

INTEGRATED ECOLOGICAL PLANNING IN SINGAPORE: NEOTIEWPIA ECO-VILLAGE IN BUSTLING METROPOLITAN

Gunawan TANUWIDJAJA¹; Trond Inge LOVDAL²; Anbarasi BOOPAL³;
Kiang Lip Eugene GOH⁴; Fan BU⁵; Hoi ki FONG⁶; Mei Lym YAN⁷

ABSTRACT : The Neotiewpia Eco-Village is located within the Lim Chu Kang district at the north of Singapore. The Eco-Village only comprised of 3.5 sq km. Meanwhile the area was dominated by farms, chalets and Sungei Buloh Wetland Reserve. In 2006, National University of Singapore, School of Design and Environment (SDE), MSc. Environmental Management and Nature Society of Singapore initiated an ecological planning exercise within the Neotiewpia site to reduce the environmental impact from the development while providing Eco-friendly Tourism and R&D activities that feasible in the site. We did participate in the exercise and we tried explaining the ecological process, the limitation and potential development for integrated ecological planning framework in Developing Countries like Indonesia, Brazil, etc with high ecological-values ecosystems. The Vision of Neotiewpia was "A Model Eco-Village that Respects its Natural Heritage, Builds Strong Community Links and Promotes Economic Development on Nature's Premises." And Neotiewpia was successfully planned and designed with integrated ecological planning approach. It embraced the land evaluation and impact assessment. Further the plan was found feasible by the Singapore Government by earmarking the Lim Chu Kang and Kranji for Agri-tainment development in 2008 (although partially implemented). The Neotiewpia or Lim Chu Kang area was found thriving with Green-Economy and Agro-Tourism. This integrated ecological planning could be translated to other areas in Developing Countries with agriculture potential and facing development pressures such as Neotiewpia. This concept would give alternate Green-Solution to the current economic crisis.

KEYWORDS : Singapore Eco-Village, Neotiewpia Eco-Village, integrated ecological planning, land evaluation, green economy, integrated water and waste management, sustainable agro-tourism, school of design and environment, National University of Singapore.

¹ MSc. Environmental Management (NUS), S.T. (ITB), Lecture of Department of Architecture, Petra Christian University, Indonesia, Email: gunteitb@yahoo.com, <http://greenimpactindo.wordpress.com/>

² MSc. Environmental Management (NUS), M.Phil. (HKU), BS International Business (California State University), First Secretary Environmental Affairs - Ministry of Foreign Affairs, Norway, <http://earthechoes.blogspot.com/>

³ MSc. Environmental Management (NUS), MSc. Biology (Bharathidasan University), Director of AWRC and Wildlife Crime Unit, Animal Concerns Research and Education Society (ACRES), Singapore, <http://www.acres.org.sg/>

⁴ MSc. Environmental Management (NUS), BSc. Biological Sciences (NUS), Senior Marine Biologist, DHI Water & Environment (S) Pte Ltd, Singapore

⁵ MSc. Environmental Management (NUS), MSc. Computer Science (Fudan Univ.), Environmental Program Manager, Hewlett-Packard Asia Pacific Pte Ltd, Singapore

⁶ Master of Architecture/ Urban Design (NUS), B.Arts – Architecture (NUS), Architectural Assistant, Peter Tay Studio, Singapore

⁷ Master of Architecture/ Urban Design (NUS), B.Arts – Architecture, Architect, SURBANA, Singapore

1. INTRODUCTION

The Neotiewpia Eco-Village is located within the Lim Chu Kang district in Singapore. It is located at the north of Singapore and bounded by the Johor Straits, the Kranji Reservoir and the Western Water Catchment of Singapore. From 18 sq km of Lim Chu Kang area, the Eco-Village only comprised of 3.5 sq km. Meanwhile the area was dominated by farms, chalets and Sungei Buloh Wetland Reserve.

The Lim Chu Kang was founded by Mr. Neo Tiew, an immigrant in early 20th century. The name was derived from “kang chu” which means “the owner of the river.” In 19th century, Lim Chu Kang was dominated by of pepper, gambier and later rubber plantations. Further, traditional farms took over most of the area due to domestic demand. In 1980s agro-technology was introduced by the Government responding to the rapid industrialization of Singapore including the Lim Chu Kang, Murai, Sungei Tengah, Mandai, Nee Soon and Loyang area.

In 2000, selected farms in the area joined the Singapore Tourism Board (STB) to boost agro-tourism in Singapore. The farms served as tourist attractions for visitors and the Urban Redevelopment Authority (URA) allowed the farms to provide accommodation for the guests, retail shops and food outlets in 2005. And this was responded by the market with increasing number of visitors to the site.

In 2006, National University of Singapore, School of Design and Environment (SDE), MSc. Environmental Management and Nature Society of Singapore initiated an ecological planning exercise within the Neotiewpia site to reduce the environmental impact from the development while providing Eco-friendly Tourism and R&D activities that feasible in the site. And apparently the idea was accepted by URA by earmarking the Lim Chu Kang and Kranji for Agri-tainment development in 2008. The Singapore Government also designated an Agri-Bio Park (ABP) within the Lim Chu Kang farmlands. The ABP would become the centre of agri-biotechnology development and provide a supportive environment R&D and technical assistance to the surrounding farms.

We would like to describe the NUS SDE ecological planning exercise and tried explaining the ecological process, the limitation and potential development for further application of integrated ecological planning framework in Developing Countries.

2. INTEGRATED ECOLOGICAL PLANNING IN NEOTIEWPIA

The Ecological Planning exercise was conducted by a team consisting 5 MSc Environmental Management and 2 Master of Architecture (Urban Design) students. And the team comprised of 1 Economists cum Conservationist, 1 Marine Biologist, 1 Terrestrial Biologist, 1 Engineer, and 3 Architects. And we conducted the process within 3 months time with multidisciplinary approach. Ideally process requires 1 year minimum time.

And the overall ecological planning steps conducted were:

- a. Setting the Vision of Neotiewpia;
- b. Survey and Secondary Data Collection;
- c. Landscape Evaluation;
- d. Analysing Broader Land Use Master Plan;
- e. Simplified Economic Feasibility Study;
- f. SWOT Analysis;
- g. Preparation of Concept of Neotiewpia Master Plan (Spatial Plan);
- h. Preparation of Infrastructure Concept (Energy, Water and Waste Management);

- i. Series of Presentations to Lecturer, URA, PUB, NEA and Local Stakeholders.
- j. Refinement of Eco-Village Integrated Ecological Plan

3. NEOTIEWPIA ECO-VILLAGE CONCEPT – BE ONE WITH NATURE

The Vision of Neotiewpia was “A Model Eco-Village that Respects its Natural Heritage, Builds Strong Community Links and Promotes Economic Development on Nature’s Premises.”

3.1 NEOTIEWPIA BIOLOGICAL DATA AND LAND EVALUATION

The primary and secondary data collection showed that the Neotiewpia was an important ecological area. Dr. Ho Hua Chew, from Nature Society of Singapore (NSS), explained the ecologically important habitats and the conservation issues of the site. And existing eco-types and land uses of Neotiewpia were analysed and described in the following figure.

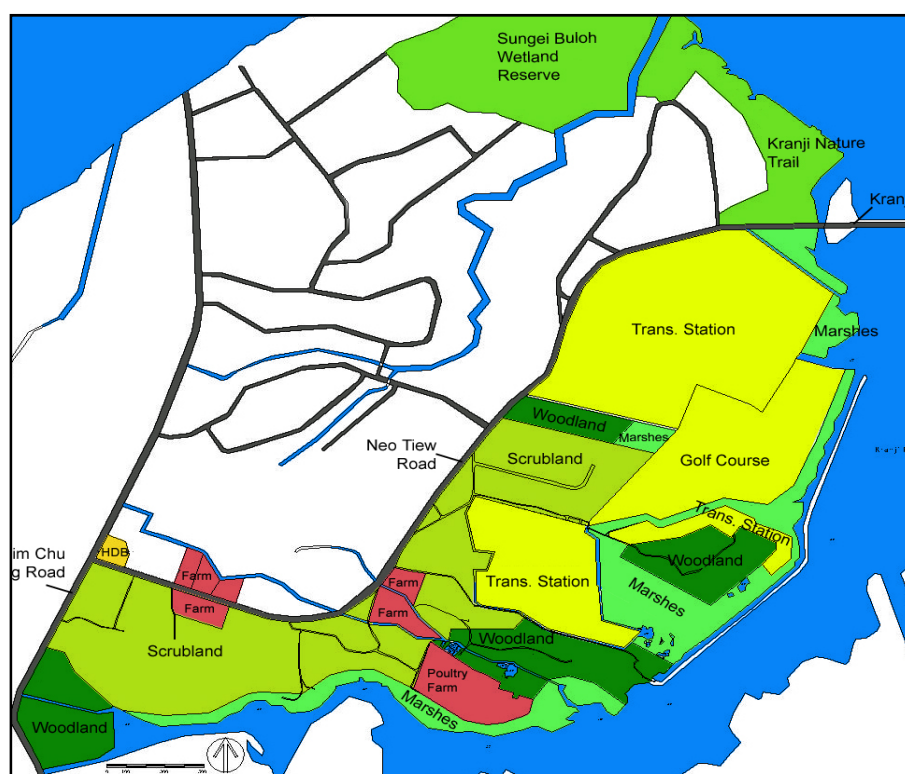


Figure 1. The Existing eco-types and land uses in Neotiewpia

Neotiewpia was found as mosaic of habitats which harboured rich biodiversity. There were important woodland, scrubland and freshwater marshes. These eco-types actually were interconnected to Sungei Buloh Wetland Reserve that was gazetted as Ramsar Site (important wetland reserve) which lied along the East Asian Flyway, a migratory route for birds; and Kranji Nature Trail Park Additionally, manmade farmlands and parklands acted as modified habitats for wildlife.

Further a total of 141 bird species (47 wetland species) found here from 350 species living in Singapore were recorded by NSS since 1985. Developments of Kranji Sanctuary Golf Course, Transmission Station and Farm land use altered this area in great extends. Wetland bird species were replaced by parkland species upon land filling. Straw-headed Bulbul a globally endangered species was found. Grey Heron and Purple Heron were species of significance because of their

threatened conservation positions. In addition to that, reptiles (the water monitor, marsh crocodile), insects (butterflies, spiders), and small mammals were also found living in the area.

3.2 NEOTIEWPIA SUSTAINABILITY OBJECTIVES AND ENVIRONMENTAL POLICIES

Understanding the condition and the Vision of Neotiewpia, we prescribed The Sustainability Objectives and Environmental Policies for Neotiewpia. First, the Sustainability Objectives were:

- a. Foster a strong sense of community and identity;
- b. Integrate nature and conservation into the planning process;
- c. Build an Eco-polis for Environmental Research & Development;
- d. Create a model eco-village for the region;
- e. Promote eco-farming, communal farming/ gardening and farm-stays.

Meanwhile several Environmental Policies for Neotiewpia were proposed comprising:

- a. Conserve natural areas;
- b. Improve quality and quantity of green spaces in the village with native plant species;
- c. Promote Green Economy through synergy with Kranji and Sungei Kadut Industrial Estate and Sarimbun Recycling Park;
- d. Make organic methods of farming mandatory in all farms, and green products to be used in the neighbourhood;
- e. Establish "industrial ecology" between housing, farms, industries, and research centre;
- f. Water and waste management through reduce, reuse, and recycle;
- g. Promote renewable energy generation and use;
- h. Implement strict pollution prevention during construction and use;
- i. Promote sustainable mass transports.

3.3 NEOTIEWPIA INTEGRATED ECOLOGICAL MASTERPLAN

We also proposed an environmental-friendly or ecological master plan integrated to the conservation plan for Neotiewpia. The important areas to be conserved were woodland, marshes, several patches of scrubland and water bodies (duck pond). 100 m buffers would be proposed in the Kranji waterfront, on the land side and water side. These buffers would reduce the impact to the pristine environment of Kranji Reservoir. This strategy was proposed by Dr Ho Hua Chew.

Further, green buffer was proposed to reduce the traffic impact on the residential and wildlife. We also suggested building natural corridors for wildlife movement. The wildlife corridors were needed by the native animals to go to Sungei Buloh Natural Reserve and Kranji Reservoir. Therefore, approximately 50 m of natural corridors were proposed dissecting the Neotiewpia Eco-Village. Beside the natural corridors, organic farming and low density high-class bungalow housing were proposed as the stepping stones and low-resistance matrix facilitating the animal movement within Neotiewpia. In conclusion, the improvement of ecological connectivity would enhance the ecological condition of the site. The conservation plan would be described in the first following figure, while the Ecological Master Plan of Neotiewpia would be described in afterward.

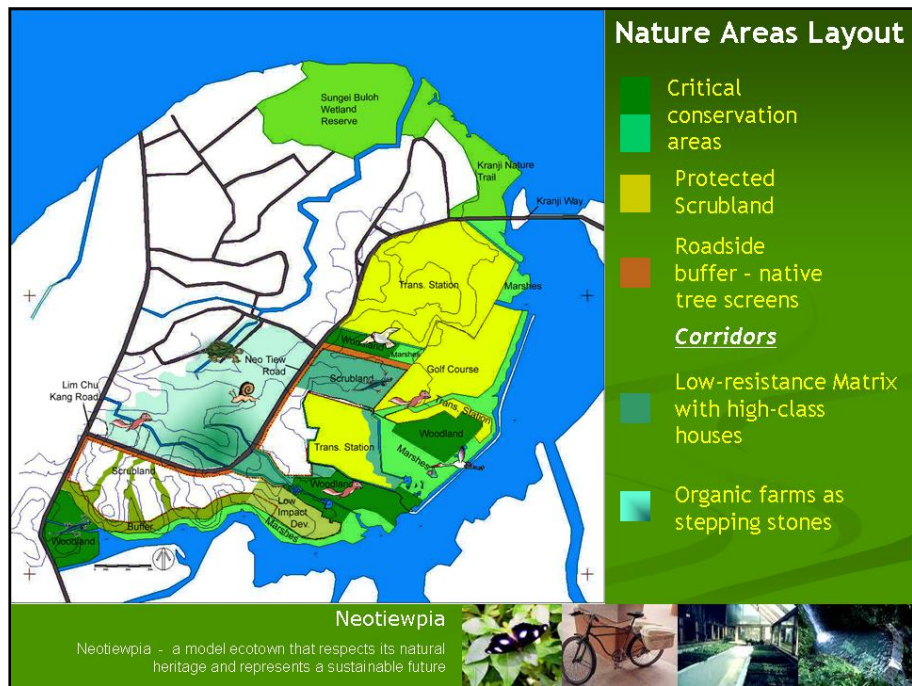


Figure 2. The Conservation plan

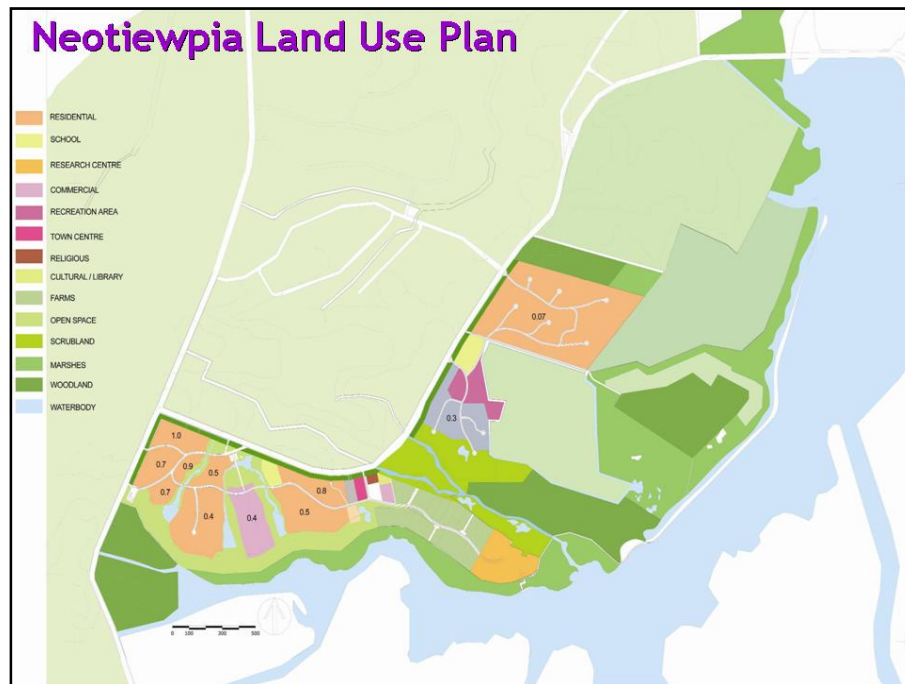


Figure 3. The Neotiewpia ecological master plan

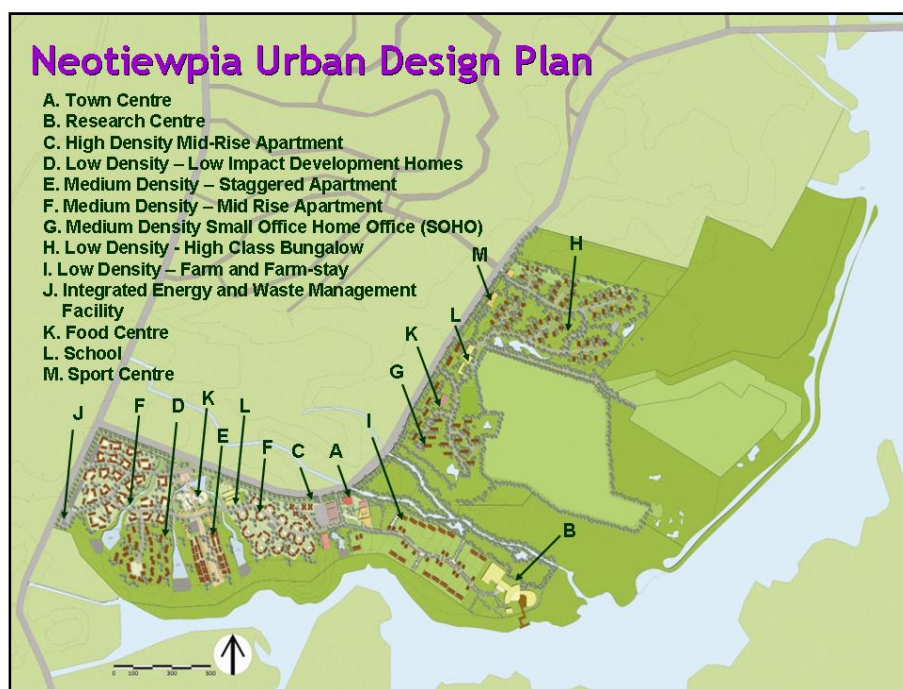


Figure 4. The Neotiewpia Urban Design Plan



Figure 5. The Town Centre



Figure 6. The Research Centre



**Figure 7. The High Density Mid-rise Apartment
 (8 stories – 80 persons/ha)**



**Figure 8. The Low Density Low Impact
 Development Homes (20 persons/ha)**

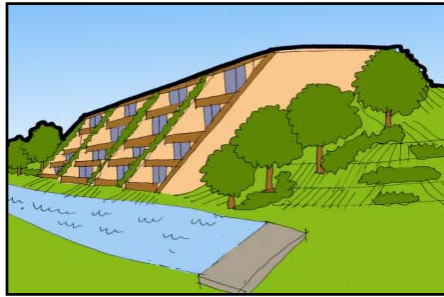


Figure 9. The Medium Density Staggered Apartment (40 persons/ha)



Figure 10. The Medium Density Mid-rise Apartment (3-5 stories – 40 persons/ha)



Figure 11. The Medium-Density Small Office Home Office (SOHO) (40 persons/ha)



Figure 12. The Low-Density High Class Bungalow (10 persons/ha)

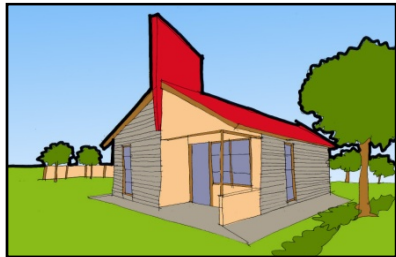


Figure 13. The Low-Density Farm and Farmstay (10 persons/ha)

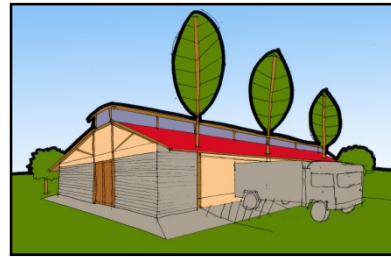


Figure 14. The Integrated Solid Waste and Energy Management Facility

And we proposed Integrated Energy, Water and Waste management system. This would create “Industrial Ecology” between Neotiewpia with Kranji and Sungei Kadut Industrial Park., as well as Sarimbun Recycling Park. The industrial ecology would ensure that the eco-living would be sustainable. The following figures explained the systems.

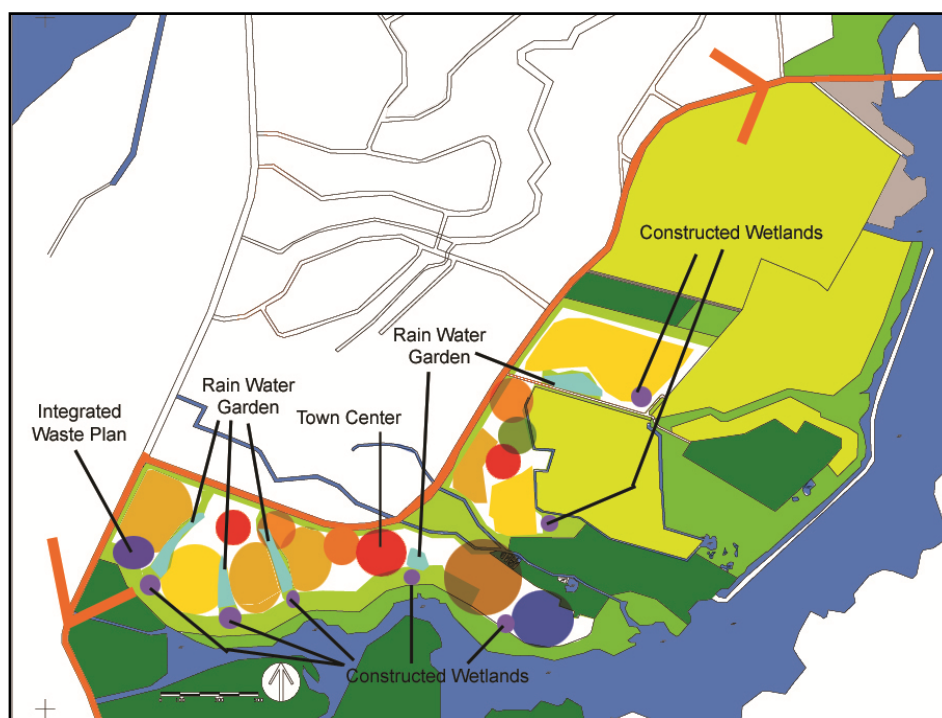


Figure 17. The Neotiewpia Integrated Infrastructure Facility

Additional to that, we prepared simple environmental impact assessment for pre-construction stage, construction as well as post-construction stage. The Environmental Impact Assessment consisted of 4 most relevant aspects, such as: Ecology, Pollution, Aesthetics and Social. These aspects were later translated to the mitigation measures for the most significant aspect in Construction and Post Construction Stages.

4. CONCLUSION

And it could be concluded that Neotiewpia was consciously planned and designed with integrated ecological planning approach. It embraced the land evaluation and impact assessment. Further, the plan was found feasible by the Singapore Government to be implemented (although partially implemented).

The Neotiewpia or Lim Chu Kang area was found thriving with Green-Economy and Agro-Tourism. This integrated ecological planning could be translated to other areas in Developing Countries with agriculture potential and facing development pressures such as Neotiewpia. This concept would give alternate Green-Solution to the current economic crisis.

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- e. Dr. Ho Hua Chew, Nature Society Singapore;

- f. Singapore Government
- g. The Kranji Farm Association: Mr Lim Ho Seng, Mrs Singh-Lim, (Bollywood Veggies)
- h. Mrs Joyce Martha Widjaya, Senior Researcher of Research Institute of Socio-Economic and Community Development, Public Works Department;
- i. Green Impact Indonesia Team: Adi Afriana.

Table 1. Example of mitigation measures (construction and post construction stages)

Predicted Impact	Mitigation Measures	Monitoring
Stress and Disturbance to wildlife	<ul style="list-style-type: none"> - Construction during non-migration period - Zoning of land into high, low and NO activity zones, with buffer - Awareness among construction workers - Restricted hours of visitor activities - Lights facing away from buffer side 	<ul style="list-style-type: none"> - Trends in birdlife and other wildlife populations will be monitored and information sharing done by the research and nature watch groups
Solid waste and air pollution	<ul style="list-style-type: none"> - Use of prefab construction materials - Strict pollution prevention measures will be practiced as a part of conduct code to avoid degradation to the reservoir 	<ul style="list-style-type: none"> - Water Quality monitoring with 2 PUB points – one upstream and one downstream
Siltation	<ul style="list-style-type: none"> - Siltation traps will be used during construction 	
Change in Ground water flow and water table	<ul style="list-style-type: none"> - Porous car parks, drives and pavements - Natural vegetated ponds and rainwater gardens will be maintained to delay runoff by storage and groundwater recharge 	
Erosion	<ul style="list-style-type: none"> - Vegetation cover will be retained to max possible extent in slope areas to reduce soil erosion 	
Phasing out the poultry and other farms	<ul style="list-style-type: none"> - Compensatory jobs for farmers in eco-farming 	

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