Sustainable Transportation Systems
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Lecture No. 17
EIA Case Study I

Hello, friends. So, by now, I am sure you are aware of several important features or aspects of EIA, that is environmental impact assessment. And we have also discussed several techniques methodologies processes of EIA, even including best practices across the world, which have been, implemented in several projects in different countries.

Today, we will discuss about one case study based on the EIA report that is Mumbai-Ahmedabad High Speed Rail project. So, we have taken several important features from the EIA report as well as other information sources and we will put forward, how this project got evolved? And what are important features? How they are addressing to those components, which are related to environmental impacts or environmental influences?

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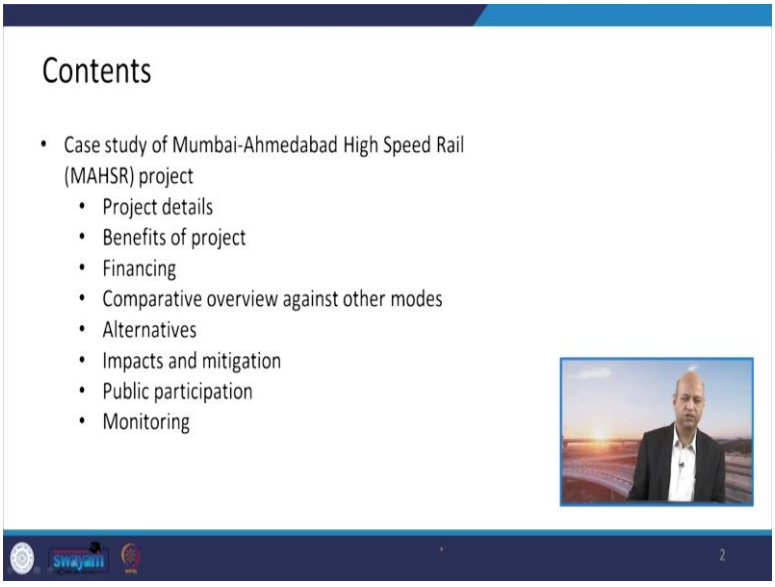

So, first of all, we will discuss like project details in brief, what kind of project it was envisaged and how it is being implemented? Then, what are the benefits of the project? Why this project was proposed? What would be the benefits when this project will be completely operational?

And then finances because, every kind of infrastructure project needs huge financial resources to construct that, to implement that. So, what are the sources of finances for this project? And then the comparative overview against other modes means, if for example,

rather than this high speed railway, we would be having normal trains or the roads, highways etc., then viz-a-viz what is the difference, how in terms of speed, in terms of time saving, in terms of cost everything. So, those alternatives will be discussed.

Then we will see the impacts and mitigation means major impacts and the mitigation, how they were, reported in the EIA assessment report, and then public participation because that is one important aspect. In last lecture, you might have seen that, if we go for genuine public participation, then we get very good feedback and the project becomes more viable.

So, public participation in this particular project, how it has been carried out, that would also be discussed. And then the monitoring of the project, we will see what are the ways to get monitoring of this project means, whatever recommendation of EIA, then what are the monitoring process for those implementation of recommendations.

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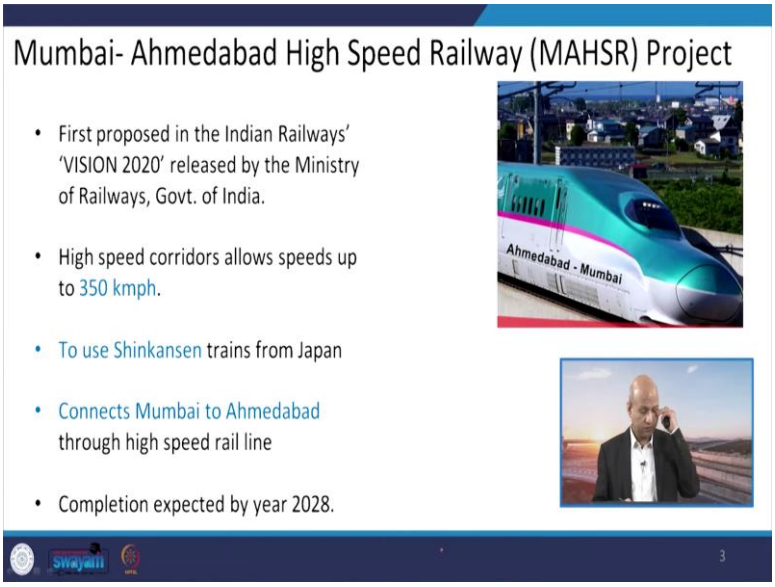

Well, so, Mumbai-Ahmedabad Speed Railway project it was part of Indian Railways 'VISION 2020' document which was released by Ministry of Railways, government of India. And the high speed corridors allows speeds up to 350 kilometre per hour so, that way lot of time saving is there, if we travel through these kind of transportation modes. Now, it was decided that this Shinkansen trains of Japan which is popularly known as bullet trains, that technology will be used in our case also.

So, several technologies were compared and because of its good feedback and good record, this was selected. And then like, of course, as it is also visible by name that it connects Mumbai and Ahmedabad but, there are several in between stations which will also be

connected. And the completion of this project is expected by year 2028. So, because this is challenging project, huge project it takes time. Well, what is the importance of this Shinkansen train? Why this was selected?

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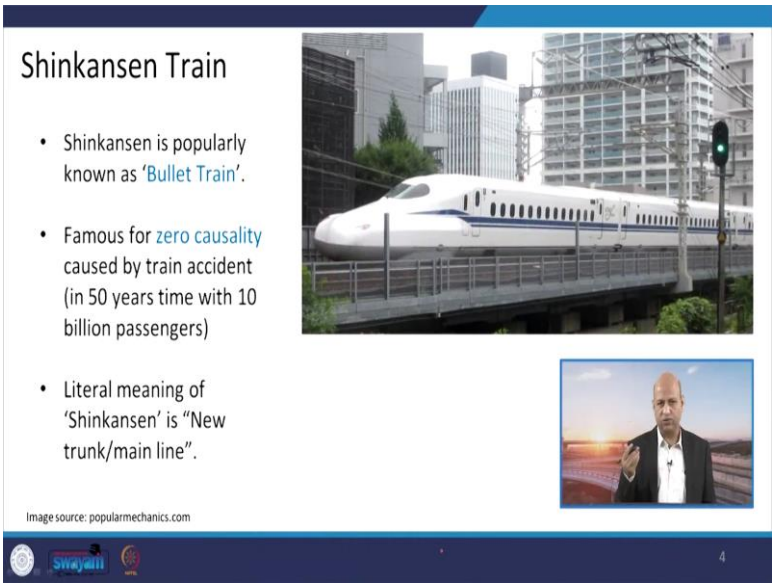

So, you can see, it is also known as bullet train. It is famous for zero casualty caused during its 50 years run, and 10 billion passengers it has catered, but still there is no casualty in any and there is no major accidents. There may be a little bit some very minor kind of thing, but there was no casualty across its time span till now. Plus, well this is the, I mean what is the meaning of Shinkansen? So, it is like new trunk, main line in Japanese this name is.

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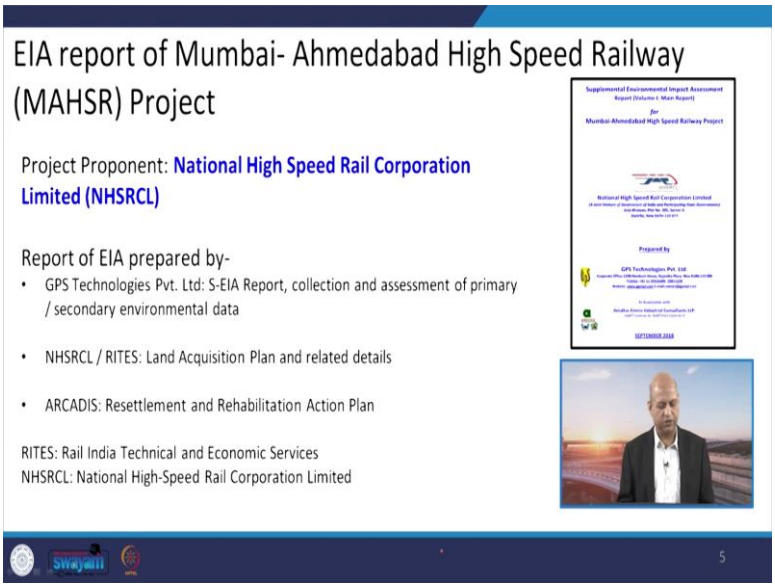

Well, so, this National High Speed Rail Corporation this EIA report for this particular project was prepared by GPS Technologies Private Limited and collection of data, then assessment of primary and secondary environmental data, all these activities were taken care of by GPS Technologies Private Limited.

Then RITES, that is Rail India Technical and Economic Services and this National High Speed Rail Corporation Limited, NHSCL this abbreviation of National High Speed Rail Corporation Limited. So, they were involved in land acquisition because they are the, basic promoters of this particular project.

So, the land acquisition plan and related other activities or details, so, RITES and NHSRCL were responsible for that. Then one other organisation was responsible for like resettlement and rehabilitation action plan, that responsibility was taken by this ARCADIS, which is again very famous organisation management related organisation.

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And in if you see this timeline when it was envisaged so, this particular corporation that is National High Speed Rail Corporation Limited, it was incorporated in 2016 under the Companies Act 2013 that is act provision where this was incorporated. Then, how this lot of money would be required for running this particular project to execute this project.

So, the financial matters or construction or maintaining, or management activities, all these were taken care of by a special purpose vehicle, SPV. This is way of doing things when you have multimodal projects or big projects, large infrastructure projects. So, this is special

purpose vehicles are the way, it is a kind of joint activity or joint venture by several organisations.

So, this is the project of central government through Ministry of Railways, and this state governments of Gujarat and Maharashtra are also involved. So, that way this SPV was created to join hands to make these three central government and to state governments join hands to execute this project.

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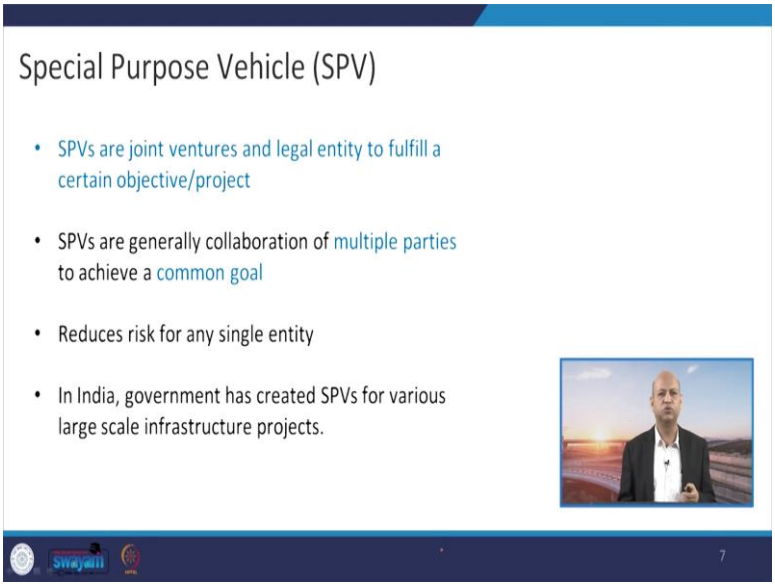

And what were the importance of this SPV, why do we need? So, basically these SPVs are joint ventures as I said, and these are legal entities like a company or that kind of legal entity which has certain rights, responsibilities, everything. And to fulfil certain objectives and projects, so, these SPVs are created. And they are generally as I said, joint ventures or collaborations of multiple parties to achieve the common goal which has been set by these partners, partner organisations.

Well, why it is needed? Because sometimes for large projects, huge projects, single entity has huge risk. So, when there are so many partners, then risk is reduced, that is one advantage. And also, because when different governments or different organisations are involved in carrying out a project, then it is good that they join hands like a partnership.

So, this SPV helped to execute that project in a smooth way. Otherwise, when one is owning one project, another one is only for giving some permissions etc., so, sometimes time is taken, lot of time is taken.

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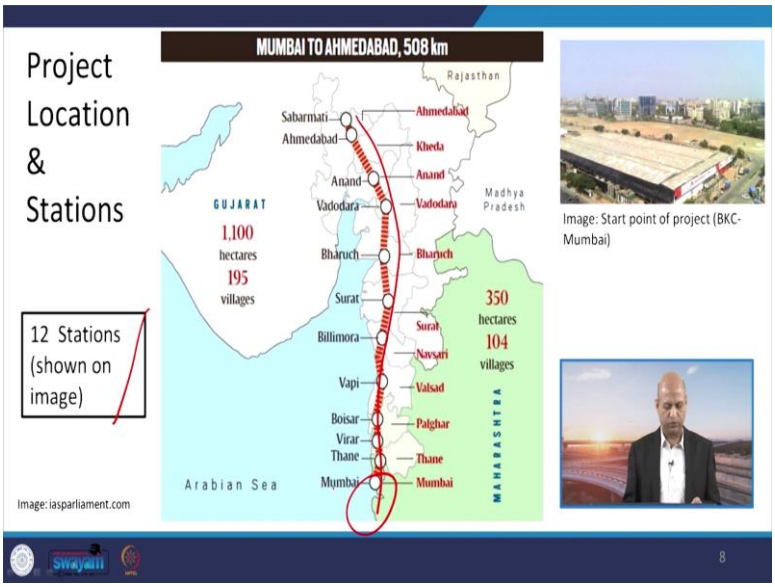

Well, if you see this, this map this line, where this Mumbai to Ahmedabad 508-kilometre track will be there for this particular project and 12 stations which are shown here like Sabarmati, then Ahmedabad, Anand, Vadodara, Bharuch, Surat, so, that way it will reach Thane and then Mumbai. So, this is the basically route for this particular project.

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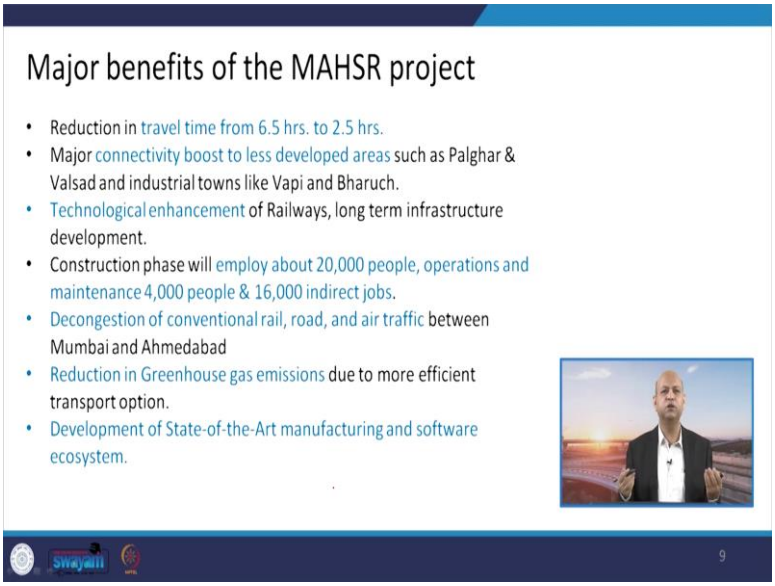

And if we, see the major benefits through this project then one major advantage is reduction of the time in significant way. For example, at present around 6.5 hours average is taken this travel time and this will be reduced to around 2 to 2.5 hours. And the connectivity will boost development activities of some underdeveloped areas like Palghar, Valsad and industrial towns like Vapi and Bharuch. So, they will have better connectivity.

Then technological enhancement, because this is the new technology for us and this will give way to learn many things and to implement in other sectors. So, several technological innovations will be implemented in this project. So, this is one more example or example of the advantage.

Then construction phase will employ around 20,000 people. So, employment generation is also there, a skill development is also there, we will see in another slide that not only the skill development of the employees, but those population which will be affected this project will take care of to enhance their skills to make them more employable.

Then operations and maintenance 4,000 people and 16,000 indirect jobs. So, many families will be benefited by this project. Then, it will also help in decongestion of other routes like railways, roads, air traffic because many people will travel through this particular mode of transport very quickly. So, the pressure on other modes will be released.

If you see in terms of like environmental benefits, then there is a lot of greenhouse gas emissions reduction, because when we are travelling through road, or through air, or through other means, then lot of greenhouse gas emissions are there which are responsible for climate change as you know.

So, with this particular efficient technology, there will be huge reduction in greenhouse gas emissions in total like if we calculate per passenger, per kilometre, then we will have very less amount of greenhouse gas emissions. And then of course, it will help in developing as I said new technologies and new innovations.

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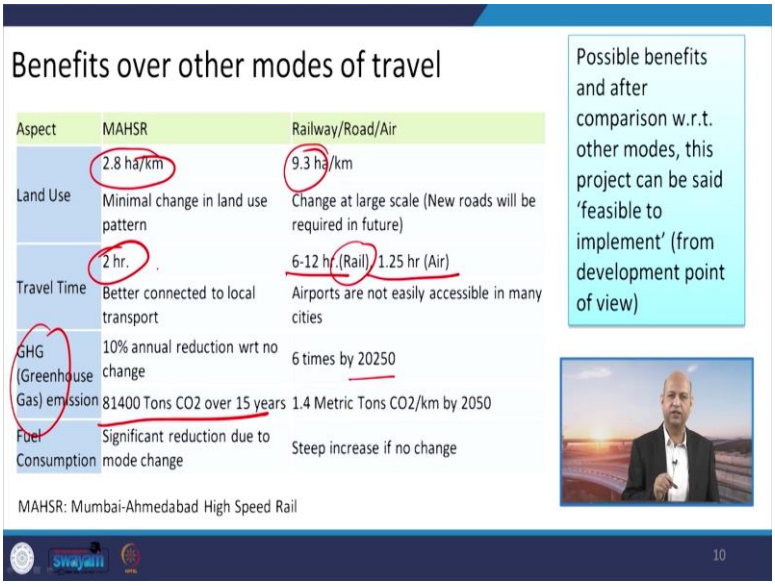

So, as I said, if we compare in terms of quantities, so, there is huge benefits in terms of land use or travel time and the reduction in greenhouse gases plus fuel consumption. So, there are lot of benefits in terms of these particular dimensions.

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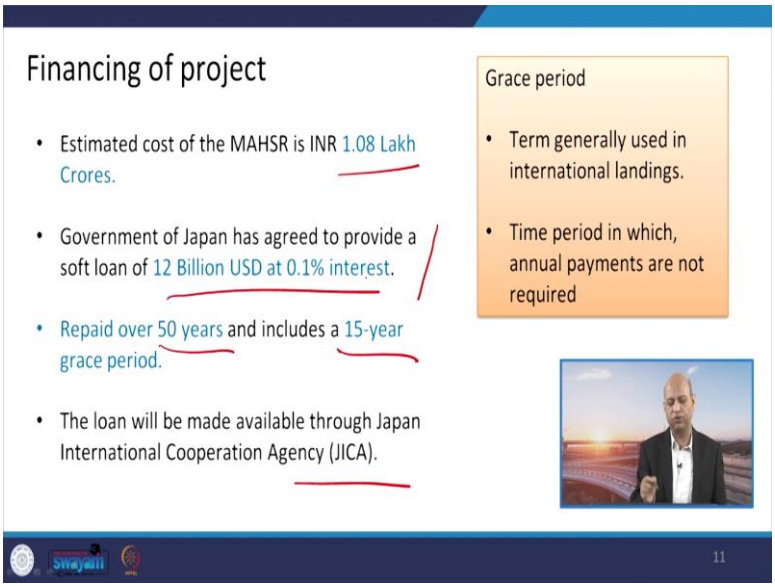

Now, the issue of finances, so, the estimated cost is very huge around 1.08 lakh crores. One crore is how much? 10 million. 1 million is 10 lakhs, one crore is 10 million. So, that way it is a huge cost which will be there for financing of the project, but this project will be funded by government of Japan through JICA, that is Japan International Cooperation Agency.

And this will be repaid, this soft loan will be repaid over the 50 years and 15 years grace period is also there in case something happens and we are not able to repay. So, this 0.1 percent interest means soft loan is there. So, that is a kind of support from Japan, because Japan has this policy of supporting their friendly nations, promoting good technologies.

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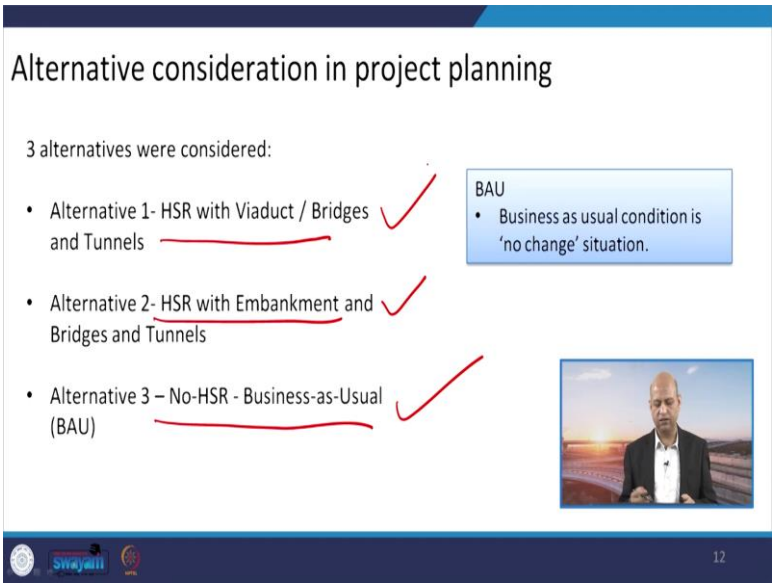

Then when this project was envisaged and different scenarios were compared. So, the alternatives were also compared, like alternative 1 was high speed rail with viaduct and bridges and tunnels or high speed rail with embankments like the tracks which will be seeing picture in next slide and bridges and tunnels.

And then alternative 3 means no high speed rail just only business as usual BAU scenario, so no change scenario and high speed rail with embankment and bridges and tunnels and high speed rail with viaduct that is above the ground, those kind of bridges etc.

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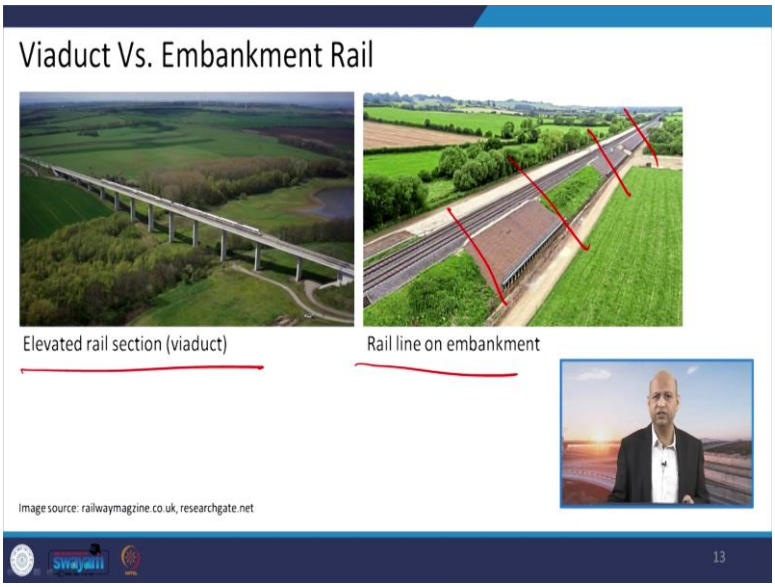

So, this is elevated rail viaduct. So, elevated rail section and this rail line on embankment. So, this occupies lot of land, the land acquisition those kinds of issues are quite critical in our

country. As you know several projects have faced these kinds of problems when land acquisition is the prime part of that project.

So, in this only very small land is being used for pillars etc. Otherwise, and there is also like crossing, freeways are there for animals or other purposes, but for this lot of land acquisition must be there. So, investment needed more. So, that way we can compare that in means less amount of the land will be required in this particular proposal, in this particular alternative.

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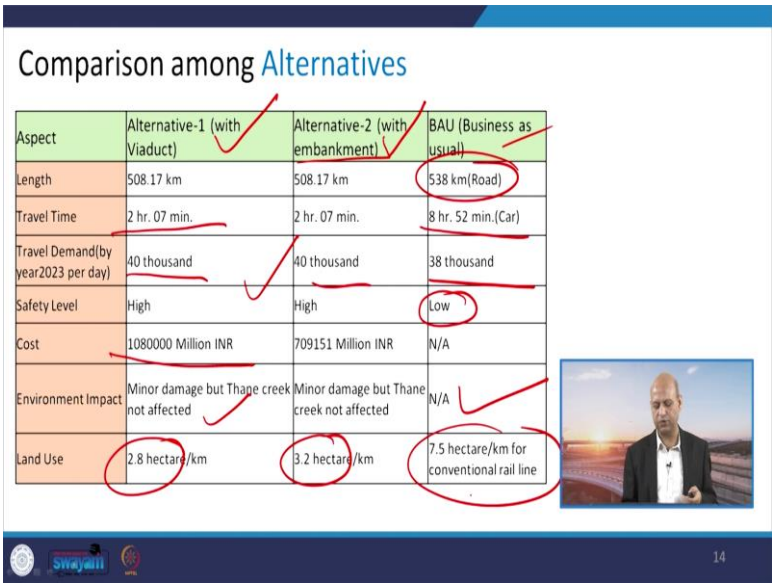

Well, if you compare different alternatives like alternative 1, which we have seen, the elevated one, then the embankment and BAU. So, lengths are same, but in this already existing the route is longer, 538 kilometre otherwise, it is around 508 kilometres. Journey time in both alternative it is same 2 hours around and this is 8 hours 52 minutes of course.

Then travel demand by the year 2023 per day that was estimated at that time 40,000, 40,000, 38,000 so, more people will use these kinds of alternatives. Safety level, very high safety level in this bullet train whereas in in comparison to the bullet train, the safety level is lower in the this BAU scenario or business as usual scenario.

Cost, no doubt where means technologies higher and so, many things, so, cost is higher. Environmental impact is we see then, business as usual means what whatever is going on that will go on, there will not any additional activities. So, environmental impact is not the case here, but in these alternatives, there will be some minor damage to the particular portions of that route, so, that will be taken care of.

And land use as earlier also we discussed only 2.8 hectare per kilometre is being used, whereas in this embankment related route, this was larger 3.2 hectares per kilometre and the present one is having longer route and other things, so, 7.5 hectares per kilometre for conventional rail line.

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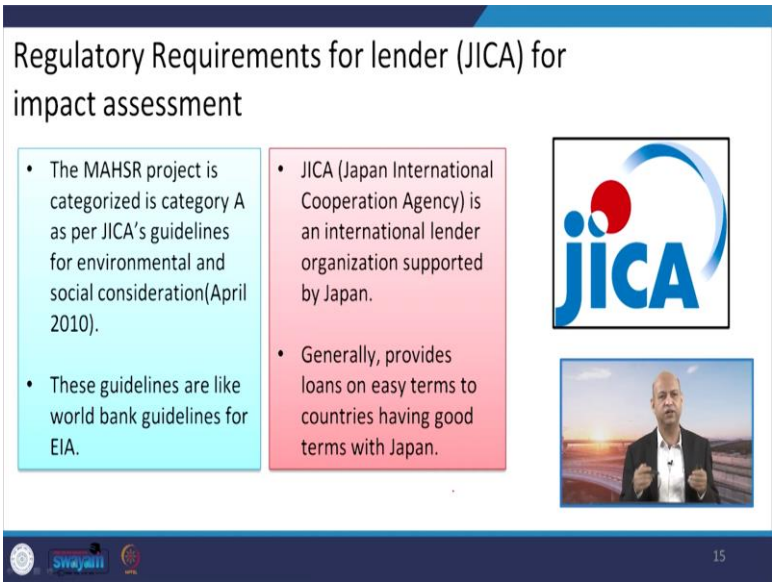

Well, regulatory requirements for lender means, whosoever funds the project they have their own conditions. There are certain terms and conditions which borrower has to fulfil. So, those guidelines from the regulatory requirements are there and that guideline also includes the EIA, very exhaustive EIA, very detailed EIA as World Bank also does.

So, similar JICA also has the guidelines for having the detailed EIA, so that one can know what are the real environmental impacts and how the mitigation measures will be taken to reduce those impacts.

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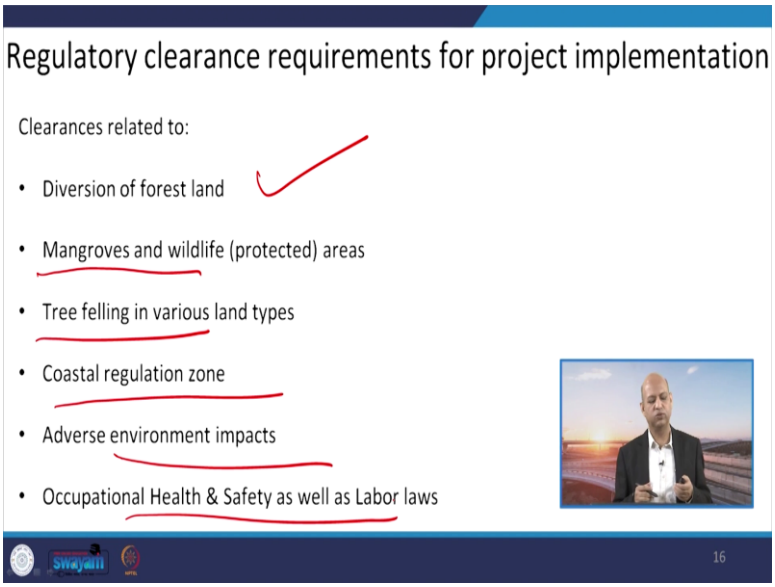

So, the diversion of forest land then there are some mangroves and wildlife protected areas which are in between the route, some tree felling cases are there at certain locations, then there are certain coastal regulation zones, adverse environmental impacts, occupational health and safety issues or labour laws, all these are the regulatory clearances required for this project implementation.

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So, then, these are the agencies which are involved for all these regulatory requirements fulfilment, like MoEF Ministry of Environment and Forests and Climate Change, then Central and State Pollution Control Boards are there who are responsible for pollution levels and air quality or water quality and land and, then forest department is there, national green

tribunal is there. So, so, many environmental protection agencies, authorities or other legal agencies are there which have their own requirements which are to be fulfilled properly.

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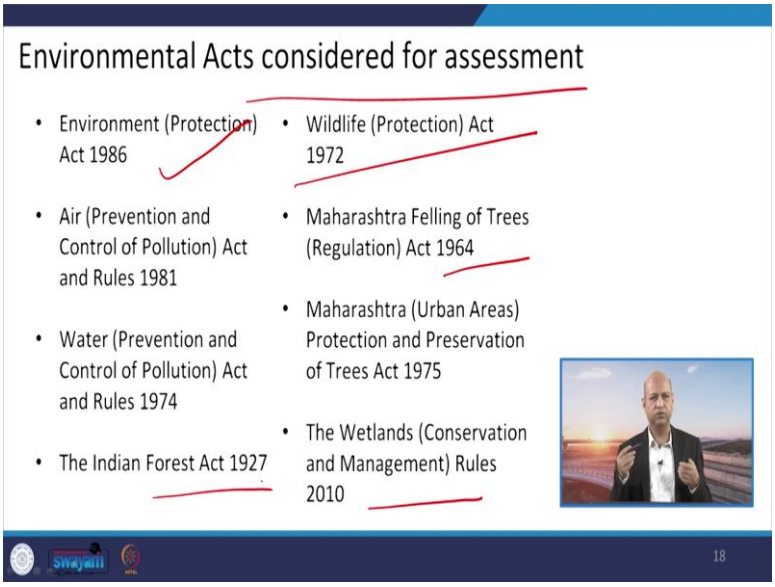

So, Environmental Acts considered for this assessment, what all these which are existing in our country like Environmental Protection Act 1986 and the Wildlife Protection Act of 1972, Maharashtra Felling of Trees Act 1964 that act is there. So, because Maharashtra government's land will be there. Similarly, Maharashtra Urban Areas Protection and Preservation of Trees Act 1975.

And then this Wetlands Conservation and Management Rules 2010, then Water Prevention Control Pollution Act, Air Pollution Control Act, Indian Forest Act, all these Acts have to be, all whatever provisions are there, one has to take care all those requirements.

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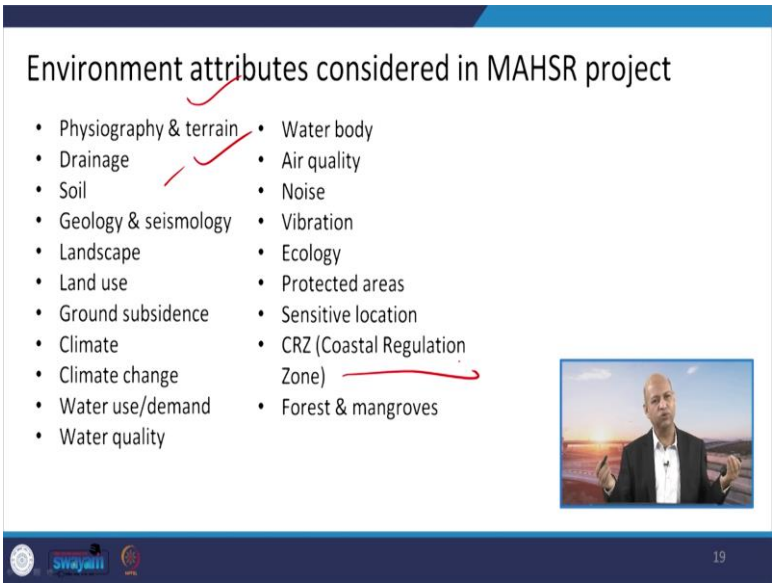

Well, so, the attributes of the environment which were considered to prepare this detailed EIA in this particular project of Mumbai-Ahmedabad High Speed Railway, so, these are like all physiography, geography, terrain, drainage, soil, geology and seismological aspects and then land use patterns or there are coastal regions also so, that is coastal regulation zone is also to be considered. Then ecology of every kind of section, air quality, noise all aspects have been taken care of.

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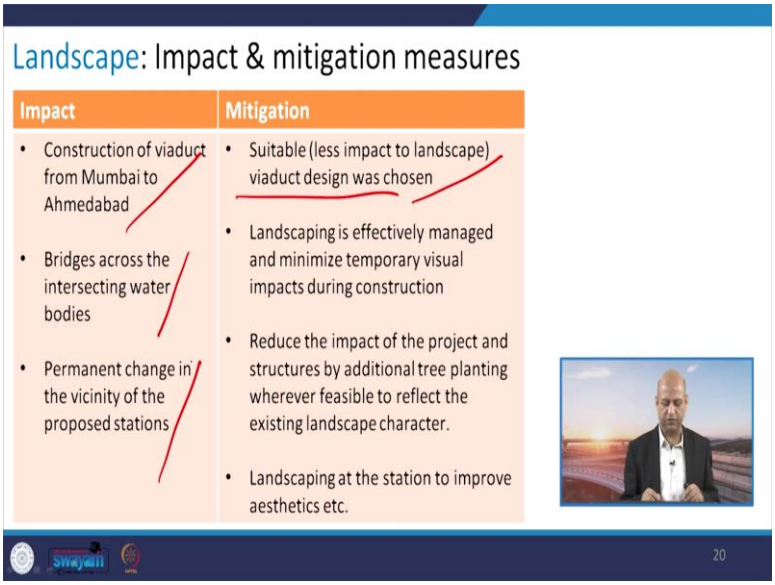

Well, when we talk about impact and mitigation measures, so, if we see some examples like construction of viaduct from Mumbai to Ahmedabad, so it is suitable, because less impact to the landscape, it will not change landscape much more and that is why this elevation design

was chosen. And there is also no issue of land acquisition as I said, and that cost is reduced basically.

Then bridges across the intersecting water bodies, permanent change in the vicinity of the proposed stations that will be there of course, but as such in the field there will be less disturbance afterwards, during construction there will be of course disturbances and things will be taken care of.

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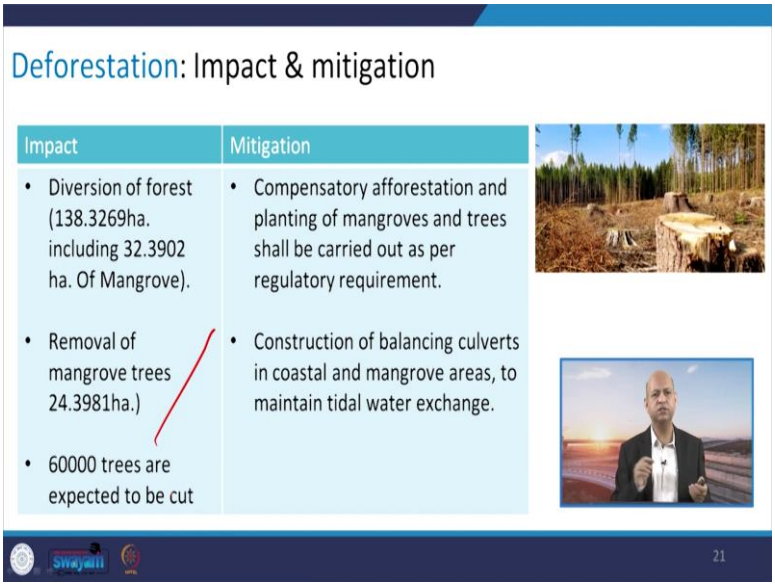

Then deforestation like there are certain number of trees or mangrove trees. So, all these have to be removed, but in place of them there are provisions that some planting of additional mangroves will be done and the trees will be planted in the vicinity of those areas. So, that compensation properly will be done.

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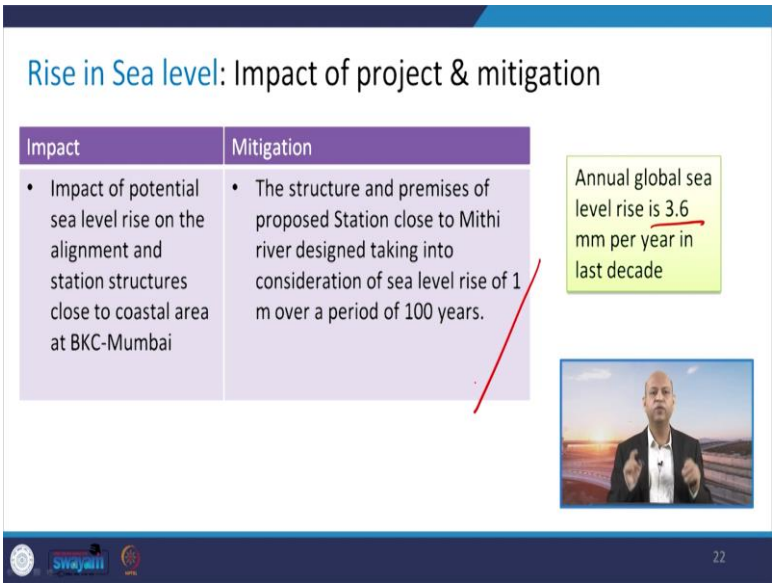

Rise of the sea level because as you know, because of global warming sea level is rising around 3.6 millimetre per year, is the average value of sea level rise. So, for designing of this project, this aspect has been taken care of and around this project can take care of even the sea level rise happens up to 1 metre. So, that kind of things have been included into design aspect, calculations.

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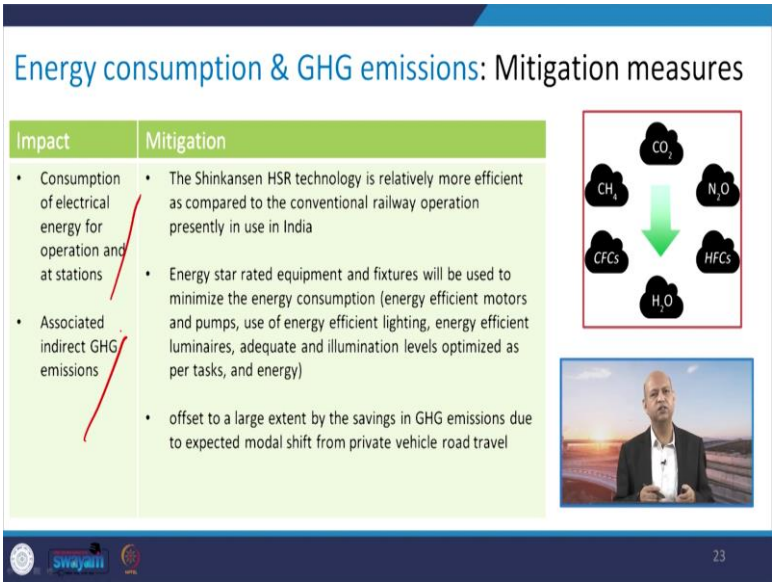

Then energy consumption and greenhouse gas emissions, as I said, because it will be run by electricity, some sources will be there of course, like fossil fuel based thermal power plants or it the electricity can be taken from other sources also, but in totality means because of the

speed, high efficient technology, the greenhouse gas reductions which we have seen in our table 10 % reduction of the greenhouse gases will be there.

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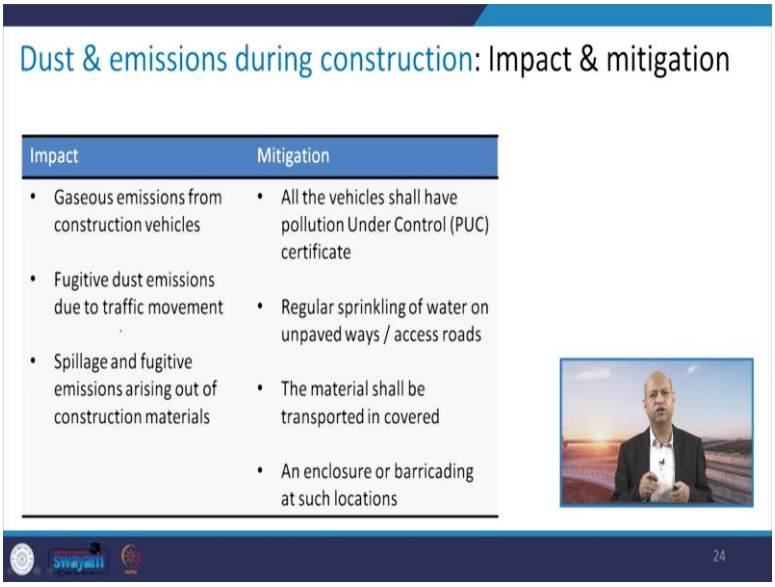

Dust and emissions during construction because construction activities cause lot of fugitive emissions etc. So, proper sprinkling of the water and those kind of ways are there they will be taken care of that way.

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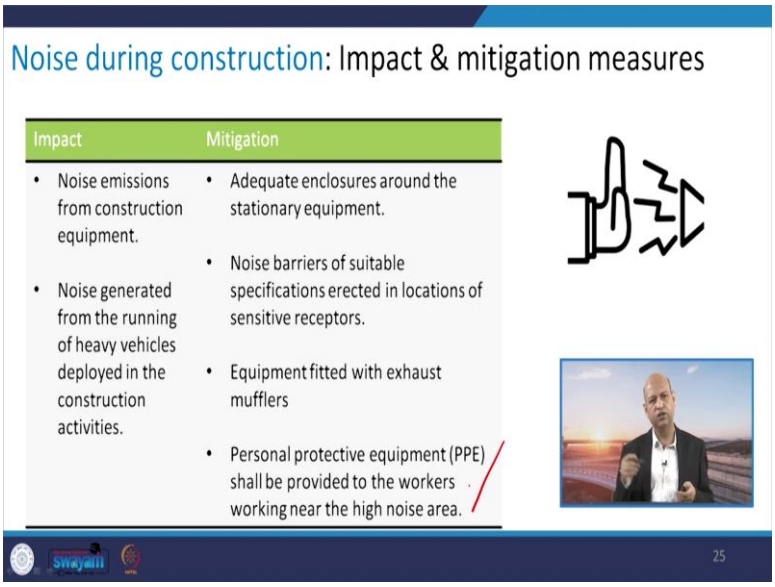

Noise because noise is there when machineries are being used or something blast, blast happens when some ways has to be cleared those kinds of things, and because of there are certain instruments which also create noise. So, these are related to occupational and health

issues. So, proper, personal protective equipments will be given to those who are the workers in, at that location.

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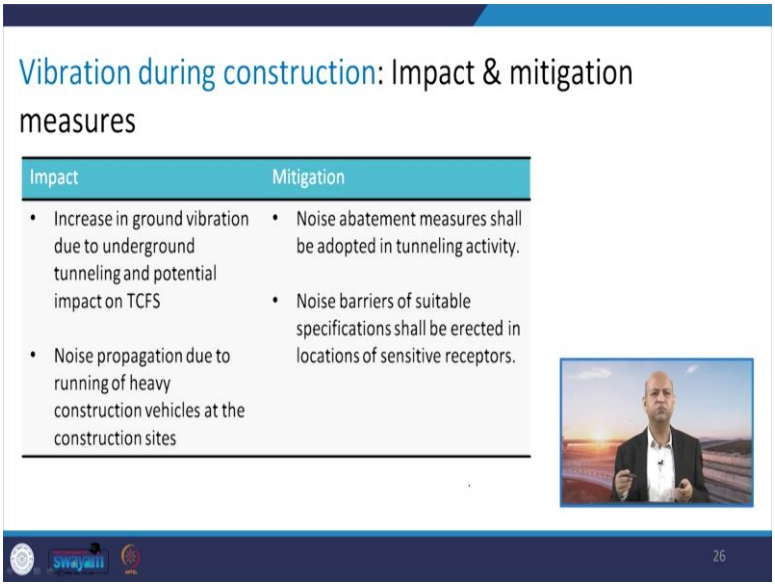

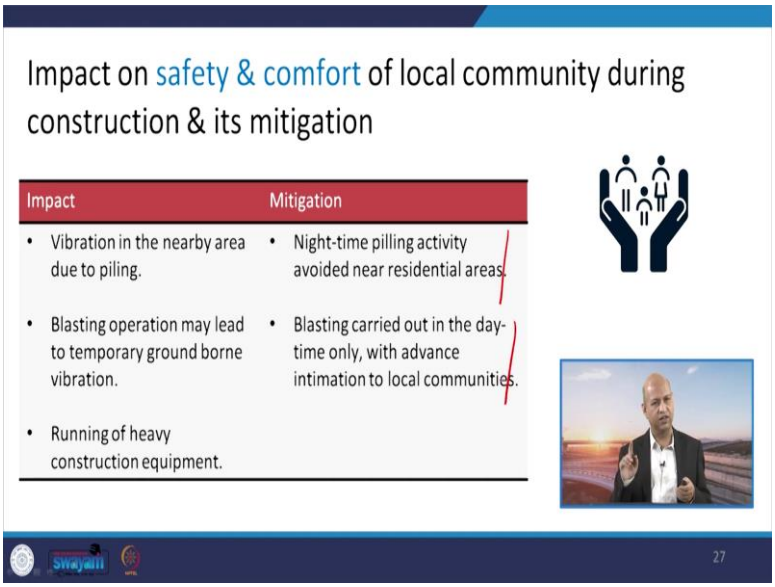

And it is also taken care of like, at certain times means, like night-time activities will be stopped if it is near eco sensitive zones and villages etc. So, the vibrations and all those noise related impacts have been taken care of with proper guidelines. So, like night-time piling activity will not be there, blasting carried out only in daytime, all those guidelines are there or provisions are there.

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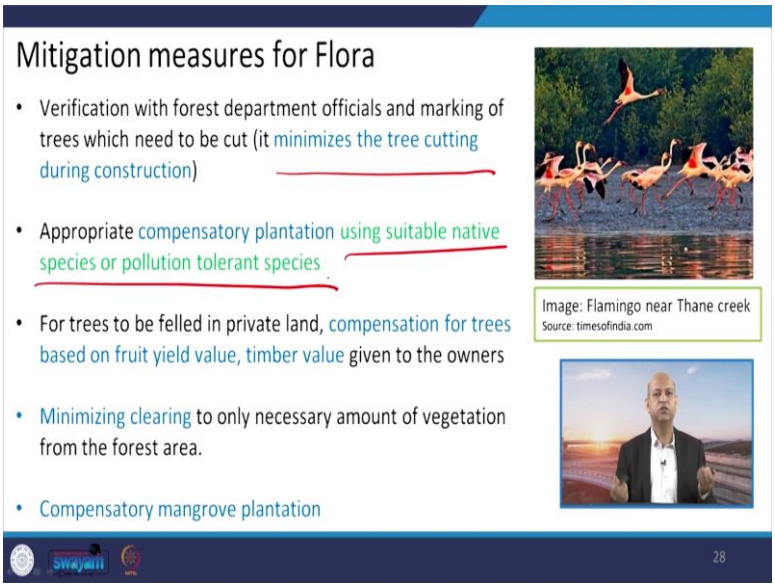

Then for flora, so, forest with forest officials and their expertise, whatever recommendations are there from their side, so, the minimization of the tree cutting during construction, so, that way routes have been designed properly and then appropriate number of trees will be planted in compensation wherever tree felling is there.

So, using suitable native species and pollution tolerant species, that is very important to focus upon because sometimes earlier people just used to have plantation of any kind of species and those species may not be native and because of those species, which are not native the native species got damaged.

So, this, in this particular project, it has been taken care of properly that only native species will be used and also those species will be promoted, which reduces pollution because there are natural plantation or plants or trees which have tendency to reduce certain pollution. So, these kind of things are there.

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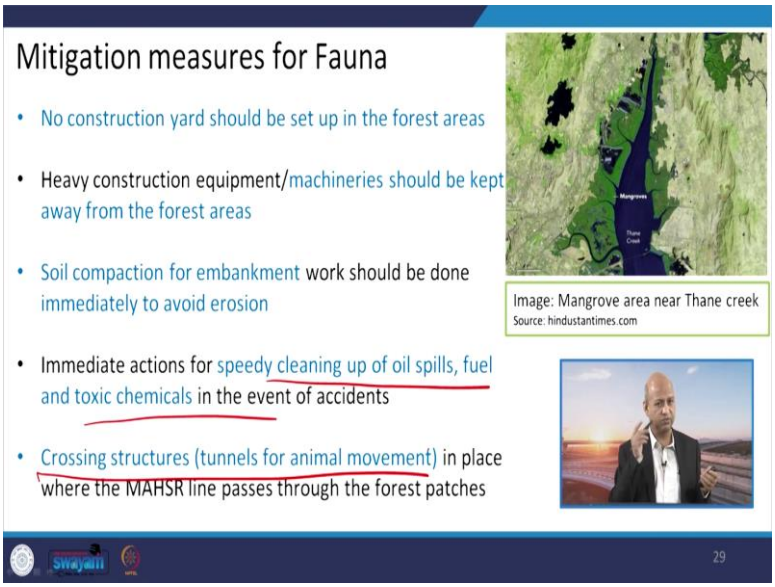

For fauna, so, again construction activities and some passes for those life forms and this you know, like cleaning up of oil spills, fuel, toxic chemicals immediately without leaving them, otherwise they can damage the sensitive ecosystems. So, all these things, crossing structures for tunnels, animals through tunnels etc., we have seen those kinds of structures in earlier lecture if you may recall. So, those kinds of structures will be there for animals etc., so that they can cross from one point to another, wherever some bridges or those kinds of things are there.

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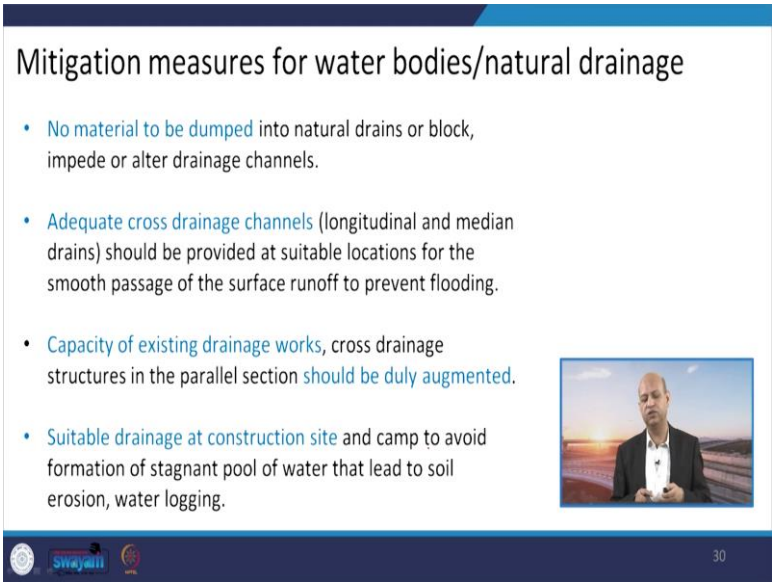

Then if we see the water bodies and natural drainages, so, again no material will be dumped to block the drainages. So, those strict plants are there to execute and they will be taken at

proper place to dispose of them or maybe to use like nowadays waste to wealth, this philosophy is growing. So, nothing is waste if we can use in some other activity to through recycling or those kinds of things. So, this drainage and construction at construction site will be taken properly care of.

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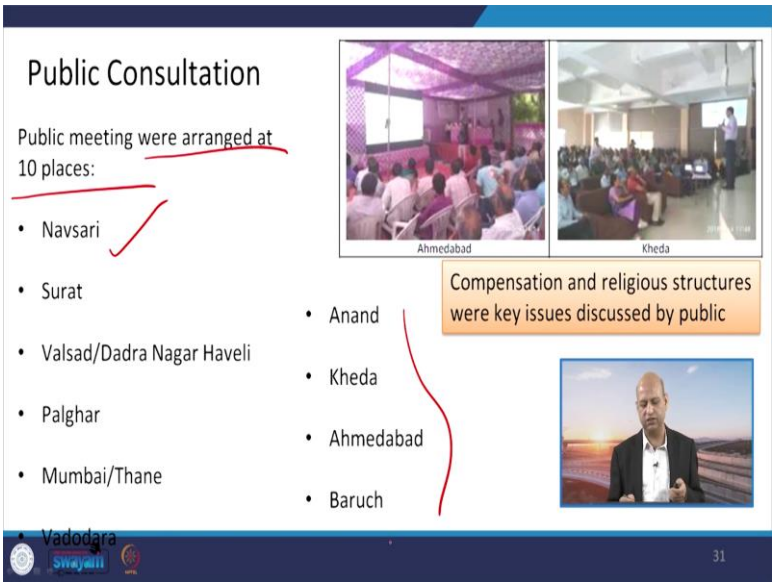

Public consultation as I said, this is one important issue because public participation makes the project successful if they are happy. So, at 10 places public meetings were arranged like this Navsari, Surat, Valsad, Palghar, Mumbai, Thane, Anand, Kheda, Ahmedabad, Bharuch all these places and people were given proper information, so that there is no grievances or there is no issues which can later emerge.

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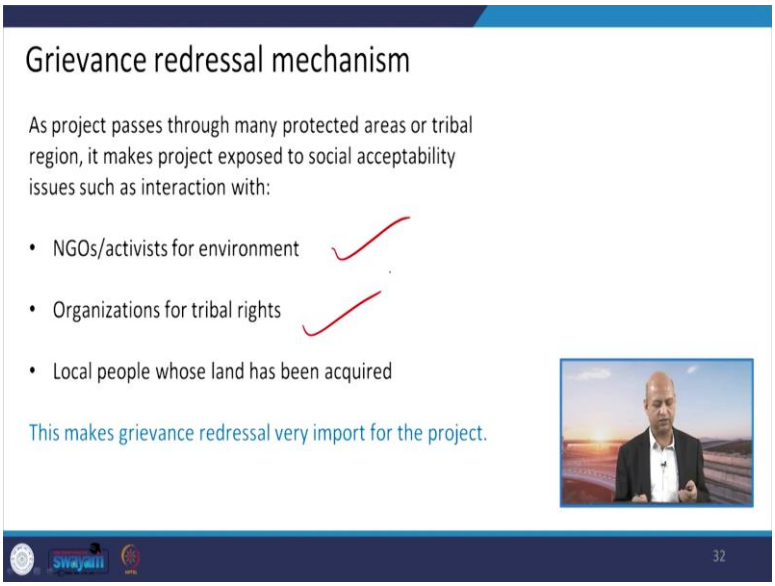

And also, there are issues, if grievances are there through NGOs or activists or some organisations which are working among, for tribal rights etcetera, local culture etc. So, their issues were also properly listened and they have to be taken care of.

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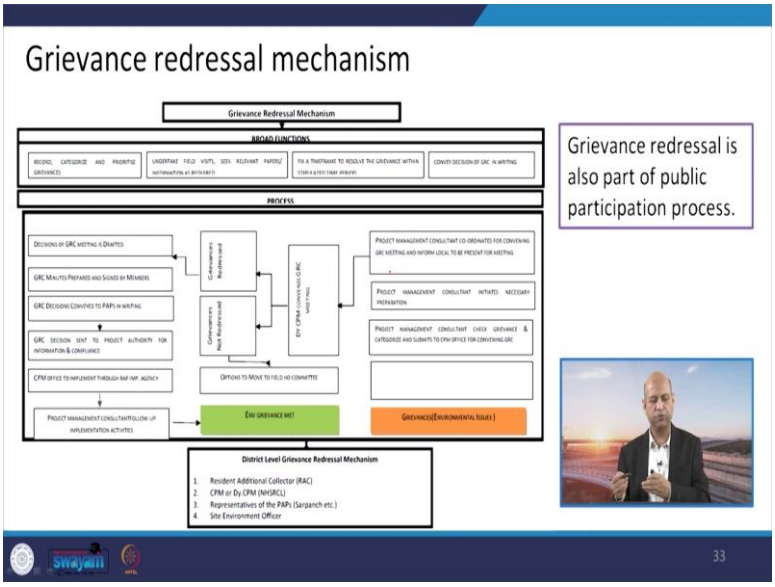

So, this particular mechanism which is shown in this flowchart has been several organisations and responsible agencies or people were put in together to redressal mechanism for grievances.

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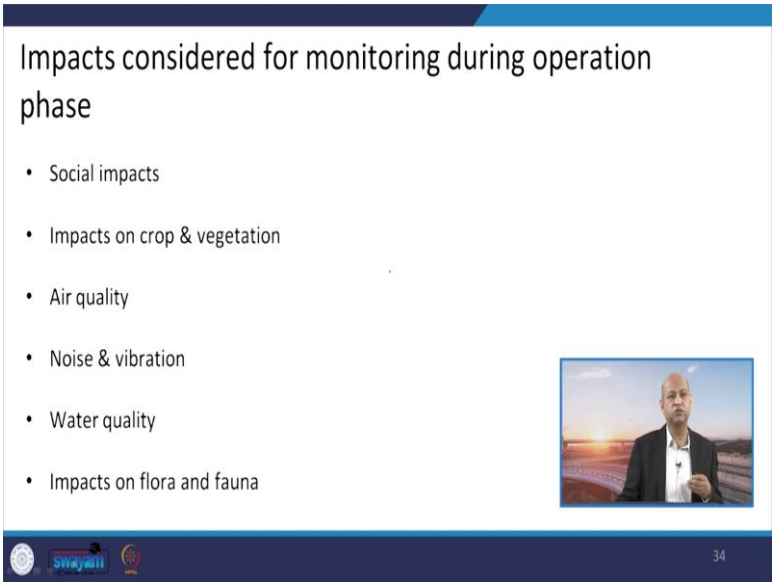

So, the impacts, which were considered for monitoring during operation phase are like social impacts or impacts on crop and vegetation, air quality, noise and vibration, water quality impacts on flora and fauna. So, all these aspects, which are part of the detailed EIA for

impact assessment and monitoring, continuous monitoring to see their condition or impacts of the project. So, they have been properly considered.

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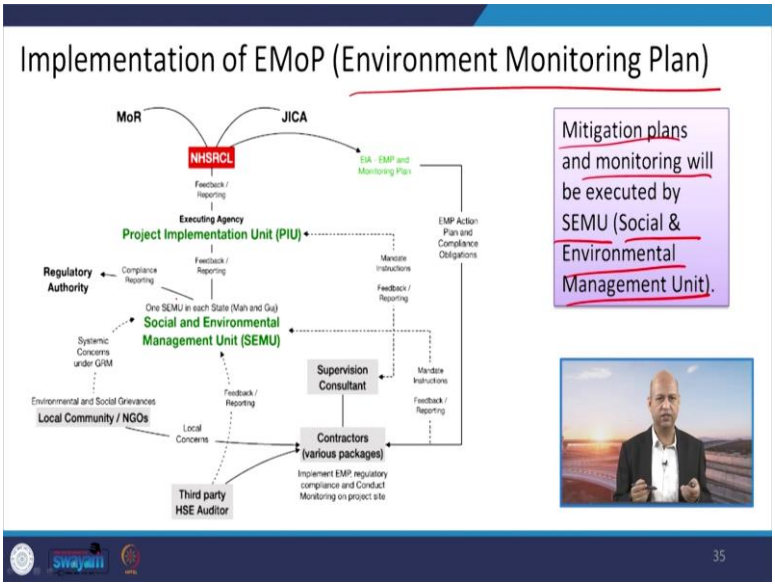

And then environmental monitoring plan has been into place. So that this unit mitigation plans and monitoring will be executed by SEMU that is social environmental management unit. So, this unit was properly created and that is responsible for this implementation of environment monitoring plan, and they submit report time to time to the officers and they take care and the review process happens. So, again, these are different ways where they collect information and the report those kinds of mechanism is there.

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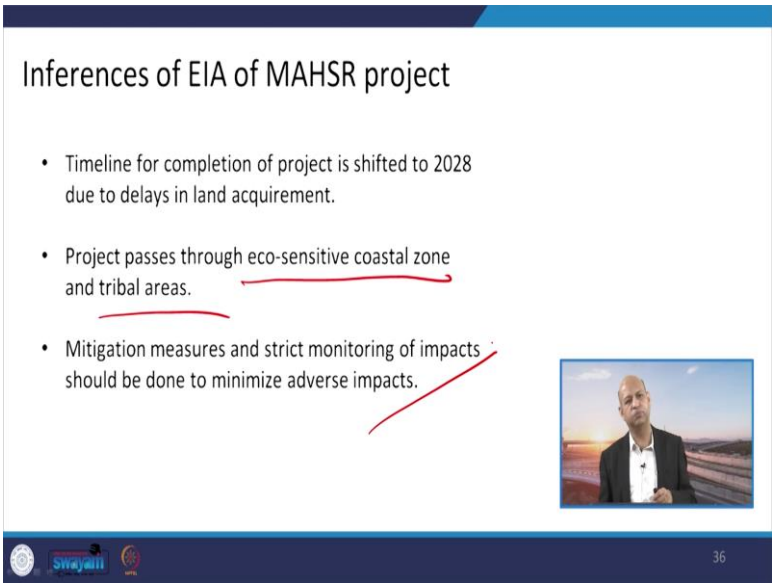

Inferences of this EIA for this particular project are that timeline for completion of project is shifted to 2028 because of this, exercise of detailed EIA, it was known that certain activities will take more than expected time, to address those issues properly, in terms of socio-economic impacts or environmental impacts, time is required. So, the timeline was shifted.

Then project passes through eco sensitive coastal zones and tribal areas, as we have seen, so, proper redressal of those issues are there, mitigation measures and strict monitoring impacts should be done to minimise adverse impacts. So, those recommendations or inferences have been properly taken care of.

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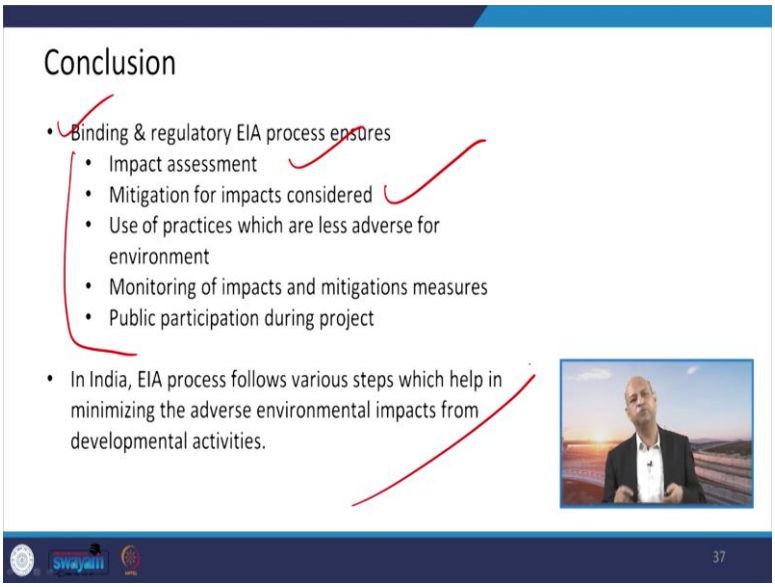

So, in conclusion, we can say that, this process, this EIA process is needed for impact assessment, mitigation of impacts, which are considered and use of practices, which are less adverse to the environment, monitoring of the impacts and mitigation measures and public participation, all these issues are kind of binding in terms of legal terms.

So, these are the binding and they have to be properly taken care of. So, these kind of EIA, if we go in detail, and if we implement the recommendations, then project becomes more successful, because there is no agitation, there is no issues or complaints or grievances afterwards.

So, that is why such kind of proper EIA must be there, and we should, use them as best practices. So, this is one very good study from EIA perspective, which we have discussed today.

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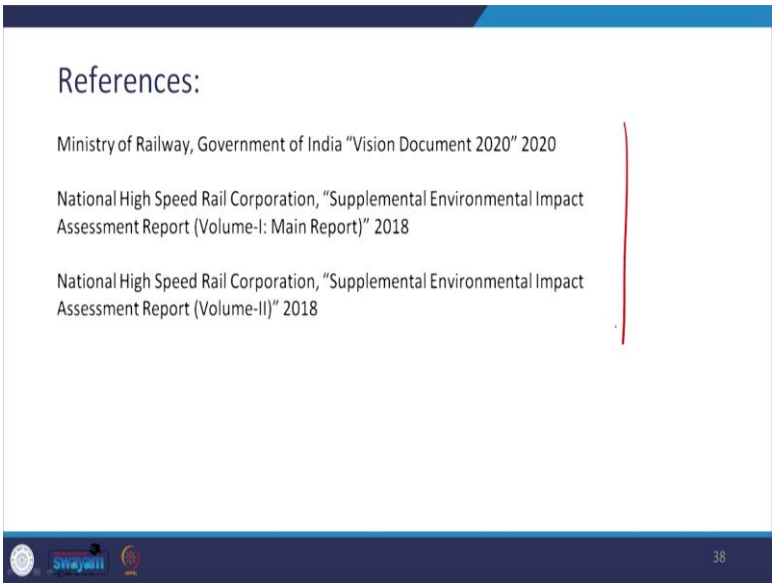

These are the references where we have taken information so, you can go through those big reports, and you can have detailed information if you want to have more database report. So, thank you for your kind attention. And we will continue to have more case studies, not only for EIA, but for transportation systems so that we can learn about their success stories, or if there are problems like failure cases that also are the ways to learn those negative things. So, we will continue these case studies further. Thank you again.