



*Defining the Future*

## DETAILED APPRAISAL REPORT

### DETAILED PROJECT REPORT FOR

### CONSTRUCTION OF MULTISPECIES MODERN SLAUGHTER HOUSE AT THIRUVALLA

Rep No. AR-2018-TRAN9-LSG003-01



## 1. SALIENT FEATURES

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### 1.1 Project details in brief:

- Name of Project : Construction of Multispecies Modern Slaughter House at Thiruvalla
- District : Pathanamthitta
- Project outlay : Rs. 11.20 Crore (Revised Cost – Rs. 11.12 Cr.)
- SPV/Implementing Agency : IMPACT Kerala Ltd.
- Budget Speech : Budget speech 2017-18 page 22
- Data reviewed : Detailed Project Report for Construction of Multispecies Modern Slaughter House at Thiruvalla and revised DPR submitted based on the Technical Appraisal Report

1.2 The Thiruvalla Municipality proposes to establish a modern slaughter house in its own land in Thukalassery in Thiruvalla constituency.

1.3 Modern facilities like Halal boxes, slaughter rails working on pneumatic systems, Carcass splitter, de-hiding machines etc. is proposed to be used in the slaughter house. Design of the slaughter house is made in compliance with bureau of Indian standards, slaughter rules of government of India, PCA act, and FSSAI rules etc. Waste management systems and effluent treatment plants of sufficient capacity is proposed to be established. The necessary backup generator, transformers are also to be provided.

1.4 Separate chiller units for small & large animals and scientific lairage as per the PCA rules is to be provided. Effluent treatment plant for 2lakh liter per day and vermi-composting unit with intake capacity of 1500 kg per day will be established.

1.5 The project will create direct employment in the plant and indirect employment by way of marketing and meat animal rearing. This model slaughter house will produce 4500 Metric tonne meat and 120 Metric tonne of meat meal annually.

1.6 The slaughter house is proposed to have a capacity of 100 large animals and 50 small animals per day. The total estimated cost of the project is 12.06 Crore (Revised Cost -11.12) for civil works and machinery.



## 2. STATUS OF FEASIBILITY STUDIES / CONCEPT STUDIES

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- 2.1 The meat industry based on the Indian scenario have been studied.
  - o Major market for Indian buffalo meat is Malaysia and Egypt.
  - o Sheep and goat meat mainly goes to UAE, Iran and Jordan.
  - o India also exports small quantity of processed meat and that goes to the market like Thailand, Yemen, and Japan
  - o Poultry products market is mainly in Saudi Arabia, Oman, Kuwait and Qatar.
- 2.2 The present trend of livestock export of the meat in the year 2013-14 have been provided in the report.
- 2.3 At present the industry faces major problems like unhygienic production of meat, contamination, poor infrastructure of abattoirs, unscientific processing, absence of cold chain, poor packaging and near absence of meat safety management systems.
- 2.4 A few model factories for cattle slaughtering and meat processing. Allana's in Maharashtra and Hind Group, initiative of Venkateshwara Hatcheries is a landmark in the poultry-processing sector etc. have been highlighted in the report.
- 2.5 Govt. of India has finalized formation of National Meat and Poultry Processing Board (NMPPB) and will address the issues related to production of hygienic, safe and wholesome meat and meat products which will result in higher value addition, harmonization of domestic standards and capacity building for the sector to take care of the Human Resource Development issues.
- 2.6 The meat production section wise have been provided in the report.
- 2.7 The meat industry based on the Kerala scenario have been studied in the report.
  - o A survey on slaughter houses was conducted by department of statistics in 2013. In the case of slaughter houses only 30.38% (1490) are registered (with local authorities) out of a total of 4904.
  - o Kozhikode district has the most registered slaughterhouses where as Ernakulam has the least followed by Malappuram.
  - o Kasaragod has the least number of slaughter houses including registered & unregistered.
  - o 78.19 % of the slaughter houses are registered in Municipal Corporation area, 54.99% registered in Municipal area and only 25.4% are registered in Panchayath area.
- 2.8 The population and meat production in Kerala in the year 2012 have been provided in the report.



- 2.9 When the state is consuming over 4 lakh tons of meat annually, more than 80% of the quantity comes from neighboring states.
- 2.10 The number of animals slaughtered in the registered and unregistered slaughter houses have been provided in the report.
- 2.11 The meat industry in the Thiruvalla scenario have been studied in detail.

### **3. REQUIREMENT / DEMAND ANALYSIS**

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- 3.1 The livestock sector serves as the exclusive source of animal protein and provides employment to over 300 million of rural people and contributes enormous amount of draught power and biomass that enriches the agricultural field.
- 3.2 Annual contribution of livestock, animal husbandry and fishery sector are Rs.1700 billion. Contribution of livestock sector to national GDP is about 7.35 %.
- 3.3 Animal protein consumption in our country is only about 14 grams per capita per day as against the world average of 34 grams/day per head.
- 3.4 In the developing countries in the total world meat consumption will increase to about 60 % by the year 2020.
- 3.5 Per capita consumption of meat is highest in Kerala.
- 3.6 About 1.8 million cattle are slaughtered in Kerala alone. Kerala thus provides a good opportunity for the growth of the meat industry.
- 3.7 Due to lack of suitable Infrastructure and because of the unhygienic and unscientific methods adopted for the Slaughter of animals, that leads on to contamination of meat and trade related issues of environmental pollution.
- 3.8 The traditional meat production systems that are adopted in Kerala and its associated unhygienic practices have considerably damaged the Kerala meat industry, due to nonexistence of rendering plants for the animal by-products and wastes.
- 3.9 Absence of meat inspection by qualified veterinarians is yet another factor that causes concern regarding the safety of meat that is sold in the Indian market.
- 3.10 NMPPB will also help industry utilize slaughter house waste materials, set up quality control laboratories for meat and meat products, promote meat manufacturers to adopt GMP, HACCP, ISO-9001 standards, help industry to create data and its dissemination, train workers, technicians



in meat processing industry and work as a central and national hub to address meat related issues.

- 3.11 When the state is consuming over 4 lakh tons of meat annually, more than 80% of the quantity comes from neighboring states.
- 3.12 Within the state, the existing meat production, processing and distribution network is in no way scientific. Moreover, no quality control measures are possible for the meat coming from other state.
- 3.13 The intake capacity of state-owned Meat Products of India and Meat plant of Kerala Agricultural University is negligible and the number of organized slaughter house under private sector is also very less.
- 3.14 The cattle and buffalo slaughtered in the state are preponderated with culled animals coming from other states, which are tough textured and requires processing for improving its quality.
- 3.15 Small flock rising is more common in the goat production sector of the state and hence the price of mutton and goat meat is very high.
- 3.16 Animal slaughter creates environmental issues unless sufficient infrastructure exists for scientific slaughter. Majority of the large animals are slaughtered in unscientific ways.
- 3.17 Slaughter wastes pollute water and water sources by increasing nutrient loads and fecal coliform count in many rivers. Effluent and slaughter waste are fertilizer for crops, and if overused, can lead to runoff of pollutants.
- 3.18 Undesirable odors contribute to air quality concerns and affect human habitations adversely. Odor is undoubtedly the most complex of all the air pollution problems
- 3.19 In the absence of a fully equipped slaughter house neither proper use of the by-products nor disposal of effluents and waste from the slaughter of cattle and buffaloes is possible. The wastes and effluent from these slaughter houses are of considerable quantity.
- 3.20 The non-utilization of slaughter by-products creates a considerable level of economic loss.
- 3.21 There is an existing slaughter house at Thiruvalla, 30 to 40 animals slaughtered every day. Veterinary services are not available and no proposed waste management systems being used. No antemortem and post mortem examinations are done here as slaughter is unauthorized.
- 3.22 Thiruvalla has a population of 11,95,537. As per Live Stock Census 2007 total livestock population in the District is 1,88,143 which contribute 5.24 percentage of the total livestock population in the State. There is no a single scientific slaughter house functioning.



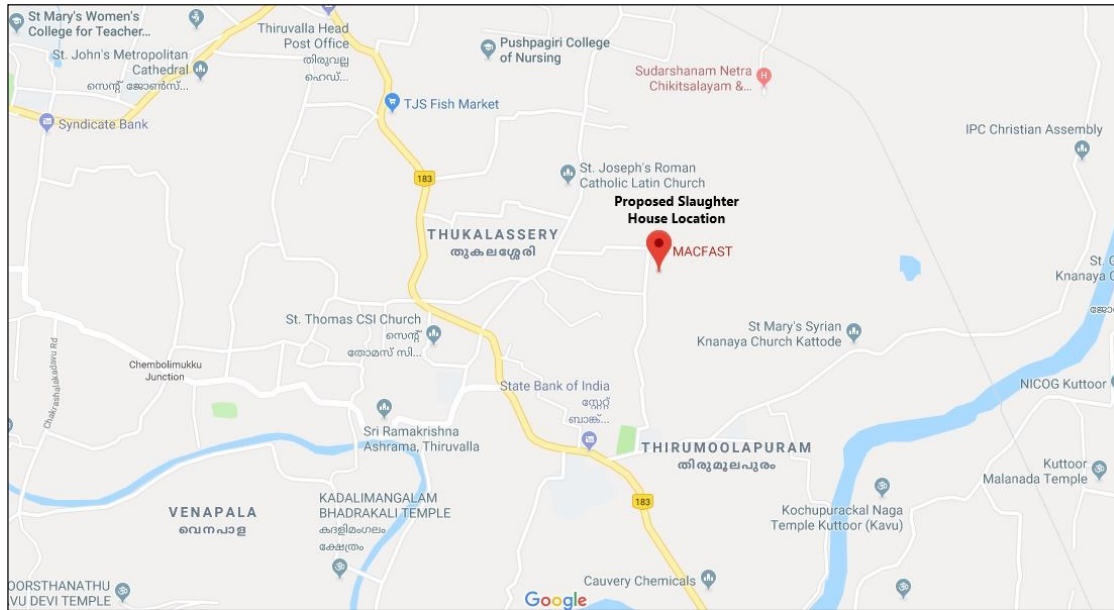
- 3.23 The meat production and number of animals slaughtered in Thiruvalla in 2012-13 have been given in the report.
- 3.24 Meat handlers in the district purchase cattle from wholesalers or directly from livestock markets of neighboring states and bring them by truck and stock them in private slaughter facility. They generally stock about 12-15 cattle on a weekly basis.
- 3.25 Nearly 500 people involved in meat production in the district traditionally doing the business. Ministry of food processing has taken an initiative for training them for hygienic meat production. But lack of infrastructure and marketing network including cold chain management is a problem of this sector in the district.
- 3.26 The implementation of National Food Safety and Standard Authority under the provision of the Food Safety and Standards Act 2006, unhygienic meat production will be strictly prevented which may results unemployment for the existing meat workers.
- 3.27 The main objective of the abattoir is to reduce contamination and cross contamination arising both from the activities of humans and due to presence of animals.
- 3.28 The abattoir has been designed in such a way that entry and exit of both humans and animals are regulated suitably to ensure food safety standards. Separate areas have been designed as animal reception, staff change, meat inspection, lairage, slaughtering, head and feet removal, horn and hooves storing, offal processing, meat processing and chilling area for meat.

#### **4. FUNCTIONAL DESIGN**

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- 4.1 Industrial killing and processing of livestock for meat is the main concept of the modern abattoir in India. Abattoir projects are meant to support food safety.
- 4.2 The slaughter houses in Kerala can be grouped into four categories:
  - Large slaughter houses
  - Medium sized slaughter houses
  - Panchayath slaughter houses
  - Village slaughter places
- 4.3 National Food Safety and Standard Authority under the provision of the Food Safety and Standards Act 2006, all the food items produced in the country will have to meet a certain level of quality standards in terms of hygiene prescribed.
- 4.4 Segregation of the clean and unclean activities in physically exclusive sections is planned.

- 4.5 The structure of all building/facilities has been considered in accordance with respective BIS Codes and National Building Codes.
- 4.6 The slaughter house is proposed in 1.5 acres of land owned by the Thiruvalla Municipality in Thukalassery and is well connected with motor able road with a width of 7m.



*Figure: Proposed Location of Slaughter House a Thiruvalla*

- 4.7 Water supply, open well and underground water is available in the site. Bore well is proposed to be built for continuous supply.
- 4.8 All infrastructure facilities and amenities such as water supply, electricity – three phase connections (HT line) with separate transformer and drainage facility are also available in the proposed abattoir site.
- 4.9 The abattoir effluents will be treated as per the prevailing norms of the Central Pollution Control Board of India. The treated effluents will be brought to the discharge standards and is proposed to be used for farming and gardening purposes.
- 4.10 The approach was towards establishing an abattoir with private partnership with a commercial viability to cater to a designated „service zone“ encompassing cities and towns of the neighborhood.
- 4.11 The steps involved in the approach have been detailed and consist of mapping project area, meat industry features of place, analysis of supply & demand situation, visualization of infrastructure & examination of suitability of site.



- 4.12 The methodology has been detailed and involves examining of supply side through secondary sources, seeking views and compliances of various governmental agencies, mapping of project area through primary survey, highlight of proposed abattoir.
- 4.13 The capacity of the proposed modern slaughter house is  
Cattle/buffaloes – 100 to 150 animals per day  
Goat/sheep – 50-75 animals per day  
Initial proposal is for 100 large animals like cattle/buffaloes, 50 small animals such as sheep and goats.
- 4.14 The common goat/cattle line would have an installed capacity of about 15 animals per hour; the number of operable hours for conducting slaughter operation could be enhanced to reach maximum production of 8 hours.
- 4.15 The plant could be upgraded to produce up to 250 large animals and 100 small animals.
- 4.16 Rendering plant has capacity of 500kg per hour. In 8-hour shift, 4 tons of slaughter waste could be rendered. The rendering plant is expected to work for two shifts a day during the first phase of the project. It could operate for 16 hours per day based on the amount of solid waste generated.
- 4.17 The various acts, rules and regulation, codes and standards that are to be followed for construction and handling of the animals in the slaughter house have been mentioned in the report. The involves PCB, various acts and rules by governments, Indian Standard codes from BIS and Food Safety and standards Act-2006.
- 4.18 For production of quality meat in a hygienic meat manner, the mandatory requirements to be observed in India are Food Safety and standards Act-2006, regulations of meat food products order 1973 & HACCP for processed meat & meat products.
- 4.19 The processes that require water have been mentioned and water demand of 275 liters per cattle; and 45 liters per sheep/goat with an extra provision of 25% have been considered.
- 4.20 The layout and design of units is based on scientific aspects and have been classified as:
- o Dirty and clean areas
  - o Clean and dirty products
  - o Building a slaughter house
  - o Requirements for premises
  - o Factors affecting slaughter house work areas





- o Facilities for staff
- o General requirements for premises, structures and equipment
- o Use of water in the slaughter house

The aspects considered have been detailed in the report

- 4.21 The general guidelines to be followed have been identified and mentioned in the report. Primary abattoir civil works, general civil works, plants and abattoir utilities and equipment, effluent management system, plumbing and electrical works, general civil equipment, services and amenities etc. have been detailed in the report.
- 4.22 Considering the revised FAO standards, 1.7 Sqm for large and 0.25 Sqm for goat and sheep could be considered in the design.
- 4.23 Materials used shall be coated with food grade epoxy paint which is impervious, easily cleanable and resistant to wear and corrosion.
- 4.24 The floors shall be non-absorbent and non-slippery with non-skid finish and shall have suitable gradient for drainage. The floor should be laid with P.C.C mixture reinforced with plastic fiber material. The slope of the floor shall be 1:10.
- 4.25 The side walls are to be made from regular brick masonry with plastering and putting with glazed tiles up to roof level or minimum of 4.05 meters height. The corners to be cladded & edges are to be reinforced with food grade material
- 4.26 Ceilings at the height of 5.5 meters in case of bovine in conveyORIZED area. The slope of the floor shall be 1:10. The ceilings are of R.C.C/ other standard material and finished on the inner side with epoxy paint and external with water resistant paint.
- 4.27 Window ledges shall be sloped 45 degrees to promote sanitation and to avoid damage & windowsills shall be 1200mm above the floor level with proper ventilation through mechanical venting or through working vents provided in the roof structure.
- 4.28 For rodent proofing, mesh will be embedded in walls and floor at their junction and such mesh shall extend vertically and horizontally to a sufficient distance.
- 4.29 Doors shall either be of rust resistant metal construction throughout, doorjambes shall be clad with rust resistant metal securely affixed.
- 4.30 All windows, doorways and other openings will be equipped with effective insect and rodent screens and air curtains will be provided over doorways in outside wall of food handling areas.



- 4.31 All parts of floor where wet operations are conducted shall be well drained with a slope of about 20 mm per meter with one drainage inlet 37 sqm of floor space with abattoir effluents diverted to Effluent Treatment Plant.
- 4.32 Sanitary drainage lines are to be connect to the external sewerage system/septic tank system.
- 4.33 Unrefrigerated work rooms shall be provided with adequate direct natural light and ventilation or ample artificial light and ventilation by mechanical means. Every abattoir unit shall be provided with distributed artificial light.
- 4.34 The main slaughter house having the main process line is proposed to be air conditioned to 24 degrees Celsius.
- 4.35 The building will house all the necessary testing facilities required in an abattoir check the suspected carcasses thoroughly for safe human consumption like Microbiological testing of carcasses.
- 4.36 The abattoir is provided with a change area for the workers.
- 4.37 The 7m wide road with bituminous material designed to withstand low speed traffic of 40 tones containers. Landscaped areas in the site with suitable greenery along the boundary is also proposed.
- 4.38 The details of primary and general civil works are as follows-

#### **Reception area**

- o Each slaughter line is provided with a reception area with unloading ramp, facility for feeding & watering, preliminary veterinary inspection area and lairage area. Sloped floor is propped with impervious, non-slippery and abrasion resistant with water jet facility with adequate illumination.
- o Each reception has contiguous isolation space.
- o The roof is proposed to be projected 1" from the wall line having a slope of 1:10 to prevent direct rain water entry into the shed.
- o The gap between the brick wall and the roof shall be covered with GI net to prevent entry of insects.
- o Eaves height of lairage is proposed to be 3.5m.

#### **Meat Reception Area**



- o The meat inspector who is a specially trained veterinary doctor, who shall examine thoroughly not more than 12 animals in an hour and not more than 96 animals in a day. The abattoirs require two meat inspectors.
- o Floor shall be non-skid impervious flooring.
- o The toilets of the veterinary chambers shall be having fitting and fixtures with sufficient illumination.

### **Slaughter Area**

- o Slaughter House - The Slaughter house will be constructed with standard construction materials. The rate of slaughter by using the overhead conveyor line is set for a capacity for processing bovine bovine/small animals @ 15 head of animals per hour. visual barrier is placed to separate the animal entrance of Stunning and sticking area and slay area and the dead animal process area.
  - o Blood Collection Area - A floor wash point shall be provided in a slaughter house for intermittent cleaning and hand wash basin and knife sterilizer shall also be provided.
  - o Skin Area
  - o Head & Feet preparation area - A tripe wash and feet processing machine for bovine and goats is contemplated.
  - o Rendering Area - Separate area is allocated for installing rendering plants.it has the capacity of 500kg continuous cooker. Waste will be taken to rendering plant via trolleys.
  - o Chiller Area - The slaughter area has provisions for hanging hall and delivery of dressed carcasses. The chilling and cold storage facility along with the packing area is to be constructed.
- 4.39 The slaughter building along with the area for other activities apart from allied activities is proposed be built with regular brick masonry work with R.C.C roof structures for most parts except for the area earmarked for metal roof. The eaves height of the non-slaughter area is proposed to be 4.5m.
- 4.40 The process floe of modern abattoir for the Bovine/Goat process line is detailed in the report. This involves reception, ante mortem inspection (ante mortem guideline & philosophy being



detailed), foot wash, slaughter area (Halal method for slaughtering detailed), bleeding & hoisting of animals, blood collection, leg preparation & decapitation, dressing in processing area which involves anus removal, flaying, lumber region & back, neck shoulders & forelegs and final removal of hide and evisceration being done subsequent to the above processes and finally splitting of carcass; post mortem inspection (general principles detailed), post slaughter processing of carcass (meat and non-meat), cleaning of carcass with hot & cold water, quartering of carcass, stamping & weighing.

- 4.41 Tools and accessories like knives, sharpeners, insect cutters, boots and apron washing cabinet etc. is required for operating modern abattoirs.
- 4.42 Support services like hot & cold water, compressed air, waste product handling & STP and power is required.
- 4.43 The auxiliary items include:
- o Quality control laboratory equipment
  - o Comfort cooling equipment
  - o Vehicle for delivery of carcasses and model meat shop
  - o Stunner for bovine and goat
  - o Insect killers & air curtains,
  - o Mechanical & electrical maintenance tools and tackles
  - o Equipment/Accessories for by product processing areas and skin handling areas.
  - o Worker's clothes for slaughter area
  - o A computer terminal with printer
- 4.44 The cattle slaughter house equipment's have been mentioned and detailed in the report. These include:

#### **Bovine Plant**

- o Singel Rotary Halal Box
- o Landing Grate
- o Landing Hoist



- o Motorized Bleeding Lane
- o Motorized Dressing Lane
- o Leg Changing system
- o Leg Cutting Platform Fixed
- o Leg Chute
- o Front Hide & Anal Bunging Platform Pneumatic
- o Head Motorized Conveyor
- o Brisket Opening Platform Fixed
- o Hide Puller Pneumatic
- o Hide Chute
- o Viscera Platform Fixed
- o Viscera Chute
- o Head & Viscera Inspection Station
- o Carcass Splitting Platform Pneumatic
- o Doctor Inspection Platform Pneumatic
- o Take Up Unit
- o Washing & Trimming Platform Pneumatic
- o Chillers Line
- o Quartering Platform Fixed
- o Quartering Station Pneumatic
- o Animal Pressing System
- o Sequence System
- o Washing Screen Manual



- o Dressing Hooks (200 Nos)
- o Bleeding Hooks (20 Nos)
- o Carcass Splitting Bandsaw (Electric) (1 No)
- o Carcass Splitting Bandsaw Balancer
- o Brisket saw Hydraulic (1 No)
- o Brisket saw Balancer
- o Sterilizer for Carcass Splitter
- o Primary structure for Abattoir & Chiller
- o Air Compressor with Vertical Air Receiver for Pneumatic Controls
- o Hot Water Line Piping & its Connection with Insulation
- o Complete Pneumatic Lines from Air Compressor Receiver to the Equipment
- o Electrical Panel
- o Electrical Cable Trays, Control cables & Cable Connections from Main Electrical Panel to the Equipment
- o On Line Weighing Scale

### **Ovine Slaughter Line**

- o Sheep Restrainer
- o Halal Table
- o Bleeding & Dressing Motorized Conveyor
- o Working Station
- o Chiller Line
- o Primary Structure for Abattoir & Chiller
- o Hot Water Line Piping & its Connection with Insulation
- o Complete Pneumatic Lines from Air Compressor Receiver to the Equipment's



- o Electrical Panel
- o Electrical Cables Tray, Cables & Cable Connections from Main Electrical Panel to Equipment
- o On Line Weighing Scale

### **Rendering Machine**

- o Raw Material Bin of 4 Metric Tonne Capacity
- o Conveyor from Raw Material Bin to Bone Meat Shredder
- o Bone Meat Shredder of 1 ton/hour Capacity
- o Screw Conveyor from Bone Shredder to Buffer Bin
- o Raw Material Buffer Bin of 3 Metric Tonne Capacity
- o Screw Conveyor from Raw Material Bin to Cooker
- o Compact Continuous Cooker of 0.5 Metric Tonne Capacity
- o Screw Conveyor from Cooker to Screw Press
- o Screw Press
- o Screw Conveyor from Screw Press to Cake Bin
- o Cake Bin
- o Screw Conveyor from Cake Bin to Hammer Mill
- o Hammer Mill
- o Screw Conveyor from Hammer Mill to MBM Storage Silo
- o Vibrating Screen
- o Tallow Buffer Tank
- o Tallow Pump (2 Nos)
- o Tallow Storage Tank
- o Condenser for Cooker Vapors



- o Water Cooling Tower
- o Cooling Tower Pumps (2 Nos)
- o Odor Vapors Collection Drum
- o Extract Fan
- o Air Piping from Cooker till Bio Filter & Suction Air from Different Points (Lot)
- o Cooling Tower Valves Fitting & Piping (lot)
- o Tallow Pipe Fittings & Valves
- o Main Electrical Panel
- o Electrical Cable Trays, Control Cables & Cable Connection from Main Electrical Panel to Equipment

#### **Electrical Equipment**

- o Standby Generator of 300 kVA Capacity with Manual Change Over
- o Transformer
- o Distribution Panel
- o Complete Electrical Cabling, Earthing etc.
- o Outside Light Fittings

#### **Hygiene & Lab Equipment**

- o Air Curtains of Different Sizes (6 Nos)
- o Fly Catchers (8 Nos)
- o Lockers for Butchers (2 Nos)
- o Shoe Racks (2 Sets)
- o Hand Drier & Boot Wash Station (2 Nos)

#### **Refrigeration Equipment**

- o Refrigeration Unit for Bovine Chiller with PU Panel & Doors





- o Refrigeration Unit for Ovine Chiller with PU Panel & Doors
  - o Electrical Control Panel with Temperature Indicators
- 4.45 Solid waste management in the slaughter house:
- o Waste produced from slaughtering of 100 Large Animals and 50 small animals-Total waste percentage is 17 for small animals 27% for large animals-Dressing percentage is 65.
  - o The assumptions for the weight and waste produced have been mentioned in the report. The same have been tabulated.
  - o The solid waste from the slaughter house have been classified as Type I waste (vegetable matter) and Type II waste (Animal Matter).
  - o The slaughter house waste i.e. type I and type II waste, can be used for compost making.
  - o Vermicomposting of the solid waste is seen to be proposed. The slaughter house waste i.e. type I and type II waste, can be used for compost making.
- 4.46 The process for the ETP for the proposed slaughter house is provided in report in form of a flow diagram. The processes have been also detailed in the report.
- 4.47 A wastewater treatment system with anaerobic reactor followed by aerobic reactor is proposed as secondary treatment. After secondary treatment chemical treatment is proposed and the final clarified effluent is filtered and disposed. A portion of the treated water shall be reused after ultra-filtration.
- 4.48 The type of wastes generated in the slaughter house and the allied area is identified in the report. A total volume of 150 kLD is expected as waste.
- 4.49 The ETP consist of screening chamber, oil skimmer tank, collection tank, digestion tank, aeration tank, secondary clarifier, sludge sump, filter feed tank, treated collection tank & panel board room are the civil works involved which is RCC except panel board room which is brick and the dimensions of the same is mentioned in the report
- 4.50 The mechanical works needed for the ETP are bar screen, raw feed pump, re-circulation pump, floating gas holder (FRP), aeration tank – Diffusers, Media in Aeration (MBBR Media), Media in Sec Setting, Filter Press, Filter Feed Pump, Disinfection & Activated Carbon Filter whose specs and details have been mentioned.
- 4.51 The electrical load details of the various units have been mentioned in the report.



- 4.52 The support services like power supply system, water supply, sewage system, storm water drainage, Effluent treatment plant, compressed air system and fire-fighting system have been detailed in the report.
- 4.53 The processes and stage wise details of the rendering technology continuous cooker is provided in the report along with a flow chart of the same.
- 4.54 The availability of sufficient water to meet the proposed demands shall be ensured before the project is initiated and other alternatives in case where the proposed sources are not available shall be mentioned.
- 4.55 The disposal of the treated water from the effluent plant has not been provided. The reuse of a portion of the treated water is envisage din the proposal. The disposal of the treated effluent as per the prevailing norms and the methodology adopted shall be finalized.

## **5. ENGINEERING DESIGN**

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- 5.1 No soil investigations have been carried out. Isolated footings are seen to be provided for the structures based on the structural drawings.
- 5.2 The basis of choosing the isolated footing shall be substantiated by expert opinions but the soil present, bearing assumed and the founding depth has not been substantiated by the expert.
- 5.3 The design basis report for the proposed slaughter house is provided in the report.
- 5.4 The site plan & layout, plan, section, elevation of the proposed buildings has been provided in the report. The preliminary structural scheming as well as the cross sections of the buildings are also provided in the report.
- 5.5 The design of the roof truss for the required buildings are included in the report.
- 5.6 The machine layout for the slaughter house & rendering plant have been provided in the report with the steel sections needed for the same.
- 5.7 The preliminary fire drawings for slaughter house, Labour quarters & rendering plant and hot & cold-water supply for the slaughter house have been provided in the drawing.
- 5.8 The architectural, electrical, plumbing drawings for the proposed labour quarters is provided in the report.
- 5.9 The process flow and the preliminary drawings for the proposed Effluent treatment plant has been provided in the report. The preliminary sized and HP of various pumps required has been mentioned in the report but the calculations for the same are not provided.



- 5.10 The layout for the proposed drains/sewage lines has been provided in the report.
- 5.11 The electrical drawings for the slaughter house is also provided in the report.
- 5.12 The technical specification for the various items for the proposed slaughter house has been detailed in the report.

## **6. O&M STRATEGY**

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- 6.1 The report mentions that fresh carcass will be transported in vehicles with cold chain management systems to different locations where the retail point is situated.
- 6.2 The organization who builds the plant will be responsible for running the plant for the first 2-3 years with annual maintenance contract. During this period, selected eligible meat workers can be trained in handling the machineries
- 6.3 The SPV shall empanel few organizations which are experts in the field of slaughter house construction and maintenance. After establishing this organization will be responsible for maintenance of the plant for 10 years for which the cost will be met by the agency/organization running the plant.
- 6.4 Marketing outlets will be offered on franchise model with preference given to those working in meat sector.
- 6.5 20 such selling points will be established in the district during the first year. Number of selling points can be increased on demand in successive years.
- 6.6 Selling counter will be air-conditioned glass houses with floor space 200 sq. ft. with infrastructure for cutting & hanging, deep freezer provided.
- 6.7 Unsold frozen meat can be taken back to the processing unit the very next day and will be converted in to value added products.
- 6.8 Direct marketing of meat to hotels, Central Jail, Naval academy, CRPF camps etc. is proposed as another option.
- 6.9 The abattoir is proposed to be run for a minimum of 300 days in a year and the manpower needed and the allocation is planned & provided in the report. The expenditure for the manpower employed have also been worked out in the report.



## 7. FINANCIAL ESTIMATES & COST PROJECTIONS

- 7.1 The estimate has been prepared in PRICE based on DSR 2016 with the corresponding Cost Index as published by Government of Kerala for Pathanamthitta (44.12 %) and market rates are adopted for plant and machineries. GST at 12% of the estimated civil works cost has been considered in then estimate,
- 7.2 The cost of machinery/plant/equipment like bovine slaughter plant, ovine slaughter plant, Effluent treatment Plant, rendering plant, electrical equipment, refrigeration equipment, hygiene and lab items, refrigerated vehicles, fire equipment, Packing, forwarding & transportation, office furniture, potable plumbing etc. have been taken as lumpsum or market rates.
- 7.3 The quotes for the market rates adopted has been provided in the report. The equipment or machinery the rates adopted shall be supported by quotes or references.
- 7.4 The preliminary expenses considered shall be met from the Centage charges allocated for the project and shall not be considered in the estimate.
- 7.5 The estimate for the electrical works shall be based on the detailed item wise estimate and the same shall be based on the DER.
- 7.6 The following are the major items of work considered in the estimate along with the corresponding recommended costs

Description	Estimated Cost (in Cr.)	Recommended Cost (In Cr.)	Remarks
Bovine Slaughter Unit	₹ 2.607	₹ 2.607	
Ovine Slaughter unit	₹ 0.580	₹ 0.580	
Rendering Plant	₹ 1.060	₹ 1.060	
ETP	₹ 0.730	₹ 0.730	
Electrical Works	₹ 0.706	₹ 0.706	
Hygiene Equipment's	₹ 0.055	₹ 0.055	
Refrigeration Equipment	₹ 0.250	₹ 0.250	
Extra Items	₹ 0.026	₹ 0.026	
Installation & Commissioning	₹ 0.400	₹ 0.400	
Packing, Forwarding & Transportation	₹ 0.300	₹ 0.300	
IGST @ 18%	₹ 1.208	₹ 1.208	

<b>Total Equipment</b>	₹ 7.921	₹ 7.921	
Modern Slaughter House	₹ 0.796	₹ 0.796	
Cattle lairage	₹ 0.252	₹ 0.252	
Sheep Lairage	₹ 0.052	₹ 0.052	
Rendering Plant	₹ 0.147	₹ 0.147	
Vermin-compost	₹ 0.142	₹ 0.142	
Labour Quarters	₹ 0.130	₹ 0.130	
Effluent treatment plant 60 KLD	₹ 0.208	₹ 0.208	
Over - head water tank 25000LTR capacity	₹ 0.059	₹ 0.059	
Compound wall	₹ 0.170	₹ 0.170	
Septic Tank and soak pit	₹ 0.017	₹ 0.017	
Plumbing and Sanitary fittings	₹ 0.038	₹ 0.038	
Landscaping work	₹ 0.130	₹ 0.130	
Electrification (10% of Rs. 1.96 Cr.)	₹ 0.235	₹ 0.235	Estimate shall be detailed based on DER rather than LS
GST 12% of Rs. 2.38 Cr.	₹ 0.285	-	Excluded from the recommended cost
<b>Total Civil</b>	₹ 2.661	₹ 2.376	
Refrigerated Vehicles	₹ 0.450	-	To be arranged during O&M stage
Lab Equipment's	₹ 0.027	₹ 0.027	
Fire Fighting Equipment's	₹ 0.005	₹ 0.005	
CCTV Systems	₹ 0.018	₹ 0.018	
Bore Well	₹ 0.010	₹ 0.010	
Statutory Approval	₹ 0.030	-	Shall be met from centage
<b>GRAND TOTAL</b>	₹ 11.122	₹ 10.357	

Amount fundable by KIIFB – Rs. 10.357 Crore



## **8. REVENUE STREAMS**

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- 8.1 The revenue streams activities have been identified as auditorium, classrooms, seminar halls etc. to conduct skill A fee can be levied from the individuals and organizations bringing animals for custom slaughter
- 8.2 The sale of MBM produced from the rendering plant is also a source of income for the slaughter house.
- 8.3 The details of revenue from the slaughter houses, expenditure, manpower with the needed salaries, depreciation, projected profit and loss, cash flow statement have been worked out for the project.
- 8.4 The possibility of sale of manure obtained from the vermicomposting used for solid waste management shall be considered as a source of revenue.

## **9. COST BENEFIT ANALYSIS**

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- 9.1 The Slaughter house creates direct as well as indirect employment opportunities.
- 9.2 The NPV value has been worked out at a discounted rate of 12 and 13 percentage.
- 9.3 The IRR of the project have been worked out as 13.32 % based substantiated with primary and secondary data.

## **10. VALUE ENGINEERING OPTIONS**

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- 10.1 The foundations are adopted based on expert opinion or assumptions which may not be most optimal options available.
- 10.2 The possibility of procuring the machineries at the various slaughter houses may be considered to obtain lesser cost by clubbing the various projects.
- 10.3 OD or market rates shall not be adopted for items having DSR references.

## **11. IMPLEMENTATION SCHEDULE & WBS**

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- 11.1 The implementation schedule for the civil construction of the slaughter house and the machinery and equipment procurement, erection/installation and commissioning have been provided in the report.



- 11.2 The civil construction of the slaughter house is proposed to start from June 2018 and end by July 2019. (14 months)
- 11.3 The Plant procurement, erection, installation and commissioning is proposed to start from July 2018 to December 2019. (18 months)
- 11.4 The proposed duration of the civil construction of the slaughter house is 14 months and that of Plant procurement, erection, installation and commissioning is 18 months with overall duration of project 19 months

## **12. PROJECT MANAGEMENT ORGANIZATION STRATEGY**

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- 12.1 Monitoring of the work will be done jointly by Engineers of SPV and Local LSGD.
- 12.2 The specific organization chart proposed for the execution of the slaughter house has been included in the report.
- 12.3 The roles of the various members in project management is also mentioned in the report.

## **13. CONTRACT MANAGEMENT STRATEGY**

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- 13.1 Technical sanction will be done by the SPV and monitoring will be done by the SPV and LSGD jointly
- 13.2 The tender document proposed to be used for the slaughter house is provided in the report.
- 13.3 Contracting methodology for the execution of the project (item rate, lump sum, design and execute, EPC etc.), system followed in the bidding document and manuals of reference etc. (PWD/CPWD/ FIDIC) and contract clause which may likely to lead to additional financial liability, if any shall be identified by the SPV and communicated while according technical sanction.

## **14. STATUTORY CLEARANCES**

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- 14.1 Statutory approvals (consent to establish) is to be obtained before start of the civil work. After the completion of civil and installation of machines, approvals are again required (consent to operate).
- 14.2 The clearances from the following are to be obtained:
- o Pollution control board
  - o Fire and rescue department



- o Broiler and factories department
- o Town and country planning
- o Fire and rescue department

## **15. ENVIRONMENTAL ASPECTS & SUSTAINABILITY**

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- 15.1 The solid waste management and the ETP proposed in the slaughter house allows the safe disposal of waste generated.
- 15.2 The rendering plant can be used for waste from the slaughter house as well as those from the nearby places that slaughter animals.
- 15.3 An Environmental Management Plan (EMP) is to be developed explaining the possible environmental issues have been included in the report.
- 15.4 Environmental impact assessment study has been conducted and measures are identified to mitigate the adverse impact have been furnished in the report.

## **16. QUALITY MANAGEMENT PLAN**

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- 16.1 Quality of civil design and construction will be assured by proper monitoring of the project with expert team from the SPV & LSGD engineering will be assigned
- 16.2 Quality management plan for the slaughter process will be taken care by the health wing of the LSGD.
- 16.3 The civil layout, work plan of the slaughter line is done according to the HACCP guideline and FSSAI rules related to slaughter house.
- 16.4 Slaughter house has been designed to APEDA standards for export purpose
- 16.5 Waste management plans are taken care to suits to the quality management plan of the project.
- 16.6 Quality checking will be done as per PWD norms by the engineers of LSGD.
- 16.7 The quality management plans for the equipment, machineries and plant have been mentioned in the report.





## **17. RISK ASSESSMENT AND MITIGATION MEASURES**

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- 17.1 The risks during the construction stages have been identified and have been grouped into potential impacts to soil, water, air, noise and waste generated along with local issues related to workforce at project site. Suitable mitigation measures against the identified risks have been mentioned in the report.
- 17.2 The risks during operation have been identified as local issues against installing slaughter house, lack of technical expertise in running plant & annual maintenance, high price of product which may affect marketing the product, issues created due to unemployment of local butchers, issues in bringing slaughter animals from nearby state, technical consultancy in implementing the project with suitable mitigation against them being recommended.

## **18. REMARKS AND INFERENCES**

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- 18.1 The DPRs contain necessary details including item wise details, master plan, detailed estimate etc.
- 18.2 The DPRs substantiate that the projects are feasible.
- 18.3 The parameters studied regarding the demand are in favor of the proposed projects.
- 18.4 The functional design is matching with the requirement and demand along with the standards.
- 18.5 The preliminary structural scheming and associated details proposed are satisfactory.
- 18.6 The O& M strategy proposed is satisfactory.
- 18.7 The detailed estimates are furnished in the report and seems satisfactory for the proposed projects. The observations made in chapter 7 shall be adhered to while making the estimate for Technical Sanction.
- 18.8 Possible revenue streams have been identified and can be used as a means of revenue generation for operations and maintenance of the proposed slaughter house.
- 18.9 The investment criteria (CBR) meets the target standards but numerical values assigned to various benefit components are not supported with adequate primary or secondary data.
- 18.10 Considering the nature of the project, the value engineering options are minimal and the estimate seems to be reasonable.
- 18.11 The period of completion is realistic and the WBS is based on the rational sequencing of activities with most likely durations.
- 18.12 The project management organization plans seem satisfactory.



- 18.13 The contract management plans are acceptable provided the documents and procedures are not in conflict with any of the rules and regulations with regard to public works execution prevailing in Govt of Kerala.
- 18.14 Explanations regarding the statutory clearances are acceptable.
- 18.15 The impacts of the project have been identified and EMP has been formulated for the project which is acceptable.
- 18.16 The quality management plans are acceptable.
- 18.17 The risk identification and management plan seem to be satisfactory.

## **19. RECOMMENDATIONS AND SUGGESTIONS**

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- 19.1 The project may be considered for funding by KIIFB subject to the execution of tripartite agreement.
- 19.2 The amount to be considered for sanction works out to be **Rs. 10.357 Crore** based on the recommended costs in chapter 7.
- 19.3 The foundations adopted are based on the assumptions. The foundations for the proposed slaughter house shall be based on actual soil investigation report and its recommendations before TS is accorded.
- 19.4 The detailed estimate submitted shall be reviewed by the TS authority considering applicability and the relevance of Cost Index and adherence of latest PRICE schedule. (GST shall be applicable as per the prevailing norms and conditions)
- 19.5 The Technical Sanction shall be issued by the competent authority by ensuring the reasonableness of the rates adopted in the estimate by comparing with the rates of equivalent items in the PRICE.
- 19.6 The observations made in Chapter 4 considering the availability of the sufficient potable water and the disposal of the treated water from the ETP shall be clarified before TS is accorded and the documentary evidence of the action initiated shall be submitted to KIIFB,
- 19.7 The Technical sanction by competent authority is mandatory before schedules are added to the Tripartite agreement.
- 19.8 The cost provisions for work alone shall be utilized for execution of work. The savings or anticipated savings from LA, QC, demolition etc. shall not be re appropriated for meeting expenditure of work proper.



19.9 While entrusting the maintenance activities to the contractor, it shall be ensured that the obligation under defect liability shall be performed without any additional cost. Hence no maintenance expenditure is considered under the original work.