#### **RDPE Business Plan**

#### **Executive Summary**

#### 1) Background of project

The applicant is a mushroom growing company based at Thakeham, West Sussex on a 30 acre site of buildings with 50 acres adjoining. The company supplies 3 major supermarket chains. It is the only major mushroom grower, growing more than 100 tonnes/week in the South East and the only major mushroom grower that makes its own compost on site.

The company is producing in the order of 130 tonnes per week. To do this it makes 900 tonnes of Phase 1 compost per week and thus needs to dispose of 500 tonnes of spent compost per week. The company spends some per annum on energy costs primarily electricity and oil on a turnover which is currently in the region of the company on an annualised basis.

The project is to utilise the spent compost as a fuel by converting it into an energy source as opposed to the compost being spread to land.

The company therefore made visits to various companies in the UK and USA and investigated biomass techniques and were particularly impressed with a burner which had the ability to burn wet material coupled with technology to power generation equipment.

The scheme has been developed to provide heat and chilling facilities.

The UK consumption of mushrooms has remained static at some 113,000 tonnes per annum.

#### 2) Description of the proposal and production process

A functional CHP unit comprises the following major components:

- a) a burner
- b) a piece of equipment such as a steam turbine to harness the energy generated from the burning to produce electricity
- c) Adsorption cooling units to enable the heat that is generated to be used to cool the mushroom sheds.
- d) Apparatus associated with using the heat, to heat or chill the mushroom sheds

The fuel for the burner in this case is mushroom compost.

Additionally if it is possible to remove some of the moisture from the spent mushroom compost, then this would help to make the whole process much more efficient, therefore various methods were investigated such as filter presses and screw presses. Alternatively the spent mushroom compost can be mixed with woodchips to increase the calorific value.

There is also an aspect of materials handling to the project, a system is needed for the spent mushroom compost to be removed from the boxes, and then either mixed with the woodchips or put through a press to remove moisture. A delivery system is needed to transport the spent mushroom compost to the CHP unit, as the burner is located in a separate section of the farm where the spent mushroom compost is 'tipped' from the boxes.

To address sourcing these various components to the CHP unit, Sussex Mushrooms researched many different companies to identify those that could contribute to the project. It was also decided to include a covered trailer system with an unloading floor so as to prevent any cross contamination between spent compost and growing compost.

#### A] The Burner

This was sourced from Origins Green Technologies. This was the only burner that Sussex Mushrooms were aware of that had been demonstrated to successfully burn spent mushroom compost. The high moisture content of the compost has made it a prohibitive substrate for the majority of burners used in Biomass CHP projects. The burner developed by Origins Green Technologies has a net thermal input of below 0.4MW which is an important threshold for environmental permit regulations, (below 0.4MW is exempt) and in the long term if other farms were to use a similar system this could be an advantage to making the CHP unit more accessible to the average farmer.

Sussex Mushrooms also felt that it was more attractive to have several small burners that could be placed in different locations on a farm, rather than just one large burner. This offered the additional insurance that if one burner was to break down, the whole CHP unit would not stall to a halt. The only other company that we were aware of that may have a burner to burn spent mushroom compost was 'Eco-links'. However Eco-links could not show us a working burner and therefore Sussex Mushrooms felt more confident with the choice of Origins Green Technologies.

#### Bl Turbine/ Equipment to harness the energy

A piece of equipment such as a turbine was needed to be sourced that would be compatible with the burner to turn the heat produced into energy in the most efficient way. Tests using the burner with 20% woodchips had indicated that 100-150kW of power could be achieved from the burner, using thermal oil with a heat exchanger (rather than water/steam). Many companies were contacted around the world to discuss what type of equipment would be the most appropriate for such a project. We identified that steam turbines were too inefficient to be used with the burner as the power achieved was only of the order of 10%.

One promising avenue was the use of a turbine based on the Organic Rankine Cycle, which can have increased efficiency compared to steam turbines when power output is lower. Staff at Sussex Mushrooms had discussions with a company in America and two companies in England, with respect to testing the ORC units that each company had developed. Meetings were held at Sussex Mushrooms with the English companies, which proved fruitful with useful suggestions of contacts for many other aspects of the project as well. In the end, however, it became apparent that these ORC units were also going to be too inefficient for use in this CHP project. One outcome of these discussions was the decision to link several of the burners to one turbine unit in order to make available a greater amount of power for the turbine to harness.

Sussex Mushrooms therefore decided that the most efficient option was to use a Star Rotor Turbine from Origins Green Technologies which could achieve efficiencies in the order of 30%.

#### C] Adsorption Cooling Units, and Chiller Units

It was considered that adsorption cooling units could be installed on the farm to use heat to cool the mushroom sheds in the summer. We therefore contacted known suppliers to provide us with quotes for this work. In the chiller section D & EC have set out the differences between adsorption chillers as opposed to absorption chillers.

#### D] Heating Units for the Mushroom Sheds

Currently oil fired units are used for heating water which is pumped around the growing blocks. The project seeks to utilise the heat from the burners for this purpose. The oil burners will be retained as emergency backup.

#### Removing Moisture from the Compost

There were two main options for removing the moisture from the compost

- i) 'Dry' the compost (for example in a 'drum dryer')
- ii) 'Press' the moisture out of the compost

Due to the large quantities of compost that would be needed to be dried (approx. 70-80 tonnes are produced each day), it was considered uneconomic to dry the compost. 'Pressing' the water out of the compost was considered to be a more viable option. We investigated two readily available methods — using a filter press or a screw press. Tests revealed that a filter press was definitely not suited to the job, as the compost was too fibrous. Tests were then performed by companies which had developed different types of screw presses. It seemed that these differed in their efficiencies, (initial tests suggested by Vincent Corporations indicated that their screw press may not be suitable, as was the press from Wam Engineering) and so after visiting a farm to see a working screw press that was efficiently removing moisture from a slightly different substrate, we engaged in a relationship with the company to use their screw press with the spent mushroom compost.

Removing moisture from the compost would make the whole process a lot more efficient as it increases the calorific value of the fuel and the water could be reused on the farm,

#### **Putting Infrastructure in Place**

Materials handling engineers, experienced in fabrication, were consulted with respect to the equipment needed to:

- i) transport the spent mushroom compost to the screw press, and then from the screw press to a trailer (or other container) to then transport the spent mushroom compost to the burner
- ii) transferring the compost from the trailer to the burner.

Sussex Mushrooms researched companies, mainly using the internet and also suggestions made by other contacts built up during the course of the project. Sussex Mushrooms tried to identify companies in the South-East of England that may be interested in providing quotes for the project. However only a few companies could be identified and none felt it was their area of expertise or could take on the project at this time. The majority of companies contacted were from the east of England with a background in supplying vegetable growers.

Following telephone conversations and emails providing details and plans of the projects, four companies visited the Sussex Mushroom site at Thakeham. Three of these companies then provided Sussex Mushrooms with a quote for the materials handling aspect.

Layout plans showing the process system are in Appendix No . 3 Plans

Sussex Mushrooms having researched the project considered that Origins Green Technologies to be the company with the most advanced expertise. Copies of correspondence are enclosed (Appendix 2.)

The Carbon Trust sponsored a report in 2007 which estimated the mushroom growing process of the business to have a carbon footprint of over 6,500 tonnes/anum. It is estimated that the carbon footprint would reduce in proportion with the reduction of the purchased energy and thus it is estimated that the carbon footprint would be reduced by 30%.

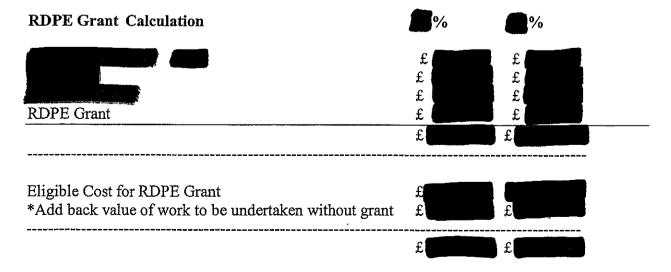
#### The CHP project will:

- a) improve the carbon footprint
- b) improve the economic viability of the company
- c) reduce traffic movements and odours and thus improve relations with the local community.

#### 3) Investment required and sources of funds

The cost of the scheme is £1,888,918.

Work to be carried out on A Block prior to grant approval and therefore not eligible for grant is £91,448. This work has not yet been undertaken but will need to be started within the next month for the purpose of installing the equipment at a time that fits in with the growing cycle.



#### 4) Profit and Cash flow projections

The Profit and Loss and Cash flow projections are set out in Appendix 11

It has been assumed that the company are unlikely to be able to produce any significantly greater quantity of mushrooms without building new growing houses.

It has been assumed that the value of the pound against the euro (currently at 91 pence) will rise over the period of the grant and thus create downward pressure on prices through the importation of product from elsewhere in the EU.

Cash flow projections have been produced to show the current position with no CHP project over the next five years and with the introduction of the CHP which alters the profit figure of the company after five years by approximately

#### 5) Risks associated with the new enterprise.

Rise in value of sterling allowing cheap imports of mushrooms from Ireland, Holland or Poland. Engineering failure of equipment.

#### 6) Economic, environmental and social impact of the proposed project

Economic Supporting the rural economy by retaining some 200 jobs full time

equivalent directly employed and a further 100 indirectly employed

(Sussex Enterprise Economic Impact report Appendix 2)

Reduction of energy overheads.

Environmental - Reduction in carbon footprint

Substantial saving in transport costs taking

Compost to spread on land.

Reduction in odours.

Social - Creating rural employment

#### 7) Current business activities and enterprises.

Sussex Mushrooms was formed in October 2006 following the receivership of Heveco Mushrooms – a UK subsidiary of a Dutch company, Heveco BV

Thakeham Partnership LLP whose partners are and least own Sussex Mushrooms Limited whose directors are

The company was formed for the sole purpose of growing and selling mushrooms. Principal customers are

The company grows between 120-150 tonnes of mushrooms per week. It is one of the few companies that still makes its own compost which is a mixture of straw (sourced locally), chicken litter and gypsum. Some 900 tonnes are produced weekly.

The company is the largest grower of mushrooms in the South East region. A plan has been prepared identifying other growers and supermarket depots. (Appendix 3)

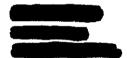
The company supplies 10% of the country's mushrooms. Statistics from Neilson's indicate that over the past three years 113,000 tonnes have been consumed per annum. Of this about 32% are produced in the UK. The market penetration has been constant at 81% as there is a desire for healthy living. In sterling terms value has gone up 8% per annum largely because of currency exchange rates vs the euro.

The company leases the premises comprising the main site and the Abingworth site both situated at Thakeham, West Sussex, from an Investment Company, Beamsync, on a five year lease.

The company has an energy bill of nearly and the same and has an odour problem from spent compost prior to it being collected and spread to land.

The company is extremely desirous of reducing it's carbon footprint and reducing it's overheads.

#### 8) Key people and their skills



sales, harvesting and packhouse Engineering and maintenance responsibility for finance and production of mushrooms

#### 9) Recent business performance and future outlook for the business

	2/10/06 - 31/12/07	Jan 08 – Dec 08	
Profit / Loss			
Total asset value			
Total liability			
Net worth			

Copies of the last 2 years accounts for the business that has evolved. The above figures have been extrapolated from the Audited Accounts. (Appendix 11)

The farm continues to improve and management figures to the end of September will follow.

#### **Outline of the Proposed Project**

### 10) Description of project, the production process and the rationale for undertaking the project.

#### Rationale

Attached is a map of South East England in Appendix 3 were it will be seen that there are no other mushroom farms producing between 100 and 150 tonnes per week. The location of the principal 4 supermarket depots are indicated.

It will be noted that there are no other mushroom farms in the South East that are so well located to the supermarket distribution points.

It is unlikely that any company will expend some £20 m to set up a mushroom farm in the current economic climate.

The principal costs for the business are labour and energy. Energy costs amount to per annum.



The company is benefitting from the current exchange rate between sterling and the Euro as supermarkets are sourcing product where possible from within the UK.

Thus the company wishes to take advantage of reducing its overheads such as energy costs so that it can continue to be competitive when the balance of the Exchange rates favour the Euro and supermarkets can import mushrooms cheaper from outside the UK. Thus with cheaper energy the company will preserve its market share and in turn will preserve the rural employment created by the company.

#### The Proposal

To construct and operate 4 burner units with electric generating equipment on 1 location within the growing and production area as set out previously and as indicated in the drawings. The process of using the compost as a fuel is as follows:-

The boxes are taken from the growing houses by tractor and trailer to a site where the boxes are emptied and the compost stored in a heap on a concrete area until such time as a contractor collects the compost and it is either sold or spread to land. The proposal is to put in a tipping line with a screw press in order to extract water and for the compost to be stored under cover in an existing building then loading into a specialist trailer and delivered to one or two hoppers feeding the burners. The purpose of the screw press is to reduce some of the water content of the fuel and thus improving the caloric value of the compost. Any wood chips can be introduced at this stage and mixed in with the compost fuel.

The reason for this specialist trailer to be supplied by Larrington (Appendix 5) is that it is fully enclosed in order to ensure that there is no cross contamination between the old spent compost and the spurs being blown into the growing houses. The specialist trailer will have a moveable floor and will supply the two hoppers feeding the burners.

#### The Burners Appendix 10

It is proposed to install four burners which will be supplied from two hoppers, the fuel being augered from the hopper into the burner. The augers will break up any consolidation of the compost and supply an even flow to the burner. The burners are proposed to produce between 160 and 200 kilo watts to provide electricity, generation, heat or chilling depending on the time of year. It is proposed to maintain a constant temperature in the growing houses whatever the time of year to maintain constant production.

#### Generation equipment Appendix8

The proposed generators will be star- rotors which have been developed from the oil industry in Texas where the generation is 30% efficient compared most generating equipment which is only 8 to 12% efficient. All electricity produced will be used on the farm.

#### Chillers Appendix 7

The chiller unit is to be adsorption and absorption, the differences are set out in the chiller section of the proposals by D & EC.

#### Generally

The proposal does not require any building works and the burner units are all being housed within an existing building. The proposal is therefore for the supply and installation of equipment.

#### 11) Expected economic social and environmental impacts of the new project

#### Economic

The mushroom growing industry in the UK has often suffered from cheap imports but currently with the value of sterling to the euro, the supermarkets are relying on UK produce and the price has risen. The company therefore wish to invest in technology which will reduce its carbon footprint and ensure it remains competitive as and when foreign imports become more competitive.

The economic benefit of the project is therefore to reduce the overheads of the company by purchasing less electricity and oil. The utility cost in 2010 would reduce from and by the year 2014 the reduction would be some being a 29% reduction in energy costs in addition the company would be eligble for ROC's which would contribute some to its gross output. The social benefits are that the company can retain in excess of 200 full time jobs in a rural area as well as having 100 jobs in indirect employment.

Environmentally there has been an odour problem in the past with the spent mushroom compost being stored and this has led to complaints from the community. By utilising the compost as a fuel the compost will not be stored for long periods and there will be a reduction in odour levels as well as saving the company some a year on transport costs and removing the compost. The carbon footprint of the company is currently estimated to be over

6,500 tonnes per annum and it is anticipated that this will drop to some 4,000 tonnes per annum.

#### 12) Expected Energy Saving

As set out in 11 above the company expects to reduce its energy bill by 29% together with significantly reduced traffic movements from the disposal of spent compost of some 500 tonnes per week will result in an increase in profit for the company of approximately per annum

#### 13) Will have business benefit from this project

The project is focussed purely on reducing energy costs and traffic movements. Ultimately it is the company's aim to demonstrate the technology to other agricultural businesses or institutions that have wet waste in order that they may acquire it and be able to achieve similar savings.

#### **Details of the Proposed NEW Project**

#### 14) Summary Costs of the Project

#### Electrical

Originss Green Technologies	Wiring, switch, gear & installation	£ 87,070.00
<u>Trailers</u>		
R Larrington	1 trailer, 2 hoppers	£167,000.00
Tipping/Emptying Line		
Traymaster	1	£148,500.00
Adsorption Chiller Originss Green Technologies	1	£235,250.00
Turbines Star - Rotor *		
Originss Green Technologies	2	£364,000.00
Screw Press Originss Green Technologies	1	£ 90,650.00
BioMass Boilers		
Originss Green Technologies	4	£695,000.00
Professional Fees		£10,000

\*One Quotation only has been obtained as no other equipment was found to be copatible

Work to be carried out but no grant to be claimed

Fitting out growing house A
Growing house B – conversion costs
Growing house C – conversion costs

£91,448 In-house staff In-house staff

#### **Profile of Funding**

A gant chart is set out in Appendix 2.. and the cash flow sets out the payment profile.(Appendix 11)
The project will take one year to complete.

#### 15) People and Skills Required

Sussex Mushrooms wish to engage the services of Origins Green as they have demonstrated the highest level of expertise in power plants as well as having installed anaerobic digesters and electrical switch gear on other sites in the UK.

The principal Director overseeing the project will be whose cv was attached to the Expression of Interest and is reproduced for ease of reference at Appendix 2 In addition. Health and Safety Officer, will be closely involved together with members of the company's 17 man maintenance team. Training will be required from Origins Green for the maintenance of the plant and the switch gear in order to properly control the works.

#### 16) Outline of legislation that applies to the project. Show it will comply

Planning consent is not required as the equipment is within an existing building (Appendix 1) Building Regulations—the equipment is all to be housed in an existing building. The electrical installation will be carried out by fully qualified electricians and no building reg requirements are involved.

Environmental agency. The burning of compost as a fuel is WID exempt as confirmed by Horsham District Council Environmental Health Department (Appendix 1). Environment Agency permit waste exemption is awaited. (Appendix 1).

17) Comments on Cash flow and profit forecasts including how the project will become self-sustaining following the period of Grant Aid and any major areas of sensitivity within the budget.

#### **Assumptions**

- 1. The figures have been calculated to reflect a 2.5% p.a. increase in wage costs (based on the 2009 Agricultural Wages Board agreement). Cost increases due to inflation have not been reflected as it would be anticipated that they would be compensated for, by equivalent increases in the prices received for product after negotiation with customers.
- 2. While it is expected that sales can be increased by increasing our market share in the SE region, this is not in any way certain to happen, and so it is not reflected in any of the calculations.
- 3. Energy costs used in the calculations are those prevailing at present. Obviously if these costs were to fall substantially, then an argument could be made that the period for payback would be extended. However, since the energy is completely consumed by the business, it may be argued that this should not materially affect the performance of the overall business.
- 4. The ROC's have been valued at 5p to reflect the base underlying value. A further model has been included in Appendix 11 to reflect the situation if they traded at 8p.
- 5. Calculations of the interest payable have been based on an interest rate of
- 6. A base level of 180kw per machine and 30% efficiency for the star rotor turbines is used on the basis of information supplied by Originss Green. The demonstration unit will be run over the coming quarter to affirm these figures in the actual Farm situation.

#### 18) Risks associated with the project and investment

Mechanical failure and lack of maintenance to be mitigated by installers training Sussex Mushroom personnel to minimise any failures.

#### 19) Any marketing or other benefits

The company intends to use the project to market its reduction in its carbon footprint to major supermarkets to which it supplies. It will keep the company competitive when foreign imports regain a competitive edge when there are currency exchange improvements

#### 20) Why Sussex Mushrooms needs Grant Aid

We have been unable to find Bankers that will fund a project on a 7 to 8 year payback period. The company commenced in October 2006 and has turned around a loss making business to a company which has just become profitable. However the M & E has not had any significant

investment for over 20 years and with the general difficulties of raising finance in the current market place the project would not be able to go ahead without a significant grant.

#### 21) Effect on other businesses in SE region

The village of Thakeham is joining the "Greening Villages" scheme and with the reduction of the Company's carbon footprint this will make a considerable benefit to the village. There is unlikely to be any affect on other businesses locally or in the S.E. Region

#### 22) Sustainability Analysis

Attached in Appendix 1

#### 23) Project Milestones

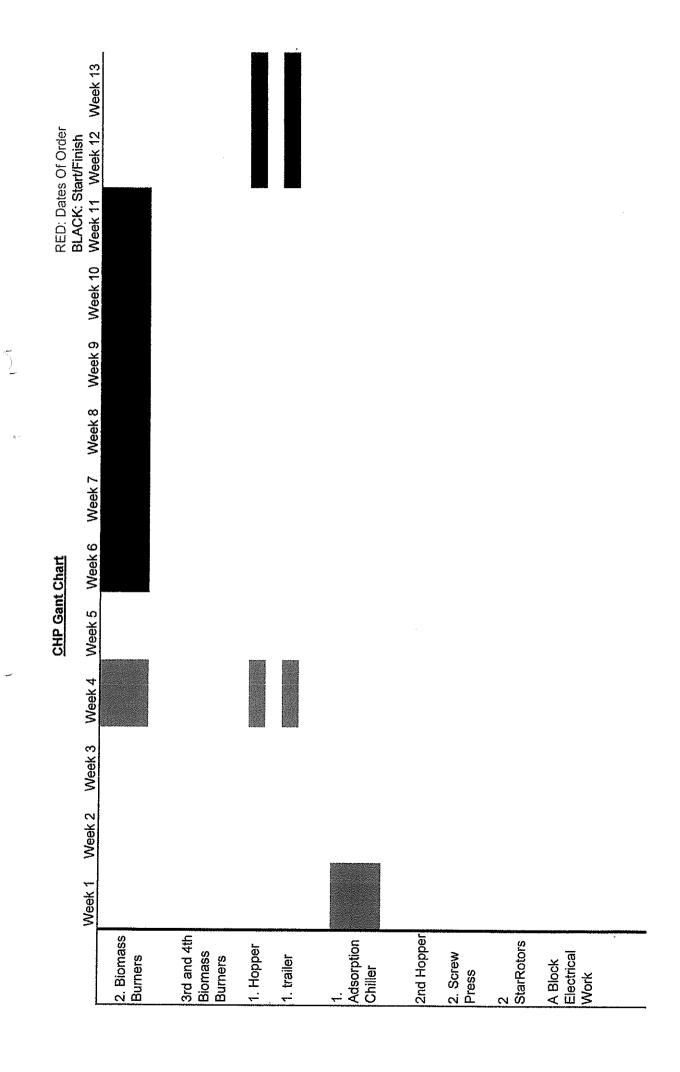
The company currently has a demonstration machine on loan which will be removed in the near future. An order will be placed with Origins Green for the supply of two burners and associated equipment on receipt of grant approval. A gant chart showing the sequence of events and the ordering programme and payments is set out in Appendix 2

#### 24) Project Management and Consultants

The project will be overseen by **Induced** who will call in any other consultants as required. As considerable in depth discussion has already taken place with a number of companies in the setting up of this project it is anticipated that there will only be very minimal requirements.

has also been closely involved in the formatting of the project including contact with Horsham District Council. He will be responsible for any professional work.

September 30<sup>th</sup> 2009



RED: Dates Of Order BLACK: Start/Finish Week 24 Week 25 Week 26

Week 14 Week 15 Week 16 Week 17 Week 18 Week 19 Week 20 Week 21 Week 22 Week 23

1 Sugar

2 StarRotors 2. Screw Press

1. trailer

1. Hopper

3rd and 4th Biomass Burners

2. Biomass Burners

Adsorption Chiller

2nd Hopper

A Block Electrical Work

	RED: Dates Of Order BLACK: Start/Finish	Week 30 Week 37 Week 38 Week 39									
	Week 30 Week 31 Wask 32 Mask 23 Mack 24 Mask 25	Week 04									
	Mook 33	200									
	Week 37	70 100								3	
·	Week 31										
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		2. Biomass Burners	3rd and 4th Biomass Burners	1. Hopper	1. trailer	 1. Adsorption Chiller	2nd Hopper	2. Screw Press	2 StarRotors	A Block Electrical Work	John John State of the State of

Week 40 Week 41 Week 42 Week 43 Week 44 Week 45 Week 46 Week 47 Week 48 Week 49 2. Biomass Burners Adsorption Chiller 3rd and 4th 2 StarRotors 2nd Hopper Biomass Burners 1. Hopper 2. Screw Press Electrical 1. trailer A Block Work

# Sussex Mushrooms and associated businesses Its impact on the economy

Report for October 2008

By

Sussex Enterprise

SUSSEX enterprise

## Sussex Mushrooms and associated businesses – Its impact on the economy Report for SEEDA

#### **Summary of findings**

The loss to the local economy (per annum) if Sussex Mushrooms and associated businesses were not based in West Sussex would be:

- 350 FTE jobs through direct employment and 5.2 million from this in salaries
- 60 FTE jobs through indirect employment due to reductions in local spending on suppliers and from salaries
- £3.8 million of income lost to the local economy directly through spending with local businesses
- £1.1 million of income lost to the local economy through spending by employees in local businesses that have direct contracts with Sussex Mushrooms and associated businesses

All the figures are in today's prices and do not take inflation into account.

#### The Economic Impact of Sussex Mushrooms and associated businesses

The economic impact of a business on its local economy is the result of four influences:

- The number of people employed
- The amount they spend directly in the local economy
- The amount spent directly on local supplies
- The amount spent indirectly (local supply chain) through local purchases and spent indirectly by employees in supporting other local jobs

Each of these factors is examined below using the Sussex Economic Impact model. This was originally developed by Business Strategies Itd (now Experian) one of the most well respected economic forecasting businesses in the UK.

The model takes information about the jobs in the business (by occupation) and local spending by the business (by industry) and calculates (using multipliers) the impact on the local economy.

#### **Current situation**

In September 2008 Sussex Mushrooms and associated businesses in Thakeham employed 364 people. 335 of these were full-time employees and 29 were part-time or casual (short-term contracts) employees. 30 of these staff were managers, professionals or supervisors. The remainder were production staff. The total salary bill for the business was circa

Spending with local businesses (Sussex) amounts to each year

#### Economic impact

If Sussex Mushrooms and associated businesses relocates to another part of the United Kingdom then there will be a loss to the local economy in terms of the staff it employs. They will either have to find alternative employment or will relocate. In addition to this the local supply chain will either be cut immediately or will dwindle over a relatively short period. Most of the goods and services Sussex Mushrooms and associated businesses purchases are available in most localities and it is the desire of the management to have local suppliers.

As a result the analysis identifies the loss to the economy as if Sussex Mushrooms and associated businesses had no economic footprint.

The loss to the local economy (per annum) if Sussex Mushrooms and associated businesses were not based in West Sussex would be:

- 350 FTE jobs through direct employment and 5.2 million from this in salaries
- 60 FTE jobs through indirect employment due to reductions in local spending on suppliers and from salaries
- £3.8 million of income lost to the local economy directly through spending with local businesses
- £1.1 million of income lost to the local economy through spending by employees in local businesses that have direct contracts with Sussex Mushrooms and associated businesses

  All the figures are in today's prices and do not take inflation into account.

These figures are calculated in the following way:

- Sussex Mushrooms and associated businesses have 335 full time jobs and 29 part time or casual jobs (350 FTE jobs). Based on the current salary structure for the occupations that will be employed the total pay bill will be the salary structure for the occupations that will be employed the total pay bill will be the salary structure for the occupations that will be employed the total pay bill will be spent in the local economy. However, national data indicates that 78% of this will leak out of the local economy due to taxation, mortgage and other household payments. This will leave only that will be spent in the local economy.
- National economic multipliers have been used (from ONS input-output tables) to calculate the
  impact of the loss of spending in the local economy and estimate the potential impact on jobs
  locally. The loss of million spending in the local economy from suppliers and
  million from lost local spending by salaries from employees) is estimated to be 60 jobs. Most
  of these will be in the services industries.
  - o Agriculture 10
  - Wholesaling 4
  - o Retailing 10
  - o Cleaning etc services 7

These economic impact figures are derived from the Sussex Economic Model developed by Experian Business Strategies Ltd. The multipliers used for secondary impacts are based on national input output tables produced by the Office for National Statistics.