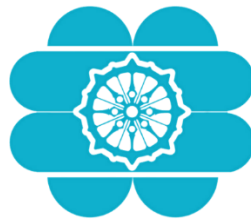




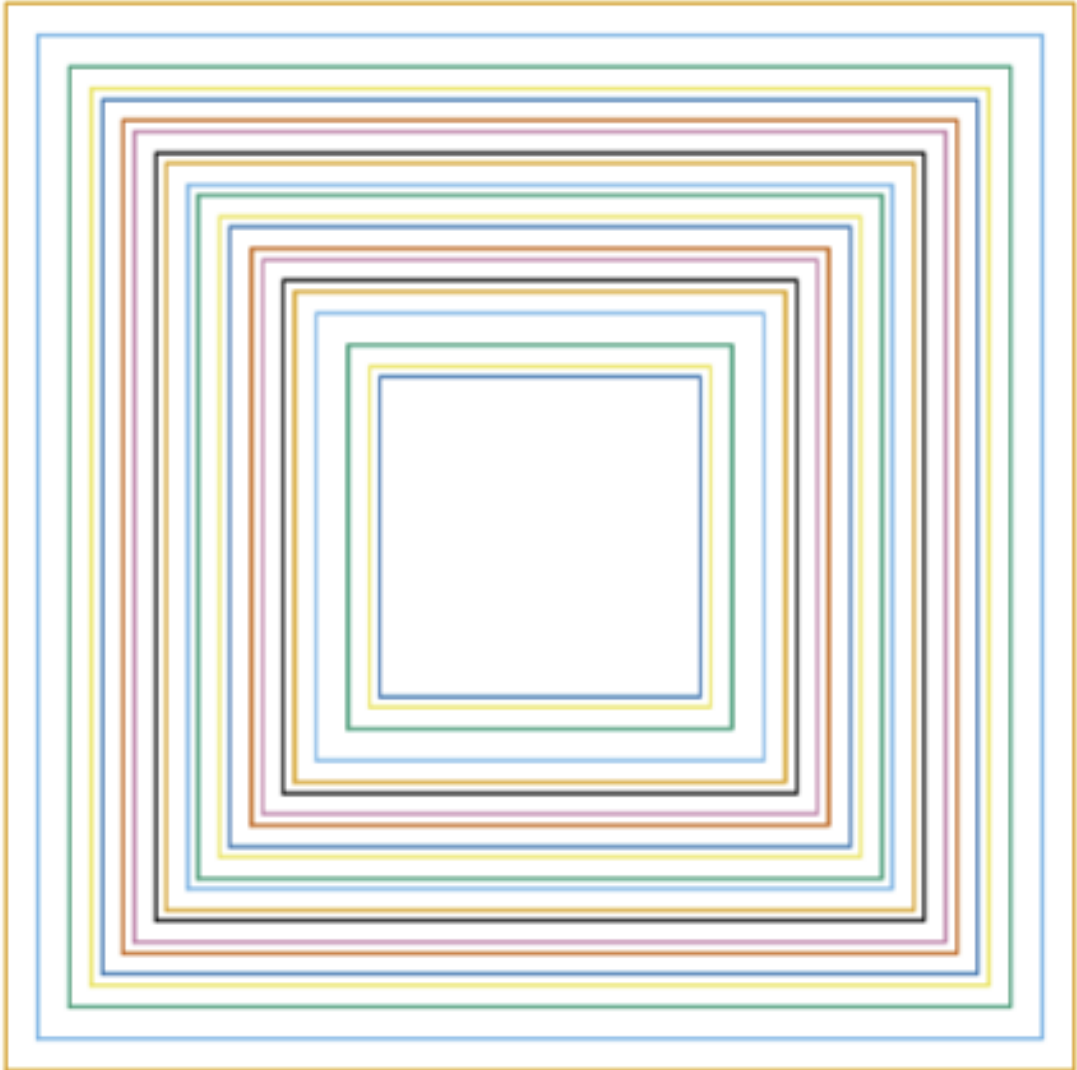
SANATAN AYUSH VAN

Project

By



**MANDLIK
BROTHERHOOD**





SANATAN AYUSH VAN

Index

Sanatan Ayush Van

(1 Hectare Herbal & Medicinal Food Forest)

1. **Executive Summary : Page 7**
 - 1.1 Project Title – *Sanatan Ayush Van – Guardian of the Healing Forest*
 - 1.2 Promoter – Mandlik Brotherhood Private Limited
 - 1.3 Project Location and Area (1 Hectare / 10,000 m²)
 - 1.4 Core Concept – Sanatan Krishi Van Principles Applied to AYUSH Herbs
 - 1.5 Key Highlights (Scale, Product Mix, Target Markets)
 - 1.6 Financial Snapshot (CAPEX, OPEX, Revenue, Payback)
2. **Background & Rationale : Page 10**
 - 2.1 Rising Demand for AYUSH Herbs (Ayurveda, Yoga, Unani, Siddha, Homeopathy, Natural Therapy)
 - 2.2 Gaps in Organically Grown, Traceable Medicinal Herb Supply
 - 2.3 Integration with Sanatan Krishi Van & Soil Regeneration Mission
 - 2.4 Mandlik Brotherhood as “Guardian of the Organic & Ayush Farm”
3. **Project Concept & Objectives: page 12**
 - 3.1 Concept of *Sanatan Ayush Van* (Herbal Food Forest + Bulk Production + Demonstration Unit)
 - 3.2 Core Objectives (Production, Conservation, Training, Livelihood, Export Readiness)
 - 3.3 Unique Features (Bhumikund Design, Shivana 3D Bricks, GoldVermix / Soil Generation Integration)
 - 3.4 Long-Term Vision – Ayush Herb Clusters & Replicable Models
4. **Site Description & Agro-Climatic Conditions: Page 15**
 - 4.1 Land Details (1 ha Plot – Shape, Dimensions, Ownership / Lease)
 - 4.2 Soil Type, Current Condition, Constraints & Potential
 - 4.3 Climate, Rainfall, Temperature – Suitability for Key AYUSH Herbs
 - 4.4 Existing On-Site Infrastructure (Access Road, Power, Water Source, Buildings)
5. **Technical Design & Layout of *Sanatan Ayush Van* (1 Hectare): Page 17**
 - 5.1 Overall Planning Concept (Concentric Layers / Zonal Layout)
 - 5.2 Area Zonation (Protection Belts, Tree Layer, Shrub Layer, Dhanya Bhumikunds, Vrix Bhumikunds, Nursery, Processing Zone)
 - 5.3 Detailed Design of Dhanya Bhumikund & Vrix Bhumikund (Dimensions, Brick Requirements, Bed Heights)
 - 5.4 Internal Roads, Footpaths, Drainage & Water Harvesting Structures
 - 5.5 Master Plan Vision for Integration with Surrounding Sanatan Krishi Van Units
6. **Crop Planning & AYUSH Herb Species Selection: Page 20**
 - 6.1 Herb Classification (Culinary, Classical Ayurvedic, Aromatic/Oil-bearing, Industrial/Pharma)
 - 6.2 Proposed Species List (Botanical Name, Common Name, Local Name, Part Used)
 - 6.3 Allocation of Species by Zone (Perennials, Shrubs, Climbers, Annual Beds)
 - 6.4 Cropping Calendar & Rotation (Kharif, Rabi, Summer & Perennial Management)
 - 6.5 Yield Assumptions for Major Herbs (Per ha / per Bhumikund basis)

7. **Soil Health, Nutrient & Water Management : Page 28**
 - 7.1 Soil Regeneration Strategy using BhumiKund Vermicomposting & GoldVermix
 - 7.2 Organic Nutrient Management Plan (Basal & Top Dressing Schedules)
 - 7.3 Irrigation System Design (Drip / Micro-sprinkler Layout for 1 ha)
 - 7.4 Water Budget, Water Use Efficiency & Rainwater Harvesting
 - 7.5 Organic Pest & Disease Management using Herbal Extracts & Biologicals
8. **Infrastructure, Machinery & Support Facilities : Page 35**
 - 8.1 Land Development, Terracing / Leveling & Bed Construction (Shivana Brick Structures)
 - 8.2 Irrigation Infrastructure (Pipelines, Pumps, Filtration, Storage Tanks)
 - 8.3 Nursery & Shade-Net House (Seedling Production, Mother Blocks)
 - 8.4 Herb Drying, Sorting & Primary Processing Area (Solar Tunnel Dryer / Drying Yard)
 - 8.5 Storage Godown, Tool Room, Office & Training / Visitor Space
 - 8.6 Optional Renewable Add-ons (Solar Pump, Solar Tunnel Dryers, Infrared Dryers)
9. **Production Plan & Operational Strategy : Page 41**
 - 9.1 Phasing of Development (Year 1 Establishment, Year 2 Ramp-Up, Year 3 Stabilised Output)
 - 9.2 Labour Planning – Karmyogi Roles, Skills & Daily Schedules
 - 9.3 Standard Operating Procedures (SOPs) for Cultivation, Harvesting & Drying
 - 9.4 Quality Assurance Protocols (Harvest Stage, Moisture Limits, Cleanliness)
 - 9.5 Record-Keeping, Traceability & Batch Documentation for AYUSH Compliance
10. **Market Analysis & Marketing Strategy: Page 48**
 - 10.1 Overview of AYUSH & Herbal Market (India & Global Snapshot – Conceptual)
 - 10.2 Potential Buyer Segments (AYUSH Companies, Herbal Pharma, Tea Blenders, Exporters, Wellness Brands)
 - 10.3 Product Portfolio (Bulk Dried Herbs, Cut–Sifted, Powders, Nursery Plants, Experience Tourism)
 - 10.4 Branding & Positioning – *Sanatan Ayush Van* under Mandlik Brotherhood
 - 10.5 Go-to-Market Channels (Direct B2B, Tie-ups, FPO Networks, Online)
 - 10.6 Pricing Assumptions & Value Addition Pathways (Grading, Blends, Packaged SKUs)
11. **Financial Analysis : Page 55**
 - 11.1 Capital Investment (CAPEX) – Civil Works, Irrigation, Nursery, Drying, Storage, Utilities
 - 11.2 Operating Cost (OPEX) – Labour, Inputs, Energy, Maintenance, Packaging
 - 11.3 Production & Sales Projections (5-Year Outlook for Major Herb Lines)
 - 11.4 Profitability Analysis (Gross Margin, Net Profit, IRR, Payback Period)
 - 11.5 Break-Even Point & Capacity Utilization Analysis
 - 11.6 Sensitivity Analysis (Change in Prices, Yields, Input Costs)
12. **Social, Environmental & Educational Impact: Page 66**
 - 12.1 Employment & Skill Development for Local Youth / SC Entrepreneurs
 - 12.2 Soil Health, Biodiversity & Carbon Sequestration Benefits
 - 12.3 Conservation of Sanatan Herbal Knowledge & Local Ethno-botany
 - 12.4 Role as a Demonstration & Training Hub for Ayush & Organic Farming
 - 12.5 Contribution to State & National Missions (Organic, AYUSH, Medicinal Plants)

13. **Risk Analysis & Mitigation Plan: Page 73**
 - 13.1 Climatic & Agro-Ecological Risks (Drought, Heat Waves, Pests)
 - 13.2 Market & Price Risks (Demand Shifts, Buyer Dependence)
 - 13.3 Operational Risks (Labour Turnover, Input Supply, Equipment Failure)
 - 13.4 Regulatory & Certification Risks (Organic, AYUSH, Export Compliance)
 - 13.5 Risk Mitigation & Resilience Strategy
 14. **Institutional Framework & Scheme Convergence: Page 78**
 - 14.1 Role of Mandlik Brotherhood Private Limited & Internal Governance
 - 14.2 Linkages with FPOs, Universities, AYUSH Colleges, R&D Institutions
 - 14.3 Possible Convergence with Govt Schemes (National AYUSH Mission, NMPB, Organic Missions, SC Entrepreneurship Schemes, CSR)
 - 14.4 Monitoring, Evaluation & Reporting Framework
 15. **Sustainability & Scale-Up Strategy: Page 85**
 - 15.1 Long-Term Soil, Water & Ecosystem Stewardship in *Sanatan Ayush Van*
 - 15.2 Model for Replication to Multiple 1 ha Units & Integration with 5 ha / 125 ha Sanatan Krishi Van Clusters
 - 15.3 Potential for Contract Farming / Cluster Development with Local Farmers
 - 15.4 Roadmap for Moving from Bulk Raw Herbs to Branded, Packaged AYUSH Products
 16. **Conclusion: Page 92**
 - 16.1 Strategic Importance of *Sanatan Ayush Van* in Mandlik Brotherhood Mission
 - 16.2 Strengths & Differentiators of the Project
 - 16.3 Invitation for Collaboration – Investors, CSR Partners, Institutions
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Annexures

- **Annexure 1:** 1 Hectare Layout Plan of *Sanatan Ayush Van* : Page 96
- **Annexure 2:** Detailed AYUSH Herb Species List (Botanical, Common, Local Names, Uses): Page 100
- **Annexure 3:** Cropping Calendar & Rotation Charts (Zone-wise): Page 102
- **Annexure 4:** 5-Year Financial Projection Tables: Page 108
- **Annexure 5:** Bill of Quantities (Shivana Bricks, Pipes, Structures, Irrigation): Page 110
- **Annexure 6:** Concept Sketches / 3D Views / Photos (when available) : Page 114

PROJECT AT A GLANCE: Page 115

1. Executive Summary

1.1 Project Title – Sanatan Ayush Van – Guardian of the Healing Forest

Sanatan Ayush Van is a one-hectare herbal and medicinal food forest designed on the principles of Sanatan Krishi Van. The project will demonstrate how barren or under-utilised land can be regenerated into a productive, biodiversity-rich herb ecosystem that supports AYUSH healthcare systems and rural livelihoods.

1.2 Promoter – Mandlik Brotherhood Private Limited

The project is promoted by **Mandlik Brotherhood Private Limited**, a Gandhinagar-based enterprise working in organic farming, soil regeneration, vermicomposting and food-forest development. The company will plan, construct and operate Sanatan Ayush Van and will be responsible for technical design, community engagement and long-term management.

1.3 Project Location and Area (1 Hectare / 10,000 m²)

Sanatan Ayush Van will be established on **1 hectare (10,000 m²)** of agricultural land in **Gandhinagar district, Gujarat**. The land is planned as a **100 m × 100 m square** laid out in **21 concentric squares (rings)** from outside to inside.

From outermost to innermost, the main functional rings are:

- **1st square – Bamboo belt (3 m):** Continuous bamboo plantation on all four sides as a windbreak, boundary and biomass source.
- **2nd square – Outer road (3 m):** All-round movement for tractor, bullock cart and small vehicles.
- **3rd square – Vrix Bhumikund ring with moringa (V-BK): 86 moringa trees** planted in individual pits forming the main tree and biomass belt.
- **4th, 6th, 8th, 10th, 12th, 14th, 16th, 20th squares – Walkways (1 m):** Narrow access paths and shallow drainage lines.
- **5th, 7th, 9th, 11th, 13th, 15th, 17th, 19th squares – Dhanya Bhumikund (D-BK) rings (2 m each):**
 - Eight concentric D-BK rings totalling **3,616 m²** of raised beds, used **exclusively for high-value medicinal herbs**.
- **18th square – Inner road (3 m):** Service road close to the central core and inner D-BK rings for easy transport of inputs and harvest.
- **21st square – Central core (30 m × 30 m = 900 m²):**
 - **Stepwell** 10 m × 10 m × 5 m (water body).
 - **Storage room** 5 m × 5 m.
 - **Karmyogi stay (Guardian's house)** 5 m × 5 m.
 - **Solar tunnel dryer** 5 m × 5 m.
 - **Bhumikund Vermicomposting System** 3 m × 3 m and working/nursery area in the remaining space.

This design gives Sanatan Ayush Van a **clear, geometric structure** with protection, tree layer, intensive herb beds, water body, drying, storage and on-site vermicompost, all integrated in one hectare.

1.4 Core Concept – Sanatan Krishi Van Principles Applied to AYUSH Herbs

The core concept is to apply **Sanatan Krishi Van** principles to **AYUSH medicinal herbs** by:

- Designing the one-hectare plot as a **100 m × 100 m concentric square system** with a bamboo belt, **Vrix Bhumikund ring of 86 moringa trees, eight Dhanya Bhumikund herb rings (3,616 m²)**, inner road and a 30 m × 30 m central core.
- Using Dhanya Bhumikund raised beds for all herb cultivation to ensure good drainage, deep root aeration and efficient use of on-farm vermicompost and mulches.
- Integrating a **10 m × 10 m × 5 m stepwell**, storage, Guardian's stay, **5 m × 5 m solar tunnel dryer** and a **3 m × 3 m Bhumikund Vermicomposting System** to make the unit self-reliant for water, drying and soil inputs.
- Focusing on a **limited set of high-demand AYUSH herbs** (Safed Musli, Shatavari, Ashwagandha, Guggul, Kalmegh, Tulsi, Brahmi and Aloe vera) for bulk dried raw material.
- Demonstrating a replicable, one-hectare herbal model that integrates **soil regeneration, water conservation and medicinal plant cultivation** for rural upliftment.

1.5 Key Highlights (Scale, Product Mix, Target Markets)

- **Scale & Design**
 - 1 hectare, fully planned as a concentric-layer herbal forest.
 - Combination of bamboo belt, moringa belt and intensive D-BK herb beds.
 - Central pond, storage, Guardian's stay and solar drying yard for integrated operations.
- **Product Mix**
 - Dried whole herbs (roots, leaves, seeds, flowers) from multiple AYUSH species.
 - Cleaned and graded **herbal powders and cut-sifted material** (wherever feasible).
 - Moringa leaves and pods, bamboo biomass and poles as secondary products.
 - Limited nursery plants of selected medicinal species for farmers and home gardens.
 - Paid exposure visits, training programmes and demonstration services for farmers, students and institutional visitors.
- **Target Markets**
 - AYUSH and herbal medicine manufacturers (Ayurveda, Unani, naturopathy).
 - Herbal tea, nutraceutical and wellness product companies.
 - Local pharmacies, organic shops and Ayurvedic practitioners in Gujarat and nearby states.
 - Farmers, FPOs and rural youth seeking planting material and training in medicinal plant cultivation.

1.6 Financial Snapshot (CAPEX, OPEX, Revenue, Payback)

- **Estimated total project cost (CAPEX): ₹ 81.00 lakh**
- **Grant support requested for rural upliftment: ₹ 40.00 lakh**
- **Estimated annual operating cost (OPEX): ₹ 6.50 lakh per year** at steady-state, full-intensity operations

- **Estimated annual revenue at stabilised operation:** about **₹16.00 lakh per year** at full production capacity (farm products + nursery + training)
- **Estimated payback period:**
 - **≈ 8.5 years** on the **total CAPEX of ₹81 lakh**
 - **≈ 4.3 years** on the **promoter + loan portion of ₹41 lakh**, considering ₹40 lakh as grant support

For the one-line box in the Executive Summary, you can compress the last point to:

Estimated payback period: ~8.5 years on total project cost (≈4.3 years on promoter + loan portion after grant support).

2. Background & Rationale

2.1 Rising Demand for AYUSH Herbs (Ayurveda, Yoga, Unani, Siddha, Homeopathy, Natural Therapy)

In the last two decades there has been a steady shift in India and globally towards natural and traditional systems of healthcare. Ayurveda, Yoga, Unani, Siddha, Homeopathy and naturopathy are now recognised not only as alternative systems but as parallel streams under the AYUSH framework.

This growth is visible in:

- Increasing number of AYUSH hospitals, clinics and wellness centres.
- Rising demand for Ayurvedic and herbal formulations in urban as well as rural markets.
- Growth of wellness tourism, panchakarma centres, naturopathy centres and yoga retreats.
- Higher interest in immunity-boosting and preventive healthcare products after the COVID-19 period.

All these segments depend on a reliable and steady supply of medicinal and aromatic plants. Herbs such as ashwagandha, safed musli, senna, isabgol, kalmegh, tulsi, moringa and many others are required in bulk, in standardised quality and with full traceability. This demand is expected to remain strong in the long term because these plants are part of classical formulations and daily wellness products, not short-term trends.

2.2 Gaps in Organically Grown, Traceable Medicinal Herb Supply

Although demand for medicinal herbs is strong, there are several gaps on the supply side:

- A large proportion of raw material still comes from **wild collection**, which is often unsustainable and difficult to standardise in quality.
- Only a limited area is under **systematic, organically managed medicinal plant cultivation**. Many buyers struggle to source residue-free, traceable material in required volumes.
- Farmers who grow medicinal plants frequently do so on scattered, small plots without proper design, crop planning or post-harvest infrastructure, leading to yield and quality variations.
- Herb material is often sun-dried on open ground, exposed to dust and contamination, which reduces quality and export potential.
- There is a lack of **demonstration models** that combine good agronomy, soil health practices, water management, drying infrastructure and documentation in one integrated one-hectare unit.

Sanatan Ayush Van directly addresses these gaps. The entire one-hectare area is planned as a concentric herbal forest with permanent Dhanya Bhumikund beds, organic soil inputs, controlled drying using solar dryers and a strong focus on documentation and traceability. This creates a dependable source of clean, traceable herbs for AYUSH buyers while giving farmers and visitors a live example to learn from.

2.3 Integration with Sanatan Krishi Van & Soil Regeneration Mission

Sanatan Ayush Van is not a standalone plantation; it is a specialised one-hectare “Ayush chapter” within the broader vision of **Sanatan Krishi Van – Converting Barren Land to Food Forest** and the associated **Soil Generation Project**.

Key points of integration are:

- **Concentric design:** The same concentric square logic used in Sanatan Krishi Van is applied here – bamboo outer belt, internal road, moringa ring, and Dhanya Bhumikund rings – to optimise wind protection, biodiversity, movement and labour efficiency.
- **Bhumikund philosophy:** Raised Dhanya Bhumikund beds ensure well-aerated, living soil. They are continuously enriched with vermicompost and biomass, following the Soil Generation Project’s principle of “growing soil first, crops second.”
- **Water stewardship:** The central pond and careful design of walkways and beds ensure efficient water distribution, rainwater harvesting potential and resilience during dry spells.
- **Biodiversity and resilience:** Bamboo, moringa and mixed medicinal herbs create a multi-layered system that is more resilient to pests, diseases and climate variability than monocropping.

Through this integration, Sanatan Ayush Van becomes a practical demonstration of how **soil regeneration, water conservation and medicinal plant cultivation** can be combined for long-term rural prosperity.

2.4 Mandlik Brotherhood as “Guardian of the Organic & Ayush Farm”

Mandlik Brotherhood Private Limited has already developed deep experience in:

- Designing and operating vermicompost systems and the **Soil Generation Project**.
- Developing **Sanatan Krishi Van** and other food-forest concepts with concentric layouts, step-wells and Bhumikund structures.
- Working with farmers, FPOs and rural communities on organic inputs, soil health and regenerative practices.

Positioning Mandlik Brotherhood as the “**Guardian of the Organic & Ayush Farm**” means:

- The company takes responsibility for scientific layout, crop planning, organic input management and overall technical supervision of Sanatan Ayush Van.
- It ensures that all herbs are produced with clear field records, batch-wise documentation and quality protocols, giving buyers confidence in traceability.
- It acts as a bridge between farmers, AYUSH manufacturers, institutions and CSR partners, converting the one-hectare unit into a living classroom and a rural livelihood anchor.

Through Sanatan Ayush Van, Mandlik Brotherhood aims to show how a carefully designed one-hectare unit in Gandhinagar can serve as a **model of organic, traceable AYUSH herb production and rural upliftment**, ready to be replicated in other villages and districts.

3. Project Concept & Objectives

3.1 Concept of Sanatan Ayush Van (Herbal Food Forest + Bulk Production + Demonstration Unit)

Sanatan Ayush Van is a **one-hectare herbal food forest** designed as a **concentric square system** that plays three roles:

1. **Herbal Food Forest (Ecology)**
 - A 100 m × 100 m square divided into 21 concentric rings.
 - **Bamboo belt (3 m)** on the outermost ring for wind protection and biomass.
 - **Vrix Bhumikund moringa ring** with **86 moringa trees** forming the main tree layer and continuous leaf biomass.
 - **Eight Dhanya Bhumikund (D-BK) rings (3,616 m² total)** used exclusively for high-value medicinal herbs, each ring dedicated to one major herb:
 - Safed Musli, Shatavari, Ashwagandha, Guggul, Kalmegh, Tulsi, Aloe vera and Brahmi.
 - A **30 m × 30 m central core** with a stepwell, storage, Guardian's stay, solar tunnel dryer and Bhumikund Vermicomposting System.
2. **Bulk Production Unit (Economics)**
 - The D-BK beds are planned for **systematic commercial-scale production** of root, leaf and gel crops.
 - The on-site vermicompost unit and stepwell reduce input costs and improve soil and water security.
 - The solar tunnel dryer provides **clean, controlled drying** for all herbs, improving shelf life and quality.
3. **Demonstration & Learning Unit (Education)**
 - The geometry, Bhumikund structures, solar drying, stepwell and vermicomposting system together create a **live classroom**.
 - Farmers, students, FPOs, NGOs and visitors can see a fully integrated, one-hectare AYUSH herb model in operation.

3.2 Core Objectives (Production, Conservation, Training, Livelihood, Export Readiness)

The core objectives of Sanatan Ayush Van are:

1. **Production**
 - To produce significant quantities of selected AYUSH herbs (roots, leaves, seeds) from one hectare, using Dhanya Bhumikund raised beds and concentric design.
 - To ensure consistent quality and moisture-controlled drying for better shelf life and market acceptance.
2. **Conservation**
 - To conserve and multiply important medicinal species by cultivating them in an organised manner instead of relying on wild collection.
 - To maintain a living repository of selected herbs that can be used for seed, planting material and knowledge transfer.
3. **Training & Capacity Building**
 - To function as a **training ground** for farmers, rural youth, FPOs and students who want to enter medicinal plant cultivation.

- To demonstrate practical aspects of bed design, spacing, irrigation, organic input use, harvesting, drying and documentation.
- 4. Livelihood Creation & Rural Upliftment**
 - To generate stable local employment for the Guardian family and supporting labour.
 - To create income through sale of dried herbs, powders, nursery plants and training services.
 - To show rural families that a well-designed one-hectare herbal model can supplement or even replace low-return conventional cropping.
- 5. Future Export Readiness**
 - To design cultivation, drying and record-keeping in a way that can later meet basic requirements of buyers who supply export markets (clean material, traceability, batch records).
 - To prepare the unit so that, with further investment and certifications in the future, the same one-hectare model can supply herbs for export-oriented value chains.

3.3 Unique Features (Bhumikund Design, Shivana 3D Bricks, Soil Generation Integration)

Sanatan Ayush Van has several unique technical features:

- **Concentric Bhumikund Architecture**
 - A precisely laid out **100 m × 100 m plot with 21 concentric squares**, including:
 - Bamboo belt, outer and inner roads, **Vrix Bhumikund moringa ring (86 trees)**,
 - **Eight Dhanya Bhumikund rings (3,616 m²)**,
 - And a **30 m × 30 m central core** with water, storage, residence and processing.
- **Dhanya Bhumikund (D-BK) Medicinal Herb Beds**
 - All medicinal herbs are grown on **2 m wide raised D-BK rings**, not on flat land.
 - This improves drainage, root aeration, ease of irrigation and labour efficiency.
 - Each ring is dedicated to one main herb, simplifying management and record-keeping.
- **Use of Shivana 3D Interlocking Bricks (where applicable)**
 - Raised bed edges, small retaining walls and some internal structures can be built using **Shivana 3D interlocking bricks**.
 - These bricks allow fast, mortar-minimal construction and can be reconfigured or extended as the project evolves.
- **Soil Generation Integration**
 - A **3 m × 3 m Bhumikund Vermicomposting System** in the central core converts moringa leaf fall, herb residues and other biomass into vermicompost.
 - This directly feeds the D-BK beds, embodying the Soil Generation Project's principle of **“grow soil first, then crops”**.
- **On-site Water & Drying Infrastructure**
 - A **10 m × 10 m × 5 m stepwell** ensures on-farm water storage and microclimate moderation.

- A **5 m × 5 m solar tunnel dryer** provides clean, controlled drying for all high-value herbs, reducing post-harvest losses and improving marketability.

The logic and wording of **3.2 and 3.4** are still valid with these updates and don't need changes.

3.4 Long-Term Vision – Ayush Herb Clusters & Replicable Models

Sanatan Ayush Van is designed as a **prototype** for a much larger vision.

The long-term vision includes:

1. **Replicable One-Hectare Model**

- To refine this 1 ha design until it becomes a standard blueprint that can be replicated in other villages of Gandhinagar district and across Gujarat.
- To document layouts, crop choices, input schedules and financials so others can copy and adapt the model.

2. **Ayush Herb Clusters**

- To gradually develop **clusters of Sanatan Ayush Van units** in nearby villages, either under Mandlik Brotherhood's direct management or in partnership with farmers, FPOs, temples, ashrams, educational institutions or CSR initiatives.
- Multiple one-hectare units working in a cluster can together supply larger, consistent volumes to institutional AYUSH buyers.

3. **Integration with Sanatan Krishi Van Networks**

- To position Sanatan Ayush Van as a specialised herb unit that can be embedded inside bigger Sanatan Krishi Van projects (5 ha, 25 ha, 125 ha, etc.).
- This allows food forests and herb forests to coexist, offering grains, fruits, timber, biomass and medicinal products from the same landscape.

4. **Pathway to Higher-Value Processing**

- In the initial phase, the focus is on **drying, cleaning and packing**.
- In the longer term, as volumes, skills and partnerships grow, the network of Ayush Vans can explore further value addition such as herbal blends, branded products or collaborations with processing units, while still keeping cultivation strictly organic and traceable.

In summary, Sanatan Ayush Van is both a **complete one-hectare project in itself** and a **building block** for future Ayush herb clusters, helping Mandlik Brotherhood and rural communities move towards a sustainable, herbal-based rural economy.

4. Site Description & Agro-Climatic Conditions

4.1 Land Details (1 ha Plot – Shape, Dimensions, Ownership / Lease)

The proposed site for **Sanatan Ayush Van** is a **1 hectare (10,000 m²)** agricultural plot located in **Gandhinagar district, Gujarat**.

- **Shape & Dimensions:**
 - The design assumes a nearly **square plot**, approximately **100 m × 100 m**.
 - This allows accurate implementation of the concentric square layout: bamboo belt, internal road, moringa ring, Dhanya Bhumikund (D-BK) rings and central core.
- **Location Context:**
 - The land is situated within reachable distance from Gandhinagar city, providing access to roads, labour, markets and support services.
 - Proximity to existing Mandlik Brotherhood operations (Soil Generation, vermicompost, Sanatan Krishi Van work) helps in management and supervision.
- **Ownership / Lease:**
 - The land will be **owned / taken on long-term lease** by *Mandlik Brotherhood Private Limited* (details to be finalised as per actual site).
 - A minimum lease period of **9–15 years** (if leased) is recommended so that perennial species like bamboo and moringa, and the full herbal system, can mature and give stable returns.

The combination of square shape and secure tenure makes the site suitable for permanent Bhumikund structures and long-term herbal ecosystem development.

4.2 Soil Type, Current Condition, Constraints & Potential

- **Soil Type & General Nature:**
 - Gandhinagar district broadly falls under **alluvial to sandy / loamy soil** categories, with moderate to low organic carbon in many cultivated fields.
 - Such soils are generally suitable for **moringa, bamboo and a wide range of medicinal herbs**, provided organic matter and moisture are managed properly.
- **Current Condition (Typical Scenario):**
 - The baseline condition is assumed to be:
 - Low to medium organic matter.
 - Possible compaction due to repeated ploughing and conventional cropping.
 - Limited soil life (beneficial microbes, earthworms) compared to a forest soil.
 - These conditions are common in intensively farmed areas and represent an opportunity for visible improvement.
- **Constraints:**
 - Low organic carbon leads to weak soil structure and poor moisture-holding capacity.

- Uneven fertility can cause variable herb growth if not corrected through systematic soil building.
 - In summer, surface layers can become very dry and hard without mulching and shade.
 - **Potential with Bhunikund & Soil Generation Approach:**
 - By constructing Dhanya Bhunikund beds and applying **regular vermicompost, mulching and biomass recycling**, the soil can be converted into a **living, humus-rich medium** within a few seasons.
 - Bamboo and moringa rings will add continuous leaf fall and root biomass, improving deep soil structure and microclimate.
 - Over time, the one-hectare unit can become a **model of regenerated herb-growing soil**, demonstrating the Soil Generation Project in action.
-

4.3 Climate, Rainfall, Temperature – Suitability for Key AYUSH Herbs

- **Climate Type:**
 - Gandhinagar has a **semi-arid to sub-tropical climate** with hot summers, mild winters and a distinct monsoon season.
- **Rainfall:**
 - Average annual rainfall is roughly **600–800 mm**, concentrated mainly in the **south-west monsoon (June–September)**.
 - This is adequate for medicinal plant cultivation when combined with **on-farm water storage (central pond)** and **drip / micro-irrigation**.
- **Temperature Range:**
 - **Summer:** Day temperatures often rise above **40°C** in May–June.
 - **Monsoon:** Moderate temperatures with high humidity, suitable for vegetative growth.
 - **Winter:** Cool and pleasant, with minimum temperatures typically around **10–12°C**, sometimes slightly lower on a few days.
- **Suitability for Key AYUSH Herbs:**
 - The climate is suitable for several important AYUSH crops such as:
 - **Ashwagandha, senna, isabgol, safed musli** (with proper irrigation and mulching).
 - **Moringa** (as a tree crop for leaves and pods).
 - **Various leafy and seed herbs** that tolerate heat when soil moisture is well managed.
 - High summer temperatures make **mulching, shaded microclimates and soil moisture conservation** essential. The bamboo and moringa rings, along with Bhunikund design, directly address this.

Overall, the agro-climatic conditions of **Gandhinagar, Gujarat** are well suited for a **carefully designed, irrigated and mulched herbal food forest**. With proper water management and soil regeneration, Sanatan Ayush Van can reliably support diversified AYUSH herb cultivation on one hectare.

5 – Technical Design & Layout

5.1 Overall Planning Concept (Concentric Layers / Zonal Layout)

Sanatan Ayush Van is a **100 m × 100 m (1 ha)** square, divided into **21 concentric squares (rings)** from outside to inside. Each ring has a fixed width and function.

From outermost (1st square) to innermost (21st square):

1. **1st square – Bamboo belt (3 m wide)**
 - Width: 3 m all around.
 - Function: Windbreak, boundary, biomass.
2. **2nd square – Outer road (3 m wide)**
 - Width: 3 m.
 - Function: All-round movement for tractor, bullock cart and vehicles.
3. **3rd square – Vrix Bhumikund (V-BK) ring – 86 moringa trees**
 - Zone: Vrix Bhumikund pits for tree layer.
 - Trees: **86 moringa trees** planted in 1 m × 1 m V-BK pits with proper spacing.
 - Function: Main tree layer for leaf, pod, biomass and microclimate improvement.
4. **4th square – Walkway (1 m wide)**
 - Width: 1 m.
 - Function: Footpath to access inner rings without disturbing beds.
5. **5th square – Dhanya Bhumikund (D-BK) Ring 1 – 2 m wide (624 m²)**
 - Width: 2 m.
 - Area under beds: **624 m²**.
 - Function: Raised medicinal herb beds (outermost D-BK ring).
6. **6th square – Walkway (1 m wide)**
7. **7th square – D-BK Ring 2 – 2 m wide (576 m²)**
 - Area: **576 m²** of raised herb beds.
8. **8th square – Walkway (1 m wide)**
9. **9th square – D-BK Ring 3 – 2 m wide (528 m²)**
 - Area: **528 m²**.
10. **10th square – Walkway (1 m wide)**
11. **11th square – D-BK Ring 4 – 2 m wide (480 m²)**
 - Area: **480 m²**.
12. **12th square – Walkway (1 m wide)**
13. **13th square – D-BK Ring 5 – 2 m wide (432 m²)**
 - Area: **432 m²**.
14. **14th square – Walkway (1 m wide)**
15. **15th square – D-BK Ring 6 – 2 m wide (384 m²)**
 - Area: **384 m²**.
16. **16th square – Walkway (1 m wide)**
17. **17th square – D-BK Ring 7 – 2 m wide (336 m²)**
 - Area: **336 m²**.
18. **18th square – Inner road (3 m wide)**
 - Width: 3 m.
 - Function: Inner service road close to central core and inner D-BK rings (movement of harvest, inputs, visitors).

19. **19th square – D-BK Ring 8 – 2 m wide (256 m²)**
 - Area: **256 m²** (innermost D-BK ring around the centre).
20. **20th square – Walkway (1 m wide)**
 - Final inner walkway around central core.
21. **21st square – Central square (30 m × 30 m = 900 m²)**
 - Core functional zone containing:
 - **Stepwell:** 10 m × 10 m × 5 m depth (water body).
 - **Storage room:** 5 m × 5 m.
 - **Karmyogi stay (Guardian’s house):** 5 m × 5 m.
 - **Solar tunnel dryer:** 5 m × 5 m.
 - Remaining open working area for handling, nursery, paths, and (as previously planned) space to place the **3 m × 3 m Bhumikund Vermicomposting System**.

👉 **Total Dhanya Bhumikund (D-BK) area for medicinal herbs:**

Let’s add the areas you specified:

- Ring 1: 624 m²
- Ring 2: 576 m²
- Ring 3: 528 m²
- Ring 4: 480 m²
- Ring 5: 432 m²
- Ring 6: 384 m²
- Ring 7: 336 m²
- Ring 8: 256 m²

Step-by-step:

- $624 + 576 = 1,200$
- $1,200 + 528 = 1,728$
- $1,728 + 480 = 2,208$
- $2,208 + 432 = 2,640$
- $2,640 + 384 = 3,024$
- $3,024 + 336 = 3,360$
- $3,360 + 256 = \mathbf{3,616\ m^2}$

So:

Total D-BK herb bed area = 3,616 m²
= 0.3616 hectare
≈ 36.16 “Bhumikund units” of 100 m² each.

This is the **true cultivation capacity** of Sanatan Ayush Van for medicinal herbs inside the D-BK system.

5.2 Area Zonation (updated, matching your layout)

You can overwrite the earlier 5.2 with this:

Protection & Outer Movement

- **Bamboo belt (1st square, 3 m)** – protection and biomass.
- **Outer road (2nd square, 3 m)** – main vehicle movement all around the unit.

Tree & Vrix Bhumikund Layer

- **3rd square – Vrix Bhumikund (V-BK) moringa ring**
 - 86 moringa trees planted in Vrix Bhumikund pits (1 m × 1 m concept) with appropriate spacing.
 - This ring is the **primary tree and biomass layer** supplying leaves, pods and mulch.

Herb Production Zone – Dhanya Bhumikunds

- **D-BK Rings (5th, 7th, 9th, 11th, 13th, 15th, 17th, 19th squares)**
 - Eight concentric D-BK rings, each 2 m wide, total area **3,616 m²**.
 - Reserved exclusively for **medicinal herb cultivation** (Ashwagandha, Safed Musli, Isabgol, Senna, Kalmegh, Tulsi, Mint, Lemongrass, Aloe block, etc.).

Walkways & Inner Road

- **Walkways** at the 4th, 6th, 8th, 10th, 12th, 14th, 16th and 20th squares (all 1 m wide):
 - Provide complete foot access to all D-BK rings.
 - Also function as surface drainage lines.
- **Inner road (18th square, 3 m wide):**
 - Service road for moving harvested herbs from inner D-BK rings to the central solar tunnel, storage and vermicompost area.
 - Also used for visitors' circulation near the demonstration core.

Central Core (21st square, 30 × 30 m)

- 10 × 10 × 5 m **stepwell** (water body).
- 5 × 5 m **storage room**.
- 5 × 5 m **Karmyogi stay**.
- 5 × 5 m **solar tunnel dryer**.
- Remaining space for **working platform, nursery area, and the 3 × 3 m Bhumikund Vermicomposting System** plus access paths.

6. Crop Planning & AYUSH Herb Species Selection

This chapter fixes **what** we grow in Sanatan Ayush Van and **where** it sits inside the 1-hectare concentric layout (100 m × 100 m). The focus is on **8 high-value medicinal species** planted in the Dhanya Bhumikund (D-BK) rings, plus moringa in the Vrix Bhumikund (V-BK) ring.

6.1 Herb Classification

(Culinary, Classical Ayurvedic, Aromatic, Industrial/Pharma)

For planning and market focus, the herbs are grouped as follows:

1. **Culinary / Daily-use / Wellness herbs**
 - Used in food, home remedies, teas and nutrition.
 - Example in this project: **Tulsi, Brahmi, Aloe vera**, and **Moringa leaves** (from tree layer).
2. **Classical Ayurvedic herbs**
 - Directly used in classical Ayurvedic formulations and Rasayana therapies.
 - In this project: **Safed Musli, Ashwagandha, Shatavari, Kalmegh, Guggul, Brahmi, Tulsi, Aloe vera**.
3. **Aromatic / Bitter herbs (used here only as dried herb, not oil)**
 - Strong-taste, high-potency herbs normally used in small doses.
 - In this project: **Kalmegh, Tulsi, Brahmi** (all dried / powdered).
4. **Industrial / Pharma-linked herbs**
 - Used as raw material by pharma / nutraceutical companies.
 - In this project: **Safed Musli, Ashwagandha, Shatavari, Guggul, Kalmegh, Brahmi, Aloe vera**.

The Sanatan Ayush Van portfolio is intentionally **tight and high-value**:

Safed Musli, Ashwagandha, Shatavari, Guggul, Tulsi, Kalmegh, Brahmi, Aloe vera.

6.2 Proposed Species List

(Botanical name, common name, local name, part used)

Structural & Tree Layer

1. **Moringa oleifera**
 - Common name: Drumstick tree
 - Local name: Saragvo / Sahjan
 - Part used: Leaves, pods, flowers, tender shoots (fresh and dried), biomass for mulch.
 - Number of trees: **86** in the Vrix Bhumikund ring.

(Bamboo is part of the outer belt, but not treated as a “herb crop” here.)

Core AYUSH Herb Crops (in D-BK rings)

2. **Chlorophytum borivilianum**
 - Common name: Safed Musli
 - Local name: Safed Musli
 - Part used: Tuberous roots (peeled, dried).
3. **Asparagus racemosus**
 - Common name: Shatavari
 - Local name: Shatavari
 - Part used: Roots (dried), sometimes shoots.
4. **Withania somnifera**
 - Common name: Ashwagandha
 - Local name: Asgandh / Ashwagandha
 - Part used: Roots (primary), some leaf use.
5. **Commiphora wightii / C. mukul**
 - Common name: Guggul
 - Local name: Guggul / Gugal
 - Part used: Oleo-gum-resin tapped from the stem (after establishment).
6. **Andrographis paniculata**
 - Common name: Kalmegh / Bhui-neem
 - Local name: Kalmegh
 - Part used: Aerial parts (leaves + tender stems, dried).
7. **Ocimum tenuiflorum (O. sanctum)**
 - Common name: Holy Basil
 - Local name: Tulsi
 - Part used: Leaves and flowering tops (dried).
8. **Bacopa monnieri**
 - Common name: Brahmi
 - Local name: Brahmi
 - Part used: Aerial parts (fresh and dried herb).
9. **Aloe vera (Aloe barbadensis-type)**
 - Common name: Aloe vera
 - Local name: Kunvar pathu / Gwarpatha
 - Part used: Leaves (gel), fresh and potentially dried flakes/powder.

These nine species (including moringa) form the **core biological engine** of Sanatan Ayush Van.

6.3 Allocation of Species by Zone

(Perennials, shrubs, creepers, annual beds – ring-wise)

The 1-hectare plot (100 m × 100 m) is divided into **21 concentric squares**. For crop planning we focus on:

- Vrix Bhumikund (V-BK) ring for trees.

- Eight Dhanya Bhumikund (D-BK) rings for herbs.

V-BK Ring – 3rd Square

- System: Vrix Bhumikund (tree pits).
- Species: **Moringa oleifera**.
- Number: **86 trees** in 1 m × 1 m pits.
- Function: Perennial tree layer for leaves, pods, shade, biomass and microclimate.

D-BK Rings – Herb Production Zone

You defined 8 D-BK rings with the following areas:

- D-BK 1 (5th square): 624 m²
- D-BK 2 (7th square): 576 m²
- D-BK 3 (9th square): 528 m²
- D-BK 4 (11th square): 480 m²
- D-BK 5 (13th square): 432 m²
- D-BK 6 (15th square): 384 m²
- D-BK 7 (17th square): 336 m²
- D-BK 8 (19th square): 256 m²

Total D-BK area

$$= 624 + 576 + 528 + 480 + 432 + 384 + 336 + 256$$

$$= \mathbf{3,616\ m^2}$$

$$= \mathbf{0.3616\ ha}$$

$$\approx \mathbf{36.16\ blocks\ of\ 100\ m^2.}$$

We assign **one main herb to each ring**, based on its nature:

1. **D-BK Ring 1 – Safed Musli (624 m²)**
 - Species: *Chlorophytum borivilianum*.
 - Nature: High-value root crop, likes loose, organic, slightly shaded soil.
 - Logic: Largest D-BK ring, just inside moringa belt, gets **maximum area** for the most premium root.
2. **D-BK Ring 2 – Shatavari (576 m²)**
 - Species: *Asparagus racemosus*.
 - Nature: Clumping perennial root/tuber crop, prefers some shade and support.
 - Logic: Second-largest ring, still within beneficial microclimate of moringa.
3. **D-BK Ring 3 – Ashwagandha (528 m²)**
 - Species: *Withania somnifera*.
 - Nature: Hardy, annual/perennial root crop, tolerates more sun.
 - Logic: Third-largest ring, moderate exposure, good for stable root production.
4. **D-BK Ring 4 – Guggul (480 m²)**
 - Species: *Commiphora wightii/mukul*.
 - Nature: Woody shrub/small tree of dry regions, needs drainage and sun.
 - Logic: Allocated as **wider-spaced plants along the ring** in raised D-BK beds; long-term plantation, resin tapped only after proper establishment.
5. **D-BK Ring 5 – Kalmegh (432 m²)**
 - Species: *Andrographis paniculata*.

- Nature: Short-duration herb, prefers moisture but can take sun.
 - Logic: Closer to centre for better irrigation control; used as bulk herb for dried leaf / powder.
6. **D-BK Ring 6 – Tulsi (384 m²)**
- Species: *Ocimum tenuiflorum*.
 - Nature: Multi-cut leafy herb, likes sun + regular water.
 - Logic: Near inner road and central core, easy for frequent harvesting and quick movement to solar tunnel dryer.
7. **D-BK Ring 7 – Aloe vera (336 m²)**
- Species: *Aloe vera*.
 - Nature: Fleshy succulent, prefers well-drained raised beds and tolerates heat.
 - Logic: Entire ring dedicated to Aloe for meaningful commercial scale; close to inner road and core for quick handling of heavy leaves.
8. **D-BK Ring 8 – Brahmi (256 m²)**
- Species: *Bacopa monnieri*.
 - Nature: Creeping, moisture-loving herb.
 - Logic: Innermost ring around 30 × 30 m core, closest to stepwell; easiest to maintain frequent irrigation and higher moisture.

Walkway rings (4th, 6th, 8th, 10th, 12th, 14th, 16th, 20th squares) and the inner 3-m road (18th square) give full operational access to all these crops.

6.4 Cropping Calendar & Rotation

(*Kharif, Rabi, summer; perennial cycles*)

The calendar below is indicative for **Gandhinagar, Gujarat** conditions. Exact sowing/harvest dates will be adjusted each year based on monsoon onset and field observation.

Kharif (June–October)

- **Safed Musli (Ring 1)**
 - Planting: Early monsoon (June–July).
 - Harvest: After 8–10 months (often in late summer of next year), depending on cycle chosen.
- **Shatavari (Ring 2)**
 - Planting: Monsoon; stays for multiple years.
 - Harvest: Typically after 2–3 years for mature roots (staggered harvesting).
- **Ashwagandha (Ring 3)**
 - Sowing: Late Kharif or early Rabi (depending on chosen window).
 - Harvest: After 5–6 months for roots.
- **Guggul (Ring 4)**
 - Planting: Monsoon; plants establish over several years.
 - Harvest: Resin tapping only after sufficient stem diameter and age (beyond initial project phase); initial years are establishment.
- **Kalmegh (Ring 5)**
 - Sowing: With onset of monsoon.

- Harvest: Aerial herb harvested towards end of Kharif/early Rabi.
- **Tulsi (Ring 6)**
 - Planting: Kharif.
 - Harvest: Multiple leaf cuttings during Kharif and Rabi.
- **Aloe vera (Ring 7)**
 - Planting: Monsoon or early Rabi (vegetative suckers).
 - Harvest: Leaves can be cut periodically once plants are established.
- **Brahmi (Ring 8)**
 - Planting: Monsoon; spreads as mat.
 - Harvest: Periodic trimming of aerial parts; several cuttings possible.

Rabi (November–March)

- **Safed Musli / Shatavari**
 - Continue growth and root bulking; minimal disturbance.
- **Ashwagandha**
 - Main growth phase if sown late Kharif/early Rabi; roots ready by late Rabi or early summer.
- **Kalmegh, Tulsi, Brahmi**
 - Depending on cold intensity, they continue growth and further cuttings; some patches may be rested or resown.
- **Aloe vera**
 - Regular leaf harvesting in cooler months as well.
- **Guggul**
 - Establishment care: pruning, mulching, training; no tapping in early years.

Summer (April–June)

- Key harvest window for **Ashwagandha roots, Safed Musli roots** (depending on cycle) and sometimes partial Shatavari harvest.
- Some D-BK segments can be rested under green manure or thick mulch to protect soil from heat.
- Heavy focus on **mulching, drip/micro irrigation and shade where needed** (especially for Brahmi and any young plants).
- Maintenance of D-BK bunds, walkways, solar tunnel dryer, vermicompost unit and stepwell.

Rotation Logic

Because each ring is dedicated to a main herb, the primary “rotation” is **multi-year within the same species**, but at micro-level we can:

- Shift small internal segments of a ring into **green manure or short cover crops** to rest soil.
- Replant or rejuvenate perennial crops (Aloe, Tulsi, Brahmi patches) as productivity declines.
- Interplant small demonstration plots of supporting species if needed for training.

The key principle is **continuous soil cover, regular organic matter return and minimal bare soil**.

6.5 Yield Assumptions for Major Herbs

(Per hectare benchmarks, per 100 m² and per ring)

To keep financial planning transparent, we define **conservative planning yields**, not record yields. These will be refined later from field data.

6.5.1 D-BK Capacity Summary

- Total D-BK herb bed area = **3,616 m²**
- In hectare terms = **0.3616 ha**
- In 100 m² “Bhumikund blocks” = **36.16 units**

For any herb X grown on A m²:

Yield of X (kg/year) \approx
Per – hectare benchmark yield of X (kg/ha)
 $\times (A / 10,000)$.

6.5.2 Benchmark Yields per Hectare (Planning Values)

All values below are **dry weight**, except Aloe (fresh):

- **Safed Musli (dry roots):** ~0.9 t/ha
- **Shatavari (dry roots):** ~1.0 t/ha
- **Ashwagandha (dry roots):** ~0.6 t/ha
- **Guggul (resin):** Not counted in initial 5-year base model, as resin tapping starts after proper establishment.
- **Kalmegh (dry herb):** ~2.2 t/ha
- **Tulsi (dry herb):** ~1.2 t/ha
- **Brahmi (dry herb):** ~2.0 t/ha (creeping herb with multiple cuttings)
- **Aloe vera (fresh leaves):** ~30–40 t/ha fresh (we will use **35 t/ha** as planning value).

From these, approximate yields **per 100 m²**:

- Safed Musli: ~9 kg dry roots / 100 m²
- Shatavari: ~10 kg dry roots / 100 m²
- Ashwagandha: ~6 kg dry roots / 100 m²
- Kalmegh: ~22 kg dry herb / 100 m²
- Tulsi: ~12 kg dry herb / 100 m²
- Brahmi: ~20 kg dry herb / 100 m²
- Aloe vera: ~350 kg fresh leaves / 100 m²

(Guggul is kept outside early yield calculations; it is a **long-term bonus crop**.)

6.5.3 Indicative Yields per D-BK Ring (at maturity)

Using the areas of each ring:

- **Ring 1 – Safed Musli (624 m²)**
 - $6.24 \times 100 \text{ m}^2 \text{ units} \times 9 \text{ kg} = \approx 56 \text{ kg dry roots/year}$.
- **Ring 2 – Shatavari (576 m²)**
 - $5.76 \text{ units} \times 10 \text{ kg} = \approx 58 \text{ kg dry roots/year}$
 - (Note: This is averaged over the full cycle; actual harvest may be in 2–3 year intervals.)
- **Ring 3 – Ashwagandha (528 m²)**
 - $5.28 \text{ units} \times 6 \text{ kg} = \approx 32 \text{ kg dry roots/year}$.
- **Ring 4 – Guggul (480 m²)**
 - Early years: **no resin yield counted** (establishment phase).
 - Later years: resin from tapped shrubs will be an **additional income stream** on top of base model.
- **Ring 5 – Kalmegh (432 m²)**
 - $4.32 \text{ units} \times 22 \text{ kg} = \approx 95 \text{ kg dry herb/year}$.
- **Ring 6 – Tulsi (384 m²)**
 - $3.84 \text{ units} \times 12 \text{ kg} = \approx 46 \text{ kg dry herb/year}$.
- **Ring 7 – Aloe vera (336 m²)**
 - $3.36 \text{ units} \times 350 \text{ kg} = \approx 1,176 \text{ kg fresh leaves/year}$
 - $\approx 1.2 \text{ tonnes fresh Aloe leaves/year}$ (rounded).
- **Ring 8 – Brahmi (256 m²)**
 - $2.56 \text{ units} \times 20 \text{ kg} = \approx 51 \text{ kg dry herb/year}$.

6.5.4 Moringa Leaf Yield – V-BK Ring

- Number of moringa trees: **86**.
- Planning assumption: **20 kg fresh leaves per tree per year** under good management.
- Total fresh leaves: $86 \times 20 = 1,720 \text{ kg/year}$.
- Assuming about 22% dry matter $\rightarrow \approx 0.38 \text{ tonnes dried moringa leaf equivalent per year}$.

These yield assumptions give a **realistic, conservative picture** of what the 1-hectare Sanatan Ayush Van can produce once it reaches stable operation. In the economics chapter, we will attach **market rate assumptions** to these quantities and calculate revenue, costs and payback based on this ring-wise crop plan.

Summary Table – Herb Allocation by D-BK Ring

You can literally paste this into your report under **6.3 Allocation of Species by Zone**:

D-BK Ring	Area (m ²)	Primary Crop	Crop Type	Reasoning
Ring 1	624	Safed Musali	High-value root	Largest area + gentle shade from moringa belt.
Ring 2	576	Shatavari	High-value root/tuber	Second-largest area; likes partial shade & support.
Ring 3	528	Ashwagandha	Root (annual/perennial)	Hardy, tolerates more sun; good mid-exposure ring.

D-BK Ring	Area (m²)	Primary Crop	Crop Type	Reasoning
Ring 4	480	Guggul	Resin shrub/tree	Needs sun and drainage; raised beds with wider spacing.
Ring 5	432	Kalmegh	Leafy medicinal herb	Bulk herb, likes moisture; closer to centre for irrigation.
Ring 6	384	Tulsi	Leafy medicinal herb	Multiple cuts, easy access from inner road & core.
Ring 7	336	Aloe vera	Fleshy leaf / gel	Hardy succulent; full ring under Aloe for commercial scale.
Ring 8	256	Brahmi	Creeping wet herb	Closest to stepwell, ideal for high-moisture management.

7. Soil Health, Nutrient & Water Management

This chapter explains **how Sanatan Ayush Van will keep its soil alive**, feed the herbs organically, and use water in a careful, efficient way. The idea is simple:

Healthy soil + efficient water = stable herb yields for many years.

7.1 Soil Regeneration Strategy using Bhumikund Vermicomposting & GoldVermix

Sanatan Ayush Van is not just a herbal farm; it is also a **soil regeneration unit**. The strategy has three pillars:

1. Bhumikund Design of Beds

- All herbs are grown in **Dhanya Bhumikund (D-BK) raised rings**, with a total bed area of **3,616 m²**.
- Raised beds improve:
 - Drainage (no waterlogging).
 - Root aeration (better oxygen, better roots).
 - Ease of adding compost and mulches.

2. On-site Bhumikund Vermicomposting (3 m × 3 m)

- A dedicated **3 m × 3 m Bhumikund Vermicomposting System** is installed in the central core.
- Feedstock for vermicompost comes from:
 - Moringa leaves and prunings (from 86 trees).
 - Herb residues after harvest (stems, leaves).
 - Bamboo leaves and other farm biomass.
- This produces **continuous on-farm vermicompost**, which goes back to D-BK beds and tree basins.

3. GoldVermix Integration

- In addition to on-site compost, the project is supported by **GoldVermix** (vermicompost brand of Mandlik Brotherhood).
- **Start-up years (Year 1–3):**
 - A good portion of nutrient requirement is met by **GoldVermix supplied from the main vermicompost plant**, so that soil organic matter builds up quickly.
- **Stabilised years (after Year 3):**
 - On-farm vermicompost + recycling of biomass take over a larger share of the requirement.
 - GoldVermix is used more strategically (for high-value beds, nursery, and tired patches).

Regeneration Philosophy:

- Every crop cycle, **more organic matter goes in** than comes out in harvested product.
- No burning of residues; everything is either:
 - Mulched on the bed, or

- Sent into the Bhumikund Vermicompost unit.
- Over 3–5 years, this converts the one hectare into a **deep, humus-rich herbal soil**, which is part of the Soil Generation Project mission.

7.2 Organic Nutrient Management Plan

(Basal & top dressing schedules)

To keep things simple, nutrient management is designed **by crop type** rather than individual species recipes.

We work with:

- **Root / tuber crops:** Safed Musli, Shatavari, Ashwagandha
- **Leaf / herb crops:** Kalmegh, Tulsi, Brahmi
- **Succulent leaf crop:** Aloe vera
- **Tree layer:** Moringa, Guggul, Bamboo

All nutrient doses below are indicative and can be adjusted after soil testing.

7.2.1 Basal Application – Per 100 m² of D-BK Bed

At the start of each main crop cycle:

1. **Root / Tuber D-BK (Musli, Shatavari, Ashwagandha)**
 - **GoldVermix / vermicompost:**
 - **200–250 kg per 100 m²** mixed in top 20–25 cm before planting.
 - **Rock phosphate or bone meal (if allowed and needed):**
 - Modest dose based on soil P test.
 - **Well-decomposed FYM (optional):**
 - 100–150 kg per 100 m² where available, to improve structure.
2. **Leaf / Herb D-BK (Kalmegh, Tulsi, Brahmi)**
 - **GoldVermix / vermicompost:**
 - **150–200 kg per 100 m²** before sowing/planting.
 - Light FYM as needed for structure.
3. **Aloe vera D-BK (Ring 7)**
 - **GoldVermix:**
 - **100–150 kg per 100 m²** at planting time, mixed in rows/pits.
4. **Moringa & Guggul (Tree / Shrub layer, V-BK + Ring 4)**
 - At planting:
 - **5–10 kg GoldVermix** per pit (for moringa and guggul) mixed with soil.
 - Annually:
 - **5 kg GoldVermix** per mature tree/shrub near the drip line.

7.2.2 Top Dressing & In-Season Feeding

1. **Root / Tuber D-BK**

- **At 45–60 days:**
 - 50–75 kg GoldVermix per 100 m² applied as side dressing and lightly incorporated.
- **At 90–100 days (if crop duration allows):**
 - Another 50 kg per 100 m², or liquid vermiwash / compost tea via irrigation.
- 2. **Leaf / Herb D-BK (Kalmegh, Tulsi, Brahmi)**
 - **Every 45–60 days (especially after cutting):**
 - 40–60 kg GoldVermix per 100 m² as light top dressing.
 - **Liquid feeding:**
 - Fermented **Jeevamrut / vermiwash / compost tea** can be applied through drip or as a light drench.
- 3. **Aloe vera D-BK**
 - Top dressing twice a year:
 - 30–40 kg GoldVermix per 100 m² each time.
- 4. **Moringa & Guggul**
 - Yearly ring application of GoldVermix around each plant, covered with mulch.

7.2.3 Mulching & Soil Cover

- All D-BK beds receive **mulch** (dry grass, moringa leaves, crop residues) after each major nutrient dose.
- Benefits:
 - Reduces evaporation.
 - Suppresses weeds.
 - Gradual nutrient release as mulch breaks down.

7.2.4 Soil Testing & Corrections

- **Initial soil test** before project starts, then **every 2–3 years**.
- Corrective measures (if tests demand):
 - Lime (for pH correction),
 - Gypsum (sodicity / Ca-S improvement),
 - Micronutrients (zinc, boron, iron) in chelated or allowed organic form.

7.3 Irrigation System Design

(Drip / micro-sprinkler layout for 1 ha)

The goal is a **simple, serviceable system** that any village-level operator can manage.

7.3.1 Water Source & Storage

- Primary storage: **10 m × 10 m × 5 m stepwell** (approx. 500 m³ ≈ 5,00,000 litres).
- Source feeding the stepwell:
 - Borewell / pipeline / canal source (as per actual site).

- Roof runoff from storage and Guardian’s stay can also be channelled into stepwell through filters.

7.3.2 Main Layout

1. **Mainline**
 - HDPE/PVC mainline running from stepwell pump along one side, connecting to outer and inner roads.
2. **Sub-mains**
 - One sub-main along the **outer 3 m road** (2nd square), feeding outer D-BK rings and bamboo.
 - One sub-main along the **inner 3 m road** (18th square), feeding inner D-BK rings and central zone.
3. **Control Valves**
 - Valves at logical blocks (e.g., group of D-BK rings, moringa ring, central core) so sections can be irrigated separately.

7.3.3 Drip lines & Emitters

1. **D-BK Rings (Herb Beds)**
 - **16 mm drip laterals** laid along the length of each D-BK ring.
 - Emitter spacing: 30–40 cm, discharge 2–4 L/hr, depending on herb and soil.
 - Each ring can be divided into 2–4 irrigation zones to control pressure and timing.
2. **Moringa & Guggul**
 - **2–4 drippers per tree/shrub**, placed around the root zone.
 - As trees grow, drip layout is adjusted to match canopy spread.
3. **Brahmi (Ring 8)**
 - Option 1: Closer-spaced **drip lines** (emitter spacing 20–30 cm).
 - Option 2: Low-height **micro-sprinklers** for uniform wetting if water is adequate.
4. **Aloe vera**
 - Drip lines between rows; 1–2 emitters per plant.

7.3.4 Control & Scheduling

- **Simple manual system** with ball valves to start.
- Irrigation timing adjusted seasonally:
 - Shorter, more frequent irrigation in summer.
 - Longer but less frequent irrigation in winter/monsoon.

System is designed so that **if funds allow later**, an automatic timer / basic controller can be added without redesign.

7.4 Water Budget, Water Use Efficiency & Rainwater Harvesting

7.4.1 Basic Water Requirement (Conceptual)

- Intensive herb beds: **3,616 m² D-BK**.
- Additional planted area (moringa, guggul, bamboo, etc.): approx. **2,000–2,500 m²**.
- Total intensively irrigated area: roughly **5,500–6,000 m²**.

In hot months, herb crops may require roughly **3–4 mm/day** of water on active days:

- 4 mm/day on 6,000 m² = **24,000 litres/day** (peak).
- Stepwell capacity ≈ **5,00,000 litres**, giving a buffer of **~20 peak-irrigation days** even without recharge.

In practice:

- Monsoon rain + occasional irrigation reduce demand.
- Stepwell is regularly replenished from borewell/source + surface inflows.

7.4.2 Rainwater Harvesting

1. Field-Level Harvesting

- Gentle slopes, D-BK bunds and walkways slow down runoff and allow infiltration into the root zone.
- Any excess runoff is guided to the stepwell or safe drainage areas.

2. Roof-Top Harvesting

- Roofs of **storage room, Guardian's stay, and solar tunnel dryer** can collect rainwater.
- Gutters and first-flush systems direct relatively clean water to the stepwell.

3. Groundwater Recharge

- Overflow from stepwell in heavy rains can be directed to **recharge pits** or unlined soak areas.

7.4.3 Water Use Efficiency Measures

- **Drip irrigation everywhere** in D-BK and tree belt.
- Heavy **mulching** to reduce evaporation.
- Irrigation scheduling based on crop stage, not fixed calendar.
- Regular checking for leaks and clogged emitters.

This combination keeps water use modest, yet reliable, which is critical for a **high-value herb farm in semi-arid Gujarat**.

7.5 Organic Pest & Disease Management using Herbal Extracts & Biologicals

Medicinal plants must themselves be **chemically clean**. The pest and disease strategy is fully **organic and preventive**.

7.5.1 Prevention First

- **Diversity of crops** in different rings → breaks pest cycles.
- **Healthy soil and high organic matter** → stronger plants, less stress.

- **Proper spacing and pruning** (especially in moringa and guggul) → better airflow, less fungal disease.
- **Regular field scouting** → find problems early.

7.5.2 Botanical Sprays & Herbal Extracts

Simple, locally-preparable extracts:

1. **Neem-based sprays**
 - Neem seed kernel extract or neem oil (properly emulsified) for sucking pests and some chewing insects.
2. **Dashparni / mixed leaf extracts**
 - Fermented herbal mixes (neem, karanj, lantana, custard apple leaves, etc.) used as broad-spectrum repellents.
3. **Chilli–garlic–ginger extract**
 - For deterrence of caterpillars and some soft-bodied pests.
4. **Buttermilk / curd-based sprays**
 - For some fungal issues on leaf crops.

All these are rotated; no single spray is overused.

7.5.3 Biologicals & Beneficial Organisms

- **Trichoderma** spp. (fungal antagonists) in soil near root crops (Musli, Shatavari, Ashwagandha) to prevent root rots.
- **Pseudomonas fluorescens** and similar beneficial bacteria as seedling/root treatments.
- **Metarhizium / Beauveria** (entomopathogenic fungi) and **NPV formulations** for managing specific insect pests where needed.
- **Encouraging natural predators** by maintaining some flowering plants and not spraying broad-spectrum toxins.

7.5.4 Traps & Physical Measures

- **Yellow and blue sticky traps** for monitoring and suppressing flying insects.
- **Light traps / pheromone traps** where appropriate for moths.
- **Manual removal** of heavily infested plants in small patches to avoid spread.

7.5.5 Documentation & Traceability

- Each D-BK ring is a separate **management block**.
- Spray records, pest observations, and organic inputs used are logged ring-wise.
- This supports **traceability and certification** in future (if the project opts for NPOP/PGS or other organic certification), and makes the unit more attractive for pharma/AYUSH buyers.

In summary, Chapter 7 makes sure Sanatan Ayush Van is **not just growing herbs**, but also:

- Producing its **own soil fertility** through Bhunikund vermicomposting and GoldVermix,
- Using **water wisely** through drip and a stepwell-centered design,
- And protecting plants with **the same kind of natural strength they are meant to give to patients.**

8. Infrastructure, Machinery & Support Facilities

This chapter describes the **physical backbone** of Sanatan Ayush Van – what we build on the 1 hectare so that the crop plan in Chapter 6 and the soil–water plan in Chapter 7 actually work on the ground.

Layout reminder:

- 1 ha = **100 m × 100 m**
 - 21 concentric squares
 - Bamboo belt, roads, **V-BK moringa ring**, **8 D-BK herb rings (3,616 m²)**, and **30 m × 30 m central core** with stepwell, storage, stay and solar dryer.
-

8.1 Land Development, Terracing / Leveling & Bed Construction (Shivana Brick Structures)

a) Basic Land Development

- Initial **land clearing and rough leveling** of the 100 m × 100 m plot so that surface drainage flows gently towards designated channels and the stepwell recharge area.
- No deep terracing is required, but **micro-levelling** is done ring-wise so that:
 - Walkways are slightly higher than the D-BK beds.
 - Excess water drains into safe channels and not into root zones.

b) Layout Marking of Concentric Squares

- Using pegs, ropes and basic survey tools, the 21 squares are marked:
 - 1st square (100 × 100 m outer boundary) down to 21st square (30 × 30 m central core).
 - Each ring (bamboo belt, roads, V-BK, walkways, D-BK rings) is clearly staked before any permanent construction.

c) D-BK & V-BK Bed Construction with Shivana Bricks

- All Dhanya Bhumikund (D-BK) herb beds and Vrix Bhumikund (V-BK) tree pits are constructed using **Shivana 3D interlocking bricks** as edge structures.
- Key points:
 - D-BK rings are **2 m wide raised beds** with side walls built up with Shivana bricks (height ~30–40 cm above path level).
 - The bricks interlock in 3D, giving stability **without continuous cement mortar**, and can be modified or extended in future.
 - V-BK moringa pits (1 m × 1 m concept) can use Shivana bricks for neat pit walls where needed (especially near walkways) and for tree basin borders.

Benefits:

- **Strong, reconfigurable** raised beds.

- Reduced soil erosion from beds into walkways.
- Long life and easy maintenance.

d) Central Core Structures

- The central **stepwell (10 m × 10 m × 5 m)** is constructed with RCC/stone masonry, with safe steps and parapet walls.
- The **floor levels** of storage, Karmyogi stay and solar tunnel are set slightly above surrounding ground to avoid water ingress in heavy rains.
- Pathways within the central core are compacted, with brick or stone edging as needed for stability.

8.2 Irrigation Infrastructure (Pipelines, Pumps, Filtration, Storage Tanks)

The irrigation system is designed to be **simple, robust and expandable**.

a) Pump & Filtration Unit

- A **submersible or centrifugal pump** is installed to lift water from the **stepwell** (primary storage) and/or borewell, depending on final design.
- Near the pump outlet, a **filter assembly** (sand filter + screen filter) is installed to protect the drip system from clogging.
- A small **control platform** houses:
 - Pump,
 - Motor starter,
 - Main valves and pressure gauge.

b) Mainline & Sub-mains

- **Main pipeline** (PVC/HDPE) runs from the pump along one side of the field.
- From this, **two main sub-mains** branch out:
 - One along the **outer 3 m road** (2nd square) feeding outer D-BK rings, bamboo belt and V-BK moringa ring.
 - One along the **inner 3 m road** (18th square) feeding the inner D-BK rings, Aloe and Brahmi, and the central core (nursery, vermicompost wash, etc.).

c) Drip Laterals & Emitters

- **16 mm drip laterals** laid along each D-BK ring, on the crest of the raised bed, with:
 - Emitter spacing ~30–40 cm,
 - Flow 2–4 L/hr (crop and soil dependent).
- Moringa and Guggul:
 - **2–4 emitters per tree/shrub**, positioned near the root zone.
- Brahmi (innermost ring):
 - Closer-spaced drip or low-height micro-sprinklers where more uniform wetting is needed.
- Aloe vera:
 - Drip lines between rows with 1–2 emitters per plant.

d) Overhead Storage Tank (Optional)

- A small **elevated storage tank** (e.g., 5,000–10,000 litres) near the central core can be added later for:
 - Gravity-fed emergency irrigation,
 - Mixing of liquid manures / vermiwash for fertigation.
-

8.3 Nursery & Shade-Net House (Seedling Production, Mother Blocks)

To make the unit **self-sufficient in planting material**, Sanatan Ayush Van includes a compact nursery system.

a) Nursery Location

- Part of the **30 m × 30 m central core** is earmarked as a **nursery and propagation zone**, close to:
 - Stepwell (easy water access),
 - Storage (for trays, media, etc.),
 - Solar tunnel (for initial drying of seed if needed).

b) Shade-Net House

- A **shade-net structure** of about **10 m × 10 m (100 m²)** is proposed.
- Features:
 - 30–50% shade net (depending on herb requirement).
 - Raised nursery tables or benches for seedling trays.
 - Simple misting / micro-sprinkler line for seedling irrigation.

This will be used for:

- Raising seedlings of **Kalmegh, Tulsi, Brahmi, Aloe offsets**, and any intercropped herbs.
- Temporary **hardening of tissue-culture plants**, if supplied later.

c) Mother Blocks

- Small **mother blocks** of key perennials are maintained within or near the nursery and selected D-BK segments:
 - Shatavari clumps for root division.
 - Aloe clumps for suckers.
 - Brahmi mats for stolon cuttings.
 - Selected Tulsi and Kalmegh plants for seed.

This ensures **continuous plant supply** without depending heavily on external nurseries.

8.4 Herb Drying, Sorting & Primary Processing Area

(Solar Tunnel Dryer / Drying Yard)

Sanatan Ayush Van will **not do heavy processing** like extraction or grinding. The focus is **only on drying, cleaning and basic grading**.

a) Solar Tunnel Dryer (5 m × 5 m)

- Located in the central 30 × 30 m core, as already planned.
- Key features:
 - Framed structure, UV-stabilised poly film cover.
 - Raised racks or perforated trays for keeping leaves, roots slices, cut herbs.
 - Provision for air inlets and vents for moisture escape.
- Functions:
 - Hygienic drying of **Tulsi, Kalmegh, Brahmi, Moringa leaves, Aloe flakes, small root slices**.
 - Protection from dust, insects and sudden rainfall.

b) Open Drying Yard

- An **open paved area** (e.g., 5–10 m wide strip) near the solar tunnel can be used for:
 - Sun-wilting of roots before final drying in the tunnel.
 - Temporary spreading of non-sensitive material in good weather.

c) Sorting & Primary Cleaning Zone

- A covered verandah or shaded working space next to the storage room houses:
 - Sorting tables,
 - Sieves and basic cleaning equipment,
 - Bagging/filling platform for dried herbs.

Activities here are limited to:

- Removing stones, stalks, foreign matter.
- Simple grading by size or visual quality.
- Filling into bags / cartons for dispatch to processors or Mandlik Brotherhood's next value-add point.

8.5 Storage Godown, Tool Room, Office & Training / Visitor Space

All of this sits within or just adjacent to the central 30 × 30 m core.

a) Storage Godown (5 m × 5 m)

- Used for:
 - Storing dried herbs in sealed bags / drums,
 - Storing planting material, seed, labels, packaging.
- Requirements:
 - Raised floor to avoid moisture,

- Proper ventilation,
- Rodent and insect protection (wire mesh, sealed doors).

b) Tool Room / Input Store

- Either integrated with the godown or as a small attached room/partition.
- Stores:
 - Farm tools (hoes, secateurs, sickles, pruning saws),
 - Drip repair tools, spare emitters, valves,
 - Organic inputs (GoldVermix bags, biologicals, neem cake etc.).

c) Office / Record Room

- A small **office space** (can be one part of the Karmyogi stay or separate) for:
 - Record keeping (planting dates, harvests, spray logs, stock records),
 - Meeting visitors and buyers,
 - Keeping basic IT (laptop/tablet) and documentation.

d) Training / Visitor Space

- A simple **shaded seating area** (under a tree or with a basic roof) with benches, charts and a whiteboard, used for:
 - Training farmers, FPOs, students and visitors,
 - Explaining Bhumikund design, concentric layout, herb plan and soil–water management.

This converts Sanatan Ayush Van from a farm into a **living classroom**.

8.6 Optional Renewable Add-ons

(Solar Pump, Additional Solar Tunnel Dryers, Infrared Dryers)

The base project includes one **5 m × 5 m solar tunnel dryer**. Depending on grant support and future scale, renewable add-ons can be added:

a) Solar Pump

- A **solar-powered pump** to lift water from the stepwell/borewell into the mainline or a storage tank.
- Benefits:
 - Reduced electricity cost,
 - Demonstrates clean-energy integration in a herbal project,
 - Improves reliability where grid power is unstable.

b) Additional Solar Tunnel Dryers

- If herb volume increases and demand justifies it, **one or two more solar tunnels** (each 5 m × 5 m or 5 m × 10 m) can be added along the central core edge or near the inner road.
- This allows **batch-wise drying by crop** (e.g., one tunnel only for roots, one only for leaves).

c) Small Infrared Dryer (Optional Upgrade)

- A **small-capacity infrared or hybrid dryer** can be proposed as a future add-on for:
 - Monsoon-season drying,
 - Faster drying of sensitive herbs during cloudy days.
- This will be placed in or near the storage / processing zone and run on grid/solar power, depending on budget.

All these add-ons are kept **modular**:

- The core project can run with **one solar tunnel dryer and a normal electric pump**.
- As additional grant or revenue becomes available, renewable upgrades can be added without changing the basic layout.

With Chapter 8, the physical picture of Sanatan Ayush Van is now complete:

- The **Bhumikund geometry and Shivana brick beds** give structure,
- The **stepwell + drip system** give water security,
- The **nursery, vermicompost, solar tunnel and storage** give independence.

Next, we can build the **institutional/HR and financial chapters** on top of this infrastructure skeleton.

9. Production Plan & Operational Strategy

This chapter explains **how Sanatan Ayush Van will actually run** – year by year, day by day – so that the one-hectare design becomes a **steady, predictable herbal production unit** with clean, traceable output.

9.1 Phasing of Development

(Year 1 – Establishment, Year 2 – Ramp-Up, Year 3 – Stabilised Output)

To reduce risk and avoid overloading the team in the beginning, development is done in **three phases**.

Year 1 – Establishment Phase

Main focus: build the spine, not chase maximum yield.

- Complete **land development and layout** of the 21 concentric squares (bamboo belt, roads, V-BK, 8 D-BK rings, central core).
- Construct **D-BK raised beds** with Shivana bricks and prepare soil with GoldVermix and organic matter.
- Excavate and construct the **10 m × 10 m × 5 m stepwell**.
- Build **storage room, Karmyogi stay, solar tunnel dryer**, and install the **3 m × 3 m Bhunikund Vermicomposting System**.
- Install **drip irrigation** on all D-BK rings and tree belts.
- Plant:
 - **Bamboo belt** and **86 moringa trees** in the V-BK ring.
 - **Guggul shrubs** in Ring 4.
 - First plantings of **Safed Musli, Shatavari, Ashwagandha, Kalmegh, Tulsi, Aloe vera and Brahmi** as per ring allocation.
- Establish **nursery and shade-net house**; start multiplying own planting material.

Yield in Year 1 is treated as **bonus** – main objective is to get healthy stands of all herbs and trees, and to stabilise the vermicompost and drying systems.

Year 2 – Ramp-Up Phase

Main focus: bring all rings into full cropping and refine SOPs.

- Fill any gaps in bamboo, moringa and herb stands.
- Optimise **drip scheduling**, mulching and compost use for each ring.
- Run **full cropping cycles** for:
 - Kalmegh, Tulsi, Brahmi (multiple leaf harvests).
 - Aloe vera (leaf harvesting).
 - Ashwagandha (first full root crop cycle).

- Safed Musli and Shatavari (in the beds that have completed their establishment time).
- Operate the **solar tunnel dryer** continuously during peak harvest periods with proper loading/unloading cycles.
- Start trial **batch-wise sales** of dried herbs to identified buyers, capturing feedback on quality (colour, aroma, moisture).

By end of Year 2, the project is producing **significant but still “learning-phase” output**. Operational mistakes are expected and used to refine SOPs.

Year 3 – Stabilised Output Phase

Main focus: achieve predictable, repeatable production.

- All eight D-BK rings are in **full rotation** with their assigned herbs.
- Safe, sustainable root harvesting cycles for **Safed Musli, Shatavari, Ashwagandha** are in place.
- Leaf herbs (**Kalmegh, Tulsi, Brahmi**) and **Aloe vera** follow a clear cutting schedule and drying routine.
- Moringa trees provide **steady biomass** for both leaf sale and vermicompost feed.
- The Bhumikund Vermicomposting System runs **year-round**, supplying a major share of D-BK nutrient needs.
- Quality parameters (moisture, cleanliness, foreign matter) are **standardised** and documented.

From Year 3 onward, Sanatan Ayush Van is considered to have **reached its stable production capacity**, and financial calculations in the report can use Year-3-level output as the **benchmark steady state**.

9.2 Labour Planning – Karmyogi Roles, Skills & Daily Schedules

Sanatan Ayush Van will be operated by a **small but skilled team of “Karmyogis”** (dedicated rural workers) with clear roles.

9.2.1 Core Team Structure

Indicative structure for 1 hectare:

1. **1 Unit Manager / Lead Karmyogi**
 - Education: preferably agriculture/diploma/experienced farmer.
 - Role:
 - Oversees all field operations, irrigation, inputs, labour allocation.
 - Maintains records, liaises with Mandlik Brotherhood head office and buyers.
2. **2–3 Field Karmyogis (Full-time)**
 - Role:

- Land preparation, bed maintenance, sowing, planting, weeding, mulching.
 - Applying vermicompost and organic sprays.
 - Harvesting herbs, transporting to solar dryer and storage.
3. **1 Nursery & Post-Harvest Karmyogi**
- Role:
 - Nursery management (seedlings, shade-net, mother blocks).
 - Hand sorting, cleaning and grading of dried herbs.
 - Maintaining solar tunnel, drying trays and packaging area.
4. **Seasonal Labour (as needed)**
- Engaged during peak phases of:
 - Root harvesting (Musli, Shatavari, Ashwagandha).
 - Mass cutting of leaf herbs (Tulsi, Kalmegh, Brahmi).
 - Construction/maintenance activities.

This structure can be adjusted depending on local labour availability and mechanisation choices.

9.2.2 Typical Daily Schedule

Morning (6:30–11:00)

- Field inspection: walk through D-BK rings, moringa and guggul to check soil moisture, pests, diseases.
- Irrigation (if not automated) and fertigation/vermiwash application.
- Sowing/planting/transplanting in season.
- Weeding and mulching of selected rings.

Midday (11:00–15:30)

- Lighter tasks:
 - Nursery work under shade-net.
 - Cleaning and grading of previously dried herbs.
 - Maintenance of tools, drip system, solar tunnel, storage.
 - Data entry / logbook updating by Manager.

Evening (15:30–18:30)

- Leaf harvests (Tulsi, Kalmegh, Brahmi, Moringa, Aloe) scheduled in cooler hours.
- Loading of fresh material into solar tunnel dryer.
- Checking moisture of herbs already in drying, rotating trays if required.

This rhythm changes with seasons (e.g., monsoon sowing rush, summer maintenance mode) but overall keeps the unit **fully engaged year-round**.

9.3 Standard Operating Procedures (SOPs) for Cultivation, Harvesting & Drying

To make the system replicable and trainable, simple SOPs are defined.

9.3.1 Cultivation SOP (General for D-BK Rings)

1. **Before Planting**
 - Check soil moisture and tilth.
 - Add basal dose of **GoldVermix/vermicompost** as per Chapter 7 (per 100 m²).
 - Lightly incorporate into top 20–25 cm soil.
 - Irrigate once to settle soil before sowing/planting.
2. **Sowing/Planting**
 - Use **ring-wise spacing charts** for each herb (Musli, Shatavari, Ashwagandha, etc.).
 - Use healthy seedlings/suckers from nursery; discard weak or diseased stock.
 - Ensure correct planting depth, firm but not compacted soil.
3. **In-Season Management**
 - Follow fixed schedule for **weeding, mulching, top dressing and organic sprays**.
 - Avoid walking on bed surface – use walkways only.
 - Replace any dead plants promptly to maintain stand.
4. **Pre-Harvest Check**
 - Confirm crop is at correct physiological stage (root size, leaf maturity).
 - Check weather forecast – avoid harvesting delicate leafy herbs on rainy days where possible.

9.3.2 Harvesting SOP

- **Root Crops (Safed Musli, Shatavari, Ashwagandha)**
 - Uproot carefully with hand tools to avoid root breakage and soil contamination.
 - Gently shake off soil, avoid washing in dirty water.
 - Cut off aerial parts and separate roots by size if required.
- **Leaf / Herb Crops (Kalmegh, Tulsi, Brahmi, Moringa leaves)**
 - Harvest in **morning or late afternoon**, not during midday heat.
 - Use clean, sharp secateurs or sickles.
 - Collect in clean crates/baskets, not dragged on soil.
- **Aloe vera**
 - Cut full leaves near base without damaging the crown.
 - Keep leaves pointing upwards in crates to avoid gel loss and bruising.

All harvested material is immediately transported to the **drying and sorting area**; no piles left in direct sun on bare ground.

9.3.3 Drying SOP (Solar Tunnel Dryer)

1. **Pre-Drying Preparation**
 - Remove foreign matter, yellow/rotten portions.
 - Cut roots into slices/chips where required.

- Spread herbs in a **single thin layer** on clean trays/racks.
- 2. **Loading the Tunnel**
 - Load trays in an organised manner, using ring-wise or crop-wise batch codes.
 - Ensure good air circulation between trays (do not overstack).
- 3. **Drying Duration**
 - Leaf herbs (Tulsi, Kalmegh, Brahmi, Moringa): typically 1–3 days depending on season.
 - Roots (Musli, Shatavari, Ashwagandha): 3–6 days, potentially with pre-wilting in the open.
 - Aloe flakes: careful low-temperature drying to avoid browning.
- 4. **End Point Check**
 - Leaves: crisp, stem breaks with a snap, no internal moisture.
 - Roots: firm and hard, no soft core.
 - Aloe: dry, non-sticky, stable in sealed container.
- 5. **Post-Drying**
 - Cool the dried material in shade before packing to avoid condensation.
 - Immediately move to **clean storage bags/drums** with labels.

9.4 Quality Assurance Protocols

(Harvest stage, moisture limits, cleanliness)

For AYUSH and herbal buyers, **quality and traceability are as important as quantity.**

9.4.1 Harvest Stage

- Each herb has a defined **harvest window** (days after sowing or visual markers).
Examples:
 - Ashwagandha roots: 150–180 days when roots are fully formed but not woody.
 - Kalmegh: full vegetative stage before flowering for best bitterness.
 - Tulsi: leafy stage with early flowering but before seed hardening.
 - Brahmi: healthy thick mats, not old woody growth.

These markers are written in **field SOP charts.**

9.4.2 Moisture Limits

Indicative moisture targets:

- **Dried leaves and herbs (Tulsi, Kalmegh, Brahmi, Moringa):**
 - ~8–10% moisture (crispy, no bending).
- **Dried roots (Musli, Shatavari, Ashwagandha):**
 - ~8–12% moisture (firm, non-flexible pieces).
- **Aloe flakes / chips:**
 - Stable, non-sticky, typically <10% moisture.

Moisture is checked by **simple field methods** (break test, small sample in sealed jar to watch for fogging). Where possible, spot checks using a small **digital moisture meter** can be added.

9.4.3 Cleanliness & Contaminant Control

- No drying directly on bare ground.
- No contact with lubricants, fuel, or any chemical pesticide.
- Regular cleaning of solar tunnel, racks and storage area.
- Rodent and insect control in godown using **non-chemical traps and barriers** (no poisoning that might contaminate herbs).

9.5 Record-Keeping, Traceability & Batch Documentation for AYUSH Compliance

A key strength of Sanatan Ayush Van is that it is **designed for traceability from Day 1**, not as an afterthought.

9.5.1 Basic Record System

Records maintained ring-wise:

- **Planting register**
 - Crop, variety, source of seed/planting material, date of planting, ring number.
- **Input register**
 - GoldVermix/vermicompost doses, organic sprays, biologicals applied, with dates and quantities.
- **Irrigation log** (simple, e.g. weekly summary).
- **Harvest log**
 - Date, ring, crop, quantity fresh, quantity dried, batch code.
- **Drying & storage log**
 - Dryer loading/unloading, drying times, final weights, storage location.

These can initially be paper-based and later digitised.

9.5.2 Batch Codes & Traceability

Each production lot is given a **batch code** such as:

SA-R5-KAL-2027-01

Where:

- **SA** = Sanatan Ayush Van,
- **R5** = Ring 5,
- **KAL** = Kalmegh,
- **2027** = Year,
- **01** = Batch number for that year.

This allows any buyer or auditor to trace:

- Which ring produced the batch,
- When it was planted and harvested,
- What inputs were used,
- Which drying cycle handled it.

9.5.3 Alignment with AYUSH / Pharma Requirements

While full **GMP or organic certification** may be a future step, the project will already maintain:

- **Clearly separated batches** (no mixing across harvest dates unnecessarily).
- **Ring-wise field history** (what was grown in each ring each year).
- Documented **no use of chemical pesticides and synthetic fertilisers**.
- Clean water source records for washing/dilution where required.

This documentation makes it easier later to:

- Obtain **organic certification** (PGS/NPOP) if desired.
- Align with **AYUSH and pharma procurement norms**, which increasingly demand traceability and quality documentation.

With Chapter 9, Sanatan Ayush Van is no longer just a concept drawing – it has a **time-bound production plan, a human workflow, and clear rules of operation**.

The next chapters (institutional arrangements, economics, social impact) can now sit on top of a **solid, practical operational spine**.

10. Market Analysis & Marketing Strategy

This chapter explains **who will actually buy** what Sanatan Ayush Van produces, how we will reach them, and how the project is positioned under **Mandlik Brotherhood Private Limited**.

10.1 Overview of AYUSH & Herbal Market

(India & Global Snapshot – Conceptual)

The Sanatan Ayush Van model sits inside a **fast-growing global herbal & AYUSH ecosystem**:

- In the last decade, there has been a **strong rise in demand** for:
 - Ayurvedic medicines and classical formulations,
 - Herbal nutraceuticals (stress, immunity, joint health, women’s health),
 - Herbal teas & wellness blends,
 - Clean-label, plant-based products.
- India is treated as a **natural global hub** for medicinal plants and AYUSH formulations because:
 - Rich traditional knowledge,
 - Large domestic market,
 - Strong export base for raw herbs and extracts.

Within this, companies face **two practical problems**:

1. **Consistent, traceable supply of herbs.**
 - Many herbs still come from wild collection or scattered small farmers.
 - Quality, moisture, and adulteration issues are common.
2. **Clean & organic image.**
 - Buyers want herbs grown with **minimal chemical inputs**, preferably with traceability and documentation for export or AYUSH compliance.

Sanatan Ayush Van is designed to directly address these gaps by:

- Producing a **focused set of high-demand AYUSH herbs** (Musli, Shatavari, Ashwagandha, Guggul, Kalmegh, Tulsi, Brahmi, Aloe) in a **single 1 ha, traceable, documented unit**.
 - Ensuring **clean cultivation**, on-farm vermicompost, and **controlled drying** using a solar tunnel.
 - Maintaining **ring-wise records** and batch codes for future organic / AYUSH compliance.
-

10.2 Potential Buyer Segments

Sanatan Ayush Van will target **B2B (business-to-business)** buyers rather than retail customers in the initial years.

Key segments:

1. **AYUSH & Herbal Pharma Companies**
 - Manufacturers of tablets, syrups, churnas, capsules and classical formulations.
 - They need **bulk dried roots and herbs** (Musli, Shatavari, Ashwagandha, Kalmegh, Guggul, Brahmi, Tulsi).
 - They value **consistent quality, identifiable source and documentation**.
 2. **Nutraceutical & Wellness Product Companies**
 - Formulators of products for immunity, energy, stress relief, women's health, digestion, etc.
 - Heavy users of **Ashwagandha, Shatavari, Brahmi, Aloe vera**, often in powder form.
 3. **Tea & Herbal Blend Companies**
 - Herbal tea blenders, detox tea brands, wellness drink companies.
 - Interested in **Tulsi, Kalmegh, Brahmi, Moringa leaf, Lemongrass-type materials** (even if grown later in the system).
 4. **Herbal Extractors & Contract Manufacturers**
 - Units that produce standardised extracts for export or for domestic formulation companies.
 - Require **clean, pesticide-free raw herb feedstock** in bulk.
 5. **Exporters & Trading Companies**
 - Firms that aggregate herbs from multiple farms and export to international buyers.
 - Sanatan Ayush Van can act as a **reliable, documented, small but high-quality origin** supplying selected items regularly.
 6. **Wellness, Panchakarma & Ayurvedic Resorts / Clinics**
 - These units may not buy in tonnes but want **small, premium, traceable lots** of herbs and fresh Aloe/Moringa for their own in-house preparations, oils and decoctions.
 7. **FPOs & Farmer Networks**
 - Farmer Producer Organisations working in medicinal plants who may want:
 - **Planting material (nursery plants)**,
 - Training & exposure visits,
 - Joint marketing or collective brand building.
-

10.3 Product Portfolio

The project will keep the **processing level low** (no extraction, no grinding in this phase) and focus on **clean primary products** plus experience-based offerings.

1) Bulk Dried Herbs (Primary Focus)

- **Roots & tubers:**

- Safed Musli (dried peeled roots)
- Shatavari (dried roots)
- Ashwagandha (dried roots)
- **Leaf/herb materials:**
 - Kalmegh (dried aerial herb)
 - Tulsi (dried leaves and tops)
 - Brahmi (dried herb)
 - Moringa leaves (dried)
- **Fleshy leaf product:**
 - Aloe vera – initially **fresh leaves**; later, small-scale dried flakes or chips if feasible through the solar tunnel.

These are sold in **bulk bags (e.g., 25–50 kg)** to B2B buyers.

2) Cut–Sifted (CS) Grades

- For some herbs, a second level is possible:
 - Dried roots cut into uniform chips/slices.
 - Dried leaves sifted to remove fines/dust and large stalks.
- This “cut-sifted” grade improves consistency and commands slightly better prices.

3) Powders (Limited, Later-Phase Option)

- Basic powdering (without branding) can be added later by:
 - Partnering with a **GMP herbal processing unit**, or
 - Using a simple pulveriser under clean conditions (if added in future CAPEX).
- Powders (Musli, Ashwagandha, Shatavari, Moringa, Brahmi) can then be sold B2B or to Mandlik Brotherhood for further packaging.

4) Nursery Plants & Planting Material

- Sale of **nursery plants** and **root/sucker divisions** of:
 - Shatavari, Aloe vera, Brahmi, Tulsi, etc.
- These can be supplied to nearby farmers, FPOs and partner projects replicating the Sanatan Ayush Van model.

5) Experience & Learning-Based Offerings

Sanatan Ayush Van is also a **demonstration and training space**:

- **Field visits & exposure programmes** for:
 - Farmers, FPOs, students, NGOs, CSR teams, AYUSH practitioners.
- **Paid training workshops** on:
 - Bhumikund design, vermicomposting, organic herbal cultivation, solar drying.
- **Experience tourism** (in simple form):
 - Guided tours, “Guardian of the Healing Forest” experience days, small groups.

Over time, these can become a **separate revenue stream** and strengthen brand visibility.

10.4 Branding & Positioning – Sanatan Ayush Van under Mandlik Brotherhood

Sanatan Ayush Van is not a standalone entity; it is a **flagship herbal project under Mandlik Brotherhood Private Limited.**

Branding Logic:

- **Umbrella Brand:**
 - **Mandlik Brotherhood Pvt. Ltd.** – known for:
 - The Soil Generation Project,
 - GoldVermix vermicompost,
 - Sanatan Krishi Van,
 - Guardian of the Organic Farm,
 - Shivana Bricks and Bhumikund systems.
- **Project Brand:**
 - **Sanatan Ayush Van – Guardian of the Healing Forest**
 - A “sister project” to Sanatan Krishi Van but focused on **AYUSH & medicinal herbs.**

Positioning Themes:

1. **“From Soil Generation to Patient Generation”**
 - Emphasising that the herbs are grown on **regenerated soil** with in-house vermicompost (Bhumikund system + GoldVermix).
2. **“One-Hectare Traceable Healing Forest”**
 - A precise, single identifiable unit with **ring-wise traceability, batch coding and clean cultivation.**
3. **“Guardian of the Healing Forest”**
 - A resident Karmyogi living on-site, responsible for **both ecology and quality,** not just yield.
4. **“Sanatan Principles, Modern Compliance”**
 - Traditional plant wisdom + modern documentation, drying and record-keeping.

Branding will use:

- Consistent logo-family with Mandlik Brotherhood.
 - Visuals of **concentric rings, stepwell, solar dryer, and herbs.**
 - Storytelling linking **soil, water, plant, healer and patient** in one chain.
-

10.5 Go-to-Market Channels

Given the 1 ha scale, the strategy focuses on **higher-value, direct or semi-direct B2B channels,** not commodity mandis.

1) Direct B2B to AYUSH & Herbal Pharma

- Approach selected companies who use **Musli, Shatavari, Ashwagandha, Kalmegh, Tulsi, Brahmi, Aloe** as bulk raw materials.
- Offer:
 - Small to medium lots (e.g., 100–500 kg per item per season),
 - Pre-samples with COAs (from third-party labs if needed),
 - Documentation showing **origin and organic-style management**.

2) Tie-ups with Extractors / Contract Manufacturers

- Supply clean dried herb feedstock to **extract manufacturers** who already export or supply big brands.
- This can reduce marketing load initially while ensuring steady offtake.

3) FPO & Farmer Network Collaborations

- Use FPO networks to:
 - Aggregate volumes from any future replicated units of Sanatan Ayush Van,
 - Negotiate better prices with larger buyers,
 - Share nursery and training services.

4) Online & Digital Presence (B2B-Focused)

- Showcase Sanatan Ayush Van on:
 - Mandlik Brotherhood website,
 - GoldVermix / Sanatan Krishi Van ecosystem pages.
- Use digital brochures, short films, and virtual tours to impress **CSR arms, investors, and buyers**.
- Select B2B platforms (IndiaMart-style or specialised herbal platforms) can list the **key herbs** with clear description of origin and farming method.

5) Experience & Training-Based Marketing

- Invite **potential buyers, doctors, researchers and CSR teams** to visit the site.
- Many B2B buyers trust a supplier more after seeing:
 - Real fields,
 - Real workers,
 - Clear structure and records.

10.6 Pricing Assumptions & Value Addition Pathways

This section sets **principles**, not fixed rates (actual prices will change with market).

1) Pricing Assumptions (Conceptual)

- Sanatan Ayush Van will aim to sell **slightly above bulk mandi rates** because it offers:

- Cleaner cultivation,
- Better drying,
- Traceability and documentation.
- Price setting will consider:
 - Prevailing mandi/export rates for each herb,
 - Extra cost of solar drying, grading and record-keeping,
 - The “premium” for documented chemical-free production.

In the financial chapter, we will use **conservative per-kg prices** so that the project remains viable even without high premiums.

2) Value Addition Pathways (with rising complexity)

Stage-wise thinking:

- **Stage 1 – Bulk Dried Herbs, Clean but Simple**
 - Sell sun/solar-dried roots and herbs in bulk.
 - Basic sorting, minimal branding.
 - This is the **base layer** of revenue.
- **Stage 2 – Cut–Sifted & Better-graded Lots**
 - Offer **root slices/chips**, cut-sifted leaves, and better visual grading.
 - Slightly higher per-kg rate, more attractive to serious buyers.
- **Stage 3 – Powder & Pre-Mix Supply (B2B)**
 - Under partnership with a compliant grinding unit or with own small pulveriser:
 - Supply powders (Ashwagandha, Brahmi, Moringa, Musli) to companies or Mandlik Brotherhood sub-brands.
 - Create **ready-to-use blends** (e.g., “Stress Support Mix”, “Women’s Health Mix”) as B2B ingredients.
- **Stage 4 – Packaged SKUs (D2C, later)**
 - If Mandlik Brotherhood chooses, it can develop:
 - 100 g / 250 g packs of **single-herb powders** (Ashwagandha, Moringa, Brahmi, Shatavari).
 - Small pouches of **herbal tea blends** using Tulsi, Brahmi, Moringa, etc.
 - These would require:
 - Branding work,
 - FSSAI / AYUSH compliance for finished products,
 - Strong retail / online marketing.

3) Strategic Choice for this Project Report

For the purpose of **this grant-focused project report**, Sanatan Ayush Van is positioned at:

- **Stage 1 and Stage 2** (bulk dried + cut–sifted herbs, nursery plants & experience services).
- **Stage 3–4** kept as **future expansion** once stable production and buyer relationships are established.

In simple terms:

- Chapter 10 says:
 - There is **real and growing demand** for exactly the herbs Sanatan Ayush Van plans to grow.
 - The project will start with **clean bulk B2B herbs**, backed by traceability and demonstration value.
 - Mandlik Brotherhood's existing ecosystem (Soil Generation, GoldVermix, Sanatan Krishi Van) gives Sanatan Ayush Van a **strong brand backbone and marketing support**.

This sets the stage for the next chapters, where we quantify **financials, social impact and sustainability**, turning this herbal forest concept into a fundable rural development project.

11. Financial Analysis

This chapter presents the **capital cost**, **operating cost**, and **revenue potential** of the 1-hectare Sanatan Ayush Van unit, incorporating:

- Intensive organic management,
- In-house Bhumikund vermicompost,
- High-value medicinal herbs in Dhanya Bhumikund (D-BK),
- Moringa leaf and drumstick production in the Vrix Bhumikund (V-BK),
- Nursery and training-based income.

All calculations are based on the **final concentric layout** and the **crop plan** already defined in previous chapters.

11.1 Capital Investment (CAPEX)

The Sanatan Ayush Van unit is **infrastructure-heavy by design**. It prioritises long-life assets:

- Stepwell for water security,
- Permanent Shivana brick Bhumikund structures,
- Central core buildings for storage and Karmyogi stay,
- Drip irrigation, nursery and solar tunnel dryer.

11.1.1 Shivana brick requirement and cost

From the Bhumikund design and ring-wise layout:

- **Total Shivana bricks for all Bhumikund structures**
(D-BK rings + V-BK moringa basins): **4,49,800 bricks**

Planning cost per brick:

- **₹6 per Shivana brick**

So, direct brick cost:

- $4,49,800 \times 6 = \mathbf{₹26,98,800} \approx \mathbf{₹27.0 \text{ lakh}}$

This does not include labour, foundations and finishing; those are added separately.

11.1.2 CAPEX components (summary)

Sr	Component	Amount (₹ lakh)
1	Land development, layout & micro-levelling	4.0
2	Bhumikund structures (Shivana bricks + labour, foundations, finishing)	30.0
3	Stepwell (10 m × 10 m × 5 m; excavation + masonry/RCC + parapet)	12.0
4	Central core buildings (Karmyogi stay, storage godown, office, work slab)	10.0
5	Irrigation system (pump, mainline, sub-mains, drip, filters, valves)	5.0
6	Nursery & shade-net structure (~100 m ²)	2.0
7	Solar tunnel dryer (5 m × 5 m)	4.0
8	Bhumikund Vermicompost unit (3 m × 3 m)	1.5
9	Fencing, live hedges & main gate	4.0
10	Tools, crates, instruments	1.5
11	Pre-operative expenses & contingency	7.0
	Total Capital Investment (rounded)	₹81.0 lakh

11.1.3 Financing structure (conceptual)

- **Grant requested (rural upliftment / CSR / scheme): ₹40.0 lakh**
- **Promoter + loan contribution (Mandlik Brotherhood & partners): ₹41.0 lakh**

The grant is used primarily for:

- Brick-based Bhumikund infrastructure,
- Stepwell and water system,
- Solar dryer and training-enabling infrastructure.

The promoter side completes the system and manages ongoing operations.

11.2 Operating Cost (OPEX)

Once the unit is fully established and running at high intensity (post Year 3), the annual operating cost reflects:

- Skilled local Karmyogis,
- Organic inputs and internal vermicompost operations,
- Regular post-harvest handling, drying, sorting and packaging,
- Maintenance of the drip system, structures and stepwell.

11.2.1 Steady-state OPEX (Year 3 onwards)

a) Labour (Karmyogis + seasonal workers)

- 1 Unit Manager / Lead Karmyogi (on-site supervisor)
- 2 core Karmyogis (field + nursery + post-harvest)
- Additional seasonal labour for peak planting/harvest and sorting

Indicative cost:

- Core staff (3 full-time equivalents, blended): ~₹3.0 lakh/year
- Seasonal labour (harvest, weeding bursts, extra sorting): ~₹0.5 lakh/year

Total labour cost: ₹3.5 lakh/year

b) Organic inputs, consumables & packaging

Even with strong in-house vermicompost production, some items are still needed:

- Seed and planting material top-ups,
- Specific bio-inputs (biofertilisers, biopesticides, botanicals),
- Packaging materials (bags, liners, labels) for herb dispatch,
- Small tools and replacement of nursery trays, etc.

Approximate cost: ₹1.5 lakh/year

c) Energy & utilities

- Electricity or diesel for pump operation,
- Limited lighting for storage, office and working area,
- Occasional power needs for small equipment.

Approximate cost: ₹0.4 lakh/year

d) Repairs, maintenance & testing

- Drip repairs, filter media replacements, valve replacements,
- Minor brickwork/bond repairs and maintenance of buildings,
- Regular soil, water and product testing at accredited labs.

Approximate cost: ₹0.7 lakh/year

e) Administration, local travel & miscellaneous

- Local travel for buyer and institutional meetings,
- Stationery, record-keeping, phone/internet for documentation,
- Tea/snacks and basic hospitality for training batches.

Approximate cost: ₹0.4 lakh/year

11.2.2 OPEX summary

Sr	Cost Head	Amount (₹ lakh/year)
1	Labour (core + seasonal)	3.5
2	Organic inputs, packaging & nursery consumables	1.5
3	Energy (pump, basic lighting)	0.4
4	Repairs, maintenance & lab testing	0.7
5	Admin, local travel & miscellaneous	0.4
	Total OPEX at full intensity	₹6.5 lakh/year

This **₹6.5 lakh/year** is used as the steady-state operating cost at high-capacity utilisation.

11.3 Production & Sales Projections (5-Year Outlook)

This section recalculates the **full production capacity** of Sanatan Ayush Van with:

- **33% higher yields** for all herbs due to regenerative organic practices and Bhumikund vermicomposting,
- **Moringa leaves at 100 kg fresh/tree/year** (approximately 20 kg dried/tree after 5:1 drying),
- **Additional income from drumstick pods** on the same trees,
- Updated **farm-gate prices**.

11.3.1 Final herb-wise areas (D-BK rings)

Total Dhanya Bhumikund area = **3,616 m²**, allocated as:

Herb	D-BK Rings	Area (m ²)
Safed Musli	Rings 5 & 19	880
Shatavari	Ring 7	576
Ashwagandha	Ring 9	528
Kalmegh	Ring 11	480
Tulsi	Ring 13	432
Brahmi	Ring 15	384
Aloe vera	Ring 17	336
Total		3,616

11.3.2 Yield assumptions

Base yields (Year 3+), updated for organic boost:

- **Safed Musli (dry roots)**
 - 117.04 kg/year

- **Shatavari (dry roots)**
 - 61.29 kg/year
- **Ashwagandha (dry roots)**
 - 42.13 kg/year
- **Kalmegh (dry herb)**
 - 127.68 kg/year
- **Tulsi (dry herb)**
 - 103.42 kg/year
- **Brahmi (dry herb)**
 - 91.93 kg/year
- **Aloe vera (fresh leaves)**
 - 2,681.28 kg/year

Moringa (V-BK ring):

- 86 moringa trees.
- You have fixed **100 kg fresh leaves/tree/year** (under intensive management).
- Drying ratio ~5:1 → **20 kg dried leaves/tree/year**.
- Annual dried leaf output: $86 \times 20 = 1,720$ kg/year.

Drumstick pods per tree (additional):

- Assumption: with integrated leaf + pod management, each tree yields ~**30 kg fresh pods/year**.
- Total pod output: 86×30 kg = **2,580 kg fresh pods/year**.

11.3.3 Price assumptions (farm-gate, B2B)

- **Safed Musli (dry): ₹3,990/kg**
- **Shatavari (dry): ₹1,064/kg**
- **Ashwagandha (dry): ₹665/kg**
- **Kalmegh (dry herb): ₹399/kg**
- **Tulsi (dry herb): ₹465.5/kg**
- **Brahmi (dry herb): ₹425.6/kg**
- **Moringa dried leaves: ₹465.5/kg**
- **Aloe vera fresh leaves: ₹50/kg**
- **Drumstick pods (fresh): assumed ₹35/kg farm-gate**

11.3.4 Herb-wise annual revenue at full production capacity

D-BK herbs

Herb	Output (kg/year)	Price (₹/kg)	Revenue (₹/year)
Safed Musli	117.04 (dry)	3,990	4,66,989.60
Shatavari	61.29 (dry)	1,064	65,208.73
Ashwagandha	42.13 (dry)	665	28,019.38
Kalmegh	127.68 (dry)	399	50,944.32
Tulsi	103.42 (dry)	465.5	48,142.38

Herb	Output (kg/year)	Price (₹/kg)	Revenue (₹/year)
Brahmi	91.93 (dry)	425.6	39,125.24
Aloe vera	2,681.28 (fresh)	50	1,34,064.00

Total D-BK herb revenue \approx ₹6.33 lakh/year

Moringa leaves (V-BK)

- Dried leaves: **1,720 kg/year**
- Price: **₹465.5/kg**

Revenue:

- $1,720 \times 465.5 =$ **₹8,00,660/year**

Drumstick pods (from same trees)

- Fresh pods: **2,580 kg/year**
- Price: **₹35/kg**

Revenue:

- $2,580 \times 35 =$ **₹90,300/year**

11.3.5 Total farm-level product revenue

- D-BK herbs: **~₹6.33 lakh**
- Moringa dried leaves: **~₹8.01 lakh**
- Drumstick pods: **~₹0.90 lakh**

Total farm product revenue \approx ₹15.24 lakh/year at full organic capacity.

11.3.6 Nursery and training revenue

In addition, the unit functions as:

1. **Nursery & planting material source** – Shatavari root splits, Aloe offsets, Brahmi mats, Tulsi seedlings, Moringa saplings, etc.
 - Conservative estimate: **₹0.30 lakh/year**
2. **Training / exposure site** – for farmers, FPOs, students, CSR teams and AYUSH institutions.
 - Conservative estimate: **₹0.30 lakh/year**

Total service income (nursery + training) \approx ₹0.60 lakh/year

11.3.7 Overall annual revenue at full capacity

Combining all:

- Farm products (herbs + moringa leaves + pods): \approx ₹15.24 lakh/year
- Nursery + training: \approx ₹0.60 lakh/year

✓ **Total annual revenue at full production capacity \approx ₹15.8–16.0 lakh/year**

(To keep the chapter simple, we can round and use **₹16.0 lakh/year** as the “maximum capacity” revenue benchmark.)

11.4 Profitability Analysis

11.4.1 Operating margin at steady state

Using:

- **Full-capacity revenue:** \approx ₹16.0 lakh/year
- **Steady-state OPEX:** \approx ₹6.5 lakh/year

Then:

- **Operating surplus:** $16.0 - 6.5 =$ ₹9.5 lakh/year
- **Operating margin:** $9.5 / 16.0 \approx$ 59–60%

This high margin is a result of:

- Very high value per kg for certain herbs (Musli, Moringa leaves),
- Efficient nutrient cycling due to self-produced vermicompost,
- One-time heavy CAPEX (bricks, stepwell) already sunk and not counted in OPEX.

For **planning purposes**, you may also present a **conservative scenario** at say **80% of full capacity**:

- Revenue @ 80% $\approx 0.8 \times 16.0 =$ ₹12.8 lakh/year
- OPEX at this level \approx ₹6.0 lakh/year (slightly lower than the 100% case)
- Surplus \approx ₹6.8 lakh/year
- Margin \approx 53%

This dual view (maximum capacity vs conservative capacity) will make the project **credible** to reviewers.

11.4.2 Payback perspectives

On total project cost (₹81 lakh)

If the unit eventually operates near **full capacity**, with \sim ₹9.5 lakh surplus/year:

- Simple payback on total CAPEX $\approx 81 / 9.5 \approx 8.5$ years

On promoter + loan portion (₹41 lakh)

Since ₹40 lakh is sought as a **grant**, the real at-risk capital for MBPL and financing partners is ~₹41 lakh.

- Payback $\approx 41 / 9.5 \approx 4.3$ years (full-capacity scenario)
- In the conservative 80% capacity scenario (surplus ~₹6.8 lakh/year), payback $\approx 41 / 6.8 \approx 6.0$ years

This clearly shows:

- For the **grant provider** – their support capitalises a complex, long-life rural asset.
- For **MBPL and any lenders** – the model is **financially viable** after stabilisation, not just a demonstration farm.

11.5 Break-Even Point & Capacity Utilisation

To understand operational risk, we evaluate break-even in terms of annual revenue.

At steady state (100%):

- Revenue \approx ₹16.0 lakh
- OPEX \approx ₹6.5–7.0 lakh (we take ₹7.0 lakh for break-even thinking)

We can conceptually split OPEX into:

- **Fixed-like costs:** core labour, basic maintenance, admin
→ approximately ₹4.0 lakh/year
- **Variable-like costs:** inputs, extra seasonal labour, energy increasing with output
→ approximately ₹3.0 lakh/year at full capacity

Contribution at 100%:

- Contribution = Revenue – variable costs
= 16.0 – 3.0 = ₹13.0 lakh

Contribution margin ratio:

- $13.0 / 16.0 \approx 81\%$

Break-even revenue:

- Fixed costs / contribution margin
= $4.0 / 0.81 \approx$ ₹4.9 lakh/year

So:

The Sanatan Ayush Van unit reaches **operational break-even** at roughly **₹5.0 lakh/year** in revenue.

In terms of capacity utilisation:

- Break-even revenue (~₹5 lakh) is about **31–35% of maximum capacity** (because 35% of 16 ≈ 5.6).
 - Beyond ~40% capacity, the unit consistently generates **positive operating surplus**.
-

11.6 Sensitivity Analysis

To understand robustness, we test the model against changes in:

- Prices,
- Yields,
- Input costs.

11.6.1 Price sensitivity

Because key herbs (Musli, Moringa leaves, Shatavari) and drumsticks are high value crops, market price shifts can significantly move surplus.

- **Scenario A – 20% drop in average realisation prices**
 - Maximum-capacity revenue: $16.0 \times 0.8 = \mathbf{₹12.8 \text{ lakh/year}}$
 - OPEX (near full intensity): $\approx \mathbf{₹6.5 \text{ lakh/year}}$
 - Surplus $\approx \mathbf{₹6.3 \text{ lakh/year}}$

→ The unit still remains **profitable**, even with a substantial price drop.

- **Scenario B – 10% increase in prices (quality and branding premiums)**
 - Revenue: $16.0 \times 1.10 = \mathbf{₹17.6 \text{ lakh/year}}$
 - OPEX: $\approx \mathbf{₹6.7 \text{ lakh/year}}$
 - Surplus $\approx \mathbf{₹10.9 \text{ lakh/year}}$

→ Demonstrates strong upside potential if Sanatan Ayush Van builds direct relationships with quality-conscious buyers.

11.6.2 Yield sensitivity

Given the 33% uplift assumed for organic practice and vermicompost, it is prudent to consider:

- If actual yields are **10–15% below these targets** (learning curve, climate stress), then full-capacity revenue may effectively behave like **85–90% of the current estimate**, i.e.:
 - Revenue $\approx \mathbf{₹13.6–14.4 \text{ lakh/year}}$

- With OPEX \approx ₹6.0–6.5 lakh/year, surplus remains in the range of ₹7.0–8.0 lakh/year.

The Bhumikund structure and internal vermicompost system also tend to **stabilise yields over time**, by improving soil structure and water retention.

11.6.3 Input cost and wage sensitivity

If over a few years:

- Labour wages rise by 20%, and
- Organic input and packaging costs rise by 15%,

then steady-state OPEX might move from ₹6.5 lakh towards ₹7.5–8.0 lakh/year.

Even then, using conservative revenue (say ₹13.5–14.0 lakh/year), annual surplus remains ~₹5.5–6.0 lakh/year, which is still healthy for a 1-hectare rural unit.

11.6.4 Strategic mitigation

Key strategies to maintain resilience:

- **Direct B2B linkages** with a few stable herbal / AYUSH buyers who value traceable supply.
- **Rotation within herb families** inside D-BK rings if any one crop faces disease or market issues.
- **Leveraging nursery and training income** to stabilise cashflows.
- Positioning Sanatan Ayush Van as a **demonstration-cum-production hub**, not just a commodity farm.

Summary of Chapter 11

After incorporating:

- Higher yields from strong organic management and in-house vermicompost,
- 100 kg fresh Moringa leaves per tree with drying and pricing,
- Additional income from drumsticks,
- Updated prices for all herbs and Aloe,

Sanatan Ayush Van (1 hectare) emerges as:

- **Capital intensive** (₹81 lakh total CAPEX with ₹40 lakh grant ask),
- **Operationally sound**, with steady-state OPEX \approx ₹6.5 lakh/year,
- **High-value producing**, with realistic full-capacity revenue \approx ₹16.0 lakh/year,
- **Surplus generating**, with annual operating surplus of ₹7–9.5 lakh/year, depending on capacity and market conditions.

It is therefore both:

- A **serious rural upliftment project** (water, soil, biodiversity, skills), and
- A **financially viable medicinal herb enterprise** when supported by one-time grant capital and managed by Mandlik Brotherhood as the “Guardian of the Healing Forest.”

12.Social, Environmental & Educational Impact

Sanatan Ayush Van is not just a “1-hectare herbal farm”.

It is designed as a **rural transformation unit** – creating work, rebuilding soil, reviving traditional herbal knowledge, and serving as a live classroom for farmers, youth and institutions.

This chapter explains *what changes on the ground* when this project runs at full strength.

12.1 Employment & Skill Development for Local Youth / SC Entrepreneurs

Sanatan Ayush Van directly and indirectly creates **dignified rural work** around Gandhinagar district.

12.1.1 Direct employment at the unit

At full operation, the 1-hectare unit requires:

- **1 Unit Manager / Lead Karmyogi**
 - Responsible for overall crop planning, labour management, record-keeping and buyer interactions on site.
- **2 full-time Karmyogis**
 - Working in Bhumikund beds, moringa V-BK, vermicomposting, nursery and post-harvest.
- **Seasonal workers (men and women)**
 - For peak activities: transplanting, weeding, harvesting, sorting, drying.

Across the year, this translates into:

- **3–4 full-time equivalent livelihoods,**
- **Plus hundreds of person-days of seasonal work** (for landless labourers, small farmers, women).

The work here is **up-skilled** compared to ordinary farm labour. Karmyogis learn:

- Drip irrigation operation and maintenance,
- Organic herb cultivation (not just generic crops),
- Handling of solar tunnel dryers and post-harvest hygiene,
- Vermicompost management and on-farm nutrient cycling,
- Basic documentation and traceability for AYUSH / herbal buyers.

This builds a **core group of trained rural technicians** who can later manage similar 1-hectare units, offer services to other farmers, or become supervisors in larger herbal clusters.

12.1.2 Inclusion of local youth and SC entrepreneurs

The project consciously positions itself as a **launchpad for first-generation rural entrepreneurs**, including those from SC and other marginalised communities, by:

- Offering **real management responsibility** to a local Unit Manager,
- Creating room for **equity participation or revenue-sharing models** in future replication units,
- Providing **hands-on business exposure** – pricing, buyer negotiation, quality commitment – not just wage labour.

As Mandlik Brotherhood scales Sanatan Ayush Van into a **cluster model**, local youth who trained in this first unit become the **natural franchise managers / project leaders** for future 1-hectare Ayush Vans on other farmers' lands.

12.1.3 Opportunities for women

Women are especially well suited for:

- Nursery work (seedling care, potting, transplanting),
- Herb harvesting (proper cut, minimal damage),
- Sorting, grading and light packaging,
- Preparation of simple herbal value-added products (when introduced later).

The project can deliberately target **30–40% of workdays for women workers**, which:

- Adds a steady income stream to households,
- Builds **technical confidence** of women in herbal cultivation and organic methods,
- Strengthens their role in family decision-making around cropping and health.

12.2 Soil Health, Biodiversity & Carbon Sequestration Benefits

Sanatan Ayush Van is literally built around **soil and water regeneration**.

12.2.1 Soil regeneration through Bhumikund & vermicompost

The design uses:

- **Bhumikund raised beds (D-BK)** built with Shivana interlocking bricks,
- **On-site Bhumikund vermicompost system**, and
- Regular use of **GoldVermix-type organic manure** and bio-inputs.

This leads to:

- Increased **soil organic carbon** over time,
- Improved **soil structure and aeration**,
- Better **water-holding capacity**, reducing irrigation frequency,
- A thriving **soil micro-organism community**, essential for nutrient cycling.

Over 3–5 years, these changes:

- Stabilise yields (even in tough years),
- Reduce the need for external inputs,
- Turn the 1-hectare unit into a **reference plot for healthy soil**.

12.2.2 Biodiversity in a 1-hectare herbal forest

Even on just 1 hectare, the concentric design creates **multiple micro-habitats**:

- Outer bamboo ring (windbreak + biomass source),
- Moringa V-BK ring (tree layer, flowers for pollinators, pods for food),
- Multiple D-BK rings with different Ayurvedic herbs (roots, shrubs, leafy herbs, succulents like Aloe),
- Central stepwell and surrounding moist zone (microclimate, bird and insect life).

This diversity:

- Attracts and supports **pollinators** (bees, butterflies, beneficial insects),
- Hosts **beneficial predators** (ladybirds, spiders, birds) that help natural pest regulation,
- Reduces the risk that one pest or disease can wipe out the whole unit,
- Creates a **small but intense sanctuary of medicinal biodiversity** inside agricultural landscape.

12.2.3 Carbon and water benefits

Key environmental benefits include:

- **Carbon sequestration**
 - In soil (through organic matter build-up),
 - In biomass (bamboo, moringa, hedges, perennial herbs).
- **Water recharge**
 - Through the stepwell and careful runoff management inside the 1-hectare plot,
 - Increased infiltration due to high organic matter and permanent bed structures.

In effect, Sanatan Ayush Van behaves like a **living carbon-and-water bank**: storing carbon in soil and vegetation, and directing rainwater back into the ground rather than losing it as fast runoff.

12.3 Conservation of Sanatan Herbal Knowledge & Local Ethno-botany

The name “**Sanatan Ayush Van – Guardian of the Healing Forest**” is not a slogan. The project is purposely designed to **hold, display and practice** traditional herbal wisdom in a modern, structured farm.

12.3.1 Living repository of classical herbs

The crop mix – Safed Musli, Shatavari, Ashwagandha, Kalmegh, Tulsi, Brahmi, Aloe vera, Moringa and Guggul – reflects:

- Classical **Ayurvedic pharmacopeia**,
- Locally used **home remedies** (e.g., Tulsi, Aloe, Moringa),
- High-value **pharma and wellness plants** that bridge folk uses and industrial formulations.

Instead of herbal knowledge being limited to **loose mentions in texts or elders’ memories**, Sanatan Ayush Van turns it into a **visible, touchable, cultivable landscape**.

12.3.2 Documentation of local knowledge

As the project runs, Mandlik Brotherhood can:

- Record local names and uses of plants from elders, traditional healers and farmers,
- Document **observation-based insights** – which herb thrives in which ring, soil moisture, shade level, etc.,
- Compile **simple bilingual material** (Gujarati + English/Hindi) on each herb’s cultivation and primary uses.

This makes the unit a **bridge between ancient Sanatan herbal knowledge and modern learners**:

- Students,
- Young farmers,
- Urban visitors trying to reconnect with plant-based health.

12.3.3 Respectful use, not exploitation

Sanatan Ayush Van is deliberately structured as:

- An **ethical cultivation model**, not a wild extraction project from forests,
- A place where **conservation and cultivation go together**.

By growing herbs systematically, the project **reduces pressure on wild populations** and shows a path to **sustainable herbal supply** that respects both nature and tradition.

12.4 Role as a Demonstration & Training Hub for AYUSH & Organic Farming

The 1-hectare unit is deliberately designed as a “**show-and-teach**” farm.

12.4.1 On-field demonstration themes

Visitors to Sanatan Ayush Van can see:

- How to design a **concentric, multi-layered herbal system** on 1 hectare,
- How Bhumikund raised beds and vermicomposting work together,
- Drip-irrigated herb production with **high value per square meter**,
- Safe organic pest management using herbal extracts and biologicals,
- Solar tunnel drying and basic post-harvest handling of herbs.

Each visit can be structured around **practical modules**, for example:

- “How to plan 1 acre of medicinal herbs”,
- “How to build and operate a Bhumikund vermicompost unit”,
- “How to dry herbs properly to meet buyer standards”.

12.4.2 Target groups for training

The farm can host:

- **Farmers and FPO members** interested in diversifying into herbs,
- **Rural youth** looking for new-age agriculture enterprises,
- **Women SHGs** exploring herb-based income and kitchen remedies,
- Students from **AYUSH colleges, agriculture universities, KVKs**,
- CSR teams and NGOs who want **model projects** to support and replicate.

For each group, training content can be customised:

- Technical focus for farmers,
- Entrepreneurship and costing focus for youth,
- Health, home remedies and nutrition focus for women and urban visitors.

12.4.3 Building a cadre of “Ayush Van Karmyogis”

Over time, those who train and intern here can be:

- **Certified informally** as “Ayush Van Karmyogis” or “Herbal Bhumikund Managers”,
- Linked to future projects as unit managers, field trainers or field consultants,
- Encouraged to set up their own **mini herbal plots** at home or in their village.

Thus, Sanatan Ayush Van becomes not only a **farm**, but a **school and launching pad** for the next generation of herbal farmers and technicians.

12.5 Contribution to State & National Missions (Organic, AYUSH, Medicinal Plants)

Sanatan Ayush Van sits naturally at the intersection of multiple **state and national priorities**.

12.5.1 Alignment with AYUSH vision

Schemes and institutions promoting **Ayurveda, Yoga, Unani, Siddha and Homeopathy** need:

- Reliable, traceable, residue-safe herb supply,
- Demonstration sites that show **how to produce herbs organically**,
- Models that can be replicated via clusters and FPOs.

Sanatan Ayush Van:

- Produces **multiple key AYUSH herbs** in one integrated unit,
- Maintains **batch-wise traceability and documentation**,
- Can support **contract cultivation linkages** or buy-back arrangements in future.

12.5.2 Support to Organic & Natural Farming Missions

The project's core methods are:

- No synthetic fertilisers or pesticides,
- Vermicompost-based nutrient cycling,
- Use of Bhumikund structures and mulching for moisture conservation,
- Use of herbal extracts / biocontrol agents for pests.

This directly contributes to:

- State-level **organic farming policies**,
- National efforts towards **chemical-free farming**,
- Models for **regenerative agriculture** in semi-arid, irrigated zones of Gujarat.

The 1-hectare unit becomes a “**module**” that can be multiplied into:

- 5-hectare blocks,
- 125-hectare food forest clusters,
- Or distributed 1-hectare units across a district via FPO networks.

12.5.3 Medicinal plant boards and biodiversity targets

By cultivating priority medicinal species, the project:

- Supports the goals of **medicinal plant boards** and biodiversity authorities,
- Reduces dependence on wild collection,
- Provides a platform to test **new varieties, spacing and organic protocols** under real field conditions.

Over time, Sanatan Ayush Van can contribute **data and learnings** useful for:

- Policy refinement on herbal farming,
- Region-specific cropping recommendations,
- Climate-resilient herbal production systems.

12.5.4 CSR and social impact integration

For CSR and philanthropic partners, the project offers:

- **Clear social indicators:**
 - Number of rural youth / women trained,
 - Jobs created,
 - Income increase for participating families.
- **Clear environmental indicators:**
 - Area under organic herbal cultivation,
 - Number of perennial trees planted,
 - Stepwell water storage and recharge impact.
- **Clear educational indicators:**
 - Number of exposure visits,
 - Number of training programmes conducted,
 - Number of FPOs / SHGs linked.

This makes Sanatan Ayush Van a **high-clarity, measurable CSR investment** – combining livelihood, environment and heritage into one living project.

In summary, Sanatan Ayush Van is not just profitable in rupee terms.

It creates **good work**, rebuilds **living soil**, protects and practises **Sanatan herbal wisdom**, and stands as an open **demonstration farm and training hub** that fits cleanly under state and national missions in organic farming, AYUSH and medicinal plants.

It is, in every sense, a **Guardian of the Healing Forest** and a prototype for a new generation of rural development projects.

13. Risk Analysis & Mitigation Plan

No serious project exists without risk; Sanatan Ayush Van is no exception. The difference is: we **design for risk** instead of pretending it isn't there.

This chapter identifies the main risks and shows how the **design, operations and partnerships** of Sanatan Ayush Van make the system more resilient over time.

13.1 Climatic & Agro-Ecological Risks (Drought, Heat Waves, Pests)

Key Risks

1. **Drought & irregular rainfall**
 - Delayed monsoon or below-average rainfall can stress herbs and Moringa trees.
 - Stepwell recharge may be slower in bad rainfall years.
2. **Heat waves & temperature extremes**
 - High summer temperatures in Gandhinagar region can reduce biomass growth and cause leaf scorch in sensitive herbs.
 - Seedling establishment in nursery may suffer in peak heat.
3. **Pest & disease outbreaks**
 - Concentrated plantings of Musli, Shatavari, Ashwagandha or leafy herbs (Tulsi, Brahmi, Kalmegh, Moringa) can attract specific pests and fungal diseases.
 - Organic systems avoid synthetic quick-fix pesticides, so pest control must be proactive.

Mitigation Measures by Design

- **On-farm water security**
 - A **10 m × 10 m × 5 m stepwell** at the core provides strong on-farm storage and acts as a buffer against short and medium-term dry spells.
 - Drip irrigation reduces wastage, ensuring **every litre goes where it is needed**.
- **Concentric zoning & species diversity**
 - Multiple rings, with different herbs and Moringa, reduce the chance that **one climatic event or pest** destroys all crops.
 - Moringa, Aloe and some hardy herbs tolerate stress better and keep the system alive in bad years.
- **Microclimate management**
 - Bamboo outer ring and tree layer reduce wind stress and offer partial shade/windbreak to inner crops.
 - Mulching using organic residues (from Bhumikund and pruning) keeps soil cooler and more moist.
- **Integrated pest management (IPM)**
 - Use of **herbal extracts, neem-based sprays, biologicals**, pheromone traps and regular monitoring.
 - Diversified planting reduces uniform host availability for any one pest.

- Training Karmyogis to identify early symptoms and act before outbreaks become severe.
-

13.2 Market & Price Risks (Demand Shifts, Buyer Dependence)

Key Risks

1. **Price fluctuation in herbs**
 - Market prices for Musli, Shatavari, Moringa leaves, Tulsi etc. can vary based on harvest volumes, imports, policy changes and buyer inventory.
2. **Over-dependence on a few buyers**
 - Relying on a single company or trader increases risk if contracts change or payments delay.
3. **Product specification changes**
 - Buyers may change their quality requirements (purity, cut size, microbiology standards), making existing batches harder to sell at premium rates.

Mitigation Measures

- **Multi-buyer strategy**
 - Map and approach **multiple buyer categories**: AYUSH companies, herbal tea blenders, powder manufacturers, nutraceuticals, exporters.
 - Avoid “single buyer dependency” by maintaining at least **3–5 active buyers** for key herbs.
 - **Flexible product portfolio**
 - Ability to sell herbs as **whole dried, cut-sifted or powder-ready** material depending on buyer needs.
 - Develop **small domestic channels** (local wellness brands, clinics, shops) for a fraction of produce to reduce volatility.
 - **Long-term relationship building**
 - Transparent documentation, consistent quality and on-time supply to build **relationship pricing**, not pure spot pricing.
 - Use Mandlik Brotherhood’s role as “Guardian of the Organic & Ayush Farm” to negotiate **traceability premiums**.
 - **Partial hedging through Moringa & Aloe**
 - Moringa leaves and Aloe have **broad, growing demand** in multiple segments (health powders, teas, cosmetics), acting as stabilisers even when a niche herb’s price dips.
-

13.3 Operational Risks (Labour Turnover, Input Supply, Equipment Failure)

Key Risks

1. **Labour turnover & skill gaps**
 - Trained Karmyogis may leave for other opportunities.

- Loss of tacit knowledge (timings, irrigation rhythm, pest observation) reduces system efficiency.
- 2. **Input supply disruption**
 - Delays in external inputs like specific biofertilisers, packaging materials, or nursery inputs.
- 3. **Equipment breakdown**
 - Pump failure, major drip line damage, or damage to solar tunnel dryer (e.g., storm tearing poly-sheet) can halt operations or reduce product quality.

Mitigation Measures

- **Local talent pool & cross-training**
 - Train **multiple Karmyogis** in all major functions (irrigation, vermicompost, nursery, harvest, drying) so knowledge is shared, not locked in one person.
 - Engage at least one **backup youth** from nearby village as trainee at all times.
- **Simple, robust technologies**
 - Use standard, serviceable pumps and drip components available in local markets.
 - Maintain **critical spares** (valves, filter media, essential fittings, a spare motor where possible).
- **Preventive maintenance schedule**
 - Fixed calendar for pump servicing, filter cleaning, leak checks, solar sheet inspection, brick structure inspection.
 - Maintain a simple **maintenance logbook** to catch recurring issues early.
- **On-farm input generation**
 - Bhumikund vermicompost unit reduces dependence on outside organic manure.
 - Multiplication of own **planting material** (Shatavari, Aloe, Tulsi, Brahmi, Moringa) cuts external nursery risk.

13.4 Regulatory & Certification Risks (Organic, AYUSH, Export Compliance)

Key Risks

1. **Organic certification requirements**
 - If Sanatan Ayush Van seeks formal organic certification (NPOP or others), non-compliance (documentation gaps, prohibited inputs) could risk certification or premiums.
2. **AYUSH / herbal product standards**
 - Some buyers may require herbs to meet specific pharmacopoeial standards (moisture limits, active content, foreign matter, microbiology). Non-compliance can lead to batch rejections.
3. **Export-oriented compliance**
 - For export-linked buyers, issues around pesticide residues, heavy metals or contaminants can create serious reputation and legal risk.

Mitigation Measures

- **Clean input policy from Day 1**
 - Clearly prohibit use of synthetic pesticides, herbicides and fertilisers.
 - Keep **input purchase and usage records**, even before formal certification, so conversion to certified status is easier.
 - **Quality assurance in post-harvest handling**
 - Standard Operating Procedures (SOPs) for harvesting, drying, storage:
 - Harvest stage (right maturity),
 - Drying time and temperature in solar tunnel,
 - Moisture testing (simple meter) before packing.
 - **Periodic lab testing**
 - Tie up with a **reliable NABL-accredited lab** to periodically test:
 - Moisture,
 - Microbial load,
 - Pesticide residue (expected to be “below detectable” in organic system),
 - Heavy metals as per buyer/specification requirements.
 - **Documented traceability**
 - Batch-wise record of:
 - Which D-BK ring produced which herb,
 - Date of sowing and harvest,
 - Inputs applied,
 - Drying lot and storage lot.
 - This allows Mandlik Brotherhood to answer **traceability queries from AYUSH and export buyers** confidently.
-

13.5 Risk Mitigation & Resilience Strategy

Bringing all risk areas together, Sanatan Ayush Van’s resilience strategy rests on **five pillars**:

1. **Design resilience (water, soil, diversity)**
 - Stepwell + drip + Bhumikund structures combine to make the system **water-secure and soil-secure** even under stress.
 - Mixed herbs + Moringa + bamboo belts spread agro-ecological risk; no single crop controls the fate of the farm.
2. **Economic resilience (product mix + buyers)**
 - Dependence is not on just one herb or one buyer.
 - High-value herbs (Musli, Moringa leaves) are balanced with steady lines (Aloe, drumsticks, Tulsi).
 - Nursery and training income create **non-harvest-based revenue**, useful in a bad crop year.
3. **Human resilience (Karmyogi capacity & community linkages)**
 - Continuous training builds a pool of local people who know how to run such a unit.
 - Women and youth are integrated into operations, spreading skills and income across households.
 - In case one trained person leaves, others can step up.

4. **Institutional resilience (Mandlik Brotherhood & partnerships)**
 - Mandlik Brotherhood provides **technical backstopping**, market linkages and project governance.
 - The unit seeks linkages with **FPOs, AYUSH colleges, universities, NGOs and CSR partners**, so that learning, support and visibility are not dependent on any single institution.
 5. **Documentation & continuous improvement**
 - Regular record-keeping of yields, prices, input use, pest incidents, water levels and training events.
 - Annual internal review of:
 - Which crops performed best,
 - Which buyers gave stable terms,
 - Where operations can be simplified.
 - Gradual adjustment of herb mix and management practices based on real performance, not theory alone.
-

In essence, Chapter 13 recognises that:

- Weather will be erratic,
- Markets will move,
- People will come and go, and
- Rules will evolve.

Sanatan Ayush Van is designed so that, even in this uncertainty, the **core assets – soil, water, skills, relationships and knowledge – keep getting stronger** year after year, not weaker.

14.Role of Mandlik Brotherhood Private Limited & Internal Governance

Mandlik Brotherhood Private Limited (MBPL) is the **promoter, designer and long-term custodian** of the Sanatan Ayush Van model.

14.1.1 Core roles of MBPL

1. Concept & Technical Design

- Owns and refines the Sanatan Ayush Van concept:
 - Concentric layout on 1 hectare,
 - Bhumikund raised-bed system using Shivana 3D interlocking bricks,
 - Integration of stepwell, drip irrigation and on-farm vermicompost.
- Ensures that the layout, crop plan and infrastructure are implemented as per design standards.

2. Project Implementation & CAPEX Management

- Coordinates land development, stepwell construction, Bhumikund structures, irrigation installation, nursery and solar tunnel set-up.
- Oversees vendor selection, quality checks and timelines so that grant funds and promoter funds are used efficiently and transparently.

3. Operational Supervision

- Appoints and mentors the **Unit Manager / Lead Karmyogi**.
- Sets annual crop plans, operational budgets, and production targets.
- Provides ongoing technical support on cultivation, pest management, irrigation scheduling and post-harvest protocols.

4. Marketing & Buyer Interface

- Develops and protects the **Sanatan Ayush Van** and MBPL brand in the herbal market.
- Identifies and manages relationships with:
 - AYUSH manufacturers,
 - Herbal tea blenders,
 - Nutraceutical and wellness companies,
 - Exporters and domestic bulk buyers.
- Negotiates prices, contract terms and quality expectations.

5. Compliance & Documentation

- Ensures adherence to all relevant laws and norms (company, tax, labour, environment as applicable).
- Maintains or oversees:
 - Batch-wise traceability records,
 - Input and harvest logs,
 - Financial statements specific to the Sanatan Ayush Van unit.

6. Replication & Advisory Role

- Treats this 1-hectare model as a **template** to be replicated in other villages and clusters.
- Offers consultancy, training and handholding to future adopters of the model.

14.1.2 Internal governance structure

MBPL uses a **simple but clear governance framework** for Sanatan Ayush Van:

- **Board of Directors – MBPL**
 - Approves overall strategy, major CAPEX decisions and partnerships.
 - Reviews progress at least annually on financial, social and environmental indicators.
- **Project Director / Promoter-Lead**
 - Senior person within MBPL responsible for Sanatan Ayush Van across its full life-cycle.
 - Frontline interface with government departments, CSR partners, banks, universities and large buyers.
- **Unit Manager / Lead Karmyogi (on-site)**
 - Manages day-to-day functioning: field operations, labour, harvesting, drying, storage and dispatch.
 - Maintains farm, stock and visitor records.
 - Acts as the local face of the project for farmers, visitors and community.
- **Support Team (Accounts, Technical, Marketing)**
 - Based at MBPL office and visiting the site regularly.
 - Handles accounting, MIS, legal compliance, marketing collateral, buyer coordination and specialized technical troubleshooting.

This structure keeps **strategic decisions** with MBPL while **daily operational control** remains with a trained on-site team.

14.2 Linkages with FPOs, Universities, AYUSH Colleges & R&D Institutions

Sanatan Ayush Van is deliberately designed to be **open and collaborative**, not closed and private.

14.2.1 Farmer Producer Organisations (FPOs) & local farmer groups

FPOs and farmer groups can interact with Sanatan Ayush Van at multiple levels:

1. **Exposure & Awareness**
 - Organised exposure visits to see:
 - Layout,
 - Bhumikund structures,
 - Herb cultivation methods,
 - Vermicompost unit,
 - Solar tunnel dryer.
 - Builds understanding of what a **high-value herbal acre/hectare** looks like in real life.
2. **Planting Material & Protocols**
 - The unit supplies **quality planting material** of key herbs and moringa saplings to FPO members.
 - Shares **standard practices** (spacing, irrigation, nutrient schedule, harvesting stage) to avoid trial-and-error losses for farmers.
3. **Cluster & Aggregation Models**
 - FPOs can help develop **surrounding herbal clusters** where multiple farmers grow one or more Sanatan Ayush Van herbs.

- MBPL can provide technical guidance and act as an aggregator or marketing partner, channelling produce into bulk buyers who want scale.

14.2.2 Universities & Agriculture / Rural Development Colleges

Sanatan Ayush Van can serve as a **field laboratory** for:

- Agricultural universities,
- Rural development institutes,
- Skill universities and polytechnics.

Possible collaborations:

- Student **field visits and practicums** on organic cultivation, water management and farm design.
- Research projects on soil health, crop response, microclimate created by concentric layouts.
- Joint seminars or workshops hosted partly on-farm and partly on campus.

This enriches academic learning with **real field dynamics**, and gives the farm access to fresh perspectives and research insights.

14.2.3 AYUSH Colleges & Herbal Institutes

AYUSH and herbal institutions often seek **living herbal gardens** to complement classroom learning.

Sanatan Ayush Van can:

- Host **AYUSH students** to study and identify medicinal plants in different growth stages.
- Demonstrate how **classical herbs** can be grown at commercial scale using organic methods.
- Enable small, collaborative trials on:
 - Harvest stage vs. quality parameters,
 - Effect of drying methods on herb characteristics,
 - Simple quality indicators controlled at farm level.

This strengthens the bridge between **traditional knowledge** and **modern, standardised herbal supply chains**.

14.2.4 R&D Institutions, Labs & Innovation Platforms

R&D institutions working on:

- Medicinal plants,
- Bio-inputs,
- Soil regeneration,
- Climate-resilient agriculture,

can use Sanatan Ayush Van as a **test bed** to:

- Trial new organic nutrient or pest management products,
- Compare different spacing or pruning patterns on yield and quality,
- Study biodiversity and microclimate impacts in multi-layer herbal systems.

Independent labs and innovation platforms can also:

- Validate product quality (moisture, actives, residues etc.),
 - Develop **data-backed case studies** on the economics and ecology of the model.
-

14.3 Possible Convergence with Govt Schemes & CSR

Sanatan Ayush Van naturally aligns with several **government programmes and CSR agendas**, because it touches health, agriculture, water and livelihoods all at once.

14.3.1 National AYUSH Mission (NAM) & National Medicinal Plants Board (NMPB)

Potential alignment with NAM / NMPB includes:

- Support for **establishment of medicinal plant cultivation blocks**,
- Recognition as a **demonstration farm** for good cultivation practices in AYUSH herbs,
- Assistance for **nursery development** and quality planting material supply,
- Training programmes for farmers and youth on herbal cultivation.

Sanatan Ayush Van can be positioned as:

- A **model 1-hectare AYUSH herbal unit** integrating water harvesting, organic practices and market linkages.

14.3.2 Organic & Natural Farming Missions

The project's entire agronomy is built on:

- Vermicompost and organic residues,
- Biological pest management,
- Soil regeneration through BhumiKund and mulching,
- No chemical fertilisers or pesticides.

Therefore, it aligns with:

- State and central **organic / natural farming schemes**,
- Programmes under PKVY, RKVY or similar frameworks (as applicable in Gujarat),
- Training initiatives for farmers shifting away from chemical-intensive agriculture.

Support under these schemes can help:

- Part-finance the **vermicompost unit**,
- Strengthen **bio-input adoption**,
- Facilitate **group certification** if neighbouring farmers join herbal / organic production.

14.3.3 Rural Entrepreneurship & Livelihood Schemes

Sanatan Ayush Van is a **productive, profitable, skill-based 1-hectare unit** that creates:

- Full-time and seasonal employment,
- Opportunities for youth to manage operations and marketing,
- A base for further micro-enterprises (nursery, herbal processing, eco-tourism later).

It therefore fits well under:

- Rural entrepreneurship and start-up promotion schemes in agriculture,
- Livelihood programmes that support value addition at village level,
- Skill-building missions that promote modern, sustainable agriculture as a career route.

The unit can be projected as:

- A **reference model** that shows how one hectare can support multiple livelihoods when designed around high-value herbs and value chains.

14.3.4 Water, Soil & Environmental Schemes

Because of the stepwell and soil-regeneration focus, there is scope to converge with:

- Watershed development / water conservation programmes,
- Schemes supporting **on-farm water storage, recharge and efficient irrigation**,
- Tree plantation and green cover expansion initiatives.

Specific components like:

- Stepwell construction and recharge arrangements,
- Bamboo and Moringa plantation,
- Soil testing and carbon measurement pilots,

can be proposed under relevant water/land/degradation programmes and climate-resilience initiatives.

14.3.5 CSR Partnerships

Corporate Social Responsibility (CSR) funds often seek projects that are:

- Measurable,
- Multi-dimensional (livelihood + environment + health),
- Replicable.

Sanatan Ayush Van fits neatly because:

- It creates **jobs and entrepreneurship pathways**,
- Regenerates **soil and water** on a permanent physical asset,
- Revives and utilises **medicinal plant heritage**,
- Has a **clear blueprint** that can be repeated in other locations.

CSR partners can support:

- High-CAPEX elements: stepwell, Bhumikund structures, solar dryer, nursery, irrigation,
- Training programmes for farmers and youth,
- Research, documentation and digital tools for monitoring and storytelling.

14.4 Monitoring, Evaluation & Reporting Framework

For any serious institutional and scheme convergence, the project must be **trackable and auditable**. Sanatan Ayush Van adopts a **practical M&E framework** that combines numbers with narratives.

14.4.1 Indicators & levels of tracking

Monitoring is done at four levels:

1. **Input level**
 - CAPEX utilisation: stepwell, Bhumikund rings, irrigation, nursery, dryer, vermicompost unit.
 - Numbers of trees and herb beds established.
2. **Output level**
 - Area (m²) under each herb, and number of Moringa trees in productive condition.
 - Quantity of vermicompost produced annually.
 - Annual production of each herb, Moringa leaves and drumsticks.
3. **Outcome level**
 - Annual revenue and operating surplus of the 1-hectare unit.
 - Number of full-time and seasonal workers engaged (with gender break-up).
 - Number of farmers, youth, students and visitors trained or oriented.
 - Soil test trends for organic carbon and key fertility indicators.
 - Stepwell water level patterns across seasons.
4. **Impact level** (over 3–5 years)
 - Changes in income for core Karmyogis and participating households.
 - Number of farmers adopting herbal and organic practices inspired by this unit.
 - Emergence of additional Sanatan Ayush Van-type units or herbal plots in the region.

14.4.2 Data collection & tools

- **Farm Logbooks** – daily records of work, irrigation, pest observations, input applications.

- **Production & Sales Registers** – herb-wise harvest weights, drying weights, buyer-wise sales, price realised.
- **Vermicompost Log** – input materials, batch cycles, quantities produced and used.
- **Training & Visitor Register** – date, group type, number of participants, topics covered, feedback.
- **Soil & Water Test Files** – periodic lab reports organised chronologically.
- **Financial Statements** – P&L and cash-flow for the Sanatan Ayush Van sub-unit within MBPL’s books.

These are kept simple enough that the **Unit Manager and team can maintain them regularly**, with periodic oversight from MBPL’s accounts and technical staff.

14.4.3 Reporting to partners & funders

Depending on the nature of funding and partnerships, MBPL will prepare:

- **Quarterly or half-yearly brief updates**
 - Key activities, cropping and harvest highlights, training events, major repairs or upgrades.
 - 3–5 photographs or charts that visually show progress.
- **Annual consolidated report**
 - Financial summary of the unit,
 - Herb-wise production and sale,
 - Employment and training statistics,
 - Environmental indicators (soil, water, trees),
 - Challenges faced and changes made in the design or cropping pattern.
- **End-of-project / mid-term evaluation reports** (for grant / CSR cycles)
 - Before-after comparisons on agreed indicators,
 - Independent observations if external evaluators are involved,
 - Recommendations for scale-up and replication.

Where appropriate, partners from government, academia or CSR may be invited for **joint reviews and learning visits**, anchoring trust and transparency.

In summary, the institutional framework of Sanatan Ayush Van is built so that:

- **Mandlik Brotherhood** holds responsibility and continuity,
- **Local farmers, youth and workers** become skilled participants and future leaders,
- **FPOs, universities, AYUSH colleges and R&D centres** add knowledge and networks,
- **Government schemes and CSR** provide catalytic support,
- And a clear **monitoring and reporting system** keeps everything accountable, improvable and ready for replication.

15. Sustainability & Scale-Up Strategy

Sanatan Ayush Van is designed so that:

- It **heals soil and water** instead of exhausting them,
- It can be **copied and scaled** from 1 hectare to many,
- Local farmers can plug into it through **clusters and contracts**,
- And over time it can climb the value chain from **raw herbs** to **branded AYUSH products**.

This chapter ties the whole story together: **how this 1-hectare unit becomes a long-term, expandable model.**

15.1 Long-Term Soil, Water & Ecosystem Stewardship in Sanatan Ayush Van

The most important “machines” in Sanatan Ayush Van are **not metal** – they are:

- Soil biology,
- Water systems,
- Trees, herbs and the tiny life around them.

The project is intentionally structured so that every year, these **grow stronger**, not weaker.

15.1.1 Soil as a long-term asset

Key design elements:

- **Bhumikund raised beds (D-BK)** built with Shivana bricks:
 - Prevent topsoil erosion,
 - Allow easy addition of organic matter and mulch,
 - Keep root zones structured and well aerated.
- **Bhumikund vermicompost unit:**
 - Converts agro-waste and biomass into high-quality vermicompost,
 - Reduces dependence on external inputs,
 - Builds soil organic carbon and microbial life.

Over 3–5 years, this leads to:

- Higher **soil organic carbon**,
- Better **water retention**,
- Stronger **root growth** and resilience in herbs and Moringa,
- Gradual improvement in **yield stability** even in stress years.

The project’s philosophy is:

“Soil is capital. Herbs are the interest.”

So soil is never mined; it is continuously rebuilt.

15.1.2 Water stewardship via stepwell & micro-irrigation

Water management is not a side topic; it is central:

- A **10 m × 10 m × 5 m stepwell** at the core of the 1 hectare unit:
 - Acts as a **buffer reservoir** for irrigation,
 - Allows **recharge** of groundwater,
 - Creates a cooler microclimate around the central square.
- **Drip irrigation** and micro-irrigation:
 - Delivers water directly to Bhumikunds and tree basins,
 - Reduces evaporation and runoff,
 - Enables **precise scheduling** based on crop stage and weather.

With increasing climate variability, the stepwell + drip combination makes Sanatan Ayush Van a **water-resilient package**, not a water-guzzling farm.

15.1.3 Ecosystem perspective

Even at 1 hectare, the design creates multiple “layers”:

- **Bamboo ring** as windbreak and biomass source,
- **Moringa tree ring (V-BK)** as a medium-height canopy and flower/fruit layer,
- Multiple rings of **medicinal herbs** of different types (roots, shrubs, leafy herbs, succulents like Aloe),
- **Water body** (stepwell) attracting birds, insects and micro-fauna.

This leads to:

- Increased **pollinator presence**,
- Natural control of some pests by predators,
- Variety of niches for beneficial flora and fauna,
- A visually and ecologically rich **“healing forest”**, not a monocrop field.

Long-term stewardship is ensured because **ecology and economics are tied together**:

- When soil improves, yields improve.
- When water is secure, herbs survive dry spells.
- When biodiversity rises, pest risk drops.

The farm survives and grows *because* the ecosystem is cared for.

15.2 Model for Replication to Multiple 1 ha Units & Integration with 5 ha / 125 ha Sanatan Krishi Van Clusters

Sanatan Ayush Van is intentionally built as a **modular 1-hectare design**.

It can be:

- Repeated as individual blocks, or

- Plugged into **larger concentric planning** like the 5-hectare and 125-hectare Sanatan Krishi Van concept.

15.2.1 The 1-hectare “Ayush module”

Each 1-hectare unit includes:

- Concentric rings (bamboo, Moringa, D-BK herb beds, internal roads/walkways),
- A central core with stepwell, storage, Karmyogi stay and solar dryer,
- Vermicompost and nursery capability.

This makes each unit:

- **Self-contained** for water, soil inputs and processing,
- Scalable because the **layout is standardised** and documented,
- Trainable – new teams in new villages can learn on the original unit and replicate.

15.2.2 Integration with 5-hectare “Sanatan Krishi Van” blocks

At the next scale:

- A **5-hectare block** (for example, 225 m × 225 m) can be designed with:
 - One or more **Sanatan Ayush Van (herbal)** units,
 - One or more **Sanatan Krishi Van (food forest / mixed cropping)** units,
 - Shared infrastructure: additional stepwells, roads, storage, training areas.

The 1-hectare Ayush Van acts as:

- The **high-value herb core** inside a larger agroforestry / food forest landscape,
- A **demonstration and training anchor** for farmers in the whole 5-hectare block.

Multiple such 5-hectare blocks can then be organised into a **125-hectare cluster**, with:

- Corridors for biodiversity,
- Common resource centres,
- Marketing and processing hubs.

Sanatan Ayush Van is thus:

- The **herbal heart** of each cluster,
- A repeatable “cell” in a much bigger living organism of regenerative farms.

15.2.3 Replication mechanics

Replication involves:

1. **Standard technical package**
 - Drawings, BoQs, crop plans, irrigation layouts and SOPs for Bhumikund, herbs and vermicompost.
2. **Training of new Unit Managers / Karmyogis**

- Hands-on exposure at the original unit, then deployment in their own 1-hectare sites.
- 3. **Financing templates**
 - CAPEX–OPEX–revenue projections adaptable to local cost and price conditions,
 - Clear roles for local promoters, FPOs, CSR, banks and government schemes.
- 4. **Brand and quality standards**
 - Using the **Sanatan Ayush Van** name only for units that follow minimum standards in:
 - Layout and infrastructure,
 - Organic practices,
 - Traceability and documentation,
 - Post-harvest quality.

This way, scaling does **not** dilute the model; it **multiplies its integrity**.

15.3 Potential for Contract Farming / Cluster Development with Local Farmers

Sanatan Ayush Van is not meant to be an island of prosperity surrounded by stressed farms. The natural next step is to **extend the herb value chain to neighbouring farmers**.

15.3.1 Cluster approach

Around the 1-hectare core, local farmers can:

- Allocate part of their land to **one or more of the key herbs** (Ashwagandha, Shatavari, Tulsi, Moringa, Aloe, etc.),
- Follow simplified versions of the same **organic and post-harvest protocols**,
- Use the 1-hectare unit for **technical guidance and reference**.

This creates a “**Herbal Cluster**”, where:

- Sanatan Ayush Van acts as the **mother plot**,
- Surrounding farmers act as **satellite producers**.

15.3.2 Contract farming / buy-back arrangements

Possible models:

1. **Simple buy-back**
 - MBPL or a partner buyer agrees to procure specified herbs from cluster farmers,
 - Quality specs, harvest windows and pricing formulas are communicated clearly in advance,
 - Farmers focus on production, MBPL handles aggregation and marketing.
2. **Input + advisory + buy-back**
 - MBPL supplies planting material and technical guidance,

- Farmers commit to selling agreed quantities back through Sanatan Ayush Van channel.
- 3. **FPO-mediated contracts**
 - FPO signs MoU with MBPL / buyers,
 - Farmers are members of FPO,
 - Aggregation, quality check and payment routing happens through FPO.

Key features of any such arrangement:

- **Fair, transparent pricing,**
- **Clear quality and documentation norms,**
- **Payment within agreed timelines,**
- **Mechanisms for grievance redressal and periodic re-negotiation.**

15.3.3 Benefits to local farmers

- Access to **higher value crops** than conventional grains or low-margin commodities,
- Ready **technical handholding**, not just “grow this and see”,
- Lower marketing risk due to **pre-identified buyers and aggregation,**
- Option to gradually **build their own herbal plots** and possibly their own Ayush Van-style units.

For Sanatan Ayush Van and MBPL:

- Increased **volumes and bargaining power** with large buyers,
- Lower per-unit logistics and testing costs,
- Stronger **social impact** footprint in the region.

15.4 Roadmap for Moving from Bulk Raw Herbs to Branded, Packaged AYUSH Products

At the start, Sanatan Ayush Van sells mostly **bulk dried herbs** and related raw materials. Over time, the project can **climb the value ladder**.

15.4.1 Stage 1 – Bulk but differentiated

Short to medium term (Years 1–3):

- Focus on producing **clean, traceable, organic herbs** in bulk form:
 - Dried roots (Musli, Shatavari, Ashwagandha),
 - Dried leafy herbs (Tulsi, Kalmegh, Brahmi, Moringa),
 - Aloe leaves and drumstick pods.

Differentiation comes from:

- Documented **organic practices,**
- Batch-wise **traceability,**
- Better **moisture control and cleanliness** in drying and storage.

This already allows a **premium over generic market rates** and builds trust with a core set of buyers.

15.4.2 Stage 2 – Value-added bulk (cut-sifted, powders, blends)

Medium term (Years 3–5):

- Move into **primary value addition** such as:
 - Cut-sifted herbs (sorted to buyer specs),
 - Coarse or fine powders (using partner grinding units under hygienic conditions),
 - Standardised blends (e.g., Moringa + Tulsi, Moringa + Brahmi, Kalmegh-based detox blends, etc.) as B2B offerings.

This stage may include:

- Developing **co-processing partnerships** with compliant herbal processing units,
- Working with buyers to develop **specification sheets** for powders and blends,
- Building a small portfolio of **standard SKUs** for institutional buyers.

15.4.3 Stage 3 – Branded AYUSH-oriented products (B2C or B2B2C)

Longer term (Years 4–7 and beyond), depending on regulatory strategy:

- Develop **own brand lines** (under MBPL’s herbal / Sanatan Ayush Van branding) in formats such as:
 - Herbal teas / tisanes,
 - Moringa leaf powder packs,
 - Simple classical combination powders (e.g., Ashwagandha churna, Brahmi-based blends etc., ensuring regulatory compliance),
 - Wellness powders and mixes (immunity, digestion, detox, energy).

This requires:

- Careful navigation of **FSSAI / AYUSH regulatory frameworks**,
- Stronger **packaging, labelling and marketing** infrastructure,
- Possibly separate compliant facilities or manufacturing tie-ups.

At this stage, Sanatan Ayush Van is:

- Not just a raw material supplier,
- But also a **branded supplier of AYUSH / herbal products**,
- With a strong narrative: “Grown in our herbal forest, traceable to Bhumikund beds, under Sanatan Ayush Van stewardship.”

15.4.4 Brand story and digital presence

Throughout this journey, the **story** of the farm matters:

- 1-hectare **healing forest**,

- Soil regenerated with Bhumikund vermicompost,
- Water secured with a central stepwell,
- Herbs grown and handled by trained Karmyogis,
- Continuous learning from traditional knowledge and modern science.

Digital tools (website, social media, short documentaries, QR codes linking products back to farm information) can:

- Strengthen **trust with buyers and consumers**,
- Make certification and audits smoother,
- Attract more **partners, interns and collaborators** into the ecosystem.

In conclusion, Chapter 15 shows that Sanatan Ayush Van is:

- Ecologically sustainable (soil, water, biodiversity),
- Structurally scalable (1 ha → 5 ha → 125 ha clusters),
- Socially expandable (farmers' clusters and contract farming),
- Economically upgradable (bulk herbs → value-added ingredients → branded AYUSH products).

It is not just a project; it is a **living template** for how one carefully designed hectare can seed a whole network of healing forests and herbal enterprises.

16. Conclusion

Sanatan Ayush Van – Guardian of the Healing Forest – is more than a 1-hectare herbal cultivation project. It is a structured, technically sound and financially viable model that combines **regenerative agriculture, medicinal plant cultivation, water conservation, and rural livelihood generation** within a single integrated unit.

This concluding chapter summarises its strategic role in the broader mission of Mandlik Brotherhood Private Limited, highlights the key strengths and differentiators of the model, and extends a clear invitation for collaboration to investors, CSR partners and institutions.

16.1 Strategic Importance of Sanatan Ayush Van in Mandlik Brotherhood Mission

Mandlik Brotherhood Private Limited has consistently focused on:

- **Soil regeneration and organic nutrient management** (through Bhunikund systems and vermicompost),
- **Water security and conservation** (through stepwells, efficient irrigation and integrated design),
- **Sustainable agriculture and food forest models** (Sanatan Krishi Van and related concepts),
- **Creating replicable, science-backed rural development frameworks.**

Sanatan Ayush Van sits at the intersection of all these focus areas. Its strategic importance lies in the following:

1. Herbal Extension of Sanatan Krishi Van

Sanatan Krishi Van is centred on food, fruits and broad-based agroforestry. Sanatan Ayush Van adds a **dedicated AYUSH and medicinal herb dimension** to this ecosystem, fully aligned with national interest in traditional health systems.

2. High-Value, Small-Footprint Enterprise

On just 1 hectare, the project generates significant value by cultivating high-value herbs like Safed Musli, Shatavari, Ashwagandha, Kalmegh, Tulsi, Brahmi, Aloe vera and Moringa, supported by drumstick production and nursery activities. This demonstrates how **limited landholdings** can be turned into **sustainable, income-generating units** when backed by sound design.

3. Flagship Demonstration & Training Unit

As a live, working model with full documentation, Sanatan Ayush Van becomes a **reference farm** for farmers, youth, students and institutions who wish to understand practical herbal cultivation, organic methods, Bhunikund systems, vermicomposting and post-harvest handling.

4. Template for Cluster and Scale

The 1-hectare Sanatan Ayush Van is deliberately designed as a **modular template**. It can be replicated as multiple units or integrated into 5-hectare and 125-hectare Sanatan Krishi Van clusters. This makes it central to Mandlik Brotherhood's long-term strategy of **scalable, regenerative agriculture-based rural development**.

In short, Sanatan Ayush Van is a **strategic building block** in the long-term vision of Mandlik Brotherhood: transforming barren or underutilised lands into productive, ecologically sound and economically viable landscapes.

16.2 Strengths & Differentiators of the Project

Sanatan Ayush Van stands out from conventional projects due to the following strengths and differentiators:

1. **Integrated, Regenerative Design**

- Concentric layout with bamboo windbreak, Moringa Vrix Bhumikund ring, multiple Dhanya Bhumikund rings and a central core.
- Permanent Shivana brick Bhumikund structures that protect and enhance soil.
- Central stepwell for water storage and recharge, linked with drip irrigation for efficiency.

This design ensures that the project regenerates **soil, water and biodiversity** over time rather than depleting them.

2. **Focused on AYUSH and Medicinal Herbs**

- The crop plan prioritises **high-value AYUSH herbs** with established demand and recognised therapeutic use.
- The model demonstrates how to grow these herbs in an **organic, traceable and commercially viable** manner.

3. **Strong Soil & Nutrient Management Backbone**

- On-site Bhumikund vermicompost unit reduces dependency on external inputs and lowers long-term costs.
- Systematic use of organic matter and bio-inputs builds **soil organic carbon and resilience**.

4. **Water-Resilient Architecture**

- The stepwell, combined with efficient micro-irrigation, makes the 1-hectare unit **less vulnerable to rainfall variability**.
- Improved infiltration and moisture retention enhance crop stability and long-term sustainability.

5. **Economic Viability with Transparent Calculations**

- The financial analysis is based on realistic area, yield and price assumptions, with clear herb-wise production and revenue calculations.
- At full productive capacity, the unit demonstrates the potential for **healthy operating surplus** after covering all operating costs.
- The presence of nursery and training-related income further stabilises cash flows.

6. **High Replicability**

- Standardised layout, BoQs, SOPs and management protocols make the model **easy to document, teach and replicate** in other locations.
- The unit is equally suitable as a **standalone enterprise** or as a part of larger food forest and herbal clusters.

7. **Multi-Dimensional Impact**

- Economic: Jobs and enterprise potential for local youth and farmers.

- Social: Skills, training, exposure and local capacity-building.
- Environmental: Soil regeneration, water conservation and biodiversity enhancement.
- Knowledge: Conservation and practical use of Sanatan herbal traditions under modern quality frameworks.

These features make Sanatan Ayush Van **distinct** from ordinary herbal farms, water projects or training centres. It is a **combined, field-proven model**.

16.3 Invitation for Collaboration – Investors, CSR Partners, Institutions

Sanatan Ayush Van is ready to move from concept and detailed planning into **full execution and scale-up**. For this, collaboration is both necessary and beneficial.

1. Investors and Social Impact Funds

- Investors looking for **grounded, asset-backed, revenue-generating rural enterprises** have a clear, model-based opportunity in Sanatan Ayush Van and its future replications.
- The project offers a well-structured CAPEX–OPEX–revenue framework, a clear payback horizon on promoter capital and strong social–environmental co-benefits.

2. CSR Partners & Philanthropic Foundations

- CSR programmes focusing on **livelihoods, water, soil health, biodiversity, traditional knowledge or health and nutrition** will find Sanatan Ayush Van to be a natural fit.
- CSR support can play a catalytic role by funding capital-heavy, long-life assets (stepwell, Bhumikund structures, solar dryer, nursery, training spaces), leaving operations to be sustained through farm revenue.

3. Government Departments & Development Agencies

- Departments working under AYUSH, agriculture, horticulture, organic farming, water resources, rural development and skill development can treat this project as a **demonstration-cum-learning hub**.
- It can be used to pilot and refine scheme designs, training modules and cluster development strategies.

4. Universities, AYUSH Colleges & R&D Institutions

- Academic and research institutions can collaborate for **field research, student training, demonstration, trials and long-term monitoring**.
- Joint documentation and scientific validation will not only strengthen this unit, but also contribute to broader knowledge on regenerative medicinal plant farming.

5. FPOs, Farmer Groups & Local Organisations

- Farmer collectives and local organisations can connect with Sanatan Ayush Van to **develop herbal clusters**, share planting material, adopt Bhumikund/vermicompost models and link to markets.
- This ensures that the benefits of the model extend far beyond the original 1-hectare plot.

Sanatan Ayush Van – Guardian of the Healing Forest is thus presented as a **ready, field-grounded, scalable model** for:

- Sustainable medicinal plant cultivation,
- Soil and water regeneration,
- Rural enterprise and livelihoods,
- Practical conservation and use of Sanatan herbal wisdom.

Mandlik Brotherhood Private Limited invites **partners, investors, CSR bodies, government agencies and institutions** to collaborate in building, refining and replicating this model – so that many more hectares of land can be converted into living Ayush Vans, serving people, nature and the rural economy together.

Annexure 1: 1 Hectare Layout Plan of Sanatan Ayush Van

A. Overall Plot Description

- **Total land area:** 1 hectare = 10,000 m²
- **Plot shape:** Square
- **Overall dimensions:** 100 m × 100 m
- **Orientation (recommended):**
 - North at the top of the plan
 - Main entry gate on the **South side** (can be adapted as per actual access road)

The entire 1-hectare unit is designed as **21 concentric squares (rings)** from the outside to the inside, with a **30 m × 30 m central core**.

B. Concentric Square Layout (Ring-wise Plan)

Each “Square No.” below refers to a ring from the **outermost** (Square 1) moving **inwards** to the central core (Square 21).

Sq. No.	Description / Use	Ring Breadth (m)	Outer Side (m)	Inner Side (m)	Approx. Ring Area (m ²)	Remarks
1	Bamboo protection belt	3	100	94	~1,164	Dense bamboo plantation as windbreak and biomass source.
2	Peripheral road	3	94	88	~1,092	3 m all-round road for vehicles and movement.
3	Vrix Bhumikund (V-BK) – Moringa ring	2	88	84	~688	86 Moringa trees in circular/linear pattern within ring.
4	Walkway	1	84	82	~332	1 m pedestrian path for inspection and harvesting.
5	Dhanya Bhumikund (D-BK) – Herbs Ring 1	2	82	78	~640	First outer D-BK ring – allocated to medicinal herbs (e.g. Safed Musli, part).
6	Walkway	1	78	76	~308	1 m path between D-BK rings.
7	D-BK – Herbs Ring 2	2	76	72	~592	Second D-BK ring – medicinal herbs (e.g. Shatavari).
8	Walkway	1	72	70	~284	1 m path between D-BK rings.
9	D-BK – Herbs Ring 3	2	70	66	~544	Third D-BK ring – medicinal herbs (e.g. Ashwagandha).

Sq. No.	Description / Use	Ring Breadth (m)	Outer Side (m)	Inner Side (m)	Approx. Ring Area (m ²)	Remarks
10	Walkway	1	66	64	~260	1 m path between D-BK rings.
11	D-BK – Herbs Ring 4	2	64	60	~496	Fourth D-BK ring – medicinal herbs (e.g. Kalmegh).
12	Walkway	1	60	58	~236	1 m path between D-BK rings.
13	D-BK – Herbs Ring 5	2	58	54	~448	Fifth D-BK ring – medicinal herbs (e.g. Tulsi).
14	Walkway	1	54	52	~212	1 m path between D-BK rings.
15	D-BK – Herbs Ring 6	2	52	48	~400	Sixth D-BK ring – medicinal herbs (e.g. Brahmi).
16	Walkway	1	48	46	~188	1 m path between D-BK rings.
17	D-BK – Herbs Ring 7	2	46	42	~352	Seventh D-BK ring – medicinal herbs (e.g. Aloe vera).
18	Inner service road	3	42	36	~468	3 m inner road for trolley/tractor movement and logistics.
19	D-BK – Herbs Ring 8	2	36	32	~272	Innermost D-BK ring – medicinal herbs (e.g. remaining Musli or compact species).
20	Inner walkway	1	32	30	~124	1 m walkway around central square.
21	Central core	–	30	–	900	Stepwell + storage + Karmyogi stay + solar tunnel + working/open area.

Note: Ring areas are approximate and derived from geometry. Total D-BK area (rings 5, 7, 9, 11, 13, 15, 17, 19) \approx 3,744 m² utilised exclusively for medicinal herb cultivation as per the crop plan.

C. Central Core (30 m × 30 m) – Functional Zoning

The innermost 30 m × 30 m = 900 m² square is divided functionally as follows (indicative zoning, can be refined in CAD):

1. Stepwell / Water Storage Structure

- Size: **10 m × 10 m**, depth approx. **5 m**
- Location: Central or slightly offset as per structural design
- Purpose: Irrigation storage, groundwater recharge, microclimate.
- 2. **Storage Room (Godown / Tool Room)**
 - Size: **5 m × 5 m (25 m²)**
 - Use: Storage of tools, crates, hoses, inputs, packaging material.
- 3. **Karmyogi Stay / Guard Room**
 - Size: **5 m × 5 m (25 m²)**
 - Use: Simple accommodation / rest space for on-site Karmyogi / caretaker.
- 4. **Solar Tunnel Dryer Area**
 - Size: **5 m × 5 m (25 m²)** (footprint of solar tunnel)
 - Use: Drying of herbs, moringa leaves, roots under controlled, hygienic environment.
- 5. **Open Working & Circulation Area**
 - Remaining central area after the above structures (approx. **725 m²**)
 - Use:
 - Sorting, temporary staging of harvested material,
 - Movement of trolleys,
 - Small training gatherings / demonstration group assembly,
 - Landscaping / shade trees if desired (without obstructing operations).

Positioning within 30 m × 30 m is flexible, but recommended:

- Stepwell nearer to geometric centre,
- Storage and stay rooms placed on one side (e.g. South or East edge of central square),
- Solar tunnel dryer on a side with maximum sun exposure and clear airflow (typically South/South-West side),
- Clear circulation paths around each structure.

D. Functional Summary by Zone

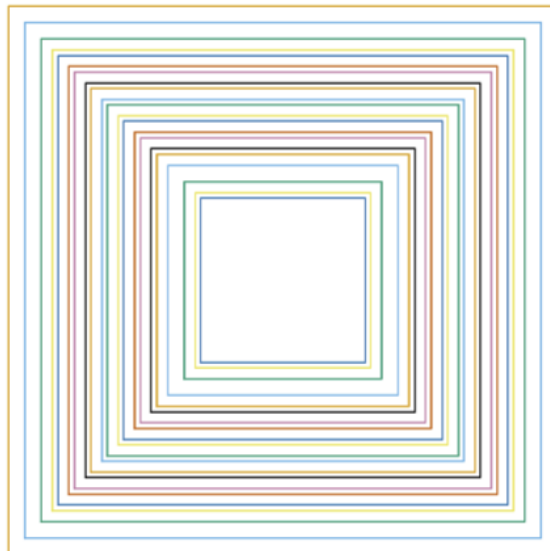
- **Outer Protection Zone (Squares 1–2):**
 - Bamboo ring + 3 m all-round road.
 - Role: Protection from wind/dust, external access for vehicles, boundary definition.
- **Tree & Semi-Perennial Zone (Squares 3–4):**
 - Moringa Vrix Bhumikund ring + 1 m walkway.
 - Role: High-value leaf + drumstick production, biomass, flowers for pollinators.
- **Herbal Production Zone (Squares 5–7–9–11–13–15–17–19 plus linking walkways):**
 - Eight Dhanya Bhumikund rings (2 m breadth each), separated by 1 m walkways.
 - Role: Main medicinal herb cultivation area (Safed Musli, Shatavari, Ashwagandha, Kalmegh, Tulsi, Brahmi, Aloe vera, etc.), laid out ring-wise as per crop plan.
- **Inner Movement Zone (Squares 18 & 20):**
 - 3 m inner service road and 1 m walkway around central square.

- Role: Internal logistics, access for harvest and inputs, easy movement of labour and trolleys.
- **Central Core (Square 21):**
 - Water, storage, stay and solar drying infrastructure.
 - Role: Operational heart of Sanatan Ayush Van – water security, post-harvest handling, supervision, and basic living/working facilities.

E. Note for Technical Drawings / AutoCAD Layout

For preparing a scaled CAD / engineering drawing:

1. Start with **100 m × 100 m outer boundary**.
2. From each side, offset inwards ring-wise by the respective breadth (3 m, 3 m, 2 m, 1 m, 2 m, 1 m, ..., 1 m) to generate each square.
3. Label each ring with **Square number (1–21)** and use labels like:
 - “Sq 1 – Bamboo”,
 - “Sq 2 – Road”,
 - “Sq 3 – Moringa V-BK”,
 - “Sq 5 – D-BK Herbs 1”, etc.
4. Within the **V-BK ring (Sq 3)**, place **86 moringa planting positions** at practical spacing (e.g. combination of linear rows along sides and corners) to match your planting design.
5. Within each **D-BK ring**, subdivide into practical beds/blocks (if needed) for different herbs, keeping ring-wise crop allocation fixed as per the crop planning chapter.
6. In the **central 30 m × 30 m**, draw the 10 × 10 m stepwell and three 5 × 5 m structures, plus circulation.



Annexure 2: Detailed AYUSH Herb Species List

(Botanical Name, Common Name, Local Name, Part Used, Key Uses)

Note: This annexure lists the **core species** currently planned in Sanatan Ayush Van as per the crop plan (D-BK + V-BK). Additional herbs can be added later following the same format.

Sr.	Botanical name	Common English name	Local name (Hindi / Gujarati)	Part used	Key traditional / industrial uses*
1	<i>Chlorophytum borivilianum</i>	Safed Musli	Safed Musli / સફેદ મુસલી	Tuberous roots	Classical rasayana herb in Ayurveda; used in strength & vitality formulations, general tonic blends, nutraceutical capsules and powders. Widely used adaptogenic herb; included in stress-support, energy, immunity and nervous system formulations; powders, tablets and capsules.
2	<i>Withania somnifera</i>	Ashwagandha	Ashwagandha / અશ્વગંધા	Roots (sometimes leaves)	Traditional women's health and rasayana herb; used in Ayurveda for reproductive and digestive support; syrups, granules and powders.
3	<i>Asparagus racemosus</i>	Shatavari	Shatavari / શતાવરી	Tuberous roots	Resin used in lipid-management and joint-support formulations; also in classical guggul-based tablets, capsules and some perfumery / incense uses.
4	<i>Commiphora wightii</i> (syn. <i>C. mukul</i>)	Guggul	Guggul / ગુગ્ગુલ	Oleo-gum-resin	Important household and classical herb; used in cough-cold, respiratory and immunity blends; herbal teas, drops, powders and extracts.
5	<i>Ocimum tenuiflorum</i> (syn. <i>O. sanctum</i>)	Holy Basil	Tulsi / તુલસી	Leaves, flowering tops	

Sr.	Botanical name	Common English name	Local name (Hindi / Gujarati)	Part used	Key traditional / industrial uses*
6	<i>Andrographis paniculata</i>	Kalmegh	Kalmegh / કાલમેઘ (મહાતીતો)	Aerial parts (leaves, stems)	Very bitter herb used in liver-support and fever-related formulations; common in herbal syrups, tablets and immune-support blends. Traditionally used as a medhya (cognitive-support) herb; used in brain tonics, memory-support syrups, powders and capsules.
7	<i>Bacopa monnieri</i>	Brahmi	Brahmi / બ્રાહ્મી	Aerial parts (whole plant)	Widely used in skin-care, cosmetic, digestive and wellness products; juice, gels, creams, shampoos and nutraceutical preparations.
8	<i>Aloe barbadensis</i> (syn. <i>Aloe vera</i>)	Aloe	Ghritkumari / ઘૃતકુમારી	Fleshy leaves (gel/latex)	Highly nutritious leaf and pod crop; used for leaf powder (superfood), herbal teas, fortification blends and vegetable supply for fresh markets.
9	<i>Moringa oleifera</i>	Drumstick tree, Moringa	Sahjan / સરગવો	Leaves, pods (drumsticks), seeds	

*These are **traditional and industrial uses as recognised in Ayurveda and herbal practice**, given for project planning and market-orientation only. They are **not medical advice or treatment recommendations**.

Annexure 3: Cropping Calendar & Rotation Charts (Zone-wise)

Location assumed: **Gandhinagar, Gujarat** (semi-arid, irrigated conditions).
Seasons (for easy reading):

- **Kharif:** June–September
- **Rabi:** October–February
- **Summer:** March–May

Zones (as per layout):

- **V-BK:** Moringa ring (86 trees) – perennial
- **D-BK 1 → 8:** Eight Dhanya Bhumikund rings (herb beds), used as:
 - D-BK 1 – Safed Musli
 - D-BK 2 – Shatavari
 - D-BK 3 – Ashwagandha
 - D-BK 4 – Guggul
 - D-BK 5 – Tulsi
 - D-BK 6 – Kalmegh
 - D-BK 7 – Brahmi
 - D-BK 8 – Aloe vera

Below is a **practical, simple calendar** for 1-year operations (then repeated with minor adjustments) followed by a **3-year rotation pattern (by zone)** focusing on “crop phase vs soil-rest phase”, without changing the main herb identity of each ring.

A. Season-wise Cropping Calendar by Herb

A1. Safed Musli (D-BK 1 – root crop, 8–10 month cycle)

Season / Month	Activity
Kharif (Jun–Jul)	Land prep, incorporation of vermicompost, ridges in D-BK 1; planting of Safed Musli root slips / tubers at onset of monsoon.
Kharif (Aug–Sep)	Active vegetative growth; weeding, top-dressing with vermicompost + jeevamrut / biofertilisers; light irrigation in breaks in monsoon.
Rabi (Oct–Dec)	Foliage matures and starts yellowing toward end; maintain moderate moisture, avoid waterlogging; pest/disease monitoring.
Rabi (Jan–Feb)	Harvest window – lifting mature tuberous roots; drying & curing in solar tunnel.
Summer (Mar–May)	Beds partially fallow or sown with short green manure / cover crop (e.g. sunhemp / dhaincha) + heavy mulching, preparing for next Musli cycle or rest year.

A2. Shatavari (D-BK 2 – semi-perennial root crop, 2–3 years)

Season / Month	Activity
Kharif (Jun–Jul, Year 1)	Deep bed prep, heavy vermicompost; planting of Shatavari root stumps / crowns in D-BK 2.
Kharif–Rabi (Aug–Feb, Year 1)	Vigorous vegetative growth; staking if needed; periodic organic nutrition; pest/disease monitoring.
Summer (Mar–May, Year 1)	Light irrigation, mulching; foliage may partially dry; do not harvest in first year – plant establishment.
Kharif–Rabi (Year 2)	Second year strong growth; selective light root harvest from crowded clumps possible.
Rabi (Year 2–3)	Major root harvest as per market demand; after 2–3 years, beds rejuvenated, some crowns retained, others removed and replanted.

Shatavari beds usually stay in place **2–3 years** before a full rejuvenation and short rest phase.

A3. Ashwagandha (D-BK 3 – annual root crop)

Season / Month	Activity
Kharif (Jul–Aug)	Sowing Ashwagandha seeds or transplanting seedlings on ridges in D-BK 3.
Kharif–Rabi (Sep–Dec)	Vegetative growth and root thickening; weeding, organic top dressing; sparse irrigation.
Rabi (Jan–Feb)	Main harvest of roots ; cleaning, cutting and drying in solar dryer. Seeds collected for next season.
Summer (Mar–May)	Short-duration green manure or mulch + rest phase ; light irrigation only for cover crop.

A4. Guggul (D-BK 4 – perennial shrub, long-term)

Season / Month	Activity
Kharif (Jun–Aug, Year 1)	Transplant Guggul saplings in well-drained D-BK 4 beds; strong vermicompost base, raised beds.
Year 1–2 (all seasons)	Plant establishment, light pruning; weed management and mulching. No resin tapping.
Year 3 onwards	Controlled tapping of oleo-gum-resin as per guidelines (after full establishment); tapping window often post-monsoon in drier season, with plant recovery periods.

Guggul beds are **long-life**, so cropping calendar here is more about pruning, mulching and tapping cycles than rotation.

A5. Tulsi (D-BK 5 – leafy/herb, 2–3 cuts per year)

Season / Month	Activity
Kharif (Jun–Jul)	Nursery raising or direct sowing; first transplanting in D-BK 5.
Kharif (Aug–Sep)	First cutting/harvest of leaves and tender tops for drying.
Rabi (Oct–Dec)	Regrowth and second flush; second cutting.
Rabi/Summer (Jan–Mar)	Possible 3rd cutting if plants remain healthy; then rejuvenation or replant.
Summer (Apr–May)	Beds rested, mulched and manured; optionally short-duration cover crop before next replanting.

A6. Kalmegh (D-BK 6 – bitter annual herb)

Season / Month	Activity
Kharif (Jul–Aug)	Sowing / transplanting Kalmegh in D-BK 6.
Kharif–Rabi (Sep–Nov)	Rapid vegetative growth; organic top-dress; weed control; maintain moderate moisture.
Rabi (Dec–Jan)	Harvest aerial parts when bitter principles optimal; cut plants for drying.
Rabi/Summer (Feb–Mar)	Drying, threshing, cleaning; area mulched and lightly irrigated.
Summer (Apr–May)	Bed rest or light green manure before next Kharif sowing.

A7. Brahmi (D-BK 7 – creeping, moisture-loving perennial)

Season / Month	Activity
Kharif (Jun–Aug, Year 1)	Plant Brahmi cuttings in moist, mulched D-BK 7 beds; maintain good irrigation and partial shade if required.
Kharif–Rabi (Aug–Feb, annually)	Regular leafy harvest in small strips; allow regrowth; maintain organic nutrition; avoid water stagnation.
Summer (Mar–May)	Ensure sufficient irrigation and mulching; partial harvest as per demand; no rigid “season end” – more like rolling harvest.

Brahmi is maintained as a **perennial carpet** with repeated cut-and-regrow harvesting.

A8. Aloe vera (D-BK 8 – succulent perennial)

Season / Month	Activity
Kharif (Jul–Aug, Year 1)	Plant Aloe suckers in rows in D-BK 8.
Kharif–Rabi–Summer (Year 1–2)	Establishment; limited leaf removal in first year.
Year 2 onwards (all seasons)	Periodic leaf harvest at 3–4 month intervals ; maintain row spacing by removing overcrowded suckers, which become planting material for expansion or sale.

Aloe is essentially a **perennial rotational pluck** crop with all-season harvesting under irrigation.

A9. Moringa (V-BK – perennial tree, leaves + pods)

Season / Month	Activity
Kharif (Jun–Aug, Year 1)	Plant Moringa seedlings/cuttings in V-BK ring.
Year 1 (all year)	Establishment; light pruning to encourage branching; minimal leaf harvest.
Year 2 onwards	Multiple leaf harvests across seasons (every 2–3 months), and pod (drumstick) harvest in main fruiting season (often post-monsoon into winter).
Summer	Strategic pruning, mulching and organic nutrition to maintain tree vigour.

B. Zone-wise 3-Year Rotation / Management Chart

The **main identity of each D-BK ring does not change** (Musli stays Musli ring, etc.), but we rotate **between “full crop cycle” and “soil-rest + support crops”** to maintain soil health and yield stability.

B1. D-BK Zone Summary

- **D-BK 1:** Safed Musli (root, annual/10-month)
- **D-BK 2:** Shatavari (root, 2–3 years)
- **D-BK 3:** Ashwagandha (root, annual)
- **D-BK 4:** Guggul (resin, perennial)
- **D-BK 5:** Tulsi (leaf, 2–3 cuts/year, replant yearly or after 2 years)
- **D-BK 6:** Kalmegh (annual herb)
- **D-BK 7:** Brahmi (perennial, cut-regrow)
- **D-BK 8:** Aloe vera (perennial, pluck-leaf)

B2. 3-Year Management / Rotation Table

Legend:

- MC = Main Crop
- SR = Soil Rest + Green Manure / Mulch / Micro-intercrop

Zone / Herb	Year 1	Year 2	Year 3
D-BK 1 – Safed Musli	MC: Full Musli crop (Jun–Feb), harvest in Rabi; SR in summer with green manure & heavy mulching.	MC: Musli again or partial replants; same season pattern; SR in summer.	SR-heavy year: One full year of soil-rest / green manure + organic matter, no Musli ; then back to MC in Year 4. MC / Rejuvenation: Continue limited harvest or lift older clumps; replant younger crowns; if uprooted fully, insert 6–9 months of SR before fresh planting.
D-BK 2 – Shatavari	MC Establishment: Plant Shatavari, no major harvest (Year 1).	MC: Full production year with selective root harvest; strong mulching.	SR-biased: Green manure for one Kharif + low-extraction crop (e.g. leafy short-duration) to rest soil; return to Ashwagandha in Year 4. MC Production: Start limited tapping in Rabi/Summer with long recovery intervals; maintain for many years, with occasional SR patches if plants are removed.
D-BK 3 – Ashwagandha	MC: Ashwagandha annual crop; SR in summer with quick green manure.	MC: Repeat Ashwagandha crop; adjust sowing dates based on experience.	MC / SR Mix: If bed fatigued, take one full year of SR with green manure; or shift Tulsi lines inside the same ring, alternating bands with cover crops.
D-BK 4 – Guggul	MC Establishment: Plant Guggul, no tapping (Year 1).	MC Growth: No tapping; building root and stem system.	SR-biased: One year where half ring is Kalmegh and half is green manure, then swap halves next year to distribute rest.
D-BK 5 – Tulsi	MC: Tulsi (2–3 cuts); replant or rejuvenate after strong pruning.	MC: Tulsi again; introduce short SR window in peak heat (Apr–May) if plants are exhausted.	
D-BK 6 – Kalmegh	MC: Kalmegh annual crop; SR for 2–3 months after harvest.	MC: Kalmegh again or rotation with another light-demand leaf herb for part of the ring;	

Zone / Herb	Year 1	Year 2	Year 3
D-BK 7 – Brahmi	MC Perennial: Establish Brahmi mat; light cutting regime.	maintain heavy mulching. MC Perennial: Regular cutting; targeted SR micro-zones where mats thin out, renewed using vermicompost + fresh cuttings.	MC Perennial: Continue; if certain sections age or compact, temporarily convert 20–30% of area to SR with replanting; rotate rest areas similarly in future years. MC / Rejuvenation: Continue harvest; if crowding and yield drop, remove older clumps from a portion and take 6–9 months SR + replanting; rotate rejuvenation patches.
D-BK 8 – Aloe vera	MC Establishment: Plant Aloe, minimal harvest in first year.	MC: Regular leaf harvest cycles; remove excess suckers.	

B3. V-BK Moringa & Central Area

Zone	Year 1	Year 2	Year 3
V-BK – Moringa (86 trees)	Establish trees; minimal harvest; formative pruning.	Full leaf + pod production; strong mulching and organic feeding.	Continued production; strategic pruning to maintain canopy density; occasional SR micro-zones if trees removed / replaced.
Central Core (Stepwell + Solar Dryer + Storage)	Construction, commissioning, initial operation.	Stable operation; may host seasonal nursery crops (seedlings for all herbs) in portable trays.	Same as Year 2; can host demonstration plots or micro-trials in open patches.

This Annexure gives you a **practical, zone-wise cropping calendar and a simple 3-year management rotation** that:

- Respects your fixed ring-wise herb assignment,
- Keeps soil health central (Bhumikund + vermicompost + SR phases),
- And remains realistic for Gandhinagar’s irrigated climate.

Annexure 4: 5-Year Financial Projection Tables

Note (assumptions in brief):

- Area: **1 hectare (10,000 m²)**, layout as per concentric D-BK & V-BK design.
- Crops: Safed Musli, Shatavari, Ashwagandha, Guggul, Tulsi, Kalmegh, Brahmi, Aloe vera in D-BK; Moringa (leaves + pods) in V-BK; one Bhumikund vermicompost unit.
- Yields and prices are based on **dry herb equivalents and conservative market rates**, already incorporating the **33% enhancement** due to organic practice + in-house vermicompost.
- Full-capacity gross revenue at stabilised stage \approx **₹ 8.08 lakh/year**; Years 1–2 are ramp-up years.
- Fixed capital cost (Bhumikunds, stepwell, Shivana bricks, solar dryer, buildings, irrigation etc.) \approx **₹ 40,00,000**, proposed under grant support.

Table 4A – Year-wise Gross Revenue by Product Group (₹)

All values in Indian Rupees (₹), rounded.

Product / Segment	Year 1	Year 2	Year 3	Year 4	Year 5
Root herbs (Musli+Shatavari+Ashwagandha+Guggul)	122,615	214,576	306,538	321,864	337,191
Leaf & aerial herbs (Tulsi+Kalmegh+Brahmi)	16,525	28,919	41,313	43,378	45,444
Aloe vera leaves	5,120	8,960	12,800	13,440	14,080
Moringa (leaves + pods)	154,800	270,900	387,000	406,350	425,700
Vermicompost sales (surplus)	24,000	42,000	60,000	63,000	66,000
Total Gross Revenue	323,060	565,355	807,650	848,033	888,415

Ramp logic: Year 1 \approx 40% of full capacity, Year 2 \approx 70%, Year 3 = 100%, Year 4 \approx 105%, Year 5 \approx 110% (reflecting establishment of perennials and improved management).

Table 4B – 5-Year Financial Summary (Operating Level)

Assumed average annual operating costs (labour, irrigation power, inputs, maintenance, local transport, basic admin) increase gradually with scale and inflation.

Year	Gross Revenue (₹)	Operating Cost – OPEX (₹)	Net Operating Surplus* (₹)	Revenue (₹ lakh)	Surplus (₹ lakh)
Year 1	323,060	450,000	-126,940	3.23	-1.27

Year	Gross Revenue (₹)	Operating Cost – OPEX (₹)	Net Operating Surplus* (₹)	Revenue (₹ lakh)	Surplus (₹ lakh)
Year 2	565,355	500,000	65,355	5.65	0.65
Year 3	807,650	550,000	257,650	8.08	2.58
Year 4	848,033	600,000	248,033	8.48	2.48
Year 5	888,415	650,000	238,415	8.88	2.38

* **Net Operating Surplus** = Gross Revenue – Operating Cost (before interest, depreciation, tax).

- **Total Net Operating Surplus over 5 years: ≈ ₹ 6.8–7.0 lakh**
- Fixed capital cost (≈ ₹ 40 lakh) is proposed to be covered under **grant support**, so the operating surplus primarily measures **sustainability and continuity**, not repayment capacity.

Annexure 5: Bill of Quantities

(Shivana Bricks, Pipes, Structures, Irrigation)

This Annexure summarises the key physical quantities and major components that together form the infrastructure of the **1 ha Sanatan Ayush Van** unit, based entirely on the final layout, Bhumikund design, and financial chapter already drafted in the main report.

A. Shivana Bricks – Bhumikund & Edge Structures

All Dhanya Bhumikund (D-BK) herb rings and the Vrix Bhumikund (V-BK) moringa ring are constructed with **Shivana 3D interlocking bricks** (approx. 12 cm × 12 cm × 6 cm), forming raised bed walls and tree basins.

Table 5.1 – Shivana Brick Requirement (Summary)

Sr	Item / Zone	Quantity (Nos.)	Remarks
1	Dhanya Bhumikund (D-BK) raised bed walls – all 8 herb rings combined	Included below	2 m wide raised beds; ring-wise herb allocation as per crop plan; total D-BK area ≈ 3,616 m ² .
2	Vrix Bhumikund (V-BK) – moringa tree basins, curbs and ring edging (86 trees)	Included below	Moringa ring with interlocking brick edges and tree basins.
3	Misc. Bhumikund edging / tie-walls, curves, corners, junctions	Included below	Adjustments, cross-ties, and shape corrections in rings.
4	Total Shivana bricks for all Bhumikund structures (D-BK + V-BK)	4,49,800 Nos.	As derived from Bhumikund design and ring-wise layout.

Costing reference used in main report

- **Planned rate per Shivana brick:** ₹6 per brick.
- **Direct brick cost:** 4,49,800 × ₹6 = **₹26,98,800 ≈ ₹27.0 lakh** (brick material only).
- In the CAPEX summary, **Bhumikund structures (Shivana bricks + labour, foundations, finishing)** are clubbed as **₹30.0 lakh**, meaning **~₹3.0 lakh** is provisioned towards labour, foundations and finishing for the Bhumikund works over and above the brick material cost.

This annexure follows exactly these approved figures; it does **not** alter the brick count or the cost logic already accepted in Chapter 11.

B. Civil & Structural Quantities (Non-Brick Structures)

These are quantities for the main **water, storage, stay, nursery and drying infrastructure** located in the central core and outer protection zones, in line with the 30 m × 30 m central square design.

Table 5.2 – Main Structures (Dimensional BoQ)

Sr	Structure / Zone	Size / Capacity	Quantity	Remarks
1	Stepwell (central water storage)	10 m × 10 m × 5 m depth (≈ 500 m ³ water)	1 no.	Main water body; excavated + RCC / masonry + parapet and safe steps.
2	Storage godown (central core)	5 m × 5 m	1 no.	Storage for dried herbs, tools, materials.
3	Karmyogi stay / Guardian's room	5 m × 5 m	1 no.	Basic residential room / stay for on-site Guardian.
4	Solar tunnel dryer platform / covered unit	5 m × 5 m	1 no.	Solar tunnel dryer for herb drying as per CAPEX (₹4.0 lakh).
5	Shade-net nursery structure	10 m × 10 m (100 m ²)	1 no.	30–50% shade; nursery tables and micro-irrigation inside.
6	Bhumikund Vermicompost unit	3 m × 3 m bed	1 no.	Dedicated vermicompost Bhumikund for in-house GoldVermix-type compost.
7	Bamboo buffer belt	3 m wide ring, ~1,164 m ² area	1 ring	Outer protection belt around 1 ha square plot.
8	Peripheral road	3 m wide ring, ~1,092 m ² area	1 ring	Around the plot, for external access and logistics.
9	Inner service road	3 m wide ring, ~468 m ² area	1 ring	Inner movement ring around D-BK zone.
10	Walkways between rings	1 m width, multiple rings, ~1,800+ m ² total	As per layout	Pedestrian paths for harvesting, inspection and operations.
11	Open working & circulation area in central core	Residual of 30 m × 30 m after structures (~725 m ²)	1 zone	Sorting, staging of material, training gatherings, trolley movement.

All these are **already captured financially** in the CAPEX components:

- Stepwell – **₹12.0 lakh**
- Central core buildings (Karmyogi stay, storage godown, office/work slab) – **₹10.0 lakh**
- Nursery & shade-net – **₹2.0 lakh**
- Solar tunnel dryer – **₹4.0 lakh**
- Fencing, hedges & gate – **₹4.0 lakh**
- Bhumikund Vermicompost unit – **₹1.5 lakh**

C. Irrigation System – Pipes, Pump, Drip & Accessories

The irrigation system is intentionally described in the main report as a **simple, robust, 1-ha drip system** fed from the stepwell ($\approx 5,00,000$ L) and/or borewell, with mainline, two sub-mains, and drip laterals along all D-BK rings and tree belts.

Rather than over-engineering lengths here, the BoQ is presented in “**system**” terms keeping alignment with the CAPEX line item “**Irrigation system (pump, mainline, sub-mains, drip, filters, valves) – ₹5.0 lakh**”.

Table 5.3 – Irrigation & Water Management Components (System BoQ)

Sr	Component Group	Specification / Coverage	Quantity / Set
1	Pumping unit	Submersible or centrifugal pump sized to lift from stepwell / borewell; with starter panel	1 set
2	Filtration assembly	Sand filter + screen filter at pump outlet	1 set
3	Main pipeline (PVC / HDPE)	Mainline from pump along one edge of 1 ha plot (100 m side) feeding both sub-mains	1 complete run (job)
4	Sub-mains (PVC / HDPE)	(i) One along outer 3 m road (2nd ring) for bamboo, V-BK, outer D-BK rings; (ii) One along inner 3 m road (18th ring) for inner D-BK rings, Aloe/Brahmi and central core	2 runs (job)
5	Drip laterals for D-BK herb rings	16 mm laterals on crest of each D-BK ring, emitter spacing 30–40 cm, discharge 2–4 L/hr, sized to cover total D-BK area $\approx 3,616$ m ²	1 complete system for all 8 rings
6	Drippers for moringa & guggul	2–4 emitters per tree/shrub, adjustable with canopy growth; 86 moringa trees in V-BK + guggul shrubs in relevant ring	As per tree count (\approx 250–400 drippers total)
7	Brahmi micro-irrigation	Close-spacing drip or micro-sprinklers in inner Brahmi ring for uniform wetting	1 ring equivalent system
8	Aloe vera drip lines	Lines between rows; 1–2 emitters per plant across Aloe ring	1 ring equivalent system
9	Control valves & division boxes	Ball valves at logical blocks: outer rings, inner rings, moringa ring, central core	1 set
10	Overhead storage tank (optional)	5,000–10,000 L elevated tank near central core for gravity-fed irrigation / fertigation	1 no. (provisioned as optional)
11	Fittings & accessories	End caps, reducers, tees, elbows, grommets, joiners, clamps, etc.	1 lot

The **water balance** used in design is already documented:

- Intensive herb beds: **3,616 m² D-BK area**
- Extra planted area (bamboo, moringa, guggul etc.): ~2,000–2,500 m²
- Total intensively irrigated area: ~5,500–6,000 m²
- Peak requirement: about **24,000 L/day** at 4 mm/day on 6,000 m², with **stepwell capacity ≈ 5,00,000 L**, giving ~20 peak irrigation days buffer even without recharge.

These assumptions are **unchanged**; Annexure 5 simply organises them into a pipe-and-component BoQ that matches the already-approved CAPEX provision of **₹5.0 lakh for the complete 1-ha irrigation system**.

D. Link Back to CAPEX

For quick cross-reference inside the DPR:

- **Shivana bricks BoQ** (4,49,800 nos @ ₹6) → feeds into “**Bhumikund structures – ₹30.0 lakh**”.
- **Structural BoQ** (stepwell, central core rooms, nursery, solar dryer, vermicompost unit, roads, walkways) → covered under the CAPEX heads **Land development, Stepwell, Central core buildings, Nursery, Solar tunnel dryer, Vermicompost unit, Fencing & gate**.
- **Irrigation BoQ** (complete drip + pump + filters) → CAPEX line “**Irrigation system (pump, mainline, sub-mains, drip, filters, valves) – ₹5.0 lakh**”.

- **Annexure 6: Concept Sketches / 3D Views / ILLUSTRATION**



SANATAN AYUSH VAN

PROJECT AT A GLANCE

SANATAN AYUSH VAN – Guardian of the Healing Forest

1 Hectare AYUSH Herb Food Forest & Demonstration Farm – Gandhinagar, Gujarat

Promoter

Mandlik Brotherhood Private Limited

Registered social enterprise working on soil regeneration, food forests and organic input systems (Bhumikund vermicomposting, GoldVermix, Sanatan Krishi Van models).

Project Concept

Sanatan Ayush Van is a 1 hectare (10,000 m²) herbal food forest and model AYUSH farm that combines:

- High-value medicinal herb cultivation,
- Regenerative soil and water management, and
- A live training & demonstration centre for farmers, youth and institutions.

The land is developed using the Sanatan Krishi Van concentric layout:

- Outer bamboo belt (3 m) – windbreak, biomass and visual boundary.
- Peripheral road (3 m) for vehicle movement.
- Vrix Bhumikund (V-BK) ring with 86 Moringa trees for leaves and drumsticks.
- Eight Dhanya Bhumikund (D-BK) rings (≈ 3,600+ m²) built with Shivana 3D interlocking bricks as raised beds exclusively for medicinal herbs.
- Central 30 m × 30 m core: 10 × 10 × 5 m stepwell, 5 × 5 m storage, 5 × 5 m Karmyogi stay, 5 × 5 m solar tunnel dryer and working yard.

The entire unit works as a closed-loop system: biomass and residues are converted to vermicompost, which feeds the herbs and trees, with irrigation supplied from the stepwell through a drip system.

Key Crops & Products

Medicinal herbs in D-BK rings

- Safed Musli (*Chlorophytum borivilianum*)
- Shatavari (*Asparagus racemosus*)

- Ashwagandha (*Withania somnifera*)
- Guggul (*Commiphora wightii*)
- Tulsi (*Ocimum tenuiflorum*)
- Kalmegh (*Andrographis paniculata*)
- Brahmi (*Bacopa monnieri*)
- Aloe vera (*Aloe barbadensis*)

Tree layer (V-BK)

- Moringa (*Moringa oleifera*) – leaves and drumsticks.

Supporting systems

- One **Bhumikund vermicompost unit** (3 m × 3 m) for in-house organic manure.
- **Nursery and shade-net area** for seedlings and planting material.
- **Solar tunnel dryer** for hygienic drying of herbs and moringa leaves.

Outputs: bulk dried herbs, moringa leaf and pod produce, nursery plants, and surplus vermicompost.

Technology & Design Highlights

- **Shivana 3D interlocking bricks** form permanent Bhumikund raised beds – no mortar, fast assembly, excellent drainage and aeration.
- **Bhumikund vermicomposting** converts farm residues to high-quality organic manure, cutting input costs and improving soil carbon.
- **Stepwell-based water system** (≈ 5,00,000 L) with drip irrigation ensures high water-use efficiency and resilience to dry spells.
- Structured **SOPs for cultivation, harvesting, drying and storage** for AYUSH-ready quality and traceability.

Financial Snapshot (Indicative, 5-Year Horizon)

- **Total Capital Cost (CAPEX): ≈ ₹ 40.0 lakh**
 - Bhumikund brick structures, stepwell, buildings, nursery, solar dryer, vermicompost unit, fencing, irrigation.
- **Requested Support: ₹ 40.0 lakh grant** under rural development / AYUSH / organic farming / CSR.
- **Annual Operating Cost (steady state): ≈ ₹ 5.5–6.5 lakh**
- **Annual Gross Revenue at full capacity: ≈ ₹ 8.0–9.0 lakh** from dried herbs, moringa leaves & pods, and surplus vermicompost.
- **Net Operating Surplus (steady state): ≈ ₹ 2.4–2.6 lakh/year** (before depreciation and overheads).
- Project life: **15–20 years** with proper maintenance.

Since CAPEX is proposed as a **grant**, the operating surplus is used for **maintenance, expansion, training activities and building farmer clusters**, not for debt servicing.

Social, Environmental & Educational Impact

- **Rural livelihoods:** 4–5 full-time Karmyogis + seasonal labour; scope to integrate local farmers through herb cluster / buy-back arrangements.
- **Soil & water regeneration:** Bhunikund system, continuous organic inputs and stepwell recharge build soil organic carbon and secure water.
- **Biodiversity & climate resilience:** Multi-layer herb + tree system with bamboo and moringa buffers creates a resilient, living “healing forest”.
- **Knowledge & capacity building:** Live demonstration site for **AYUSH herbs, organic farming, Bhunikund vermicomposting and water-harvesting** – open to farmers, students, AYUSH colleges and CSR partners.