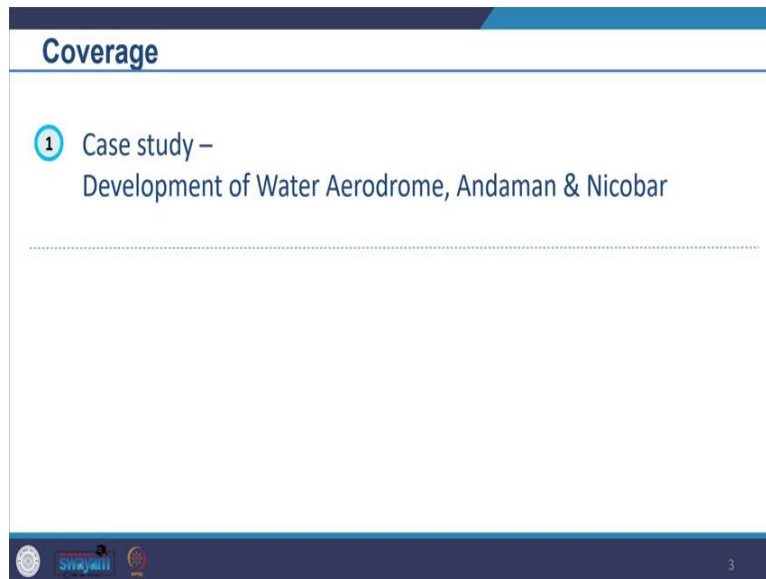


**Environmental Impact Assessment**  
**Professor. Harshit Sosan Lakra**  
**Department of Architecture and Planning**  
**Indian Institute of Technology, Roorkee**  
**Lecture 59**

**EIA Case Study - Development of Water Aerodrome, Andaman and Nicobar**  
**Part I**

Welcome to the course Environmental Impact Assessment. And today we will look at another case study and we will look at in two parts. So, today we will cover one part of it. We will look at the case study of what aerodrome in Andaman and Nicobar. So, we will look at this case. This is another typology which we are looking at. And this is new happening in the country. So, we will see how the EIA about this particular infrastructure was prepared. So, we will look at that aspect here.

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So, our coverage would be the, we are going to look at this case study EIA of Development of Water Aerodrome in Andaman and Nicobar.

(Refer Slide Time: 01:22)

**Learning Outcomes**

- 1 You should be able to comprehensively review the Case study - Development of Water Aerodrome, Andaman & Nicobar with respect to environmental status and pressure, EIA process, Legislative perspective, all domain perspective and tools and techniques used, public participation and EIA report writing.

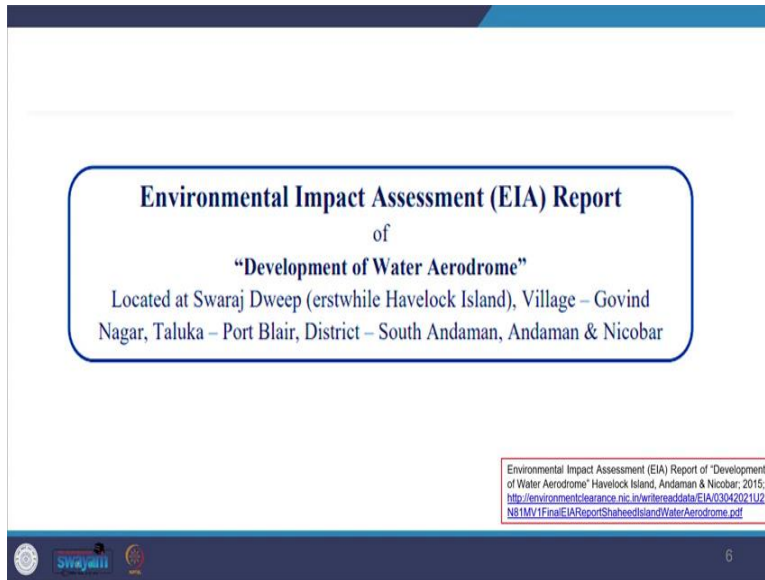
swayamii

5

So, the expected learning outcome, what is expected after you complete this particular session, these parts that you should be able to comprehensively review the case study and look at all the components what we have studied in this subject, look at from the point of view of environmental status, what kind of development pressures we have, the EIA process, and then look at it from the legislative perspective and then look at it from all the domains which should have been covered in this particular case, and then the details of it, the tools and techniques applied, and then how was the public participation and EIA report writing.

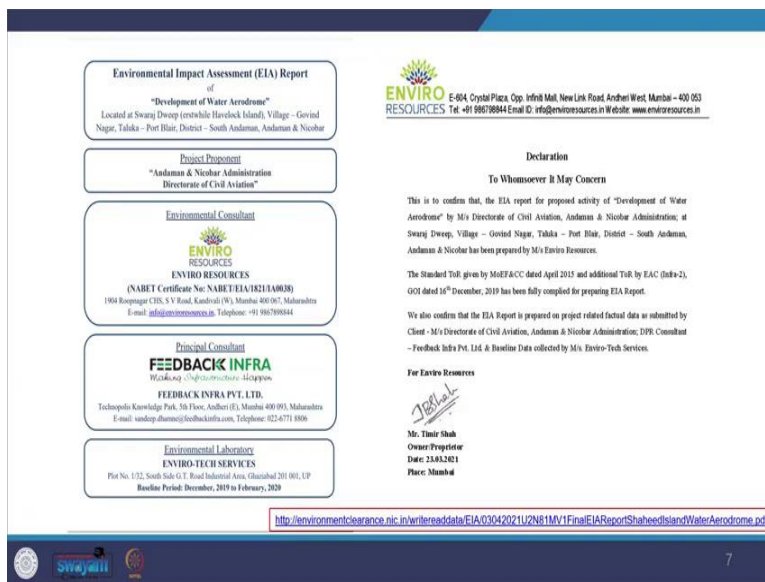
So, we will not critically review that I would make you walk through the report, but then in our discussion forum, you can take it forward with your understanding of all the aspects and see how this EIA was undertaken and your take and your perspective on this particular case.

(Refer Slide Time: 02:18)



So, looking at this Environmental Impact Assessment Report, this particular project is located at Swaraj Dweep, which was formerly called Havelock Island. It is located in the Govind Nagar Village and the Toluka of Port Blair and is located in the district of South Andaman and Andaman and Nicobar Island. So, we are looking at a very typical case Island case here and then looking at very upcoming projects of water aerodrome here.

(Refer Slide Time: 02:52)



So, this project was proposed by looking at the project proponents Andaman and Nicobar administration which is the Directorate of Civil Aviation, and the environmental consultant for this is ENVIRO RESOURCES, you can see that their NABET certified agency consultant to undertake the EIA, and then their principal consultant, our Feedback Infrastructure, and all the tests and lab work laboratory work was done by ENVIRO-TECH Services Environmental Laboratory.

So, you can see all that information is provided here. And then you also see that there is a declaration here, which has been provided by the ENVIRO RESOURCES who are the environmental consultant for this. So, they take responsibility for all the content of the EIA report for the proposed development.

(Refer Slide Time: 04:03)

**PROJECT TEAM**

Declaration by Experts contributing to the EIA of "Development of Water Aerodrome" at Eranga, Deerp, Village - General Stage, Tables, Post Box Street, South Australia, Australia & Number

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

EIA consultant's Full Name:  
Name: Mr. Mohammad Akbar  
Signature and Date: *[Signature]*

Team Member worked with EIA Consultant: Tarek Hamed Shih *[Signature]*

Contact information: Enviro Resources, Address: 190 Kingsway CRES, Opp. Millip, S V Road, Kadkolli, Near, Madhavaram, Madurai.

Functional Area Experts:

S. No.	Functional area	Name of the expert	Involvement	Signature and date
1	AP*	Tarek Hamed Shih	Impact Assessment of AP	<i>[Signature]</i>
2	NP*	Pritam Kadam	Impact Assessment of NP	<i>[Signature]</i>
3	SN*	Tarek Hamed Shih	Impact Assessment of SN	<i>[Signature]</i>
4	SP*	Aad Shihab	Impact Assessment of SP	<i>[Signature]</i>
5	IP*	Tarek Hamed Shih	Impact Assessment of IP	<i>[Signature]</i>
6	IS*	Milind Kamal	Impact Assessment of IS	<i>[Signature]</i>

Prepared by: Mr. Envo Resources Page 3

**PROJECT TEAM**

S. No.	IC*	Name/MS No	Impact Assessment of IC	Signature
7	IC*	Narayana PS Varde	Impact Assessment of IC	<i>[Signature]</i>
8	AQ*	Pritam Kadam	Impact Assessment of AQ	<i>[Signature]</i>
9	SO*	Vishal Manjappa	Impact Assessment of SO	<i>[Signature]</i>
10	IS*	Milind Kamal	Impact Assessment of IS	<i>[Signature]</i>
11	IS*	Satish Gupta	Impact Assessment of IS	<i>[Signature]</i>

\*Over TM against each FAE may be shown

Team Members:

S. No.	Functional area	Name of the expert	Involvement	Signature and date
1	ES*	Hankar Y.rajul	Pre-implementation ES CAT A with other ACO	<i>[Signature]</i>
2	IS*	Pritam Kadam	Annual Category A Expert as Team member for FAS-01	<i>[Signature]</i>
3	AP*	Pritam Kadam	Annual Category A Expert as Team member for FAS-02	<i>[Signature]</i>

\*\*Please attach additional sheet if required

<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81MVFineEIAReportShaheedIslandsWaterAerodrome.pdf>

So, here you can see what we learned about how the team is. So, you look at the project team here, the range of project teams as per the various domains you can see here functional areas, and who were the experts involved and what was their involvement into and, and their endorsements. So, they are responsible for the segment which they have done.

(Refer Slide Time: 04:26)

**TABLE OF CONTENTS**

EXECUTIVE SUMMARY ..... 1

1.0 Introduction ..... 1

2.0 Project Location ..... 1

3.0 Project Description ..... 4

4.0 Description of the Environment ..... 7

5.0 Anticipated Environment Impacts and Mitigation Measures ..... 12

6.0 Analysis of Alternatives ..... 15

7.0 Risk Assessment and Emergency Response Plan ..... 15

8.0 Post Project Environmental Monitoring Plan ..... 16

9.0 Environmental Management Plan ..... 16

10.0 Project Benefits ..... 16

11.0 Corporate Environment Responsibility (CER) Action Plan ..... 17

12.0 Project Schedule and Cost ..... 17

13.0 Conclusions ..... 17

**CHAPTER 1: INTRODUCTION ..... 18**

1.1 Purpose of the Report ..... 18

1.2 Identification of Project & Project Proponent ..... 18

1.3 Brief description of Project, Site, Location of the Project and its Importance ..... 18

1.4 Objectives and Scope of EIA Study ..... 20

1.5 Terms of Reference (TOR) and other Compliances ..... 20

**CHAPTER 2: PROJECT DESCRIPTION ..... 20**

2.1 Type of Project ..... 20

2.1.1 Supplier Operation - Overview of the World Services ..... 20

2.2 Need for Project ..... 20

2.3 Location of the Project ..... 20

2.3.1 Site Description ..... 20

2.3.2 Site Description ..... 20

2.4 Site or Marginal of Operation ..... 20

2.5 Proposed Schedule for Approval and Implementation ..... 20

2.6 Technology and Process Description ..... 20

2.6.1 On-Site Information Development ..... 20

2.6.1.1 Passenger Terminal Building (PTB) ..... 20

2.6.1.2 Terminal Road ..... 20

2.6.1.3 Parking Area ..... 20

2.6.1.4 Walkway Towards Flaring Jetty ..... 20

Prepared by: Mr. Envo Resources Page 3

**TABLE OF CONTENTS**

2.6.2 Off-Site Infrastructure Development ..... 20

2.6.2.1 Flaring Jetty ..... 20

2.6.2.2 Access Campsite ..... 20

2.6.2.3 Flaring Tanker Visual (FTV) - Solar Operated Boat ..... 20

2.6.2.4 Flaring Trucking Pad ..... 20

2.6.2.5 Sea Ponto ..... 20

2.6.2.6 Process of Flaring ..... 20

2.6.2.7 Lighting within the Water Operating Area ..... 20

2.6.2.8 Water Flumes and Runway Strip ..... 20

2.6.3 Utilized Resource Requirement ..... 20

2.6.3.1 Power and Fuel Requirement ..... 20

2.6.3.2 Solar Power Requirement ..... 20

2.6.3.3 Water Requirement and Wastewater Management ..... 20

2.6.3.4 Manpower Requirement ..... 20

2.6.3.5 Waste Generated from Activities, Workshops and Offices ..... 20

2.7 Basis and Use of Flaring Plan ..... 20

2.8 CKZ Mapping as per Island Protection Zone (IPZ) Notification 2011 ..... 20

**CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT ..... 20**

3.1 Introduction ..... 20

3.2 Marine, Wetland and Terrestrial ..... 20

3.2.1 Marine ..... 20

3.2.2 Wetland ..... 20

3.2.3 Terrestrial ..... 20

3.3 Land Environment ..... 20

3.3.1 Satellite Image ..... 20

3.3.2 Location - Location/Close Details ..... 20

3.3.3 Geomorphology and Soil ..... 20

3.3.4 Geology ..... 20

3.3.5 Topography and Hydrology ..... 20

3.3.6 Hydrology ..... 20

3.3.7 Meteorology ..... 20

3.4 Air Environment ..... 20

3.4.1 Meteorology ..... 20

3.4.2 Ambient Air Quality Monitoring ..... 20

3.4.3 Sampling Procedure & Analysis ..... 20

3.4.4 Air Quality Monitoring Results ..... 20

Prepared by: Mr. Envo Resources Page 3

<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81MVFineEIAReportShaheedIslandsWaterAerodrome.pdf>

And then how the report is structured. If looking at the report structure, here you can see you have executed a summary which is very key element of report writing then you can see the introduction then you can see Chapter 2 deals with the project descriptions, where you will see how with the different kinds of projects you

will see the type of the project or how the Seaplane Operations will take place, need of the project, why it is needed, where it is located, and then looking at the size and magnitude of operations and then the technology and process description.

Then all this information and detailed information about the project is given, then you can see Chapter 3 which describes the environment in which the project will be located. So, you see all the materials methods, and approaches that will be used in the land environment, the air environment, and then you will see the noise environment, water environment, soil environment, biotic environments, and socio-economic environments. So, you will see all that has been covered in the report.

(Refer to Slide Time: 05:32)

TABLE OF CONTENTS

- 3.1.1 Introduction 31
- 3.2 Noise Environment 31
- 3.2.1 Introduction (Soil/Fire Monitoring) 31
- 3.2.2 Method of Monitoring 31
- 3.2.3 Noise Level Monitoring Results 34
- 3.2.4 Summary 34
- 3.3 Water Environment 35
- 3.3.1 Surface Water Sampling Locations 35
- 3.3.2 Surface Water Sampling Results 36
- 3.3.3 Impacts of Surface Water Quality Results 37
- 3.3.4 Ground Water Monitoring Locations 37
- 3.3.5 Ground Water Sampling Results 38
- 3.3.6 Impacts of Ground Water Quality Results 39
- 3.7 Soil Environment 39
- 3.7.1 Soil Sampling Locations 39
- 3.7.2 Soil Sampling Results 39
- 3.7.3 Impacts 39
- 3.8 Biotic Environment 39
- 3.8.1 Introduction 39
- 3.8.2 Objectives 39
- 3.8.3 Study Area 39
- 3.8.4 Ecological Assessment 39
- 3.8.5 Flora 39
- 3.8.6 Fauna 39
- 3.8.7 Impacts of primary & secondary sites 39
- 3.9 Socio-Economic Environment 39
- 3.9.1 Baseline Status 39
- 3.9.2 Demographic Structure 39
- 3.9.3 Infrastructure Services 39
- 3.9.4 Economic Activities 39
- 3.9.5 Health Status 39
- 3.9.6 Quality of Life 39
- 3.9.7 Cultural and Aesthetic Environment 39
- 3.9.8 Institutions and Environmental Plan (A & R Plan) 39
- 4.0 ENVIRONMENTAL IMPACTS & MITIGATION MEASURES 39
- 4.1 Air Environment 39
- 4.1.1 Construction Phase 39
- 4.1.2 Operational Phase 39

Prepared by M/S Enviro Systems Page 11

TABLE OF CONTENTS

- 4.2 Noise Environment 39
- 4.2.1 Construction Phase 39
- 4.2.2 Operational Phase 39
- 4.3 Water Environment 39
- 4.3.1 Construction Phase 39
- 4.3.2 Operation Phase 39
- 4.4 Biotic Environment (Terrestrial & Aquatic) 39
- 4.5 Socio-Economic 39
- CHAPTER 5 - ANALYSIS OF ALTERNATIVES 39
- 5.1 Introduction 39
- 5.2 Alternative of Project Site 39
- 5.3 Alternative for Energy & Water Consumption 39
- CHAPTER 6 - ENVIRONMENTAL MONITORING PROGRAMME 39
- 6.1 Environmental Monitoring Plan 39
- 6.2 Design Construction Phase 39
- 6.2.1 Air and Noise Monitoring 39
- 6.2.2 Water Management 39
- 6.2.3 Biotic Environment 39
- 6.2.4 Soil monitoring 39
- 6.3 Design Operation Phase 39
- 6.3.1 Air and Noise Monitoring 39
- 6.3.2 Water and Wastewater Management and Analysis 39
- 6.3.3 Biotic Environment 39
- 6.3.4 Soil monitoring 39
- 6.4 Environmental Monitoring Plan with Budgetary Allocation 39
- 6.5 Environmental Monitoring Agency 39
- CHAPTER 7 - ADDITIONAL STUDIES 39
- 7.1 Public Consultation 39
- 7.2 Risk Assessment 39
- 7.2.1 Risk Assessment Methodology 39
- 7.2.2 Classification of Emergency Disaster 39
- 7.2.3 Consequence Analysis 39
- 7.2.4 Early Analytical Response 39
- 7.2.5 Vulnerability & Impact Assessment 39
- 7.2.6 Timeline 39
- 7.2.7 Funding 39
- 7.2.8 Key Areas 39
- 7.2.9 Summary 39
- CHAPTER 8 - PROJECT BENEFITS 39
- 8.1 Improvement in the Physical Infrastructure 39
- 8.2 Improvement in the Social Infrastructure 39
- 8.3 Employment Potential (Direct, Semi-Skilled and Unskilled) 39
- 8.4 Direct Revenue Earning to the National and UT Exchequer 39
- 8.5 Other Tangible Benefits 39
- 8.6 Chapter Conclusions 39
- CHAPTER 9 - ENVIRONMENTAL COST-BENEFIT ANALYSIS 39
- CHAPTER 10 - ENVIRONMENTAL MANAGEMENT PLAN 39
- 10.1 Introduction 39
- 10.2 Organization and Environmental Cell 39
- 10.3 Environmental Management Measures 39
- 10.3.1 Air Environment 39
- 10.3.1.1 Construction Phase 39
- 10.3.1.2 Operational Phase 39
- 10.3.1.3 Noise Environment 39
- 10.3.1.4 Construction Phase 39
- 10.3.1.5 Operation Phase 39
- 10.3.1.6 Operation Phase 39
- 10.3.1.7 Operation Phase 39

Prepared by M/S Enviro Systems Page 11

<http://environmentclearance.nic.in/writer/readdata/EIA/03042021/U2N81MVFineEIAReportShaheedIslandWaterAerodrome.pdf>

Then you also see the environmental impact and mitigation measures that they have taken including for all the key impact areas air, noise, water, biotech, and socio-economic. So, what are the measures they have taken to

mitigate the impact, then you will see here in Chapter 5 Analysis of Alternatives, that, they have also analyzed the alternatives, which we will look at in Part 2. And then an environmental monitoring program.

So, how do they plan to monitor the entire thing, how they are going to follow up the entire mitigation, which they have talked about, and how they are going to comply with all the environmental aspects which they have committed to, and then, since, it is a very unique project, what you see here, so, you can also see the additional studies which they have undertaken. So, that is covered under Chapter 7.

So, you see the public consultation, and risk assessments that all is given and then you will see within risk assessment also you can see risk assessment with the logic classification of emergency and disaster consequence analysis, accidents, scenario, vulnerability and impact assessment, tsunami, flooding, seaplane all that you can see the aircraft crash incident, cyclone, so, all that aspects have been covered here, there is a range of aspects which can come up so all the specific additional study which was done under this project has been covered here.

So, you also see that they have a disaster management plan here in addition to risk assessment, then you also see, within this, you see a range of mitigation and preparedness, preparedness policies, all that aspects is covered here within the disaster management plan. So, in Chapter 8 you see the project benefits, so, they have talked about the impact.

So, here you see what are the project benefits and what benefits will be there because of the project in the neighborhoods, where the project is located. And then in Chapter 9, they look at the environmental cost-benefit analysis, and then in Chapter 10 they look at the environmental management plan, and they summarize and conclude which helps them to decide on the decision-makers.

(Refer Slide Time: 08:07)

TABLE OF CONTENTS		
10.1	Soil Environment	149
10.1.1	Construction Phase	149
10.1.2	Operation Phase	149
10.1.3	End Use Management	149
10.1.4	Construction Phase	149
10.1.5	Operation Phase	149
10.1.6	Details of EMP Budget Allocation	150
10.1.7	Overall Development Plan	150
10.1.8	Soil Management	150
10.1.9	EER Activity	150
10.1.10	Terms of Payment of the Consultant's/Contractor's Environmental Fees	150
<b>CHAPTER 11: DISCLOSURE OF CONSULTANT</b>		150
11.1	Disclosure of Consultant	150
<b>LIST OF TABLES</b>		
Table 1.1	Project Brief	18
Table 1.2	Geographical Location of the project	19
Table 1.3	Completion of EIA	21
Table 1.4	Geographical Location of the Project	40
Table 1.5	Environmental Sensitive Areas within 10 km	40
Table 1.6	Area Treatment of Project	41
Table 1.7	Cost Break up Details	41
Table 1.8	Technical Parameters of Visting Off Shore Shipyard	51
Table 1.9	Comparison of Battery Design	52
Table 1.10	Estimated Electrical Load and Details	52
Table 1.11	Technical Specification of Solar Monitoring System	54
Table 1.12	Area Under Solar Storage Capacity	54
Table 1.13	Area Under Investment	55
Table 1.14	Water Conserved from Rainwater, Windings & Leaking	58
Table 1.15	CRZ Classification Details of the Project	64
Prepared by: S.S. Jeyaraj		Page 1/3

TABLE OF CONTENTS		
Table 1.1	Summary of Sampling	66
Table 1.2	Frequency of Sampling	66
Table 1.3	Data Specifications List For Present Study	68
Table 1.4	Location - Landcover Statistics of Area within 10 km Radius	71
Table 1.5	Location - Landcover Statistics of Area within 1 km Radius	72
Table 1.6	Water Quality Data	78
Table 1.7	Location of the Sampling Point	80
Table 1.8	Method Adopted for Quality Standards	82
Table 1.9	Ambient Air Quality Results	82
Table 1.10	Noise Level Standards	83
Table 1.11	Noise Monitoring Locations	83
Table 1.12	Noise Monitoring Results	84
Table 1.13	Soil Water Sampling Locations	87
Table 1.14	Soil Water Quality Results	88
Table 1.15	Overall Water Monitoring Locations	88
Table 1.16	Overall Water Results	89
Table 1.17	Soil Sampling Locations	89
Table 1.18	Soil Sampling Results	89
Table 1.19	Chemical Classification of Soil Quality	92
Table 1.20	Levels of Soil Fertility	93
Table 1.21	Coordinates of EER Studies Survey Locations	94
Table 1.22	Details of Sites Locations for Soils Environmental Field Studies Surveys	95
Table 1.23	Summary of Ecologically Sensitive Areas in Study Area	99
Table 1.24	Project Site Specific Flora Inventory along with Cutting Details	104
Table 1.25	Flora Inventory for Soils Environmental Studies Surveys Within Study Area	107
Table 1.26	Flora Inventory for Soils Environmental Studies Surveys Within Study Area	108
Table 1.27	Soil Classes in Study Area from Secondary Data	110
Table 1.28	Map of Soil Classification in Study Area from secondary Data	112
Prepared by: S.S. Jeyaraj		Page 1/3

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And all the disclosures of the consultants, what all who have been involved. So, you see the list of tables here the kind of information which has been provided from project brief to geography locations, compliance of ToR, so all that has been provided with all detailed data which has been collected.

So, you see the wide range of information that is there from all the details that one road needs to provide as per different domains which are decided from as per the ToR or scoping of the project. So, you see all the tables and then a list of figures that have to be provided you can see the all information about the project and the environment and then the calculations all have been provided. So, you see how intense all the details have to be given here.

(Refer Slide Time: 09:04)

TABLE OF CONTENTS	
LIST OF ANNEXURES	
Annexure 1	EIR Letter
Annexure 2	ECBC Compliance Analysis Report
Annexure 3	Land Allotment Document
Annexure 4	Check of Environmental Status of the Site of Landmark Project Site
Annexure 5	Public Hearing Proceedings and Minutes
Annexure 6	Recommendation of AAR/CDIA
Annexure 7	Final 1:500 P.T. (Detailed) Plan
Annexure 8	CEZ map as 1:500 scale with project activities superimposed on the map
Annexure 9	Undertaking by Government of Civil Aviation, Airports & Northern Administration (including the dates in a calendar year or part of the year for the implementation within Governmental Clearance)
Annexure 10	Application for Forest Land Conversion Permission

Prepared by M/s. Suresh Engineers Page 10/11

<http://environmentclearance.nic.in/inter/roaddata/EIA/03042021/UP2N81MV1/FinelEIAReportShaheedIslandWaterAerodrome.pdf>

And then all the other supporting documents that you are letter and then ECBC compliance land allotment document and all these what proceedings they had with public participation have to be given here.

(Refer Slide Time: 09:19)

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

**EXECUTIVE SUMMARY**

**EXECUTIVE SUMMARY**

**1.0 Introduction**

Directorate of Civil Aviation, Andaman & Nicobar Administration, (Project Proponent) has proposed Water Aerodrome project at Swayam Dweep, Village: Govind Nagar, Taluka: Port Blair, District: South Andaman, Andaman & Nicobar Islands.

As per Environment Impact Assessment (EIA) Notification dated 14<sup>th</sup> September 2006, and its further amendments, all projects pertaining to Airports are listed under "Category A" with activity number 7(a).

The proposal was submitted to MoEF&CC, New Delhi & subsequently project was considered in the 46<sup>th</sup> meeting of Expert Appraisal Committee (EAC, India-2) held on 25-26 November, 2019 & as per approved ToR Letter "EAC noted that Water Aerodrome is not a listed project/activity in the Schedule to the EIA Notification 2006 and its amendments. However committee opined that the activities proposed under the project would have similar types of impact as that of normal Airport".

Considering the Water Aerodrome are just emerging in the country as a new mode of transport, involving sea/river/brush and its likely impacts on water, air and aquatic biodiversity including flora and fauna, the EAC has had taken a view to follow the EC process as per category A of item 7(a), 'Air Ports', of the Schedule to the EIA Notification, 2006 and accordingly, the ToR was recommended by EAC.

**2.0 Project Location**

The proposed project will be located at Swayam Dweep, Village: Govind Nagar, Taluka: Port Blair, District: South Andaman, Andaman & Nicobar Islands. The geographical location of the project is 12°19'46"N, 92°58'43.87"E. The proposed project is approximately 50 km (Aerial Distance) from Veer Sarabhai International Airport, Port Blair.

The Topobath map of the study area is as shown in Figure 1.

(1)	(2)	(3)	(4)	(5)
7(a)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7	Physical infrastructure including Environmental Services Air ports including terminals, which are for commercial use.	All projects	All projects	All projects, which are not involving handling involving handling of Air Traffic Control, are exempted.
7(b)	All strip landing paths including strip landing paths	All projects	All projects	All projects
7(c)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(d)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(e)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(f)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(g)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(h)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(i)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(j)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(k)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(l)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(m)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(n)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(o)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(p)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(q)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(r)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(s)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(t)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(u)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(v)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(w)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(x)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(y)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply
7(z)	Industrial storage & handling of hazardous materials As per classification given in Schedule I of EIA Notification, 2006	All projects	All projects	General Condition shall apply

<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81MVF1FinalEIAReportShaheedIslandWaterAerodrome.pdf>

So, first quickly looking at the executive summary, I would mix some of the things just to cut it short. So, you see here that the water aerodrome, if you look at the list as per the notification of 2006 does not come under EIA purview. However, there was concern about the committee expert appraisal committee EAC related to infrastructure.

So, they thought that there might be a similar impact as per the normal airport and airports do come within the purview of EIA, you can see I have snipped it for you here activity no. 7 (a) Airports and they come under Category A all projects including airstrips which are for commercial use. And so, these come under category A. So, given that context and it was a water port, which has not been there before in the Indian context, so, it is not there in the list, but given the possibility of the kind of impact it might have, it has been included and taken under EIA.

(Refer Slide Time: 10:40)

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

**EXECUTIVE SUMMARY**

**Figure 2: Location Map of the Project Site**

<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81MVF1FinalEIAReportShaheedIslandWaterAerodrome.pdf>

Prepared by M/s Enviro Resources Page 3



So, looking at the project location just to understand, so that all our learners understand where it is located. So, you can see here the island, you see these islands here. So, here you see that these are Andaman and Nicobar Island and that is where the project is located. And you can see the runway here and how the water runway would be there.

(Refer Slide Time: 11:10)

**On shore facilities such as**

- Passenger Terminal Building (PTB),
- Utility Building,
- Parking Area,
- Walkway towards Floating Jetty, etc.

**Off shore facilities such as**

- Floating Jetty,
- Passenger Transfer Vessel,
- Floating Dock,
- Fire and Rescue Boat,
- Sea Planes and a suitable water operating area,
- including identified approach and departure paths.

The Site Layout of the on shore and off shore facilities is as shown in Figure 3 and Figure 4.

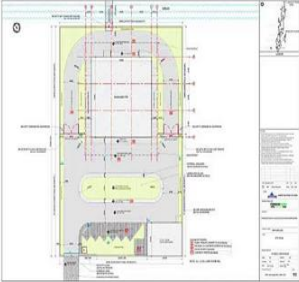


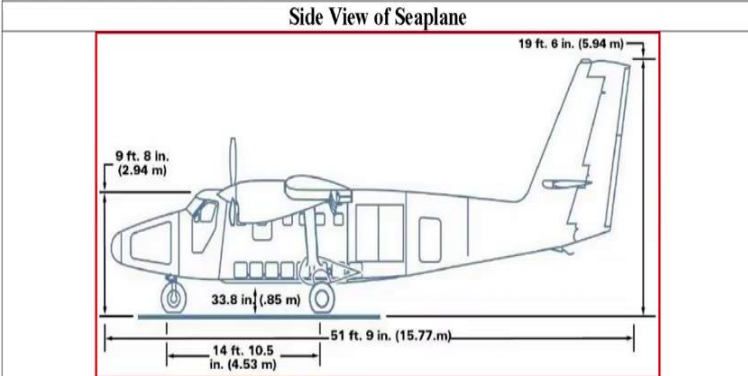
Figure 3: Passenger Terminal Building Layout Plan

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021/U2N81M/1FinalEIAReportShahedIslandWaterAerodrome.pdf>

So, this project would have facilities like it will have some onshore facilities such as a passenger terminal building, utility building, parking area, walkway, floating jetty, and so on and then they would have offshore facilities such as a floating jetty, passenger transfer vessel, floating dock, fire and rescue boat, seaplanes, and suitable water operating area and then approach and departure of paths. So, all that would be here you can also see the passenger terminal building layout here how it would be. So, all these constructions would come up for the project all these facilities would come up.

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**Side View of Seaplane**



**Front View of Seaplane**

9 ft. 8 in. (2.94 m)

19 ft. 6 in. (5.94 m)

33.8 in. (.85 m)

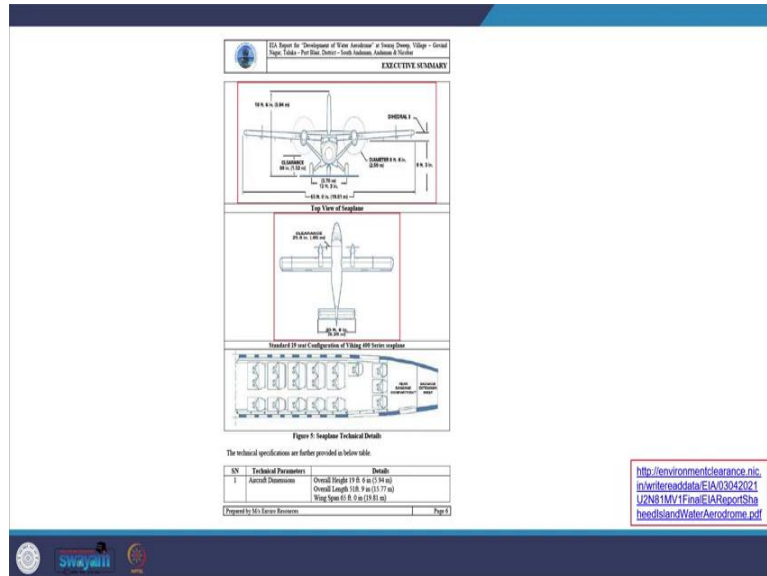
14 ft. 10.5 in. (4.53 m)

51 ft. 9 in. (15.77 m)

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021/U2N81M/1FinalEIAReportShahedIslandWaterAerodrome.pdf>

And looking at the magnitude of this, it would be the kind of seaplanes which would come here would carry 19 passengers and it would have like 380 packs, the infrastructure would take care of 380 pax. So, each round-trip of seaplane will carry approximately 30 passengers.

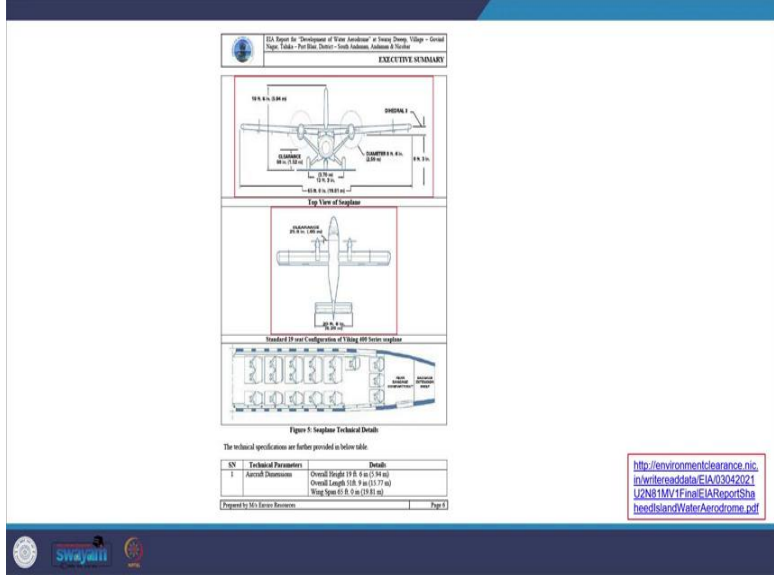
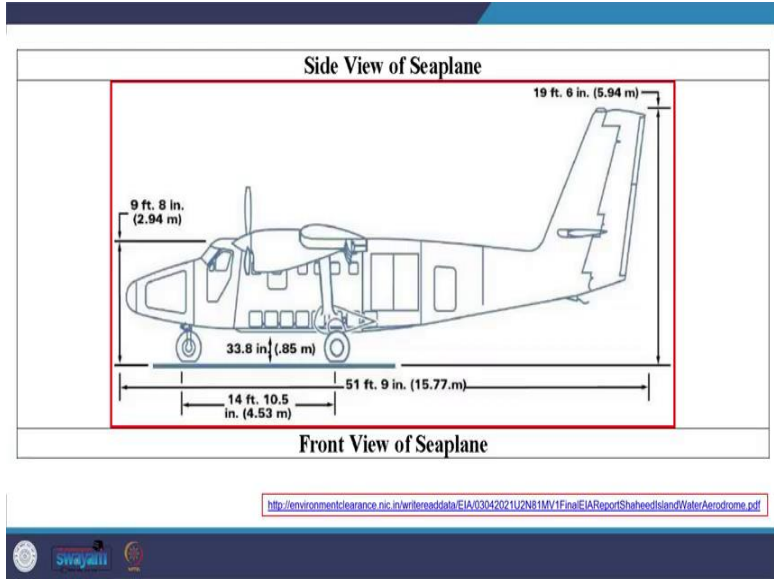
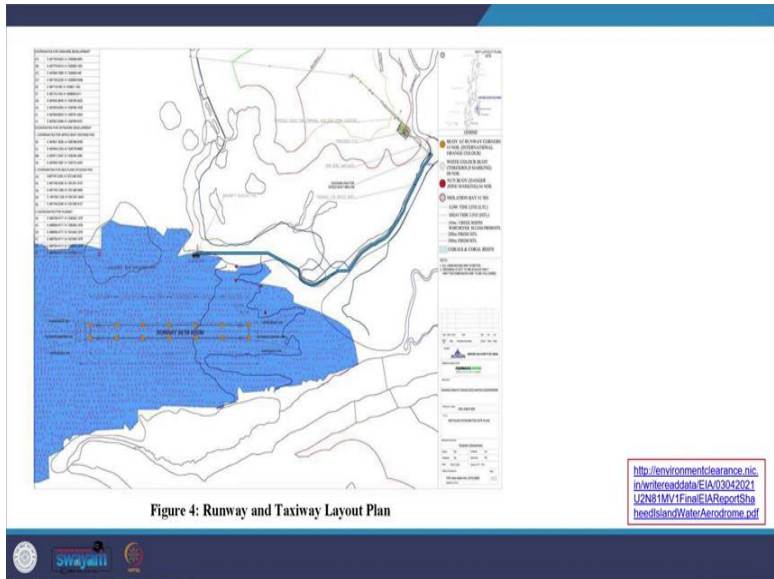
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So, you see each seaplane has 19 capacity. So, round trip it will carry 38 passengers and we will have considered having 5 such trips for each of these to see planes in a day. So, you see how those calculations are done and then this particular project would carry passengers in the range of 1 lakh passengers per annum, which is like 380 pax daily for 2790 non-monsoon days for one sea plane. So, that is what the calculations have been made to understand the magnitude of the project.

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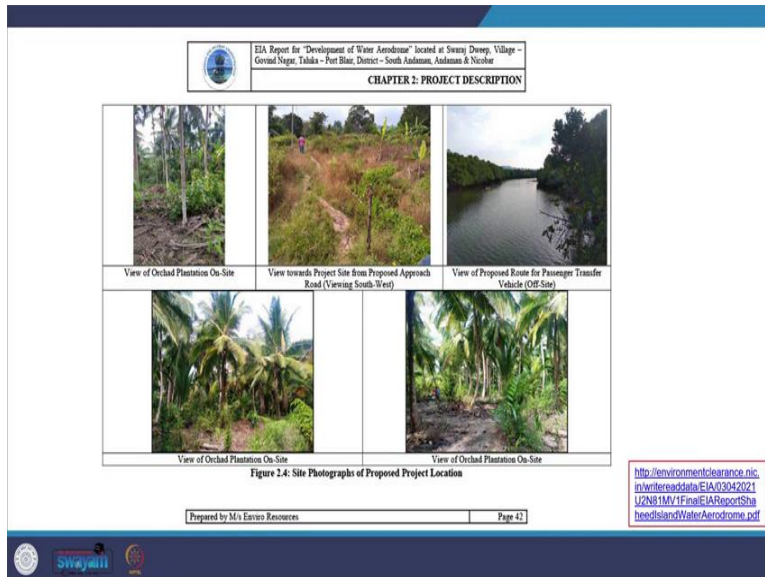




So, you can see here the project site the image of the project site, you can see here runway and taxiway layout plan, and then all the details are given here. So, you see how the understanding of the project detail has been

developed here, the size of the seaplane that will be coming to this particular aerodrome and the details of technical details of the seaplane.

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Then you can look at the site photographs, and where the project would come from. So, you see the orchard plantation on site, which is there then you can also see approach road proposed approach road currently versus status and then view the proposed route for passenger transfer vehicles, so the passenger route for that.

So, you also see that this particular area has environmentally sensitive places. So, you recollect what we studied about environmentally sensitive places, how we identify and what are the key concerns when we deal with such kind of environmentally sensitive areas.

(Refer Slide Time: 14:06)

**Table 2.2: Environmental Sensitive Places within 15 km**

Sr. No.	Areas	Name/ Identify	Aerial distance (within 15 km) of Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value.	Yes	Rani Phans Marine National Park is present at approximate distance of 2.8 km from the proposed project site.
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	Yes	1) The project is falling under CRZ IA, CRZ III & CRZ IV as per ICZM notification, 2011. 2) The project offshore facilities/operations will be in Andaman Sea & Connected Creek (Nallah No.2 as referred by Locals).
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, overwintering, migration.	Yes	Mangrove Forest, Corals & Andaman Sea are in close proximity.
4	Inland, coastal, marine or underground waters.	Yes	The project offshore facilities/operations will be in Andaman Sea & Connected Creek (Nallah No.2 as referred by Locals).
5	State, National boundaries	No	Not present within 15 km radius from project site.
6	Routes or facilities used by the public for access to recreation or other tourist/pilgrim areas.	Yes	The nearby area from project site itself serves as tourist place.
7	Defense installations	No	Not Applicable
8	Densely populated or built-up area.	Yes	The project site is in the Govindnagar Village which is relatively densely populated
9	Areas occupied by sensitive man-made land uses	Yes	Present at nearby locations

10	Areas containing important, high quality or scarce resources (Ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	Yes	The project offshore facilities/operations will be in Andaman Sea & Connected Creek (Nallah No.2 as referred by Locals).
11	Areas already subjected to pollution or environmental damage. (Those where existing legal environmental standards are exceeded)	No	No Any.
12	Areas susceptible to natural hazard which could cause the project to present environmental problems (Earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)	Yes	There are built-up areas within 15 radius which could be susceptible to natural hazards, however, the project falls under Zone V as per IS 1893 (part 1): 2002 classification, which is seismically it is a stable zone, hence any possible hazard will not be created.

Prepared by M/s Enviro Resources Page 40

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021/U2N81MV1FinalEIAReportShaheedIslandWaterAerodrome.pdf>

So, here you see they have identified environmentally sensitive places within 15 kilometers. So, they have taken a radius of 15 kilometers for environmentally sensitive areas. So, you see areas like areas protected under

international convention, so they are referring to all the protected areas under international convention. So, you see that do they have it, have in this particular radius, what they are studying and the details of those projects.

So, you can see Rani Jhansi Marine National Park is present. Then likewise, you see areas that are important or sensitive for ecological reasons like wetlands, water courses, or other water bodies. So, all those are present in these 15 kilometers then you see the area used by protected important or sensitive species of Laura.

So, you also see those mangrove forests, coral, and the Andaman Sea nearby. So, you see all these inland, coastal marine, state national boundaries, routes, or facilities. So, all these sensitive places have been identified. So, many preparing area reports see how intensive it could be and all those details have to be given point by point.

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**Project Schedule & Cost** : The proposed project is scheduled to be commissioned within 8-10 months after Environment Clearance (EC) and other statutory approvals are granted. The estimated cost of the project is Rs. 24.79 Crores. The budget for Environmental Management Plan for the proposed project is ~ Rs. 59.13 Lakhs.

**Resource Requirements**

- Land** : The proposed project will be executed within the plot area of ~0.35 Ha on the land side. The project land currently has been allocated to Andaman and Nicobar Islands Integrated Development Corporation Ltd (ANIIDCO) for proposed project by Andaman & Nicobar Administration.
- Water** : The required water for project activities viz. domestic use, fire water storage/reserve, road washing and for greenbelt development & maintenance purposes is ~ 16.4 m<sup>3</sup>/day and will be sourced from local water supply.
- Power** : Power supply will be sourced from Electricity Department, Andaman and Nicobar. The anticipated connected load will be ~ 143 KW. DG sets of 2 x 50 kVA (construction phase) & 1 x 320 kVA (operational phase) are proposed. Further around 150 numbers of Solar modules each have capacity of 400 watt; thus solar power harvesting system having a total of 60 KW (DC) capacities will be installed.
- Manpower** : The total manpower envisaged is approximately 50 Nos. for the project.

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021/U2N81Mv1FinalEIAReportShaheedIslandWaterAerodrome.pdf>

So, looking at the project schedule and cost here. So, the project -- Estimated cost of the project is nearly twenty 5 crores you see here, and the budget of the environmental management plan. So, what they will do to mitigate the environmental impact would be nearly 60 lakhs, 59 Plus lakhs. So, that is what their calculations are. And the kind of resources they would be used as land resources, water resources, power, and manpower.

So, if you look at the land resource what they would be using is like 0.35 hectares on the land side they would be using and then you also see water, water will be required for project activities like domestic use, fire water storage, road washing, and for Greenbelt development maintenance of that and we will be channelized through the local water supply.

Then you see power supply will be sourced from electrical departments and then what will be the requirements and so on. And total manpower which is required is calculated to be 50 numbers for the project, so they would be required for this particular facility 50 numbers, so you will see that here.

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SN	Component	Description
1	Latitude / Longitude	12°02'31.20"N, 92°58'52.26"E
2	Village/ Taluka/ District/ State (UT)	Govind Nagar / Port Blair/ South Andaman / Andaman & Nicobar UT
3	Nearest Airport	Veer Savarkar International Airport- 50 km (Aerial Distance)
4	Nearest Wildlife Sanctuary/ESA/National park	Rani Jhansi Marine National Park is at an approximate aerial distance of 2.8 km from the proposed project site.

With the growth of aviation industry, India is also witnessing tremendous growth in aircraft operations. Seaplane operations in India are yet an untapped market even though a tremendous potential exists, being a vast country with magnificent waterfronts all across. With current growth scenario in civil aviation, particularly in India, the Central Government has launched "Ude Desh ka Aam Naagrik" Regional Connectivity Scheme (UDAN-RCS) to reach out to remote areas.

<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81M/1FinalEIAReportShaheedIslandWaterAerodrome.pdf>

Details of the geographic locations are given you can see where it is located. And particularly, this one is done within India's UDAN program which is like Ude Desh ka Aam Naagrik, which is like which means which is said in Hindi here, it means every common citizen of the country would fly, so Ude Desh ka Aam Naagrik. And within Regional Connectivity Scheme RCS, RCS, which has been abbreviated UDAN which means flying, flight. And it is the program for regional connectivity. So, within that, this particular project has been done.

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## Objective of the EIA Report

So, looking at now, that was a brief description of the project looking at the purpose of the EIA report. So, we see that the purpose of this, the key purpose behind this EIA report is to integrate the environmental concerns in the development activities, what we are addressing as sustainable development. So, that it can enable integration of environmental concerns and mitigation measures and the project development and also to have any kind of future liabilities, any kind of things which happen because of the project.

So, anticipating all that and paring it down about all the actions which they are going to take. So, the study area for this EIA versus the 10-kilometer radial area from the proposed project site and wherever it was environmentally sensitive areas where it was concerning studying, then a 15-kilometer radius was taken. For this study secondary data was collected around the 10 kilometers or 15 kilometers of the site as per the study purpose for any kind of study detailed environmental monitoring, they are taken 10 kilometers for the environmentally sensitive area they had taken 15 kilometers.

So, to get an idea about the existing state of the environment, various environmental data were collected, including metrology, air quality, water quality, soil quality, and all those areas. It was carried out As you will see this is fairly latest report from December 2019 to February 2020.

So, the scope of the study included a description of the project and associated work, so describing the project, so, becomes the key purpose key component of the EIA report, then establishing the base environment and social scenario and then identification and description of the elements of community and environment which would be likely to be impacted by the project. So, those all community and environmental aspects, what kind of impact it would have?

So, identifying them and then describing them. Then it also had the study the existing traffic scenario, and the impact on transportation, so that it would also do that and conservation of resources, how resource efficiency is attained here, and then design. Specifying monitoring and audit requirements is necessary so how they are going to monitor and audit all that is going on at the operational stage of this project?

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So, here we see how they are complying with the ToR Terms of Reference, or like I said, it is the scoping stage, where the ToR is used as per the domain wise-like what they need to undertake what they need to study while

assessing the environmental impact of any kind of a project. So, as you will see here they have given point by point how they are complying with the ToR.

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The image shows two pages of an EIA report. The left page is titled 'CHAPTER 1: INTRODUCTION' and contains 'Table 1.3: Compliance of ToR'. The right page is also titled 'CHAPTER 1: INTRODUCTION' and contains a table with 8 rows of compliance details. A URL is visible in the bottom right corner: <http://environmentclearance.nic.in/infobasedata/EIA/03/24/2021/122818MV1FinalEIAReportShaheedIslandWaterAerodrome.pdf>

So, you see like, they have reasons for selecting the site with details of alternative sites and so on, which is like given in the ToR. So, they have like how did they comply by it, so, they had four sites 1, 2, 3, 4, Char Nariyal and then South Kalapatthar, then you have Vijayanagar Beach Site, Lacam Harbor, so all these were studied as an alternative. So, they have given it point by point and the details are given later.

Then you will see the details of the land use breakout for the proposed project in point number 2, you can see the details of land use around a 10 10-kilometer radius of the project site. So, how they have worked it out, and in which sections they are giving those details been given. So, likewise, you see that point 3 submits the present values and permission required for any conversion such as forest agriculture and so on.

So, how they have complied with it? Likewise, you can examine and submit the water bodies, including the seasonal ones within the corridor of impact. So, how they have taken care of that where all they are describing is how they have documented it. So, compliance has been given. Like in point 5 you can see submit a copy of the contour plan with the slope drainage pattern of the site. So, they have also created a digital elevation model map, elevation profile, and digital pattern of a 10-kilometer area study area, which was within the scope.

So, and then they have given all the figures that address these terms of reference. Likewise, you can see some details of environmentally sensitive places' land acquisition status, and how they have addressed it examine the impact of a proposed project or nearest settlements. So, the anticipated impact, and what will happen during the construction and operation of the project have been mentioned and they have also mentioned in which chapter to cover that. So, likewise, you can see examined baseline environmental quality along with the project incremental load due to proposed project activities.



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EIA Report for 'Development of Yam Andaman' located at Young Deep, Village - Central/Naga, Table - Por Blat, District - South Andaman, Andaman & Nicobar		
CHAPTER I: INTRODUCTION		
SN	Talk	Compliance
9	Examine and submit details of level of filling material and Transportation details etc. Submit details of a comprehensive Assessment and Thematic Management Plan including emergency response during natural and man-made disaster comprising with existing support.	1.37 Purpose of the Project lies in below quantity required for filling, source of filling material and Transportation details etc. Submit details of a comprehensive Assessment and Thematic Management Plan including emergency response during natural and man-made disaster comprising with existing support.  The approx. quantity of filling required is 5300cum, which will be generated from the site leveling work and adjacent area, and approved road cutting/leveling work and proposed adjacent borrow pit.  The project location viz. Young Deep is connected to surrounding islands by dense traffic network due to the proposed infrastructure. A detailed traffic and transportation study should be made for existing and proposed passenger and cargo traffic.  The existing PCU's of Young Deep is 1024 in one phase proposed for use in this project is having capacity of 19 Passengers. It is proposed to develop the infrastructure facility for 100 passengers per day. The proposed project will create a max addition of ~ 200 trips per day of cars i.e. 20 cars per hr resulting in less of driver operations.  The existing design capacity of road is per IRC 100-1990 guidelines is 1000 PCU's/hr (2 Lane 1 way). The additional 20 cars per hour (i.e. 20 PCU's/hr) is very marginal to the design capacity and will not significantly affect the current traffic situation.
11	Submit details regarding R&R involved in the project	Detailed traffic assessment study is given in Chapter 10, Section 10.4, Page No. 254 to 256.  The proposed project plot is an orchard land under Forest Department - Andaman & Nicobar Union Territory Administration & post division the said land has been allocated to Andaman and Nicobar Islands Integrated Development Corporation Ltd (ANIDCO). This project plot is uninhabited and R&R aspects are not applicable.
12	Examine the details of water requirements, use of treated waste water and prepare a water balance chart. Source of water via a via waste water to be generated along with treatment facilities to be prepared.	The water requirement during construction phase will be 4.1 m <sup>3</sup> /day. At during operational phase initial water requirement for the proposed project activities will be 24.1 MLD & in later stage the net freshwater requirement will be 14.4 m <sup>3</sup> /day (once of 77 m <sup>3</sup> /day treated sewage). Water for construction phase will be sourced from Tankers & that of the operation phase will be sourced from Local Administration.  The detailed water balance chart is given in Chapter 7, Table No. 7.10 & Figure No. 7.10, Page No. 53 to 54.
13	Rain water harvesting proposals should be made with the catchments for ground water quality. Maximize recycling of waste and reduction of rain water.	Rainfall run off rain water will be harvested through the storm water drainage network proposed for complete treatment process, a holding tank along with dosing chamber is proposed to store the collected water & proposed to be used for green job & flushing. Overflow of the tank will be connected to sea.  The solid waste generation due to proposed project is management & disposal are given in detail in Chapter 1, Section 1.6.1.5, Table No. 2.11, Page No. 34 to 36.  The land use classification of the site of Young Deep waste treatment facility was previously categorized as forest land. Presently the site has been transferred to Andaman and Nicobar Islands Integrated Development Corporation Ltd (ANIDCO) for the Waste Andaman development. There is no habitation currently available at the project location. The application for forest land conversion permission is in progress.
14	Examine details of Solid waste generation, treatment and its disposal.	
15	Submit the present land use and permission required for any conversions such as forest, agriculture etc.	

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021/U2N81MVFineEIAReportShaheedIslandWaterAerodrome.pdf>

So, the baseline environmental quality had to be given. So, the entire baseline environmental quality has been provided in the report. Then you see how they have examined levels, quantity required for filling, source of filling, material, and all these details you can see. We will see point number 11 where submit details regarding rehabilitation and resettlement involved in the project. So, you can see here what compliance they have done or what they mention here.

The proposed project plot is an orchard land under the forest department of Andaman and Nicobar Union Territory administration and post division and the said land has been allocated to Andaman and Nicobar Island Integrated Development Corporation thus project plot is uninhabited and R&R aspects are not applicable. So, you think about what kind of resettlement, and rehabilitation rehabilitation are required economically and physically, and what part they have covered and not covered. So, you can reflect on that when you go through all these things.

So, here again, point number 12 you can see, the various water requirements that they are required to address and how they have created the detailed water balance chart for this particular project. And point number 13, you can see rainwater harvesting. So, how they have taken care of that and then solid waste generation and disposal of it and then with segments addresses to that, and present land use permissions required for this purpose.

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EIA Report for 'Development of New Aerodrome' based at Green Dunes Village - Central Nyaanga Tables - Fort Blue Dunes - South Ashburn, Ashburn & Yorba		EIA Report for 'Development of New Aerodrome' based at Green Dunes Village - Central Nyaanga Tables - Fort Blue Dunes - South Ashburn, Ashburn & Yorba	
CHAPTER 1: INTRODUCTION		CHAPTER 1: INTRODUCTION	
SN	Task	SN	Task
16	Examine separately the details of construction and operation phases both Environmental Management Plan and Environmental Monitoring Plan with cost and parameters	17	Submit details of corporate social responsibility (CSR)
17	Submit details of comprehensive Disaster Management Plan including emergency response during natural and man-made disaster	18	Examine the details of alternative routes, including land and financial outlay, landscape plan, green belts and other related matters to be included in the EIA report
18	Examine baseline environmental quality along with proposed incremental load due to the proposed project activities	19	Public hearing to be conducted for the project in accordance with provisions of Environmental Impact Assessment Act, 2006 and the rules made thereunder
19	The air quality monitoring should be carried out as per the conditions stated in 16th November, 2009 notification dated as per in Chapter 3, Section 3.4.2 to Section 3.4.3, Page No. 73 to 75	20	Examine separately the details of construction and operation phases both Environmental Management Plan and Environmental Monitoring Plan with cost and parameters
20	Examine baseline environmental quality along with proposed incremental load due to the proposed project activities	21	Examine the details of alternative routes, including land and financial outlay, landscape plan, green belts and other related matters to be included in the EIA report
21	Submit details of comprehensive Disaster Management Plan including emergency response during natural and man-made disaster	22	Submit details of corporate social responsibility (CSR)
22	Submit details of comprehensive Disaster Management Plan including emergency response during natural and man-made disaster	23	Submit details of trees to be cut, including their species and whether it is also protected or endangered species
23	Submit details of comprehensive Disaster Management Plan including emergency response during natural and man-made disaster	24	Public hearing to be conducted for the project in accordance with provisions of Environmental Impact Assessment Act, 2006 and the rules made thereunder
24	Examine baseline environmental quality along with proposed incremental load due to the proposed project activities	25	A detailed EIA/EMP report should be prepared in accordance with the above mentioned TOR and should be submitted to the Ministry in accordance with the notification
25	The air quality monitoring should be carried out as per the conditions stated in 16th November, 2009 notification dated as per in Chapter 3, Section 3.4.2 to Section 3.4.3, Page No. 73 to 75	26	Details of litigation pending against the project of law, with direction order passed by the Court of Law against the Project

<http://environmentclearance.nic.in/online/eia/EIA03242011/228111171.html#ReportSheet>

So, you see all the details for construction or operations have to be given as the comprehensive Disaster Management Plan which you also saw in the table of contents of the report then examined baseline environmental quality, and then it was required to do it with incremental load due to the project activities.

So, not just the baseline environmental quality, but also the projected incremental load on that and how did they address that with chapters have addressed they have mentioned it, then air quality monitoring and then, that has to be done then also construction operation phase both for environmental management plan and environmental monitoring plan with cost and parameters. So, the Environmental Management Plan and monitoring plan have to be given.

So, they have covered under which chapter they have covered, and then what kind of corporate social responsibility CSR, they are going to take care of that is been mentioned. So, likewise, you see they are required to submit details of trees to be cut, including their species and whether it is also -- Whether it also involves any protected or endangered species. So, recollect what we studied, and how those aspects have to be covered.

So, it is required by the ToR that the detailed list is prepared. We had, in the previous just the previous lectures, seen how the entire metro line there was like a 200-page list, which meant for the details of the trees and where the trees were cut. So, here again, you see point number 23, where you have details of afforestation indicating land and financial outlay related with that, so how they are addressing it, how they are creating the Greenbelt, then 24 you see public hearing to be conducted for the project by the provision of EIA notification 2006.

So, we have also seen this notification and that also comes here in the ToR so how did they comply with that, and then how do they have to give a detailed draft EIA EMP report that should be prepared by the ToR and details of litigation pending any kind of litigations which are involved. So, that had to be mentioned here.

(Refer Slide Time: 27:53)

EIA Report for 'Development of Water Aerodrome' based at Inuvik Deep, Village - Central Inuvik, Yukon - Fort Reliance, District - Inuvik, Yukon - Inuvik		
CHAPTER 1: INTRODUCTION		
SN	Talk	Compliance
27	The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly split out.	The estimated project cost is \$ 14.79 Core. The Environmental Management Plan cost contribution is \$ 10.30 Core. The L&L and the Environmental Management Plan cost for operational phase is Capital - \$ 29.13 L&L & Recurring cost is \$ 10.30 L&L.
28	Any further clarifications on carry out the above studies including anticipated impacts due to the project and mitigation measures proposed can refer to the model talk available on Ministry website 'http://enr.on.ca/Manual.aspx?'	The same has been noted.
<b>Additional Talk:</b>		
1	Impacts and benefits of the project.	The proposed project impacts & benefits are detailed in Chapter 2, Section 2.2, Page No. 15 and in Chapter 3, Page No. 23 to 25.
2	The EIA will discuss the compliance to the Pollution Control Laws and the guidelines established by the Airway Authority of India/Ministry of Civil Aviation in this regard.	The same has been addressed in EIA. Compliance to Pollution Control Laws will be observed as project implementation. A get a certified report from the Pollution Control Board.
3	The EIA will give a justification for land requirements along with a comparison to the guidelines established by the Airway Authority of India/Ministry of Civil Aviation in this regard.	The land requirement details are given in Chapter 2, Section 1.11, Table No. 1.3, Page No. 41.
4	A comparison of the study area of radius of 10 km and site location on an A&A (not including all non-sensitive areas and environmentally sensitive areas) as per an Executive Summary, Section 2, Figure 1, Page No. 2.	A comparison of the study area of radius of 10 km and site location including all non-sensitive areas and environmentally sensitive areas is given in Executive Summary, Section 2, Figure 1, Page No. 2.
5	Layout map of proposed project including runway, Aerodrome building, parking, apron, taxiway, etc. as per in Chapter 2, Figure 2.3 & Figure 2.4, Page No. 6 & 7.	Layout map of proposed project including runway, Aerodrome building, parking, apron, taxiway, etc. as per in Chapter 2, Figure 2.3 & Figure 2.4, Page No. 6 & 7.
6	Cost of project and time of completion.	The estimated cost of proposed project is \$ 14.79 Core & time of completion will be within 180 months, also obtaining Environment Clearance. A necessary permission from Airline and Non-Airline Pollution Control Committee (ANPCC) and other statutory agencies is required.

Prepared by M. J. Lawrence

EIA Report for 'Development of Water Aerodrome' based at Inuvik Deep, Village - Central Inuvik, Yukon - Fort Reliance, District - Inuvik, Yukon - Inuvik		
CHAPTER 1: INTRODUCTION		
SN	Talk	Compliance
7	The impacts of demolition and the activities related thereto shall be minimized and a management plan drawn up to conform to the Construction and Demolition rules under the E.P. Act 1986.	This is a green field project area, hence no demolition activity required to be carried out.
8	The report shall examine the details of recreation, in respect and the impact of management Plan shall be prepared.	The estimated material will be stored for filling of proposed development area and under plots of the terminal building. Additional material required for filling will be arranged from nearby borrow pit and approved excavation work.
9	Detail plan for deplan water and impact of noise on the sensitive environment specially the wildlife, structures and natural paths.	In flight track will not be generated as fuel tanks will not be stored at head of sea planes. The sea planes to be operated for proposed project will not have hazardous waste facilities. Thus, no wastewater will not be generated. This deplan water will not be generated.
10	EIA report should contain the water quality, flow and fauna details along with a comparison to the guidelines established by the Airway Authority of India/Ministry of Civil Aviation in this regard.	The impact of noise during construction & operational phase of proposed project on sensitive environment within 10 km radius area of project is detailed in Chapter 4, Section 4.2, Page No. 159 to 179.
11	An assessment of the cumulative impact of development and proposed activities, being carried out or proposed to be carried out for the project or other projects in the core area, shall be made for traffic, dust and parking operations in a 10 km radius from the site. A detailed traffic management and a traffic description plan drawn up through an organization of 10 persons and specializing in Transport is proposed to develop the infrastructure facility for 100 passenger per day. The proposed project will cause an additional addition of the same. Urban Development and Transport Department shall also include the interest of all the concerned organizations.	The detailed extent of noise (spread & surface) quality flow & fauna within 10 km radius area is given in Chapter 1, Section 1.11, Page No. 41. The project location viz. Inuvik Deep is in compliance to surrounding lands by being further a 14 km wide road a proposed which will ultimately connect the project site to SDA by 2018. The existing PCU of Inuvik Deep is 1054 & was proposed for use in this project in having capacity of 19 Passengers per hour and specializing in Transport is proposed to develop the infrastructure facility for 100 passenger per day. The proposed project will cause an additional addition of the same. Urban Development and Transport Department shall also include the interest of all the concerned organizations.

Prepared by M. J. Lawrence

<http://environmentclearance.nic.in/writer/readdata/EIA/03242021/U2N81MVFineEIAReportShu.html>

So, other details like the cost of the project, any clarifications which are required. And there are also you will see here that there are additional ToRs apart from the key ToR. You have the importance and benefits of the project which was to be given then EIA will discuss the compliance of pollution control laws. So, what laws does it have to comply with and what justification for the land requirements, how much land they are using, and all the drawings and details, the maps they are using here that have to be provided here including all the eco-sensitive areas as well and environmentally sensitive places also.

Then all the maps which they had to do cost of all project at the time of completion. So, all that detail had to be given here. So, you see a range of additional ToR which has been adopted here, so you can see here all that.

(Refer Slide Time: 28:57)

EIA Report for 'Development of Water Aerodrome' based at Inuvik Deep, Village - Central Inuvik, Yukon - Fort Reliance, District - Inuvik, Yukon - Inuvik		
CHAPTER 1: INTRODUCTION		
SN	Talk	Compliance
29	Any litigation pending against the project under any applicable law or any Court of Law against the project, if any, details thereof shall also be included. This the case covered any notice under the Section 1 of Environment (Protection) Act, 1986 or other Sections of Act and Water Act, 1986 or other Sections of Act and present status of the case.	The detailed quantification of anticipated use generation from (TPZ) in management and disposal is given in Chapter 2, Section 2.2.3, Table No. 2.3, Page No. 19 to 20.
30	Public hearing to be conducted and concerned and commitments made by the project proponent on the same should be included in EIA EMP Report in the form of a table chart with financial budget if any, resolving with the commitments made.	None. Litigation pending against the proposed project under any applicable law or any Court of Law is not raised against the proposed project.
31	Public hearing to be conducted and concerned and commitments made by the project proponent on the same should be included in EIA EMP Report in the form of a table chart with financial budget if any, resolving with the commitments made.	The proposed project is a new (Green field) activity & has not covered any other under Section 1 of Environment (Protection) Act, 1986 or other Sections of Act and present status of the case.
32	Public hearing to be conducted and concerned and commitments made by the project proponent on the same should be included in EIA EMP Report in the form of a table chart with financial budget if any, resolving with the commitments made.	The undertaking by Director of Civil Aviation, Airline and Non-Airline Administration, declaring that is in violation of EIA, Notification 147 September 2006 & in Amendment) and as part of the project has been implemented as per in Annexure 1 of the EIA report.
33	Public hearing to be conducted and concerned and commitments made by the project proponent on the same should be included in EIA EMP Report in the form of a table chart with financial budget if any, resolving with the commitments made.	Public hearing has been conducted on 27 September 2020, the summary of issues raised & commitments made by project proponent are given in Chapter 1, Section 1.11, Table No. 1.1, Page No. 17 to 183. Proceedings of the Public Hearing are given in Annexure 1 of the EIA report.
34	Public hearing to be conducted and concerned and commitments made by the project proponent on the same should be included in EIA EMP Report in the form of a table chart with financial budget if any, resolving with the commitments made.	The proposed project has been funded by the Central Funding and will provide the loan to borrow and accrue in employment.
35	Public hearing to be conducted and concerned and commitments made by the project proponent on the same should be included in EIA EMP Report in the form of a table chart with financial budget if any, resolving with the commitments made.	The proposed project has been funded by the Central Funding and will provide the loan to borrow and accrue in employment.
36	Public hearing to be conducted and concerned and commitments made by the project proponent on the same should be included in EIA EMP Report in the form of a table chart with financial budget if any, resolving with the commitments made.	Table chart with notes for post use compliance of above talk.
37	Public hearing to be conducted and concerned and commitments made by the project proponent on the same should be included in EIA EMP Report in the form of a table chart with financial budget if any, resolving with the commitments made.	The recommendations of AIN CDCA are given in Annexure 4 of EIA report.
38	Public hearing to be conducted and concerned and commitments made by the project proponent on the same should be included in EIA EMP Report in the form of a table chart with financial budget if any, resolving with the commitments made.	Form is per 392, 2011 is given in Annexure 7 of EIA report.

Prepared by M. J. Lawrence

<http://environmentclearance.nic.in/writer/readdata/EIA/03242021/U2N81MVFineEIAReportShu.html>

So, here again, you would see that since it is an island the last point which you can see here, in addition to the above since the proposal also was in see Island Protection Zone. So, it had to abide by TPZ notification Island Protection Zone notification as per the report it says 2011. Accordingly, they had to submit EIA and EMP

reports. So, they have undertaken all these considerations and have also provided regular details about that. So, you see how the ToR compliance has to be done.

(Refer Slide Time: 29:41)

The slide is titled "Reference Case Study" and features three images of seaplanes. The first image shows Harbour Air Vancouver with several seaplanes docked at a pier. The second image shows Maldivian Trans Air with a DHC-6-300 Twin Otter seaplane. The third image shows Kenmore Air with a seaplane on the water. A URL is provided in the bottom right corner: <http://environmentclearance.nic.in/writerreaddata/EIA/03042021/U2N81Mv1FinalEIAReportShaheedIslandsWaterAerodrome.pdf>

So, you also see their reference case studies. So, like since it was being done emerging area, it is a very new area in the Indian context. So, they also had reference case studies. So, you can see Harbor Air Vancouver then you have Maldivian Trans Air, and Kenmore Air flight and it is in Victoria, you can see here San Juan Islands.

So, you see all these further key references are based on which they had also judged their possible what kind of impact it would have on what kind of domain. So, we had discussed that you also adopt a case study approach. So, here they have also taken case studies for reference.

(Refer Slide Time: 30:43)

The slide is titled "Need for the Project" and contains the following text: "With the growth of aviation industry, India is also witnessing tremendous growth in aircraft operations. Seaplane operations in India are yet an untapped market even though a tremendous potential exists, being a vast country with magnificent waterfronts all across. With current growth scenario in civil aviation, particularly in India, the Central Government has launched "Ude Desh ka Aam Naagrik" Regional Connectivity Scheme (UDAN-RCS) reach out to remote areas." A URL is provided in the bottom right corner: <http://environmentclearance.nic.in/writerreaddata/EIA/03042021/U2N81Mv1FinalEIAReportShaheedIslandsWaterAerodrome.pdf>

And then you will see here how they have highlighted the need for the project. So, you see how there is growth in aircraft operation and within this government initiative for creating flights for every common man of the

country, there is regional connectivity within the regional connectivity scheme, this project has created. So, it is for the government set up for which this project has been created. So, on that basis, they have established the need for the project. So, further, you see all the details they have given for the project description.

(Refer Slide Time: 31:20)

**2.6.1.1 On Shore Infrastructure Development**

**2.6.1.1.1 Passenger Terminal Building (PTB)**

The terminal building layout has been finalized with an area of 40023 sq m. The building passenger flow provided in the terminal building is as follows.

**Facilities in Departure Area for Departure Passengers**

- Public Concourse - 12.75m x 5.5m
- At the entrance of the building public concourse is of 69 sqm sq. with an X-ray machine for luggage scanning.
- Check counter
- After baggage scanning, at the left side of the public concourse area two mandatory check-in counters has been provided, passenger will enter in the counter after scanning of their check-in baggage, in the check-in counter they will dispose their check-in baggage and collect the boarding pass.
- The check-in baggage will be covered by the porter/loader manually using trolley through the check-in area of the building.
- Security check - 7.765m x 10.06m
- After baggage drop and boarding pass collection, passengers will go to for the security check, security checking machine has been provided of 70 sqm sq. equipped with one number hand baggage scanner and one number metal linking booth and one number flexible linking check facility.
- Security hold area - 11.876m x 7.802m
- Security hold area will be provided after security check area to facilitate the untraced passengers' baggage. The area will have seating arrangement of approx. 50 nos. people. Traveller vending machine along with trolley facility will be provided for the security hold area.
- Tablet Block
- The number tablet block, each comprising of one number port's unit, one number left's unit and one unit for specially disabled person's tablet area has been provided in the building for arrival passenger service. Within which, one block provided at public concourse area for passengers before security checking and for staff's use. Other block will be located at security hold area behind the passenger waiting lounge.

**Facilities in arrival Area for Arrival Passenger**

- Arrival Lounge - 8.06m x 4.41m
- Arrival passengers will be coming to the arrival lounge located adjacent of the security hold area, the arrival lounge having an area of 35 sqm. Limited seating arrangement has been provided in the arrival lounge area (approx. 6 people), as maximum arrival passengers will not require waiting after arrival. Baggage claim area has been provided within this area.
- Tablet Block
- One number tablet block comprising of one number port's unit, one number left's unit and one unit for specially disabled person's tablet area has been provided in the building, at the arrival lounge.

**2.6.1.2 Other Facilities in Passenger Terminal Building**

- Ticketing counter
- Two number Ticketing counter at the front side of the building for current ticket booking/printing as well in enquiry.
- Medical Room - 2.225m x 3.1m
- Medical room of area 6.96sqm at entrance of the building for first aid facility.
- Travelling Book - 2.225m x 1.375m
- Travelling Book of area 3.09sqm to facilitate the passenger for booking tickets at the entrance of the building.
- Office - 10.10m x 3.615m
- Office of the terminal manager at adjacent to the entrance area of the building having area of 22.77sqm.
- VP Lounge
- VP lounge of 10.40sqm adjacent to the public concourse area. The lounge has been equipped with shade canopy and rest room.
- Baggage Room - 2.975m x 2.47m
- Additional baggage room with an area of 7.4sqm.
- CCTV Room - 2.975m x 2.47m
- CCTV monitoring room with an area of 6.15sqm.
- Stack Office - 3.3m x 2.175m
- Stack office for refuse staff adjacent to the check-in counter having an area of 7 sqm.
- Security office - 4.06m x 3.82m
- Office for airside security with an area of 11.80sqm adjacent to the security check-in area.
- Air Side Store room Locker Room - 3.17m x 1.825m
- Air side store room locker room with a floor area of 12.17sqm, having made under facility.

**2.6.1.3 Road Access**

Vehicle circulation must be provided for the public, service personnel and other project related activities. These roads will influence width and the entrance road access. It is desirable that the entrance road access to the airplane base (administration building and public area) be by an all-weather road.

**2.6.1.4 Road Planning**

The access or entrance road is being provided with adequate width of 10m which will serve the unimpeded traffic, and prevent safe and easy circulation throughout the backside of the facility.

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021/U2N81MVF/Fin/EIARReportShaheedIslandWaterAerodrome.pdf>

**2.6.1.3 Parking Area**

Provisionally, the parking area should be located for the staff, government access to the various machine and domestic facilities. Since, a parking area is not, including hand-parked cars, and other transport has been provided.

Facility of the path for smooth handling of passenger loads during each trip at water aerodrome has been provided.

**2.6.1.4 Walkway Towards Flaring Jetty**

The proposed walkway from the terminal building till the flaring jetty is approximately 60-metre length and width of 7-metre. As the area comes under CEZ restricted area, construction of permanent structure has been prohibited, hence these blocks have been proposed for the road walkway over compacted WBM surface of 157 m thickness, rock filling has been proposed at both sides of walkway to retain the paved blocks in position. Graded layer of 150 mm has been proposed from the rest of the terminal building premises to the flaring jetty for ease of movement of golf cart/utility as well as pedestrian. As this is a high security zone, chain link fencing has been proposed to block the walkway of length of 2.4 m. Fencing equipment and lighting has been proposed over the walkway to protect the passengers and luggage's from fire and limit the security perspective.

**2.6.1.5 Off Shore Infrastructure Development**

**2.6.1.5.1 Flaring Jetty**

Presently for sea plane operations only two types of Flaring jetty are being used based on the water condition namely DESP and Concrete Flaring. It is proposed to have concrete platform for flaring jetty at Shalimar & Nishida Island. The following are its advantages:

- To ensure stability and sea worthiness, into concrete, low maintenance and safety.
- To ensure that the maintenance does not compromise cause failure of the concrete.
- To ensure safety even during low water conditions.

**2.6.1.5.2 Access Gangway**

An access gangway will be constructed to lead by water means, especially a ramp. The type of facility runs and falls with water actions, with total seasonal variations in water level. It remains as a relatively fixed position which lead to a structure as to be installed on the flaring jetty with water will channel smoothly.

**2.6.1.5.3 Docking Pad Design for 3 Jetty Operation**

The jetty operation is proposed to be carried out by the water aerodrome operator. The water aerodrome operator shall ensure that the instructions are given to the PTB drivers about the direction of water conveyance and the movement of the aircraft for take-off and the specific use of its berth.

For handling the passengers, water has been proposed which has capacity to carry maximum 10 passengers and the baggage from passengers terminal building to docking pad of sea plane.

**2.6.1.5.4 Flaring Jetty Pad**

There is a need to create the infrastructure for the maximum two sea plane operation. Considering the above facts, docking pad for airplane is designed with length of Docking pad of 30 Meter and Width of Docking pad of 8 Meter whereas passenger safety is taken into account while passenger will reach to docking pad from walkway through speed boat.

**2.6.1.5.5 Sea Plane**

The airplane manufactured by AAI is Viking DHC-6 Series 400 Three One is airplane operation.

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021/U2N81MVF/Fin/EIARReportShaheedIslandWaterAerodrome.pdf>

So, all the components that will come from the passenger terminal building to facilities at the arrival area for arrival passengers, you see all details have been mentioned. So, this is about the DPR detailed project report, which is prepared, and designed for the project. So, based on that, what kind of impact assessment they will do here?

So, that all has been transferred here as well as referred here as well. So, you see all the other facilities aligned with the passenger terminal building, then the external roads, the parking area, the walkway, the floating jetty, and the offshore infrastructure. So, the points which we talked about, you see all the details are being discussed here.

**EIA Report for 'Development of New Aerodrome' located at Sionga, Tiligala - General Layout, Tables - Part 10a (Cover: Civil, Airside, Access, & Support)**

**CHAPTER 1: PROJECT DESCRIPTION**

2.4.1.7 Lighting within the Water Operating Area

A single and independent lighting circuit for a one line, two channel, etc., is to install a sequence of public, battery-operated lights on top of towers or other appropriate location devices.

FAA 80400-21 advises engineer pilots that a night water landing should generally be conducted only as an emergency. They can be extremely dangerous due to the difficulty of a wing-above in the water, judging surface conditions, and avoiding large waves or swell.

Source: See AC 91-69 for payload loadings, passenger loading devices, and other Federal requirements.

2.4.1.8 Water Runway and Runway Strip

The landing area will be rectangular in shape and will encompass all parts of the water surface intended for the taking off and landing of airplanes.

Comparison of Runway as per DOCA requirement A as per Indian Air Force (attached) possible as per Table 2.4

**Table 2.4: Comparison of Runway Design**

SN	Requirement as per DOCA	Provision as per Indian Air Force (Attached)	Remarks
1	Runway - 300m x 45m	Runway Strip - 300m x 150m	Runway as provided as per actual site condition
2	Runway - 300m x 45m	Runway Strip - 300m x 150m	Runway as provided as per actual site condition
3	Minimum Depth of Water - 3m	Minimum Depth of Water - 3m	Minimum Water Depth available

2.4.1.8.1 **Electricity Requirement**

2.4.1.8.1.1 Power and Fuel Requirement

The detailed power load calculations are as provided in Table 2.7

**Table 2.7: Estimated Electrical Load and Demand**

SN	DESCRIPTION	CONNECTED LOAD	DIVERSITY	DEMAND LOAD (KW)
1	LIGHTING	101	0.7	71
2	POWER	14.2	1.1	16
3	UPS POWER	3.3	0.9	3

Prepared by M/S. Sionga Engineers Page 10

**EIA Report for 'Development of New Aerodrome' located at Sionga, Tiligala - General Layout, Tables - Part 10a (Cover: Civil, Airside, Access, & Support)**

**CHAPTER 2: PROJECT DESCRIPTION**

SN	DESCRIPTION	CONNECTED LOAD	DIVERSITY	DEMAND LOAD (KW)
1	TRIPLEV EHV EQUIPMENT	3	0.9	3
2	TRUC	36	0.7	40.3
3	INTERNAL LANDSCAPE LIGHTING	20.8	0.3	10.8
4	PRELIMINARY LIGHTING	20.1	0.4	11.2
5	TOTAL LOAD (KW)	80.2	-	76.1

**SELECTION OF EQUIPMENT**

TOTAL DIVERSITY OF UPS = 0.9

**SELECTION OF TRANSFORMER**

TOTAL MESSAGING LOAD (KW) = 76.1 KW

INFLUENCING P.F. POWER FACTOR = 0.9

CONSIDERING LOADING @ 90% (KW) = 84.5 KW

CAPACITY OF TRANSFORMER = 100 MVA

**SELECTION OF DC SETS**

TOTAL MESSAGING LOAD (KW) = 76.1 KW

INFLUENCING P.F. POWER FACTOR = 0.9

CONSIDERING LOADING @ 90% (KW) = 84.5 KW

CAPACITY OF DC SETS = 2 x 100 MVA

**SELECTION OF UPS**

LOADING LOAD = 76.1 KW

UPS POWER = 84.5 KW

TRIPLEV EHV EQUIPMENT = 3 KW

TOTAL LOAD = 87.4 KW

INFLUENCING P.F. POWER FACTOR = 0.9

CONSIDERING LOADING @ 90% (KW) = 97.1 KW

UPS SELECTED = 2 x 100 MVA

High Speed Diesel (HSD) will be required for the operation of D. G. Set only during power failure. The storage tank will be adequate for minimum 3 hours of continuous operation of all DG sets.

The fueling for the two planes shall be done at the New Terminal International Airport, Port Blair. No fueling facility shall be provided at the proposed Project Site.

2.4.1.8.2 Solar Power Harvesting

Solar power harvesting is proposed on the roof top of the Passenger Terminal Building which is 24.534 x 24.534 which is approx. 600.72 sq m.

Design of Solar system: Based on the direction of roof facing of Passenger Terminal Building, we will have maximum 50% of the available area out of 600.72 sq m for placing the solar modules on the roof top.

Each module will have a weight of 23.7 Kg and size is around 2 m x 1 m so while designing the structure of roof, the total dead weight of solar system of approx. 60 KW DC is considered.

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<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81MV1FinalEIAReportShaheedIslandWaterAerodrome.pdf>

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**EIA Report for 'Development of New Aerodrome' located at Sionga, Tiligala - General Layout, Tables - Part 10a (Cover: Civil, Airside, Access, & Support)**

**CHAPTER 1: PROJECT DESCRIPTION**

In normal course water aerodrome building will be connected to water power electricity generated by cooling water pumps, and only during emergency water power will be connected through grid. Hence, DC storage will be required.

**Table 2.8: Technical Specifications of Solar Harvesting System**

SN	Description	Unit	Details
1	Module type	-	High efficiency JMW 120 300W0
2	Dimension	mm	PVC with half cut technology
3	Weight	Kg	23.7
4	Module/ module arrangement	-	4000 (12 x 12)
5	Module type	-	Monocrystalline silicon
6	Cells & connection junction degree	-	100 (mono & MC) compatible
7	Cells area surface & length	-	1 m <sup>2</sup> / 1.50 m

Annual 100 numbers of solar modules each having capacity of 400 watt will be installed then total installed capacity of Solar Power Harvesting System will be 40 KW DC.

2.4.1.3.3 Water Requirement and Wastewater Management

It is expected that the managed water supply connection from local water supply line will be used as well as managed quantity of public water as in case for daily domestic water requirement. The water is being distributed by Andaman Public Water Works and the distribution lines will be done in 100 mm Water Taps. A overflow line will be stored in Domestic Tank. A 1000 litre tank, the minimum capacity of the underground tank will be as follows:

**Table 2.9: Water Tank Storage Capacity**

SN	Description	Storage Tank Capacity	1000 litre Tank Capacity	Total Capacity
1	Flow	3000	1 No (1000)	3000
2	Domestic	2000	2 No (1000)	4000
3	1000 litre Tank/Overflow	1000	1 No (1000)	1000
	Total	6000		8000

The water requirement of the project is as detailed in Table 2.10

Prepared by M/S. Sionga Engineers Page 12

**EIA Report for 'Development of New Aerodrome' located at Sionga, Tiligala - General Layout, Tables - Part 10a (Cover: Civil, Airside, Access, & Support)**

**CHAPTER 2: PROJECT DESCRIPTION**

2.4.1.3.3 Water Requirement and Wastewater Management

It is expected that the managed water supply connection from local water supply line will be used as well as managed quantity of public water as in case for daily domestic water requirement. The water is being distributed by Andaman Public Water Works and the distribution lines will be done in 100 mm Water Taps. A overflow line will be stored in Domestic Tank. A 1000 litre tank, the minimum capacity of the underground tank will be as follows:

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The water requirement of the project is as detailed in Table 2.10

Prepared by M/S. Sionga Engineers Page 12

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And then lighting within the water operating area, water runway, and runway strip, you will see power and fuel requirements and then solar power harvesting how they would be doing, water requirements, and Wastewater Management how they would be handling it.

(Refer Slide Time: 32:22)

EIA Report for "Development of Water Aerodrome" located at Sunny Dewey, Village - Govind Nagar, Taluka - Port Blair, District - South Andaman, Andaman & Nicobar												
CHAPTER 2: PROJECT DESCRIPTION												
Table 2.10: Water Requirement												
SN	Description	Units	Total Population	Total Water demand per person per day	Cold Water Requirement				Total Water Requirement	Flow to Sewer (100% Flushing & 80% Domestic)		
					Domestic Use		Flushing Use					
					LPCD	LFD	LPCD	LFD				
<b>A Domestic Use</b>												
1	Passenger/ Visitors		380 (190 Phase I)	15	5	1900	10	3800	5700	5320		
2	Employee & Staff		50	70	40	2000	30	1500	3500	3100		
<b>TOTAL (A)</b>									<b>6200</b>	<b>3700</b>	<b>9200</b>	<b>8660</b>
<b>B Miscellaneous Use</b>												
1	Fire Water make up	Lump sum							2500			
2	Landscaping requirement	Water							8259			
3	Road Washing	Lump sum							4100			
<b>TOTAL (B)</b>									<b>14859</b>	<b>0</b>		
<b>GRAND TOTAL</b>									<b>24059</b>	<b>8420</b>	<b>24.1 KLD</b>	<b>8.5 KLD</b>
<b>STP CAPACITY</b>										<b>Say 10 KLD</b>		

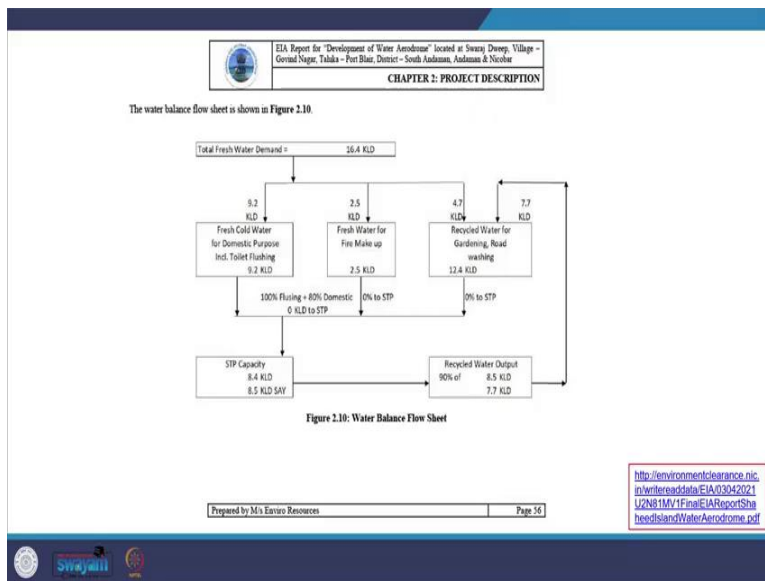
6 KLD STP has been proposed under Phase I of the project as only one sea plane will be operated, and based on the response. 2<sup>nd</sup> sea plane will be started and the required infrastructure (STP) will be enhanced accordingly during Phase II.

Prepared by M/s Enviro Resources Page 35

<http://environmentclearance.nic.in/writerreaddata/EIA/03042021/U2N81Mv1/FinalEIAReportShaheedIslandWaterAerodrome.pdf>

So, here you see how they have created the water requirements, tabulation for what purpose how much water they would require, and what would be the total requirement and the estimation related to that.

(Refer Slide Time: 32:44)



Then, like in compliance with the ToR and also for estimation purposes, they have created the water balance flow here.


(Refer Slide Time: 32:46)

### Manpower Requirement

**During construction phase** - it is expected to generate direct & indirect employment of about 30 -40 nos. of people of various skills. Local businessmen will get opportunity to supply construction materials and demand generated from the temporary' workers colony for the basic needs. This will increase local business of the area and thereby improve the local economy.

**During the operation phase** - Approx. 50 Nos. of people will get direct employment at the proposed facility. Apart from this, local vendors' businesses and other related population will be indirectly employed due to the implementation of the project with improved tourism infrastructure.

<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81Mv1FIneEIAReportShaheedIslandWaterAerodrome.pdf>



And then you also see the manpower requirement what they have calculated estimated that direct and indirect employments of about 30 to 40 numbers of people which of various skills will happen and then also they highlight that local business will get the opportunity to supply construction material and demand generated from temporary workers, colony for basic needs, and then they can be increased in the local business.

So, if you remember what we had talked about in the social impact assessment when we were talking about the London Bridge craze, also, what kind of opposition was raised, what kind of concerns were raised. So, look at that, and then try to see whether this assessment also addresses that kind of aspect or not.

(Refer Slide Time: 33:33)

#### 2.6.3.5 Waste Generated from Aircrafts, Workshops and Eateries

During construction phase, portable toilets will be used to keep hygienic conditions at site. During construction phase, the top soil will be stored separately and will be used in the green belt area. Further, the excavated material shall be used for backfilling purpose. No disposal of solid waste is envisaged during construction phase.


Handling and disposal practices of the wastes generated from landing aircrafts, workshops and eateries at the airport are given in Table 2.11.

**Table 2.11: Waste Generated from Aircrafts, Workshops & Eateries**

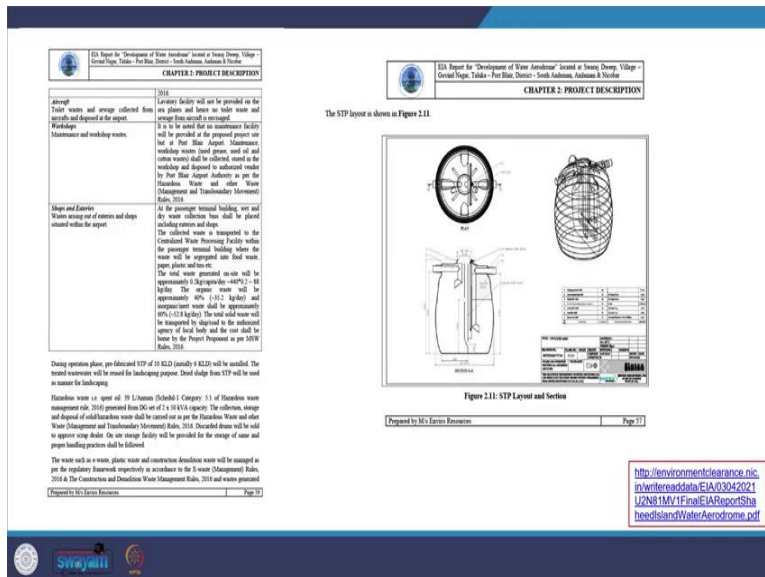
Source of Waste Generation	Management Practices
<b>Aircraft</b> Trash collected in flight and disposed at the airport including the segregation mechanism.	Food/beverages will not be served for short duration flights as envisaged in proposed project. However, minimal trash such as paper, etc. if any will be collected by the airline's ground support team and placed at a waste transfer station. Subsequently, the waste will be transported to the Centralized Waste Processing Facility within the PTB. Here, the waste will be segregated and handed over to the recyclers as per the as per MSW Rules.

Prepared by M/s Enviro Resources Page 58

<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81Mv1FIneEIAReportShaheedIslandWaterAerodrome.pdf>

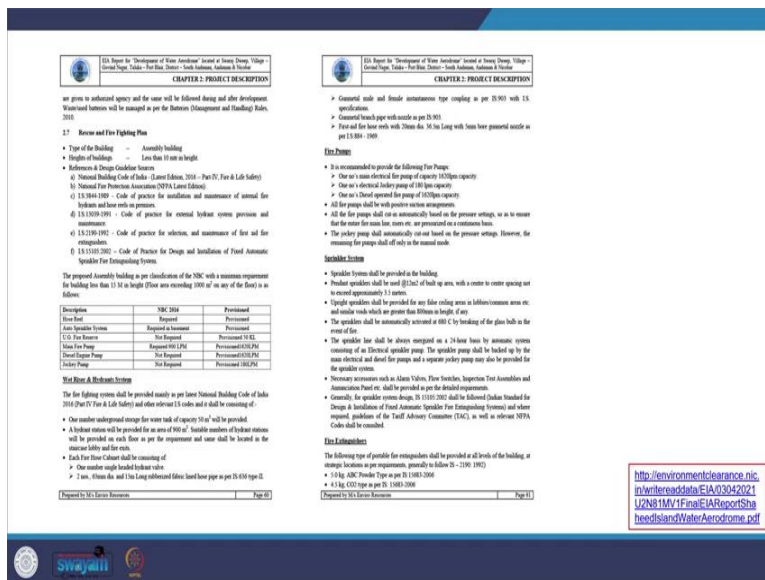






So, they have also given what kind of waste will be generated and how they are going to handle it in the management practice. So, for example, we just looking at one, so, this copy will be given to you, you can see it in detail, but just to skim through that you look at the aircraft and then the from the aircraft the trash which will be collected, so how they are going to manage those waste here and then how they will also establish the STP and what will be its design like and then how they are going to deal with that.

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**2.8 CRZ Mapping as per Island Protection Zone (IPZ) Notification 2011**

The Ministry of Environment and Forests, Govt. of India issued the Coastal Regulation Zone (CRZ) Notification, 2011 for the mainland and the Island Protection Zone (IPZ) Notification, 2011, to protect the coastal environment of the Andaman & Nicobar (AAN) and Lakshadweep group of islands. As per the IPZ Notification, 2011, Environmental Management for the Islands of Andaman and Nicobar and Lakshadweep shall be managed as per Island Coastal Regulation Zone (ICRZ) for larger islands of Middle Andaman, North Andaman, South Andaman and Greater Nicobar where as other islands of AAN and Lakshadweep shall be managed based on Integrated Island Management Plan (IIMP). Baratang, Little Andaman, Car Nicobar, Shalabardi and Swamy Deepy were awarded to the list of islands under ICRZ based environmental management vide amendment to IPZ Notification dated 22<sup>nd</sup> August, 2013 of Ministry of Environment and Forests, Government of India (now MoEF&CC).

In view of the unique coastal ecosystems of coast and backwater around Andaman & Nicobar Islands, Ministry has regulated various activities in the ICRZ zones as indicated in IPZ Notification 2011. It has also declared the area up to 200m from HTL on the landward side in case of seafront and 100m along tidal influenced water bodies or within of the creek whichever is less in as 'No Development Zone (hereinafter referred to as the NDZ) with limited permissible activities such as Avirup and associate facilities.

Keeping in view of the requirements of notification, Institute of Remote Sensing, Anna University under took the following scope of work:

- Demarcation of HTL, LTL for Bay of Bengal, tidal influenced water bodies in the vicinity of proposed water aerodrome in Swamy Deepy by conducting field survey using DGPS survey.
- Demarcation of ecologically sensitive centers such as Mangroves, Coral Reefs, Sand dunes, Turtle breeding grounds in the vicinity of project site using auxiliary data and field verification.
- Superimposition of HTL, LTL, Ecologically Sensitive Areas along with the proposed water aerodrome and its associated facilities on to the geo referenced cadastral map
- Preparation of Local Level ICRZ Map at 1:4000 scale for the proposed Water Aerodrome in Swamy Deepy of Port Blair Taluk, South Andaman District of Andaman & Nicobar.

Accordingly, ICRZ Maps at 1:4000 scale has been prepared as shown in Figure 2.12 and it provides the following conclusion:

SN	Description	CRZ Classification	Area in ha	Total Area in ha
1	Jetty area Runway and Jetty and Terminal Building	CRZ IV	619.2	619.2
2	Proposed Road	CRZ III (NDZ) Mangroves (CRZ IV) Coral Reef (CRZ IV)	644.9 413.3 633.4	1718.6
3	Runway	CRZ II	5904	5904
4	Terminal Building	CRZ III (NDZ) Mangroves (CRZ IV)	1017.3 1588.9	1485.1*

Note:  
 1- The proposed land acquisition includes the runways from the sea side of the Project Site to the Floating Jetty as well as the Approach Road connecting the project site with the main street.  
 2- The Terminal Building here mentioned is for the Total Project Site Area (including PTH Area as well as associated facilities).  
 3- The total project site area is 3,508 m<sup>2</sup>.

Prepared by M.S. Eswari Reddy Page 63

Prepared by M.S. Eswari Reddy Page 62

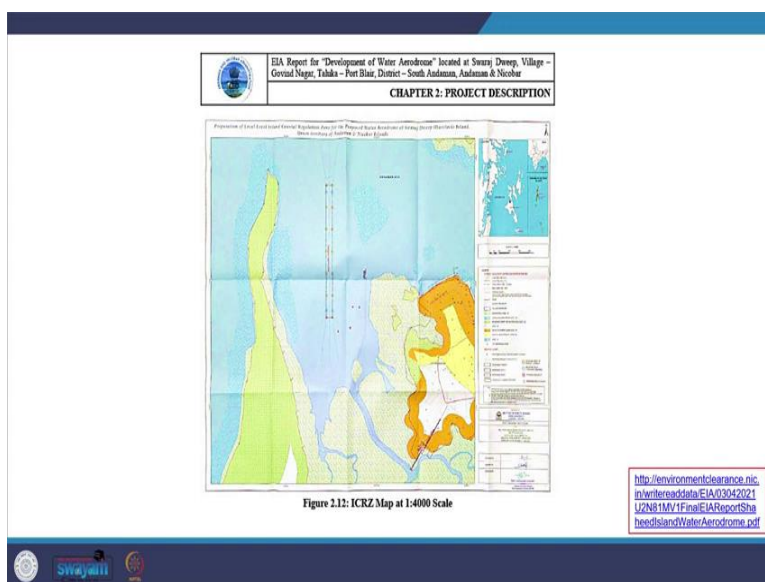
<http://environmentclearance.nic.in/writer/wa/Details/EIA/03242021/122811MVFFinalEIAReportShahedIslandWaterAerodrome.pdf>

And then further what kind of rescue and firefighting plan will be there fire pumps, sprinkler system, fire extinguisher. Further another thing since we are dealing with islands, you also need to notice that it would also come under CRZ coastal regulations zone notification, so, it will fall under that, how do they comply with that?

So, CRZ mapping is done as per the island protection zone notification of 2011 which they have referred to here. And then they have demarcated all the areas of high tide level low tide level and so on. So, you will see that all acknowledgment and mapping have been done and what will fall under what has been taken care of.

So, in this table, you can see the CRZ classification detail of the project. So, the Jetty near the runway would come in CRZ 4, then the proposed road would come under CRZ 3, then the runway would come under CRZ 4, and the terminal building would come under CRZ 3. So, you see how all the elements are coming.

(Refer Slide Time: 35:18)



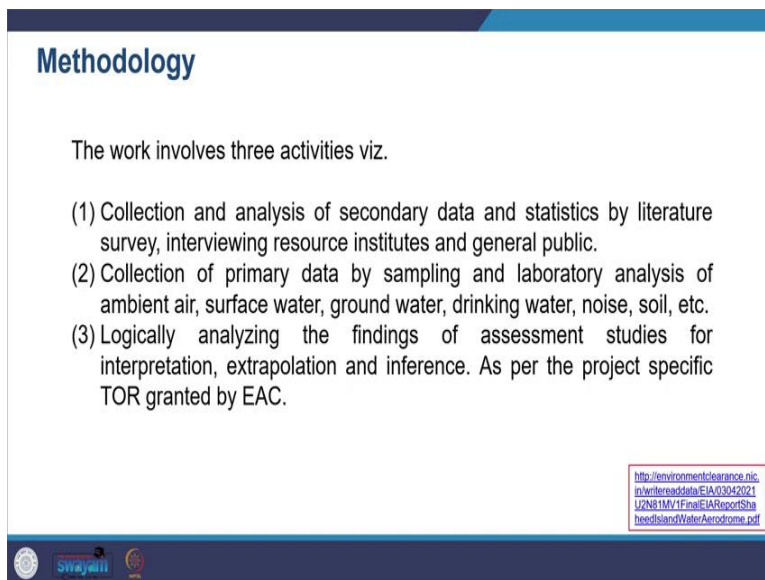
So, all those details have been given here you can see also the CRZ map which has been created here for the project. So, that was about the project description.

(Refer Slide Time: 35:27)



So, now we will move towards the description of the environment where the project will be located, and how they are giving it. And while you go through this think of what they have given what they have not given and what more kinds of impacts can come in. So, a description of the project environment.

(Refer Slide Time: 35:54)



So, you see, they have -- The methodology which they have adopted as like that is a much-simplified methodology which you can see here. So, collection and analysis of secondary data and statistics. So, they collected through literature review, interviewing, resources, institute, and the general public, then they collected primary data by sampling and laboratory analysis, which they have mentioned at the very beginning of the cover page itself.

And then how they use laboratory analysis for air, water, groundwater, drinking water, noise, soil, and so on. So, the third step is logically analyzing the findings of assessment studies for interpretation, extrapolation, and inferences. So, they have logically and systematically analyzed all that data as per the report.

(Refer Slide Time: 36:44)

**Table 3.1: Summary of Sampling**

SN	Environmental Media	Stations	Parameters	Frequency
1.	Surface Water	6	37	Once
2.	Ground Water	4	39	Once
3.	Ambient Air	7	12	Twice a week
4.	Ambient Noise	7	1	Once a week
5.	Soil	8	20	Once

All the samples were collected by Standard Practices and analyzed as per Indian Standard Specifications or by APHA (USA) 21<sup>st</sup> edition of 2005.

**Table 3.2: Frequency of Sampling**

Attribute	Parameters	Frequency of Monitoring
Ambient Air Quality	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , NO <sub>x</sub>	24 hourly samples twice a week during study period
	CO	8 hourly samples twice a week during study period

<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81MVF1FinalEIAReportShaheedIslandsWaterAerodrome.pdf>

So, you see how they have given all the details of the summary of sampling for surface water, how many stations they use, what kind of, how many parameters were covered, and what the frequency of collecting this data is also mentioned. So, you will see the frequency of sampling as well mentioned here for all the aspects of ambient air quality, metrology, water quality ecology, and so on, you can see here.

(Refer Slide Time: 37:21)

**Methods**

To fix the scope of the study to foresee the potential environmental problems that would arise due to proposed construction activities, detail characterization of various environmental components like air, noise, water, and land biological environment and socio-economic parameters within an area of 10 km radius around the plant area is executed. The steps are as follows;

- The present human activities within 10 km radius and prepared Environmental Inventory (EI)
- The present environmental status by sampling.
- Establishing correlation between cause-effect of step 1 & 2 above.
- Effect of proposed activities in the influence zone and ancillaries especially with respect to pollution.
- Mitigation measures for anticipated environmental impacts
- The legal provisions required to be obeyed.

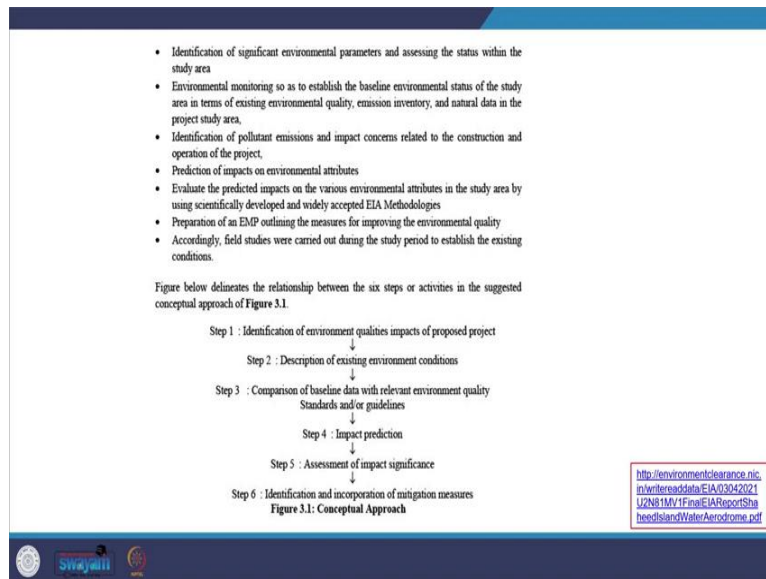
<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81MVF1FinalEIAReportShaheedIslandsWaterAerodrome.pdf>

And then looking at their method, what they adopted is like one was they took 10 kilometers for the environmental sensitivity, they took 15 kilometers, and then they presented the environmental status by sampling. So, by creating the baseline information, they presented the environmental status, then, they did the

cause-effect by integrating one and two that is, first they established the human activities around 10 kilometers, then they also had environmental status.

So, they created cause and effect relationship here to understand what kind of human activities are having an impact on the resources or the environment. So, and then, based on that they created influence zones and all kinds of ancillary areas concerning pollution, and then they created mitigation measures for the anticipated impact, environmental impact, and what kind of legal provisions are required to be obeyed, so all that was identified.

(Refer Slide Time: 38:24)



They also looked at the significant environmental parameters, also environmental monitoring, and then also looked at the environment, identification of pollution emissions, and impacts on environmental attributes, what kind of impact it had, and then evaluated the predicted impact. So, you have also seen how we evaluate the predicted impact, and then further, they prepare the EMP and then also carry out field studies for establishing the existing conditions. So, you can also see in the diagram here.

(Refer Slide Time: 39:05)

### Land Environment

#### Satellite Image

The digital image processing was performed on ERDAS Imagine 2014 and QGIS 2.2 software system on high-configured computer. This software package is a collection of image processing functions necessary for pre-processing, rectification, band combination, filtering, statistics, classification, etc. Apart from contrast stretching, there are large numbers of image processing functions that can be performed on this station. Arc GIS map 10.1 is used for final layout presentation.

**Table 3.3: Data Specification Used For Presents Study**

Satellite/ Image	Sensor	Spatial resolution	Date of Pass
Resource SAT-2	LISS IV	5.6 m	12 <sup>th</sup> May 2019

Prepared by M/s Enviro Resources Page 68

<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81MV1FInaEIAReportShaheedIslandWaterAerodrome.pdf>

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**Figure 3.3A: Landcover map of 20 km Study Area**

S#	Level-1	Level-2	Land Use	Area (km <sup>2</sup> )	Percentage (%)
1	Built-up land	11 Built-up land	11.1 Urban Areas	1.47	9.06
2	Agricultural land	12 Crop land	12.1 Irrigated crop	2.5	8.8
			12.2 Double Cropped	0.93	
3	Wetlands	13 Land with shallow water	13.1 Open Areas	1.3	8.4
4	Water bodies	4.1 Sea	4.1.1 Sea	109.2	83.64
5	Wetlands	5.1 Swamp	5.1.1 Lotus/ Swamp	10.4	8.1
6	Forest	5.2 Forest	5.2.1 Mangrove	16.6	20.7
			5.2.2 Deciduous	1.46	6.7
			5.2.3 Forest	2.16	9.3
			Total Area	124	100

**Figure 3.3B: Landcover map of 1 km Study Area**

Level-1	Level-2	Land Use	Area (km <sup>2</sup> )	Percentage (%)	
1	Built-up land	11 Built-up land	11.1 Urban Areas (A, B, C, D, E)	0.96	27.59
2	Agricultural land	12 Crop land	12.1 Irrigated Crop	0.46	14.67
			12.2 Double Cropped	0.2	
3	Water bodies	4.1 Land with shallow water	4.1.1 Open Areas	0.3	9.35
4	Water bodies	4.2 Sea	4.2.1 Sea	0.27	8.09
5	Wetlands	5.1 Swamp	5.1.1 Lotus	0.25	8.48
			5.1.2 Mangrove	0.39	12.34
			5.1.3 Forest	0.24	8.22
			Total Area	3.34	100

**3.3.1 Geomorphology and Soil**

**3.3.1.1 Geomorphology**

The size, shape and height of islands control the occurrence and movement of both surface and ground water resources to a considerable extent. Either on both types of water resources are

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<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81MV1FInaEIAReportShaheedIslandWaterAerodrome.pdf>

So, here, you see how they have provided point by point all the details and what kind of data source they have used. So, land environment, for that, they have a use satellite image, and you will see how that is been brought up, and then what kind of land cover land use statistics are there, so within what radius and that all has been given here.

EIA Report for "Development of New Automobile" at Newy Dweep, Village - Gendrapaga, Tala - Pudi Blue District - South Andaman, Andhra Pradesh

**CHAPTER 3 DESCRIPTION OF THE ENVIRONMENT**

very gentle slope and relatively wide coast extending for islands. The slightly north from low lying islands. Near the coast there are being developed resorts on the shallow part of the sea because of waves action. low quantity of coral reef sands are produced. They give rise to the formation of wide beaches. Examples of such islands are Shalini Island, Jolly Bay, Newy Dweep etc. In the higher elevation spots, there are present a thick cover which give rise to five perennial streams as could be seen in Gendrapaga, Kadhanga and Viper Dweep on the way to Kadapa village in Newy Dweep. The Coralline limestone in the low lying area from precipitation of ground water.

5. Bugged coast devoid of beaches. This type of coastal features is visible in the islands or parts of the islands which are inhabited by Opticogenera species. Examples are Cape Island, Mahadivulu Dweep (covered and fringed) island, small islands parts of South Andaman in between Chikiteeru to Bhookhalidi. At the Opticogera are highly fringed having good potential of ground water, highly porous in some particular spots. ground water in such rocks locally give rise to some perennial streams. like Thera, Naha, Charyapaga, Labary Naha at Bhookhalidi, streams of Kadhali etc.

Springs: The characteristic geological and geomorphological conditions of the island have facilitated the origin of numerous springs at all the three major geological formations i.e. Mesozoic sedimentary group of rocks, volcanic and other igneous rocks and coralline limestone. The most common springs in the entire island except Jolly Bay (There are eight wells in the island) are situated either directly from the springs or spring fed perennial streams. These springs are, in general, located in high altitudes because of good fracturing in the rocks. In the low area they are named as fracture springs. However, the springs are highly yielding and sustainable in igneous rocks and limestone as seen in Bahadli (Kadhapa) and Cape Island inhabited by igneous rocks and in Little Andaman and Newy Dweep, situated by limestone.

**3.3.3.2 Soil**

Soils in South Andaman, Bahadli, Canque, North Sentinel, Viper, Pidi Bay etc. Islands are mainly derived from sedimentary and igneous rocks like Kadhapa, Sir, sand, Shalini limestone and Mahadivulu and Opticogera class of rocks comprising Thera, Sir, and interstratified volcanic, gabbro, Presidite, Hercynite etc. The soils in the islands comprise alluvial soil, Salish soil, Viller soil and Silt soil. These soils are mostly deep, very deep, medium to poorly drained, clay to clayey loam with regular blocks to sub angular blocks structure. The soil structure could be seen in Kadhapa Island where the ground level is at sea level and used for Paddy in Kadhapa, vegetable, pulses and oil seeds in Kaha Island. Most of the plantation crops like coconut, are not so evenly cultured in coastal plain and hills land where slope is less than 10%. The village land in South Andaman coast fields are a mixture of sugar cane coming from the hillside.

The soils of the other islands of South Andaman District like Newy Dweep, Mahadivulu, Little Andaman, etc. are derived from the sedimentary rocks like limestone, Coral

Prepared by M.S. Eenva Engineers Page 31

EIA Report for "Development of New Automobile" at Newy Dweep, Village - Gendrapaga, Tala - Pudi Blue District - South Andaman, Andhra Pradesh

**CHAPTER 3 DESCRIPTION OF THE ENVIRONMENT**

used. Most areas etc. These soils are well drained with rapid permeability and are naturally classified as sandy, loamy and sandy loam. Plantation crops like, Coconut, are not grown, except banana, papaya etc. are very well grown in such soils. There is no coral reef structure there is a chance of water logging even during rainy season while high permeability also occurs good drainage during dry months because growth of coconut, are not so well along the coastal stretch.

**3.3.4 Geology**

The islands in the South Andaman district are composed mainly of dark igneous sediments deposited on the Tertiary basement. All major and minor mountains of base and coralline igneous rocks (Opticogera). In the geologically Tertiary Kadhapa, Mahadivulu, Mahadivulu and other areas common. The available geological evidence leads to the conclusion that the geological profile of the islands and North Andaman Island is a range between basins and basins. The Andaman and Nicobar Islands with Paganas and Canque formed a continuous hill connected with the Thera (Sedimentary) through Cape Paganas. The Tertiary sediments deposited in the Mahadivulu and Andaman Flysch Group comprises highly bedded alternations of sandstones and shales, grey, conglomerate, limestone, dolomite, etc. are of Upper Cretaceous to Upper Eocene age. The Tertiary Group is overlain successively by the Kadhapa Group, Newy Dweep Group and the Quaternary Holocene Group, intermingled with alluvium. The pre-tertiary geological succession is as follows:

Stratigraphic Unit	Thickness (m)	Composition
Quaternary	< 10	Clay, silt, sand, gravel, pebbles, shells, etc.
Upper Eocene	100 - 150	Shale, sandstone, limestone, dolomite, etc.
Upper Cretaceous	100 - 150	Shale, sandstone, limestone, dolomite, etc.
Lower Cretaceous	100 - 150	Shale, sandstone, limestone, dolomite, etc.
Triassic	100 - 150	Shale, sandstone, limestone, dolomite, etc.
Permian	100 - 150	Shale, sandstone, limestone, dolomite, etc.
Carboniferous	100 - 150	Shale, sandstone, limestone, dolomite, etc.
Devonian	100 - 150	Shale, sandstone, limestone, dolomite, etc.
Silurian	100 - 150	Shale, sandstone, limestone, dolomite, etc.
Duress	100 - 150	Shale, sandstone, limestone, dolomite, etc.
Pre-Tertiary	> 1000	Various igneous and sedimentary rocks

Major igneous sedimentary group of rocks comprising dike, andesite, gabbro and conglomerate dykes and Mahadivulu Group and igneous sedimentary like Coralline and limestone and mixture of sedimentary rocks (volcanic and sedimentary) occupy the entire geographical area. Amongst these, the former (igneous) sedimentary group is much prevalent and occupy nearly 70% of the entire area of the islands while the latter group covers nearly 15% while the rest 15% goes to the coralline and limestone formation. All the rock formations are brought under the influence of their diagenesis as a tectonically active zone. evident from the occurrence of diastase and deep faults outcrops in the islands. The low relief and the limestone resources were also the effect of tectonic setting of the island.

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<http://environmentclearance.nic.in/writerreaddata/EIA/03042021/U2N81MV1FIna/EIAReporShaheedIslandWaterAerodrome.pdf>



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**CHAPTER 3 DESCRIPTION OF THE ENVIRONMENT**

is a surrounding plain margin. Because of uneven, the igneous and sedimentary group of rocks are highly fractured and fissured. The fracturing of hard rocks leads to the movement of ground water in the deeper horizon. The geology of the islands is highly varied and very change in small distance.

**3.3.3 Topography and Hydrology**

**3.3.3.1 Topography**

The physical setting of study area shows a contrast of numerous dimensions and reveals a variety of landscape influences to relief, climate, vegetation and resources use by the area. In fact, roughly, there is considerable local variation. The area is elevated roughly. The Digital Elevation Map (DEM) of the study area is shown in Figure 3.4B. The Elevation from the MSL to 300 MSL is observed in the study area.

**Figure 3.4B: DEM Map of 10 km Study Area**

Prepared by M.S. Eenva Engineers Page 31

EIA Report for "Development of New Automobile" at Newy Dweep, Village - Gendrapaga, Tala - Pudi Blue District - South Andaman, Andhra Pradesh

**CHAPTER 3 DESCRIPTION OF THE ENVIRONMENT**

**3.3.3.2 Hydrology**

The area around the project site is surrounded by the Andaman Sea. The study area is surrounded by salt water streams, which normally empty into the Andaman Sea. Detailed type of drainage pattern is observed in study area. Figure 3.4C represents the drainage pattern of the study area.

**Figure 3.4C: Drainage Map of 10 km Study Area**

**3.4 Air Environment**

The climate of Newy Dweep is humid. The cold season from November to February is followed by hot season lasting up to early June. The pre-monsoon rain falls just at the beginning of October continues to mid-end summer season. The overcast period up to November is the post-monsoon or transition season.

Wind - The predominant wind direction is from North-East and East in November to April months. In rest of the months, the predominant wind direction is from West and West-south-East.

Cloud Cover - Most of the year clouds were observed in the sky. Minimum of the sun is observed in the region from April to December.

Humidity - During a typical humid climate high humidity is observed in all the months. The relative humidity in the region ranges between 55-90%.

Rainfall - The annual rainfall is 2061 mm.

**3.4.1 Monitoring**

The parameters for which data have been collected are:

- Wind speed
- Wind direction
- Temperature

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<http://environmentclearance.nic.in/writerreaddata/EIA/03042021/U2N81MV1FIna/EIAReporShaheedIslandWaterAerodrome.pdf>



EIA Report for "Development of New Automobile" at Newy Dweep, Village - Gendrapaga, Tala - Pudi Blue District - South Andaman, Andhra Pradesh

**CHAPTER 3 DESCRIPTION OF THE ENVIRONMENT**

- Relative humidity
- Cloud cover

**3.4.1.1 Meteorological Data**

The prevailing wind direction is shown through following wind roses in Figures 3.5 and for summarized data for the study period as shown in Table 3.4.

**Figure 3.5: Wind Rose Diagram**

**Table 3.4: Meteorological Data**

Month	Temperature, °C		Relative Humidity, %		Wind Speed, m/s	
	Min	Max	Min	Max	Min	Max
December 2019 to February 2020	23	30	85	95	1.5	3.5

**3.4.1.2 Ambient Air Quality Monitoring**

As is one of the most vital natural resource for the existence of all the living organisms on the planet Earth. Good quality air is essential for the physiological processes such as respiration and regulation of blood circulation. Ambient Air Quality is an indicator of overall state of environment and degradation occurs through various sources like industries.

The ambient air quality can be measured by the use of a having representative concentrations of various gases like oxygen, nitrogen etc. Nitrogen itself maintains the balance of concentration of oxygen, as the latter naturally, over a few decades, runs in disturbing the process by introducing various air pollution through industrialization and transportation.

Trace gases like SO<sub>2</sub>, NO<sub>x</sub>, CO, CO<sub>2</sub>, Hydrocarbons, and Chlorofluorocarbons, introduced through various polluting sources may cause degradation of ambient air quality which may lead to various human diseases like asthma and other respiratory diseases. For example, for urban atmosphere, if exposed to ambient air causes with human blood converts the hemoglobin into carboxyhemoglobin, which is toxic.

Prepared by M.S. Eenva Engineers Page 31

EIA Report for "Development of New Automobile" at Newy Dweep, Village - Gendrapaga, Tala - Pudi Blue District - South Andaman, Andhra Pradesh

**CHAPTER 3 DESCRIPTION OF THE ENVIRONMENT**

In the present study, ambient air monitoring stations were determined on the basis of meteorological conditions, human settlement and the concentration of pollutants. Among the meteorological conditions, wind speed and wind direction were considered, whereas population density was given a very priority among other population characteristics for determining the monitoring station.

**3.4.1.3 Sampling Procedure & Analytes**

The location for Ambient Air Quality Monitoring was decided based on the guidelines given in EIA manual from MoEF&CC. The purpose is to ascertain the baseline pollutant concentration in ambient air as residential areas and area road area.

**Source of Air Pollution**

A major source of air pollution in the buffer zone of 10 km radius around the plant area includes:

- Private Vehicle Traffic
- Domestic Fuel Burning
- Unpaved Road

During the study, High Volume Sampler (HVS) is used for ambient air monitoring as used. The equipment is designed to get the specifications of the ambient based for the prevention and control of water pollution, New Delhi, extension stipulation (December 1985). It is used to measure the ambient air quality for suspended particulate matter (SPM), which has procedure to collect sample of gaseous pollutants such as SO<sub>2</sub>, NO<sub>x</sub>, CO, HCL, etc. from ambient air by absorbing them in appropriate reagent kept in impinger tubes followed by further analysis in the laboratory.

As is known area is covered by forest and through a filter by a slow rate filter of 1.5 x 1.5 m<sup>2</sup> size filter allows wind suspended particulate matter with diameter less than 100 microns (Diameter) to collect in the impinger. Particulate with diameter of 1.1 - 100 microns (collected on glass fibre filter). The particulate concentration (µg/m<sup>3</sup>) in ambient air is computed by measuring the mass of SPM collected and the volume of air sampled. All the samples are collected once in a 24 hours cycle per day for CPCN zones.

The Particulate concentration (µg/m<sup>3</sup>) in ambient air is computed by measuring the mass of SPM collected and the volume of air sampled. The use of the sample collected is usually observed by further analysis of their elements. Sampling locations are shown in Table 3.1 and Figure 3.6.

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<http://environmentclearance.nic.in/writerreaddata/EIA/03042021/U2N81MV1FIna/EIAReporShaheedIslandWaterAerodrome.pdf>



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**CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT**




Figure 3.6: Ambient Air Quality Monitoring Locations

Table 3.7: Location of the Sampling Locations

SN	Station Code	Latitude	Longitude	Distance	Distance
1	A1	12°07'29.00"N	47°02'07.00"E	100	100
2	A2	12°07'29.00"N	47°02'07.00"E	100	100
3	A3	12°07'29.00"N	47°02'07.00"E	100	100
4	A4	12°07'29.00"N	47°02'07.00"E	100	100
5	A5	12°07'29.00"N	47°02'07.00"E	100	100
6	A6	12°07'29.00"N	47°02'07.00"E	100	100
7	A7	12°07'29.00"N	47°02'07.00"E	100	100

**3.4.3 Air Quality Monitoring Results**

The National Ambient Air Quality Standards are as provided in Table 3.8 and the AQI Standards are provided in Table 3.9.

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**CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT**

Table 3.8: National Ambient Air Quality Standards

SN	Pollutant	Unit	Industrial, Institutional, Road and Other Area	Ecological Sensitive Area (Classified as Green)
1	SO <sub>2</sub>	24 hours	80 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>
2	SO <sub>2</sub>	24 hours	80 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>
3	PM <sub>10</sub>	24 hours	100 µg/m <sup>3</sup>	100 µg/m <sup>3</sup>
4	PM <sub>10</sub>	24 hours	80 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>
5	CO	1 hour	1.0 mg/m <sup>3</sup>	1.0 mg/m <sup>3</sup>

Table 3.9: Ambient Air Quality Results

Parameter	A1	A2	A3	A4	A5	A6	A7
PM <sub>10</sub> (µg/m <sup>3</sup> )	Max	103	264	214	284	217	402
	Min	22	191	183	189	183	342
	Average	21	128	207	218	218	360
PM <sub>2.5</sub> (µg/m <sup>3</sup> )	Max	40	103	103	103	103	103
	Min	10	10	10	10	10	10
	Average	15	15	15	15	15	15
SO <sub>2</sub> (µg/m <sup>3</sup> )	Max	1.5	4.5	4.7	1.6	4.7	1.7
	Min	0.1	0.1	0.1	0.1	0.1	0.1
	Average	0.8	0.8	0.8	0.8	0.8	0.8
NO <sub>x</sub> (µg/m <sup>3</sup> )	Max	1.5	1.5	1.5	1.5	1.5	1.5
	Min	0.1	0.1	0.1	0.1	0.1	0.1
	Average	0.8	0.8	0.8	0.8	0.8	0.8
CO (mg/m <sup>3</sup> )	Max	0.1	0.1	0.1	0.1	0.1	0.1
	Min	0.1	0.1	0.1	0.1	0.1	0.1
	Average	0.1	0.1	0.1	0.1	0.1	0.1

It shall be noted that other parameters such as Ammonia, Acoustic, Odour, Lead, Nickel, Benzene & Hexane to Pesticide were below Detection Limit. Monitoring of Benzene & Hexane to Pesticide was carried out over a month.

**3.4.3 Interpretation**

The study reveals that maximum concentration was observed to be in the range of 10.0-40.0 µg/m<sup>3</sup>. The highest 24-hourly concentration was recorded at sampling location A1. All the other

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So, likewise, you see how they have given for the soil, how they have given for the geology, topography, how they have done for hydrology, and then, so, what they have done for air environments, how they are monitoring air, ambient air quality, and what kind of sampling procedure and analysis they are taking.

So, they have identified different sorts of air pollution and then ambient air quality monitoring locations, they have identified in the report, and then all the -- how they are following standards national ambient air quality standards, and what was the result of this survey has been compared with the standards.

(Refer Slide Time: 40:18)

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**CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT**

**3.5 Noise Environment**

Noise, in general, is a sound which is composed of many frequency components of various intensities distributed over the audible frequency range. Various noise scales have been conceived to describe a single number. The exposure of a receptor human to a complex sound made up of various frequencies at different intensities levels.

The most common and universally accepted scale is the weighted scale which is measured in dB. This noise scale is the audible range of 20-20,000 Hz and has been designed to weigh various components of noise according to the response of a human ear. The environmental impact assessment of a noise from the industrial activity, vehicles traffic can be undertaken by taking into consideration various factors like potential change in hearing, physiological responses, annoyance and general community responses which have varied effects varying from noise induced hearing loss (NIHL) etc. Noise levels have been monitored at the study area to assess the background noise levels in different areas like residential, commercial, industrial and school zones.

**3.5.1 Instrument Used For Monitoring**

Noise levels were measured using a sound level meter. The sound level meter measures the sound pressure level (SPL), the maximum sound pressure level (max) and the equivalent continuous noise level (Leq) by weighting on the corresponding function mode.

**3.5.2 Method of Monitoring**

Sound pressure level (SPL) measurements were undertaken at all locations, with an interval of 10 seconds over a period of 10 minutes per hour for 24 hours. The day noise levels have been measured during 8 am to 10 pm and night levels during 10 pm to 8 am at all the locations recorded in the table of the study area.

Table 3.10: Noise Level Standards

Area Code	Category of Area Zone	Day Time (Leq)	Night Time
(A1)	Industrial area	75	55
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	School Zone	50	40

Table 3.11: Noise Monitoring Locations

SN	Code	Latitude	Longitude	Distance	Distance
1	N1	12°07'29.00"N	47°02'07.00"E	100	100
2	N2	12°07'29.00"N	47°02'07.00"E	100	100
3	N3	12°07'29.00"N	47°02'07.00"E	100	100
4	N4	12°07'29.00"N	47°02'07.00"E	100	100
5	N5	12°07'29.00"N	47°02'07.00"E	100	100
6	N6	12°07'29.00"N	47°02'07.00"E	100	100
7	N7	12°07'29.00"N	47°02'07.00"E	100	100

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**CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT**

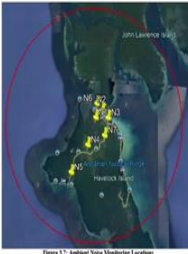


Figure 3.7: Ambient Noise Monitoring Locations

**3.5.3 Noise Level Monitoring Results**

Table 3.12: Noise Monitoring Results

SN	Leq (dB)	Category of Area Zone	Limits in dB(A) Leq	Day Time	Night Time
N1	53.0	Commercial	65	55	45
N2	49.2	Residential	55	45	40
N3	50.4	Residential	55	45	40
N4	52	Residential	55	45	40
N5	48.1	Residential	55	45	40
N6	49.1	Residential	55	45	40
N7	48.1	Residential	55	45	40

**3.5.4 Interpretation**

The noise monitoring conducted at seven locations for 24 hrs, once in a week and average hourly readings were recorded. The maximum noise level recorded during the daytime was observed at

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So, you also see that they have covered noise environment, and then how they are doing it, what kind of instruments are used methods of monitoring those noise that they have detailed out here.

(Refer Slide Time: 40:33)




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**CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT**

Location N0, where in the maximum water level can be observed at location N0. The location N0 is present closed to beachside area. It should be noted that the groundwater level was not observed at any of the locations.

**3.4.1 Surface Water Monitoring Location**

Surface Water samples were collected from all the available sources and were analyzed for their physico-chemical characteristics. The sampling locations and the water quality at the selected stations are presented in Table 3.13.



**Table 3.13 Surface Water Monitoring Location**

S/N	Code	Location	Latitude	Longitude	Direction	Distance from Site
1	SW1	Shoring Project Site	12°12'13.17"N	87°51'14.17"E	SW	1.50
2	SW2	Sea Mangrove Forest	12°12'13.30"N	87°51'14.11"E	SW	3.31

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EIA Report for 'Development of Five Aerodromes' located at Swang Dweep, Village - General Naga, Taluka - Fort Bham, District - South Anandam, Andaman & Nicobar

**CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT**

The surface water quality results are presented in Table 3.14.

**3.4.2 Surface Water Sampling Results**

Status of surface water quality of study area is judged using IS 3025 (Part-4) standards. The findings are tabulated in Table 3.14.

**Table 3.14 Surface Water Quality Results**

S/N	Parameter	Unit	SW1	SW2	SW3	SW4	SW5	
1	Colour	PCU	<5.0	<5.0	<5.0	<5.0	<5.0	
2	Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	
3	pH	7.86	8.12	8.2	7.95	7.85	7.9	
4	Turbidity	4.508	4.3	4.9	3.80	3.8	4.9	
5	Total Dissolved Solids (TDS)	mg/L	1918.8	1764.8	1885.9	2084.8	1761.9	1861.2
6	Total Alkalinity (CaCO <sub>3</sub> )	mg/L	461.8	435.9	481.3	545.2	552.5	561.1
7	Total Hardness (CaCO <sub>3</sub> )	mg/L	510.9	482.2	618.4	581.4	578.0	605.0
8	Chloride (Cl <sup>-</sup> )	mg/L	127.3	127.4	127.2	127.4	127.1	126.7
9	Calcium (Ca <sup>2+</sup> )	mg/L	86.9	71.7	86.4	87.8	79.0	81.9
10	Magnesium (Mg <sup>2+</sup> )	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
11	Sulphate (SO <sub>4</sub> <sup>2-</sup> )	mg/L	81.0	81.0	73.1	84.1	74.1	74.1
12	Nitrate (NO <sub>3</sub> <sup>-</sup> )	mg/L	2.17	2.1	1.84	2.15	2.12	2.18
13	Fluoride (F <sup>-</sup> )	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
14	Iron (Fe)	mg/L	<0.01	<0.01	<0.01	0.14	0.07	0.16
15	Aluminium (Al)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
16	Selenium (Se)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
17	Cadmium (Cd)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
18	Copper (Cu)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
19	Manganese (Mn)	mg/L	0.3	0.2	0.2	0.82	0.12	0.12
20	Zinc (Zn)	mg/L	2.28	2.11	2.48	2.16	2.43	2.71
21	Lead (Pb)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
22	Nickel (Ni)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
23	Mercury (Hg)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Barium (Ba)	mg/L	0.10	0.01	0.01	0.01	0.01	0.01

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<http://environmentclearance.nic.in/writeresaddata/EIA/03042021/U2N81MVFineEIAReportShs-headIslandsWaterAerodrome.pdf>

Likewise, you see water environments, what locations from where they are collecting the samples, what standards they are following, and what are the results of their sampling survey.

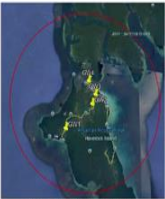
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**CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT**

Local body other requirements of water during construction phase will be met by water tankers. Ground water sample was collected and analyzed.

Ground Water samples were collected from all the available sources and were analyzed for their physico-chemical characteristics. The sampling locations and the water quality at the selected stations are presented in Table 3.15.



**Table 3.15 Ground Water Monitoring Location**

S/N	Code	Latitude	Longitude	Direction	Distance from Site
1	GW1	12°12'14.78"N	87°51'17.48"E	SW	4.10
2	GW2	12°12'14.78"N	87°51'17.48"E	SE	1.91
3	GW3	12°12'14.78"N	87°51'17.48"E	SE	1.39
4	GW4	12°12'13.29"N	87°51'17.71"E	SE	1.09

The quality of groundwater is monitored by drawing samples from hand pump as well as well in the well. Data for study area. Analysis was done by Standard Method. The results are summarized below in Table 3.16, and compared with drinking water standards as per IS 10900:2012.

**3.4.3 Ground Water Sampling Results**

The results of the ground water sampling at the selected stations are presented in Table 3.16.

Prepared by M/s. Earth Resources Page 39

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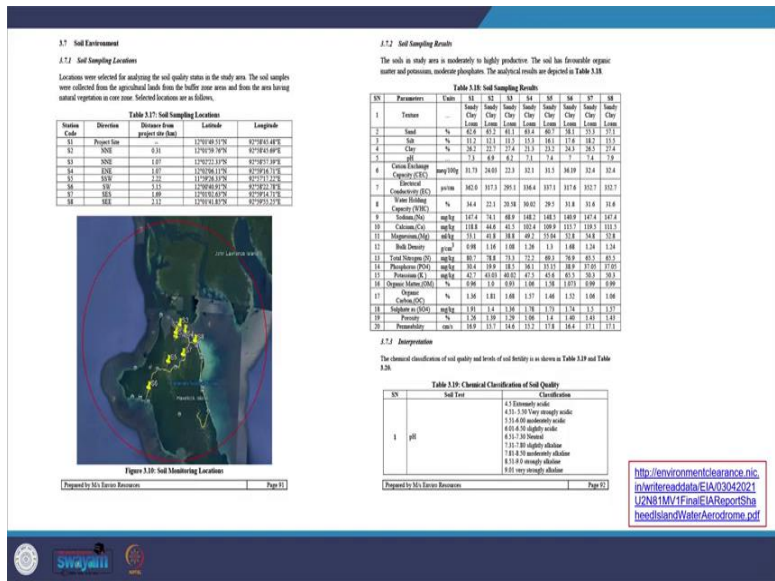
**CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT**

**Table 3.16 Ground Water Results**

S/N	Test Parameter	Units	GW1	GW2	GW3	GW4	IS:10900		Method
							Acceptable	Permissible	
1	Colour	Hazen	<5.0	<5.0	<5.0	<5.0	5	15	IS 3025 (Part-4)
2	Odour	---	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	IS 3025 (Part-5)
3	pH	---	7.8	8.1	7.9	8.3	6.5-8.5	NR	IS 3025 (Part-11)
4	TDS	---	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	IS 3025 (Part-8)
5	Turbidity	NTU	<1.0	<1.0	<1.0	<1.0	1	5	IS 3025 (Part-10)
6	Total Dissolved Solids (TDS)	mg/L	460.7	748.9	715.7	765.3	500	2000	IS 3025 (Part-16)
7	Total Alkalinity (CaCO <sub>3</sub> )	mg/L	139.04	141.51	146.74	148.96	300	400	IS 3025 (Part-12)
8	Total Hardness (CaCO <sub>3</sub> )	mg/L	270.21	271.37	305.25	301.87	300	400	IS 3025 (Part-12)
9	Chloride (Cl <sup>-</sup> )	mg/L	41.85	48.95	41.85	51.02	250	1000	IS 3025 (Part-13)
10	Calcium (Ca <sup>2+</sup> )	mg/L	86.91	91.81	91.96	81.14	75	200	IS 3025 (Part-13)
11	Magnesium (Mg <sup>2+</sup> )	mg/L	<0.01	<0.01	<0.01	<0.01	0.5	NR	IS 3025 (Part-13)
12	Sulphate (SO <sub>4</sub> <sup>2-</sup> )	mg/L	78.18	71.48	71.44	70.66	200	400	IS 3025 (Part-13)
13	Nitrate (NO <sub>3</sub> <sup>-</sup> )	mg/L	1.74	1.08	4.07	2.42	45	NR	IS 3025 (Part-14)
14	Fluoride (F <sup>-</sup> )	mg/L	1.0	<1.0	<1.0	<1.0	1	1.5	IS 3025 (Part-16)
15	Iron (Fe)	mg/L	0.06	<0.01	<0.01	<0.01	0.3	NR	IS 3025 (Part-13)
16	Aluminium (Al)	mg/L	<0.01	<0.01	<0.01	<0.01	0.5	NR	APHA (3008) (B)
17	Selenium (Se)	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	NR	APHA (3111) (B)
18	Cadmium (Cd)	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	NR	APHA (3006) (C)
19	Copper (Cu)	mg/L	<0.04	<0.04	<0.04	<0.04	0.05	1.5	APHA (3115) (B)
20	Manganese (Mn)	mg/L	23.5	26.1	21.3	21.7	30	100	IS 3025 (Part-13)
21	Zinc (Zn)	mg/L	0.08	0.21	0.20	0.22	0.1	0.3	APHA (3118) (B)
22	Nickel (Ni)	mg/L	0.46	0.81	0.88	1.05	1	15	APHA (3111) (B)
23	Lead (Pb)	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	NR	APHA (3111) (B)
24	Mercury (Hg)	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	NR	APHA (3111) (B)
25	Barium (Ba)	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	NR	APHA (3111) (B)
26	Nitrite (NO <sub>2</sub> <sup>-</sup> )	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	NR	APHA (3111) (B)
27	Arsenic (As)	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	0.05	APHA (3006) (B)

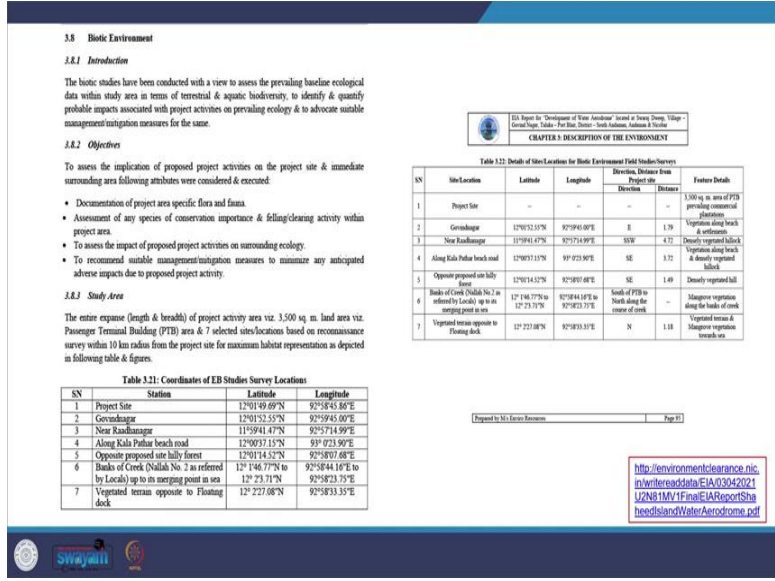
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<http://environmentclearance.nic.in/writeresaddata/EIA/03042021/U2N81MVFineEIAReportShs-headIslandsWaterAerodrome.pdf>



So, you see here for the similar for groundwater, and what are the results for groundwater, soil sampling also, you see here and then what are the results for that. So, you see how different locations from where they are taking, what are the different parameters you can see on soil sampling all that we had studied about and then and what are the results coming.

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And then they have also studied the biotic environment. Here you can see different survey locations and then what are their observations related to different features that are coming so you can see that in the table here features detail.

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Figure 3.11: Google Earth Imagery Depicting Sites/Locations for Biotic Environment Studies/Surveys

Prepared by M's Enviro Resources Page 96

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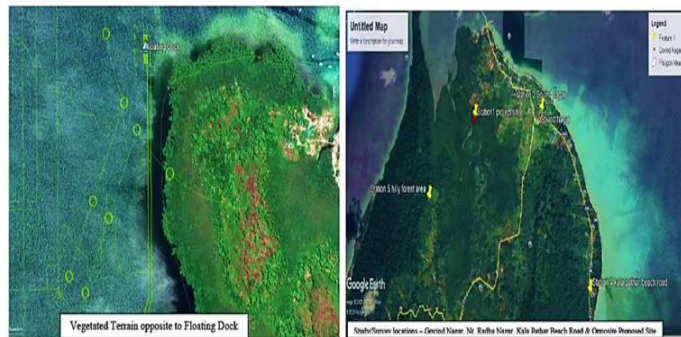


Figure 3.12: Google Earth Imagery Depicting Sites/Locations for Biotic Environment Studies/Surveys

<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81Mv1FinaIEIAResortShaheedIslandWaterAerodrome.pdf>



So, some of the photographic evidence of the biotic environmental studies and service. So, how is the site around the terminal building area and then the banks of creeks how they are coming here and see the biotic environment in and around the project area?

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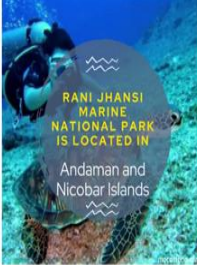

**Table: 3.23 Summary of Ecologically Sensitive features in Study Area**

Sr. No.	Ecological Feature	Presence		Name/Identity	Details	Direction from project site	Distance from project site
		Yes (Y)	No (X)				
<b>Sites of Conservation Importance</b>							
1	Biodiversity Heritage Sites (BHS)	X	--	--	--	--	--
2	Biosphere Reserves	X	--	--	--	--	--
3	Elephant Reserves	X	--	--	--	--	--
4	Important Bird Areas (IBA's)	X	--	--	--	--	--
5	Important Coastal And Marine Biodiversity Areas (ICMBA's)	X	--	--	--	--	--
6	Key Biodiversity Areas (KBA's)	X	--	--	--	--	--
7	RAMSAR Wetland Sites	X	--	--	--	--	--
8	Tiger Reserves	X	--	--	--	--	--

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<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81M/V1/FinalEIAReport/ShaheedIslandWaterAerodrome.pdf>

Protected Areas							
1	Community Reserves	X	--	--	--	--	--
2	Conservation Reserves	X	--	--	--	--	--
3	Marine Protected Areas	X	--	--	--	--	--
4	National Parks	√	--	Rani Jhansi Marine National Park	NE	2.87 km	--
5	Wildlife Sanctuaries	X	--	--	--	--	--

<http://environmentclearance.nic.in/writereaddata/EIA/03042021/U2N81M/V1/FinalEIAReport/ShaheedIslandWaterAerodrome.pdf>

So, they have also given the ecological sensitive features summary here. So, you can see here in the table ecological features, what kind of features are there Biodiversity Heritage sites, so as per all the checklist, you can see that yes, it is present or not, what are the name, identity details, direction from the project site and detail, so you see, like, I have not put all of them but you can see National Park Here which is present Rani Jhansi Marine National Park and which is 2.87 kilometer from here northeast of the project area. So, you can see this here, some of the pictures need for you to understand what the park is like here.

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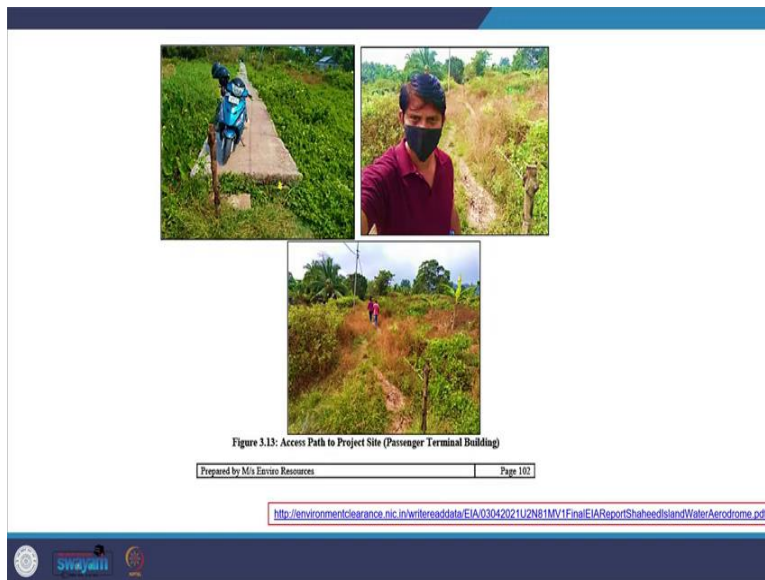
**Ecologically sensitive sites**

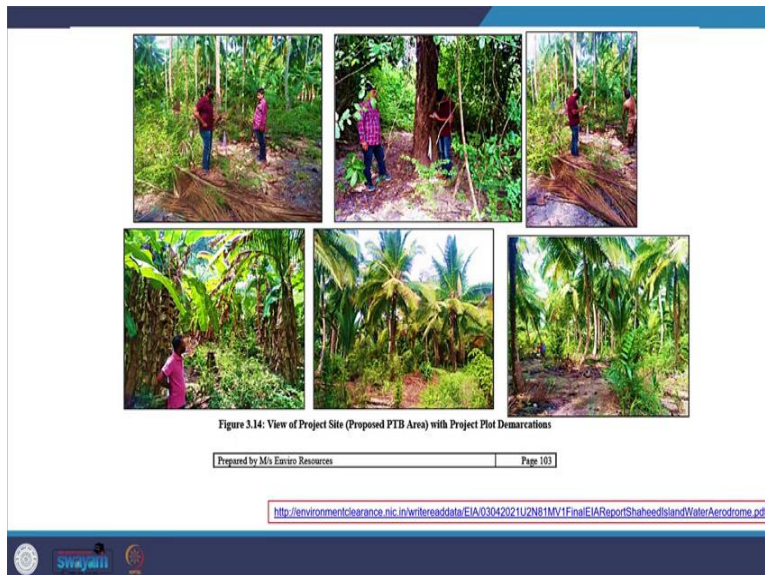
1	Coral Reefs	√	Scleractinian (Stony) Coral	121 species of stony corals were reported from northern & northwestern sea off Havelock Island	North NW	0.34 km from Sea plane taxi way 6.99 km from PTB
2	Turtle Nesting Sites	√	Hawks bill & Green Turtles	Nesting's of Hawks bill & Green Turtles is known from secondary data in Havelock Island	--	--
3	Mangroves	√	20 species of true mangroves	20 species of true mangroves & mangrove associate flora are abundantly present along coasts of Havelock Island within 10 km radial study area	--	Present near offshore activity area & onshore PTB
4	Mudflats	X	--	--	--	--
5	Wetlands	X	--	--	--	--
6	Plateaus	X	--	--	--	--
7	Forests	√	--	Dense tropical evergreen, semi evergreen forests present within study area	--	--
8	Maas Feeding grounds	X	--	--	--	--
9	Breeding grounds	X	--	--	--	--
10	Migratory routes	X	--	--	--	--

<http://environmentclearance.nic.in/writereaddata/EIA/03042021U2N81MV1FinalEIAReportShaheedIslandWaterAerodrome.pdf>

And then ecologically sensitive sites, you can see what all are present. So, you see how sensitive the location is where the project is coming up, how they are following certain norms, and what kind of process they are adopting to understand the environmental status of that particular place. So, here you see how they are describing the environment here.

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And then the related pictures of this site project site you can see here.

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**3.8.5 Flora**

*Project plot specific flora assessment*

As described in earlier section the majority of the prevailing vegetation on site of activity was by virtue of orchard plantation with some ground dwelling gregrarious & herbaceous growth, the detailed project plot specific flora inventory is given in Table 3.23

Further the following section is compliance to the project specific TOR granted by MoEF&CC vide F. No. 10-53/2019-IA-III dtd. 16<sup>th</sup> December 2019. The TOR conditions & respective compliances are summarized in following table.

TOR Point No.	TOR Condition	Compliance
Annexure 7 (a) (xxa)	Submit the details of the trees to be cut including their species and whether it also involves any protected or endangered species. Measures taken to reduce the number of the trees to be removed should be explained in detail. Submit the details compensatory plantation. Explore the possibilities of relocating the existing trees.	The project plot specific detailed flora inventory along with IUCN status, cutting details is given in Table 3.23

**Table 3.24: Project Site Specific Flora Inventory along with Cutting Details**

SN	Botanical Name	Family	IUCN Status	Common Name	Habit	No. of Individuals	To be Felled	To be Retained	
1	<i>Cocos sp.</i>	Arecaceae	--	Coconut	Tr	63	61	2	
2	<i>Areca sp.</i>	Arecaceae	--	Bread Nut	Tr	17	14	3	
3	<i>Musa sp.</i>	Musaceae	--	Banana	Hb	4	4	--	
4	<i>Dendrocalamus strictus</i>	Poaceae	--	Bamboo	Hb	1	1	--	
5	Other trees						2	2	--
The other ground dwelling vegetation which will be cleared during preparation activity									
SN	Botanical Name	Family	IUCN Status	Common Name	Habit				
1	<i>Miconia paniculata</i>	Tiliaceae	Least Concern ver 3.1	Eleo-Leaf Grevia	Tr				
2	<i>Chromolaena odorata</i>	Asteraceae	--	Sum Weed	Hb				
3	<i>Mimosa pudica</i>	Mimosaceae	Least Concern ver 3.1	Touch-me-not	Hb				
4	<i>Lantana camara</i>	Verbenaceae	--	Lantana	Sh				
5	<i>Claena viscosa</i>	Cleomeaceae	--	Asian spider flower	Hb				
6	<i>Ziziphus sp.</i>	Rhamnaceae	--	Jujube	Sh				
7	<i>Gibricedra saphim</i>	Fabaceae	Least Concern ver 3.1	Mexican lilac	Sh				
8	<i>Dioscorea bulbifera</i>	Dioscoreaceae	--	Aerial yam	Cl				
9	<i>Dactyloctenium aegyptium</i>	Poaceae	--	Crested Grass	Hb				
10	<i>Hypis capitata</i>	Lamiaceae	--	Kaobweed	Hb				

Hb - Herb, Sh - Shrub, Cl - Clamber, Tr - Tree

<http://environmentclearance.nic.in/writereaddata/EIA/03042021U2N81MVF/FinaleIARReportShaheedislandWaterAerodrome.pdf>

So, you also see that they are documenting the flora of the project and as per ToR conditions, they will support some of the details of the trees that are going to be cut. So, in the table, you see here project site-specific flora inventory has been prepared with the cutting details. So, you see all the botanical names IUCN status list, we have seen it when we studied environmental status, so, they are comparing with that, and then that is helping them to evaluate the significance of that particular loss what is happening.

And, like what they are going to -- how much they are going to retain which ones they are going to cut to be felled, so you can see here like number 1 63 are there 61 will be felled and only two will be retained, so on so they are preparing a detailed list of that.

**EIA Report for 'Development of Five Aerodromes' located at Heavy Duty, Village -  
Gandhinagar, Taluka - Porbander, District - South Kathiawar, Indian State - Gujarat**

**CHAPTER 3 DESCRIPTION OF THE ENVIRONMENT**

**Assessment of Area Endangered species/Conservation species**

From the above table it is evident in the road activity (passenger terminal building) area prevailing vegetation was mostly by natural plantation which composed of cultivated varieties of Coconut, betel nut & Banana near river bank plain being cultivated varieties they do not come under any categories of concern & the ground dwelling flora at project is largely assessed as Least Concern & have a good range of presence & abundance in Heavy Duty. Thus it is evident the flying activity for conservation of Passenger Terminal building does not endanger any of the protected or endangered plant species.

**Study Area Flora Assessment**

**Table 3.25: Flora Inventory for Biodiversity Studies/Surveys within Study Area**

SN	Botanical Name	Family	IUCN Status	Common Name	Habit	Type	Origin
<b>Mangrove</b>							
1	<i>Avicennia officinalis</i>	Euphorbiaceae	Least Concern	Blinding Tree	Ts	Ex	Na
2	<i>Rhizophora mucronata</i>	Malvaceae	Least Concern	Looking Glass Mangrove	Ts	Ex	Na
3	<i>Excoecaria agallocha</i>	Euphorbiaceae	Least Concern	Yellow Mangrove	Ts	Ex	Na
4	<i>Sonneratia caseolaris</i>	Lythraceae	Least Concern	Red Mangrove	Ts	Ex	Na
5	<i>Avicennia marina</i>	Avicenniaceae	Least Concern	Salt Mangrove	Ts	Ex	Na
6	<i>Sonneratia caseolaris</i>	Lythraceae	Least Concern	Red Mangrove	Ts	Ex	Na
7	<i>Avicennia marina</i>	Avicenniaceae	Least Concern	Salt Mangrove	Ts	Ex	Na
8	<i>Sonneratia caseolaris</i>	Lythraceae	Least Concern	Red Mangrove	Ts	Ex	Na
9	<i>Avicennia marina</i>	Avicenniaceae	Least Concern	Salt Mangrove	Ts	Ex	Na
10	<i>Sonneratia caseolaris</i>	Lythraceae	Least Concern	Red Mangrove	Ts	Ex	Na
11	<i>Avicennia marina</i>	Avicenniaceae	Least Concern	Salt Mangrove	Ts	Ex	Na
12	<i>Sonneratia caseolaris</i>	Lythraceae	Least Concern	Red Mangrove	Ts	Ex	Na

Prepared by M.S. Laxmi Reddy Page 107

**EIA Report for 'Development of Five Aerodromes' located at Heavy Duty, Village -  
Gandhinagar, Taluka - Porbander, District - South Kathiawar, Indian State - Gujarat**

**CHAPTER 3 DESCRIPTION OF THE ENVIRONMENT**

**Assessment of Area Endangered species/Conservation species**

SN	Botanical Name	Common Name	Family	IUCN Status
13	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
14	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
15	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
16	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
17	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
18	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
19	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
20	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
21	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
22	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
23	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
24	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
25	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
26	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
27	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
28	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
29	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
30	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern

Prepared by M.S. Laxmi Reddy Page 108

<http://environmentclearance.nic.in/writereaddata/EIA/03042012/2/N81MV1/FinalEIAReportShahedIslandWaterAerodrome.pdf>

**EIA Report for 'Development of Five Aerodromes' located at Heavy Duty, Village -  
Gandhinagar, Taluka - Porbander, District - South Kathiawar, Indian State - Gujarat**

**CHAPTER 3 DESCRIPTION OF THE ENVIRONMENT**

**Assessment of Area Endangered species/Conservation species**

From the above table it is evident in the road activity (passenger terminal building) area prevailing vegetation was mostly by natural plantation which composed of cultivated varieties of Coconut, betel nut & Banana near river bank plain being cultivated varieties they do not come under any categories of concern & the ground dwelling flora at project is largely assessed as Least Concern & have a good range of presence & abundance in Heavy Duty. Thus it is evident the flying activity for conservation of Passenger Terminal building does not endanger any of the protected or endangered plant species.

**Study Area Flora Assessment**

**Table 3.26: Flora Inventory for Biodiversity Studies/Surveys Within Study Area**

SN	Botanical Name	Family	IUCN Status	Common Name	Habit	Type	Origin
1	<i>Albizia lebbekii</i>	Mimosaceae	Least Concern	Leucaena	Ts	Ex	Na
2	<i>Albizia lebbekii</i>	Mimosaceae	Least Concern	Leucaena	Ts	Ex	Na
3	<i>Albizia lebbekii</i>	Mimosaceae	Least Concern	Leucaena	Ts	Ex	Na
4	<i>Albizia lebbekii</i>	Mimosaceae	Least Concern	Leucaena	Ts	Ex	Na
5	<i>Albizia lebbekii</i>	Mimosaceae	Least Concern	Leucaena	Ts	Ex	Na
6	<i>Albizia lebbekii</i>	Mimosaceae	Least Concern	Leucaena	Ts	Ex	Na
7	<i>Albizia lebbekii</i>	Mimosaceae	Least Concern	Leucaena	Ts	Ex	Na
8	<i>Albizia lebbekii</i>	Mimosaceae	Least Concern	Leucaena	Ts	Ex	Na
9	<i>Albizia lebbekii</i>	Mimosaceae	Least Concern	Leucaena	Ts	Ex	Na
10	<i>Albizia lebbekii</i>	Mimosaceae	Least Concern	Leucaena	Ts	Ex	Na
11	<i>Albizia lebbekii</i>	Mimosaceae	Least Concern	Leucaena	Ts	Ex	Na
12	<i>Albizia lebbekii</i>	Mimosaceae	Least Concern	Leucaena	Ts	Ex	Na

Prepared by M.S. Laxmi Reddy Page 107

**EIA Report for 'Development of Five Aerodromes' located at Heavy Duty, Village -  
Gandhinagar, Taluka - Porbander, District - South Kathiawar, Indian State - Gujarat**

**CHAPTER 3 DESCRIPTION OF THE ENVIRONMENT**

**Assessment of Area Endangered species/Conservation species**

SN	Botanical Name	Common Name	Family	IUCN Status
13	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
14	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
15	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
16	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
17	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
18	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
19	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
20	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
21	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
22	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
23	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
24	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
25	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
26	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
27	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
28	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
29	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern
30	<i>Albizia lebbekii</i>	Leucaena	Mimosaceae	Least Concern

Prepared by M.S. Laxmi Reddy Page 108

<http://environmentclearance.nic.in/writereaddata/EIA/03042012/2/N81MV1/FinalEIAReportShahedIslandWaterAerodrome.pdf>

Likewise, you can see the study area flora assessment here complete lists, I have not put the complete list here, you can see the birds they are studying, and then you can see how they are making the judgment assessment. So, you can see your IUCN Red List category in the table here. So, they are saying several species, which they listed, and then out of that, how many of least concern 18 out of 20 are least concern near threatened is 1, vulnerable is 1.

So, none of the recorded bird species recorded during the primary surveys are listed in schedule one of the document here. So, here like how they need not undertake special measures for that.

**Butterflies**

The publication reports 84 species of Butterflies under 5 families & 58 genera from Ritchie's Archipelago, out of 84 species of butterflies, 79 species were reported from Havelock listed as under.

Sl.No.	Common Name	Islands of Ritchie's Archipelago							
		Havelock Levance	John Levance	Henry	Inglis Butin	South Butin	North Butin	Middle	Outram Neil
1.	Palaemon Dart	✓							
2.	Common Blue Flat	✓	✓	✓				✓	✓
3.	Common Aed								
4.	White Banded Aed		✓						✓
5.	Plain Banded Aed	✓						✓	
6.	Brown Aed		✓	✓	✓			✓	✓
7.	Great Red Eye	✓	✓	✓			✓	✓	✓
8.	Common Spotted Flat	✓	✓		✓				
9.	Plain Bred Swath	✓							
10.	Common Banded Deneo		✓	✓	✓			✓	✓
11.	Great Jay		✓	✓	✓		✓		✓
12.	Fliesha Swallowtail	✓	✓	✓					
13.	Andaman Swallowtail	✓	✓	✓	✓		✓	✓	✓
14.	Tahiti Jay	✓	✓	✓	✓		✓	✓	✓
15.	Andaman Robin	✓	✓	✓	✓	✓	✓	✓	✓
16.	Andaman Monna	✓	✓	✓	✓	✓	✓	✓	✓
17.	Great Monna	✓	✓	✓	✓	✓	✓	✓	✓
18.	Common Monna	✓	✓	✓	✓	✓	✓	✓	✓
19.	Large Butterfly	✓	✓	✓	✓	✓	✓	✓	✓

<http://environmentclearance.nic.in/writereaddata/EIA/03042021/2N81M/1/FinalEIAReportShaheedIslandWaterAerodrome.pdf>



**Reptiles & Amphibians**

**Table 3.28: Reptiles & Amphibians in Study Area from secondary Data**

SN	Common Name	Scientific Name	Family	IUCN Status	WPA Assessment
<b>Reptiles</b>					
1	Saltwater crocodile	<i>Crocodylus porosus</i>	Crocodylidae	Lower Risk-Least concern ver 3.1	Schedule - 1 (Part II)
2	Tokay gecko	<i>Gekko gekko</i>	Gekkonidae	Least Concern ver 3.1	--
3	Common house gecko	<i>Hemidactylus frenatus</i>	Gekkonidae	Least Concern ver 3.1	--
4	Andaman Islands day gecko	<i>Phelsuma andamanensis (Phelsuma andamanensis)</i>	Gekkonidae	Least Concern ver 3.1	--
5	Andaman green calotes	<i>Calotes andamanensis</i>	Agamidae	--	--

Prepared by M/s Enviro Resources Page 126

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5	<i>Siphonophora chlorocera</i>	Green Fish Sea Cucumber	Least Concern ver 3.1	--
6	<i>Holothuria impatiens</i>	--	Data Deficient ver 3.1	--
7	<i>Comanthus parvicornis</i>	--	--	--
8	<i>Comanthus samonensis</i>	--	--	--
9	<i>Comastella nigra</i>	--	--	--
10	<i>Lamprometra palmata</i>	--	--	--
11	<i>Stephanometra indica</i>	--	--	--
12	<i>Cultzia novaezelandiae</i>	--	--	--
13	<i>Ophiactis savignyi</i>	--	--	--
14	<i>Macrophysalis longipoda</i>	--	--	--
15	<i>Ophiotela dinca</i>	--	--	--
16	<i>Ophiotela exigua</i>	--	--	--
17	<i>Ophiocoma erinaceus</i>	--	--	--
18	<i>Ophiolaps superba</i>	--	--	--
19	<i>Echinoderus calamari</i>	Banded sea urchin	--	--
20	<i>Echinomene cyclostomus</i>	--	--	--
21	<i>Levinea elongata</i>	--	--	--

The study conducted during 2001 revealed presence of 21 echinoderm (other than holothuroidea) species sea off Havelock Island in Ritchie's Archipelago the IUCN assessment of the recorded species is as under.

No. of Species	IUCN Red List Categories							Not Assessed
	Data Deficient (DD)	Least Concern (LC)	Near Threatened (NT)	Vulnerable (VU)	Endangered (EN)	Critically Endangered (CR)	Extinct in the Wild (EW)	
21	2	1	--	--	--	--	--	18

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So, for the butterflies also they have undertaken you can see also they have taken for reptiles and amphibians, you can see how they are going on comparing with the IUCN Red List categories here.

(Refer Slide Time: 45:15)

**3.9 Socio Economic Environment**

The initiation, growth and development of infrastructure development associated with it are intended to create impact on the socio-economic profile of the communities nearby to project area.

The impact could be positive or negative depending on the development activities. An assessment of socio-economic environment forms an integral part of the EIA/EMP study. In order to improve the quality of life of the people affected by the project activities it is necessary to understand the socio-economic aspects and its trends in the study area.

Socio-demographic features / survey are very useful for understanding social and economic problems and identifying potential solutions. To understand the socio-demographic status and the trends of the communities in the 10 km radius map census 2011 & District census handbook 2011 has been contemplated and necessary data collected and compiled from it.

**3.9.1 Baseline Status**

Baseline information is collected after delineation of the baseline study area in order to study the socio-economic profile of the project affected area. The process related to baseline database analysis includes:

- Demographic Structure
- Infrastructure Base
- Economic Structure
- Health Status
- Cultural Attributes
- Salient Observations
- Public Awareness and their concerns regarding the proposed project
- Socio-economic status in relation with 'Quality of Life'

**3.9.2 Demographic Structure**

The demographic structure of the study area was derived primarily from data of Census record of South Andaman District covering one Taluka and 05 Villages. The demographic structures of each village in the study area as per Census 2011 are presented in Table 3.27. Summary of demographic structure is presented in Table 3.33.

**Table 3.33: Summary of Demographic Structure in Study Area**

No. of States/Union Territory	1
No. of District	1
No. of Taluka	1
No. of Villages	05
Total Area of surveyed village (ha)	1717.74
Total No. of Households	1941
Total Population	6515
Density of Population (per sq. km)	388
Sex Ratio (No. of female / 1000 males)	807
Scheduled Caste	0 (0%)
Scheduled Tribe	71 (0.11%)
Literate	4894 (77.02%)
Total Worker	3677 (42.17%)
Main Worker	2324 (64.92%)
Marginal Worker	348 (9.51%)
Non Worker	3643 (57.89%)

Source: Primary Census Abstract & CSDS 2011, South Andaman District, Andaman & Nicobar

**3.9.3 Infrastructure Resources**

The details of infrastructure resources have been extracted from housing, household amenities and assets (KHIS 2011 of South Andaman District District South Andaman) in under the developmental process. As compared to the villages coming under study area of 10 km radius, less population. The infrastructure resources in the study area with reference to education, medical facility, water supply, post and telegraph, transportation, communication and power supply is as follows.

**Table 3.34: Infrastructure Resource Base of the Study Area**

S. No.	Village	Education	Medical	Post	Water	Common	Transportation	Health	Religion	Power	SB
1	General	GPSS/PP, SCPS/SCVT, SO/SC/HS	PHS, SCVT, C	PH, TPA	PH, TPA	PH, TPA	PH, TPA	PH, TPA	PH, TPA	PH, TPA	PH, TPA
2	1/night spot	GPSS/PP, PPS/PPS, GHS	PHS, PHC	PH, PHC	PH, PHC	PH, PHC	PH, PHC	PH, PHC	PH, PHC	PH, PHC	PH, PHC
3	Stream spot	GPSS/PPS, GHS	PHS, PHC	PH, PHC	PH, PHC	PH, PHC	PH, PHC	PH, PHC	PH, PHC	PH, PHC	PH, PHC

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<http://environmentclearance.nic.in/webcontent/data/EIA/03042021/2281MV/1FinalEIAReport/ShahedIslanWaterAerodrome.pdf>

So, they have also done socio-economic environments here. So, they have undertaken baseline status. And you see here the demographics. So, the number of states 1, District 1, and villages which will come within this are 5, and then the total population is nearly like 6000 plus and then the density of the population, sex ratio you can see here. There are no scheduled casts, then you see scheduled tribes the indigenous people here 21 percent.

The literacy rate, the total workers, main workers, you can see marginal workers. And so you also see evaluate what is the employment rate here or what is the sensitive community which is located here. So, what kind of things they have evaluated, and their socio-economic impact assessment, so that all you can review?

(Refer Slide Time: 46:12)

**3.10 Impact on 'Development of their Resident' based on Survey Doney Village**

**CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT**

The significant features of few important parameters for each study area are discussed as follows:

(1) **Education Facilities:** In the study area, education is available from Primary School to Senior Secondary School. Higher education facilities along with Colleges and other diploma courses are available in Port Blair and are 11 km away from the project site.

(2) **Medical Facilities:** There are three (3) government hospitals available within the study area in Villages Gondegaon, Vijaynagar, and Kachibagan. However, two villages namely Kachibagan and Vijaynagar in the study area were having no medical facilities. Hospital and other basic medical facilities were available in Port Blair.

(3) **Drinking Water:** Survey Doney Deepwell largely on cement. A check done constructed across the Gondegaon Taluka in the major source of water at Survey Doney with the total water availability of 0.19 MLD. Water from this source is piped to treatment plant at Vijaynagar and then supplied to public through public taps. Kachibagan and Kachibagan Taluka are the two other major water sources with the capacities of 0.10 MLD and 1.1 MLD of water respectively. Borewells and Rainwater are underground water. Water is supplied to the residents in domestic form.

(Source: Master Plan for Kachibagan and Noid Kachibagan, Town and Country Planning Dept, APND)

(4) **Power Supply:** All villages are having electricity facility for all purposes. Land available was a common problem being faced by the villages. The solar power was also available in some surveyed villages.

(5) **Transportation:** For transportation purpose, State and Public Bus, Ferry Services are available in the study area. Transportation facilities were not sufficiently available in the region. Three vehicles like Bicycle and Motor Cycles were mostly used by villagers for transportation purpose.

(6) **Communication Facilities:** For communication purpose, mainly Post Office, Telegraph, Mobile phones and internet are available in most of the villages.

(7) **Agri-business:** Most of the respondents are engaged in their work, agriculture, fishing and business activities. Farming is the main occupation. It is a dependent service or government service. Most of the respondents are laborers and others are trying to migrate towards other city places.

(8) **Recreation:** Most of the houses are public and some public with good construction in the study area.

(9) **Employment:** Most occupations of the people in the study area are agriculture and labor work. As directed by the A&N Administration, Office of the Labor Commission, the annual statement lists of wages in the schedule of Employment control under

Prepared by M.S. Emaria Resources Page 142

**3.10 Impact on 'Development of their Resident' based on Survey Doney Village**

**CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT**

(10) **Waste Management:** Solid waste is collected and treated in a sanitary landfill. No 60-day, Semi-Solid, Unsanitary Disposal - Rs. 60/day, Solid/Slurry - Rs. 60/day, Highly Solid - Rs. 60/day.

(11) **Forest:** The primary source of cooking fuel is LPG and wood. Kerosene is also being used as per requirement.

(12) **Main Crops:** The principal crops grown in agricultural farms are Coconut, palm, Main, green gram, black gram, Chick, locally, Papaya, water, pine, areca nut, capsicum, orange, papaya, guava, etc.

(13) **Language:** The most widely spoken language in the study area is Bengali followed by Hindi, Tamil, Telugu and Malayalam. Official language is Hindi and English.

(14) **Migrations:** Survey doney is a rural land but local population was migrating towards towards the Port Blair in a process of employment and some to other cities.

(15) **Sanitation:** System of individual and combined open drains are in use in some places of the study area. The solid waste and the form of Survey and Survey Doney help in draining of combined sewage.

(16) **Survey and Survey Doney:** Survey Doney had proper solid waste collection and treatment system except for the survey doney and Kachibagan. The collection of population concentration, like Gondegaon (Survey Doney) and Noid. Kachibagan (Survey Doney) already faces the problem of water management and dumping of waste in some public places. In the survey doney, most of the open drains were not be maintained that around 1.5 metric tonnes of garbage will be generated daily at Survey Doney. However, the annual waste generation much much higher at 1 to 1.5 metric tonnes, which is mainly due to the large quantity of waste generated by the hotels, and restaurants, catering to the tourist population. These wastes mostly comprise PET bottles, glass bottles, cans, tin and broken waste. The hotels by and large segregate the waste and the recyclable waste are collected by the hotels and sent to municipal for recycling. The small collection of Garbage is not available in the villages of study area.

(17) **Road Connectivity:** Most of the roads are tar and concrete in the villages. Both tar and gravel roads were commonly used in the villages.

(18) **Market Facilities:** Study area is predominantly rural type. In villages, small shops are available for daily needs. Port Blair is major hub for all type of facilities in the area.

(19) **Recreation:** Temples, Sanatoriums, Television and Radio are the main recreation facilities in the study area. Survey Doney is also used for the villages.

(20) **Environment:** Survey Doney offers tremendous scope for fishing activity. It is also known for its dense area and beaches, like Jhapkar Beach, with its coral reefs. Concrete dug-out Kachibagan Beach is a popular spot for watching the sunset. On the island, water table, rocky terrain, mangrove, sea level, Survey Doney Beach.

Prepared by M.S. Emaria Resources Page 143

<http://environmentclearance.nic.in/webcontent/data/EIA/03042021/2281MV/1FinalEIAReport/ShahedIslanWaterAerodrome.pdf>


And what kind of resources they have, they have evaluated the education facilities and all kinds of facilities which are there. So, that has been reviewed. So, recollect and rethink what we studied when we did the socio-economic impact assessment. So, they have studied all this. And you also think about what they have not studied in detail.

(Refer Slide Time: 46:33)

**INDIA NEWS**

### Panel raises concerns over Andaman water aerodrome project

The aim of the project, part of the Centre's Udan scheme (for regional airport development), is to connect remote areas of the island to Port Blair to promote tourism "resulting in growth in economic condition," the minutes of the EAC meeting held on April 12 and published earlier this month stated



As per the environmental impact assessment (EIA) report, the project site for the construction of the terminal building (1568.9 sq m) and associate infrastructure (453.3 sq m) falls partly in a large patch of mangroves (AFP) (Representational image)

Updated on May 11, 2021 07:31 AM IST

By Jayashree Nandi, Hindustan Times, New Delhi

However, the management plan submitted by Andaman and Nicobar Administration does not address the impact on the mangroves due to the project.

The EAC found the EIA report inadequate. "Since the EIA consists of mostly secondary data on biodiversity without actual site-specific biodiversity studies with respect to aquatic and natural environment in effect of tourism, the project proponent needs to resubmit the revised EIA covering biodiversity conservation/ management plan, including water and air quality data," minutes of the EAC meeting, seen by HT, said.

The study on biodiversity should be conducted by any national lab, it added.

The EAC also asked for a comprehensive risk analysis for sea-plane crashing/catching fire at the sea-aerodrome, status of coastal regulation zone (CRZ) clearance at the state and central level and reassessment of the impact of the noise level during landing and take-off on the fauna in the area.

<https://www.hindustantimes.com/india-news/panel-raises-concerns-over-andaman-water-aerodrome-project-101620691501484.html>

105

There are also news clippings, which we have also given you in the suggested reading which suggest that this EIA was also opposed for being inadequate in terms. So, you also give your inputs and what ways now you have studied a lot of aspects in what ways you see this particular EIA to be adequate or inadequate. So, what is your judgment and discussion on it?

(Refer Slide Time: 46:57)

# Environmental Impacts and Mitigations Measures

105

## Air Environment

### Construction Phase

#### Identification of Sources

During construction phase of the proposed aerodrome project, construction of terminal building and corresponding amenities are identified as major source of air emission during construction phase. During these construction activities like site clearance, stockpiling & material handling dust nuisance are the major sources of air pollution. It also includes combustion of fuel in DG set used for energy supply and illumination purpose, during construction period. Apart from this vehicular movement is also identified as source of air pollutant.

#### Impact Prediction

Dust emissions generally differ from day to day, depending on the level of activity, the specific operation and the prevailing meteorological conditions. Therefore for predicting the quantitative value of TSPM that would be affect baseline due to the construction activity air quality dispersion modelling is performed.

There would be max 100 temporary workers appointed for construction activity who may get affected by the dust pollution. Workers getting exposed to the dust generated due to the minor

<http://environmentclearance.nic.in/writereddata/EIA/03042021/2281MVI/FinalEIAReport/ShaheddisaNdWaterAerodrome.pdf>

So, now looking at the environmental impact and mitigation measures, after this after looking at all these areas, they came up with the what kind of impact it has and then what are the mitigation measures. So, you can see where they have one for the air environments during the construction phase.

So, they saw that during the construction phase, there would be a lot of emissions, and also during the operational phase they would have so how they are going to control the dust and other things and then you see you can reconnect with the methods part which we had studied.

(Refer Slide Time: 47:36)

**Table 4.1: Atmospheric Inversion Level at AAN Islands.**

SN	Time	Mixing Height, Meter
1	7:00	240
2	8:00	320
3	9:00	500
4	10:00	550
5	11:00	600
6	12:00	600
7	13:00	700
8	14:00	700
9	15:00	700
10	16:00	400
11	17:00	550
12	18:00	475
13	19:00	420

**Table 4.2: List of Reference Documents for Emission Rate Calculation**

SN	Emission Source	Reference document to calculate emission factors
1	Emissions from Unpaved Road within construction premises	Construction Phase EPA AP-42, chapter no. 11 Miscellaneous Sources, Unpaved Road, Section 13.1.2
2	Heavy Construction Activities	EPA AP-42, chapter no. 11 Miscellaneous Sources, Heavy Construction operation, Section 13.3.3
3	Aggregate Handling & Stockpiling	EPA AP-42, chapter no. 11 Miscellaneous Sources, Aggregate Handling And Storage Piles, Section 13.2.4
4	DG Set Operation	EPA AP-42, chapter no. 3 Stationary Internal Combustion Sources, Gasoline and Diesel Industrial Engines, Section 3.3

**Table 4.3: Model Input Parameters for Modeling (Construction Phase)**

SN	Parameters	Value
1	Source: Truck transport loading, unloading & transport on unpaved road	Construction, 2 min heavy vehicle required at 1 sec modeling event rate emission
2	Exhaust Height (m)	1.8 m
3	Aggregate Speed of Vehicle	1.5 km/hr
4	Emission Factor (g/s)	PM <sub>10</sub> = 1.00000 g/m <sup>3</sup> SO <sub>2</sub> = 0.00011 g/m <sup>3</sup> NO <sub>x</sub> = - CO = -

**Table 4.4: Model Input Parameters for Modeling (Operational Phase)**

SN	Parameters	Value
1	Source: Heavy Construction Activities	Overall construction activity
2	Load Construction Area	1.257 sq. m
3	Exhaust Height (m)	1.8
4	Emission Factor (g/s)	PM <sub>10</sub> = 1.2150 g/m <sup>3</sup> SO <sub>2</sub> = - NO <sub>x</sub> = - CO = -

So, the model which they have opted for the computation purpose. So, all the models have been listed here, listed here which were available to them as per the CPCB norms also. So, we had seen as per the ToR for different domains they give in the Indian context and what the standard as per the literature also we have studied what are the different available models.

So, you see how what model options were available to them, what did they adopt, and what modeling procedures did they follow here, and then how did they document all those emissions, calculations, and what was the -- You can see in the table here what are the model input parameters, and what were the values which they got here.

(Refer Slide Time: 48:28)

**Mitigation Measures**

Control measures like temporary wind barrier, proper traffic management during loading and unloading of the construction materials, regular sprinkling of water on the working site, Avoiding Cement dust emission, Managing stockpiles (sand, gravel) by using water sprays (when emptying cement bags into mixer) will be implemented to ensure minimum dust generation. Additional mitigation measures are as follows:

- Site barricades shall be provided.
- The project shall have a pre-cast factory for the walls & slabs. These pre-cast units will be fitted to the structural component of the buildings reducing raw material handling, transportation and waste.
- Excavation and transport shall be done during off peak hours along with material loading from site minimize to about 15-20mins;
- Excavation, handling and transport of materials shall be avoided under high wind conditions or when a visible dust plume is present;
- During windy conditions, dust suppression measures shall be adopted (dampening with water, tire washing facility at the entrance of the project site, etc.);
- The vehicles hired for transportation of material and labor shall have PUC certificate in order to reduce air emissions;
- Dust covers shall be provided on trucks used for transportation of materials prone to fugitive dust emissions;
- Use of Ready Mix Cement (RMC) is suggested to prevent any air emission due to mixing of the cement on site.
- If small volumes of concrete are to be mixed (manually), mixing is to be undertaken on a hard surface covered in plastic sheeting so that concrete waste and runoff can be contained;
- Traffic Management - vehicular movement to be regulated with proper parking facility and internal road system;
- The generators used on the site for energy backup will be CPCB norms complied for air emissions.

<http://environmentclearance.nic.in/water/aerodrome/EIA/03042021/228/1MV/1FinalEIAReport/Sheet5of5indWaterAerodrome.pdf>

And then what were the mitigation measures? So, point by point, they are giving mitigation measures. So, like, they are taking care of the site barricades, and then also a precast factory for walls and slabs, how they are going to reduce the onsite pollution, here excavation and transport shall be done during off-peak hours and so on. So, those kinds of mitigation measures have been taken.

(Refer Slide Time: 48:57)

**4.1.2 Operational Phase**

**Identification of Sources**

The following probable sources are identified in phase of after construction:

- Emission from vehicular movement
- Emission from D.G sets of capacity 2 no. of 50 kVA
- Emissions from fossil fuel burning for sea phase operations at different speeds & altitudes.

Note: Speed boat is not considered as source of emission since it will be solar operated.

**Impact Prediction**

Emissions coming out of continuous movement of vehicles & planes may degrade the existing environmental baseline conditions. The CO released due to fuel combustion in engines may reduce the hemoglobin concentration in blood of the people likely to get exposed to higher concentrations of CO.

The emission factor used in the air dispersion modeling for estimating the pollutants from different sources are calculated using document of EPA AP-42, the source wise details of the same are tabulated below:

**Table 4.4 : List of Reference Documents for Emission Rate Calculation**

Sl. No.	Operation Phase	Reference Document
1	Emissions from Aircrafts	Airport Air Quality Manual 2011 of International Civil Aviation Organization (ICAO)
2	DG Set operations	EPA AP-42, chapter no. 3 Stationary Internal Combustion Sources, Gasoline and Diesel Industrial Engines, Section 3.3
3	Vehicular Movements	Emission Factors Calculated by (ARAD, 2007)

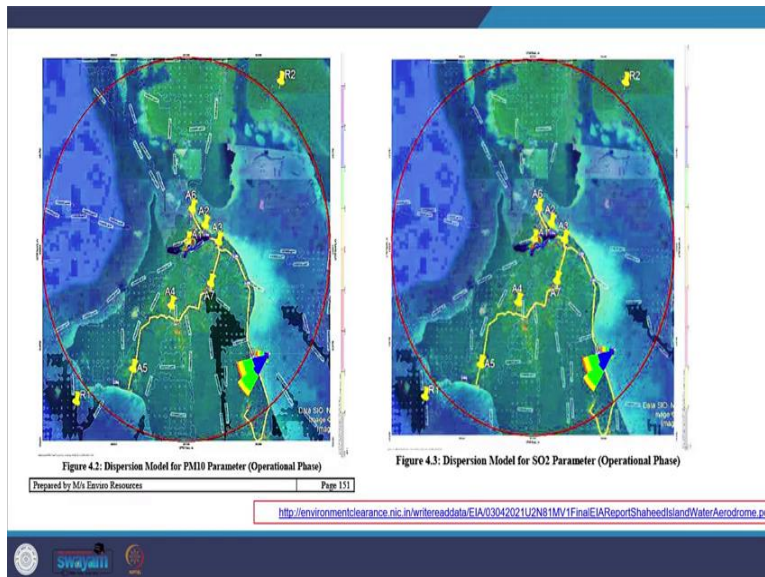
Daily 150 vehicles are considered to visit at terminal building for travelling purpose. Considering worst case scenario and dimensions of road area, all 150 vehicles are considered for performing air quality modeling studies.

S.N	Parameters	Value
1	Source - DG set operation	Operation of DG set
2	Capacity	50 kVA X 2 Nos.
3	Fuel Used	HSD
4	Stack height	7.0 m above roof for each set
5	Stack exit velocity of gas (m/s)	8.0
6	Stack diameter	0.11 m
7	Emission Factors (g/h)	PM <sub>10</sub> 0.02972 g/sec PM <sub>2.5</sub> - SO <sub>2</sub> 0.02769 g/sec NO <sub>x</sub> 0.4188 g/sec CO 1.09718 g/sec

S.N	Parameters	Value
1	Source - Aircraft emission	Short haul plan
2	Capacity	-
3	Fuel Used	Aviation Turbine Fuel (ATF)
4	Airway distance	0.8 km
5	Emission Factors (g/h)	PM <sub>10</sub> 0.009259 g/sec PM <sub>2.5</sub> - SO <sub>2</sub> - NO <sub>x</sub> 0.258 g/sec CO 0.11 g/sec

S.N	Parameters	Value
1	Source - Transport of Vehicles	20 vehicles per Hour
2	Length of approach road	300 meters
3	Width of road	6 meter
4	Average Car dimension	4.9m (L) X 1.73 m (W)
5	Fuel used	Diesel (Considering Worst case)
6	Emission Factors (g/h)	PM <sub>10</sub> 0.000321 g/h NO <sub>x</sub> 0.00049 g/h CO 0.000136 g/h SO <sub>2</sub> 0.0008 g/h

<http://environmentclearance.nic.in/water/aerodrome/EIA/03042021/228/1MV/1FinalEIAReport/Sheet5of5indWaterAerodrome.pdf>



As well as you see mitigation measures are also taken during the operational phase. So, they have identified possible sources. So, you see emissions from vehicular movement emissions from DG sets, emissions from fossil fuels, and then what kind of impact they are predicting. So, you see here that emissions, what kind of emissions would happen and what are they and how are they studying were using various model dispersion models here, you can see for all the parameters they have used.

(Refer Slide Time: 49:33)

EIA Report for "Development of Water Aerodrome" located at Swayy Deep, Village - Gerdad Naga, Tahla - Port Blair, District - South Andaman, Andaman & Nicobar

CHAPTER 4: ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

Table 4.7: Interpretation of Incremental Values (Operational Phase)

S.N	Sampling Location Code & Name	PM <sub>10</sub> (ug/m <sup>3</sup> )			SO <sub>2</sub> (ug/m <sup>3</sup> )			NOx (ug/m <sup>3</sup> )			CO (mg/m <sup>3</sup> )		
		BV	IV	RV	BV	IV	RV	BV	IV	RV	BV	IV	RV
1	*A1	60.10	0.06	60.16	10.80	5.18	15.98	20.49	0.07	20.56	0.89	0.000022	0.890022
2	A2	53.58	0	53.58	9.75	0	9.75	18.52	0	18.52	0.96	0	0.96
3	A3	50.89	0	50.89	9.27	0	9.27	17.61	0	17.61	0.92	0	0.92
4	A4	55.98	0	55.98	9.22	0	9.22	19.29	0	19.29	0.88	0	0.88
5	A5	31.46	0	31.46	9.36	0	9.36	17.8	0	17.80	0.73	0	0.73
6	A6	67.21	0	67.21	11.52	0	11.52	28.7	0	28.70	0.69	0	0.69
7	A7	50.65	0	50.65	9.08	0	9.08	17.07	0	17.07	0.79	0	0.79
NAAQS Standards		100 (24 hourly)			80 (24 hourly)			80 (24 hourly)			4 (1 hourly)		

Table 4.8: Predicted 24-Hourly Short Term Incremental GLCs

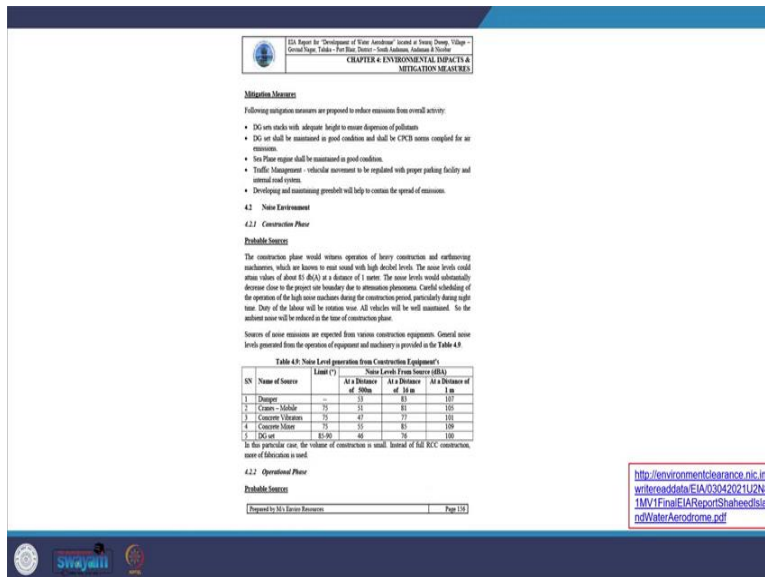
Pollutants	Maximum Incremental Levels	Distance, m	Direction
PM	0.06 µg/m <sup>3</sup>	110	NNE
NOx	0.07 µg/m <sup>3</sup>	110	NNE
SO <sub>2</sub>	5.18 µg/m <sup>3</sup>	110	NNE
CO	0.022 mg/m <sup>3</sup>	110	NNE

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<http://environmentclearance.nic.in/writeradddata/EIA/03042021U2N81MVF/FinelEIAReport/ShahedIslandWaterAerodrome.pdf>

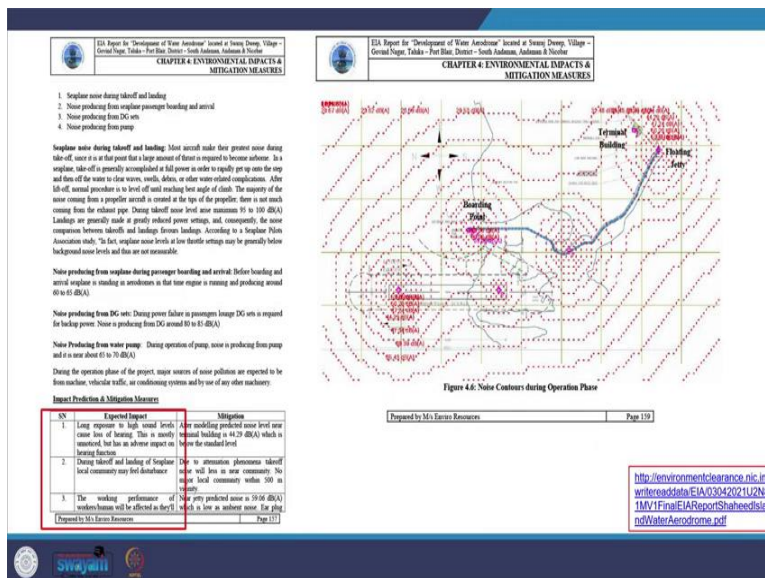
And then like that, you are said that they had to do the incremental values also. So, how they have undertaken it, how they are looking at all the parameters, and how they are also seeing the incremental values for all these parameters.

(Refer Slide Time: 49:48)



And then they have suggested the mitigation measures. So, you can see that the DG sets stacks with adequate height to ensure the dispersion of pollutants. So, seaplane engines shall be maintained in good condition, the maintenance part of it, and then they are looking at the noise environment and what are the probable source and how they are going to take care of it.

(Refer Slide Time: 50:07)



So, here you see seaplane noise during takeoff and landing and the expected impact you can see in the table. So, you see long exposure to high sound levels can cause loss of hearing. So, what kind of mitigation they would do during the takeoff and landing of the seaplane local community may feel disturbed.

So, what kind of mitigation they would take for that, and then the working performance of the workers humans will be affected? So, what kind of things they will do? So, here you see the noise control during the operation phase. So, we learned about what kind of maps are prepared. So, you can see that they have prepared noise control during the operation phase.

(Refer Slide Time: 50:55)

**218 Report for 'Development of New Airfield' located at Unnao Cheng Village, General Naga, Tada - Pali Dist. District - South Odisha, India's Frontier**  
**CHAPTER 4: ENVIRONMENTAL IMPACTS & MITIGATION MEASURES**

**4.3 Water Environment**

**4.3.1 Construction Phase**

**Anticipated Impact**

The proposed built up area of the project will be ~744.25 sq. m. The construction activity will involve water consumption in low quantity i.e. around 17 m<sup>3</sup>/day. Apart from water required for construction activity, increase in domestic water consumption is predicted due to involvement of construction workers at project site. It is estimated that around 10-15 numbers of workers will be engaged for construction activity of the project. According to the NBC (National Building Code of India) 45 lit. per person is considered for water consumption as domestic part i.e. 1.18 m<sup>3</sup>/day.

Water from construction activity may contain oil, cement traces, other debris which may get drain into the nearby surface or ground water bodies. The sewage water from construction site is generally characterized by high level of Biochemical Oxygen Demand, Ammonia & E-coli count. Therefore, exposure of such runoff to the water bodies will have a significant negative impact on the water bodies near to project site.

**Mitigation Measures**

Sewage generated from the construction workforce: Temporary sanitation facilities shall be provided during construction phase of the unit. Maintenance or cleaning of the mobile toilets will be done on regular basis.

Construction runoff and drainage: Good housekeeping shall be practiced like handling & disposing of solid waste in a debris & which is sent from the drainage channel. The waste water from construction site will be drained into drainage line to avoid any direct contact with surface or ground water body.

**4.3.2 Operation Phase**

**Anticipated Impact**

Water requirement for present activities will be met through water distribution lines being provided by Andaman Public Water Works. Activities that involve water consumption are domestic activity, fire water, Electrical working and grounds. During operational phase of the unit, the major stream, identified as source of water pollution is domestic sewage.

The detailed water budget depicting the consumption and sewage generation into the overall operation of the unit is mentioned in Table 2.18. The total water requirement will be around 24.1 m<sup>3</sup>/day out of which 17 m<sup>3</sup>/day will be met by re-use of treated sewage from STP and hence the net water requirement will be ~14 m<sup>3</sup>/day.

(Prepared by M.S. Kumar Swamy Page 102)

<http://environmentclearance.nic.in/wfereaddata/EIA/03042021U2N81MV1FinalEIAReport/ShaheddisiaNdWaterAerodrome.pdf>

So, yes, you see that they have done water environments, water environments, what kind of anticipated impact they would have. So, water consumption would be there, and then how they are going to adopt what kind of mitigation measures they would adopt. So, during the construction, runoff, and drainage, they have commented about good housekeeping, which will handle how the water is drained out of the site and even in the operation phase.

(Refer Slide Time: 51:25)

**Table 4.10: Anticipated Impacts & Mitigations Measures during Construction & Operational Phase on Terrestrial Environment**

Project Activity/ Component: Passenger Terminal Building			
Components	Passenger Terminal Building (PTB)	Anticipated Impact	Precautionary/Mitigation Measures
Habitat loss	<ul style="list-style-type: none"> <li>PTB will be constructed in a dedicated of 3,500.00 sq. m.</li> <li>The PTB area largely prevails cultivated vegetation of Commercial plantations of Coconut, Betel Nut, Banana &amp; is devoid of prominent natural vegetation except for ground dwelling herbs &amp; shrubs.</li> <li>82 No. of trees to be felled &amp; prevailing ground vegetation does not belong to any category of concern.</li> <li>Except for some birds seen in &amp; around proposed PTB area, it is not inhabited by any wild fauna, signs of wildlife activity were also not observed and also nesting/roosting activity was not evidenced.</li> </ul>	<ul style="list-style-type: none"> <li>Temporal disturbances are anticipated which may lead the immediate surroundings of PTB area unfavorable for birds.</li> </ul>	<ul style="list-style-type: none"> <li>Instead of mass felling activity individual trees will be felled thereby saving 5 no. of trees.</li> <li>Green belt development will be done in 1,155.00 sq. m.</li> </ul>
Disposal/Dumping	<ul style="list-style-type: none"> <li>The built-up area will be 744.25 sq. m.</li> </ul>	<ul style="list-style-type: none"> <li>Unscientific management disposal of construction waste may lead to degradation of surrounding areas &amp; habitats.</li> </ul>	<ul style="list-style-type: none"> <li>The excavated material &amp; left over construction material will be completely used as filling material for peripheral &amp; PTB access road development.</li> </ul>
Releases	<ul style="list-style-type: none"> <li>The magnitude of construction is as such setup of workers colony is not required.</li> <li>Local workers will be hired who will daily travel to &amp; fro from project site.</li> </ul>	<ul style="list-style-type: none"> <li>Open defecation &amp;/or urination may lead to vectors &amp; diseases spread.</li> </ul>	<ul style="list-style-type: none"> <li>Mobile sanitation facility will be provided to workers on site to avoid open defecation &amp;/or urination.</li> </ul>

<http://environmentclearance.nic.in/wfereaddata/EIA/03042021U2N81MV1FinalEIAReport/ShaheddisiaNdWaterAerodrome.pdf>

So, here you see how they have all the range of anticipated impact and mitigation measures point by point. So, here you see habitat loss, disposal dumping, release, and then from what activity it will happen and what the precautionary mitigation measures would take and so that is all given here in the form of a matrix.

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	hence any sort of sewage (washing, bathing etc), generation will not occur.		
Emissions	<ul style="list-style-type: none"> <li>Emissions from fuel combustion by construction machineries viz. Poclains, Earth Movers, Dumpers, Trucks, Lift Cranes, Diggers will temporally occur.</li> <li>Fugitive dust emissions during material hauling &amp; construction activity will occur.</li> </ul>	<ul style="list-style-type: none"> <li>Unchecked emissions may lead to locale specific high incremental scenario in terms of CO<sub>2</sub> &amp; CO gases, which may affect the overall surrounding ecology adversely.</li> <li>Incremental particulate matter may be carried away by wind &amp; can settle on surrounding vegetation, which may affect the overall surrounding ecology adversely.</li> </ul>	<ul style="list-style-type: none"> <li>It will be ensured that vehicles &amp; machineries will valid PUC certification will only be used for construction activity.</li> <li>Material piles will be covered, regular water sprinkling will be done to arrest the particulate matter at site itself.</li> </ul>
Disturbances to Surrounding Habitat	<ul style="list-style-type: none"> <li>Noise &amp; vibrations will be generated due to overall construction activity.</li> </ul>	<ul style="list-style-type: none"> <li>High noise &amp; vibrations may cause disturbances &amp; locale specific migration of surrounding faunal species</li> </ul>	<ul style="list-style-type: none"> <li>Construction activity will be achieved in step by step manner to ensure all machineries are not deployed simultaneously to keep noise &amp; vibrations at minimum.</li> <li>Construction activity will be limited from 9 AM to 5 PM only to avoid early morning &amp; evening hours.</li> </ul>

<http://environmentclearance.nic.in/writeresddata/EIA/03042021/2281MV/1FinalEIAReport/ShaheddislandWaterAerodrome.pdf>

So, you can see emissions and disturbance to the surrounding habitat.

(Refer Slide Time: 51:50)

Table 4.11: Anticipated Impacts & Mitigations Measures during Construction & Operational Phase on Aquatic Environment

Project Activity/ Component: Speed boat path & operations			
Components	Speed boat path	Anticipated Impact	Precautionary/Mitigation Measures
Habitat loss	<ul style="list-style-type: none"> <li>The speed boats will cruise through gangway point up to floating dock through the Creek (Nallah No. 2 as referred by Locals) southwest of PTB.</li> <li>The approximate average width of creek is 30 m in which speed of boats will easily cruise through, hence the banks of creek will largely remain undisturbed &amp; mangrove vegetation will not be affected in whatsoever manner.</li> </ul>	<ul style="list-style-type: none"> <li>Habitat loss will not occur.</li> </ul>	--
Alteration/Disturbance of creek bed/creek bottom	<ul style="list-style-type: none"> <li>The average depth of Creek (Nallah No. 2 as referred by Locals) is sufficient for speed boats to operate, thus creek any sort of de silting/dredging activity is not involved thereby ensuring the integrity of creek bed.</li> </ul>	<ul style="list-style-type: none"> <li>Alteration/Disturbance of creek in whatsoever manner will not occur.</li> </ul>	--
Releases	<ul style="list-style-type: none"> <li>Speed boats will not have urinals/lavatories, the cruise time of speed boat from gangway to floating dock will be only few minutes.</li> </ul>	<ul style="list-style-type: none"> <li>Releases from speed boat in whatsoever manner will not occur in creek/sea.</li> </ul>	--
Emissions	<ul style="list-style-type: none"> <li>Emissions from speed boat operations will not occur since solar operated speed boats will be used.</li> </ul>	<ul style="list-style-type: none"> <li>Noise emissions are anticipated from operation of speed boats.</li> </ul>	--
Disturbances to Surrounding Habitat	<ul style="list-style-type: none"> <li>Unlike the fuel driven boats, electric speed boats are likely to generate</li> </ul>	<ul style="list-style-type: none"> <li>The magnitude of noise &amp; vibrations to be generated will be</li> </ul>	<ul style="list-style-type: none"> <li>Electric driven speed boats are already provisioned with a view</li> </ul>

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Page 164

<http://environmentclearance.nic.in/writeresddata/EIA/03042021/2281MV/1FinalEIAReport/ShaheddislandWaterAerodrome.pdf>

Project Activity/ Component: Floating Dock & operations			
Components	Floating Dock	Anticipated Impact	Precautionary/Mitigation Measures
Habitat loss & Alteration/Disturbance of sea bed	<ul style="list-style-type: none"> <li>Floating dock will be installed near sea plane taxi way.</li> <li>The only point of contact of floating dock with sea bed will be through mooring activity.</li> <li>Floating dock will be moored to sea bed by tying to natural rocks with ropes.</li> <li>The floating dock mooring area (sea bed) is mainly sand dominated &amp; free from underwater growth.</li> </ul>	<ul style="list-style-type: none"> <li>Habitat loss will not occur, however at the point of contact of rocks &amp; seabed benthic faunal communities may be temporarily disturbed.</li> </ul>	<ul style="list-style-type: none"> <li>In order to ensure minimum disturbances to sea bed activities viz. dredging/digging are being avoided.</li> </ul>
Project Activity/ Component: Provision of sea surface as taxi way & run way			
Components	Provision of sea surface as taxi way & run way	Anticipated Impact	Precautionary/Mitigation Measures
Habitat loss & Alteration/Disturbance of sea bed	<ul style="list-style-type: none"> <li>The sea surface will be operated as superficial taxi way and run way.</li> <li>Since the design of planes to be operated is as such only 2 m water depth is required for taxiing/takeoff/landing activities, these activities are not anticipated to in contact with sea bed at any given point of operation.</li> <li>The sea surface area to be used for bottom/underwater growth.</li> </ul>	<ul style="list-style-type: none"> <li>Habitat loss &amp; disturbances to/alteration of sea bed will not occur in whatsoever manner.</li> </ul>	<ul style="list-style-type: none"> <li>To avoid contact of sea planes with sea bed, the design of sea planes to be operated is already considered to be operable on surface water.</li> </ul>

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Page 165

<http://environmentclearance.nic.in/writeresddata/EIA/03042021/2281MV/1FinalEIAReport/ShaheddislandWaterAerodrome.pdf>



So, you can see habitat loss, alteration, disturbance of creek bed, creek bottom, releases, and emissions, because of the speed boat path, you can see here, then you will see from the floating dock what kind of what impact it will have on which component. So, here you can see again what kind of precaution mitigations they would take.

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**Socio-Economic**

The setting up of any kind project would undoubtedly include significant impact on socio-economic and cultural life of the people in the project area. Here, an attempt is made to visualize and discuss such tentative impacts likely to be induced by the project. The likely impacts due to project activity are described below:

**Positive Impacts**

- The proposed project does not involve any displacement of inhabitants and so aspects like resettlement and rehabilitation does not figure.
- Establishment of project will help to improve tourism on Swaraj Dweep.
- There will be job opportunity for working in terminal building, apart from this there will be growth in indirect jobs and business opportunities to the local and surrounding people such as contractors, transporters and raw material suppliers etc. due to the proposed development in the area.
- There could be increase in hotels and restaurants.

<http://environmentclearance.nic.in/writeresddata/EIA/03042021U2N81MVI/FinalEIAReport/ShaheddislandWaterAerodrome.pdf>

Swajati

And then also the socio-economic part you will see that they have said that it would have a positive impact, we saw that it is going to generate 40 to 50 employment. So, here it says the proposed project does not involve any displacement of inhabitants, so there is no displacement, but we do not know if it is a physical displacement or economic displacement.

And then you also see the establishment of a project will help to improve tourism. So, tourism itself has its impact, negative and positive impact, and then the range of the rate of change which happens so we are not aware of that here as well. There will be job opportunities for working in the terminal buildings.

So, that is also claimed here but we are not aware how the local community is trained for taking the benefit of this opportunity. And likewise, they say that they can have, they would have increasing hotels and restaurants. But again, the question that we had learned about was how the local community is trained to take the benefit of these opportunities that come up.

(Refer Slide Time: 53:20)


**Negative Impacts**

- Due to the proposed project activity, there may be influx of contractors/skilled workers as needed during the construction phase. This may lead to strain on infrastructure facilities in the area. However, this impact is only for the short duration and temporary in nature.
- During construction phase, increase level of dust and other air pollutants may lead to health problems.
- Vehicular traffic and construction activities may create noise disturbance in the immediate vicinity.

**Mitigation Measures**

In order to mitigate the adverse impacts likely to arise in the surrounding area due to proposed project activity, it is necessary to formulate an effective mitigation plan. The suggestions are as follows:

<http://environmentclearance.nic.in/writeresddata/EIA/03042021/2281MV/1FinalEIAReport/Shahweddisa%20Water%20Aerodrome.pdf>




So, it also talks about negative impacts on all the skilled workers or contractors during the construction phase, who would be coming here which can put pressure on the infrastructure, and then they would be increased in the dust that would also have health issues, and then also congestion, vehicular traffic and so on, and then how they are going to mitigate those aspects.

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**Operation Phase:**

- The project management collectively will need a pool of watchmen, gardeners, sweepers, plumbers, fitters, STP operators, etc. Preference should be given to local people for any possible employment opportunities.
- The authority should help in promoting local people for livelihood commensurate with their will, skill and abilities.

<http://environmentclearance.nic.in/writeresddata/EIA/03042021/2281MV/1FinalEIAReport/Shahweddisa%20Water%20Aerodrome.pdf>



So, we do see that this particular project panel raises concerns over the Andaman water aerodrome project, and they do identify that the EIA report is inadequate. So, you also think and look at it like in what terms it is inadequate, what aspects they have covered to what detail, and what they have not covered.

So, that was part one of this particular case study, we will look into all the details. And I am just going to ask you to reflect on all the aspects which we have covered. So, you keep thinking and keep discussing in the forum. So, we see the part of this particular case study here. So, what is the scenario? What is the project like? What kind of likely impacts might happen?

(Refer Slide Time: 54:44)

**Summary**

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

106

So, that was what we covered today. We will continue with this in the next session.

(Refer Slide Time: 54:52)

**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>

107

So, our key reference for this is the EIA report itself on the development of water aerodrome in Andaman and Nicobar. And I have also given you the link and we will also share it with you on the forum, and it is available in the public domain so you can also access it.

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### Suggested Watch and Read



[https://www.youtube.com/watch?v=VdJtsErpf4i0&t=4s&ab\\_channel=Bacteriatwork](https://www.youtube.com/watch?v=VdJtsErpf4i0&t=4s&ab_channel=Bacteriatwork)



[https://www.youtube.com/watch?v=skb1QIhh9QM&ab\\_channel=ThinkAdvertising](https://www.youtube.com/watch?v=skb1QIhh9QM&ab_channel=ThinkAdvertising)




[https://www.youtube.com/watch?v=ukMUrHP9830&ab\\_channel=LondonAssembly](https://www.youtube.com/watch?v=ukMUrHP9830&ab_channel=LondonAssembly)

108

So, there are a lot of suggested watches and reads related to this so you can understand this particular case better. And you can see all these case references which are there.

(Refer Slide Time: 55:22)

 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



109

So, winding up today's session. Please feel free to ask questions. Let us know about any concerns you have to share your opinions, experiences, and suggestions. Looking forward to interacting and co-learning with you while exploring EIA. Thank you.