



Kandalama - year 2009



Munnar - year 2008



Periyar - year 2008



Resort
in natural landscapes



Kandalama - year 2009

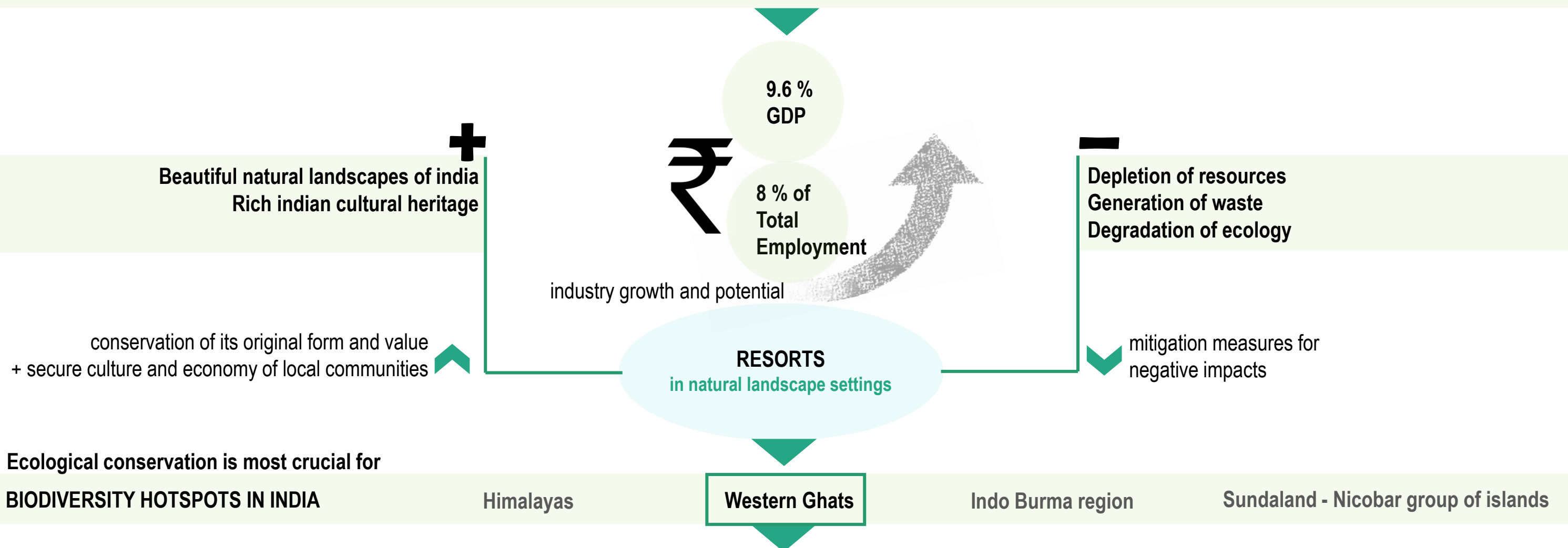


Dambulla - year 2009



Maldives - year 2009

TOURISM AND HOSPITALITY IN INDIA



Ecological Benefits

Community Benefits

DEVELOPING AN ECO-RATING SYSTEM

Recreational Benefits

Economic Benefits

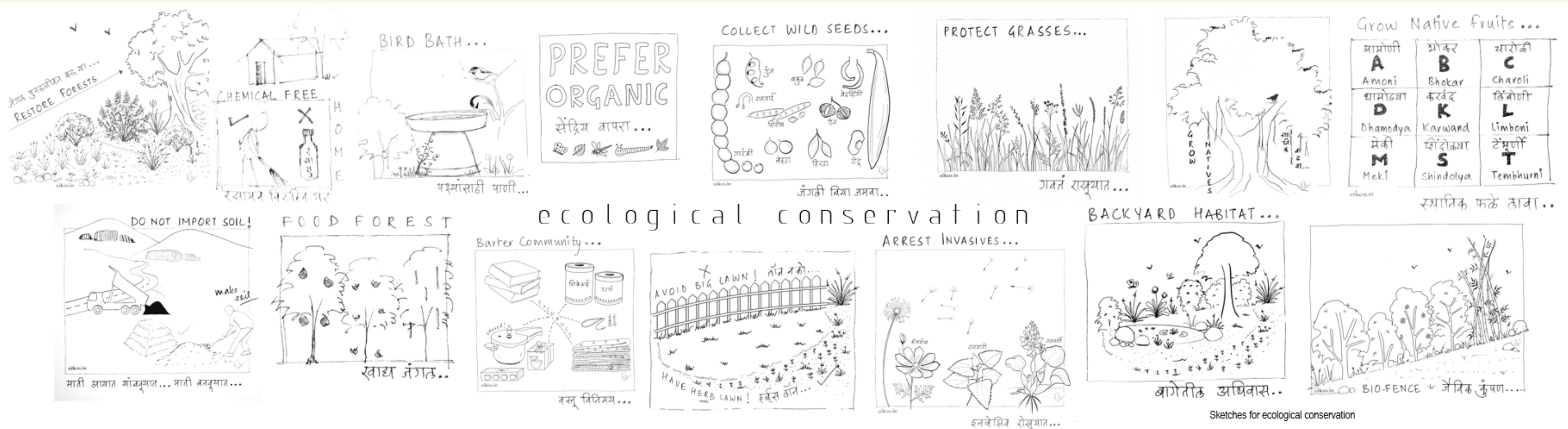
save operational costs of Resort and add Value through eco-Design and eco-Branding

Need for a defined 'System' towards ecological conservation is even stronger in the wake of COVID-19

AIM : DEVELOPING AN ECO-RATING SYSTEM AS A TOOL TO INCENTIVIZE ECOLOGICAL CONSERVATION IN RESORTS SITUATED IN SENSITIVE NATURAL LANDSCAPES OF WESTERN GHATS

3 Objectives to develop an Eco-Rating system are:

- 1) To encourage holistic pre-planned approach through well-defined framework and certification of Eco-design for Resorts.
- 2) To incentivize ecological conservation, that promotes strong reasoning cum willingness of Resort owners and management to adopt better practises.
- 3) To create a Region-specific Rating system for Resorts as a tool for ecological conservation in biodiversity Hot Spot - the Western Ghats.

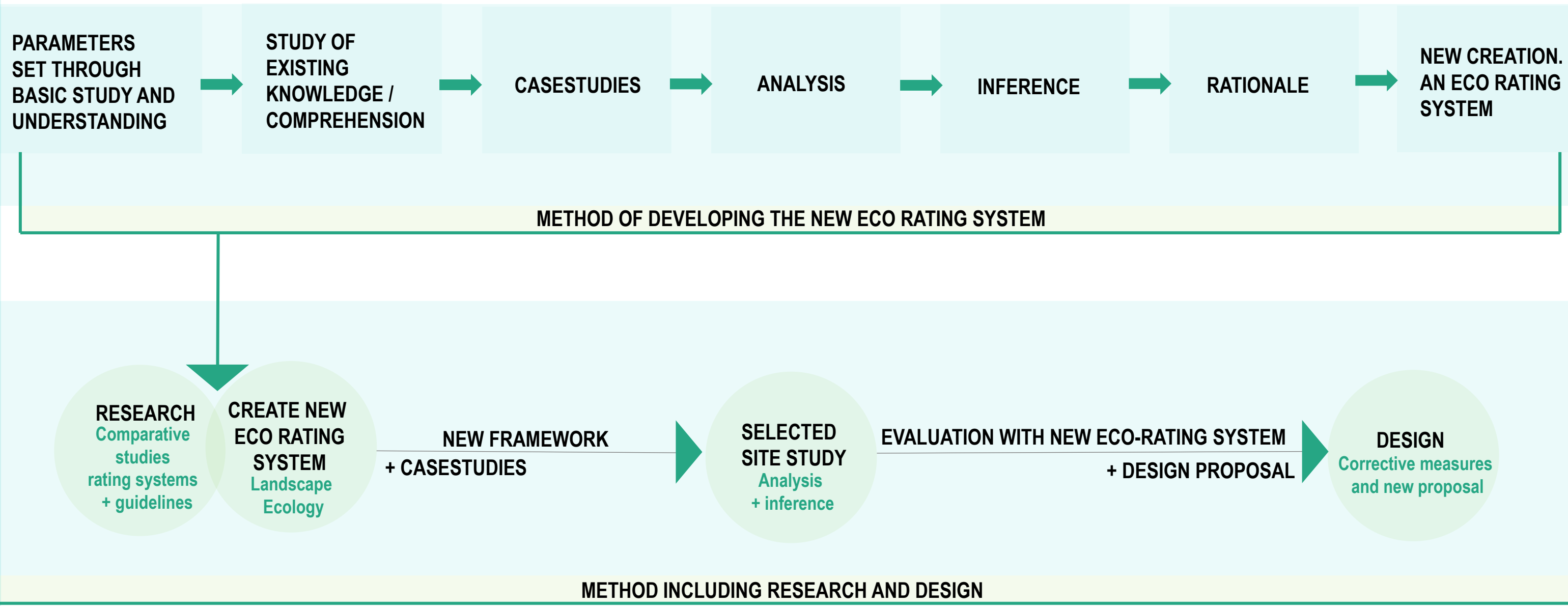


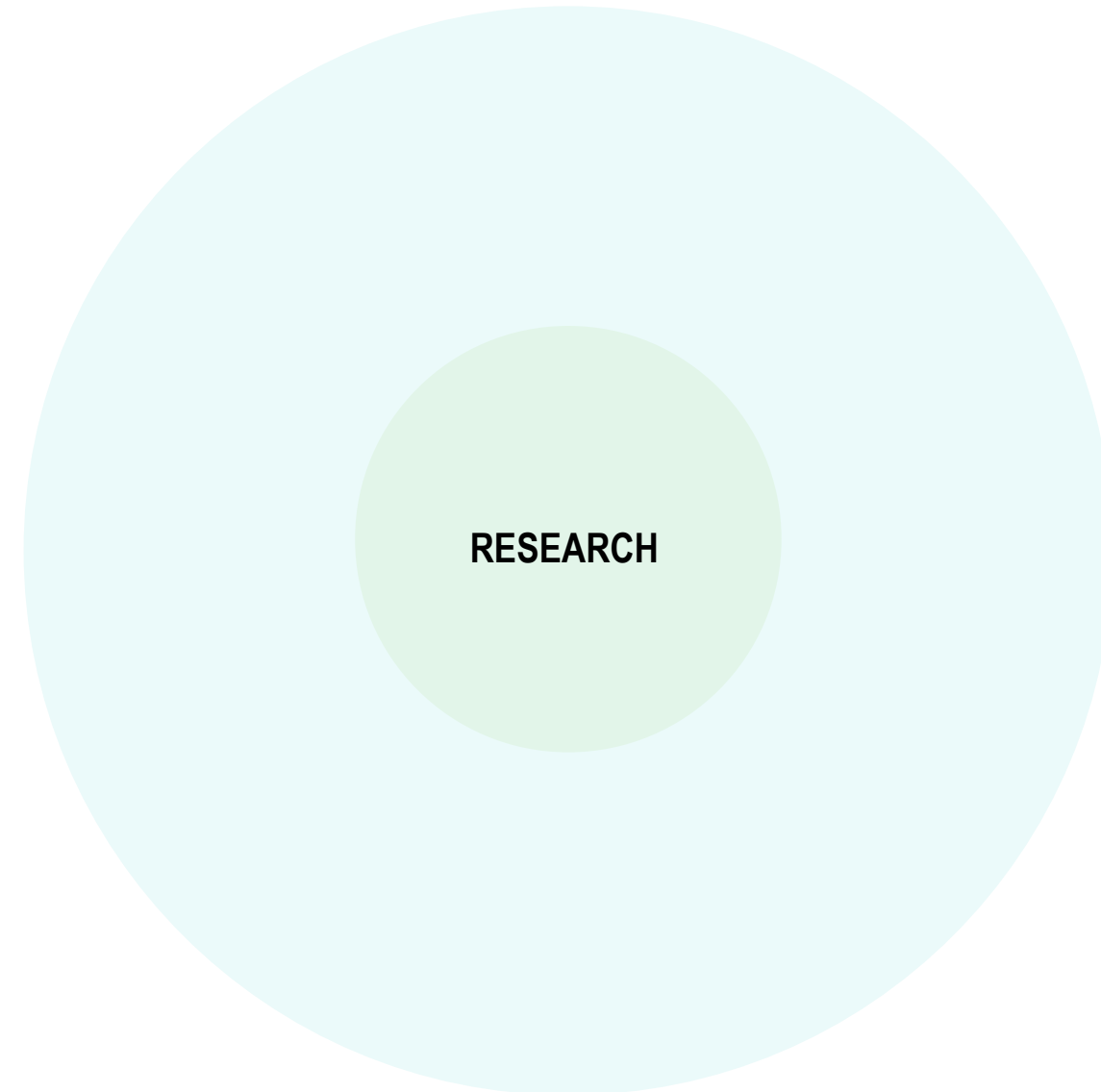
Sketches for ecological conservation

Source : services, OIKOS for Ecological. Research and Documentation. n.d.

<http://www.oikos.in/html/oikos-research-and-documentation.html>. 26 January 2020.

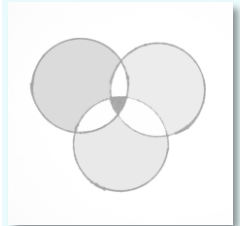
AIM : DEVELOPING AN ECO-RATING SYSTEM AS A TOOL TO INCENTIVIZE ECOLOGICAL CONSERVATION IN RESORTS SITUATED IN SENSITIVE NATURAL LANDSCAPES OF WESTERN GHATS







1 PREDESIGN STAGE MEASURES



2 DESIGN STAGE MEASURES



3 CONSTRUCTION STAGE MEASURES



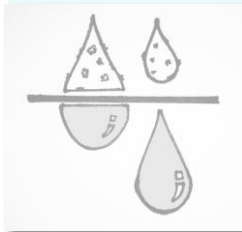
4 SOIL CONSERVATION



5 RAIN WATER HARVESTING



6 GREY WATER TREATMENT



7 BLACK WATER TREATMENT



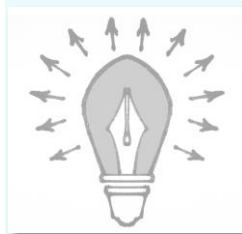
8 SOLID WASTE MANAGEMENT



9 CONSERVATION OF FLORA AND FAUNA



10 ENERGY SAVING AND GENERATION



11 EDUCATION AND AWARENESS



12 COMMUNITY AND CULTURE



13 EXCELLENCE OR INNOVATION

With an ecological perspective these parameters are included through Author’s Academic landscape learnings, readings of various Rating systems, Guidelines, Author’s Professional experience of 18 years in Architecture and correlated informal landscape learnings.

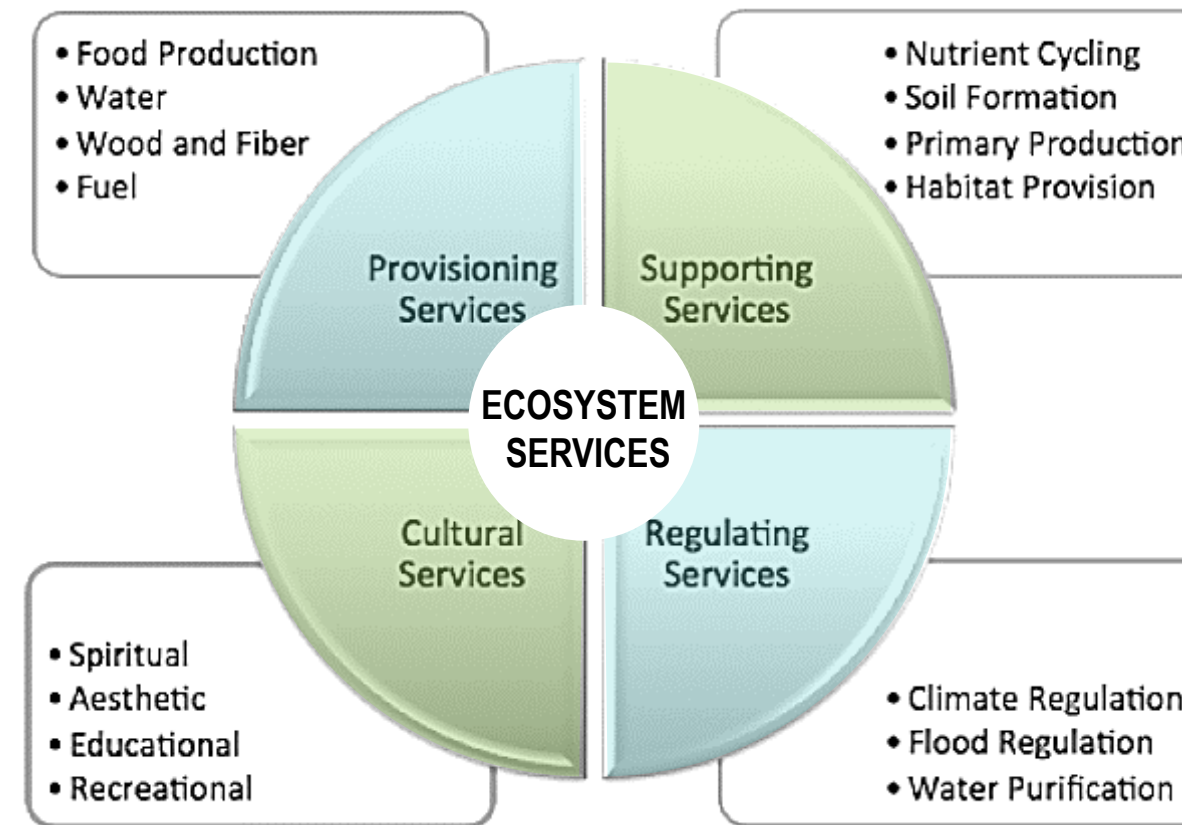
Relevant study and analysis :

- No Indian Rating system or guidelines are sufficiently elaborate, holistic or complete in terms of landscape ecology.
- **Bhutan** green building design guidelines were studied, as its a country sensitive to environment that believes in Gross National Happiness - has **elaborate** guidelines. (international)
- Only one available **IGBC Green Resorts Rating system [2018]** is generic (not region specific) for Resorts in which focus is more on resources/ energy savings in operational phase, but lacks perspective of landscape ecology - natural systems and processes.
- **WGEPP** and **UNESCO** has mention of ecological points for **Western Ghats** but it is **not specific to Resorts**.

RATING SYSTEMS				
CONCERN AUTHORITIES / INSTITUTIONS / CONSULTANCIES	IGBC green Resorts [Nov 2018]	GRIHA [2019]	LEED [2011]	NZGBC [Aug 2016]
	RATING SYSTEMS			
REF .	R1	R2	R3	R4
	Indian Green Building Council - Green Resorts Rating systems.	Green Rating for integrated Habitat Assessment.	Leadership in Energy and Environment	NewZealand Green Building Council

GUIDELINES									
CONCERN AUTHORITIES / INSTITUTIONS / CONSULTANCIES	HRACC [Jan 2018]	MOEF [2010]	UNESCO [2009]	WGEPP [2011 Report]	TOURISM POLICY OF MAHARASHTRA [2016]	MAHARASHTRA SHASAN RAJPATRA, [July 1997]	ENVIRONMENT MANAGEMENT PLAN FOR MATHERAN PLATEAU	RESEARCH AND DOCUMENTATION ON WESTERN GHATS	BHUTAN CONSERVATION GUIDELINES [June 2013]
	GUIDELINES								
REF NO.	G1	G2	G3	G4	G5	G6	G7	G8	G9
	Hotel and Restaurant Association Classification committee, Ministry of Tourism, Government of India (Approval , Classification and Reclassification of Hotels)	Ministry of Environment and Forestry, Government of India	United Nations Educational, Scientific and Cultural Organization	Western Ghats Ecology Expert Panel - Report 2011- constituted by MOEF - Ministry of Environment and Forestry, Government of India.	Tourism policy of Maharashtra, 2016, Government of Maharashtra	Special Regulations for Development of Tourist Resorts in Hill station areas.	Funded by MMR - Environment improvement society. Prepared by Grassroots Research and consultancy.	OIKOS for ecological services - Research and documentation	Bhutan Green Building Design Guidelines. Ministry of Works and Human Settlement, Royal Government of Bhutan.

RATING SYSTEMS					GUIDELINES									
CONCERN AUTHORITIES / INSTITUTIONS / CONSULTANCIES	IGBC green Resorts [Nov 2018]	GRIHA [2019]	LEED [2011]	NZGBC [Aug 2016]	CONCERN AUTHORITIES / INSTITUTIONS / CONSULTANCIES	HRACC [Jan 2018]	MOEF [2010]	UNESCO [2009]	WGEEP [2011 Report]	TOURISM POLICY OF MAHARASHTRA [2016]	MAHARASHTRA SHASAN RAJPATRA, [July 1997]	ENVIRONMENT MANAGEMENT PLAN FOR MATHERAN PLATEAU	RESEARCH AND DOCUMENTATION ON WESTERN GHATS	BHUTAN CONSERVATION GUIDELINES [June 2013]
RATING SYSTEMS					GUIDELINES									
REF .	R1	R2	R3	R4	REF NO.	G1	G2	G3	G4	G5	G6	G7	G8	G9
ELABORATE FRAMEWORK FOR ECOLOGICAL CONSERVATION ↓	Indian Green Building Council - Green Resorts Rating systems.	Green Rating for integrated Habitat Assessment.	Leadership in Energy and Environment	NewZealand Green Building Council	ELABORATE FRAMEWORK FOR ECOLOGICAL CONSERVATION ↓	Hotel and Restaurant Association Classification committee, Ministry of Tourism, Government of India (Approval , Classification and Reclassification of Hotels)	Ministry of Environment and Forestry, Government of India	United Nations Educational, Scientific and Cultural Organization	Western Ghats Ecology Expert Panel - Report 2011- constituted by MOEF - Ministry of Environment and Forestry, Government of India.	Tourism policy of Maharashtra, 2016, Government of Maharashtra	Special Regulations for Development of Tourist Resorts in Hill station areas.	Funded by MMR - Environment improvement society. Prepared by Grassroots Research and consultancy.	OIKOS for ecological services - Research and documentation	Bhutan Green Building Design Guidelines. Ministry of Works and Human Settlement, Royal Government of Bhutan.
FOR RESORTS	GIVEN	X	X	X	FOR RESORTS	BRIEF MENTION	X	X	X	X	X	BRIEF MENTION	X	GIVEN
ANALYSIS	ONLY IGBC HAS MADE A GREEN RATING SYSTEM FOR RESORTS IN NOV 2018				ANALYSIS	THERE IS NO ELABORATE FRAMEWORK FOR ECOLOGICAL CONSERVATION IN RESORTS EXCEPT BHUTAN. [IN BHUTAN, RESORTS HAVE TO FOLLOW SAME GUIDELINES AS FOR OTHER BUILDINGS]								
PARAMETERS ↓					PARAMETERS ↓									
PREDESIGN STAGE MEASURES	X	X	X	X	PREDESIGN STAGE MEASURES	X	X	X	X	X	X	X	X	ELABORATE
DESIGN STAGE MEASURES	X	X	X	X	DESIGN STAGE MEASURES	X	X	X	X	X	•	•	•	ELABORATE
CONSTRUCTION STAGE MEASURES	X	X	X	X	CONSTRUCTION STAGE MEASURES	X	X	X	X	X	X	•	X	ELABORATE
SOIL CONSERVATION	X	X	X	X	SOIL CONSERVATION	X	X	X	X	X	X	•	•	X
RAIN WATER HARVESTING	GIVEN	X	X	X	RAIN WATER HARVESTING	•	X	X	X	X	X	X	X	ELABORATE
GREY WATER TREATMENT	GIVEN	X	X	X	GREY WATER TREATMENT	•	X	X	X	X	X	X	X	ELABORATE
BLACK WATER TREATMENT	•	X	X	X	BLACK WATER TREATMENT	•	X	X	X	X	X	X	X	ELABORATE
SOLID WASTE MANAGEMENT	GIVEN	X	X	X	SOLID WASTE MANAGEMENT	X	X	X	X	X	X	•	X	ELABORATE
CONSERVATION OF FLORA AND FAUNA	GIVEN	X	X	X	CONSERVATION OF FLORA AND FAUNA	X	X	X	X	X	X	•	•	ELABORATE
ENERGY SAVING	ELABORATE	X	X	X	ENERGY SAVING	X	X	X	X	X	X	X	X	ELABORATE
EDUCATION AND AWARENESS	GIVEN	X	X	X	EDUCATION AND AWARENESS	X	X	X	X	X	X	X	X	X
COMMUNITY AND CULTURE	GIVEN	X	X	X	COMMUNITY AND CULTURE	X	X	X	X	X	X	X	X	•
FRAMEWORK FOR REGION - WESTERN GHATS	X	X	X	X	FRAMEWORK FOR REGION - WESTERN GHATS	X	X	•	GIVEN	X	X	ELABORATE	•	X
ANALYSIS	ONLY IGBC GREEN RATING FOR RESORTS IS AVAILABLE WHICH LACKS ECOLOGICAL PERSPECTIVE AND IS INADEQUATE FOR ECOLOGICAL CONSERVATION.				ANALYSIS	THERE IS NO ELABORATE FRAMEWORK FOR ECOLOGICAL CONSERVATION SPECIFIC TO RESORTS EXCEPT BHUTAN. [IN BHUTAN, RESORTS HAVE TO FOLLOW SAME GUIDELINES AS FOR OTHER BUILDINGS]								
INFERENCE	FRAMEWORK OF ECOLOGICAL CONSERVATION MEASURES ARE NEEDED FOR RESORTS IN WESTERN GHATS THAT CAN BE USED TO FORM AN ECO- RATING SYSTEM TO INCENTIVISE ECOLOGICAL CONSERVATION.				AS RATINGS ARE INADEQUATE, GUIDELINES ALSO CAN BE LOOKED AT AS A REFERENCE TO FORM NEW ECO-RATING SYSTEM									
	X - NO MENTION	• - BRIEF MENTION				X - NO MENTION	• - BRIEF MENTION							
POINTS FROM RATING SYSTEMS OF OTHER BUILDINGS LIKE HOTELS / TOWNSHIPS FOR SAME PARAMETERS	considered by IGBC	GIVEN - not for Resorts	GIVEN - not for Resorts	GIVEN - not for Resorts	POINTS FROM GUIDELINES OF OTHER BUILDINGS LIKE HOTELS / TOWNSHIPS FOR SAME PARAMETERS	X	GIVEN - Have elaborate points for construction stage measures, which can be applicable for Resorts.	X	X	X	X	GIVEN - points specific to western ghats region.	X	Same as for resorts.



Source : Millenium ecosystem assessment, 2005, 20 April 2020.
<https://www.millenniumassessment.org/en/GraphicResources.html>

SUSTAINABLE SITES INITIATIVE DEVELOPED BY ASLA

SITES. *SITES Rating System*. n.d. 20 April 2020. <<http://www.sustainablesites.org/certification-guide>>.
 —. *The sustainable SITES initiative*. n.d. 20 April 2020. <<http://www.sustainablesites.org/resources>>.
 Council, U.S. Green Building. *SITES Curriculum*. n.d. 20 April 2020.
 <<https://www.usgbc.org/education/sessions/introduction-sites-program-6749989>>.

ACADEMIC LANDSCAPE LEARNINGS

Conservation + reducing environmental impact
 Restoration + Giving back to Nature

LANDSCAPE PERFORMANCE BY LANDSCAPE ARCHITECTURE FOUNDATION

Foundation, landscape Architecture. *Landscape Performance Series*. n.d.
 20 April 2020. <<https://www.landscapeperformance.org/guide-to-evaluate-performance>>.

KEY ECOLOGICAL LEARNINGS

concepts of ecosystem services and regenerative design for better landscape performance

Regenerative design is a process-oriented whole systems approach to design.

Term 'regenerative' describes processes that restore and renew their own sources of energy and materials

underpinning idea of
Reinforce natural landscapes to
Reactivate natural systems

Reinforce - here means to strengthen the very idea, as well as literally protect, restore, improve, and enhance natural landscapes.

Need is even stronger in the wake of COVID -19

TAP THE NATURAL POTENTIAL OF SITE

HEALTHY PATTERNS

CONSERVATION

RETAIN, PROTECT ,ENHANCE

SELF-REGULATING SYSTEMS

PROTECT ENVIRONMENT

VISUALLY PLEASING
REGIONAL ENHANCEMENT

LIFE INTERACTING A
SUSTAINABLE WAY
MORE BENEFITS

RENEW RESOURCES

SPECIFIC SITE ECOLOGY

SOIL AND WATER MANAGEMENT

USE NATURAL SYSTEMS

OPTIMIZING ECOSYSTEM SERVICES

BETTER LANDSCAPE PERFORMANCE

RESORATION

CREATE HABITATS

ENHANCE BIODIVERSITY

RECREATIONAL
EXPERIENCE



natural ..free ..wilder ..untamed

graphic source : creation by Author

3 MAJOR REASONS - WHY AN ECO-RATING SYSTEM FOR WESTERN GHATS ?

IGBC GREEN RESORTS RATING SYSTEM

- 1 **The only system** for Resorts - IGBC Green Resort Rating system [2018] is generic and structured to be applied on any Resort whether it is a natural landscape, urban, rural, or any biogeographic zone in india, so it doesn't consider specific ecological aspect in its structure. It is focused more towards resources and energy savings, under the broad spectrum of sustainability.
- 2 IGBC has emphasis on operational phase while has inadequate guidelines for predesign, pre-construction, during construction and post construction phases, which is most crucial phase in relation to conservation, ecological processes and ecosystems.
- 3 IGBC guidelines are not elaborate enough in some portions and has loopholes which could lead to escape in its implementation and doesnot serve the purpose of landscape ecology.

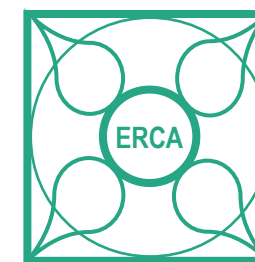
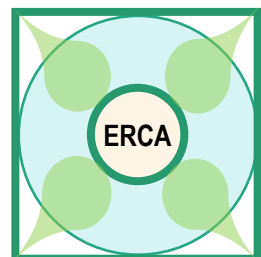


November 2018

IGBC Green Resorts Rating System

DEVELOPING AN ECO- RATING SYSTEM

- 1 A new Eco-rating system to consider landscape ecology of Western Ghats for regenerative design to better landscape performance. Hence this System was to be designed underpinning idea of 'Reinforce Natural landscapes to Reactivate natural systems' on any Resort site that includes creation of habitats, reviving of ecosystems, and revitalizing natural self-regulating systems and processes for any Resort site.
- 2 A new Eco-rating system to develop an elaborate framework for predesign, pre-construction, during construction and post construction phases, which is most crucial phase in relation to conservation, ecological processes and ecosystems.
- 3 A new Eco-rating system to be elaborate and well - defined that considers landscape ecology and regenerative design. Need for a defined 'System' towards landscape ecology at Resorts is even stronger in the wake of COVID-19.

Image source :
ERCA Stamp : Author**NEW PROPOSAL****Eco-RATING CERTIFICATION AUTHORITY**Image source :
ERCA Logo : Author

CRITERIA for choice of Resort case studies are :

- One **International case study** in an environmentally **sensitive** country Bhutan that is located in a biodiversity hotspot.
- Resorts in **Western Ghats**.
- Resorts that are in **Natural landscape settings**.
- Resorts that are **well known brand** or famous - **most visited** and liked by travellers.
- Resorts with area of **25 acres or more**.
- Resorts that more or less **follow environmental conservation** measures.



Image source : *SIXSENSES BHUTAN*. n.d. <https://www.sixsenses.com/en/resorts/bhutan>. 5 December 2019.
SIX SENSES, PUNAKHA, BHUTAN



Image source : photographs - Author
TUNGI RESORT, LONAVALA



Image source : *WILDERNEST*. n.d. <http://www.wildernest-goia.com/> 10 December 2019
WILDERNEST RESORT, GOA [WESTERN GHATS]



Image source : LLP, Macchan Resorts. *The Macchan*. 2019. <https://www.themacchan.com/about-us.php>. 5 December 2019.
THE MACHCHAN, LONAVALA, MAHARASHTRA. [WESTERN GHATS]



Image source : Banasura Hill Resorts. *banasura*. 2019. <https://www.banasura.com/> 25 December 2019.
BANASURA NATURE RESORT, WAYANAD [WESTERN GHATS]



FALLING SHORT IN TERMS OF LANDSCAPE ECOLOGY

Site selection based on study of relevant articles, information, Author's landscape learnings, Author's professional experience, Visual survey, interviews with Resort managers, Architects, Resort staff, visitors and guests.

CASE : TUNGI RESORT, LONAVALA

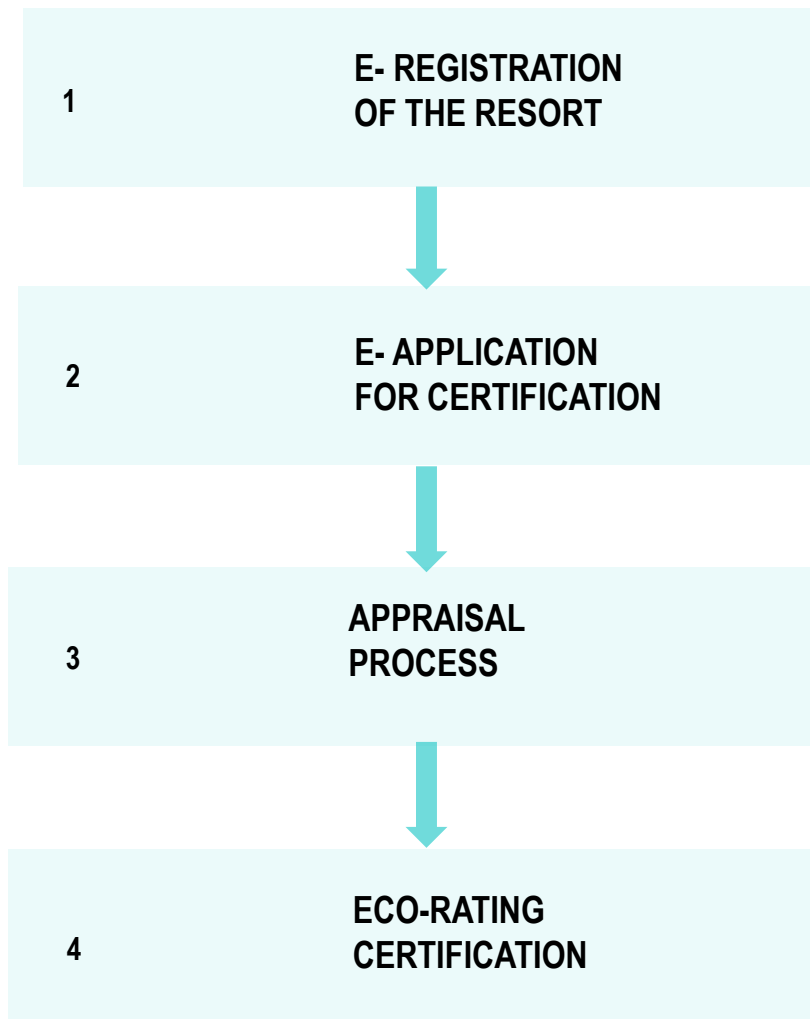
**CREATION
OF AN
ECO-RATING
SYSTEM**

VOLUNTARY ECO - RATING SYSTEM INDEPENDENT BODY - ERCA

ERCA - Eco-Rating Certification Authority

ERCA framework is guidebook for any individual / company involved in development of Resort.

FOUR STEPS TO ERCA CERTIFICATION :



AUTHORITATIVE SOURCE WITH A FRAMEWORK FOR CERTIFYING RESORT LANDSCAPES

ELIGIBILITY

Resorts in Western Ghats

X Type Resorts

Upcoming Resorts

Y Type Resorts

Operational Resorts

(operational / completion certificate before **31 March, 2021**)

Validity for certification for Y type Resorts remains till **31 March, 2025**

Y type Category shall **dissolve on 31st March 2025** beyond which only single category of Resorts that is upcoming Resorts shall be considered for certification.

For Y Type Resorts, appraisal is done considering measures starting from operational phase.

A compensatory clause (R1) is added for Y Type Resorts.

Where academic and research support for stipulated time is expected from Resort to gain points.

ERCA RATING STRUCTURE

CORE POINTS - 40

ECO GROVE - AVERAGE [41-60]

ECO WOODS - GOOD [61-80]

ECO FOREST - BEST [81-100]

- mandatory points and easy to implement points
- following practices but needs improvement.
- following almost all practices within the site.
- following practices with innovation, excellent performance and greater contribution to Ecology and society.

PROVISIONAL CERTIFICATE - 1 YEAR, FINAL CERTIFICATION - 3 YEARS - (evolving natural landscapes)

Author believes that in the wake of COVID-19, this System of ERCA ideally should be considered by Ministry Of Environment and Forestry, and to be taken under jurisdiction of WGEEP [Western Ghats Ecology Expert Panel] for policy level consideration and implementation of this defined System specifically for best results in Resorts.

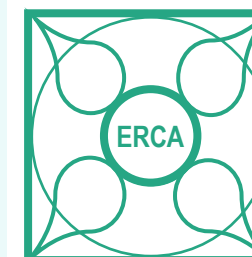


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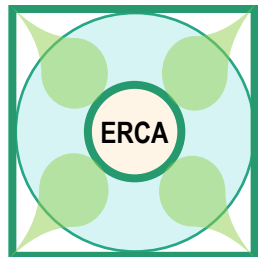
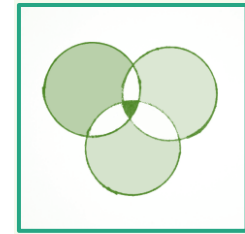


Image source :
ERCA Logo : Author

Eco-RATING CERTIFICATION AUTHORITY



1 PREDESIGN STAGE MEASURES



2 DESIGN STAGE MEASURES



3 CONSTRUCTION STAGE MEASURES



4 SOIL CONSERVATION



5 RAIN WATER HARVESTING



6 GREY WATER TREATMENT



7 BLACK WATER TREATMENT



8 SOLID WASTE MANAGEMENT



9 CONSERVATION OF FLORA AND FAUNA



10 ENERGY SAVING AND GENERATION



11 EDUCATION AND AWARENESS



12 COMMUNITY AND CULTURE



13 EXCELLENCE OR INNOVATION

Eco-RATING CERTIFICATION AUTHORITY

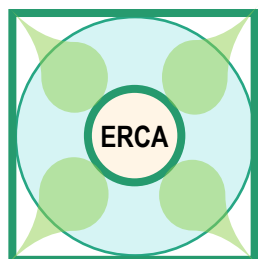


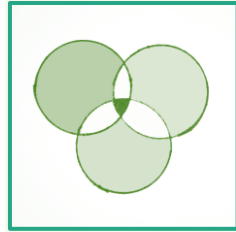
Image source :
ERCA Logo : Author

PAULOMI KANAKIA



A PREDESIGN STAGE MEASURES

A1	Appointment of collaborative professional team of respective field experts [M]
A2	Detail study of all site features and ecological layers [M]



B DESIGN STAGE MEASURES

B1	Holistic Plan and design for preservation of natural features on site :
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C CONSTRUCTION STAGE MEASURES

C1	Preconstruction measures:
C1.1	Preservation of existing trees, native or medicinal trees and plants. [M]
C1.2	Biofencing the property
C1.3	Site to build toilets for labourers and compost pits before Resort construction starts.[M]
C2	During construction measures
C2.1	Retaining natural features of site during construction [M]
C2.2	Preservation of top soil [M]
C2.3	Lighting on construction site to be solar lighting.[M]
C2.4	Regular PUC check for vehicles and machinery during construction.[M]
C3	Post construction measures
C3.1	Construction waste to be given to the recyclers [M]
C3.2	Use of eco-friendly materials and products for construction



D SOIL CONSERVATION

D1	Increasing tree cover by tree plantation on site for soil conservation.
D2	Use Bunds or vegetation to control soil erosion.
D3	Use Organic fertilizers only [M]
D4	Use Organic pesticides only [M]



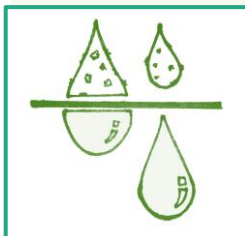
E RAIN WATER HARVESTING

E1	Rain water harvesting system on site.
E2	permeable/ impermeable pavings -25% max.



F GREY WATER TREATMENT

F1	100% Grey water treatment
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G BLACK WATER TREATMENT

G1	100% Black water treatment
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H SOLID WASTE MANAGEMENT

H1	Plastic free zone, with supporting measures [M]
H2	Waste segregation on site [M]
H3	Vermiculture, composting pits, biogas plant to manage waste



J CONSERVATION OF FLORA AND FAUNA

J1	Detail Documentation and efforts to conserve Flora and fauna in and around site.
J2	Preservation and Plantation of Native species [M]
J3	Uprooting invasive species, and prohibition of genetically modified species.[M]
J4	Lawns to be minimal with justification , covered with native grasses.
J5	Creative / Ecological / Nature theme park



K ENERGY SAVING AND GENERATION

K1	Generation and use of solar energy.
K2	Eco lighting - use solar lights and LEDs (with automatic light shut off n control)
K3	Use of electric vehicles to travel within site [M]
K4	Meters for consumption of water and electricity.[M]



L EDUCATION AND AWARENESS

L1	Sinage on site to encourage guests to walk and cycle.[M]
L2	Planned activities in nature for education and awareness for guests
L3	Educating and keeping staff aware about ecological conservation practices.[M]



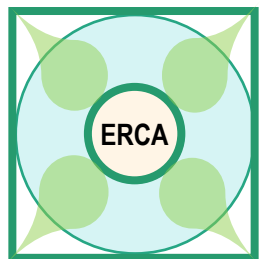
N COMMUNITY AND CULTURE

N1	Ecological initiatives by Resort owners beyond the site boundaries
N2	Promoting economy of local communities.
N3	Preserving culture of local communities.



P EXCELLENCE OR INNOVATION

[M] – means mandatory



Eco-RATING CERTIFICATION AUTHORITY

Image source :
ERCA Logo : Author

N) COMMUNITY AND CULTURE

N1 : Ecological initiatives by Resort owners beyond the site boundaries

➡ **Rationale:** Ecological initiatives by Resort owners beyond their property is an extremely noble act. It goes way beyond gaining profits from region to a great social service as they are in the position to do good around. - like adopting a village, helping them develop, educating locals and villagers about Ecological conservation practices, or carrying out any Ecological conservation practices like rain water harvesting, preserving flora and fauna around resort site, providing solar energy to villagers, initiatives may depend on need of the community and Ecology, as needed in the region. Ref: (R1), (G9)

➡ **Consultants :** CSRs or NGOs shall be involved.

➡ **Strategies:** Different Ecological initiatives as needed and suitable for region.

➡ **Documentation:** Descriptive study and proposals report, photographs, videos and documentation about work done around site.

➡ **Time span:** During operational phase for life time of resort.

➡ **Formulas:** not applicable here.

➡ **Scores: 10 points:** It is primary to think about the larger region, because Ecological conservation never works as isolated site Ecology. Site is small part of Ecology. - 2 points It costs extra when resort invests beyond the site boundaries. - 2 points It is challenging to gain trust of villagers and work with them for co-benefits.- 2 points . 4 points are additional points for the noble act. Scores / number of points here are subjective and will be as per joint and final decision of ERCA panel.



Elaborate and defined framework of about 45 pages Chapter in Thesis book is dedicated to this detail framework of ERCA.

- Common sub-points across 39 sub-headings of framework are:
- Rationale:
 - Consultants / sources:
 - Strategies:
 - Documentation:
 - Time span:
 - Formulas:
 - Scores:

Eco-RATING CERTIFICATION AUTHORITY

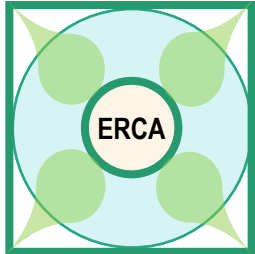


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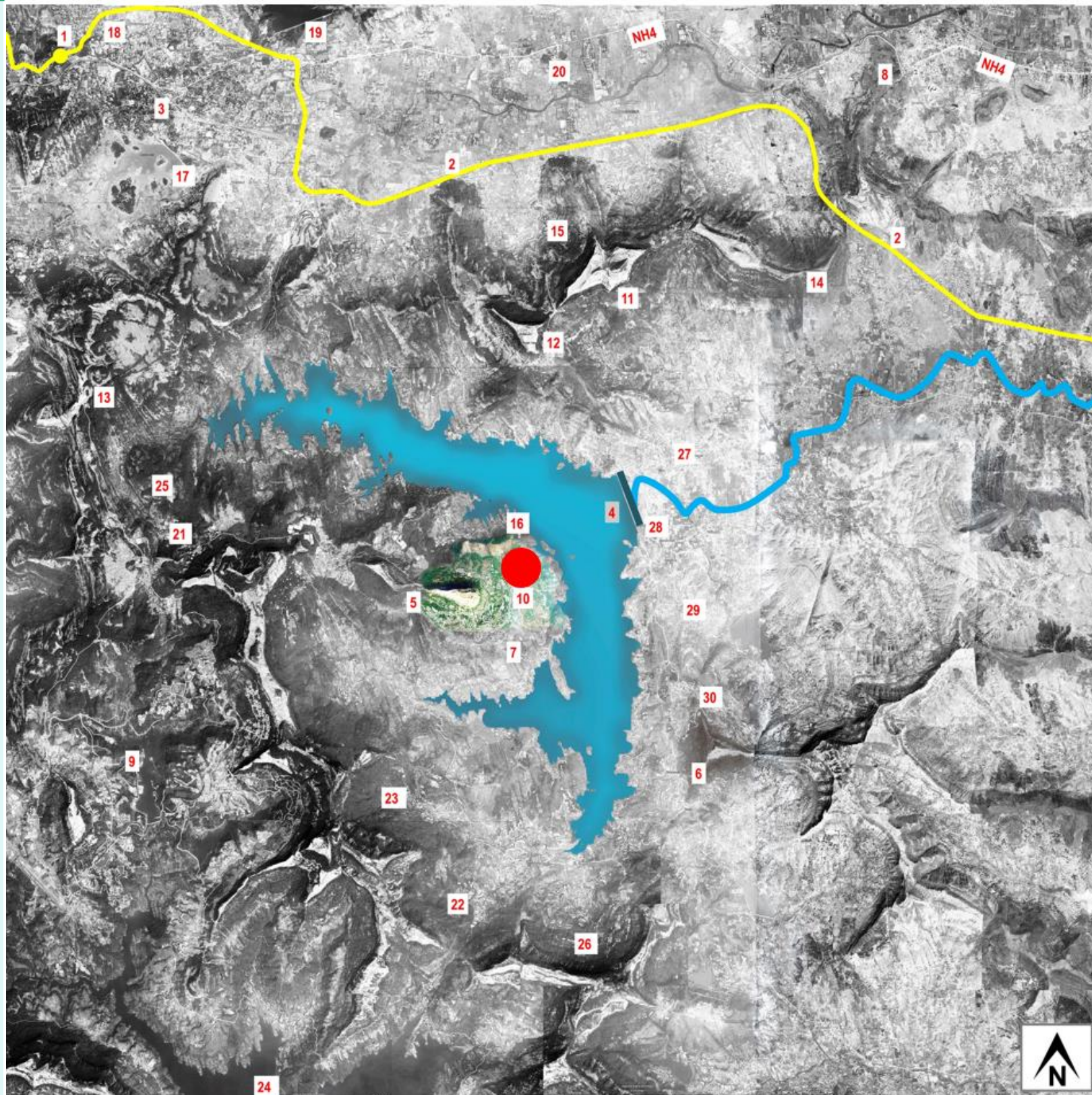
	FRAMEWORK OF ECOLOGICAL CONSERVATION MEASURES	X type Resorts	Y type Resorts
			valid till 31.3.2025
A	PREDESIGN STAGE MEASURES		
A1	Appointment of collaborative professional team of respective field experts [M]	2	*
A2	Detail study of all site features and ecological layers [M]	2	*
B	DESIGN STAGE MEASURES		
B1	Holistic Plan and design for preservation of natural features on site :	4	*
C	CONSTRUCTION STAGE MEASURES		
C1	Preconstruction measures:		
C1.1	Preservation of existing trees, native or medicinal trees and plants. [M]	2	*
C1.2	Biofencing the property	1	*
C1.3	Site to build toilets for labourers and compost pits before Resort construction starts.[M]	1	*
C2	During construction measures		
C2.1	Retaining natural features of site during construction [M]	2	*
C2.2	Preservation of top soil [M]	2	*
C2.3	Lighting on construction site to be solar lighting.[M]	1	*
C2.4	Regular PUC check for vehicles and machinery during construction.[M]	1	*
C3	Post construction measures		
C3.1	Construction waste to be given to the recyclers [M]	1	*
C3.2	Use of eco-friendly materials and products for construction	1	*
R	COMPENSATORY CLAUSE - 20 Points for 'Y' type Resorts.		
R1	Research and Educational programmes	*	20
D	SOIL CONSERVATION		
D1	Increasing tree cover by tree plantation on site for soil conservation.	2	2
D2	Use Bunds or vegetation to control soil erosion.	2	2
D3	Use Organic fertilizers only [M]	1	1
D4	Use Organic pesticides only [M]	1	1
E	RAIN WATER HARVESTING		
E1	Rain water harvesting system on site.	6	6
E2	permeable/ imperable pavings -25% max.	1	1
F	GREY WATER TREATMENT		
F1	100% Grey water treatment	4	4
G	BLACK WATER TREATMENT		
G1	100% Black water treatment	4	4

H	SOLID WASTE MANAGEMENT		
H1	Plastic free zone, with supporting measures [M]	2	2
H2	Waste segregation on site [M]	1	1
H3	Vermiculture, composting pits, biogas plant to manage waste	2	2
J	CONSERVATION OF FLORA AND FAUNA		
J1	Detail Documentation and efforts to conserve Flora and fauna in and around site.	6	6
J2	Preservation and Plantation of Native species [M]	4	4
J3	Uprooting invasive species, and prohibition of genetically modified species.[M]	2	2
J4	Lawns to be minimal with justification , covered with native grasses.	2	2
J5	Creative / Ecological / Nature theme park	5	5
K	ENERGY SAVING AND GENERATION		
K1	Generation and use of solar energy.	2	2
K2	Eco lighting - use solar lights and LEDs , with red light arrangement (and with automatic light shut off n control)	2	2
K3	Use of electric vehicles to travel within site [M]	1	1
K4	Meters for consumption of water and electricity.[M]	1	1
L	EDUCATION, AND AWARENESS		
L1	Sinage on site to encourage guests to walk and cycle.[M]	1	1
L2	Planned activities in nature for education and awareness for guests	2	2
L3	Educating and keeping staff aware about ecological conservation practices.[M]	2	2
N	COMMUNITY AND CULTURE		
N1	Ecological initiatives by Resort owners beyond the site boundaries	10	10
N2	Promoting economy of local communities.	2	2
N3	Preserving culture of local communities.	2	2
P	EXCELLENCE OR INNOVATION		
P1	Excellence or innovation in design and technology	10	10
	Total scores	100	100
	* - not applicable here. [M]-mandatory		
	ECO - RATING SYSTEM		
	core points - 40		
	3. ECO GROVE - AVERAGE - [41-60 points]		
	2. ECO WOODS - GOOD - [61-80 points]		
	1. ECO FOREST - BEST - [81-100 points]		

TUNGI RESORT EVALUATION			
Name		Tungi Resort, Lonavala	
State		Maharashtra	
Region		Western Ghats	
FRAMEWORK OF ECOLOGICAL CONSERVATION MEASURES	Y type Resorts	RATING	
	valid till 31.3.2025		
A	PREDESIGN STAGE MEASURES		
A1	Appointment of collaborative professional team of respective field experts [M]	*	*
A2	Detail study of all site features and ecological layers [M]	*	*
B	DESIGN STAGE MEASURES		
B1	Holistic Plan and design for preservation of natural features on site :	*	*
C	CONSTRUCTION STAGE MEASURES		
C1	Preconstruction measures:		
C1.1	Preservation of existing trees, native or medicinal trees and plants. [M]	*	*
C1.2	Biofencing the property	*	*
C1.3	Site to build toilets for labourers and compost pits before Resort construction starts.[M]	*	*
C2	During construction measures		
C2.1	Retaining natural features of site during construction [M]	*	*
C2.2	Preservation of top soil [M]	*	*
C2.3	Lighting on construction site to be solar lighting.[M]	*	*
C2.4	Regular PUC check for vehicles and machinery during construction.[M]	*	*
C3	Post construction measures		
C3.1	Construction waste to be given to the recyclers [M]	*	*
C3.2	Use of eco-friendly materials and products for construction	*	*
R	COMPENSATORY CLAUSE - 20 Points for 'Y' type Resorts.		
R1	Research and Educational programmes	20	0
D	SOIL CONSERVATION		
D1	Increasing tree cover by tree plantation on site for soil conservation.	2	0
D2	Use Bunds or vegetation to control soil erosion.	2	0
D3	Use Organic fertilizers only [M]	1	1
D4	Use Organic pesticides only [M]	1	1
E	RAIN WATER HARVESTING		
E1	Rain water harvesting system on site.	6	0
E2	permeable/ imperable pavings -25% max.	1	1
F	GREY WATER TREATMENT		
F1	100% Grey water treatment	4	4
G	BLACK WATER TREATMENT		
G1	100% Black water treatment	4	4

		Area	55 acres
		avg.level	775 m.
		eligibility	Y type resort
H	SOLID WASTE MANAGEMENT		
H1	Plastic free zone, with supporting measures [M]	2	2
H2	Waste segregation on site [M]	1	0
H3	Vermiculture, composting pits, biogas plant to manage waste	2	0
J	CONSERVATION OF FLORA AND FAUNA		
J1	Detail Documentation and efforts to conserve Flora and fauna in and around site.	6	0
J2	Preservation and Plantation of Native species [M]	4	0
J3	Uprooting invasive species, and prohibition of genetically modified species.[M]	2	0
J4	Lawns to be minimal with justification , covered with native grasses.	2	0
J5	Creative / Ecological / Nature theme park	5	0
K	ENERGY SAVING AND GENERATION		
K1	Generation and use of solar energy.	2	2
K2	Eco lighting - use solar lights and LEDs , with red light arrangement (and with automatic light shut off n control)	2	2
K3	Use of electric vehicles to travel within site [M]	1	1
K4	Meters for consumption of water and electricity.[M]	1	1
L	EDUCATION, AND AWARENESS		
L1	Sinage on site to encourage guests to walk and cycle.[M]	1	1
L2	Planned activities in nature for education and awareness for guests	2	1
L3	Educating and keeping staff aware about ecological conservation practices.[M]	2	1
N	COMMUNITY AND CULTURE		
N1	Ecological initiatives by Resort owners beyond the site boundaries	10	0
N2	Promoting economy of local communities.	2	1
N3	Preserving culture of local communities.	2	1
P	EXCELLENCE OR INNOVATION		
P1	Excellence or innovation in design and technology	10	0
Total scores		100	24
* - not applicable here. [M]-mandatory		Tungi Resort, Lonavala	
		NEEDS ENHANCEMENT	
ECO - RATING SYSTEM			
core points - 40			
3. ECO GROVE - AVERAGE - [41-60 points]			
2. ECO WOODS - GOOD - [61-80 points]			
1. ECO FOREST - BEST - [81-100 points]			





TUNGI RESORT

Pawna Nagar Post,
Taluka Maval, Tungi,
Lonavala, Pune,
Maharashtra 410401

Legend

- NH4 - old Mumbai-Pune highway
- 1 - Khandala bypass
- 2 - Mumbai Pune Express highway
- 3 - Lonavala Railway station
- 4 - Pawna lake [dam and river]
- 5 - Tung Fort
- 6 - Tikona Fort
- 7 - Tung village
- 8 - Kamshet
- 9 - Amby valley city
- 10 - Tungi Resort**
- 11 - Visapur fort
- 12 - Lohagad fort
- 13 - Lion's point
- 14 - Bedse caves
- 15 - Bhaja caves
- 16 - Pansoli Resort / camp.
- 17 - Lonawala lake waterfall
- 18 - Fariyas Hotel
- 19 - Valvan dam
- 20 - Karla
- 21 - The Macchan Resort
- 22 - Shilimb
- 23 - Hilton Shilimb Retreat
- 24 - Mulshi lake
- 25 - Atvan village
- 26 - Ajiwali Devrai
- 27 - Pawana nagar
- 28 - Shevati
- 29 - Waru
- 30 - Tikona Peth

Rivers in the region have semi dendritic pattern.
Pawna lake of 113.5 sq.kms area is backwaters of pawna dam over pawna river .



Image source : Google maps

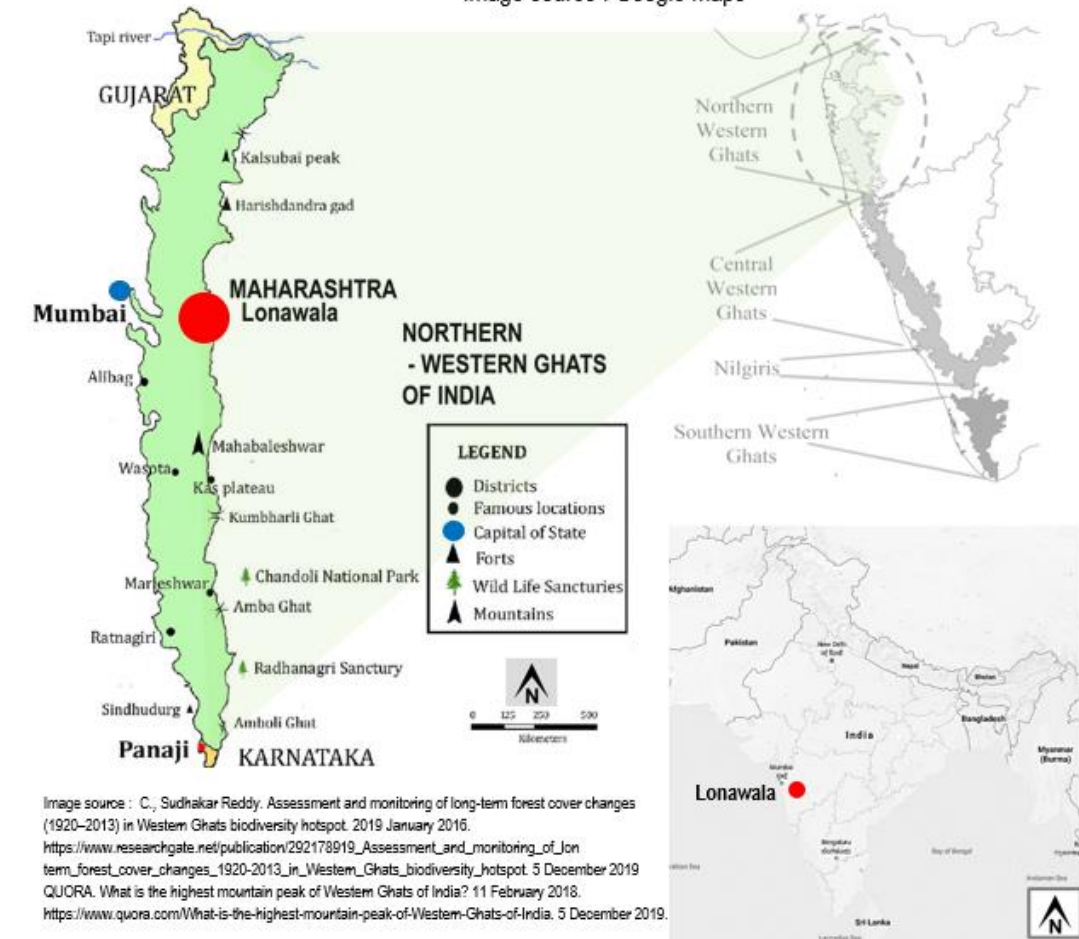
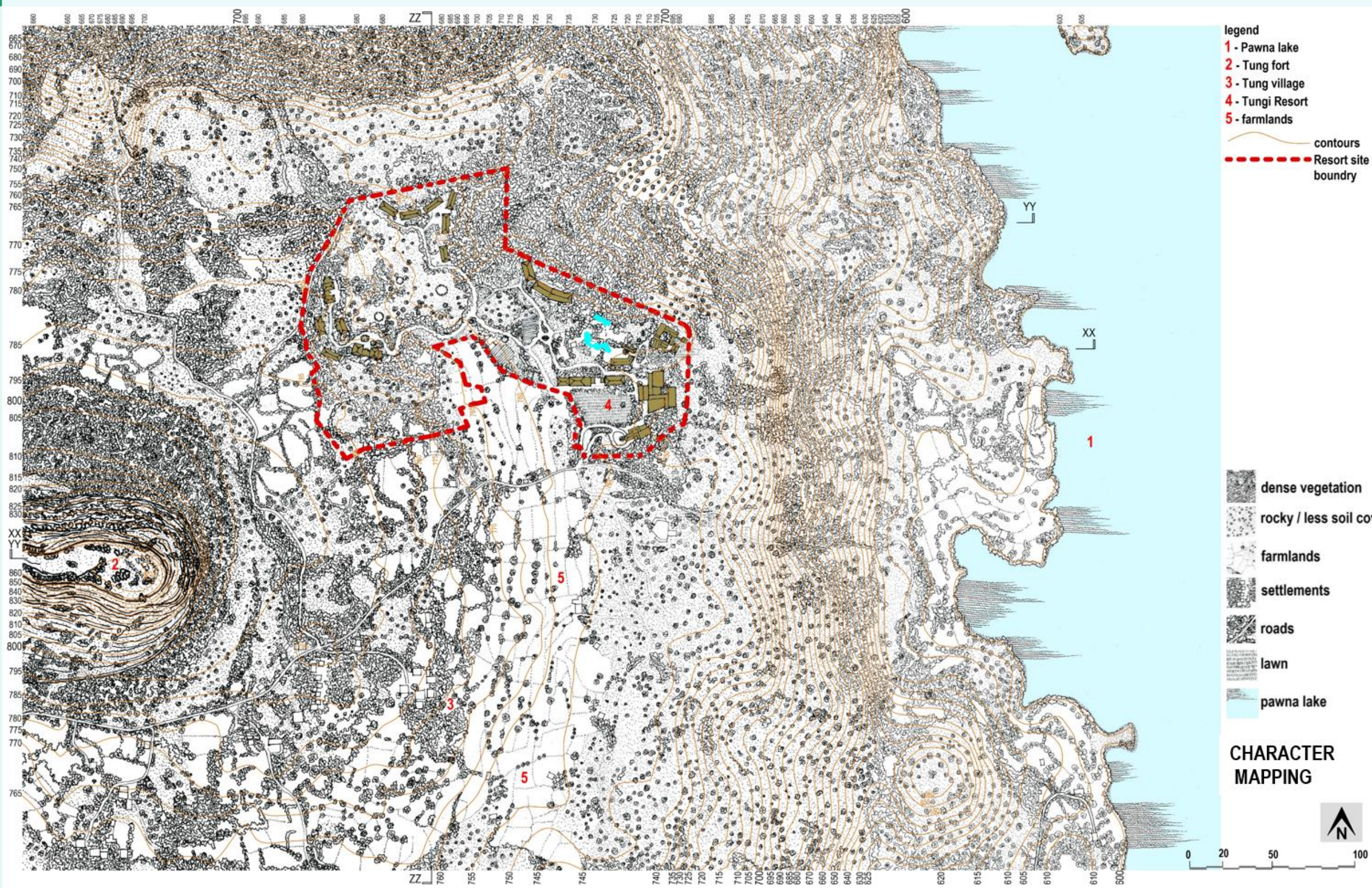
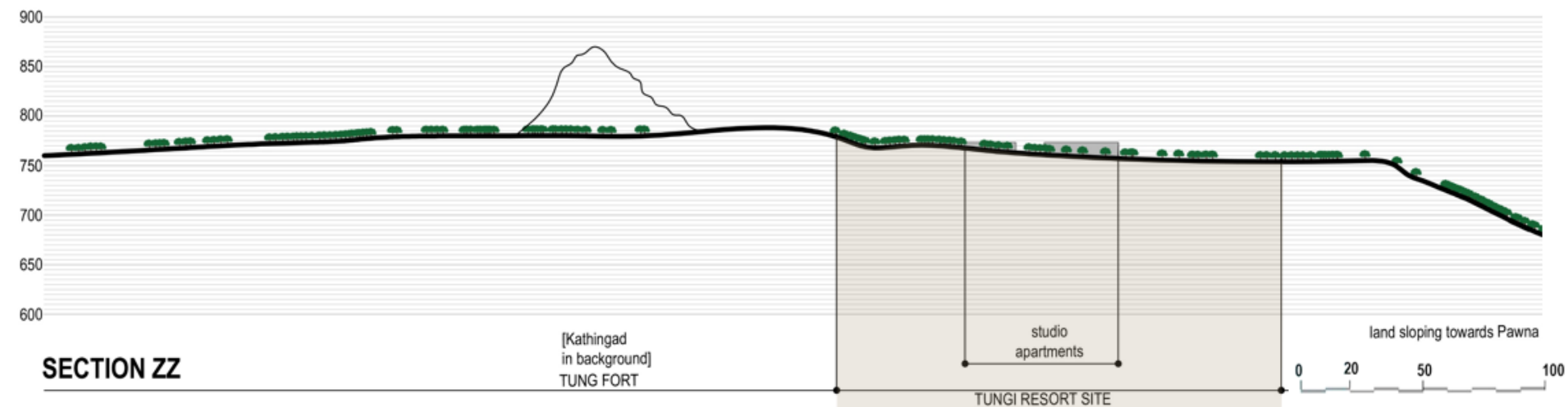
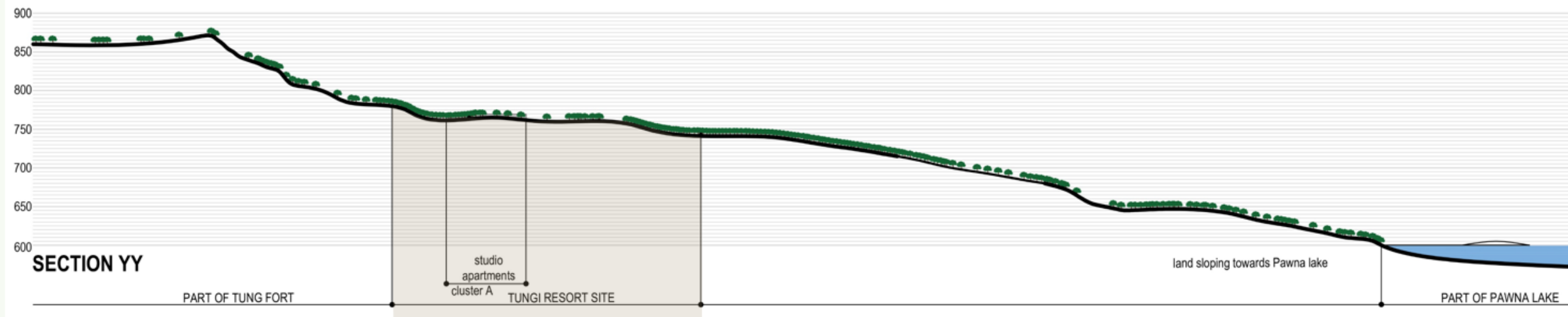


Image source : C., Sudhakar Reddy. Assessment and monitoring of long-term forest cover changes (1920–2013) in Western Ghats biodiversity hotspot. 2019 January 2016.
https://www.researchgate.net/publication/292178919_Assessment_and_monitoring_of_Long-term_forest_cover_changes_1920-2013_in_Western_Ghats_biodiversity_hotspot. 5 December 2019
QUORA. What is the highest mountain peak of Western Ghats of India? 11 February 2018.
<https://www.quora.com/What-is-the-highest-mountain-peak-of-Western-Ghats-of-India>. 5 December 2019.

Image source : Google maps



Surroundings of Tunggi Resort
Image source : Photographs : Author



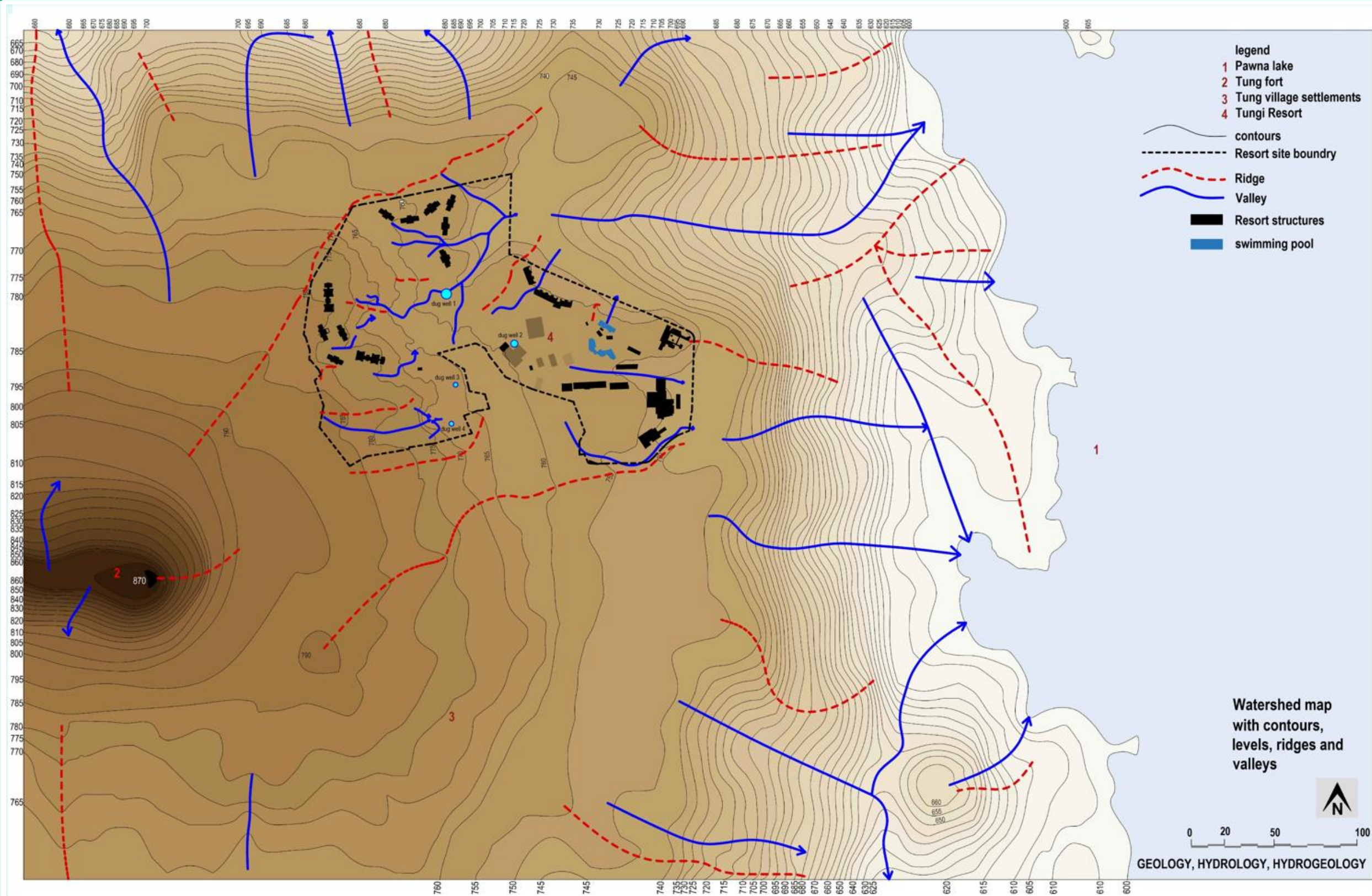
As per Koppen-Geiger climate classification
lonavala is considered to be 'Am' that is
TROPICAL MONSOON CLIMATE

Max. temperature – 27.9 degrees celcius
Min. temperature – 20.9 degrees celcius
Wind direction – southwest monsoon winds
Wind direction – north east in winter

Total rainfall is more than 4000mm per year
Average rainfall is 750mm



Road to Tungi Resort
Image source : Photographs : Author



Deccan trap Basalt is hard impervious rock formations, of upper cretaceous to eocene age.

These are one of the largest igneous rock features on earth, that are result of **volcanic eruptions** in history of earth.

'Trap' in geology refers to **step like hills** forming the landscape of the region.

Hydrogeology includes water bearing formations like **weathered, fractured, jointed and vesicular basalts**.

In basaltic area, artificial recharge structures are **check dams, gully plugs, percolation tanks, nalla bunds, contour bunds, ponds**.

Dug wells are **most feasible** in entire basaltic deccan trap.

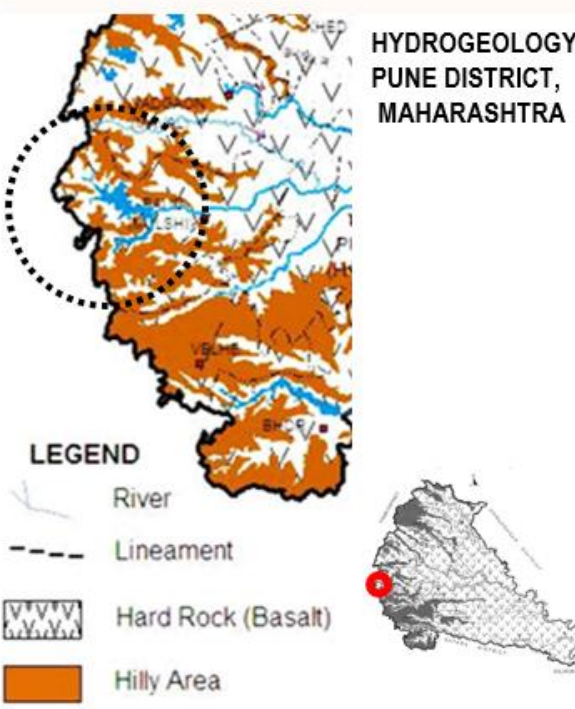
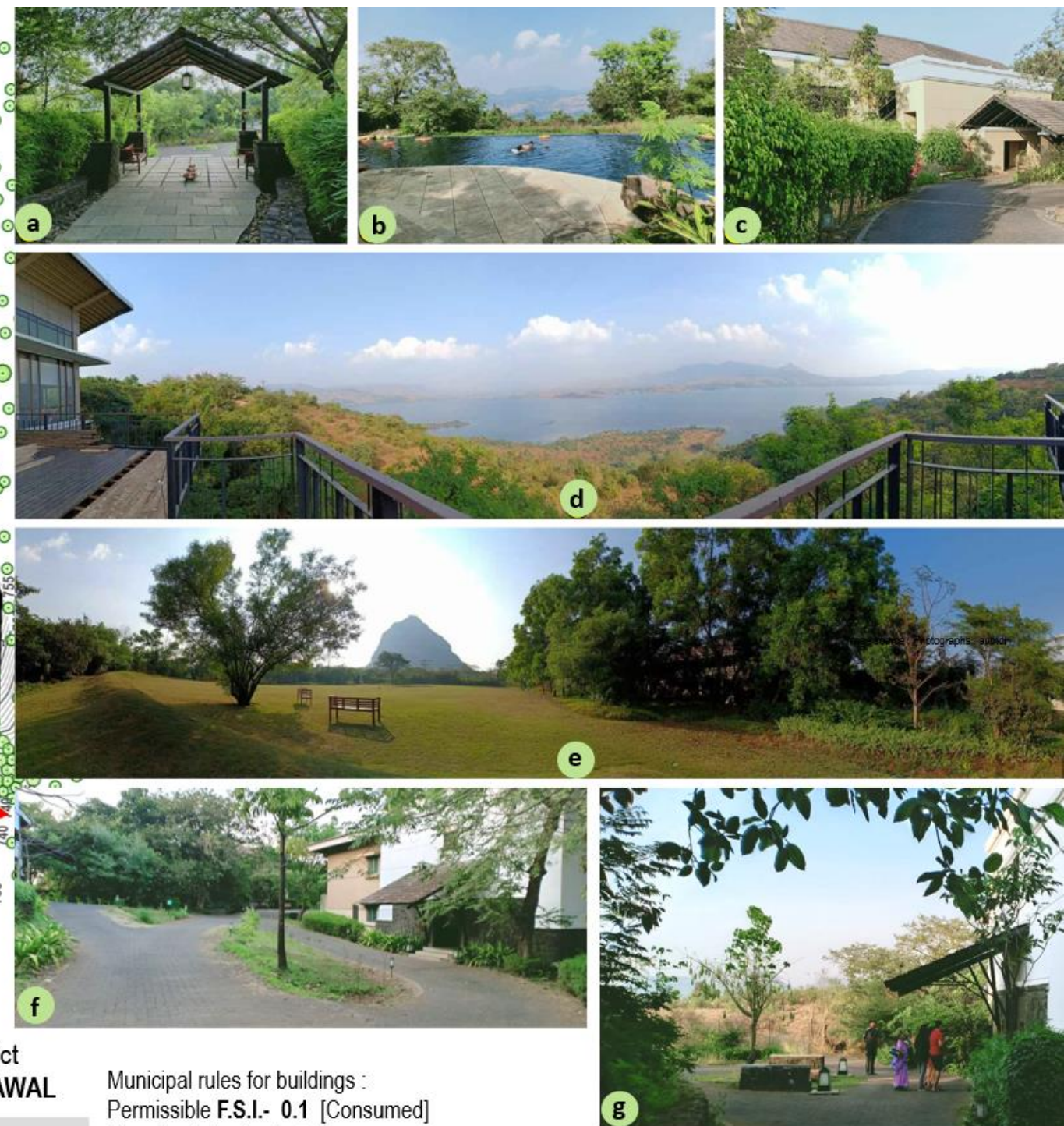
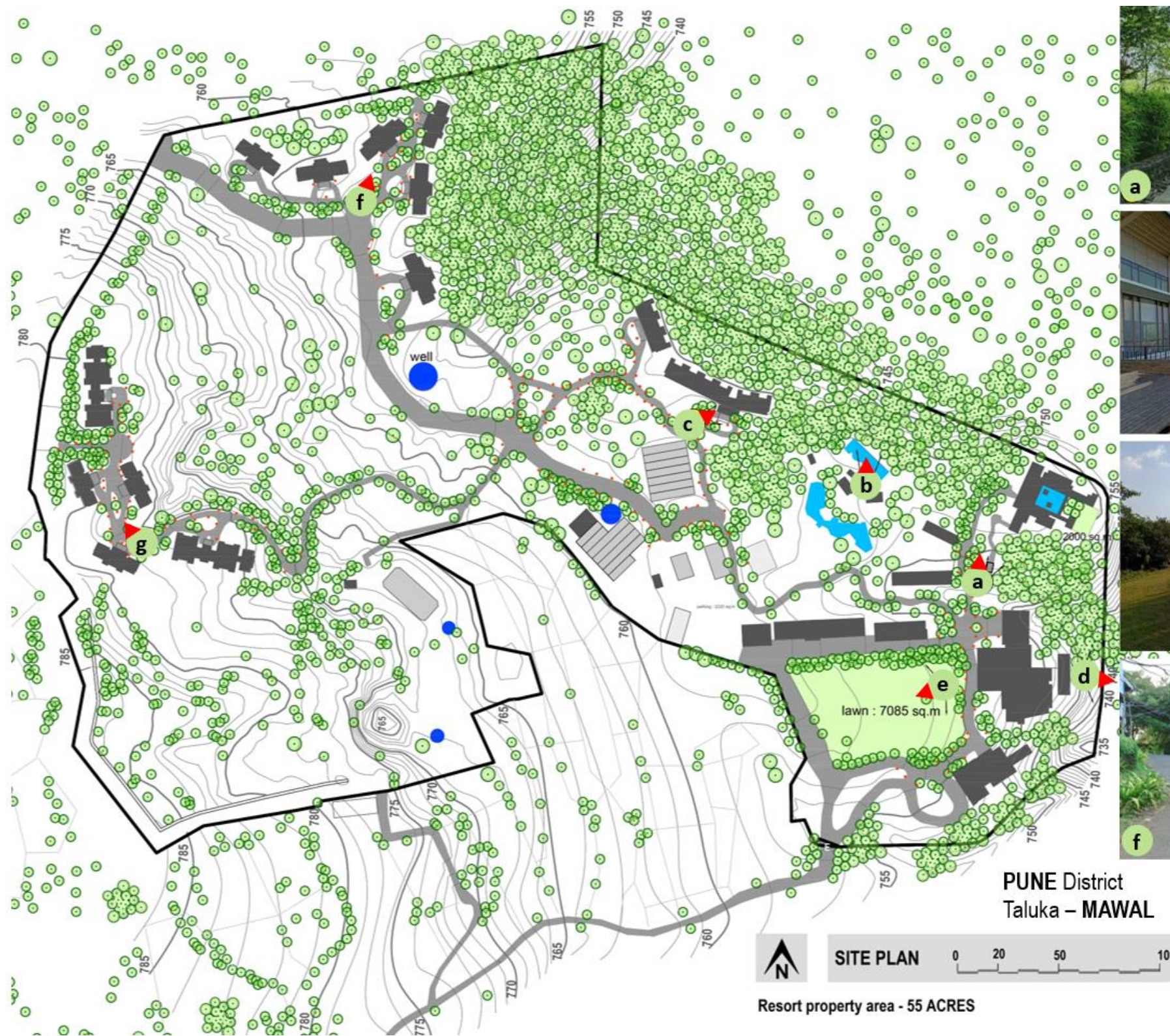


Image source : BOARD, CGWB CENTRAL GROUND WATER.
Government of India, Ministry of water resources. 2013.
http://cgwb.gov.in/District_Profile/Maharashtra/Pune.pdf. 10 February 2020.



Municipal rules for buildings :
 Permissible F.S.I.- 0.1 [Consumed]
 Planning to be in clusters,
 with distance of 150 meters minimum between clusters.
 source : IMK Architects

Image source : Photographs : Author

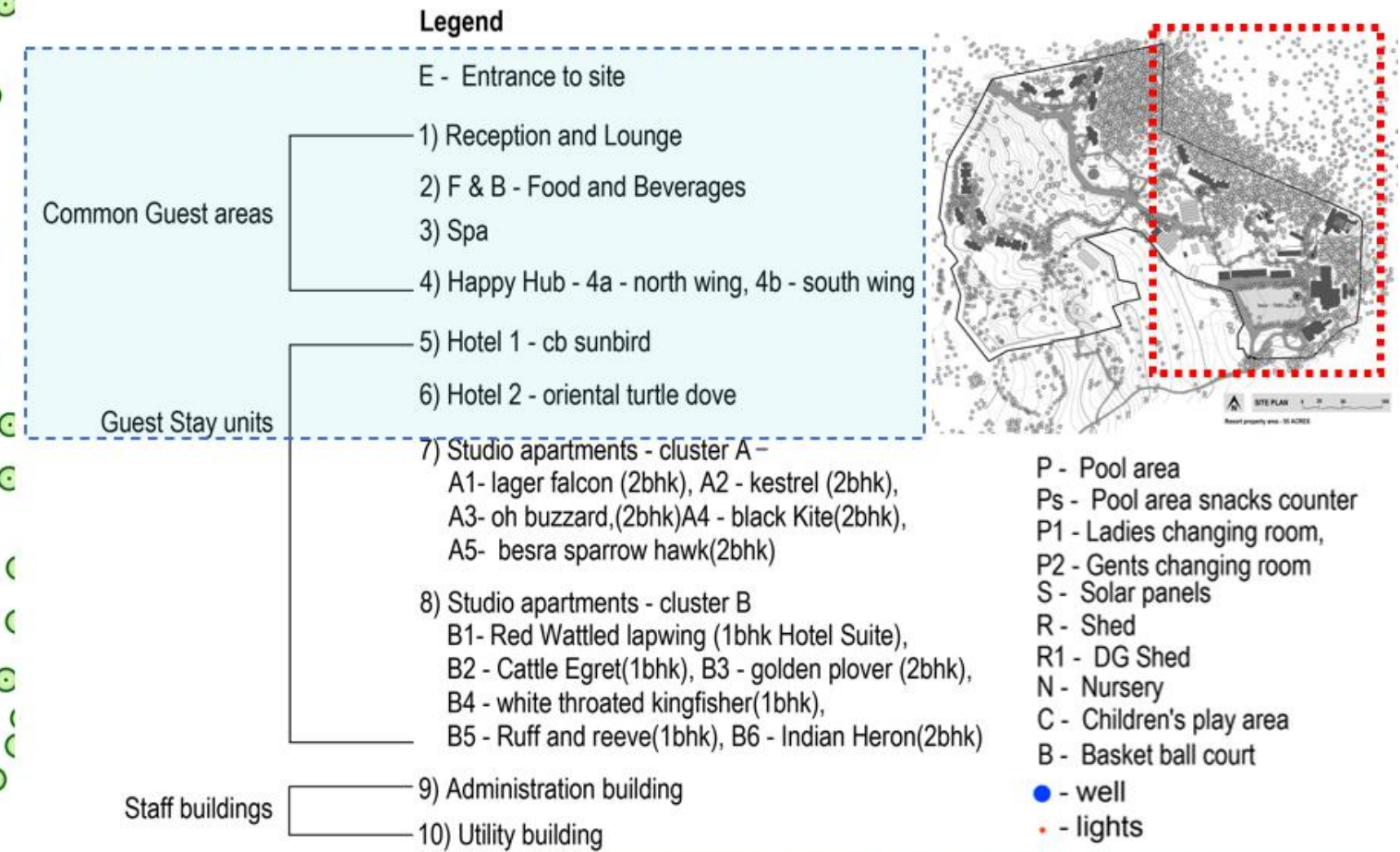


Image source : Photographs : Author

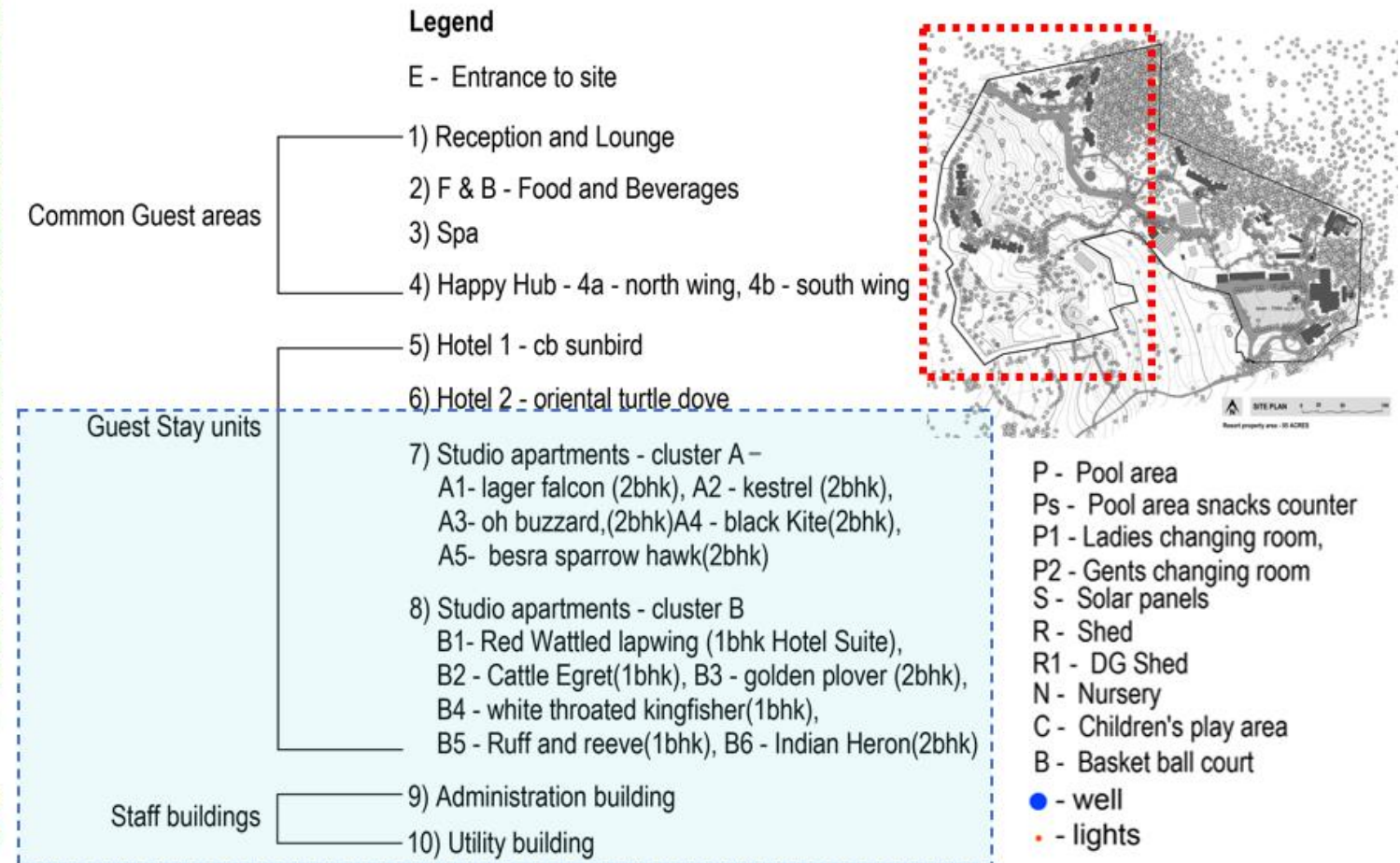
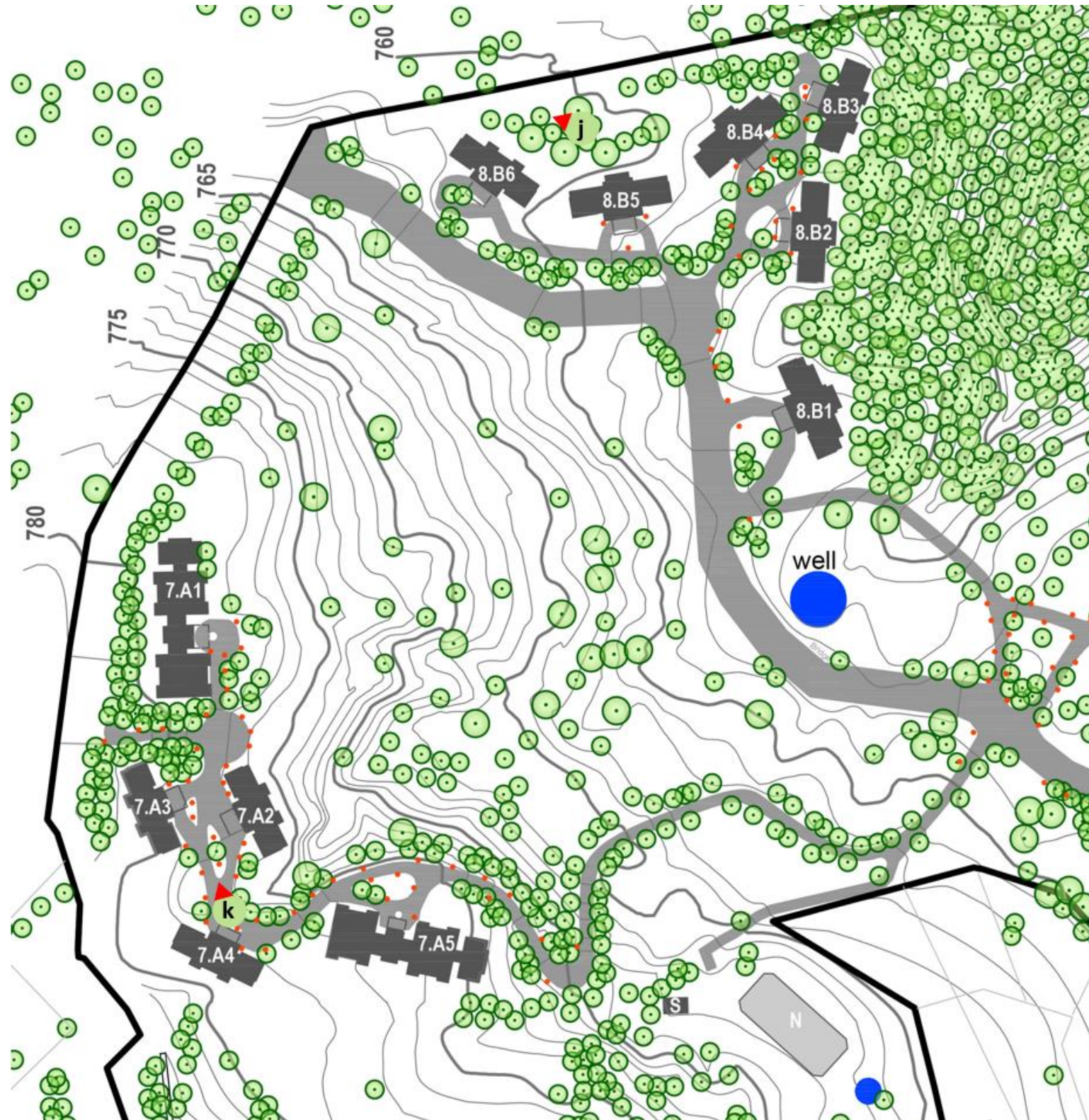


Image source : Photographs : Author

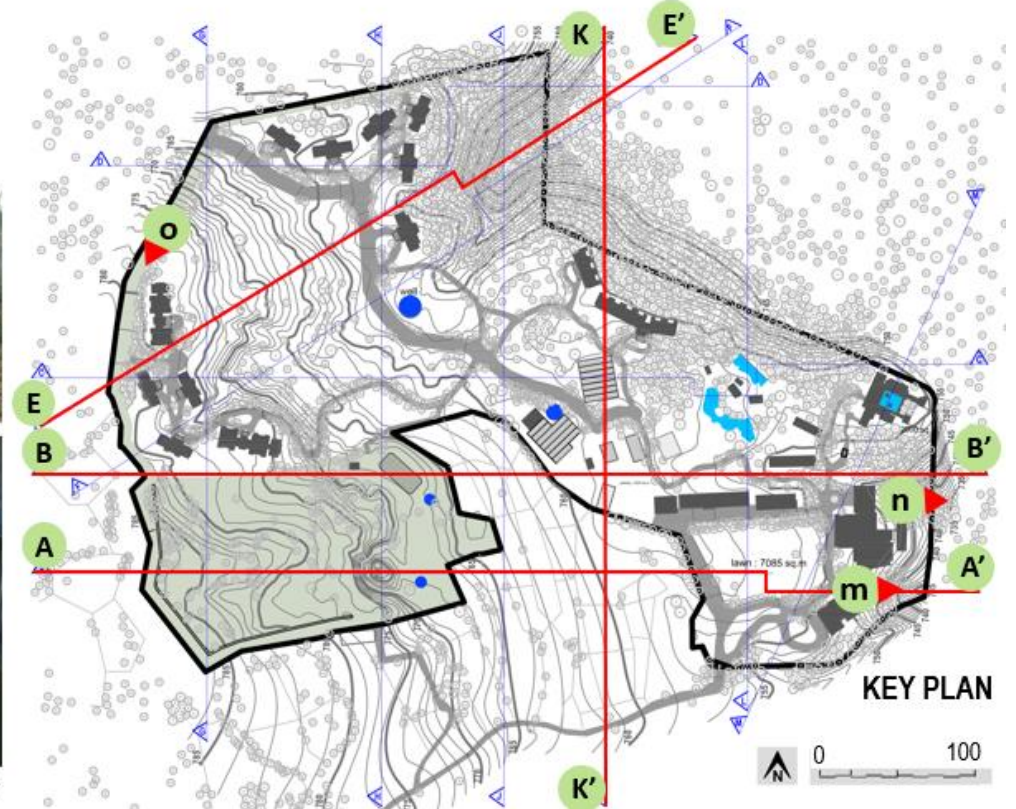
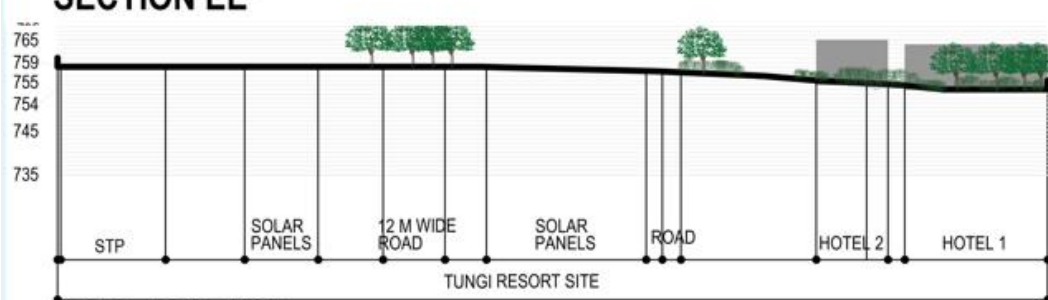
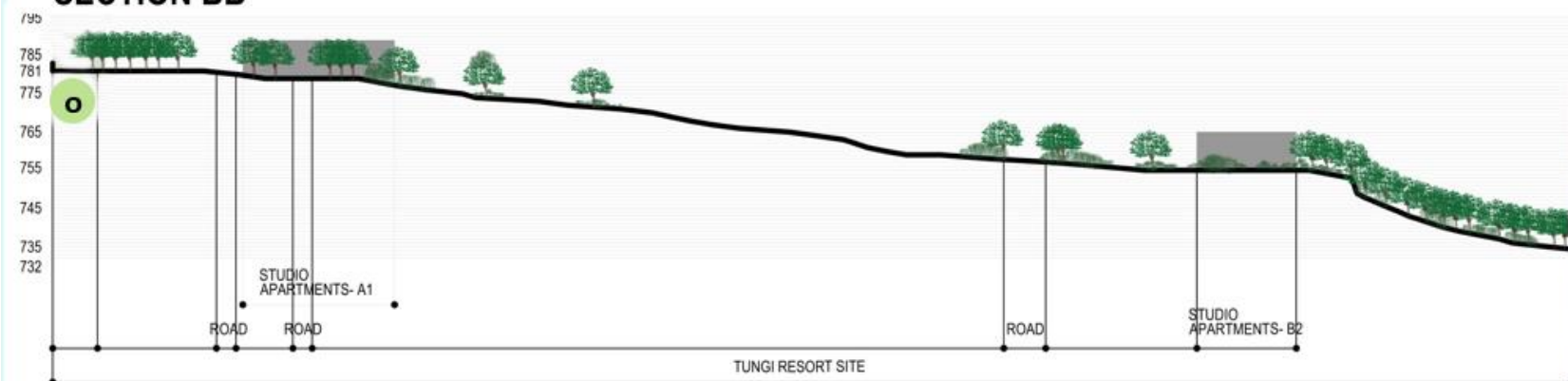
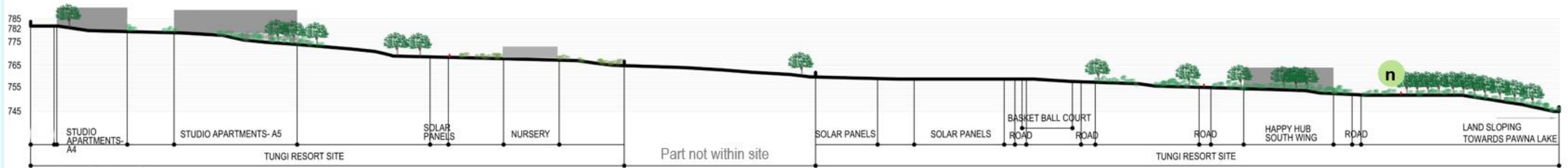
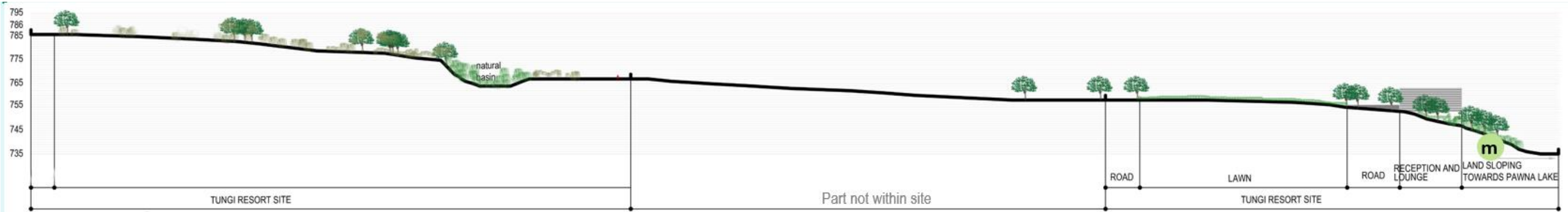


Image source : Photographs : Author

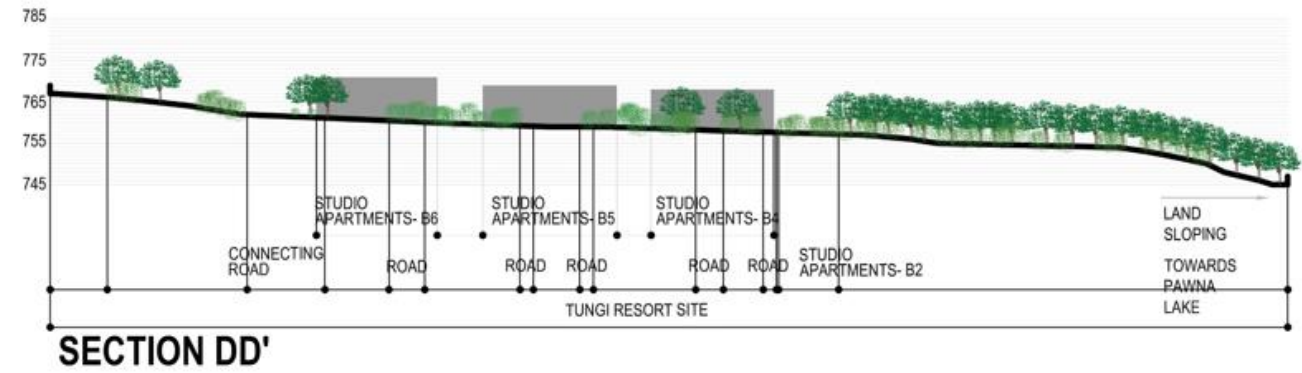
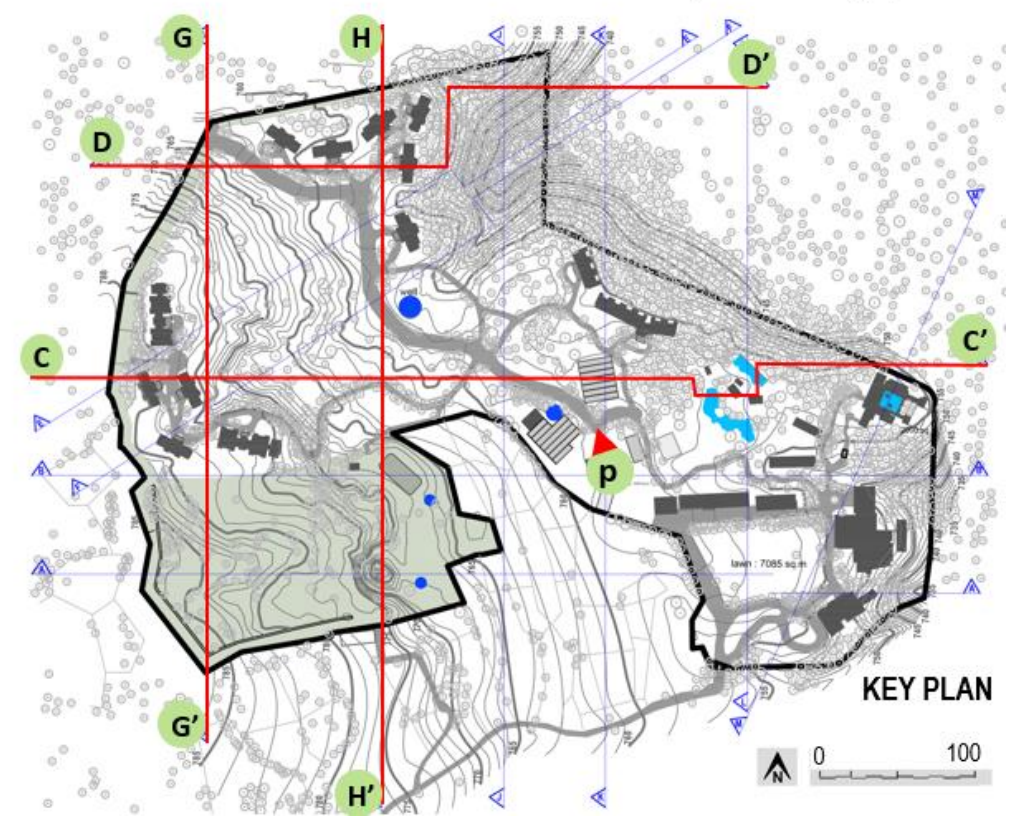
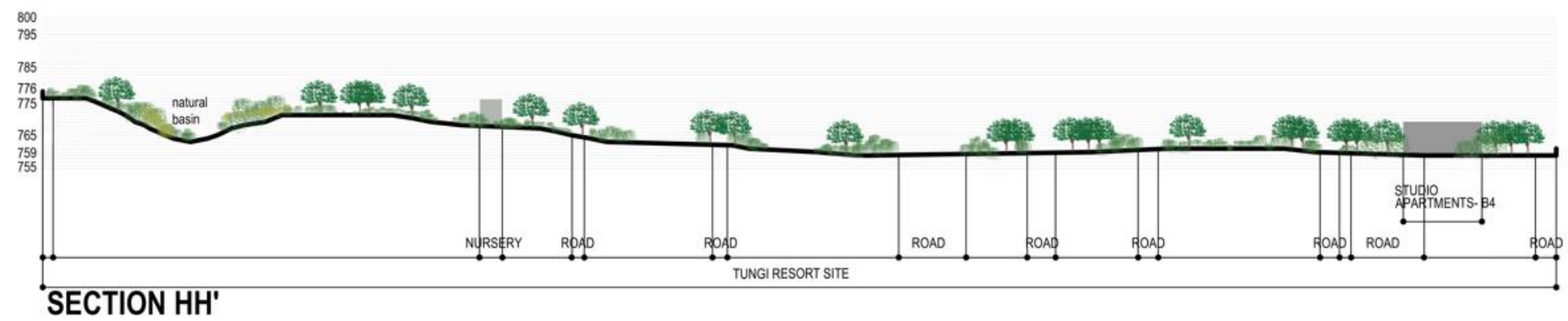
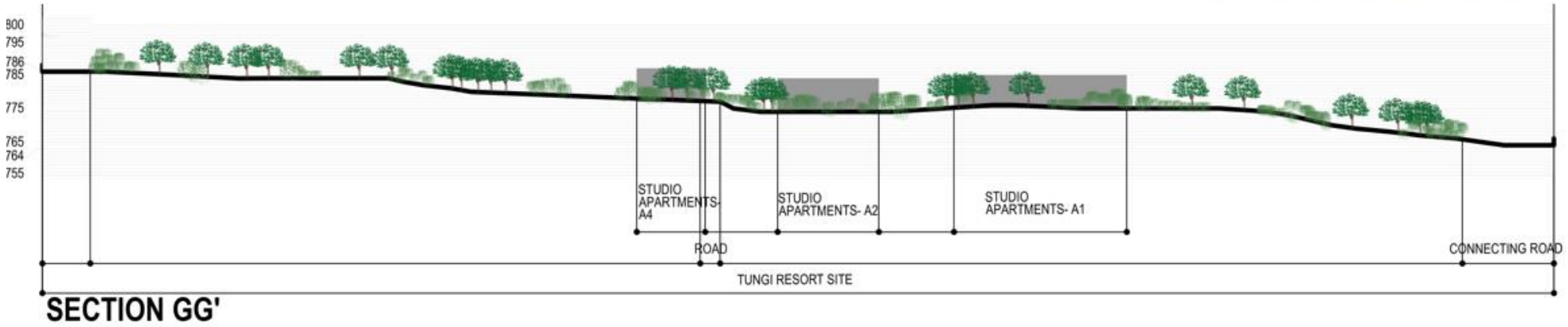
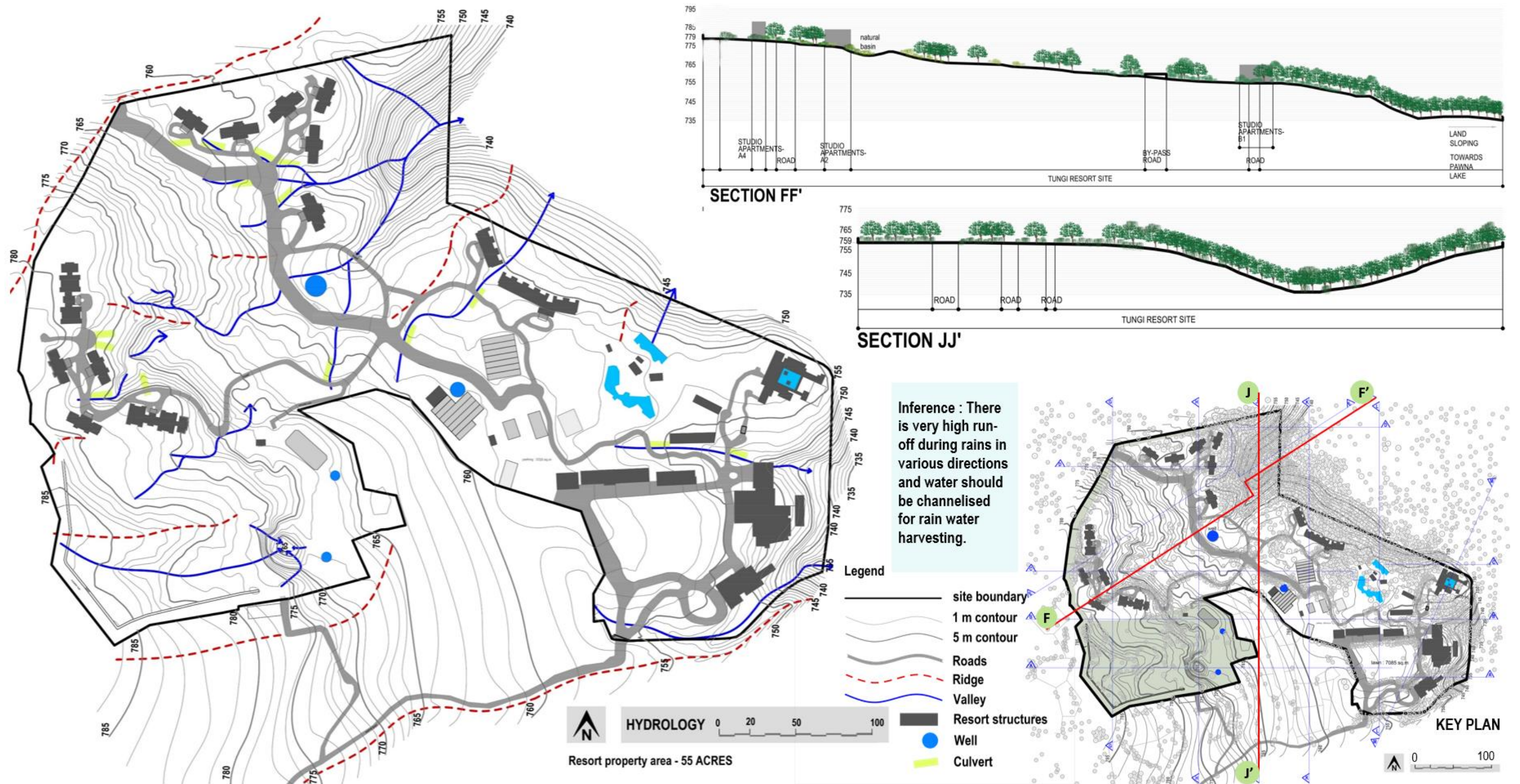
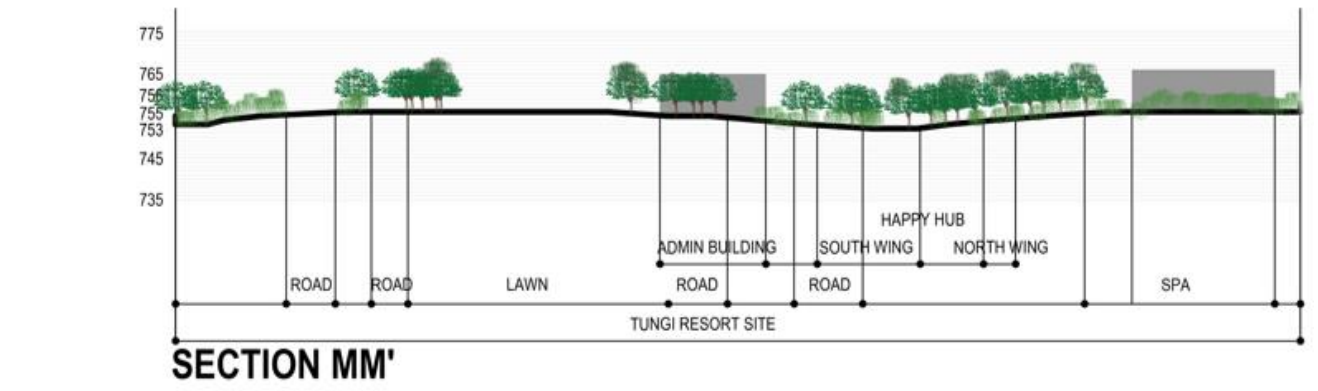
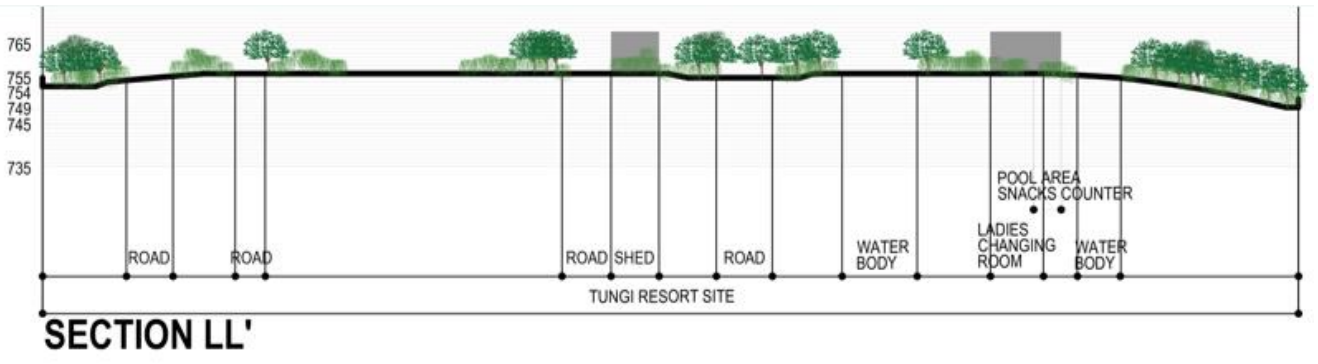
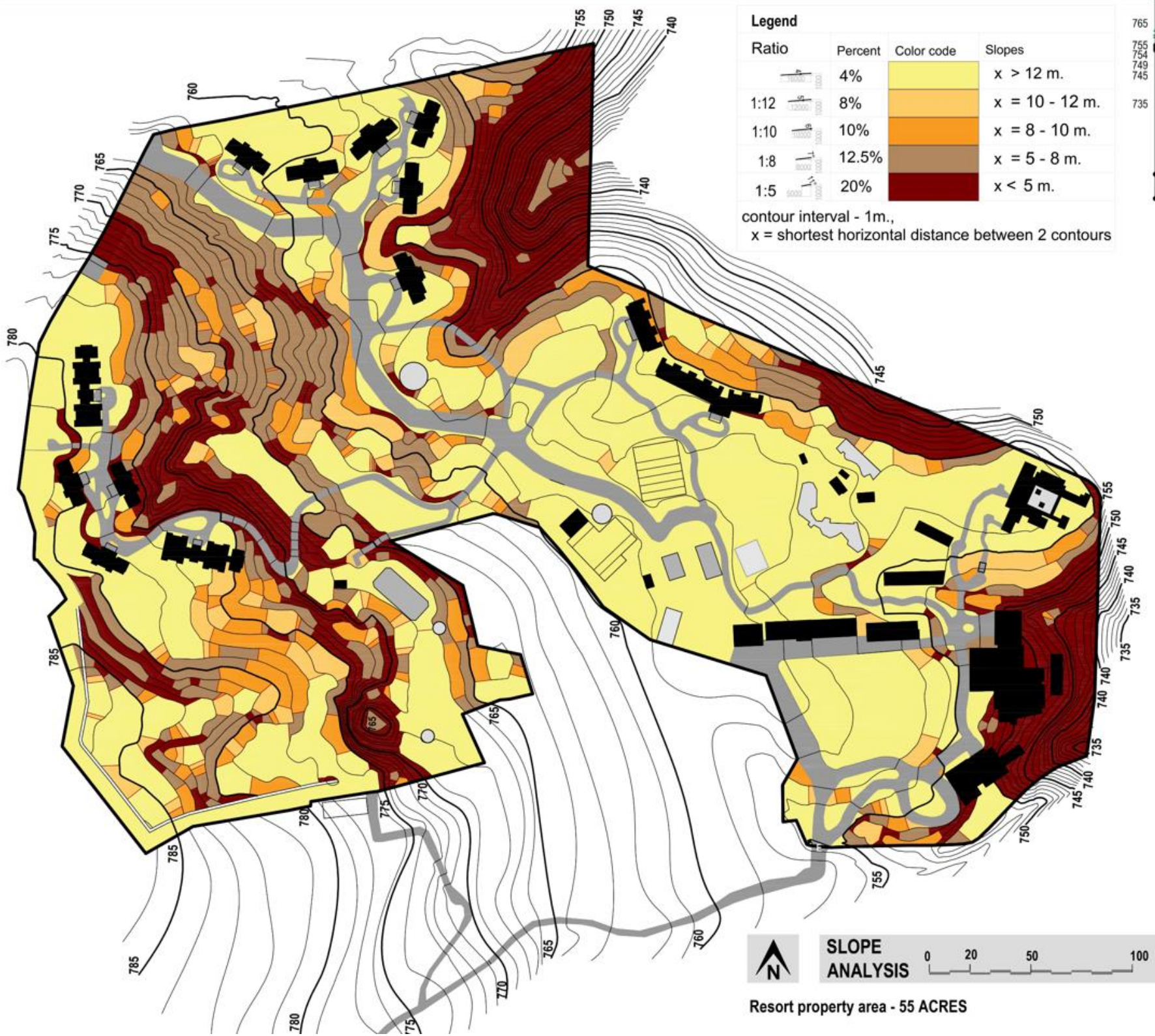


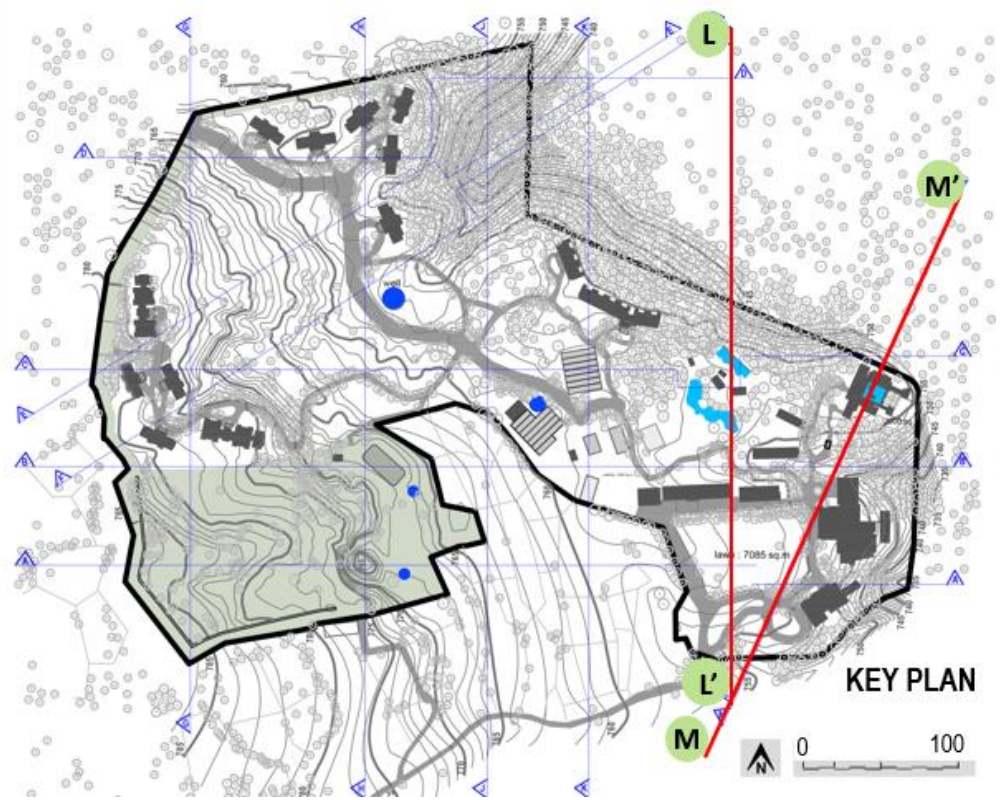
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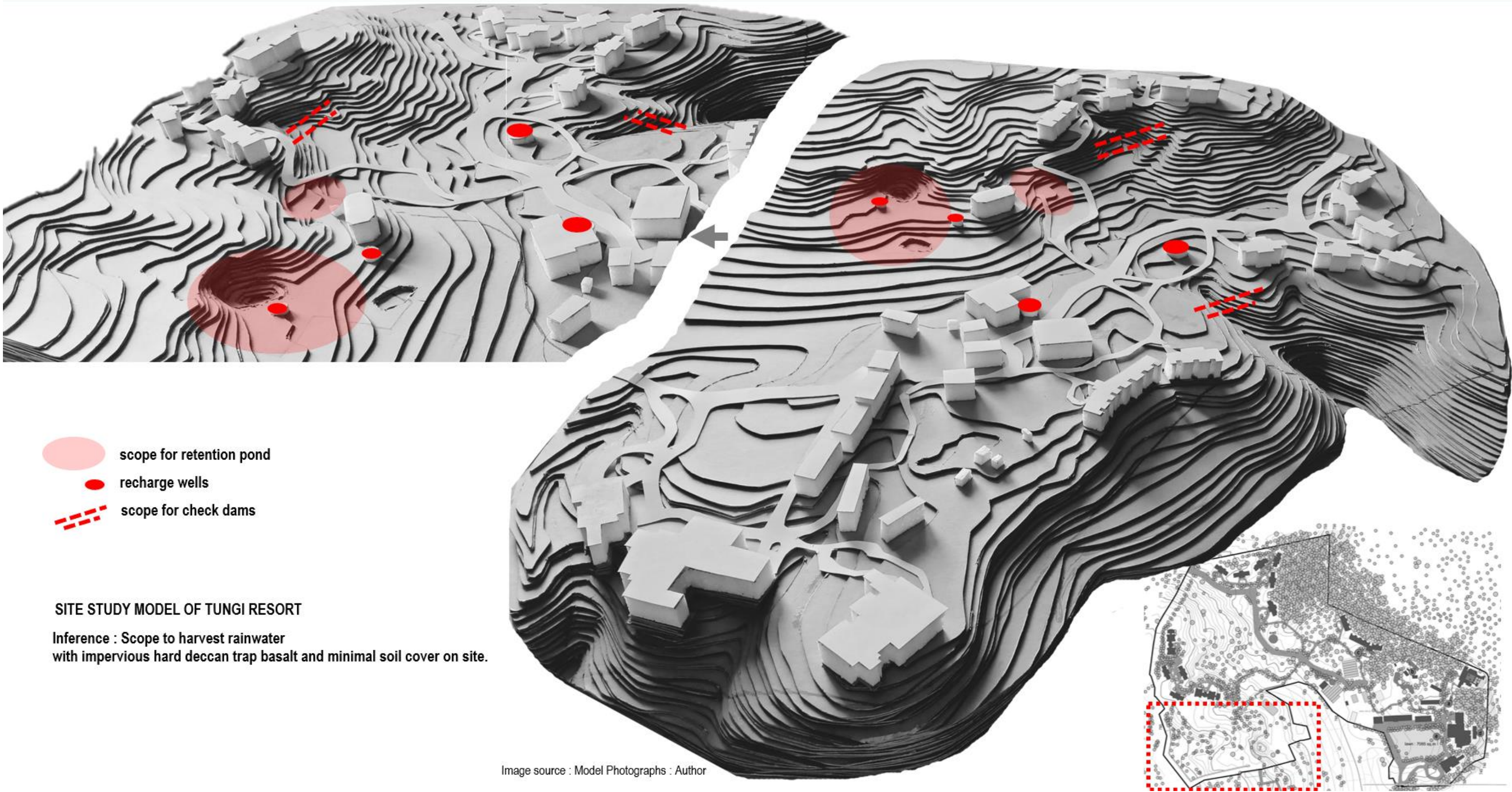


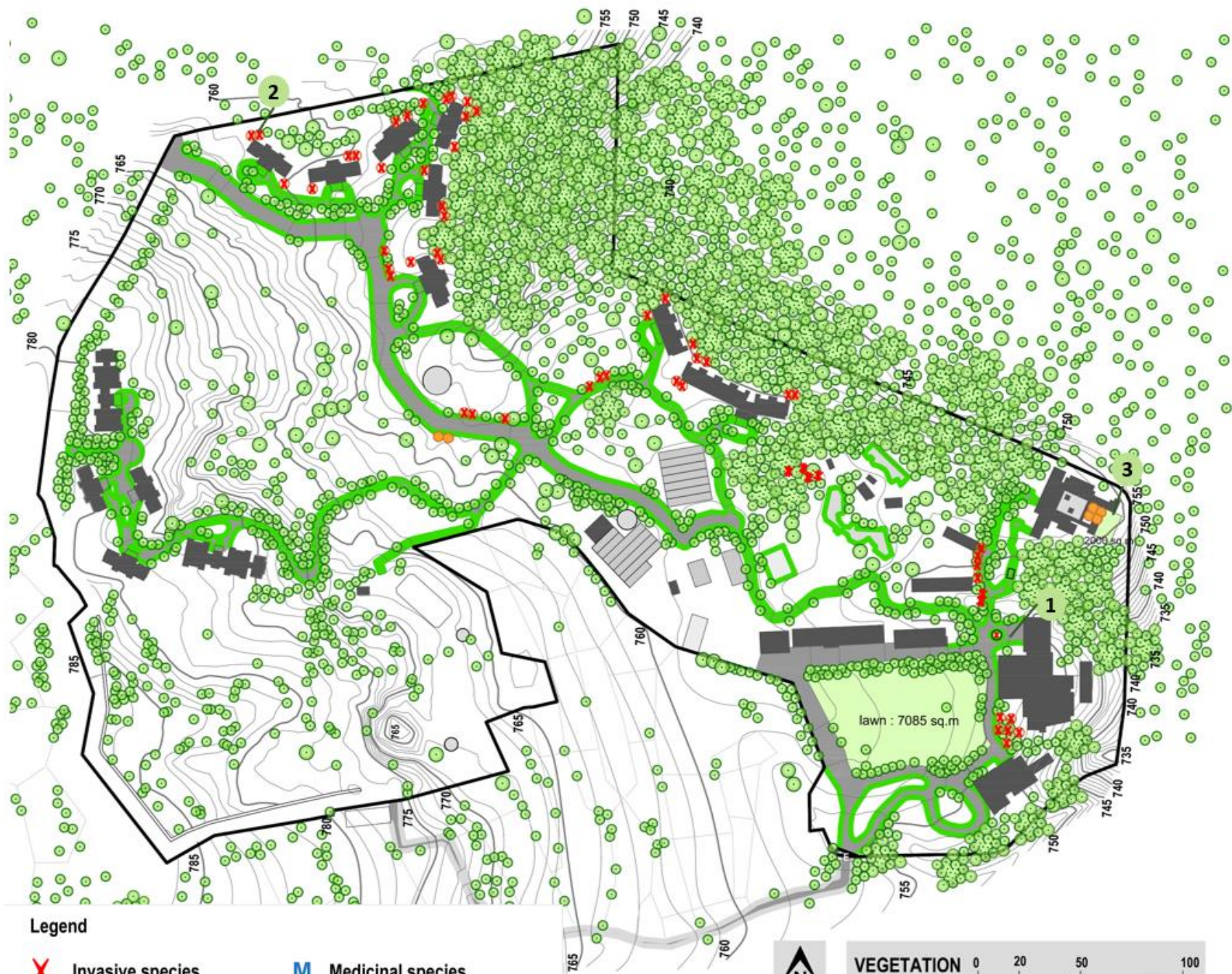




Inference :
Control intense soil erosion in areas with slopes steeper than 1:10, especially in the areas that are not covered with vegetation.







Legend

- X Invasive species
- +S Native to sahyadris
- +I Native to india
- ✓ Naturalized in india
- E Exotic species
- O Ornamental species
- M Medicinal species
- D Drought tolerant species
- ✱ Aromatic / fragrant species
- ✱ Flowering species
- 🍌 Fruiting species



Resort property area - 55 ACRES

Inference : With added efforts for plantation in Resort, more of exotic species, and invasive varieties are rapidly grown on site with sole purpose of beautification. Native plantation is needed on site for sustainable landscapes as well as to maintain natural landscape character of the region.

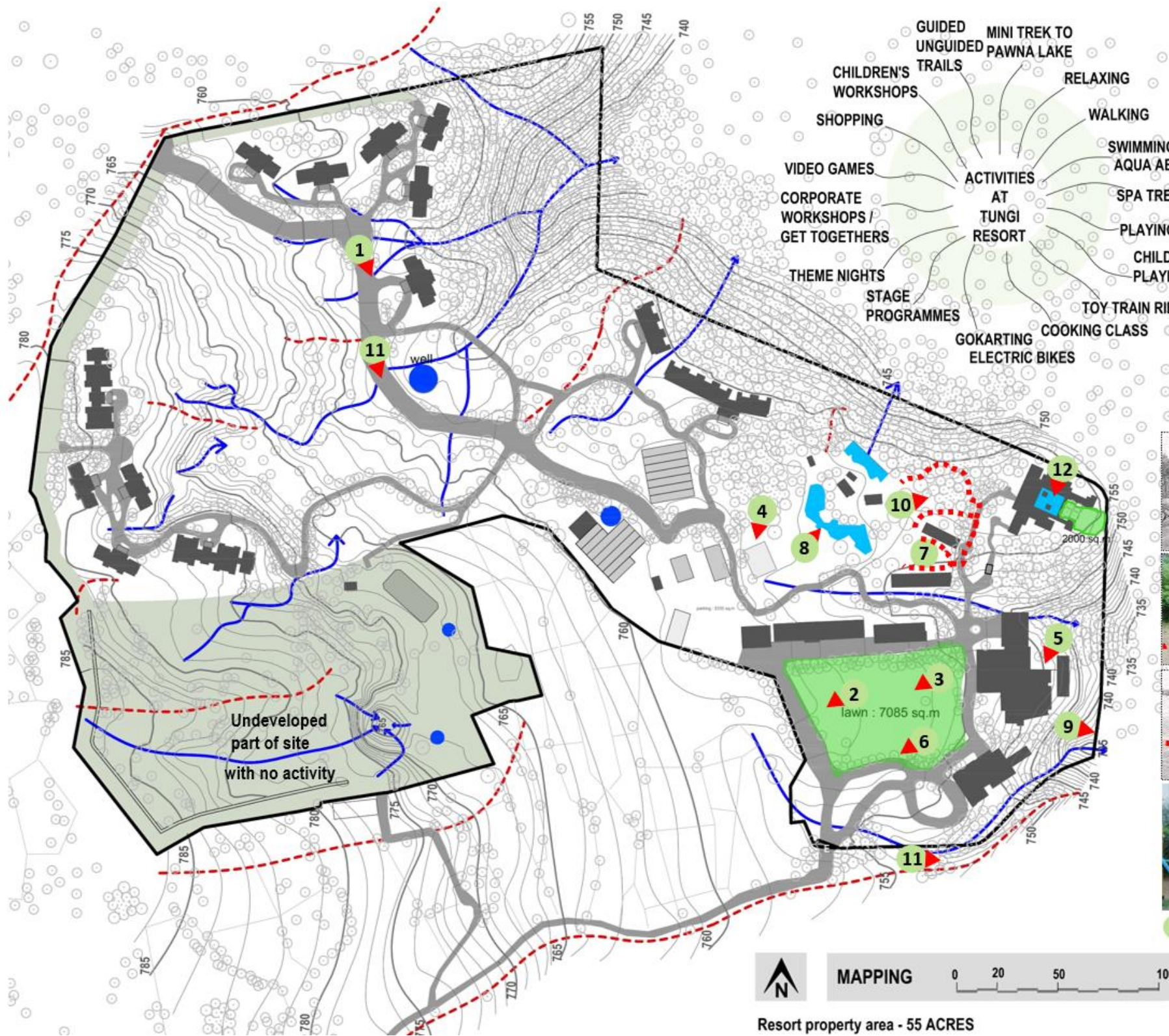
EXISTING PLANT MATERIAL IN RESORT

TREES / UPPER STOREY			MIDDLE AND LOWER STOREY		
Common name	Botanical name	Type	Common name	Botanical name	Type
X Australian Babul	<i>Acacia auriculiformis</i>	X D	X Wild sage	<i>Lantana camara</i>	X
Gulmohar	<i>Delonix regia</i>	x O E ✓ ✱ D	Yellow oleander	<i>Thevetia Peruviana</i>	E O ✱
Nirgudi	<i>Vitex nigundo</i>	+S M D	Lajalu	<i>Mimosa Pudica</i>	✓ O M
Pichkari	<i>Spathodea campanulata</i>	O E ✓ ✱ D	Jaswand	<i>Hibiscus rosa-sinensis</i>	+I O M ✱
Copper pod	<i>Peltophorum Pterocarpum</i>	O E ✓ ✱ D	Shatavari	<i>Asparagus Racemosus</i>	+S O M
Rain tree	<i>Samanea Saman</i>	+S ✱ D	green pampas	<i>Cortaderia Selloana</i>	E O
Saptarni	<i>Alstonia scholaris</i>	+I ✱ D	purple pampas	<i>Cortaderia Selloana</i>	E O
Silk cotton tree	<i>Bombax ceiba</i>	+S ✱ D	Rhoeo	<i>Tradescantia spathacea</i>	E O
Kadu mehendi	<i>Clerodendrum inerme</i>	+S M D	Philodendron	<i>Philodendron selloum</i>	E O
Karanj	<i>Pongamia pinnata</i>	+S D	Mondo grass	<i>Ophiopogon japonicus</i>	E O
Mango	<i>Mangifera indica</i>	+S 🍌	Wedelia	<i>Wedelia trilobata</i>	E O
Pangara	<i>Erythrina variegata</i>	+S D	Bear grass	<i>Yucca glauca</i>	E O
Bhend	<i>Thespetia populnea</i>	+S ✱ D	Golden duranta	<i>Duranta erecta</i>	E O
Madagascar almond	<i>Terminalia Mantaly</i>	E 🍌	Agave	<i>Agave americana</i>	E O D
Karwanda	<i>Carissa carandas</i>	+S 🍌	Railway creeper	<i>Ipomoea cairica</i>	✓ O ✱
Sonchafa	<i>Magnolia champaca</i>	+I O ✱ ✱	Spider lily	<i>Crinum asiaticum</i>	X E O
Peepal	<i>Ficus religiosa</i>	+I E	Lemon grass	<i>Cymbopogon citratus</i>	+S
Champa	<i>Plumeria alba</i>	+I O ✱ ✱	Buddha belly	<i>Bambusa ventricosa</i>	E O
Avla	<i>Phyllanthus emblica</i>	+S 🍌	yellow bamboo	<i>Bambusa vulgaris</i>	E O
Palas	<i>Butea monosperma</i>	+S ✱	Sontakka	<i>Hedychium coronarium</i>	+I O ✱ ✱
Bakul	<i>Mimosops elengi</i>	+S ✱ ✱	2 X Peacock flower	<i>Caesalpinia pulcherrima</i>	X ✱
Umber	<i>Ficus Racemosa</i>	+S 🍌	Fern	<i>Nephrolepis exaltata</i>	+S
Chinch	<i>Tamarindus indica</i>	+I E	Golden Fern	<i>Acrostichum aureum</i>	+S
Ritha	<i>Sapindus laurifolius</i>	+S 🍌	Korean grass	<i>Zoysia japonica</i>	E O
Kinjal	<i>Terminalia Paniculata</i>	+S D	Dallas grass	<i>Paspalum dilatatum</i>	E O
Kadamb	<i>Neolamarkia cadamba</i>	+S D	Pendilanthus	<i>Euphorbia tithymaloides</i>	E O
			Heliconia	<i>Heliconia rostrata</i>	E O
			Croton	<i>Croton petron</i>	E O
			Brazilian Joyweed	<i>Red alternanthera</i>	E O
			Palms	<i>Areaceae</i>	E O

+ many more exotic species are being added for beautification



Image source : Photographs : Author



1 Toy train



2 lawn



4 games



5 workshops



3



6 Cookery class



7 Go karting



8 Swimming, relaxing, aqua aerobics



9 photography



10 Play area



walking
cycling
trekking 11



12 SPA





Image source : Photographs : Author

12 ACRES OF NEGLECTED UNUSED PART OF LAND AND CONNECTING PATH

- F.S.I. fully consumed - no scope to build on that part.
- Distance between 2 clusters to be 150m. hence cannot construct there.
- Area is covered with weeds and inaccessible.

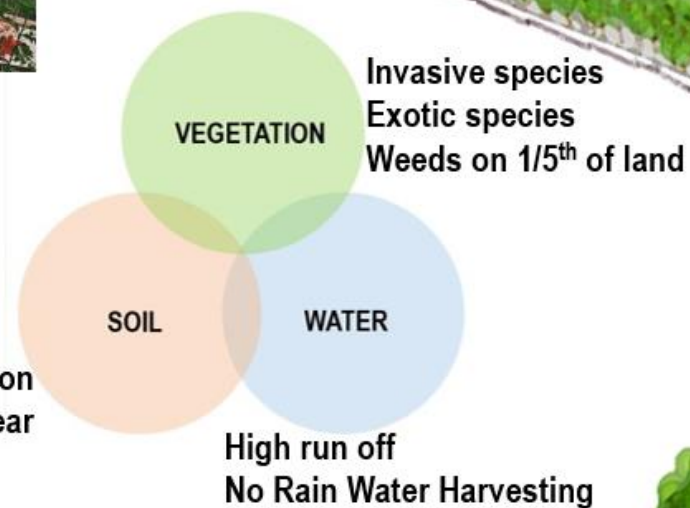
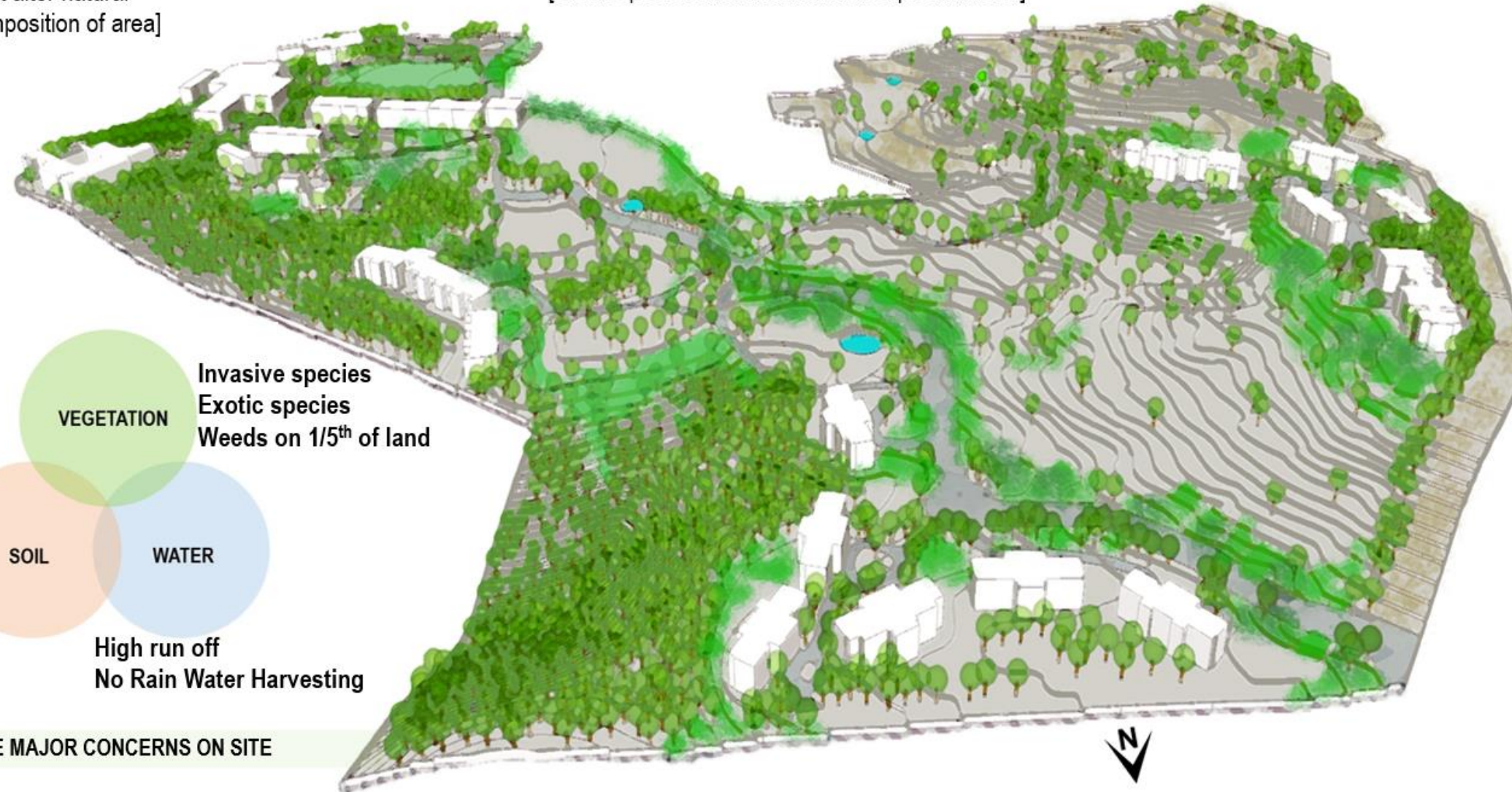
Inference : 1] Neglected part of land needs restoration, and 2] when high maintenance of manicured landscape stops, landscapes degrade as it is not a self regulating system like natural landscapes, and also highly manicured landscapes change the original landscape character of a region, hence reinforce natural landscapes in such Resorts is a better design solution.



Aggressively growing
invasive species
[that alter natural
composition of area]

Few exotic have potential to be invasive
+ most grasses and lawn are exotic variety.
[exotic species alter natural landscape character]

exotic species
rapidly grown for
beautification



Intense soil erosion
Import of soil every year

High run off
No Rain Water Harvesting

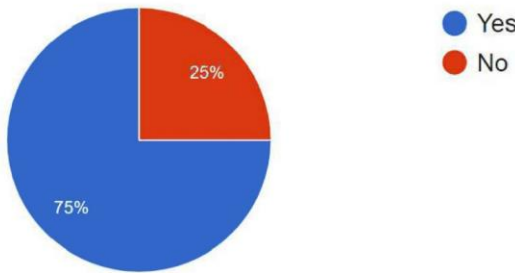


Inference : THREE MAJOR CONCERNS ON SITE

AS EXISTING - SITE STUDY MODEL OF TUNGI RESORT WITH VEGETATION

Image source : 3 D model image : Author

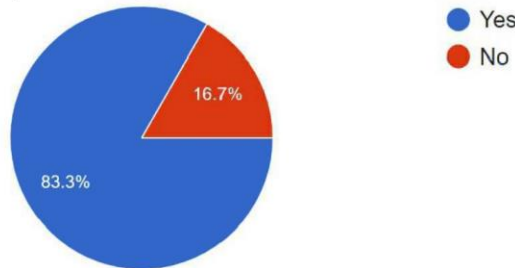
Did your room have good view and direct access to outdoor space ?



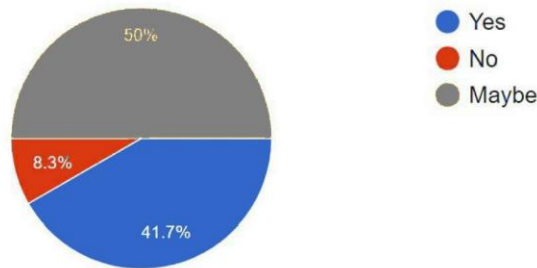
Does the level of outdoor lighting in the resort seem satisfactory?



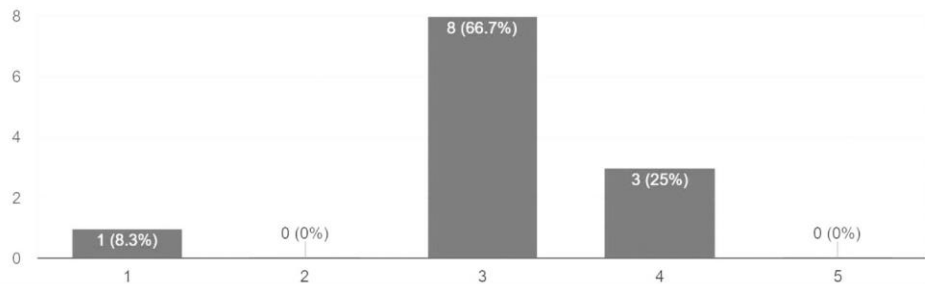
Do the spaces/ activities provided in the outdoor area satisfy all the age groups in your family ?



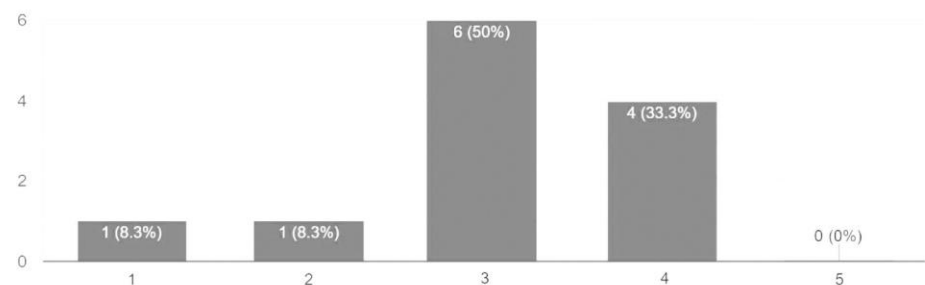
Does the resort design use its location near the pawna lake to its full potential?



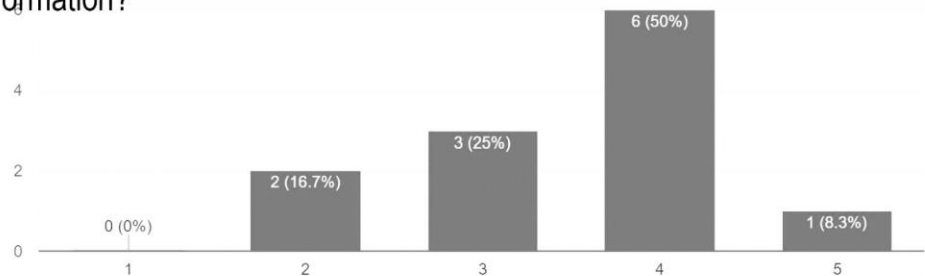
How would you rate the ease and convenience of walking / cycling in the resort?



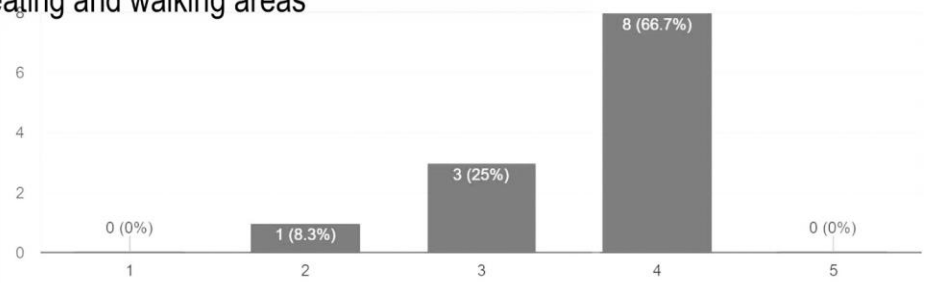
How would you rate the outdoor experience in the Resort in terms of nature trails and fitness features?



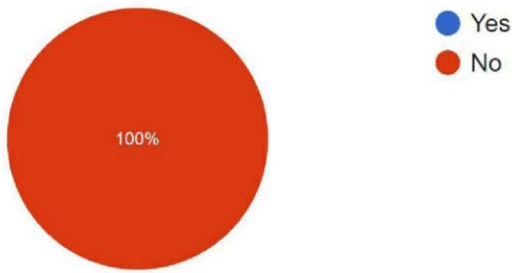
How would you rate the resort in the proper placement of signages and information?



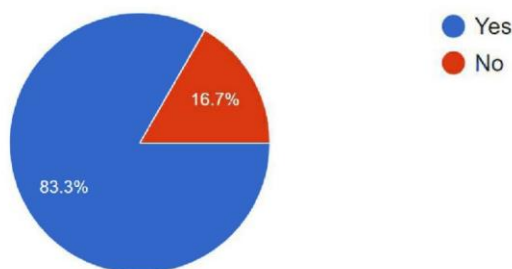
on a hot day, how would you rate the comfort level in the outdoor seating and walking areas



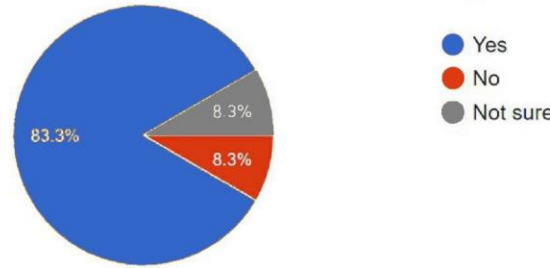
Did you experience any noise disturbances from the roads adjacent to the resort ?



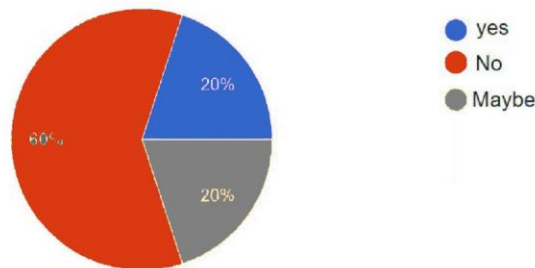
Are there enough washrooms in the outdoor areas?



Did you get a chance to explore the local art and local cuisine in the Resort ?



Was there provision of drinking water fountains to refill bottles at convenient distances in the Resort?



STRENGTHS

- POPULAR BRAND IN RESORT AND HOSPITALITY
- STRATEGIC LOCATION
- SPECTACULAR VIEWS
- DEVELOPED INFRASTRUCTURE
- PROVIDES ENVIRONMENT FOR RELAXATION
- PROVIDES ACTIVITIES FOR RECREATION

WEAKNESSES

- INADEQUATE OVERALL MEASURES FOR CONSERVATION
- NEGLECTED UNDEVELOPED PART OF LAND
- INTENSE SOIL EROSION
- NO RAIN WATER HARVESTING ON SITE
- NO MANAGEMENT FOR SOLID WASTE
- NO EFFORTS FOR CONSERVATION OF FLORA AND FAUNA
- PLANTATION FROM BEAUTIFICATION POINT OF VIEW

OPPORTUNITIES

- UNDEVELOPED PART OF LAND AVAILABLE FOR DEVELOPMENT
- MORE AND BETTER GUEST ACTIVITIES IN NATURE
- NATURE THEME PARK TO PLAN GUEST ACTIVITIES
- USE HUMAN RESOURCES FROM VILLAGES NEAR BY
- DESIGN IN SYNC WITH NATURE + ECOLOGICAL CONSERVATION

THREATS

- MAJOR THREATS FROM INVASIVE SPECIES
- ADDED GENERATION AND ACCUMULATION OF WASTE
- DEPLETION OF AVAILABLE RESOURCES
- NO OR LESS PLANTATION OF NATIVE SPECIES
- MORE AND MORE ADDITION OF EXOTIC SPECIES
- CHANGING LANDSCAPE CHARACTER

February 2011



February 2016



February 2020



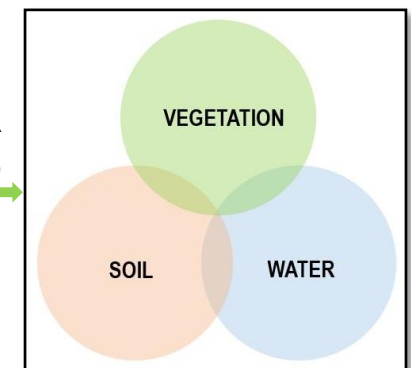
GOOGLE TIMELINE



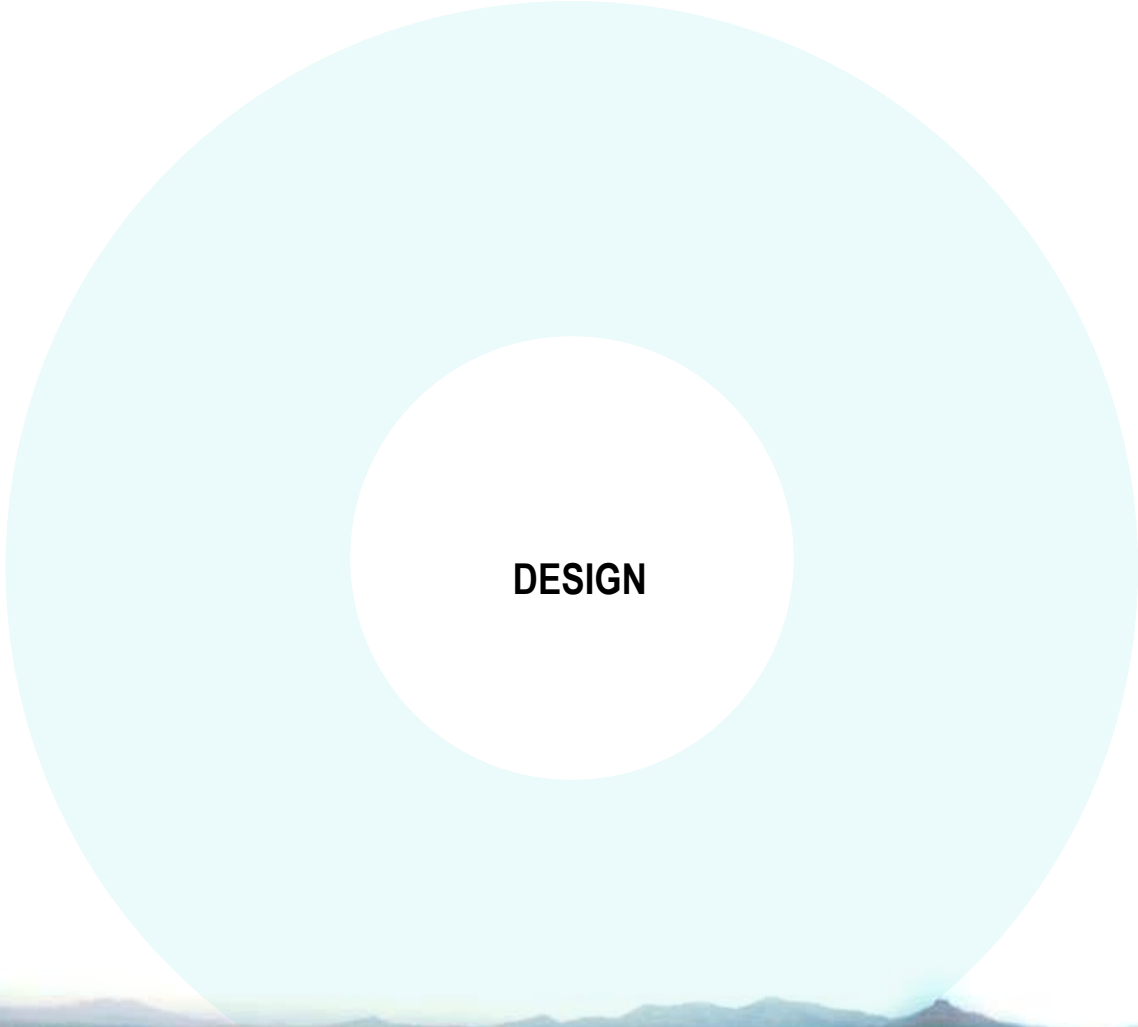
Summary of Inference : Barren to Green has been the change with a lot of human effort at Resort, yet better landscape design is needed because :

1. Better design solutions in relation to soil, water, and vegetation can **save human efforts and maintenance costs** at Resort.
2. Resort to follow the framework of eco-rating system, for **a holistic approach conducive to change in natural processes** on site.
3. Approach needs to be more natural and sustainable, **to regenerate ecosystems for self-regulation and systemic changes** on site.

MAJOR
CONCERNS



On the decade old Tungi Resort site, certain sustainable measures are an after thought and instead of just beautification, site needs a new vision towards better landscape performance, and self-regulating natural systems that renew its own natural resources, with a holistic approach.



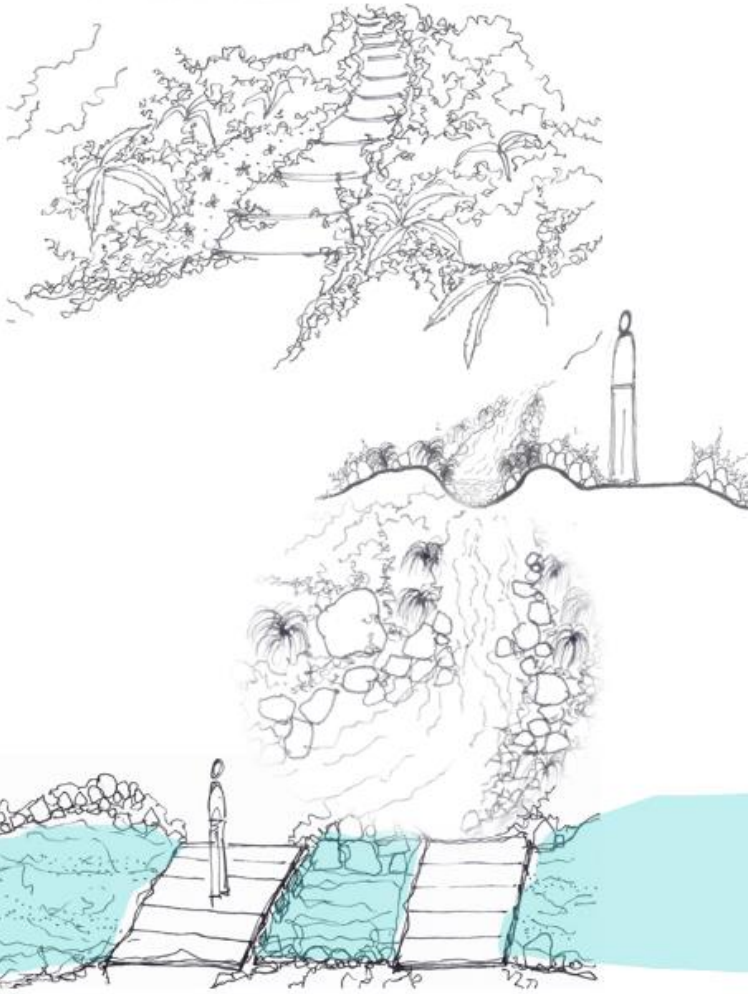
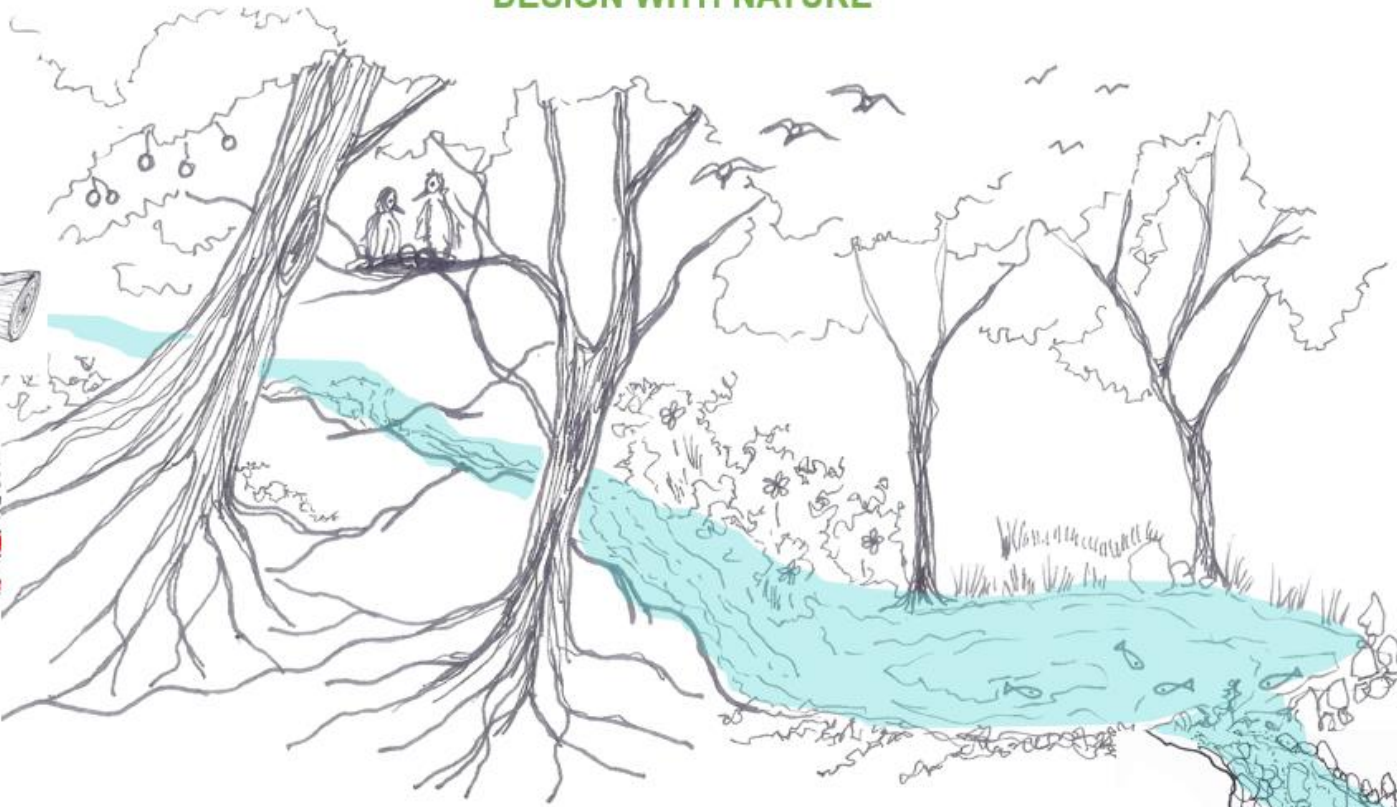
DESIGN



Image source : Panoramic photograph : Author



DESIGN WITH NATURE



natural ..free ..wilder ..untamed
underpinning idea of
**‘Reinforce Natural Landscapes to
Reactivate Natural Systems’**
on Resort site in Western Ghats

Images source : sketches : Author

DESIGN PROGRAMME
POINTS LINKED TO RESEARCH
BASED ON EVALUATION OF TUNGI RESORT
Along the framework of ecological conservation
measures for Resorts

Y type Resorts validity till 31 March 2025

Name	Tungi Resort, Lonavala
State	Maharashtra
Region	Western Ghats
Area	55 acres
Average Level	775 m.
Eligibility	Y type resort

Total scores	100	24
* - not applicable here, [M]-mandatory		Tungi Resort, Lonavala
		NEEDS ENHANCEMENT

	FRAMEWORK OF ECOLOGICAL CONSERVATION MEASURES	Y type Resorts	TUNGI RATING
		valid till 31.3.2025	scores
R	COMPENSATORY CLAUSE - 20 Points for 'Y' type Resorts.		
R1	Research and Educational programmes	20	0
H	SOLID WASTE MANAGEMENT		
H2	Waste segregation on site [M]	1	0
H3	Vermiculture, composting pits, biogas plant to manage waste	2	0
L	EDUCATION, AND AWARENESS		
L2	Planned activities in nature for education and awareness for guests	2	1
L3	Educating and keeping staff aware about ecological conservation practices. [M]	2	1
N	COMMUNITY AND CULTURE		
N1	Ecological initiatives by Resort owners beyond the site boundaries	10	0
N2	Promoting economy of local communities.	2	1
N3	Preserving culture of local communities.	2	1
P	EXCELLENCE OR INNOVATION		
P1	Excellence or innovation in design and technology	10	0
J	CONSERVATION OF FLORA AND FAUNA		
J1	Detail Documentation and efforts to conserve Flora and fauna in and around site.	6	0
J2	Preservation and Plantation of Native species [M]	4	0
J3	Uprooting invasive species, and prohibition of genetically modified species. [M]	2	0



TO BE ADOPTED / FOLLOWED BY RESORT MANAGEMENT
AS PER FRAMEWORK IN DEVELOPED ECORATING SYSTEM

	FRAMEWORK OF ECOLOGICAL CONSERVATION MEASURES	Y type Resorts	TUNGI RATING
		valid till 31.3.2025	scores
D	SOIL CONSERVATION		
D1	Increasing tree cover by tree plantation on site for soil conservation.	2	0
D2	Use Bunds or vegetation to control soil erosion.	2	0
E	RAIN WATER HARVESTING		
E1	Rain water harvesting system on site.	6	0
J	CONSERVATION OF FLORA AND FAUNA		
J4	Lawns to be minimal with justification, covered with native grasses.	2	0
J5	Creative / Ecological / Nature theme park	5	0



TO BE PLANNED, DESIGNED, INCLUDING CORRECTIVE MEASURES, AS PART OF HOLISTIC APPROACH

Linked to Research
+ Developed Eco Rating system
+ Site Study and evaluation

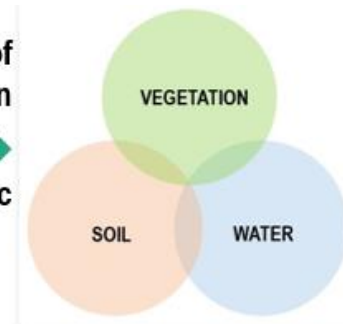
Total scores	100	24
* - not applicable here, [M]-mandatory		Tungi Resort, Lonavala
		NEEDS ENHANCEMENT

+20 for compensatory clause if fulfilled

On the decade old Tungi Resort site, certain sustainable measures are an after thought and instead of just beautification, site needs a new vision towards better landscape performance, and self-regulating natural systems that renew its own natural resources, with a holistic approach.

major areas of intervention

Site specific



underpinning idea of

*Reinforce natural landscapes to
Reactivate natural systems*

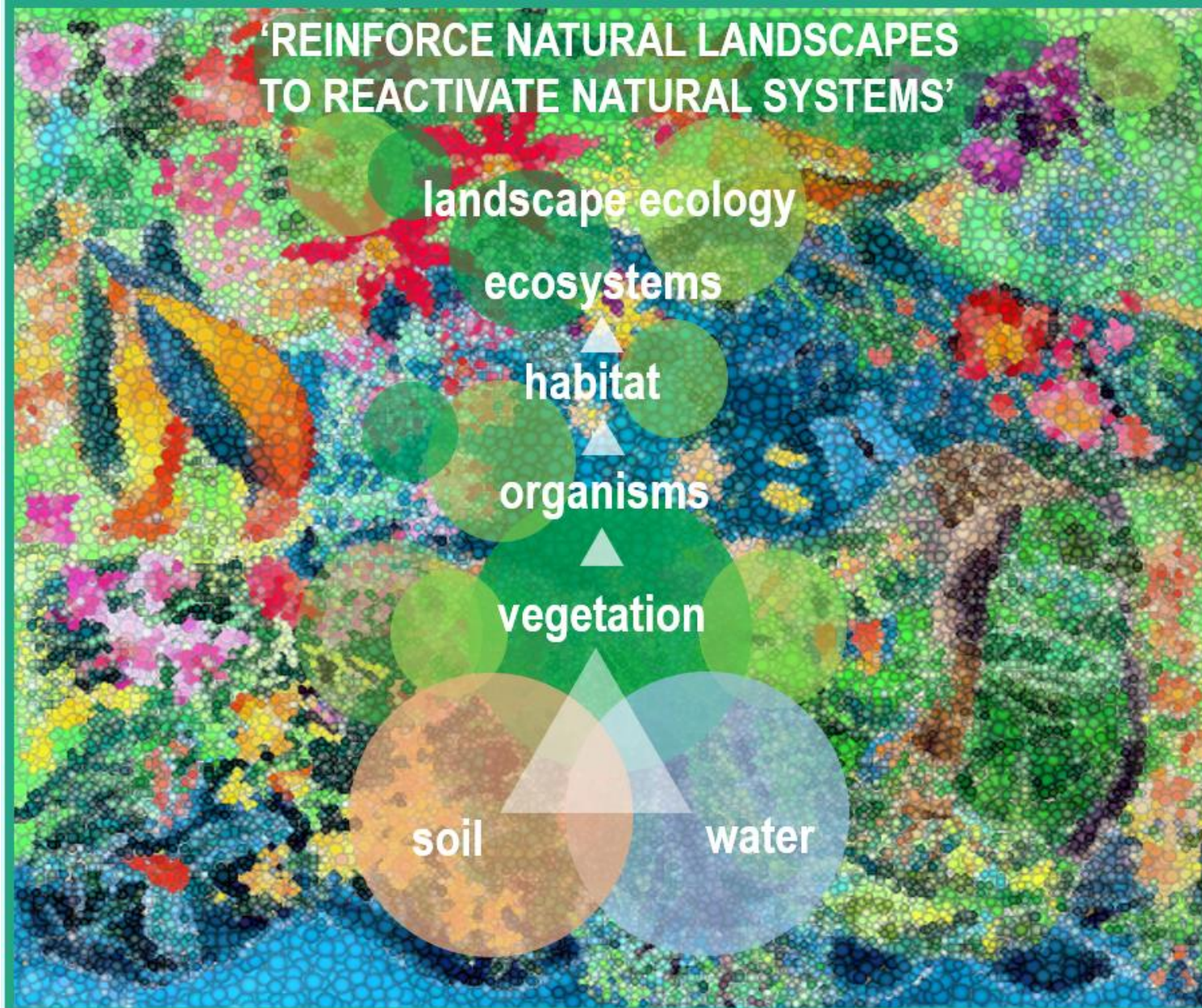
visually - natural ..free ..wilder ..untamed

functionally - protect, conserve , restore , revive natural landscapes, create forest / biodiversity park, and recreational spaces.

- **Controlling Soil Erosion** - Stone bunds to channelise water towards natural collection points on site, wells, slow down runoff, and use vegetation to control intense soil erosion.
- **Rain Water Harvesting** - optimize natural land form , collect water in ponds and wells for daily use and landscape, slow down runoff, recharge ground water.
- **Native Vegetation** - native vegetation that creates suitable environment for habitats and ecosystems at various places on site, along riparian edge and biodiversity park.



graphic source : creation by Author



graphic source : creation by Author



SKETCH

- Ecological benefits
- Community benefits
- Economical benefits
- Recreational benefits

RAIN WATER HARVESTING
functional

- 1 Swales, Stone bunds, Retention ponds, Check dams, Recharge wells

BIODIVERSITY PARK
Enhance guest experience

- 2 Ecological and Native planting attracting fauna
Nature trails for exploration

+ **CONNECTING PATH**

- 3 Easy access and connectivity

DATA : NUMBER OF USERS ON SITE

no. of guests	units	ground + 1st - structures
36 x (avg.)3 = 108 2 adults 1 kid	36 no.s - Hotel units	H1 - 6 + 6 = 12 H2 - 12 + 12 = 24 (ground + 1st) 12+24 = 36
4 x (avg.)4 = 16 2 adults 2 kids	04 no.s - Hotel suites[B1]	B1 - 2 + 2 = 4 (ground + 1st)
44 x (avg.)4 = 176 2 adults + 2 adults / kids	44 no.s - cluster A	A - 10+10+8+8+8 = 44 5 bldgs
40 x (avg.)4 = 160 2 adults + 2 adults / kids	40 no.s - cluster B	B - (4 + 4) X 5 = 40 5 bldgs
floating population = 40 visiting day guests on weekends and holidays Total guests = 500	Total accommodation units- 124	kids and teenagers = 150 approx.
restaurants guest no.s = 500 including staying guests + visiting guests		staff = 150 front office, back office staff room service boys, cleaners drivers, gardeners

WATER CONSUMPTION

Total Number of People In Resort = Resort Guest / Visitors + Staff

1) Resort Visitors= 460 (Staying Visitors) + 40 (Floating Population)
= 500 People

2) Staff Workers= 100 Workers

The Total Number Of People In Resort= 500+100= 600 People

As Per DCR rules:

Hotels With Lodging Accommodations Are Allowed To Have 180 Litres Per Head Per Day Consumption

Staff Can Be Considered To Be Using 135 Litres Per Day

The Visitors Are Allowed 15 Liters Per Head Per Day

Total Water Consumed By Guest (By Per Person) = 460 *180
=82,800 L

Total Water Consumed By Floating Visitors= 40 * 15
=600 L

Total Water Consumed By Staff= 100 * 135
= 13500 L

Water Consumed At Restaurant= 200 * 70 (70 Per Seat)
= 14000 L

Hence Total Water Consumed At Resort= 82800 + 600 + 13500 +14000
= **110,900 Litres = 110.9 Cu.m.** (1 Litre = 0.001 Cu.m.)

RAIN WATER RUN OFF CALCULATION

TOTAL SITE AREA = 2,18,921 SQ.M. (55 Acres)

PARTICULARS	CATCHMENT AREA IN SQ.M. (A)	RUNOFF COEFFICIENT (C)
1. ROOFTOP AREA	11,900	0.8
2. GREEN AREA	1,62,900	0.18
3. PAVED AREA (PARKING)	2220	0.7
4. ROADS	5100	0.7
5. DENSE VEGETATION	34,668	0.25

Average annual rainfall is 750 mm.

RUNOFF VOLUME = SURFACE AREA X RUNOFF COEFFICIENT X RAINFALL.

Runoff volume of rooftop area

$$= 11900 * 0.8 * 0.75$$

$$= 7,140 \text{ cu.m.}$$

Runoff volume of green area

$$= 162900 * 0.18 * 0.75$$

$$= 21,991 \text{ cu.m.}$$

Runoff volume of road area

$$= 5100 * 0.7 * 0.75$$

$$= 2677.5 \text{ cu.m.}$$

Runoff volume of paved area

$$= 2220 * 0.7 * 0.75$$

$$= 666 \text{ cu.m.}$$

Runoff volume of dense vegetation (steep slope) area

$$= 34668 * 0.25 * 0.75$$

$$= 6500.25 \text{ cu.m.}$$

Total runoff volume= **38,974.75 cu.m.**

$$= \mathbf{38,97,4750 \text{ Litres}}$$

RAIN WATER RUNOFF ON PART OF UNDEVELOPED LAND

Total Selected Area = 41, 431 Sq. M.

Runoff Coefficient For Green Area = 0.18

Average Annual Rainfall Is 750 mm

RUNOFF VOLUME

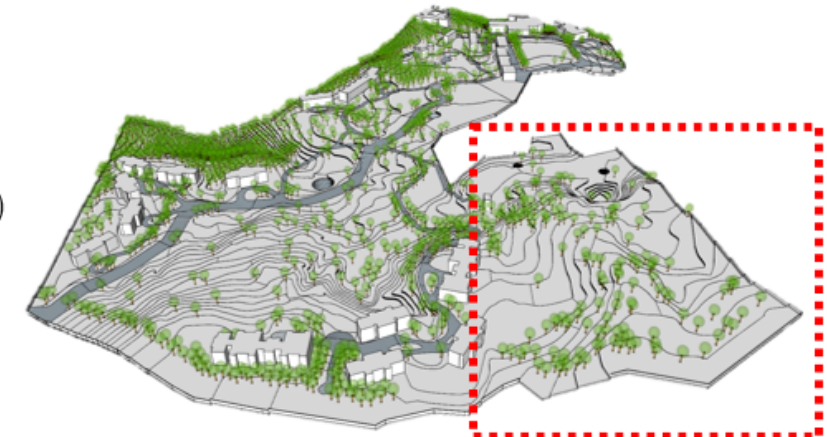
= SURFACE AREA X RUNOFF COEFFICIENT X RAINFALL.

Runoff Volume Of Selected Area

$$= 41,431 * 0.18 * 0.75$$

$$= \mathbf{5,593 \text{ Cu.m.}}$$

$$= \mathbf{55,93,000 \text{ Litres}}$$



Inference : part of it to be collected in ponds,
part of it to be filtered for well recharge - as much
as possible can be harvested

Sources:

(PCMC), Pimpri Chinchwad Municipal Corporation. *City residents info*. n.d. 20 April 2020. <https://www.pcmcindia.gov.in/residents_info.php>.

Board, Government Of India- Central Ground Water. *MANUAL ON ARTIFICIAL RECHARGE OF GROUND WATER*. September 2007. 20 April 2020. <<http://cgwb.gov.in/documents/Manual%20on%20Artificial%20Recharge%20of%20Ground%20Water.pdf>>.

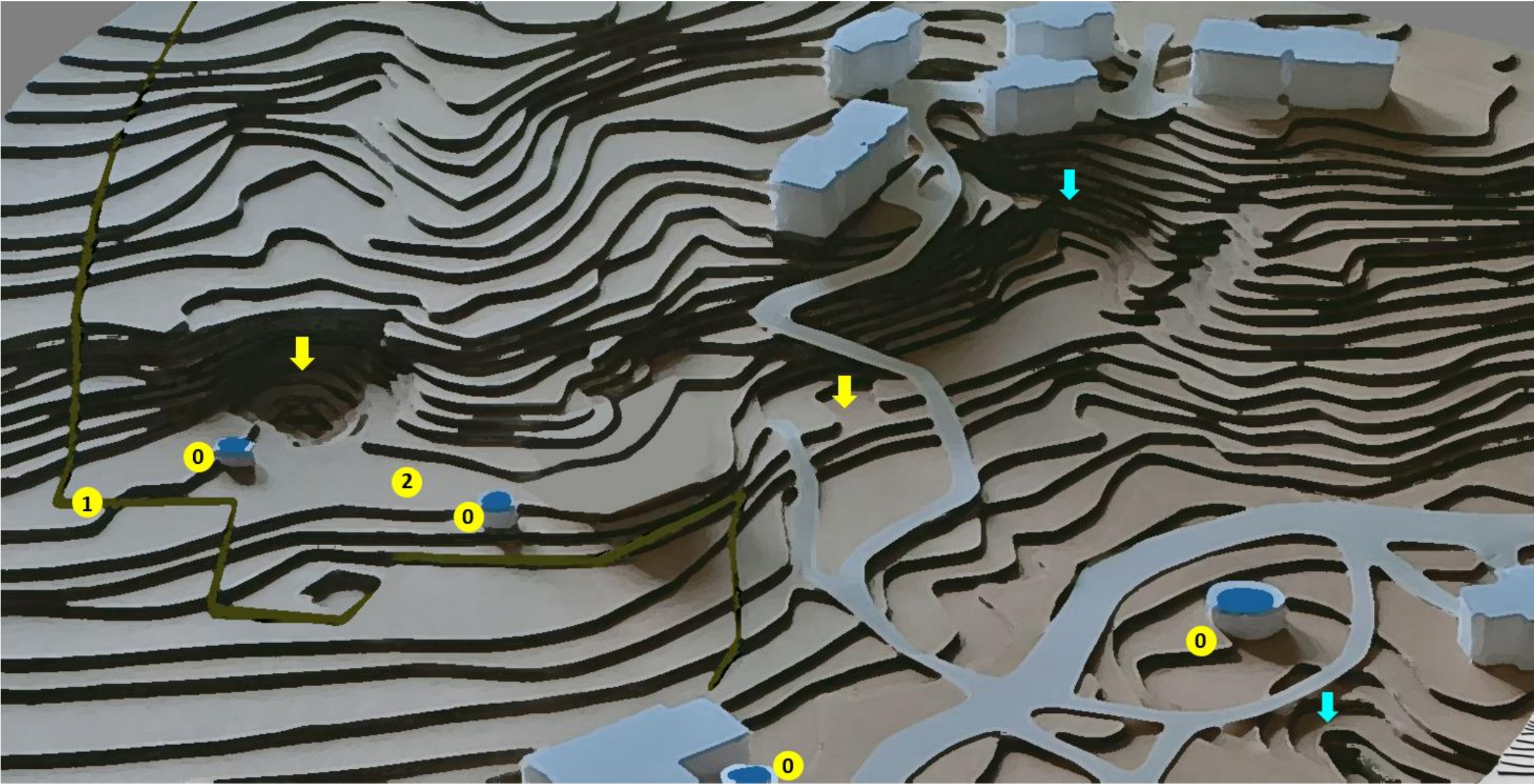
Central Ground Water Authority Jam Nagar House, New Delhi. *Estimation of water requirement for drinking and domestic use*. n.d. 20 April 2020. <<http://cgwa-noc.gov.in/LandingPage/Guidelines/NBC2016WatRequirement.pdf>>.

Council, The Indian Green Building. *IGBC Rating system for Green*. 2008. 20 April 2020. <https://igbc.in/igbc/html_pdfs/IGBC%20Green%20Resorts%20Rating%20system%20-%20Pilot%20Version.pdf>.

DELHI, CONSULTANCY SERVICES ORGANISATION CENTRAL PUBLIC WORKS DEPARTMENT NIRMAN BHAVAN NEW. *RAINWATER HARVESTING AND CONSERVATION MANUAL*. 11 June 2002. 20 April 2020. <<http://cpheeo.gov.in/upload/uploadfiles/files/Rainwater%20Harvesting%20Manual-CPWD.pdf>>.

LTD, M/S HOLIDAY ON HILLS RESORTS PVT. *CONCEPTUAL PLAN of M/s Holiday on Hills Resorts Private Limited Commercial Building*. 24 August 2016. 20 April 2020. <<http://environmentclearance.nic.in/writereaddata/FormB/TOR/PFR/24082016SW0QK3RQDocumentConceptualPlan.pdf>>.

RESOURCES, MINISTRY OF WATER. *Rain water Harvesting Techniques To Augment Ground Water*. 2003. 20 April 2020. <http://cgwb.gov.in/documents/RWH_GUIDE.pdf>.



Stone bunds / aligning stones along 1m.contours - in slopes steeper than 1:10, and in the parts not covered with vegetation.



Image source : Model and graphics : Author

0

Existing wells

1

Site boundary

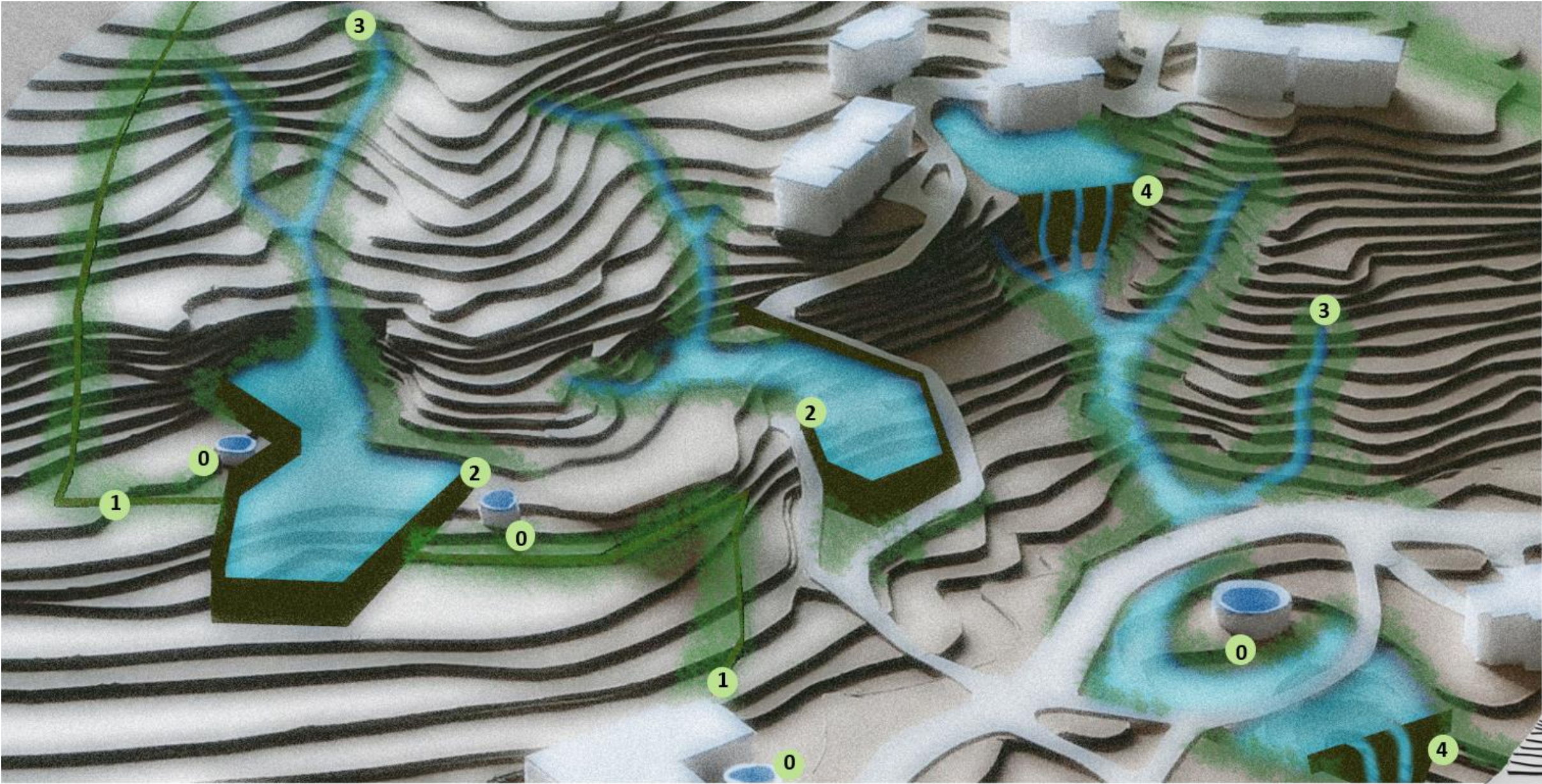
↓

Scope for retention pond

↓

Scope for Check dams to hold water

Slow down run-off, prevent soil erosion, harvest rainwater, increase ecological and recreational value through self-regulating natural systems on site.



sustainable stormwater management restores functional hydrology through self-regulating systems on site, like any natural processes.

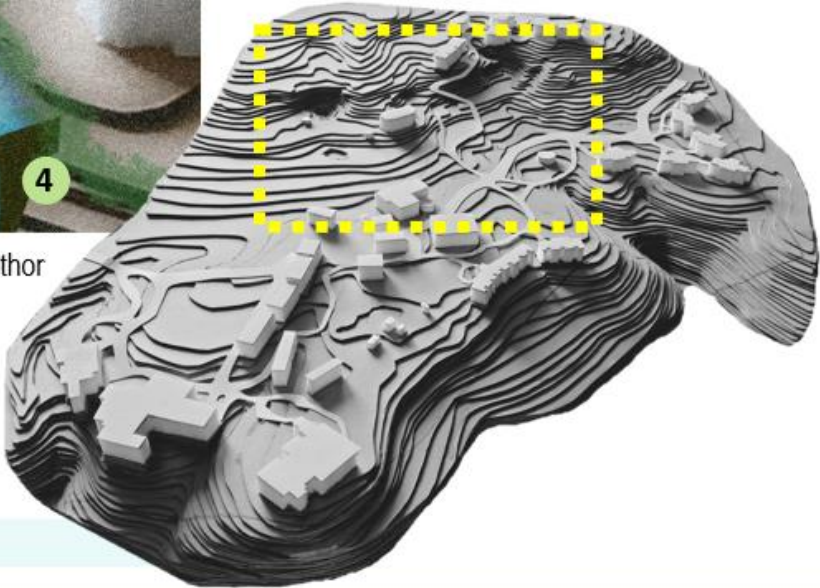


Image source : Model and graphics : Author

- 0 Recharging the wells
- 1 Proposed Biofence
- 2 Scope for retention pond
- 3 Swales With stones and riparian edge
- 4 Proposed Check dams to hold water
- 5 Stone bunds / aligning stones along 1m.contours – in slopes steeper than 1:10, and in the parts not covered with vegetation.

Slow down run-off, prevent soil erosion, harvest rainwater, increase ecological and recreational value through self-regulating natural systems on site.





Name	Scientific name	
Pisa	<i>Actinodaphne angustifolia</i>	
Shirish	<i>Albizia lebbek</i>	
Satvin	<i>Alstonia scholaris</i>	
Rohitak	<i>Aphanamixis polystachya</i>	
Apta	<i>Bauhinia racemosa</i>	
Savar	<i>Bombax ceiba</i>	
Asna	<i>Bridelia retusa</i>	
Palas	<i>Butea monosperma</i>	
Kumbh	<i>Careya arborea</i>	
Bherli Maad	<i>Caryota urens</i>	
Bahava	<i>Cassia fistula</i>	
Gela	<i>Catunaregam spinosa</i>	
Tamalpatra	<i>Cinnamomum zeylanicum</i>	
Bhokar	<i>Cordia dichotoma</i>	
Varun	<i>Crataeva adansonii</i>	
Shisam	<i>Dalbergia latifolia</i>	
Amla	<i>Emblica officinalis</i>	
Pipar	<i>Ficus amplissima</i>	
Nandruk	<i>Ficus microcarpa</i>	
Umbar	<i>Ficus racemosa</i>	
Shivan	<i>Gmelina arborea</i>	
Dhaman	<i>Grewia tiliifolia</i>	

Name	Scientific name	
Hedu / Haldu	<i>Haldina cordifolia</i>	
Varas	<i>Heterophragma roxburghii</i>	
Kuda	<i>Holarrhena pubescence</i>	
Khuri	<i>Ixora brachiata</i>	
Nana	<i>Lagerstroemia microcarpa</i>	
Taman	<i>Lagerstroemia speciosa</i>	
Moi	<i>Lannea coromandelica</i>	
Chandva	<i>Macaranga peltata</i>	
Amba	<i>Mangifera indica</i>	
Khirni	<i>Manilkara hexandra</i>	
Limbara	<i>Melia dubia</i>	
Anjani	<i>Memecylon umbellatum</i>	
Nagchafa	<i>Mesua ferrea</i>	
Bakul	<i>Mimusops elengi</i>	
Kalam	<i>Mitragyna parvifolia</i>	
Barthondi	<i>Morinda pubescens</i>	
Pandhar	<i>Murraya paniculata</i>	
Kadamb	<i>Neolamarckia cadamba</i>	
Narkya	<i>Nothapodytes nimmoniana</i>	
Parjambhul	<i>Olea dioica</i>	
Tetu	<i>Oroxylum indicum</i>	
Kala Palas	<i>Ougeinia oojeinensis</i>	

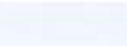
Name	Scientific name	
Shindi	<i>Phoenix sylvestris</i>	
Karanj	<i>Pongamia pinnata</i>	
Beeja	<i>Pterocarpus marsupium</i>	
Muchkund	<i>Pterospermum acerifolium</i>	
Putranjiva	<i>Putranjiva roxburghii</i>	
Khadshingi	<i>Radermachera xylocarpa</i>	
Valunj	<i>Salix tetrasperma</i>	
Reetha	<i>Sapindus laurifolius</i>	
Seeta Ashok	<i>Saraca asoca</i>	
Kusum	<i>Schleichera oleosa</i>	
Ambada	<i>Spondias pinnata</i>	
Kuker	<i>Sterculia guttata</i>	
Padal	<i>Stereospermum colais</i>	
Jambhul	<i>Syzygium cumini</i>	
Behda	<i>Terminalia bellirica</i>	
Hirda	<i>Terminalia chebula</i>	
Kinjal	<i>Terminalia paniculata</i>	
Ain	<i>Terminalia tomentosa</i>	
Bhend	<i>Thespesia populnea</i>	
Kharal	<i>Trema orientalis</i>	
Kala Kuda	<i>Wrightia tinctoria</i>	
Tirfal	<i>Zanthoxylum rhetsa</i>	

Image collage - Sahyadris Native plants – Source : Author

Table z: Sahyadri -Native plant list - Source : services, OIKOS for Ecological. Research and Documentation. n.d. <http://www.oikos.in/html/oikos-research-and-documentation.html>. 26 January 2020



NATIVE SHRUBS LIST - SAHYADRI	
Name	Scientific name
Karvand	<i>Carissa congesta</i> 
Kaarvi	<i>Carvia callosa</i> 
Bharangi	<i>Clerodendrum serratum</i> 
Pandharfal	<i>Flueggea spp.</i> 
Rametha	<i>Gnidia glauca</i> 
Murudsheng	<i>Helicteres isora</i> 
Adulsa	<i>Justicia adhatoda</i> 
Kadhipatta	<i>Murraya koenigii</i> 
Phapat	<i>Pavetta crassicaulis</i> 
Chitrak	<i>Plumbago zeylanica</i> 
Nirgudi	<i>Vitex negundo</i>  
Dhataki	<i>Woodfordia fruticosa</i> 

NATIVE CLIMBERS LIST - SAHYADRI	
Name	Scientific name
Gunj	<i>Abrus precatorius</i> 
Samudra ashok	<i>Argyreia nervosa</i> 
Shatavari	<i>Asparagus racemosus</i> 
Sagargota	<i>Caesalpinia bonducella</i> 
Piluki	<i>Combretum albidum</i> 
Calri	<i>Cryptolepis dubia</i> 
Amph raki	<i>Elaeagnus conferta</i> 
laldadang	<i>Embelia tsjeriam-cottam</i> 
gayamphi	<i>Entada rheedei</i> 
Ukshi	<i>Getonia floribunda</i> 
bhadh nashalni	<i>Gymnema sylvestre</i> 
annatbhur	<i>Hemidesmus indicus</i> 
bhadhlirata	<i>Hiptage benghalensis</i> 
lakeyi	<i>Moullava spicata</i> 

NATIVE PLANTATION - BAMBOO	
Name	Scientific name
Bamboo Kalak	<i>Bambusa arundinacea</i> 
Bamboo Mes	<i>Dendrocalamus strictus</i> 
Uda	<i>Pseudoxytenanthera stocksii</i> 

NATIVE PLANTATION – GRASSES	
Name	Scientific name
Brahmi	<i>Bacopa monnieri</i> 
Mandukparni	<i>Centella asiatica</i> 
Durva	<i>Cynodon dactylon</i> 
Lemon grass	<i>Cymbopogon cytratus</i> 
Vetiver	<i>Chrysopogon zizaniodes</i> 

Image collage - Sahyadri Native plants – Source : Author

Table z: Sahyadri -Native plant list - Source : services, OIKOS for Ecological. Research and Documentation. n.d. <http://www.oikos.in/html/oikos-research-and-documentation.html>. 26 January 2020.





EXISTING

Manicured landscapes need extra care , are not self-regulatory and are not habitats / ecosystems



PROPOSED

enhance microclimate, create habitats and ecosystems

Sculptural bird bath fountain

Bird bath attract fauna and quench their thirst especially in summers. In sculptural form, it becomes a focus, attractive, asthetic , functional element and relaxing feature. Add Stone sculpture with creepers at various small islands on site to enhance spaces.

Stone sculpture - with creepers

Inviting entrance with natural pond, also attracting butterflies

Natural pond carved out, with few gappi fishes, grasses like mandukparni, durva, bramhi along pond with flowering shrubs attracting butterflies, makes an inviting entrance space, and area near reception with traditional swings in playful butterfly garden as a welcoming space.

Traditional Swing with natural garden

Rockery / Rock garden with attractive native plants

Import of soil is strictly prohibited. Make soil with combination of a variety of plant based materials like leaf litter, cuttings, cocopeat, agricultural wastes, dung, decomposed wastes can form best growing mix. Use stone bunds, rocks, rockery with native plants, to control soil erosion.

Biofence - green living growing wall

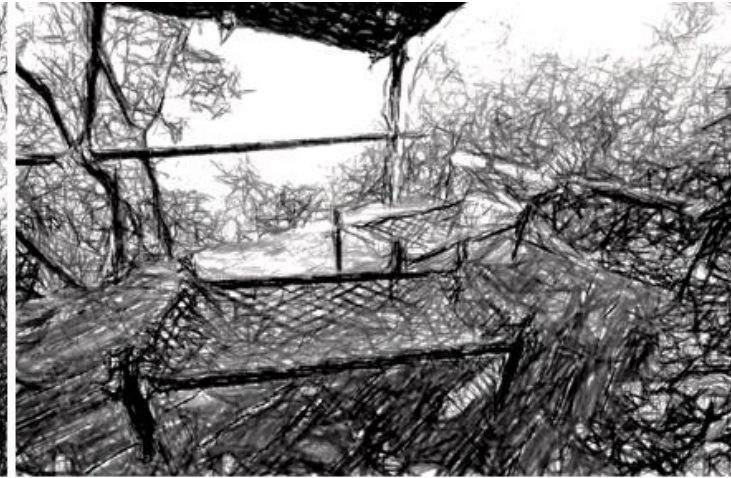
Consider Adulasa, Nirgudi, Karwand, sagargota, chillar, murundsheng, kadipatta, dhayati, Rui, baman. Trees like pipar, Umbar, shivan, kalam, etc and bamboo biofence, especially for biofence in Western ghats.



Hot air balloon



View macchan



Outdoor stall for local art and food



Biodiversity park



Star gazing



Night walks

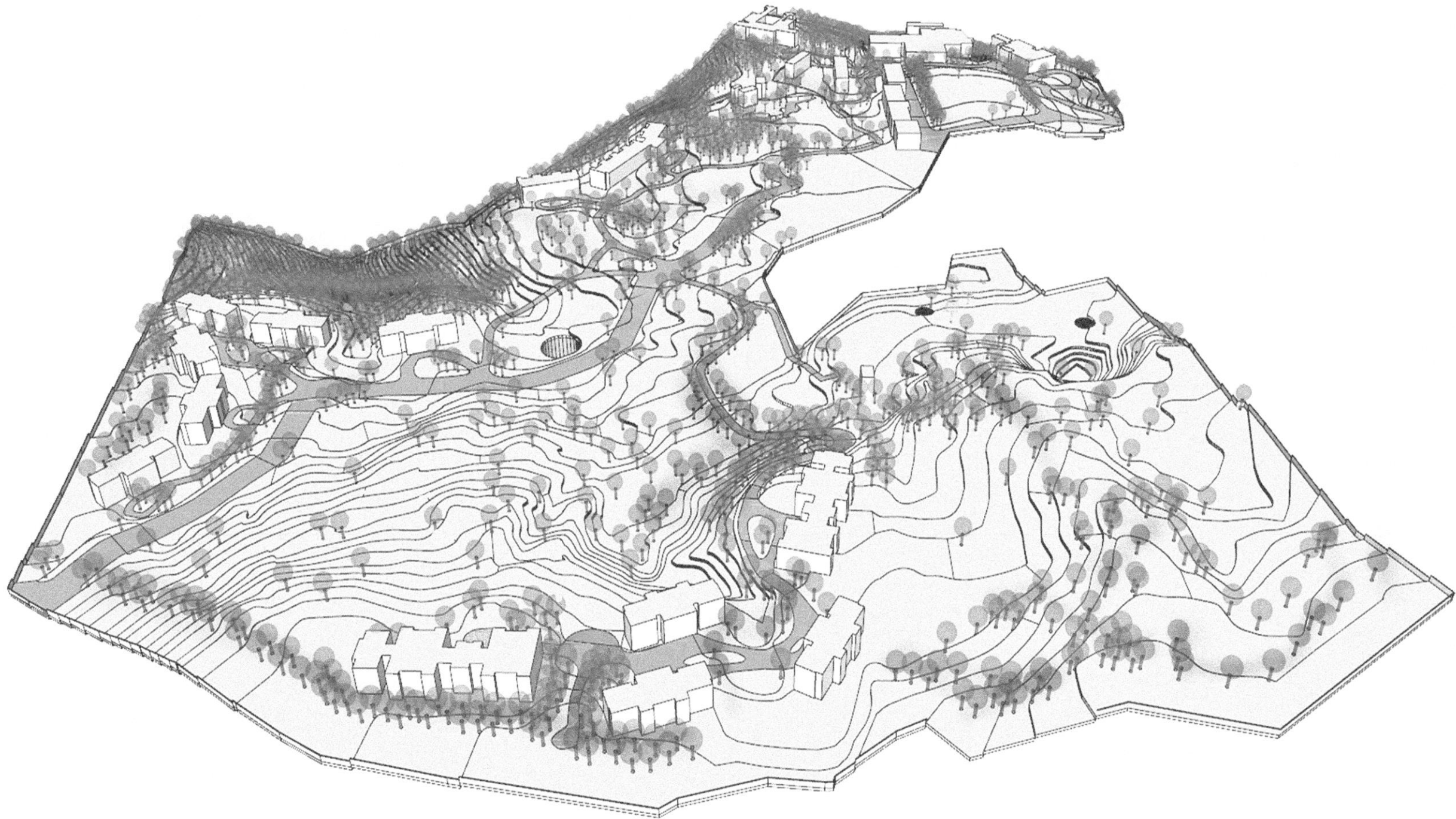


Sculptural bird baths

Outdoor library

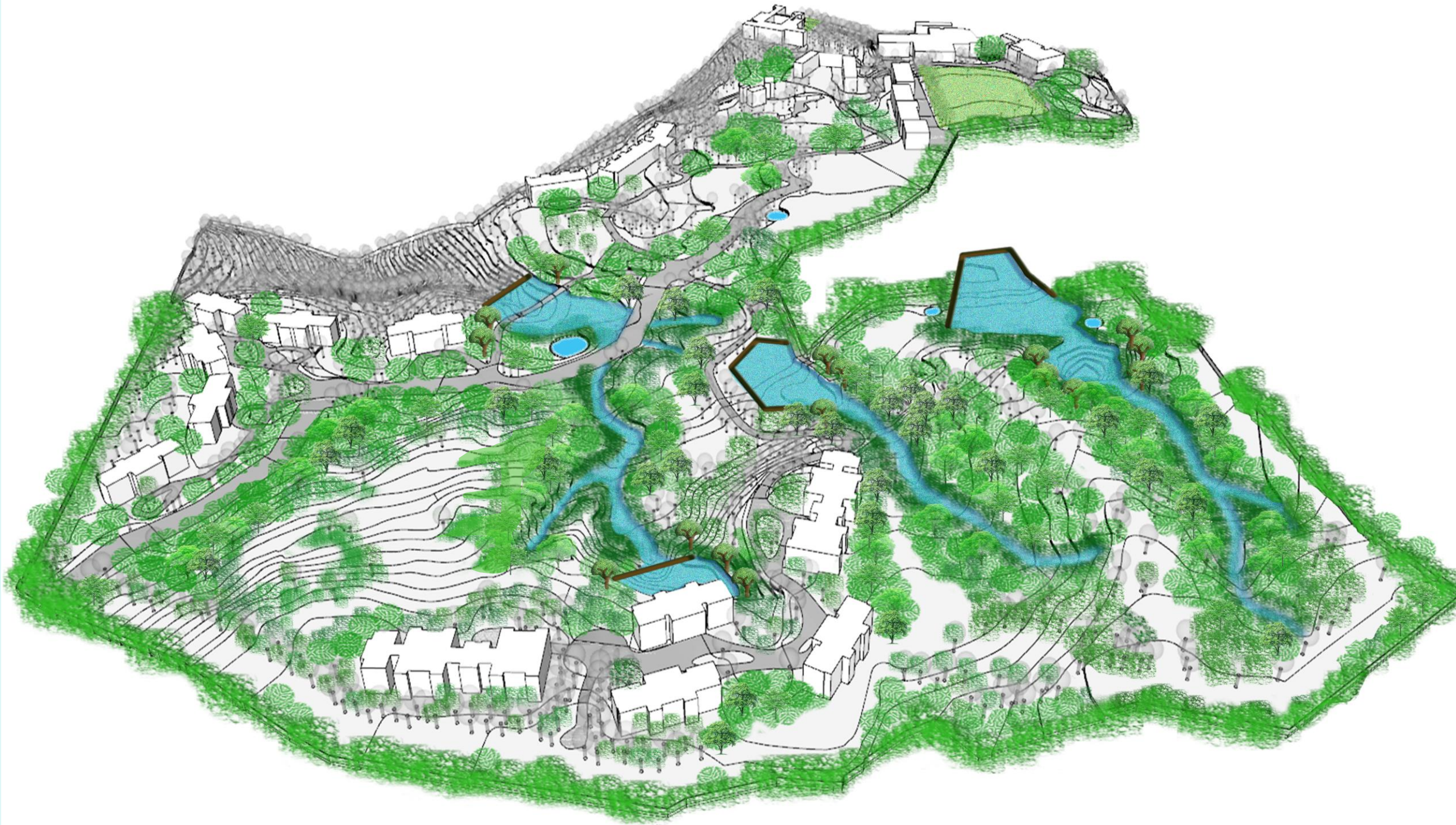


Image collage - Design ideas - Source : Author




BIRD'S EYE VIEW OF TUNGI RESORT SITE
 Existing shown here in black and white

- Resort entry
- Retention pond
- Swales to channelise water
- Riparian edge
- Stone bunds
- Recharge wells
- Biodiversity park [forest]
- Check dams
- Kuccha road connection
- Space for Hot air balloon.
- Star gazing spot
- Native [felicitous] planting
- Viewing machaans
- Vermiculture pits
- Lawn with native grasses
- Biofence
- Outdoor library and stall
- Nature play area
- Sculptural bird baths - 8no.s



BIRD'S EYE VIEW OF TUNGI RESORT SITE

Existing shown here in black and white

Proposal shown in color



- E Resort entry
- 1 Retention pond
- 2 Swales to channelise water
- 3 Riparian edge
- 4 Stone bunds
- 5 Recharge wells
- 6 Biodiversity park [forest]
- 7 Check dams
- 8 Kuccha road connection
- 9 Space for Hot air balloon. ●
- 10 Star gazing spot ★
- 11 Native [felicitous] planting
- 12 Viewing machaans □
- 13 Vermiculture pits ■
- 14 Lawn with native grasses
- 15 Biofence
- 16 Outdoor library and stall
- 17 Nature play area
- s Sculptural bird baths - 8no.s

◀ N BIRD'S EYE VIEW OF TUNGI RESORT SITE
PROPOSED MASTER PLAN

*Reinforce natural landscapes to
Reactivate natural systems*