Wind Speed (knots)
	Max	Min	08:30	17:30			08:30	17:30	08:30	17:30	
January	25.8	22.4	72	74	32.1	NE, E	9	11	4.3	4.9	5.8
February	30.2	22.1	71	72	16.3	NE, E	16	26	3.5	4.1	4.7
March	31.3	22.7	69	72	32.5	NE, E	22	37	2.7	4.4	4.5
April	32.3	24.1	69	74	75.9	NE, E	19	42	4.6	5.2	4.9
May	29.2	24.2	73	81	399.8	SW, W	16	24	6.2	6.4	5.6
June	25.8	23.9	82	84	442.2	SW, W	3	5	6.9	7.0	13.8
July	25.4	23.8	83	84	442.5	SW, W	6	5	6.9	6.9	12.9
August	29.7	23.6	84	85	445.4	SW, W	5	5	6.9	7.0	14.1
September	25.2	23.0	84	87	438.3	SW, W	14	24	6.6	6.7	9.6
October	25.7	23.0	80	85	301.4	SW, W	26	44	5.9	6.1	6.2
November	29.8	23.3	77	82	242.4	NE, E	15	24	5.6	5.9	6.7
December	28.5	23.0	72	75	102.2	NE, E	7	10	4.8	5.3	6.7
Annual Total or Mean	30.1	23.3	77	80	2968.3	NE, E & SW, W	14	23	5.5	5.8	8.2

Source: IMD, Port Blair.

Being a tropical humid climate high humidity is observed in all the months. The relative humidity in the region ranges between 32-99%. The maximum humidity during rainy season is 99%.

Most of the year clouds were observed in the sky. The Relevant details about the number of days with zero oktas of cloud cover (all clouds) for all months are presented in the following table.

Table 7.8: No. of days with zero oktas of cloud cover (Port Blair)

Cloud	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
08:30	0	1	1	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0

Impact

- Flooding spots may affect emergency movements and rescue operations on the approach road for external help.
- Direct impact in terms of injury, fatality, loss of property and Long term local and wide spread impacts on the residents.

<http://environmentclearance.nic.in/writereaddata/EIA/03042021U2NS1M1U1FmsEIAReportShahedshlandWaterAerodrome.pdf>


Then, you also see that they have looked into the time series data concerning Port Blair. So, they have looked into 30 years of average 1981 to 2010 data to understand how the flooding vulnerabilities there concerning heavy rain coinciding with high tide timing.

(Refer to Slide Time: 14:06)

7.2.4.3 Sea Plane

A seaplane is a fixed winged aeroplane which is designed for taking off and landing on water and includes amphibians operating as sea planes. A seaplane is in the unique position of being able to provide air service which is practically impossible with any other kind of craft. It offers the public the speed of the airplane with the utility of the boat.

There are two main types of seaplane: flying boats (often called 'hull seaplanes') and floatplanes. The bottom of a flying boat's fuselage is its main landing gear. This is usually supplemented with smaller floats near the wings, called wing or tip floats. The hull of a flying boat holds the crew, passengers, and cargo; it has many features in common with the hull of a ship or boat.



SEA PLANE (TYPICAL)

Vulnerability:
Collision, grounding, cross wind, hits rocks/ objects etc. leading to mishap on water. The onset of hypothermia, and its associated effects, during and following prolonged immersion in cold water, and the immediate tetanic and respiratory effects on survivors in the water following the ingestion of floating fuel and oils and their associated vapors, and fire suppressant foams, powders and gases.

7.2.4.4 Aircraft Crash Incidents

Aircraft incidents due to bird strike,
Hazards posed to infrastructure and surrounding areas

primary consequences of aircraft crash incidents on the ground include Property damage, injuries or perhaps fatalities. An aircraft crash could also cause an emergency incident at the island or a bush fire in the adjacent wetlands.

Methods for estimating individual risk require three basic quantities:

- The annual probability that a crash occurs near a given airport (crash frequency). Crash Frequency is estimated from the annual aircraft movements multiplied by the applicable crash rate for each aircraft type;
- The distribution of these crashes with respect to the airport location (crash location); and
- The size of the crash area and the lethality within this area (crash consequence).

- Landing overshoot;
- Landing veer-off;
- Take-off veer-off;
- Landing overrun;
- Take-off overrun;
- Ground collision with other aircraft in landing; and
- Ground collision with other aircraft in take-off.

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So, you also see that they have looked at the seaplane because of that what kind of vulnerability is there, contact, collision, grounding, crosswind hits, hits rocks, what can happen, then you also see aircraft crash incidents also can happen, aircraft incidents due to bird strike as opposed to infrastructure and surrounding areas. So, landing overshoot, landing veers off, taking the year off and all that analysis has been undertaken.

(Refer Slide Time: 14:41)

EIA Report for 'Development of Water Aerodrome' located at Swayam, Village -
Gandhinagar, Taluka - Porbandar, District - South Gujarat, Andaman & Nicobar

CHAPTER 7: ADDITIONAL STUDIES

Landing Overrun Fishbone Diagram

Figure 7-4: Landing Overrun Fishbone Diagram

- The overrun accident is an accident during a landing or an aborted take-off, when the pilot is unable to prevent the aircraft from leaving the paved surface of the runway times in each. It is a "Longitudinal deviation", that is the Longitudinal distance travelled beyond the acceleration distance available (for takeoff events), and beyond the landing distance available (for landing events).
- The under shoot accident is a "Longitudinal deviation", that is the Longitudinal distance the aircraft undershoots the intended threshold.
- The veer-off accident, both take-off and landing, is a overrun in which the aircraft leaves the side (as opposed to the end). It is a "lateral deviation" that is the lateral distance to the extended runway centreline.
- The ground collision with other aircraft is an event where aircraft collide on the runway or while one is on the ground and the other in the air close to the ground, both take-off and landing.

Civil aviation is a complex mosaic of many varied, yet interrelated human, technical, environmental, and organizational factors that affects safety and system performance. Aviation accidents result from multiple contributing factors. Logan (1999) mentioned that operational safety data such as aircraft reliability, flight data records, employee safety reports, endorsement information, inspectors investigations or oversight information were also essential to aviation risk analysis.

In the present study the reliable data in this regard is not available. Also the study doesn't take in to account category of human factor because of the absence of the human failure data. However, the risk is so low as broadly acceptable region likelihood of such an incident is considered as being extremely low.

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So, concerning landing, you can see that they have done a fishbone diagram of what possible scenarios can happen.

(Refer Slide Time: 14:49)

7.2.4.5 Cyclone Strike

Vulnerability

The predominant wind direction at Port Blair and neighboring islands is from North East and East in November to April months. During monsoon period the predominant wind direction is from South West and West.

Visibility	Number Of Days In The Year
More than 1 km	92.7 days
1 to 4 km range	36.6 days
4 to 10 km range	95.4 days
Between 10 to 20 km	108.7 days
Above 20 km	392.7 days

Special Weather Phenomena

- The occurrence of thunderstorms is 64.8 days per year, mostly spread across the months of April to July.
- Annual Dust Storms is only 0.2 days during September month.

Impact

- Cyclones bring in their wake considerable loss of life and property.
- Long term wide spread impacts on the residents.
- Destruative potential to damage lifeline infrastructure such as power and communication towers, hospitals, roads etc. due to high velocity winds.
- Direct impact in terms of injury, disability, loss of property and long term local and wide spread impacts on the residents.
- Structures falling outside protection provided by lightning arrestors are vulnerable especially heavy rainfall associated with cyclone causes flooding. Storm surge creates low-lying areas.

7.2.4.4 Earthquake

Seismic Vulnerability

Andaman & Nicobar falls in seismic Zone 'V' which is very high Damage Risk Zone (MSK II, or more).

Year	Remarks
19 th August 1881	Earthquake M_w 7.5 in the Bay of Bengal. Tsunamis were run-up level in Port Blair. Andaman Island 4 m.
31 st December 1881	Earthquake of magnitude M_w 7.9 in the Bay of Bengal, reported tsunami run-up level of 1.8 m at Car Nicobar, 0.3 m at Dindak, 0.3 m at Nagapattanam and 1.2 m at Port Blair in Andaman & Nicobar Islands.
29 th June 1941	Earthquake of magnitude M_w 8.1 in the Andaman Sea at 13.9°N, 92.3°E. No reliable data on the resultant tsunamis on the east coast of India. Although there is some considerable reports, no precise reports of any tsunami related damage from East Coast.

<http://environmentclearance.nic.in/writereaddata/EIA/03042021U2N81MVFinaEIAReportShahedIslandWaterAerodrome.pdf>

And then also, you see in the report they have also done the study of cyclone strike and then they have looked into the vulnerability. So, here you see the visibility and the number of days in the year, what would be the visibility range? So, they have also looked into the vulnerability aspect and what kind of impact it would have concerning cyclone strikes. And then likewise you can see with the earthquake, they have looked into the historical data and tried to understand that as well.

(Refer Slide Time: 15:22)

EIA Report for 'Development of New Andaman Island at Inam Dweep, Village - Central Nagar, Table - Port Blair, District - South Andaman, Andaman & Nicobar'

CHAPTER 7: ADDITIONAL STUDIES

Impact (Unmitigated Risk)

- Direct impact in terms of injury, disability, stampede during evacuation, loss of property and Long term local and wide spread impacts on the residents.
- In Zone II, (moderate risk zone) earthquakes of higher intensity may be felt. Earthquakes that happen over time, making it difficult for the people to stand. Even people in moving vehicles may feel such quakes. Structures/buildings of good design and construction suffer slight damage, while poorly designed/ built ones suffer considerable damages. ("Intensity VIII" intensity is here considered in classification of the severity of the ground shaking on the basis of observed effects, in a limited area and it is measured in the MSK Scale ranging from I to X).
- * Adopted From National Disaster Management Guidelines, Management of Earthquake, Seismic Zone Map of India (S. 1991, 2002)

7.2.4.7 Land Slide

Mild rolling topography, dense mass of canopy trees already raising in the coast to a height of 30 - 40 meters, humid climate and high intensity of rainfall are the characteristics generally associated with Inam Dweep.

Currently project site is covered with vegetation of 47 nos. of plants with no erosion influence.

Potential Land Slide Causes

- Interference with, or changes to, natural drainage.
- Vibrations caused by earthquake.

7.2.4.8 Fire and Explosion

Flash handled at site are MSD for DG set also flammable gas cylinder during construction phase.

Table 7.9: Applicability of 'The MSRB Rules, 1989'

Group	Max. Storage Capacity (ME)
5.1 Flammable Gases	< threshold*
5.3 Very Highly Flammable Liquids Chemicals having flash point ≤ 23°C & boiling point < 35°C	< threshold*
5.5 Highly Flammable Liquids Chemicals having 35°C < flash point < 60°C	< threshold*
5.6 Flammable Liquids Chemicals having 60°C < flash point < 95°C	< threshold*

*Criteria used - The Manufacture Storage and Import of Hazardous Chemicals Rules, 1989

- In-situ hazard occurrence may result in.
- Fire and/or explosion.
- Leakage of flammable material.

Prepared by M/s. Eastern Engineers Page 303

<http://environmentclearance.nic.in/writereaddata/EIA/03042021U2N81MVFinaEIAReportShahedIslandWaterAerodrome.pdf>

EIA Report for 'Development of Water Aerodrome' located at Swayy Dweep, Village - Central Nagar, Thakur - Port Blair District - South Andaman, Andaman & Nicobar

CHAPTER 7: ADDITIONAL STUDIES

Damage due to Hazards at ATF stock and HRD stock or at Airport: Model simulations reveal that leakage at HRD store causing fire will be 100% lethal within <10 meters and 50% lethal within <10 meters. Vulnerable zone within 100m horizontal heat is within 15 meters.

As there is no proposal for storage for ATF. BLEVE - fireball due to failure of ATF storage is not credible event. Safe distance for pool fire (leakage) at ATF or HRD spill is <10 meters.

Vapour Cloud Explosion is due to confined (in a vessel & pipeline) or unconfined explosion (in open air). The peak pressures in confined explosion reach hundreds of KPa while in unconfined it is a few KPa. However in the present case the energy of vapour cloud of fuel being less vapour cloud explosion is not credible scenario.

DESIGN CONSIDERATION FOR HAZARDOUS MATERIAL STORAGE.

The implication of the above observations is that the location of ATF tank shall be not on the project site but at Port Blair Airport. The design consideration should consider that any spill of HRD at DG set not to enter the store tank.

SMOKE

In the early stages, smoke from the fire will quickly rise into the roof space. The smoke can spread laterally at a velocity of up to 5 m/s. An average person will walk at 1 to 2 m/s and run at 7.5 m/s. Once the building roof space is full, the smoke will start to build down. The rate at which this occurs varies significantly with the nature of the combustibles and building geometry. Although the smoke is made up mostly of entrained air, it can contain sufficient toxic substances and asphyxiants to disorientate and disable within seconds and kill within minutes. Most fire-related deaths are due to inhalation of toxic gases in smoke, not to fire or heat as Carbon monoxide (CO) is thought to be the most common cause of fire-related death. Because of its high affinity for haemoglobin, relatively small concentrations of CO can saturate the blood, form carboxy haemoglobin (COHb), and deprive tissues of oxygenation. In general, COHb levels can also impede escape from fire, and thereby increase risk of death, by obscuring vision as a result of eye irritation and lacrimation, by impairing mobility, or by impairing mental acuity. The simplest burning scenario is one in which a moderate fire begins on the furniture and does not spread perceptibly. If the fire size is 100 KW (i.e., about 0.6 m in diameter), it can be shown that the hot smoke will have filled the room to a depth of 1 m from the floor in about 6 min; the temperature of the hot layer will have reached 1000°C after 11 min. Hence, by the temperature criterion mentioned above, the environment will have become lethal in 11 min.

<http://environmentclearance.nic.in/writereaddata/EIA/03042021U/2N81MV1FinalEIAReport/ShahedIslamdWaterAerodrome.pdf>

And then you can see here a landslide, the same way you can see a firing explosion. So, what are the rules that they have to abide by, that have been studied here?

(Refer Slide Time: 15:34)

Table 7.18 Vulnerable Zone for Bomb Blast
Bomb Threat Evacuation Guide

HAZARD	DESCRIPTION	EXPLOSIVE QTY	MIN (m)	MAX (m)
	Pipe Bomb Small	200g	80	875
	Pipe Bomb Medium	900g	100	800
	Pipe Bomb Large	2.5kg	120	1,125
	Bomb Blast	2.5kg	180	1,500
	Compact Device	250g	270	1,915

Note: The distance estimates are indicative and for initial evacuation.

Impact

- Direct impact on occupants in terms of injuries, trauma and facility likely during evacuation.
- Long term trauma on the residents.
- Stampede during evacuation.

7.2.4.19 Toxic Gas Release

A typical average treatment plant consists of the following:

- Biological treatment
- Filtration
- Sludge Treatment

Figure 7.5: Typical STP (Sewage Treatment Plant) Process

Manufacturing of Biogas

Biogas	Carbon Dioxide	Hydrogen Sulphide	Ammonia	Chlorine gas	Full Sludge	Sludge	Sludge	Sludge	Sludge
Landfill Gas	✓	✓	✓	✓	✓	✓	✓	✓	✓
Septic tank	✓	✓	✓	✓	✓	✓	✓	✓	✓
Domestic Sewer	✓	✓	✓	✓	✓	✓	✓	✓	✓
Closed drains	✓	✓	✓	✓	✓	✓	✓	✓	✓
Open drains	✓	✓	✓	✓	✓	✓	✓	✓	✓
Manholes	✓	✓	✓	✓	✓	✓	✓	✓	✓
Closed drains	✓	✓	✓	✓	✓	✓	✓	✓	✓

Prepared by Mr. Easwar Reddy Page 203

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Confined Space Hazards

Possible hazards in confined space include Oxygen deficiency, Hydrogen Sulphide poisoning and danger of combustible gases.

Risk of Oxygen Deficiency

- When oxygen concentration drops below 17%, shortness of breath may occur
- If the concentration reduces further, consciousness may be lost.
- When the oxygen concentration drops below 10%, death may result.

Oxygen Concentration (%)	Symptoms of Anoxia
18.3	Human begins to suffer adverse health effects when the oxygen level of their breathing air drops below 19.5%.
16 to 18.5	Workers engaged in any form of exercise can rapidly become symptomatic as their tissues fail to obtain the oxygen necessary to function properly. Increased breathing rate, accelerated heartbeat, and impaired thinking or coordination occur more quickly in an oxygen-deficient environment. Even a momentary loss of coordination may be disastrous to a worker if it occurs while the worker is performing a potentially dangerous activity, such as climbing a ladder.
12 to 16	Concentration of 12 to 16% oxygen causes increased breathing rate, accelerated heartbeat, and impaired attention, thinking and coordination, even in people who are resting.
10 to 14	All oxygen levels of 10 to 14 %; daily judgment, attention span, and coordination can be expected even with minimal exertion.
6 to 10	Breathing air containing 6 to 10% oxygen results in nausea, vomiting, lethargic movements, and perhaps unconsciousness.
Below 6	Breathing air containing less than 6% oxygen produces convulsions, then cessation of breathing, followed by cardiac arrest. These symptoms occur immediately. Even if a worker survives the oxygen deficiency, organ may show evidence of oxygen-deficiency damage, which may be irreversible.

Risk of Hydrogen Sulphide Poisoning In Confined Space

- Hydrogen sulphide is extremely toxic. Sometimes it may be generated in high concentration in a sewage treatment facility, which causes immediate death.
- Hydrogen sulphide enters the body through eyes or mucous membrane of breathing organs.
- Blood seeps out from the capillaries in vicinity of the lungs, causes pulmonary oedema, leading to breathing difficulties and death by asphyxiation.
- In sewer facilities, it is generated in rising mains with no oxygen supply and in inverted siphons, etc., where sludge is likely to accumulate easily.
- It is generated in grit chamber, pumping well, sedimentation basin, and sludge thickening tank in sewage treatment plant.
- Hydrogen sulphide generated in sewage and deposited sludge is not oxidized and in the static condition, so it does not disperse to the atmosphere easily. However, when agitated, it disperses all at once to the atmosphere.

Prepared by Mr. Easwar Reddy Page 203

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So, you also see any kind of vulnerable zone for bomb blasts, which is which can also likely happen in a place like this. So, what kind of threat are there? And what is what are the possibilities and what will be their impact? Likewise, you can see toxic gas releases which can happen they have studied that as well, and what are the risks of oxygen deficiency?

(Refer Slide Time: 16:03)

EIA Report for "Development of Water Aerobiosis" located at Sunny Dewey, Village - General Naga, Taluka - Por-Bhat, District - South Andaman, Andaman & Nicobar
CHAPTER 7: ADDITIONAL STUDIES

Such disasters may be natural in the form of epidemics or pandemics of existing, emerging or re-emerging diseases and pestilences or man-made by the intentional use of disease causing agents in Biological Warfare (BW) operations or incidents of Bio-terrorism (BT)

Epidemics
The outbreak of a disease affecting or tending to affect a disproportionately large number of individuals within a population, community, or region at the same time.

Pandemics
A pandemic is an epidemic (an outbreak of an infectious disease) that spreads across a large region (for example, a continent), or even worldwide.

Corona virus disease (COVID-19)
Symptoms: People may experience:
• Cough
• Fever
• Difficulty breathing (severe cases)

In more severe cases infection can cause pneumonia, severe acute respiratory syndrome, and even death. The period within which the symptoms would appear is 2-14 days.
Using available preliminary data, the median time from onset to clinical recovery for mild cases is approximately 2 weeks and in 3-4 weeks for patients with severe or critical disease

7.2.5 Failure Frequency Assessment
The frequency assessment stage of the analysis involved defining the potential release sources and subsequently determining the likelihood (frequency) of the various releases. The failure frequencies were determined using failure rate counts for each of the failure items identified and publicly available historical failure rate data. Ignition probability data was used to estimate the probability of a release subsequently being ignited.

SN	Event	Event Frequency/ Yr
Event 1	High Speed Diesel stock accidental spill followed by pool fire	1×10^{-6}
Event 2	Vehicle at parking fuel release followed by fire	1×10^{-6}
Event 3	Sea plane mishap followed by fuel fire explosion	1×10^{-6}

It is reasonable to assume this change however it should be noted it depends heavily upon the maintenance of the hardware and of the management procedures; neglect of either will lead to loss of protection and the rating will rise to the original estimate (a) indicated above.

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Further, you can see the new subject here coming it is related to the epidemics pandemic and then COVID-19. So, what can happen in this given it is a very sensitive area and what is the failure frequency assessment? So, even failure frequency, what events can happen, you can see in the table high-speed diesel stock accidental spill, followed by pool fire.

So, event frequencies you see it is very, very less likely to happen in a year than an event to the vehicle at parking fuel release followed by fire even three seaplane mishaps followed by fuel fire and explosion.

(Refer Slide Time: 16:49)

EIA Report for "Development of Water Aerobiosis" located at Sunny Dewey, Village - General Naga, Taluka - Por-Bhat, District - South Andaman, Andaman & Nicobar
CHAPTER 7: ADDITIONAL STUDIES

7.2.6 Risk Assessment

7.2.6.1 Individual Risk

Individual risk is defined by ANCIER/CCPS (1989) as:
Risk to a person in the vicinity of a hazard. This includes the nature of the injury to the individual, the likelihood of the injury occurring and the time period over which the injury might occur.

Individual risk is useful in understanding and managing risk at a location where people might be present. It is also useful in understanding the risk to a particular person, or a group of people, based on knowledge of the geographical location of that person or those people.

In this study, the nature of the injury for both individual and societal risk calculations will be immediate fatality resulting from fire, explosion, or exposure to toxic vapors.

Individual Risk Contours
Individual risk at any point is given by the following equations (CCPS, 1989):

$$IR_{x,y} = \sum_{i=1}^n IR_{x,y,i}$$

$$IR_{x,y,i} = f_i \times P_{f,i}$$

Where:
 $IR_{x,y}$ = The total individual risk of fatality at geographical location x, y (probability of fatality per year)
 $IR_{x,y,i}$ = The individual risk of fatality at geographical location x, y from incident outcome case (i) (probability of fatality per year)
 n = The total number of incident outcome cases considered in the analysis.
 f_i = Frequency of incident outcome case (i), (per year)
 $P_{f,i}$ = probability that incident outcome case (i) will result in a fatality at location x, y

As a initial estimate (for simplicity) in the present case assumes that each incident outcome case has an equal impact (probability of fatality $P_{f,i} = 1$) throughout its geographical impact zone. Therefore, within the impact zone for each incident outcome case, the individual risk from that incident outcome case $IR_{x,y,i}$ is equal to the frequency of that incident outcome case (Equation 2). Outside the impact zone, $IR_{x,y,i}$ is zero.
The respective impact zones from each incident are superimposed on a map of the region of the plant and its surroundings as shown in following Figure 7-6.

<http://environmentclearance.nic.in/writeresaddata/EIA/03042021U/2N81MV1FinalEIAReportShaheslandWaterAerodrome.pdf>

Further, they have studied risk assessment related to individual risk and what they mean by individual risk, risk to a person in the vicinity of a hazard. This includes the nature of the injury to the individual the

likelihood of injury occurring and the period over which the injury might occur. So, they have given the formula here, and they have calculated it what is the possibility of that and how the population is distributed in and around the facility which can lead to individual risk.

(Refer Slide Time: 17:18)

EIA Report for "Development of 'Rise Aerobics' located at Jeeva Deep, Village - Gopal Nagar, Taluka - Por-Ban, District - South Annapurna, Andhra Pradesh"

CHAPTER 7: ADDITIONAL STUDIES

Figure 7.6: Vulnerable Zone Map

The total individual risk of facility at each geographical location is as follows:

Population Distribution

Liberty number of people present at the location is assumed as follows:

Location	A	B	C	D	Total
Terminal employees and users of facility	10	20	10	10	50
Visitors	0	120	0	0	120
Total	10	140	10	10	180

Location is then determined by adding the individual risk from all accident scenario case impact zones that impact that location (Equation). For example, in the area labelled "C" in the above figure, application of equation gives the results listed as following table:

Incident Occurrence Case	f_i (once per year)	P_{ij}	IR_{ij} (per year)
Event 1	1×10^4	1	1×10^4
Event 2	1×10^4	1	1×10^4
Event 3	4.5×10^3	1	4.5×10^3
Event 4	9.2×10^2	0	0
Total			6.5×10^4

A similar calculation for the other areas in the figure gives the results summarized in the following table. The following figure is an individual risk contour plot for the example problem with the individual risk values for each area listed in the following table.

Exposure to Risk: Airborne Emissions Page 201

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021U/2N81MV1FinalEIAReport/ShahedIslamdWaterAerodrome.pdf>

EIA Report for "Development of 'Rise Aerobics' located at Jeeva Deep, Village - Gopal Nagar, Taluka - Por-Ban, District - South Annapurna, Andhra Pradesh"

CHAPTER 7: ADDITIONAL STUDIES

The average individual risk is the average of all individual risk estimates over a defined population. It is important to define a population which does not include a large number of people at little or no risk, as this will give a low bias to the result. Average individual risk is given by CCR (1985) as:

$$IR_{av} = \frac{\sum_{i,j} IR_{ij} \cdot P_{ij}}{\sum_{i,j} P_{ij}}$$

Where:

- IR_{av} = average individual risk in the exposed population (probability of fatality per year)
- P_{ij} = number of people at location i, j

Applying above equation to the population in the example (second figure), averaging only over the population which is subject to risk from the facility (individual risk > 0) gives:

Location	A	B	C	D
IR_{av}	$\frac{(10)(1 \times 10^4) + (140)(4.5 \times 10^3) + (10)(1 \times 10^4) + (10)(1 \times 10^4)}{180}$			
IR_{av}	$\frac{6.5 \times 10^4}{75}$			
IR_{av}	$= 1.24 \times 10^{-3}$ per year (for the exposed population)			
IR_{av}	$= \frac{10(1 \times 10^4)}{180}$			

If all people in the area, even those who incur no risk from the facility (100 users averaging out of vulnerable zones) are included in the individual risk calculation, the denominator in the above calculation is 180, and the average individual risk is:

$$IR_{av} = \frac{6.5 \times 10^4}{180}$$

$$IR_{av} = 3.68 \times 10^{-3} \text{ per year (for the total population)}$$

Exposure to Risk: Airborne Emissions Page 201

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021U/2N81MV1FinalEIAReport/ShahedIslamdWaterAerodrome.pdf>

So, what are the risks of fatalities in these particular fatalities, you can see at events 3, 5, 7, and all those what the individual risks of fatalities, which can happen every year. So, you see that the calculation, so, very, very less possibility of that happening.

(Refer Slide Time: 17:40)

EIA Report for 'Development of Five Aerobics' located at Shree Shree Village -
General Page Table - Part Blue, District - South Andhra, Andhra Pradesh

CHAPTER 7: ADDITIONAL STUDIES

Another average individual risk which might be of interest is the average individual risk to on-site employees (the people marked * as second figure). The average individual risk for the terminal employee population (these people are vulnerable again) is:

$$IR_{op} = \frac{[(0)(10^{-10}) + (0)(6.45 \times 10^{-10}) + (0)(6.45 \times 10^{-10}) + (0)(6.45 \times 10^{-10}) + (0)(6.45 \times 10^{-10})]}{50}$$

$IR_{op} = 0.65 \times 10^{-10}$ per year (for the terminal employees)

The Fatal Accident Rate (FAR) is calculated from the average individual risk, and is normally used as a measure of employee risk in an exposed population. Using the average individual risk for the Terminal employee population, FAR is calculated from the following equation:

$$FAR = [1.14 \times 10^7] IR_{op} \text{ (for employees population)}$$

Where:
 IR_{op} = has units of probability of fatality per year
 FAR = has units of fatalities per 10⁷ man-hours of exposure
 $FAR = [1.14 \times 10^7] IR_{op}$

$FAR = 0.96$ (fatalities / 10⁷ manhours of exposure)
 $FAR = [1.14 \times 10^7] [0.65 \times 10^{-10}]$

7.2.6.2 Societal Risk Calculations

Societal risk measures the risk to a group of people (CCPS, 1989). Societal risk measures estimate both the potential size and likelihood of incidents with multiple adverse outcomes. In this example, the adverse outcome considered is immediate fatality resulting from fire, explosion or release to toxic gases. Societal risk measures are reported for emergency risk in a situation where there is a potential for accidents impacting more than one person.

F-N Curve

A common measure of societal risk is the Frequency Number (F-N) Curve. The first step in generating an F-N Curve for the example problem is to calculate the number of fatalities resulting from each incident outcome case, as determined by:

$$N_i = \sum_{j=1}^m P_{i,j} \times P_{f,j}$$

Where:
 N_i = number of fatalities resulting from Incident Outcome Case (i)
 For the example, P_{ij} in the above equation equals 1. Because the impact zones for the example are simple, this calculation can be done graphically by superimposing the impact zones from

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Prepared by M/s. Enviro Resources Page 217

So, they have also calculated societal risk calculations, you remember individual risk calculation and societal risk calculation. So, here also the frequency number curve FN curve, that you have studied about. So, they have done that calculation here as well.

(Refer Slide Time: 17:57)

EIA Report for 'Development of Five Aerobics' located at Shree Shree Village -
General Page Table - Part Blue, District - South Andhra, Andhra Pradesh

CHAPTER 7: ADDITIONAL STUDIES

Figure uses the population distribution and counting the number of people inside the impact zone. The data must then be put into cumulative frequency form to plot the F-N Curve:

Where:
 F_i = frequency of all incident outcome cases affecting N or more people, per year
 f_i = frequency of incident outcome case (i) per year
 $F_i = \sum_{j=i}^m f_j$ for all incident outcome cases (i) for which N_i ≥ N

Table 7-15: Estimated Number of Fatalities from Each Incident Outcome Case

SN	Event	Event Frequency / Yr	Cumulative Frequency / Yr	Estimated Number of Fatalities (N)
Event 3	Sea plane mishap followed by fuel fire/explosion.	1 x 10 ⁻⁷	1 x 10 ⁻⁷	35
Event 1	Fuel tank accident spill followed by pool fire.	1 x 10 ⁻⁷	2 x 10 ⁻⁷	5

Societal Risk (F-N Curve)

Societal risk criteria are generally presented as curves on F-N plots. Mathematically, the equation for an F-N criterion curve may be presented as, [Baird 1998]:

$$F = k \times N^{-a}$$

Where:
 F = the cumulative frequency of N or more fatalities.
 N = the number of fatalities.
 a = aversion factor (often between 1 and 2).
 k = constant.

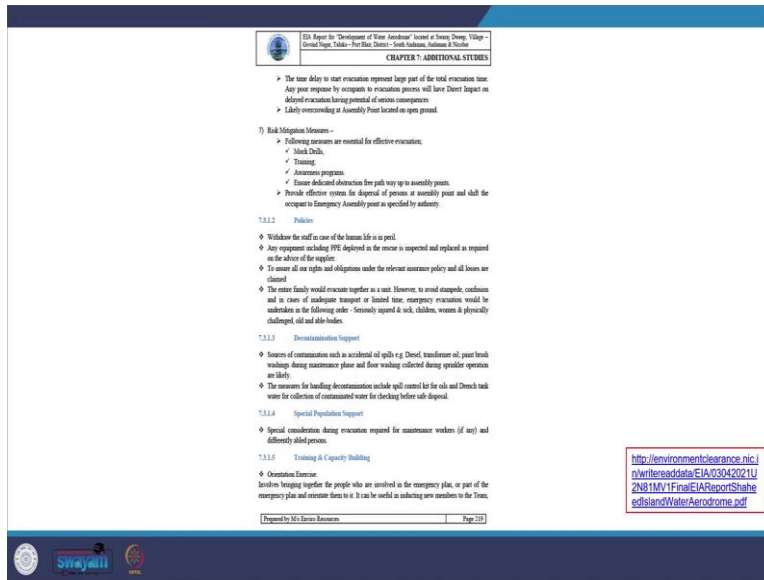
The slope of the societal risk criterion (when plotted on a log-log basis) is equal to -a and represents the degree of aversion to multiple fatality events embodied in the criterion. When the F-N curve slope is equal to -1, the risk criterion is termed 'risk neutral'. A risk criterion for which the curve slope is more negative than -1 is said to be more risk averse. An anchor point along the curve (e.g. 10⁻⁷ fatalities, 10⁻¹⁰/year) and a slope (e.g. -2) is usually enough information to plot a risk criterion F-N Curve. If any portion of the calculated F-N curve exceeds the criterion risk level, the societal risk is said to exceed that risk criterion. In the present case the slope is negative and the curve is well below the criterion line indicating insignificant societal risk. The estimated consequences of the fatal incidents are well contained within the premises of the facility and surrounding population is not likely to be affected.

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021U2N81MV1FinalEIAReportShahedSislandWaterAerodrome.pdf>

Prepared by M/s. Enviro Resources Page 217

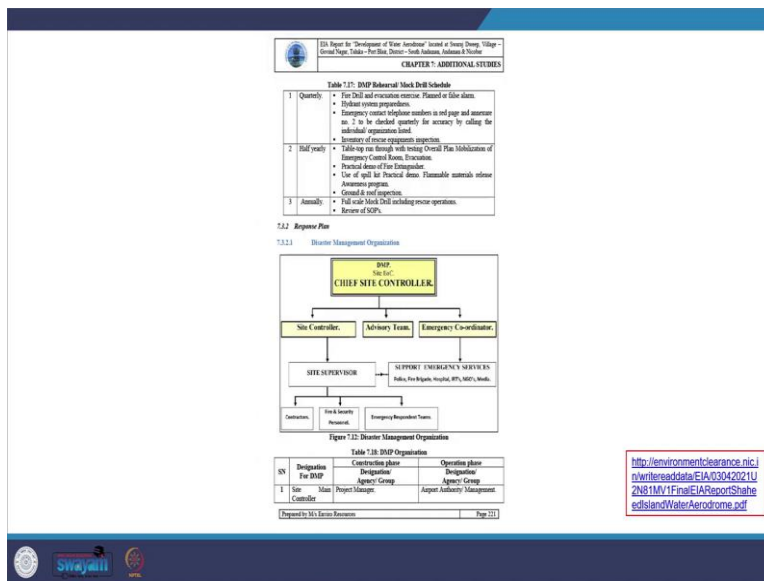
So, the estimated number of fatalities for each incident outcome case, so, what kind of event can happen, you can see in the table here, seaplane mishap followed by fuel fire or explosion. So, what is the possibility of frequency, what is the cumulative frequency, and estimated number of fatalities that can happen?

(Refer Slide Time: 18:19)



So, aligned with that, what are the risk mitigation measures with which they are taking, so, for that, they have mock drills training, awareness programs, and ensure dedicated obstruction-free pathways at the assembly point, so all that is as taken as a mitigation measure. And then they are also looking at the policies here and then the contamination support, special population support training, and capacity building. So, all that would be taken care of.

(Refer Slide Time: 18:55)



So, they have also created a response plan. So, if anything mishap happens, what will be the response plan, so you see the disaster management organization?

(Refer Slide Time: 19:05)

SN	Designation For DMP	Construction phase	Operation phase
		Designation/ Agency/ Group	Designation/ Agency/ Group
2	Site Incident Controller	Site Manager	Terminal Manager
3	Emergency Coordinator	EHS Manager	Admin Manager
4	Supervisor	<ul style="list-style-type: none"> Site Supervisor Contractor Supervisor 	Safety Officer
5.1	SAR Team	Security guards, first aiders, fire fighters, staff & workmen, external IRT's	Aircraft Rescue and Firefighting trained persons, first aid trained persons, NDRF, IRT's
5.2	Engineering Team	<ul style="list-style-type: none"> Electricians Operators 	<ul style="list-style-type: none"> Electricians Operators
5.3	Advisory Team	Architect, Consultants	
6	All others at site	Contractors, staff, workers, visitors, drivers, contractor workers colony	Contractors, staff, workers, passengers, drivers

7.3.2.2 Roles & Responsibilities

Roles and responsibilities for all the emergency respondents are detailed in respective SOP's in Section 7.3.6 of this report.

<http://environmentclearance.nic.in/writereaddata/EIA/03042021U2NS1MVFineEIAReportShahedSdIslandWaterAerodrome.pdf>



7.3.2.3 Emergency Response Guide

Table 7.10: Emergency Response Guide

SN	TASK	Site Manager	Site Incident Controller	Emergency Coordinator	Supervisor	Contractor Supervisor	Architect/Consultant	All others at site
1	Raising for site emergency alarm	*						
2	Inform police, fire brigade and publishing site emergency services	*						
3	Determination of level of emergency, help from advisory team, if required	*						
4	Mobilizing ECV and AP	*						
5	Mobilizing Emergency Respondent teams, IRT, NGO's	*						
6	Mobilize resources for emergency response team	*						
7	Ensure co-ordination between site emergency services	*						
8	Review situation, assess the emergency level, consult advisory team, take external help if required, inform district disaster control cell, and declare Off Site Emergency	*						
9	Evacuation	*						
10	Ensure operations as per SOP							*
11	Ensure proper coordination between all IRT's							*
12	Stand clear at assembly point							*
13	Free back of hand cover to SAR	*						
14	Ensure traffic, law & Order and crowd control	*						
15	Withdraw the staff of the Island till to up point	*						
16	Ensure any conflict resolved in the vicinity	*						
17	Authorize release of information to the media	*						
18	Release of ambient information to the media	*						
19	Emergency under control, inform to CSC	*						
20	Authorize to raise 'All Clear' alarm	*						
21	Raise 'All Clear' alarm	*						

Table 7.10: Disaster Category

- Category 1: Events can be controlled by Site Security Department with local resources.
- Category 2: Events action plan requires additional help from local fire brigade and evacuation.
- Category 3: Events action plan requires mobilization of external agencies, resources and evacuation.

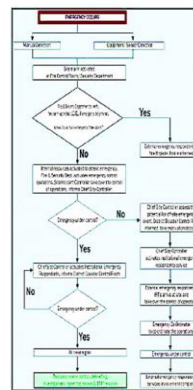


Figure 7.13: DMP Steps to Declare Category 3 Emergency/ Off Site Emergency

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So, there, how it works and what kind of response plan they have. So, how each one would be responsible for what kind of responding and taking care of the activity? So, the emergency response guide they have prepared will help them to take action when any kind of mishap happens. So, you can see the stable emergency response guide as well as you can see steps to declare a category three emergency of a site emergency. So, how they would be doing that, so, that these will be the procedural aspects.

(Refer Slide Time: 19:42)

EIA Report for "Development of Water Aerodrome" located at Jasing Drees, Village - General Negeri, Tadas - Fort Base, District - South Iskandar, Johore Bahru

CHAPTER 7: ADDITIONAL STUDIES

7.3.2.4 Rescue & Relief Operation

The priority of the SAR will be to:

- Protect life;
- Minimize safety;
- Protect assets;
- Ensure security and
- Maintain or restore business continuity;

7.3.2.5 Response Activities Specific to Disaster

SCP's specific to disaster enclosed in Section 7.3.6 of this report.

7.3.2.6 Requisition of Services/assistance

Emergency coordinator to establish communication to district disaster control room for requisition of services/assistance of BRTV/NGO's.

7.3.3 Recovery

7.3.3.1 Recovery

- Declaration of the ESC once the recovery operations are over as declared by chief site commander;
- Replacement of used stocks of fire fighting materials;
- Follow up of request at hospital;
- Recall keeping;
- Clean and rehabilitate the disaster site;
- Determine priorities for restoration work and seek the advice of a contractor as to the best methods and options, and obtain cost estimates;
- Contact insurers;
- Analyze the disaster and improve the plan in the light of experience.

7.3.3.2 Medical

- Information and help desk at site;
- Informing the relatives of the injured;
- Follow up of request at hospital, if any.

7.3.3.3 Damage Assessment for Insurance Survey

Damage Assessment for insurance survey with following objectives:

- Reduce the loss in terms of death if a disaster happens, and
- Reduce the income in the event that the facility becomes unavailable or partly unavailable.

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<http://environmentclearance.nic.in/writereaddata/EIA/03042021U2N81MVFmaEIAReportShahedSidiandWaterAerodrome.pdf>

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CHAPTER 7: ADDITIONAL STUDIES

7.4 Financial arrangements

Table 7.21: Inventory of Resources

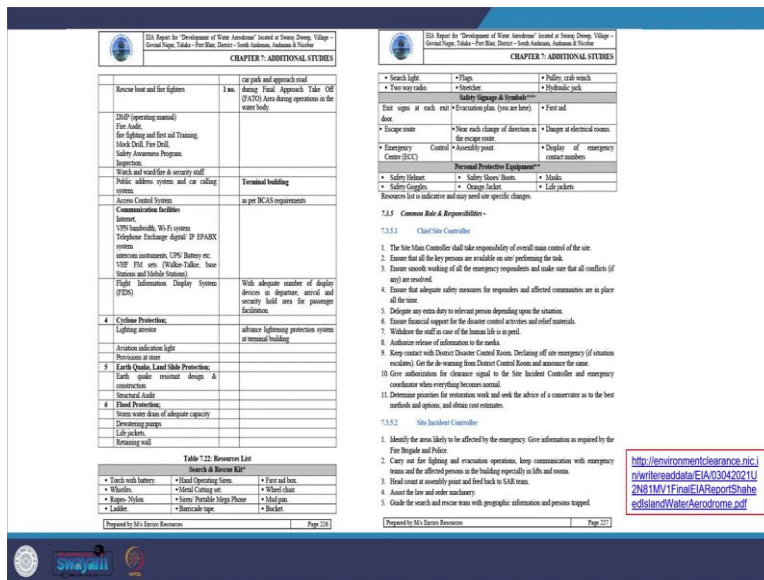
Sl. No.	Item	Remark
1	Fire Extinguisher Protection:	
	Fire detection and alarm system	Designed as per NSC 308 and also compliance with fire department of Johore state for FFD (BANKING/AFRON/RETT) structure.
	Smoke detection and alarm system	
	Flammable Gas detection and alarm system	
	Fire control room	At Terminal building
	Water sprinkler system	With automatic fire alarm system
	Fire trailer	1 No. 42' Air Side unit 3000 litres (class hood/capacity in HJ category as per DCA) access pavilion (Aviation standard)
	Fire Hydrant system	
	• Portable fire extinguishers: DCP, foam, ABC type, used tuckers	4000 units (one for emergency use)
	• water supply system	
	• fire hydrant, fire hose reel, fire hose reel	
	• DCP and fire emergency power	2x20 KVA
	• Fire Control room to carry fire for 24x7	
	• Fire fighting vehicle fire prevention	
	• Fire control room	
2	Security Threat Protection:	
	Scrap machines	for scanning Registered Baggage (RB) Hand Baggage (HB) including provision of required number of ETDs, DPHs and HEDAs as per SCAS system.
	Surveillance Close Circuit TV system (SCTV) and	provision of adequate number of close circuit TV monitors, in the security control room, terminal manager room, APO office etc.
	Perimeter Compound wall	
	Emergency Control Centre	
3	Emergency Resources:	
	Personal Protective Equipments (PPE)	
	Search & Rescue kit **	
	Subsidiary Signage & Treatments ***	Retro reflective road signage in the

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<http://environmentclearance.nic.in/writereaddata/EIA/03042021U2N81MVFmaEIAReportShahedSidiandWaterAerodrome.pdf>

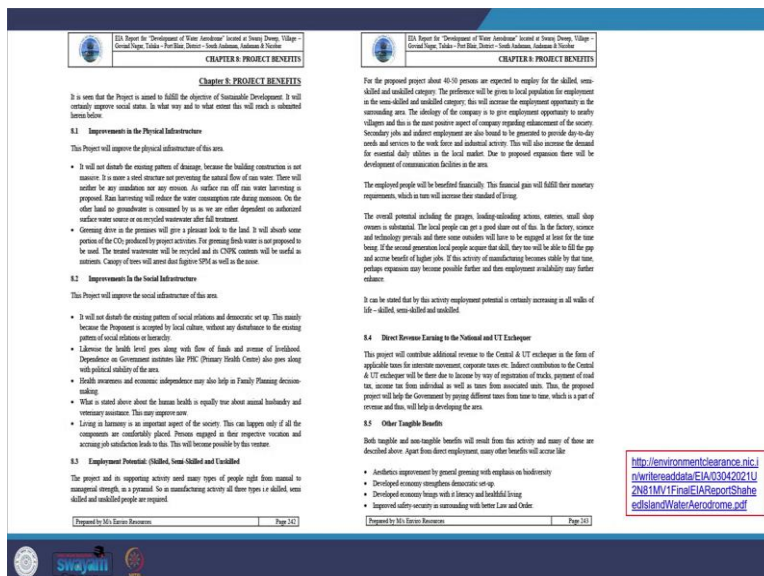
And then you also see what kind of rescue and relief operation will be taking place response activities specific to the disaster what kind of services and support they are going to offer what kind of recovery plan they would have, what kind of medical assistance, and what kind of insurance they would offer. So, all the inventory of the resources, what kind of financial arrangements are made for all that has been given in detail here. So, you can see that here.

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And what kind of common roles and responsibilities they would take, so, all that has been mentioned here is any kind of risk.

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So, now, coming to the next segments, we look at the project benefits. So, here, what the EIA reports suggest, indicates that there will be improvement in the physical infrastructure, and the project will improve the physical infrastructure in this area. And it will not disturb the existing pattern of drainage, because of the way it has been designed, and then it will also improve the social infrastructure in the area.

So, it says that it will not disturb the existing pattern of social relations and the Democratic setup. And likewise, the health level goes along with the flow of funds and avenues of livelihood. And it will also depend on what they write on the public health center primary health center and how that will also respond. So, they assume that there will be improvement in the social infrastructure.

And then they also mentioned there will be employment potential like there is employment potential for skilled, semi-skilled, and unskilled people. So, the project and its supporting activity need many types of people right from the manual to manage real strength. So, they would need people for that. So, for the

proposed project, there will be 40 to 50 percent are expected to be employed for these skilled, semi-skilled, and unskilled categories, so, how they would employ people here?

So, the project predicts that there will be positive benefits from the project. And then there is direct revenue earning to the national agency here. So, you see that here the central government would benefit from this particular project. And then there will be also other tangible benefits. So, like an aesthetic improvement, there will be developed economic strength, there will be economic strengthening in this and then it would also be expected to bring literacy and helpfulness and improve safety and security.

However, we do not see how, how this would be done here. But that has given us a destructive statement here. So, that was part of the project benefits. So, it writes about several positive benefits of the project.

(Refer Slide Time: 23:01)

CHAPTER 8: PROJECT BENEFITS

Synthesis and sustainable development will be the ultimate objective

8.6 Chapter Conclusion

Overall benefits of the project are as follows:

- This project will convert remote areas of island to Part B class and ultimately it will promote tourism, enabling cost growth to economic condition of these remote areas.
- This project will serve job opportunities to local people in terms of direct and indirect employment.
- Demands of community services and commercial development also create additional employment for the poor strata of society by way of maintenance, sewage, security guard etc. the project will provide positive impact on the economic development of the region in terms of employment opportunities.
- Connecting to main or developed land will result into infrastructural development of these islands.
- Considering close ecosystem of this island, foreign tourists are assumed to be attracted at these places, resulting into good foreign exchange amount.
- A&P proposed to install solar panels for generation of electricity, which will reduce the additional load on electricity department.
- It will be TLD project, entire treated sewage will get used for gardening.
- Professional materials are preferred for construction of building, will reduce on site water generation from conventional construction practices.
- Greenbelts with mandatory area will be provided, ultimately increasing aesthetic value of project site.

CHAPTER 9: COST-BENEFIT ANALYSIS

The proposed project falls in Category '1(a) of the Schedule table EIA notification 2006 mandated to date involving preparation of Environment Impact Assessment study and Environment Management Plan. The environmental cost-benefit analysis was not made mandatory in the project specific Terms of Reference accorded to the company (Refer Annexure C). Also the Standard Terms of Reference published by the MCE/EFACC on April 2011 does not include the environmental cost-benefit analysis in the General & Specific TOR.

<http://environmentclearance.nic.in/writesaddata/EIA/03042021U2N81MVFna/EIARepor/ShahedIsland/WaterAerodrome.pdf>

Then you also see the environmental cost-benefit analysis, what they have done. So, as per the standard ToR, they have undertaken a cost-benefit analysis.

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CHAPTER 10: ENVIRONMENTAL MANAGEMENT PLAN

10.1 Introduction

Every development is associated with the positive and negative impacts on environmental components. Though the probable negative impacts cannot be realized completely the much required developmental activities cannot be suspended.

Environmental Impact Assessment helps in identifying potential environmental impacts of a proposed project activity. Based on the findings of the impact assessment, Environment Management Plan is devised to minimize the adverse impacts and ensure various steps to be taken for improvement of the environment. Environmental Management Plan helps in formulation, implementation and monitoring of environmental parameters during & commissioning of project. Environmental Management Plan (EMP) is the tool to ensure a safe and clean environment. A project may have identified proper mitigation measures but without a management plan to execute it, the desired results may not be obtained. The Environment Management Plan envisage proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities.

Some of the major objectives of the EMP are:

- Ensure the project implementation with minimal impacts on all environmental components
- Minimize the impacts on socio-economic indicators of local and adjoining regions
- Maintain the highest level of vigilance for setting the scale of any deviation in sustainability practices
- Systematic implementation with adequate manpower, budget and action plan for EMP
- To demonstrate the effectiveness of EMP in maintaining along with the project implementor's commitment.

10.2 Organization and Environmental Cell

Table 10.1: Environmental Cell

SN	Responsible Person	Event	Aspect
1	Chief Engineer	Construction Phase	Material waste management, labour camp sanitation, Noise, soil erosion, vibration measure control, accident prevention
		Post Construction	Remediation of eroded sites
2	Environment Coordinator	Air	Ca emission, PUC control, Noise mitigation
		Water	Water budget, O&M of water waste treatment plants
		Solid waste	Segregation, collection, catering

CHAPTER 10: ENVIRONMENTAL MANAGEMENT PLAN

10.3 Environmental Management Measures

10.3.1 Air Environment

10.3.1.1 Construction Phase

The following measures will be adopted during construction phase to mitigate the impact on ambient air quality:

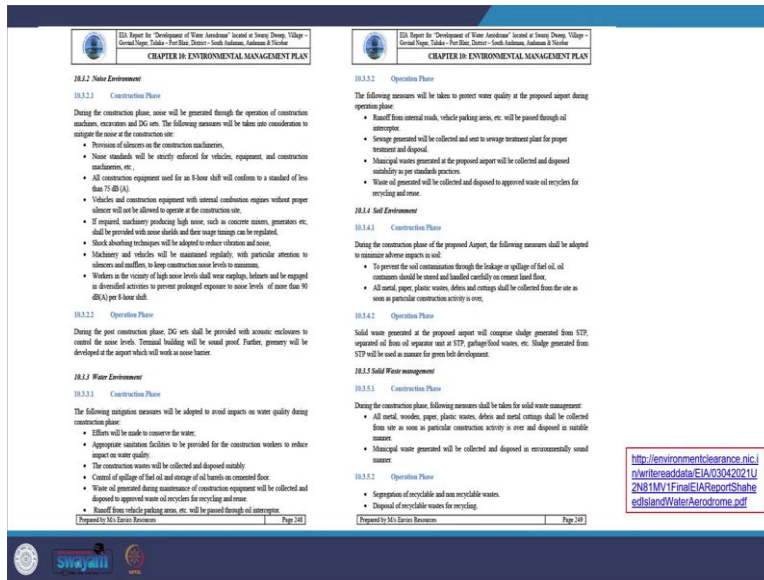
- Installation of branch mix plant at isolated place and providing cover shed around the plant.
- Providing dust suppression system in loading and unloading area.
- Providing appropriate stack height for the DG sets for natural dispersion of pollutants.
- Pollution under Control Certificate will be mandatory for all vehicles approaching to the site. Any vehicle not carrying the vehicle pollution records will not be allowed within the construction site and for the construction activity.

10.3.1.2 Operational Phase

Major pollutants envisaged from the proposed project will be from aircraft exhaust, vehicle traffic, and speed boat as ground support, parking and dropping and from DG sets. The major pollutants will be SOx and Carbon monoxide besides particulates and NOx. The background ambient air quality levels in the project area are within the permissible limits as specified in National Ambient Air Quality Standards. The following methods of abatement will be employed for the air pollution control at the source level during operation phase of proposed project.

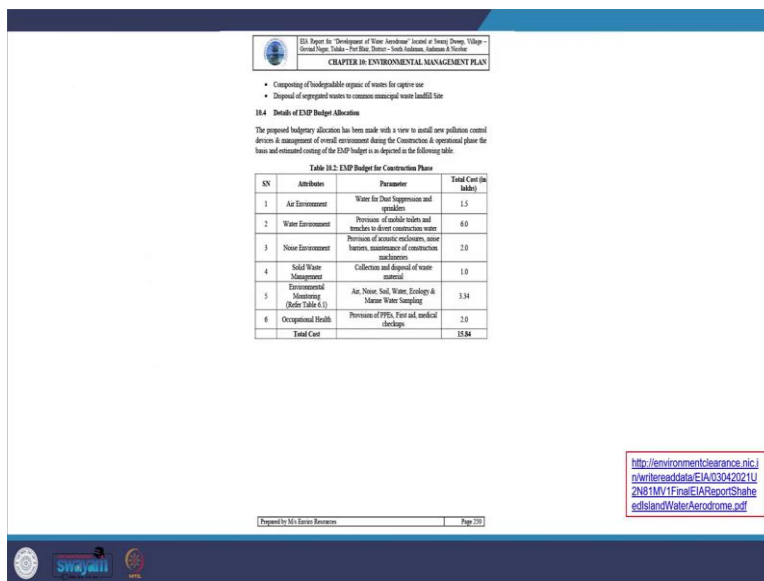
- Shut down combustion engines when not in use.
- Single engine starting and reduced idling would be effective in reducing emissions of HC and CO from aircrafts.
- Height of the stack for DG sets will be kept as per CPEC guidelines.
- Proper car parking facilities and traffic flow to avoid traffic congestion.
- Providing suitable green belts to reduce the impact of air pollution.
- In addition to the above, any additional control measures suggested by MoEF/ACC will be implemented.

<http://environmentclearance.nic.in/writesaddata/EIA/03042021U2N81MVFna/EIARepor/ShahedIsland/WaterAerodrome.pdf>



Then you see in chapter 10 they have covered an environmental management plan. So, here you see how, what is the organizational structure, how it is going to take care of things. So, you see the environmental cell, what will be the composition and how it will be taken care of at every phase of the project, and then how they will look after each component air components at every phase, noise problem, then water environments at every phase of the project and how they will take care of solid waste and other things in every case.

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And then you also see how they are allocating the budget for the environmental management plan. So, we do not see the social management plan here. But we do see the environmental management plan. So, like how different physical environments will be taken care of and what kind of budget has been allocated for the purpose.

(Refer Slide Time: 24:08)

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CHAPTER 10: ENVIRONMENTAL MANAGEMENT PLAN

Table 10.3: EMP Budget for Operational Phase

SN	Component	Particulars	Budgetary Allocation Capital Investment (INR, in lakhs)	Budgetary Allocation Recurring Expenditure (INR, in lakhs/yr)
1	Air	Provision of Stack for DG set, PUC of all vehicles in terminal service, Boat maintenance etc. Provision of suction hood and vent to cafeteria	2.5	1.5
2	Water	Construction of STP & its maintenance	30.0	5.0
3	Noise	Provision of acoustic enclosures to STP Pumps, DG set and terminal building wherever necessary	4.0	1.5
4	Environment Monitoring & Management (Refer Table 6.2)	Quarterly Environment Monitoring (Per year) Ambient Air Monitoring PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , CO Noise Monitoring dB(A) Biotic Environment Terrestrial & Aquatic Sewage water (Treated & Untreated) pH, COD, BOD, TSS, TDS, Oil & Grease	-	11.36
5	Occupational Health	Periodic medical checkups of staff, provision of PPEs, Trainings, First aid kits etc.	3.0	1.0
6	Green Belt	Green belt development activity	14.13	---
7	Solid Waste Management	Estimated annual expenditure for maintenance of green belt Solid Waste Management	0.5	2.83
8	Oil spill contingency	Procurement of necessary equipment and chemicals and their maintenance	5.0	0.5
Total Cost (INR, Lakhs)			59.13	23.89

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<http://environmentclearance.nic.in/writerreaddata/EIA/03042021U/2N81MV1FinalEIAReport/ShahedIslamdWaterAerodrome.pdf>

So, how they would undertake that, so, you see all that has been covered here particulars about what will be undertaken, what are the components and what is the budgetary allocation and how much they will spend every year into that.

(Refer Slide Time: 24:25)

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CHAPTER 10: ENVIRONMENTAL MANAGEMENT PLAN

10.5 Greenbelt Development Plan

Generally green developed along the project boundary helps to arrest/delay dust emissions thereby avoiding it to escape beyond the project boundary and also to maximize intensity of noise propagating out of the factory premises along with improving the aesthetics of project site.

Design: Thick green belt will be developed along the boundary of the project plot as per the Standard TOR prescribed by MoEF, GOI.

Area allocation for green belt: As per the additional TOR granted by EAC, green belt development will be done in 10% area of the total project plot area i.e. 1.135 sq. m.

Area consideration for growth of individual tree: The area allocation for individual large/medium size growth allowing tree is 2.50 m x 2.50 m = 6.25 sq. m. as per the Standard TOR prescribed by MoEF, GOI.

Selection of plant species: The plants to be planted are suggested considering the floral scents as observed in the study area during the baseline assessment study (preferably native fast growing, non-invasive plants having large leaf area).

The proposed green belt in an area of 1.135 sq. m will be developed in phase wise manner viz. plantation will be done in single phases during June 2021 described below.

The landscape layout is as shown in Figure 10.1.

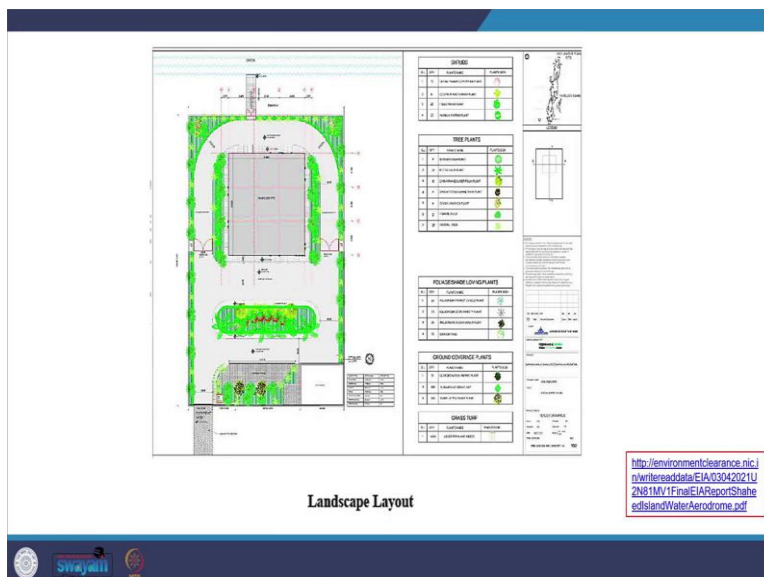
The details of existing trees on-site and trees to be cut are as provided in Table 10.4 and list of proposed tree/shrub, etc. is as provided in Table 10.5.

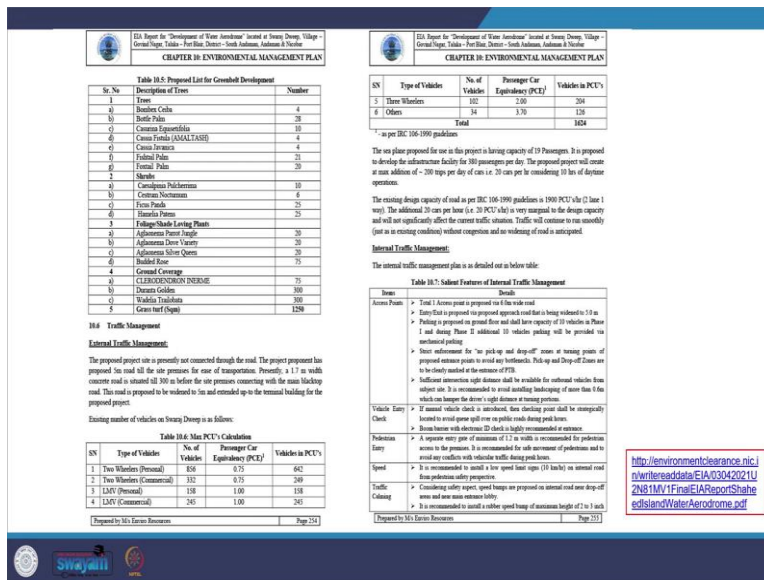
Table 10.4: Existing List of Trees to be Retained/Cut

SN	Description of Trees	Total available tree (Number)	Trees to be Cut
1	Bottle Tree	17	11
2	Cocunut	69	60
3	Banana	4	4
4	Shadon	1	1
5	Other trees	2	2
Total		97	82

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<http://environmentclearance.nic.in/writerreaddata/EIA/03042021U/2N81MV1FinalEIAReport/ShahedIslamdWaterAerodrome.pdf>

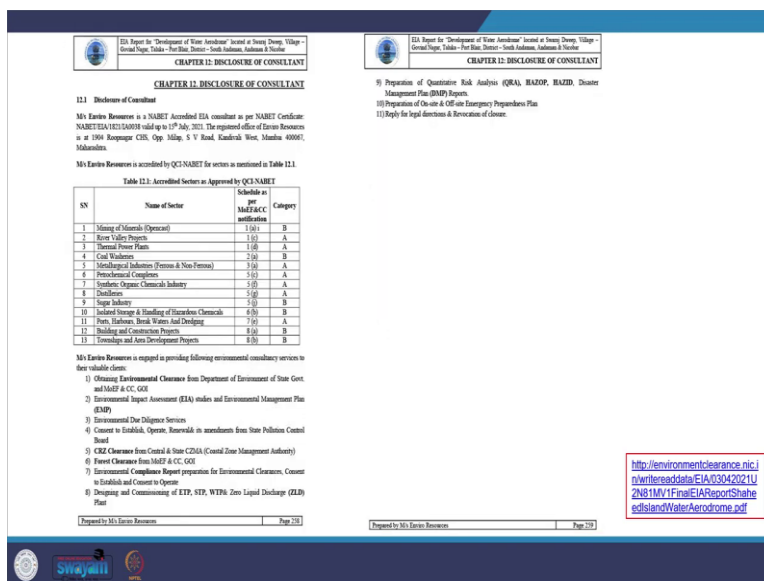




Then they would also develop a green belt what is the plan for that and how what are the trees they want to plant around it? What are the total available trees and trees which they would be cutting, so, there are 87 trees, trees to be cut are 82, and then how they are going to develop the green belt around it?

So, they have prepared the drawings and numbers and the proposed list for the green belt has been also provided. So, likewise, you also see they have worked out on the traffic management, how they are going to manage the traffic, the internal traffic, see how they are going to take care of it.

(Refer Slide Time: 25:02)



So, now, we see the last part of the report which deals with the disclosure of the consultants. So, you see what all things are disclosed by the consultant. So, you will see that Enviro Resources is the NABET accredited EIA consultant, and what are the areas in which they are accredited sector-wise for this, so, you can see all the domains which they have worked on from 1 to 13 areas you can see and like what kinds of things they are engaged in and providing environmental consultancy services.

So, you can see they provide environmental clearance, they provide environmental impact assessments, they prepare environmental management plans and environmental diligence services, and then you also see CRS

at clearance for his clearance compliance report. And then they also are involved in designing and commissioning ETP, STP, WTP, and zero liquid discharge and also preparation of code detailed risk analysis preparation on the on-site site emergency preparedness plan and any kind of legal matter they can handle.

So, we have seen the entire report of EIA for this particular water aerodrome case, and you see what kind of analysis has been done, and what kind of analysis has not been undertaken, so, you can think of ecosystem services that are not yet required as the legislation in our scenario, but what kind of potential it had to understand from this where we have questions like what the fishermen would be impacted or not from coming from the public hearing.

So, all that kind of what other areas and what are the details could have been covered and what are the details which have been covered very well. So, you can review all those aspects and see, what the advantages of the EIA process which was followed here, what the advantages of the entire legislation were followed here, the process of ToR that was followed here, and what was missed out, so, you can look into that.

So, winding up, this is the culminating session of the entire course, we have covered a range of topics which we have seen. So, you see how we end with the series of case studies where we see how the EIA report looks like what is happening in the practice, and how it is addressing the sustainable development aspect.

(Refer Slide Time: 27:50)

Summary

- 1 Case study - Part II –
Development of Water Aerodrome, Andaman & Nicobar

83

References


- 1 Environmental Impact Assessment (EIA) Report of "Development of Water Aerodrome" Havelock Island, Andaman & Nicobar, 2015; Enviro Resources (NABET Certificate No: NABET/EIA/1821/IA0038); <http://environmentclearance.nic.in/writereaddata/EIA/03042021U2N81MV1FinalEIAReportShah eedIslandWaterAerodrome.pdf>

84

So, today, in particular, we covered part two of the EIA case study. And with this, we end this particular course session. So, the key reference for this particular session was the EIA report of this particular case. And you are already aware of the key textbooks which we have used in this. For these case studies, I would encourage you to talk more in the discussion forum and give your feedback on what you observed while we went through we skim through the entire report here.

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Suggested Watch and Read



https://www.youtube.com/watch?v=VdjsErp4i0&t=4s&ab_channel=Bacteriatwork



https://www.youtube.com/watch?v=skb1Qlh9QM&ab_channel=ThinkAdvertising




https://www.youtube.com/watch?v=ukMURHP9830&ab_channel=LondonAssembly




85

So, these are the suggested watch and read which you can see more, and they were suggestions related to case studies from different parts of the world from where all the learners are coming together. So, I will be sharing all of those in the discussion forum as far as possible.

(Refer Slide Time: 28:45)

 Please feel free to ask Questions.
Let us know about any Concerns you have 
Do share your Opinions, Experiences and
Suggestions.
Looking forward to Interacting and
Co-learning with you while exploring EIA

   86

You are free to ask questions and let us know about any concerns you have, you share your opinions, experiences, and suggestions looking forward to interacting and co-learning with you while exploring EIA. So, continue discussing with us, continue posting your questions to us and we will try to answer as much as possible. Thank you so much.