

**Lively'Hood Farm Financial Analysis
A Feasibility Study of Commercial Urban Agriculture
in the City of San Francisco**

Created by:

Team Lively'Hood

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I. Executive Summary

The San Francisco Department of the Environment partnered with Presidio Graduate School's Team Lively'Hood to assess the viability of commercial urban agriculture (CUA) in the City of San Francisco. To provide structure for the research and financial analysis for a startup CUA business, Lively'Hood created a fictional business, Lively'Hood Farm.

Initial research focused on the various external factors impacting CUA in San Francisco. We found that the most successful urban agriculture ventures have a clear business strategy, a well-defined target market, and a differentiated value proposition that enables them to compete by selling premium priced products. While there aren't any long-standing examples of commercially viable urban agriculture businesses in San Francisco, we have identified key characteristics that successful CUA ventures across the country have in common, including:

- Varied agricultural products and revenue streams that mitigate business risk and create cross-selling opportunities.
- Focus on higher-margin products and distribution methods, including specialty produce, value-added goods and services, and direct sales channels.
- Key partnerships with community members, investors, and buyers that provide brand recognition and valuable sources of feedback.
- Supplementary income through educational workshops, production supplies, and/or technologies shared with other interested urban farmers.

Research also uncovered many challenges to CUA in San Francisco, including higher costs and the unavailability of land for such ventures. However, demand for fresh, local, sustainably grown produce remains strong. Temra Costa, urban farm expert and author of *Farmer Jane*, told us, "If you can grow it, the people, restaurants and grocers of SF will buy it" (T. Costa, personal communication, March 27, 2011).

Armed with extensive research on all things 'urban ag', Team Lively'Hood created a financial model for the fictional farm to assist urban agricultural entrepreneurs in planning and implementing viable businesses. The model illustrates various scenarios to explore how the relatively high upfront investment on low margin goods like produce would work in one of the most expensive cities in the world. Key assumptions, analysis, and conclusions about this venture follow.

Cover Photo¹

¹San Francisco Mayor Ed Lee signed Ordinance 101537 on April 12, 2011, lifting restrictions on commercially grown urban agriculture in residential zoning areas of San Francisco (Chui, 2011).

II. Key Assumptions

A. Physical Attributes of the Lively'Hood Farm

The recent San Francisco Ordinance 101537, legalizing commercially grown agriculture in residential zones, applies to sites one acre or less (Chui, 2011). To simplify our model and make it more applicable to the average size of vacant lots in San Francisco, Lively'Hood modeled the farm on a ½ acre site, equivalent to 21,612 square feet. The site plan includes greenhouse hydroponics, outdoor hydroponics, and outdoor raised-bed planting. The proportions of the farm dedicated to each of these three methods are flexible and integrated into the financial model. The most probable outcome, based on our strategic recommendations and analysis of materials costs, produce yields, and space allocations, is represented in Figure 1.

Site Allocations of the Lively'hood Farm:

Greenhouse:

2000 sq.ft.

Indoor seedlings:

500 sq.ft.

Indoor hydroponics:

1500 sq.ft. x 2 stacks =
3000 sq.ft.

Outdoor hydroponics:

1,243 sq.ft.

Outdoor raised beds:

10,045 sq.ft.

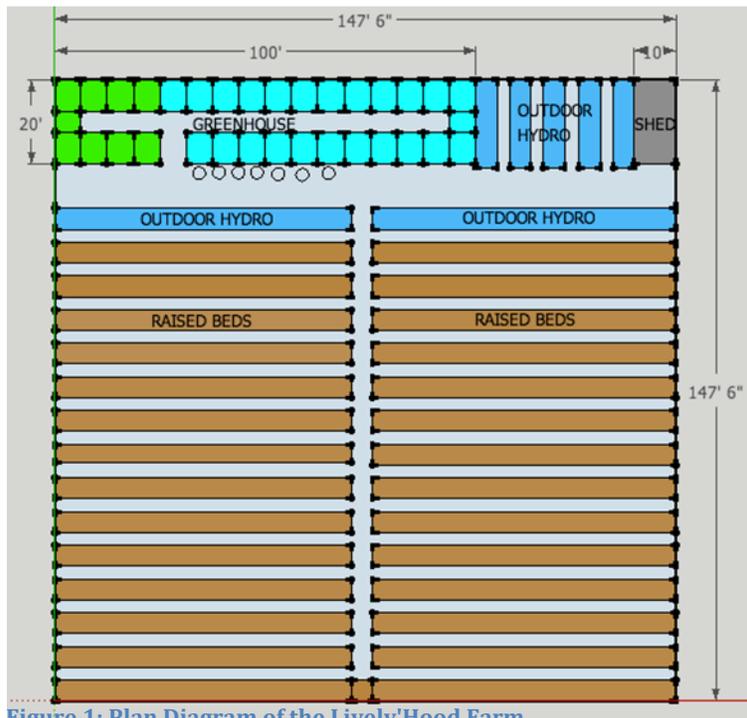


Figure 1: Plan Diagram of the Lively'Hood Farm.

B. Financial Assumptions

Fixed Assets

Fixed assets for the Lively'Hood Farm would be sourced secondhand wherever possible to reduce costs. In line with this strategy, salvage values are conservatively assumed to be zero, with the estimate life of the assets generally set at five years. Depreciation was calculated on a straight-line basis.

Resources used to determine the types of assets needed for a small farm include:

- Little City Gardens wish list. Little City Gardens is an existing 3/4-acre farm in San Francisco (Little City Gardens, 2011).
- Articles referring to essential tools and equipment for small farms, such as those in *Hobby Farms Magazine* (Ekarius, 2004).

- Extensive interviews by Lively'Hood team members with experts in the field, such as Dexter Carmichael, Manager of the San Francisco Ferry Plaza Farmer's Market (D. Carmichael, personal communication, April 21, 2011). (For a complete list of interviews conducted throughout this project, see Appendix K of the Lively'Hood Strategy Report).

The construction of essential farm structures such as a shed, greenhouse, raised beds, hydroponics planting structures, and a composting toilet were assumed to be built of reclaimed materials by the farm owners themselves. Cost assumptions for these structures are based on conversations with local salvaged materials clearinghouses like the ReUse People and research on the cost of new equipment (B. Sosa, personal communication, April 20th, 2011). We also researched government resources to procure necessary assets. For example, the San Francisco Public Utility Commission (PUC) offers a substantial subsidy for rainwater catchment cisterns (SFPUC, 2010).

The assumed \$1.00 per linear board foot for raised bed outdoor planter boxes is based on a figure from the ReUse People on reclaimed, untreated, unfinished 2x10s selling for \$0.30 per linear foot. It is therefore assumed that nails, reclaimed metal dowels and other construction materials would make up the rest of the \$.70 per linear foot for construction of raised beds. Hydroponics nutrient tank costs were estimated to be \$5.00 per square foot based on the University of Hawaii's study of hydroponics (Uyeda, Cox & Radovich, 2011) and validated based on our interview with Keith Agoda of Sky Vegetables (Agoda, personal communication, March 21, 2011).

Cross-referencing several online sites, such as the Department of Horticultural Sciences from Texas A&M University (Pena, 2005), provided consistent ranges from \$4/square foot up to \$30/square foot for new, traditional greenhouse construction. Based on this data and materials costs of locally reclaimed wood, fiberglass, and recycled plastic, the model assumes greenhouse costs of \$5 per square foot. For a complete list of costs and references, see the Fixed Assets (FA) tab of the Lively'Hood Financial Model.

Working Capital

Net working capital requirements are conservatively estimated at 45 days projected revenue for each respective year. This estimate reflects the assumption that 75% of produce sales will be sold on account to restaurants, at an average collection period of 45 days. As restaurant partnerships are forged, partial deposits will be taken for customized orders, reducing the average collection period. In addition, Lively'Hood Farm will hold some inventory, but the inventory costs of stocked products will be minimal. This is because value-added goods will be produced in small batches and represent a relatively small percentage of total Farm revenue.

The balance sheet calculations assume retained earnings will be plowed back into the business to fund necessary fixed asset investments and working capital requirements, but otherwise will be paid out as dividends to the owners and other shareholders.

Expenses & Headcount

Land is by far the largest operating expense for Lively'Hood Farm. Land rental is estimated to be \$0.30/square foot based on an available industrial site in the Mission Bay district of San Francisco. At \$0.30 cents/square foot/month, rent makes up 86% of annual expenses. This is a crucial fixed cost that needs to be carefully negotiated and considered before moving forward with any CUA venture. There may be opportunities to eliminate this ongoing cost by negotiating more favorable use of building rooftops, although most properties in San Francisco would require engineering and construction upgrades that could cost upwards of \$30 per square foot. This upfront cost makes this approach unfeasible for most aspiring urban farmers, who would likely have difficulty raise the necessary capital given the long investment time horizon (Stevenson, personal communication, April 18, 2011).

Other assumptions were made on headcount related expenses. The two fictional owner operators, Jeff and Sandy, would be expected to function on very low startup salaries in the first year (\$20k), with moderate increases thereafter. It is also assumed that a part time helper will be needed during busier times of the year at a rate no lower than California's minimum wage of \$9.93 per hour (City & County of San Francisco, 2011).

Revenue & Gross Margins

Lively'Hood Farm's revenue and gross margins assume four primary sources of revenue:

1. Sales of produce to individuals and restaurants
2. Sale of honey to individuals and restaurants.
3. Sale of value-added products to individuals and high-end retailers.
4. Revenues from training courses and workshops.

The primary labor source will be the two owners of Lively'Hood Farms, so the labor cost is largely fixed. Accordingly, labor costs are not included in the gross margin calculations, as it is difficult to estimate how each owner's time should be allocated to each product. However, the owners should track the time spent on specific tasks and eventually develop more accurate gross margin estimates to ensure the Farm is focused on the most highly profitable products as the business matures. The Financial Model incorporates a growth assumption of 5% for both revenues and costs after the point at which the farms gets up to capacity and brings all of the recommended products and services online.

1. Produce

Produce revenues and gross margins are estimated based on a number of inputs including:

1. Estimated production capacity (i.e. yield) of the farm².
2. Estimated percentage of produce unsold from year to year.
3. Current market prices for specific produce items on a per pound basis.
4. Target customer mix (e.g., direct to consumer versus restaurant).

² Based on allocation of space to hydroponic and non-hydroponic growing, allocation of specific crops in hydroponic nutrient tanks and raise beds, estimated number of crops per year, estimated spacing requirements, and estimated yields per planting row or square foot for specific crops.

5. Estimated costs or gross margin percentages for specific crops.

Produce yields and gross margins are estimated differently for hydroponically grown food and soil-grown food. Margins for hydroponics are estimated using a “bottoms-up” approach, where the costs of all of the inputs needed to grow produce in a 3’x8’ nutrient tank were calculated and compared to revenue for the tank based on estimated yield and current product pricing. Research published by the University of Hawaii was leveraged to develop the financial model, with the specific inputs validated based on research into product variations and price differentials to better reflect the local San Francisco market (Uyeda, Cox & Radovich, 2011).

The revenues and yields were translated into a per square foot basis, so that total output, revenue, and gross margin could be adjusted based on decisions regarding the allocation of land to hydroponics used, the number of hydroponic stacks used, and changes to product mix. Table 1 shows the model used for lettuce.

Table 1: Produce Revenues and Crop Yields Used for Lettuce.

Model for a 42-head Organic Nutrient Tank	Average Yield Units	Price/Cost		% Gross Rev
		per Unit	Total	
REVENUE	7 pounds	\$ 10.88	\$76	100.00%
Variable Production Costs				
Lettuce seeds	0.25 grams	\$1.00	\$0.25	0.33%
Rapid rooter cubes	42 cubes	\$0.28	\$11.72	15.39%
Organic Fertilizer	42 teaspoons	\$0.11	\$4.62	6.07%
pH Up	1 teaspoons	\$0.25	\$0.25	0.33%
Total planting costs			\$16.84	22.12%
Irrigation	75 gallons	\$0.003	\$0.23	0.30%
Other costs not accounted for (pest control, etc.)		n/a	\$5.00	6.57%
TOTAL VARIABLE COST OF PRODUCTION	7 pounds	\$3.15	\$22.07	28.99%
Gross Margin \$ per square foot planted			\$2.25	
Estimated Total Annual GM\$ per Sq. Ft	10 Crops/season/sqft		\$22.52	

Note: Price per unit reflects assumption that 25% will be sold direct to consumers and 75% will be sold direct to restaurants.

There is the potential to grow a much wider variety of crops for soil based farming, so it was not practical to develop a crop-specific model for each potential varietal. Instead, the calculations are tailored to specific crop using the following variables:

- Estimated yield (in pounds) per foot row planted.
- Recommended spacing between rows.
- Estimated per pound market prices.
- Estimated crops per year.

Research suggests that costs for soil-grown produce could vary significantly from product to product and farm to farm, with gross margins (including labor) typically ranging from 30% to 60% of revenues (Hendrickson, 2005). Based on this information, and testing against a bottom-up analysis for tomatoes, we have assumed an average gross margin (excluding labor) of 65% of revenues. Table 2 shows the calculation used for a kale crop.

Table 2: Average Gross Margin for Kale Crop.

Kale Crop Yield		Kale Crop Revenue & Gross Margin (Max)	
Total Available Row Feet	4,998	Consumer Price (per lb.)	\$ 4.00
% Beds Allocated	20.0%	% Sold to Consumers	25%
Row Feet Planted	1,000	Restaurant Price (per lb.)	\$ 3.50
Avg Yield per 100' Row (lbs.)	75	% Sold to Restaurants	75%
Crop Rotations/ Yr	5	Maximum Revenue	\$ 13,586.99
Total Annual Yield	3,748	Average Gross Margin %	65%
		Average Gross Margin \$	\$ 8,831.54

Over time, Lively’Hood Farm should track gross margins specific to certain products, thereby improving the validity of the model. To assist with this exercise, Team Lively’Hood gathered data on seed costs for a wide range of produce varieties and has also created a sample crop-specific soil-based profit model that may be utilized to more closely track costs. This appears in the Financial Model on the tab titled “Ref – Soil Calcs – Tomatoes”.

For both the hydroponic and soil-based revenue calculations, the assumption is that 25% of produce would be sold directly to consumers on-site and 75% would be sold directly to restaurants. Based on interviews with restaurant proprietors and wholesalers, Lively’Hood discovered that restaurants pay a slightly lower price for their products than consumers. Assuming that restaurant prices and consumer prices represent a 75% and 100% mark-up over wholesale prices, respectively (M. Burritt, personal communication, April 7th, 2011), a 12.5% discount to retail prices applies when calculating revenues from the restaurant channel.

In the financial model, the mix of hydroponic crops and soil-grown crops planted is an adjustable variable. The planting assumptions used in the scenarios take into account considerations of the likely market size for certain products, as well as profitability and physical requirements of the crop. For example, while basil is a more profitable product to grow in the greenhouse hydroponic systems than lettuce, the market for basil is much smaller than for lettuce. Accordingly, 75% of the greenhouse hydroponic system is dedicated to lettuce, while only 25% is dedicated to basil. Table 3 shows the square footage allocated to certain crops, as well as the annual gross margin dollar per square foot for each crop. Note that the hydroponic figures assume that two nutrient tanks may be stacked on top of each other to increase the yield per square foot of ground space.

Table 3: Area Allocation for Certain Crops.

Crop	Square Feet Allocated	Annual Yield (lbs./per sq ft)	Gross Margin (\$/sq ft)
Hydro Lettuce	1125	5.8	\$45.05
Hydro Basil	375	8.0	\$98.48
Hydro Watercress (outdoor)	1243	4.3	\$59.12
Beets	500	4.0	\$9.82
Broccoli	800	1.5	\$2.65
Cabbage	1000	3.0	\$4.52
Carrot	800	2.0	\$3.31
Cauliflower	500	1.4	\$2.49
Cucumber	800	0.9	\$1.32
Endive	500	1.0	\$4.12
Greens, Mustard	500	5.0	\$11.78
Kale/Collard	2000	1.9	\$4.42
Tomato	1200	1.5	\$5.30
Zucchini	500	1.2	\$1.69
Yellow Summer	500	1.2	\$1.69
Patty Pan	500	1.2	\$1.41

Finally, the model assumes that Lively’Hood Farm will not be able to sell 100% of the produce it generates. A portion of the unsalable product will be used to create value-add products and the remainder will be donated to hunger relief efforts in the local community. This percentage is expected to be higher in the early years of the business while the Farm is still establishing its brand and attracting customers. The percentage of unsalable products is expected to eventually decline to about 10% annually in the fifth year. These percentages are noted in the ‘Assumptions & Notes’ tab and accounted for in the ‘Revenues & COGS’ tab of the Financial Excel Model.

2. Honey

Honey revenues and margins assume that 40 pounds of honey will be produced per hive each year, and that 100% of the honey will be packaged and sold direct to consumers at a price of \$32 per pound (K. Peteros, personal communication, March 20th, 2011). The strategic plan assumes that one hive will be in operation in the first year and a second hive will be added in year two. The hives can be purchased for \$150 per hive and are included under fixed assets. Other costs include the jars and packaging at \$120 annually, resulting in a gross profit per hive per year of \$2560 (before labor and hive depreciation costs).

3. Value-Added Products

The strategic plan assumes that Lively’Hood Farms will launch two value-add products in the first year of operation (sauerkraut and kale chips) and two more in the second year of operation (pickles and pesto). For all products, approximately 20 units will be sold per week at an average price of \$5 per unit for the sauerkraut, kale chips and pickles and \$7 per unit for the pesto. The cost of goods sold, including fresh produce, additional ingredients, and jars and labeling, is assumed to be 15% of the selling price. This excludes the cost of labor and also the rental of the commercial kitchen space, as it is difficult to predict the time involved in producing each of these products. These assumptions need to be refined over time as Lively’Hood Farm tracks its costs and labor allocations more closely.

4. Training Courses and Workshops

To supplement its sales, Lively'Hood Farm's strategic plan includes offering training courses and workshops to community members beginning in the second year of operations. To estimate the revenue from these training courses, approximately 12 four-hour sessions, attended by an average of 15 students, at a cost of \$30 per hour are assumed. The direct costs of hosting the workshops is expected to be minimal, but there is an allocated budget of 10% of revenues from the workshops for printing and other class materials.

C. Net Present Value (NPV) Assumptions

Because Lively'Hood Farm is a fictitious business, virtually all of the data included in the Net Present Value analysis is based on assumptions around revenue, cost of goods sold, operating expenses, and fixed assets. These assumptions are documented thoroughly in the Financial Model. Lively'Hood Farms represents a long-term investment, and accordingly, we have projected cash flows over a twenty-year period.

III. Methods of Analysis

A. Opportunity Cost of Capital

Sources of Capital

The financial projections incorporate three sources of capital:

- **Peer-to-peer gifting.** This includes resources like Kickstarter that have proven successful for other local urban agriculture ventures, such as Little City Gardens. However, funds raised through Kickstarter are not treated as an investment. The funders receive incentives like products or artwork, but do not receive equity in the business. Instead, they are recorded as pre-paid revenue in Year 0, with the revenue recognized in Year 1. Therefore, the peer-to-peer gifts are not included in the Weighted Average Cost of Capital (WACC) calculations.
- **Personal credit cards.** The founders are assumed to have existing lines of credit, and would not otherwise not be eligible for commercial bank loans given the high risk, particularly in the current climate.
- **Social venture capital.** This includes slow money and social angel investors. These investors generally don't expect the same level or timeline of fiscal returns as traditional venture capital investors. Instead, they take social returns into account, and generally consider the investment to have a long time horizon.

Government grants were also considered as a potential source of capital, but research found that there are not currently any grant programs focused on urban agriculture.

Weighted Average Cost of Capital (WACC)

The weighted average cost of capital is based on personal credit cards and social venture capital, excluding peer-to-peer gifting. Based on these sources of funding, the WACC is 15.4%, as detailed in Table 4 below. In addition to the required

financial return of 15.4%, the financing model implies an expectation of non-financial returns from peer-to-peer lenders and social investors. Such non-financial returns for the CUA venture include increased awareness of local food systems as measured by the number of people touched through farm education programs, or decreased usage of city health services as food equity issues improve.

Table 4: Weighted Average Cost of Capital (WACC).

Source	Amount	% of Total	Expected Return	Equity or Debt?	Tax Adjusted Rate
Social venture capital	\$ 30,000	75.0%	17.5%	Equity	17.5%
Credit cards	\$ 10,000	25.0%	14.4%	Debt	9.4%
Total	\$ 40,000			WACC	15.4%

Footnotes 3, 4, 5

The WACC for financing beyond year one will likely increase because peer-to-peer gifting is usually only available in the launching phase. A bank line of credit would become a more realistic option, and eventually, the venture may appeal to more traditional equity investors.

Cost of Equity Comparative Beta with Capital Assets Pricing Model

To further understand how the cost of equity might change for the business over time, compare the implied beta under the Capital Assets Pricing Model (CAPM) assuming an expected annual rate of return of 17.5% (as estimated for our social venture financing) to the betas of publicly-traded produce companies. Agriculture and food stocks generally have very low betas (sometimes even negative) because these industries are less sensitive to economic fluctuations and may be seen as a safer bet during times of broader market decline. See Table 5 below for more details.

Table 5: Cost of Equity Comparative Betas Using CAPM.

Type of Financing	Cost of Capital	Beta
Current equity financing	17.5%	2.09
Public company equity financing	11.0%	1.11

Large public companies are not directly comparable to this start-up, given the differences in size, complexity, and risk profile. However, these companies provide a directional indication of the future cost of equity Lively'Hood Farm might encounter as it matures.

B. Net Present Value (NPV)

The NPV analysis helps the owners and potential investors better understand the potential value, risks, and rewards of investing in Lively'Hood Farms. The main inputs to the analysis are the assumptions described above concerning fixed assets,

³ Assumes 35% corporate tax rate.

⁴ Based on an expected financial return of 5x within 10 years (versus 10x for traditional venture capital investors) according to social venture angel investor, Andrew Popell (Popell, A. personal communication, December 18, 2010).

⁵ Average credit card rate for the week ending March 31, 2011 ([McFadden, 2011](#)).

revenue, working capital, operating expenses, and the WACC. The analysis shows the net present value of the overall investment in Lively’Hood Farms at horizon years 5, 10, 15, and 20. The NPV and Total Value at each horizon year is summarized below in Table 6.

Table 6: Net Present Value and Total Value at Each Horizon Year.

Year	NPV Cash Flows	PV Horizon Value	Total Value
5	\$ (15,085)	\$ 148,522	\$ 133,436
10	\$ 50,175	\$ 91,465	\$ 141,640
15	\$ 87,778	\$ 60,687	\$ 148,465
20	\$ 115,333	\$ 36,525	\$ 151,858

The NPV and valuation at each 5-year period shows that given a 15- or 20-year horizon, the partners and potential investors should invest \$65,000 in Lively’Hood Farms.

C. Social Return on Investment (SROI)

As a local business, focused on providing healthy, sustainably grown food for its community, Lively’Hood Farm is inherently a socially responsible business. In addition to actively supporting the surrounding community, growing food on vacant industrial land captures CO₂ and makes the surrounding area more aesthetically appealing. These two benefits have the potential to generate carbon credits as well as increase the value of the surrounding real estate.

Lively’Hood Farm donates unsalable but still edible products to charitable organizations for consumption or to be made into value-added products. Lively’Hood Farm also pays a fair wage to workers and donates 1% of proceeds to charity once it becomes profitable. Key impact areas and possible metrics, based on the Stewardship Index for Specialty Crops (2011) and Global Reporting Initiative (2011), include:

- **Biodiversity.** This is measured by the number of unique crops and heirloom varieties grown at the Farm. (The Farm will not use genetically modified (GMO) seeds, which lead to monocultures.)
- **Education.** Metrics for education include the number of individuals who visit the farm and learn about sustainable food systems, and those who attend workshops or classes to explore production models more intensively.
- **Health.** In the immediate community, Lively’Hood Farm, tracking the usage of health services and absenteeism will indicate improved health for the Farm’s constituents.
- **Green House Gases (GHG).** GHG usage will be mitigated by the use of organic fertilizers, bike transportation until an alternative fuel truck is purchased in year 3, and capturing heat and light in the greenhouse for the hydroponic production. GHG impact can be measured by closely tracking all inputs for each product.
- **Waste.** Lively’Hood Farm can quantify how many pounds of food are diverted from landfill.

- **Food Safety & Traceability.** By publishing information about the inputs to the products and ensuring that the highest safety measures are taken, the Farm can provide transparency into safety and other impacts described above.

IV. Financial Scenarios Study

A. Recommended Financial Scenario

The core recommendations for the action plan that have impacted our financial analyses include:

- Focus on high-yield greens and fast-growing herbs.
- Utilize a hydroponic growing method in a greenhouse with natural light to supplement soil-based farming methods.
- Develop supplier relationships with local restaurants as a primary sales channel.
- Pursue supplemental income opportunities, such as training courses.
- Develop line of value-added product offerings to sell direct to consumers and through select vendors.

B. Alternative Financial Scenarios

To test the impact of the recommended financial scenario on the ultimate value of the business, Team LivelyHood analyzed the following two alternative scenarios.

Alternative 1

Eliminate land allocation for hydroponically grown greens in favor of a diversified soil-based farm operation. Other variables changed for this scenario include:

- Assumes 75% of product sold direct to consumers (due to increased crop variability, allowing for the generation of a more desirable CSA model).
- Assumes yields per square foot planted can be doubled using bio-intensive growing methods, such as companion plant spacing (Jeavons, 2006).
- Assumes doubling of revenue from classes and workshops (with launch moved to year 1), and value-add products and honey output.
- Assumes decrease in working capital requirements decrease from 45 to 20 days revenue to reflect fact that majority of sales will be cash sales direct to consumers.
- WACC decreased to 9.4% to reflect reduced upfront capital requirements, allowing for 100% reliance on debt financing.

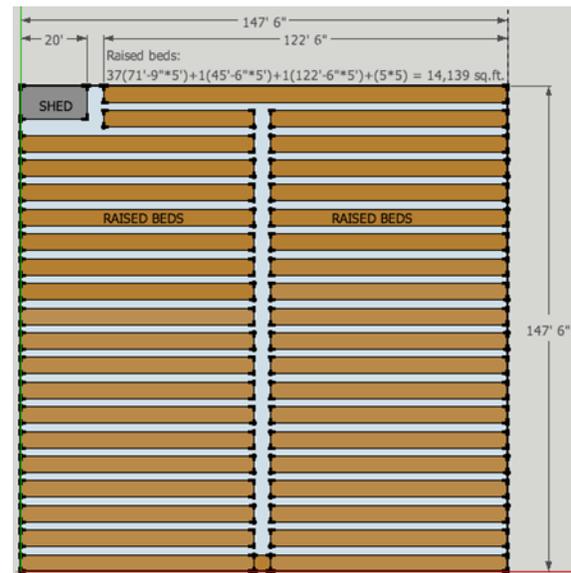


Figure 2: Plan Alternative 1- Maximize Soil-Based Farming.

Alternative 2

Eliminate land allocation for outdoor soil-based raised beds in favor of maximum build-out of indoor greenhouse hydroponically grown greens. Other variables changed in this scenario include:

- 90% of product sold to restaurants (versus 75%).
- Unsalable product assumptions increased by 50% to recognize greater risks associated with monoculture approach.
- No value added products or honey sold.
- Ongoing fixed asset investments increased to reflect higher ongoing hydroponic and greenhouse maintenance costs.
- WACC increased to 22.5% greater reliance on traditional equity funding and higher expected return given larger upfront investment.



Figure 3: Plan Alternative 2- Maximize Hydroponic Greenhouse Farming.

C. Financial Scenario Comparatives

Under the first alternative, the value of the firm decreases significantly, suggesting that it may be difficult to generate sufficient yields to make the Farm profitable without the use of some hydroponics. Conversely, the hydroponics only model results in a much higher net present value. This requires much more start-up capital, and would be out of the reach for most start-up urban farmers. These scenarios are compared to our recommended strategy in Table 7.

Table 7: Recommended Investment & Year 10 Valuation Scenarios Comparison.

	Recommended: Mix	Alternative 1: No Hydroponics	Alternative 2: All Hydroponics
Required Upfront Investment	\$ 64,000	\$ 26,000	\$ 254,000
NPV Cash Flows (year 10)	\$ 50,175	\$ (23,042)	\$ 540,895
PV Horizon Value (year 10)	\$ 91,465	\$ 40,178	\$ 256,970
Total Value (year 10)	\$ 141,640	\$ 17,136	\$ 797,865

V. Conclusion

A. Key Insights

- Owner skill level is a crucial asset.
- Future changes in policy and fuel costs could dramatically affect business.
- Productivity and efficiency are key.
- Technologies will change, which can affect crop yields and growing techniques.

B. Challenges & Solutions

We learned an incredible amount of information about small farm practices and the challenges facing a commercial urban farm. Though the challenges are significant, there are many creative solutions to financing a small urban farm.

Here are the main challenges and solutions we found:

Land is the key fixed cost:

- Creatively search for land/roof options under \$0.30 Sq/Ft.

Need for working capital higher than originally anticipated:

- Look for creative ways to finance, like peer-to-peer lending.
- Diligent measurement and efficient management can help stabilize costs and keep margins high.
- Maintain tight controls over accounts receivable and payment terms.

Cost of capital may change:

- Use the Excel tool to understand changing costs of capital.

Developing product mix and customer balance is critical:

- May result in early surplus losses, but can lead to long-term stability.

There are many uncertainties:

- Stay adaptable. For example, if early demand for classes shows high potential then adjust strategy to capture this more reliable revenue source.
- Stay aware of consumer trends and restaurant needs.

Marketing is critical:

- Community engagement can build brand value and provide additional marketing value. Local popularity will drive sales.
- Know how to properly package goods.
- Experiment with unique heirloom varieties to create new markets.

C. Opportunities & Risks

The financial analyses highlighted the key opportunities and risks of operating a commercial urban agriculture venture in San Francisco. Given that City legislators only recently endorsed this business type, there is an opportunity to develop brand recognition as an early adopter and pioneer of healthy, local sustainable food sources. As a commercial venture, Lively'Hood Farm (e.g. a similar commercial urban farm venture) can access diversified revenue streams and commercial transactions that may not be available to a not-for-profit organization. The ability to develop personalized relationships with its consumer base also allows for product customization and fast turn-around. These relationships and the novelty of being one of the first to grow San Francisco's hyper-local fresh food, illuminate a unique opportunity to enter the yet untapped market for hyper local food sources.

There are also many risks associated with this pioneering venture. Fresh produce is a low margin product with relatively high upfront capital investments. San Francisco, in particular, has higher costs of living than most US cities. While Jeff and Sandy would have access to plenty of fresh, healthy food, they would be paid near poverty level wages in the formative years of the business. Though we have created a potential six-year payback plan, commercial urban farming is clearly a long-term investment, requiring a great deal of dedication and ingenuity on the part of the growers. Indeed, growing food is a labor of love!

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Appendix

I. Summary of Financial Model Worksheets

(1) **Assumptions and Notes (Notes):** assumed costs, rates, margins, square footage calculations, as well as estimated waste factors in years 1-5, and department abbreviations.

(2) **Exhibits:** Exhibits such as NPV at Horizon Year and Kale Crop Yield, used in final presentation and paper.

(3) **Income Statement (IS):** income statement with operating expenses, EBITDA, depreciation expense, taxes, and profit after taxes. Also includes the balance sheet, with assets and liabilities and required external financing.

(4) **Discounted Cash Flow (Disc.CF):** fixed assets, working capital and plant investments, operations, free cash flow, total value (horizon plus free cash flows), and breakeven analysis.

(5) **Operating Expenses (OpEx):** operating expenses broken down per department- general and administration (G&A), sales and marketing (S&M) and research and development (R&D).

(6) **Headcount (HC):** estimated salaries for Lively'Hood Farm co-owners Jeff and Sandy as well as a part-time employee in years 1-5.

(7) **Revenues & COGS (Rev):** breakdown of revenue generated from farmed soil, hydroponics, value-added goods, honey, and classes and workshops. Also includes estimated COGS in years 1-5, which is tied to the waste factors in each year.

(8) **Max Revenue by Product Pricing (ProdSum):** estimated low, average, and high profit margins generated from hydroponically-grown lettuce, basil, watercress, and mixed-crop soil based raised beds, as well as value-added goods such as sauerkraut, kale chips, pesto, and pickles. Also includes profit from honey (per hive) and educational workshops. Farm totals exclude administration and rent expenses.

(9) **Fixed Assets (FA):** capital investments per year, organized by information technology, tools & equipment, and leasehold improvements. The asset and depreciation schedule assumes straight-line depreciation over the specified term.

(10) **Weighted Average Cost of Capital & Capital Asset Pricing Model (WACC + CAPM):** expected return and adjusted tax rate for peer-to-peer gifting, social venture capital, and credit cards. Also includes comparative betas with publically traded companies in the agricultural and produce industries.

(11) **Product Pricing:** estimated product pricing per plant and crop type, with key assumptions on consumer-to-wholesale price and restaurant-to-wholesale price.

(12) **Raised Beds Calcs-ALL:** average number of seeds needed per area of planting and estimated low, average, and high crop yields.

(13) **Hydro Calcs- Lettuce:** estimated revenues and costs for producing hydroponic lettuce in a 42-head tank using organic fertilizer.

(14) **Hydro Calcs- Basil:** estimated revenues and costs for producing hydroponic basil in a 42-head tank using organic fertilizer.

(15) **Hydro Calcs- Watercress:** estimated revenues and costs for producing outdoor hydroponic watercress in a 42-head tank using organic fertilizer.

(16) **REF Soil Calcs – Tomatoes:** estimated revenues and costs for producing three seasons of tomatoes per year, for reference and future modeling only. Not tied to other calculations in current model.

(17) **REF Margins %:** gross margins for potatoes, cabbage, onions, carrots, leeks, beetroot, zucchini, cauliflower, and sweetcorn.

(18) **REF Margin \$/acre:** combined fruit and vegetable margins from farm in Scotland; converted breakdown of weighted average yield in \$/acre.

(19) **REF Planting Plants / sq.ft.:** estimated required spacing per crop type.

(20) **REF Organic Prices USDA:** average and high prices per crop type, including some costs of seeds.