Sustainable Architecture
Prof. Avlokita Agrawal
Department of Architecture and Planning
Indian Institute of Technology, Roorkee

Lecture – 21
Sustainable Sites - I

Good morning. Welcome to this new week where we are studying about Sustainable Architecture, this online course on Sustainable Architecture. From this week, we will start looking at the strategies and the technical details of how to design sustainable buildings. In the previous week, we have seen how to understand the climate of a place what are the tools that we can use, what are the passive design strategies which can be employed in buildings. They were largely the passive design strategies that we were focusing on which we were discussing.

From today's lecture onwards, we will be talking about the design strategies and construction strategies which will be employed in design and construction of sustainable buildings. Today we are looking at how a site development should take place for sustainable architecture.

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So, while talking about sustainable site development for any building project we have to look at few aspects which are common. The first one being site selection, where the site should be located, what all amenities should be around it, how much, what should be the

distance and all that is covered within the site selection, what kind of land should be there which would be selected?

The next is the design, development and management of the site. So, how are the different features on site going to be, where will the building be, how will in how a timely manner or phase wise manner, how the construction would go on and how will the construction materials? And all other activities will be managed are covered in this site design, development and management.

Next we have transportation, because for any site the transportation to and from the site becomes very very important. So, what are the options available, what are the other strategies which can be provided while we are developing and hence the options the possibilities opportunities will have to be provided right in the beginning when the site is being designed developed. And we have stormwater management. So, all these aspects will be looked at in detail when we are talking about the sustainable development of sight. Let us look at each one of these individually.

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So, we are here looking at the site selection goals. What is it that we should look while selecting a site for a sustainable project? The first one is its location, where is it located. So, when we talking about location we are looking at its proximity to the transport hubs. For example, railway station, bus terminus, the local transport, that is one aspect of

location. We are also looking at its location with respect to the natural features which are present.

For example, are we within the flood line, the within the flood plain of a water body, are we coming in way of the catchment area of the water body, are we building, are we developing our construction on an area which is a natural habitat for some species or it contains some endangered plants and animals. So, all that is considered while we are selecting the site.

So, we are looking at its location with respect to the development which is already there the infrastructure. We are looking at the natural areas, how we can avoid the destruction of these natural areas, how we can protect the natural areas. In addition to that when we are developing we are looking at encouraging density and diversity.

In the initial lectures, when we were establishing the need for sustainable architecture we have seen how the world is growing. So, urbanization is a trend which is on a rise these days across the world not just in India. So, more and more people are rushing towards cities and our cities becoming bigger. Instead of the city is becoming bigger it is necessary that the development be contained in smaller areas and the density be increased. So, to encourage the increase of density and along with that the diversity, diversity through use of land for different purposes. And then we also have to restore natural areas wherever possible through the site selection.

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So, what are the strategies that we would employ when we are looking at the site selection? First of all we will be looking at increasing the density. So, we construct in an area which is already developed, which is already constructed. So, adding another building to that reduces, not reduces, but does not increase the load on infrastructure.

Suppose for example, we have to come up with a new housing scheme. So, instead of developing the housing scheme come on a green field little far away from the city it is a advisable that the pockets be found closer to the city. So, that no additional transportation will have to be planned, no additional water pipelines, sewer lines and electricity everything all that infrastructure in addition to what is existing will not be needed if we were building it closed.

Other amenities for example, which will grow organically, suppose there is a residential housing coming up in a new area then a lot of amenities will automatically start to grow up organically, banks will can come up shopping areas will come up, crush a lot of these amenities will come up. Now, that is an additional infrastructure. So, we try to build in areas which are already dense, which are already developed and hence we prefer redevelopment. Instead of development we will prefer redevelopment. So, areas where the buildings are very old or have completed their life will need to be redeveloped. While doing that we are ensuring that the habitat for animals, plants, the natural habitat is protected at any point of time.

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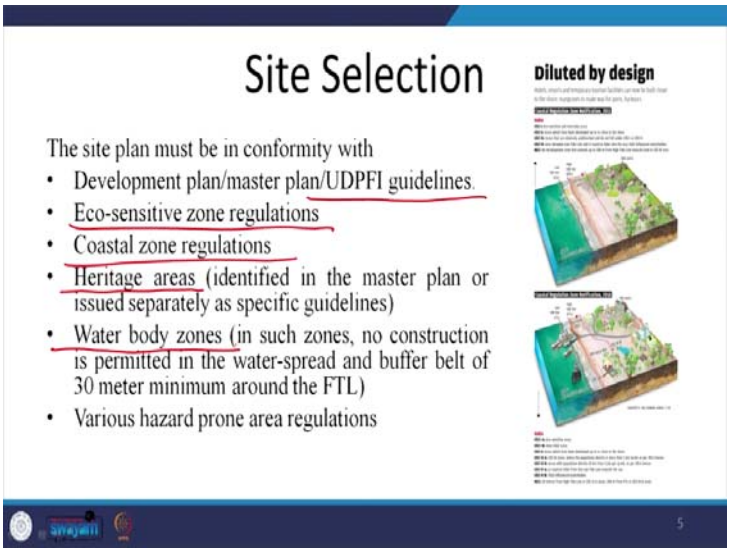

So, when we are looking at site selection besides the broad thing we have to see that the development plan or the master plan is confirming with the UDPFI guidelines, the local bylaws or any local law which governs the development of a site. It has to confirm to that.

We have to keep in mind and we have to adhere to the eco sensitive zone regulation and coastal zone regulations. So, all the government regulations and local by laws; local laws which are governing must be fulfilled we should also keep in mind whether we are building in proximity to the heritage areas. So, there are laws governing the distance between the new development and the heritage site which is already there and all that. So, we have to keep into my in mind the heritage areas and the laws associated with them.

We have to understand we have to know the water body zones. So, no construction should be done where within the hundred year flood line level. Also no construction should be done in the catchment area of a water body. So, if you remember there was there is usually an uproar when the catchment areas of rivers and lakes are being encroached upon. So, a lot of projects you might be able to recall through media, through newspapers which keep coming up in the limelight, the impact of such haphazard development if we are not taking into account all of that is it will impact the natural resources and some all the other way.

There are a lot of water bodies where because a lot of catchment area was developed covered because of boundary walls the water did not reach the surface aquifer and the water body has died. It has a direct impact on further systems for example, the ground water table will deplete, it will decrease. There is no surface aquifer which will help it recharge. It will reduce the amount of greenery which is their vegetation because the ground water table the there is not enough moisture and the land we eventually moved towards desertification. So, all these are subsequent effects if we do not do take into account, keep in mind all these different guidelines and regulations.

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We have to give preference to Brownfield development. We have already discussed about what a Brownfield is, versus a Greenfield. Here for a sustainable site development we would prefer that a Brownfield is chosen it is often difficult to develop Brownfield because there is already an existing contamination or a building structure which needs to be demolished. So, often an extra cost has to be added for clearing the site and making it ready for the new construction, new site development.

However, we ignore the cost of natural resource consumption in all such cases. Simply because it is not going out of our pocket, we totally omit it, we just do not think about it. But for any sustainable site development the preference should be a Brownfield not a Greenfield.

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Here we will have the opportunity to restore the degraded urban land and to it will help to promote the infill and it will reduce the sprawl. In today's times when urbanization is increasing at such a fast pace, we are witnessing the sprawl, urban sprawl. The cities have increased multiple times if we look at their areas, if you look at Delhi, Mumbai, any other metro city not just within India, but across the world. The cities have gone at least many many times from what they originally were. So, the aim of sustainable site development is to reduce sprawl and which can happen if we select Brownfield sites for the development and redevelopment.

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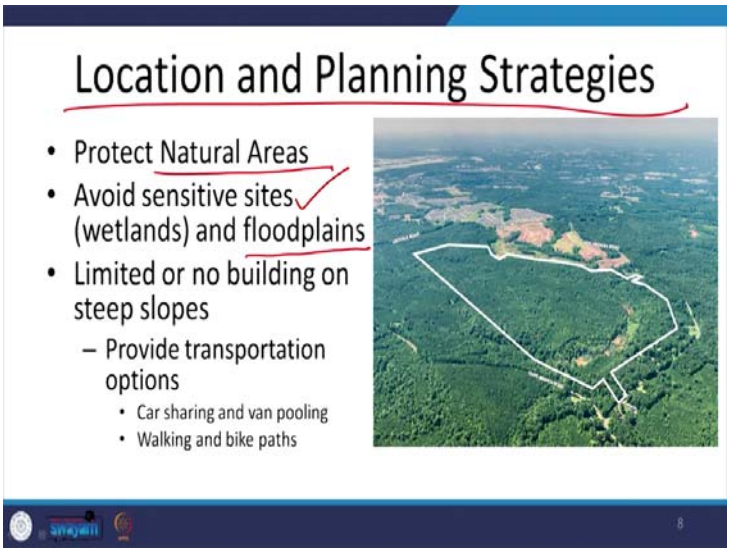

Besides the selection strategies we also have the location and planning strategies. Here the things which we have just discussed for example, the protection of natural areas, these become very very important. So, this is planning strategy. We have to avoid the sensitive sites, building on sensitive sides and the flood plains.

Now, these are the recharge, these are the lungs for the nature and they help in sustaining the natural resources and the regular systems of nature. So, we have to avoid any sensitive site, development in any sensitive side and floodplain. We have to limit or not build on any of the steep slopes. Unfortunately, if we look at all the hill towns these days because of this increase in migration people move to the city areas more and more the steep slopes are being constructed.

Thankfully, fortunately a lot of new technological advances are also there to support the kind of construction we are looking at, construction on extremely steep slopes. However, nature is unpredictable these constructions are so prone to hazard specially in hilly areas, so there are earthquakes, there are landslides, now all these slopes steep slopes and construction on them will then become extremely prone to these hazards, highly vulnerable. That is what we have to do when we are deciding upon the strategy for planning and selecting this site for its location.

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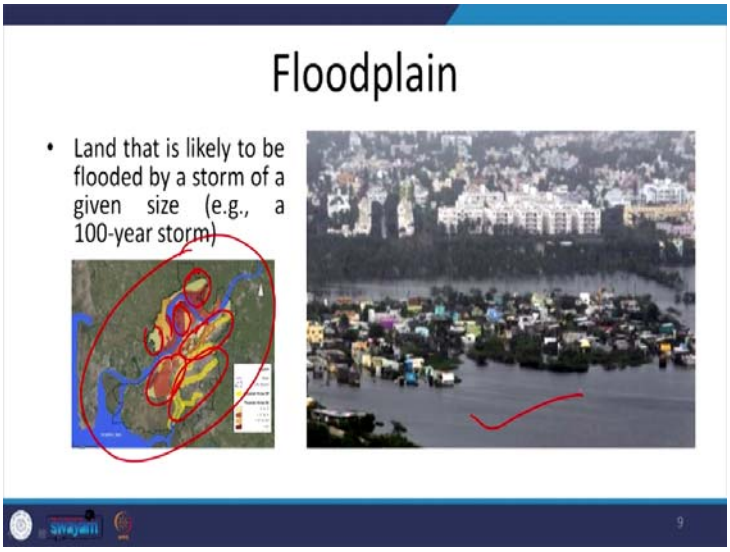

For floodplains we have to see that the site does not come within the level of a 100 year flood line. This particular image is for the city of Surat and when they mapped the last

100 year flood line they found that a lot of development a lot of these areas which were developed were actually the floodplain areas, and they that is what was causing the problem because all these areas have been developed.

Now, this is not the only city which is witnessing such problems. This particular images is of Chennai, Gurgaon, New Delhi wherever come on soon and we find the media the newspapers flooded with the news of some low lying areas in the city is being submerged, this is simply because we have ignored the total concept of this flood plain. So, each city and this is where we are also ignoring the fact that there was a water body, the lakes have been eaten up, now there is no place for the water to accumulate.

In large cities, earlier if we would see there were a number of water bodies surface aquifers which would shrink during summers and they were they had enough volume to hold a lot of rain water. Though the rains have decreased and the water bodies have almost vanished that is why we see a lot of flooding in the cities in the urbanized areas. We have to ensure that we are not constructing in any of the sites which is coming within the 100 year flood line.

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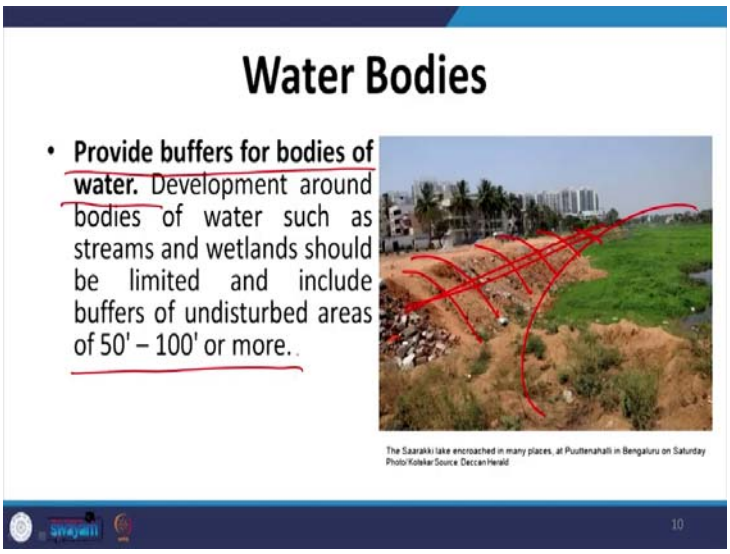

Now, coming to water bodies which I was just mentioning, we have to ensure that we provide buffers for bodies of water. This is a water body a lake, in Bangalore which is being encroached by addition, the infill. A lot of lakes in cities have already been eaten up and this site a couple of years later will be used for constructing new buildings which

is what we have to avoid at any cost. So, the development around water bodies should be at a minimum distance which is specified in different local as per local bylaws, laws and also in national governing laws.

It is approximately it way varies ranges between 50 feet to 100 feet or it may be more depending upon the scale of water body depending upon the type of water body. But we have to ensure that we do not construct adjacent two water bodies.

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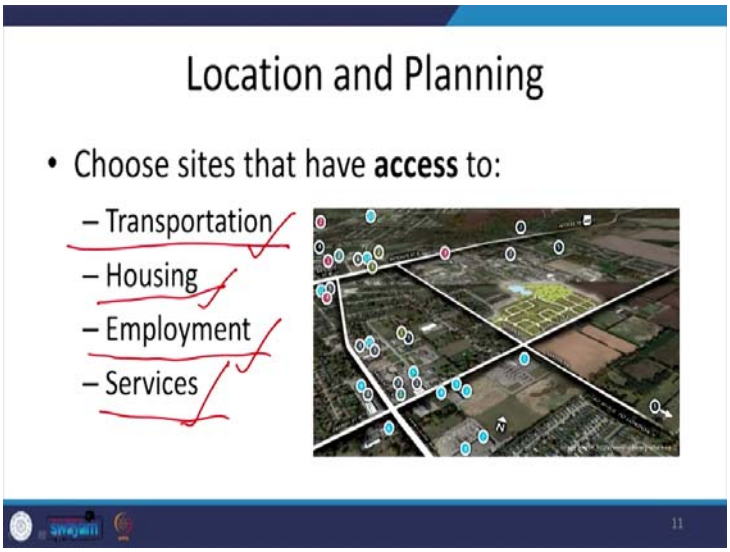

Then we come back to location and planning and we have to ensure and all the green building rating systems which are voluntary inlay nature and also change vary from place to place. They also mention is that such sites should be chosen for development constructing buildings which have access to transportation, housing, employment and services around them.

Now, this we are talking about a commercial building development where we are looking that they should be housing in the proximity, there should be other opportunities for employment, the services infrastructure should be available, there should be enough of transportation. So, that we reduce the load on privately owned vehicles and the transport public transportation is used maximized. To do that what we do is we look at the development density.

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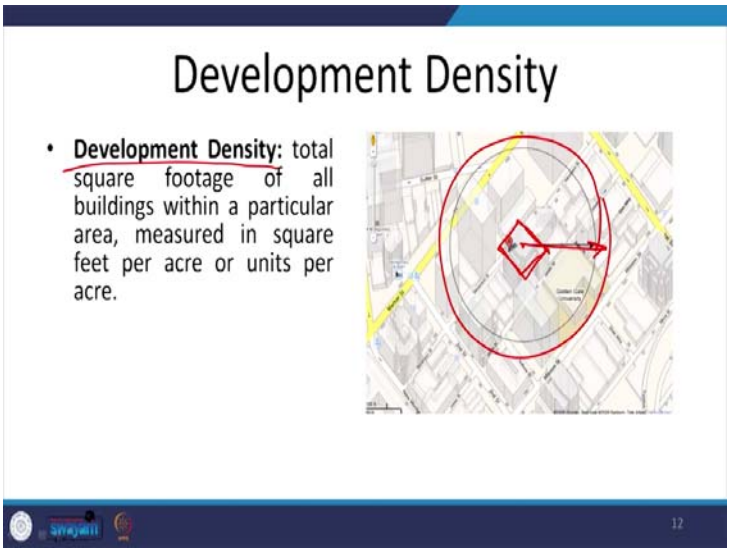

So, there are two-three concepts which we understand here. First is of development density. Now, what we do is from the building under questions, for this is the building which is being developed from the centre of it and this radius also varies from different rating programs, but it is at times 400 meters, 500 meters, sometimes more, half a mile, 1 mile is also there and in this entire circle we try to see what is the development density.

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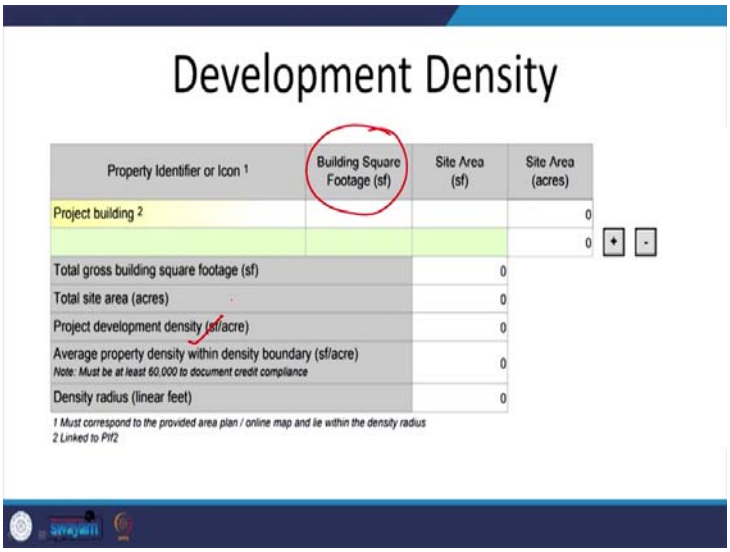

We can calculate the total building square footage. So, total square foot of air which is there, we look at the total area total site area and then calculate the project development

density. And we see that how and for different rating programs this development density is also prescribed. The ultimate objective is to increase this development density, higher is the development density lesser is the additional load on infrastructure which is the main intent of this calculating this development density. Another concept when we are talking about selecting the site is community connectivity.

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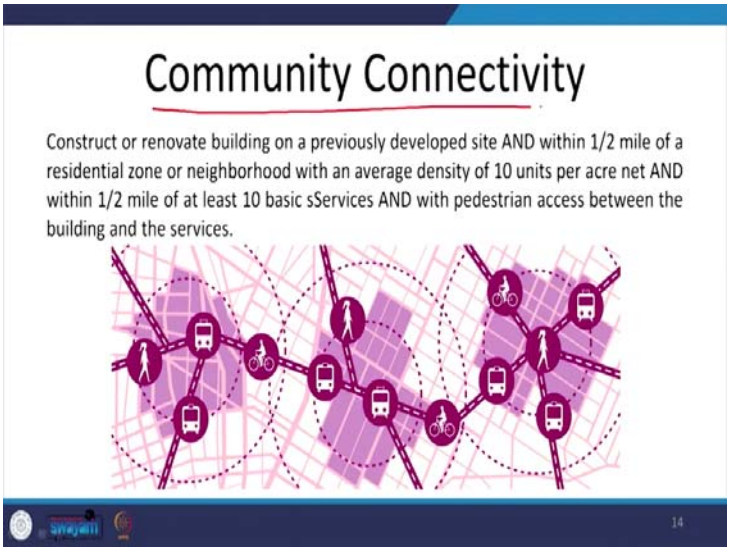

Now, we are looking at development of such sites redevelopment maybe which are connected to the community. Now, within this radius which we were talking in the previous slide, we would calculate, we would count the number of amenities which are there. So, these different amenities which are present around it.

Now, there is a list of these amenities which are considered when we are talking about community connectivity. So, how many such amenities are present within this area or there is another concept where what is the distance from the site in question to this amenity. Now, it may not be a linear path it may be a staggered path. So, what is that total distance which one has to travel from the site in question to the amenity?

So, a total distance has travelled is also considered in some of the rating programs, in some many others only the presence of amenities within a given radius within a given distance of the site is considered. But again, the intent here is that as many community amenities are present within the proximity of the site which is under development. Now,

that will happen when we are developing and already developed area, so that the load on transportation on services everything is minimized. No new infrastructure is developed.

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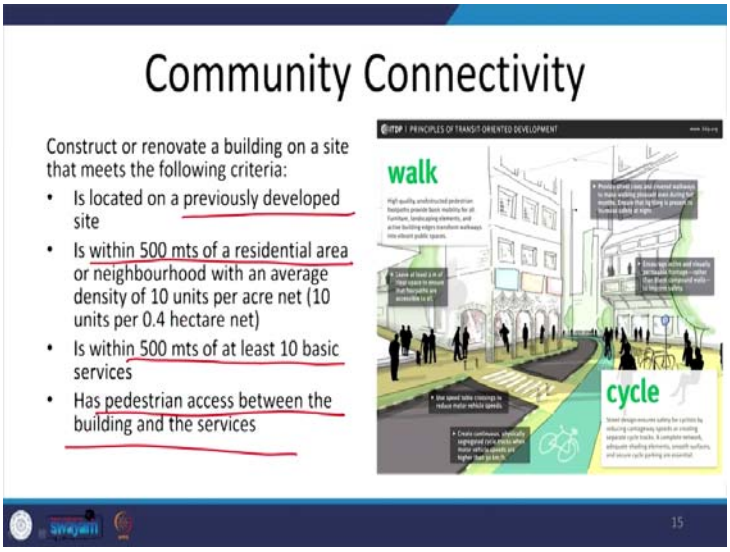

So, here when I was talking there, this is the concept where either we are developing on a previously developed site or we are developed developing within 500 meters of a residential area. Now, this is for commercial buildings or we are developing within the 5, within 500 meters of at least ten basic services and there is a pedestrian access between the building and the services. If these are present then the site is considered to be good a sustainable site.

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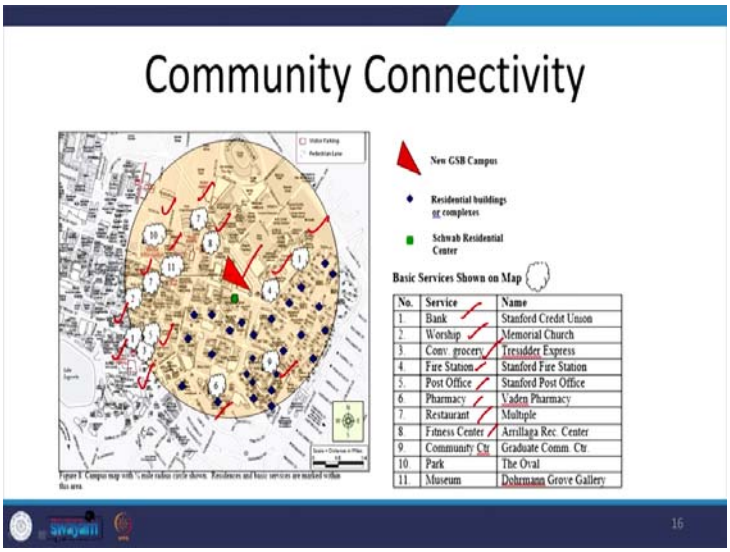

To show the compliance there are multiple options which are available, one very common is this where we identify where is our site and we also identify the different amenities which are located around the site and we properly list them. So, a lot of amenities are listed. Some of them we can see here, banks, worship centres, convenient store or grocery store, fire station, post office, pharmacy, restaurant, fitness centre. Now, this is the one which is already present there is an exhaustive list. So, a lot of other amenities are also counted within this.

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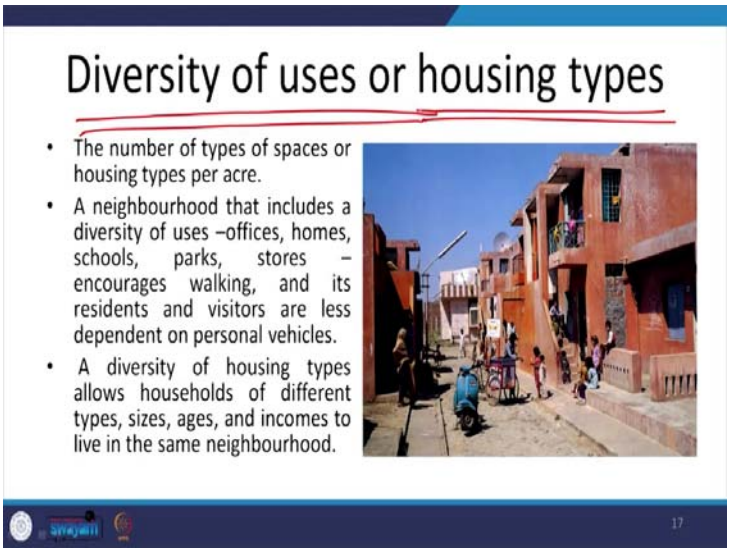

The next is diversity of uses and diversity of housing types. Now, any development which has a mix of different land uses commercial, residential, institutional, office buildings, a lot of these different land uses reduces the requirement of a person to travel large distances, the requirement for transportation. So, no additional transportation will be required if mix of land uses is present within the close proximity of the site.

Also diversity of housing types that helps a good mix of people brings in the diversity which is where we are talking about the social aspect of sustainability. So, often in green building rating programs we might not find that, but when we are talking about sustainable site development this becomes very important where a mix of housing types has to be provided. Now, also different classes within a community are interdependent on each other for various purposes for various services. This is this diversity of uses and housing types fulfils that.

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Then, when we are talking about location and planning, we are talking basically about taking advantage of the existing infrastructure, and that will happen when we develop in the already developed areas.

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The dense and diverse sites and we promote compact development. A not just a city, but almost a country in itself Hong Kong is developing in such a manner that it is highly dense. Yet if you ever visit Hong Kong you would see that all the basic amenities and infrastructure is being provided to each building. Now, that is managed because for the same amount of built up area they have reduced the sprawl, they have reduced its the coverage on ground, they have shrunk it they have gone vertical and so, the requirement for infrastructure is less. So, less length of our transportation line is required.

We will need to apply more metro trains, but the line metro line will remain limited, it will be contained. The same for many other infrastructure or and services. For example, sewer line. The total overall length of sewer line is reduced, it is contained, though the volume that it carries may be increased. So, this is what we have to aim at and achieve when we talking about sustainable site development.

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One very important thing which we will look at it, look at in detail in further lectures is access to public transportation. Many large cities in the world are facing a problem because they never paid attention to how public transportation should be developed. People started using their own, privately owned transportation more like their cars and two wheelers and all, and there was not enough emphasis on public transportation, one it is very very energy intensive, because each one travels in his own car, instead of a bus which can carry 50, 60, 70 or passengers all at the same time, and consumes less amount of resources.

Besides that there are a lot of other problems which we see, traffic jams are there in metro cities, all that can be avoided if we develop in such a manner that the sites have access to public transportation and from policy side the government pays a lot of attention to development of public transportation.

So, while we are selecting the site and it automatically is reflected in the economic in the economy, where the site which are closer to the mass transit always get paid higher, but we have to consciously select sites which are located near the mass transit.

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We have to limit the parking, so that people are encouraged to use public transportation more. We have to encourage carpooling. So, policies and apps can be developed where people are encouraged to use carpooling, promote alternative fuel vehicles by providing opportunities for people to do so, for example, charging stations. So, if there are charging stations people will be motivated to use electricity driven vehicles and like that.

Incentivizing all these activities, so that people use public transportation and quite using private vehicles. And we have the support alternative transportation through design, through planning, through policy planning and we have to encourage last mile connectivity.

Now, you might have seen across many cities within India and world is anyways promoting it that bikes are available for share and ride. So, you hire a bike, bicycle and you move from one place to other way are you are able to commute in using public transportation and only the last mile connectivity problem is resolved. So, transportation strategies are a very important area of concern when we are talking about sustainable site development.

Now, through this lecture we have broadly covered all the aspects which will go when we are talking about site development, the broad areas of site selection, how to develop these sites. In the next lecture, we will specifically be talking about the qualitative aspects of how site should be developed. Here we have selected the site based upon all

these parameters, next we will talk about how the site should be designed and developed, so that it continues to remain a sustainable site.

Thank you very much for being with us. See you in the next lecture.