Energy Industrial Park

Turnpike Road Master Plan

Prepared for

Town of Montague

Prepared by

The Cecil Group
BioEngineering
Cambridge Economic Research

April 2012

Energy Industrial Park
Turnpike Road

Final Report - DRAFT

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SUMMARY OF FINDINGS AND RECOMMENDATIONS

Manufacturing and process industries have been part of the Franklin County's history and currently remain as an important land use for the Town of Montague in terms of jobs and taxes. Establishing a strategy to nurture and grow the available industrial sectors is therefore a clearly needed, near-term and long-term goal. Findings from this study determined that the development of a new industrial park has a good chance of success.

- There are few remaining, buildable sites for industrial development within the region. There is growth and demand determined from the market research that, based on past absorption, indicates there will be a lack of open industrial properties within 3 to 4 years.
- The current and projected industrial markets are strongest for certain historic and new sectors such as metal fabrication and food processing. Warehousing and distribution, and health care also have strong potential. However, almost all of the expansion will come from businesses already within Franklin County and needing to grow.
- The Town of Montague has an opportunity to capture the expansion of these industrial market sectors within a newly established industrial park. There is town-owned land south of Turnpike Road off Shady Lane that provides a reasonable option for a new industrial park.
- As proposed, the Turnpike Road Energy Industrial Park could provide:
  - » 93 acres of subdivided land for industrial development
  - » About 20 lots fronting on a new subdivision road of about 4400 feet in length, with several out parcels for conservation and public works activities
  - » A large area of conservation land, preserved for perpetuity
  - » Land for expansion of Judd Wire, the existing and adjacent manufacturer
  - » Separation of the burn dump and landfill on different parcels for closure and management
  - » Closure of the burn dump as a paved parking area for adjacent uses
  - » Use of the landfill for leaf composting
  - » Site design standards for reducing the impact of development
  - » An opportunity to construct an alternative energy generating facility.
- The subdivision construction is potentially fundable through federal economic development grants. However, construction could also be phased to match costs and income from sale of properties.

To create the subdivision, the public works facilities that exist there; leaf composting, transfer station, gas pump and dog pound, must be relocated. The preferred consolidation of all DPW facilities is not fully possible with the current budget constraints. Consequently, the proposed plan is to:

- Refurbish and use the existing DPW garage on A Street for cold storage of equipment
- Relocate the leaf composting to the landfill parcel
- Move the main facilities; Administrative offices and Garage, and other DPW facilities to the site adjacent to the new Public Safety building on Turnpike Road.

The strategy for implementation of this plan is to proceed with the project under the following design, permitting, and administrative actions.

Design and Permitting Steps:

- Complete a survey of the property which includes information necessary for the closure of the burn dump, and showing wetland resource boundaries.
- Prepare an engineered Preliminary Subdivision plan and initiate platting.
- Complete an architectural and engineering feasibility study for the DPW facilities relocation as proposed.
- Initiate wetland resource permitting for the subdivision and DPW facilities modifications.

- Complete the Burn Dump Closure plan and initiate filing with the MassDEP.
- Negotiate Burn Dump Closure plan with the MassDEP.
- Obtain State DEP permission to use closed Landfill area for DPW functions.

Administrative Steps:

- Submit grant request(s) for funding of the subdivision land preparation and road construction.
- Remain in contact with the State's NHESP office regarding amendments to the Priority Habitat Maps around this area.
- Amend and update the Airport Industrial Park covenants for the new Energy Industrial Park.

CHAPTER 1
Introduction

INTRODUCTION

The Town of Montague recognizes the value of industry to the overall economic health of the community. Montague has a strong history of industrial uses in its history and recent experiences suggest the town should look again at industrial uses as new opportunities for economic development that create jobs and expand the tax base. The Turnpike Road Energy Industrial Park is as an important opportunity to implement such a plan.

What is needed is a careful analysis and conceptual study to understand the potential of the Energy Industrial Park and thereby be able to advise the residents and business owners of this potential so that they may make informed decisions about possible investments. The plan could also leverage other benefits to the community and become an important part of local "sustainable economic development."

The Cecil Group team's recommendations are based on the direction provided by the town and the Reuse Committee and our professional estimation of the most effective approach to completing the plan. Based on the goals of the town, there were five steps in our approach to defining the recommended plan:

- Determining the market directions and requirements for attracting business and industry.
- Physically analyzing the relationships of the previously-manipulated sites and environmental resource areas to determine the best industrial subdivision plan.
- Determining the needs and requirements for town Public Works functions and facilities.
- Reconfirming the town's master plan goals and guidelines for a sustainable energy- or eco-industrial development project.
- Preparing phased strategies including options for financial assistance to advance the project.

In completing these steps the team incorporated the Master Plan Guidelines while making new discoveries that influenced the plan:

- The number of industrial sites practicable, which at the start of the project was estimated to be a maximum of between 5 and 10 sites, was determined by new physical and market factors to be a different mix and size of lots. Consequently the desire is to provide a flexible design for the subdivision, where lot configurations could be easily modified to accommodate different users.
- The construction of a new Public Works Maintenance Facility and transfer station within the industrial park was considered but deemed potentially counter-productive to the maximum use of the industrial park for private development. Consequently, a review and search was made for alternative sites.
- The Burn Dump when capped in compliance with MassDEP regulations is limited by the design of the closure. The option was to close the area with a functional use such as paved parking.
- The land that is compatible for solar electric energy generation was determined to be the landfill area. While this did not change, the project proponent is yet to be determined. In the absence of a current concrete proposal, the use of the landfill for DPW leaf and yard waste composting is recommended.
- Roads and sites designed with sustainable and low impact design principals including the preservation of high quality natural resource areas was found to be relatively easy to accommodate within the development plan. The plan includes buffering, performance standards, and industrial impact limitations to protect neighboring homes and residents, and the environment.
- While previously recognizing that potential new development may come from expansion of the adjacent Judd Wire plant, the market research determined that expansion of the other local and Franklin County regional industries were the actually the best opportunities for growth of the Energy Industrial Park.
- Designing the site preparation, grading and infrastructure to reduce costs, allow flexible design options and a range of potential users with the proper phasing plan promotes the type of flexibility supported by the market findings. 'Green' industrial development to many means the proper engineering of buildings and sites. Current and revised building codes, including the local adoption of the Stretch Code, will ensure that highly energy-efficient projects are constructed. No additional building code requirements appear needed to create a sustainable project.

- Because business needs are the determining factor, incorporating Eco- and Energy-Industrial Park concepts and Smart Growth Principles as a branding of the park, distinguishes its unique qualities and may attract businesses concerned with their corporate identity.

Through a process of determining and considering these findings, while considering the town's master plan goals and guidelines, The Cecil Group was able to craft a master development plan that allows the town to proceed in the creation of an attractive site for industrial development and become a valuable asset to the community.

What follows in this report is a review of the findings and conditions, and the presentation of the subdivision and development plan.

CHAPTER 2
Economic Base Analysis

ECONOMIC BASE ANALYSIS

To provide a basis for the selection of target industries for Montague Energy Park, the Cecil Group Team has assembled a comprehensive database of economic and demographic data for Montague and for the surrounding region. Trends in population, income, housing prices and trends in employment by industry and earnings over the past ten years are evaluated and are compared with trends in state and national averages. In order to assess the strengths and performance of the local and regional economic base, the findings of a shift-share model assessing industry concentration and performance are presented. This analysis is the first step in the process of identifying the best prospective target industries for Montague in energy and non-energy sectors.

DEMOGRAPHIC ANALYSIS

Table 1 shows that the population of the five villages that comprise Montague has declined by 4% between 2000 and 2009 and currently stands at 8135 residents. Over half of them, 4430, live in Turners Falls. Reflecting the aging of this population, the median age increased from 39 to 44, significantly above the national average median age of 36 years. Average household size has dropped to 2.1 people.

TABLE 1: SOCIO-ECONOMIC TREND ANALYSIS - TOWN OF MONTAGUE *2000-2009*

				% Change Montague
General Characteristics	**2000**	**2009**	**US Avg.**	**2000-09**
Population	8489	8135	-	-4%
Median Age	39	43.7	36.5	12%
Avg. Hhld size	2.3	2.1	2.6	-7%
Housing Units	3616	3934	-	9%
Median Housing Value	$ 113,400	$ 204,700	$185,400	81%
% Owner Occupancy	61%	55%	67%	-10%
% Renter-Occupancy Housing Units	39%	44%	33%	13%
Vacant Housing Units	6%	4%	12%	-32%
Social Characteristics				
% High school Graduates	84%	88%	85%	5%
Bachelors Degree or higher	19%	26%	28%	37%
Speak Foreign Language at home	10%	7%	20%	-30%
% White	95%	90%	75%	-5%
% Black	1%	3%	12%	275%
% Latino	3%	6%	15%	131%
Economic Characteristics				
% in Labor Force	66%	64%	65%	-3%
Mean Travel Time to Work	23 mins	25 mins	25 mins	9%
Median Household Income	$ 33,750	$ 41,865	$ 51,425	24%
Per Capita Income	$ 17,794	$ 25,422	$ 27,041	43%

Source: US Census Bureau, American Factfinder.

In spite of the population loss, the number of housing units in Montague grew by nearly 10% as 318 new units were added to the housing stock. The median housing value, at $205,000 exceeds the US average but is well below the $358,000 state average value. Owner-occupancy has decreased significantly since 2000, from 61% to 55%. Vacancy has dropped from 6% in 2000 to 4% in 2009, suggesting a strong demand for housing. Nationally, housing vacancy averages 12%.

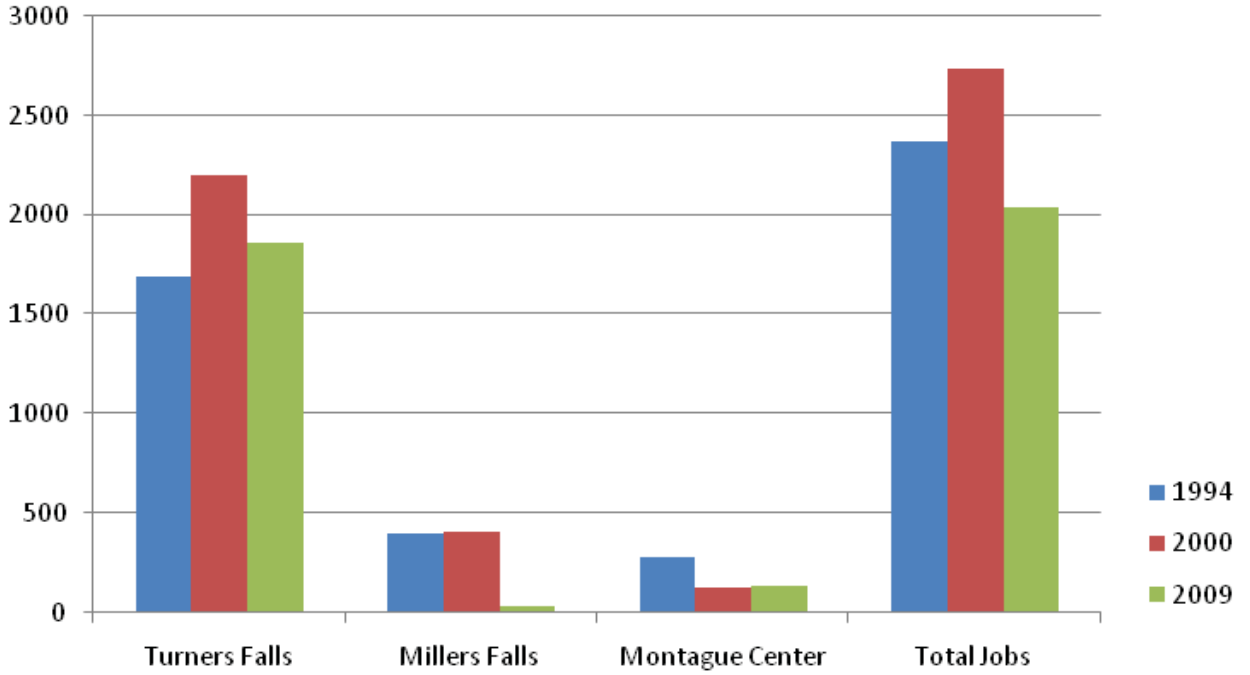
Of Montague's residents, 88% have finished high school, indicating an educated blue collar workforce. Nearly 20% have Bachelor's degrees. The proportion of Latinos has doubled and that of African Americans has tripled, but the numbers are small, adding 259 Latinos and 207 African Americans since 2000. The proportion of households that speak a language other than English at home has dropped from 10% to 7% in the past decade, compared to a national average of 20%. This suggests that there are few recent immigrants in the town.

Despite its relatively older population, 66% of Montague's population is economically active. With the loss of jobs locally (which will be discussed in the sections that follow), the mean travel time to work for Montague's employed has increased to 25 minutes. However this is still low for a rural area. Remarkably, Montague's per capita income has grown by 43% since 2000 to $25,422, compared to national average growth of 25% for the past decade. This has narrowed the gap between local and state and national averages of around $27,000.

Employment Trends in Montague

Figure 2 looks at trends in jobs in Montague during the 15 year period from 1994 to 2009. The data in the chart include only private sector employment and exclude self-employment and public sector jobs. The number of jobs in the town grew by 15% from 1994 to 2000 to 2,739 jobs, but soon afterward jobs began to decline to their present level of 2,038 jobs, a drop of 25%. Some of the 700 jobs lost were made up by an increase in self-employment to which 200 jobs were added by 2009, when self-employment in the town was estimated at over 1,200 and total private employment and self-employment was estimated at 3,240 jobs. It is estimated that nearly 40% of Montague's private sector workforce is self-employed.

FIGURE 2 EMPLOYMENT TRENDS IN MONTAGUE *1994-2009*



Excludes Public Sector Employment

** Self-employment jobs estimated by CER based on BEA Regional Information Economic Series Data*

Sources: US. Census Bureau, ZIP Code Business Patterns, SIC & NAICS, BEA REIS Data Series.

Businesses in Montague

Figure 4 shows that the number of businesses in Montague grew in all of Montague's villages between 1994 and 2000, but the recession has caused the number of businesses to decline by 25%. Only Montague Center gained 12 businesses, both Turners Falls and Millers Falls suffered significant losses of businesses.

TABLE 3: BUSINESSES IN MONTAGUE *1994-2009*

	1994	2000	2009	% Change 2000-09
Turners Falls	130	156	112	-28%
Millers Falls	20	20	7	-65%
Montague Center	26	32	38	19%
	176	208	157	-25%

Includes only Private Sector Jobs, excludes government & self-employment.

Sources: US. Census Bureau, ZIP Code Business Patterns, SIC & NAICS, BEA REIS Data.

Excluding self-employed people, there are presently 157 businesses in Montague. As is shown in Figure 4, the majority of businesses are in Turners Falls.

FIGURE 4: BUSINESSES IN MONTAGUE'S VILLAGES

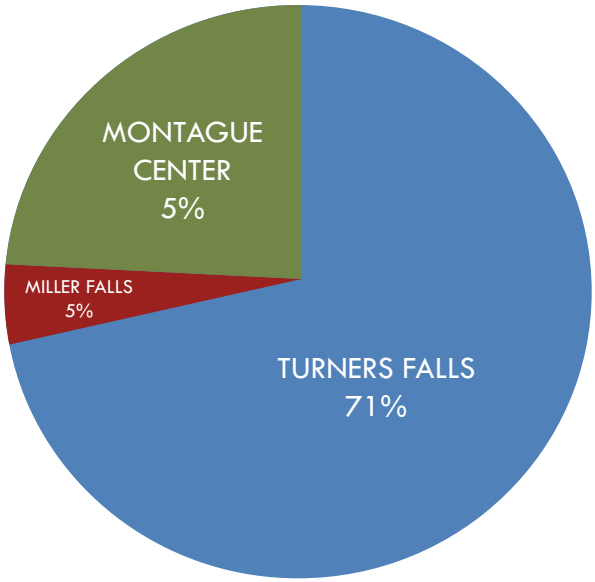


Table 5 looks at changes in the types of businesses in Montague from 2000 to 2009. Significant gains were made in businesses in management Services, Waste Management & Remediation, Health Care, and Education. Construction, Finance & Insurance, Real Estate, and Hotel & Restaurant sectors also registered positive gains in businesses.

TABLE 5: BUSINESSES IN MONTAGUE BY INDUSTRY *(NUMBER OF BUSINESSES)*

	2000	2009	% Change
Forestry & Fishing	1		-100%
Construction	12	13	8%
Manufacturing	18	14	-22%
Wholesale Trade	5	4	-20%
Retail	29	20	-31%
Transport & Warehousing	7	4	-43%
Information	2	1	-50%
Finance & Insurance	5	6	20%
Real Estate	6	4	-33%
Professional Services	12	8	-33%
Management Services		4	400%
Waste Remediation	4	5	25%
Educational Services	3	7	133%
Health Care	21	26	24%
Arts & Entertainment	5	2	-60%
Hotels & Restaurants	16	17	6%
Other services	32	22	-31%
Unclassified	30	0	-100%
TOTAL	**208**	**157**	**-25%**

Includes only private sector employers

Source: US Census Bureau, Zip Code Business Patterns (NAICS)

As is shown in Table 6, Montague has lost some major employers in the past decade, but has gained new large employers as well. In 2000, there were six businesses with over 100 employees. The number of large construction and hotel/restaurant sectors declined. But these were offset by gains in large employers in health care and transportation & warehousing and sectors. The number of manufacturing establishments with over 100 jobs remained constant at 4. In 2011 the firms were Hillside Plastics, Judd Wire, LightLife Foods, and Heat Fab.

TABLE 6: BUSINESSES WITH OVER 100 EMPLOYEES IN MONTAGUE *(NUMBER OF BUSINESSES)*

	2000	2009
Construction	1	-
Manufacturing	4	4
Wholesale Trade	-	-
Transport & Warehousing	-	-
Health Care	-	1
Hotels & Restaurants	1	-
Total	**6**	**6**

Includes only private sector employers

Source: US Census Bureau, Zip Code Business Patterns (NAICS) – Updated by Cambridge Economic Research 2011 Survey of Manufacturing Firms in Montague.

Unemployment in Montague

Table 7 compares the unemployment rate in Montague with those of selected towns in Franklin County. Montague has the second-largest labor force of the surrounding towns, next to Greenfield. Montague's 7.1% unemployment rate is slightly above the Massachusetts state average rate of 6.8%. It is higher than most of the surrounding towns, but is significantly lower than that of Orange (9%) and Shelburne (9.3%).

TABLE 7: UNEMPLOYMENT IN SELECTED TOWNS IN FRANKLIN COUNTY *OCTOBER 2011*

Area	Labor Force	Employed	Unemployed	Town Rate	Massachusetts Rate
Bernardston	1,223	1,146	77	6.3%	6.8%
Deerfield	2,726	2,565	161	5.9%	6.8%
Erving	836	778	58	6.9%	6.8%
Gill	792	751	41	5.2%	6.8%
Greenfield	9,022	8,407	615	6.8%	6.8%
Montague	**4,187**	**3,890**	**297**	**7.1%**	**6.8%**
Orange	3,626	3,287	339	9.3%	6.8%
Shelburne	1,093	995	98	9.0%	6.8%
Whately	945	910	35	3.7%	6.8%

Source: Bureau of Labor Statistics

Regional Employment Trends

Table 8 present data from the Bureau of Economic Analysis Regional Economic Information System for Franklin County, which, unlike the Census Business Patterns data presented in the previous sections, include public sector employment and self-employed people. It shows that employment in Franklin County remained relatively stable during the eight-year period from 2001 to 2009, with the loss of just 116 jobs. This mirrors state average performance. Nearly 2,000 salaried positions were lost during these years in Franklin County. These losses were mostly offset by the growth of 1,864 new jobs from self-employment and business start ups for a net loss of just 116 jobs. The number of farm proprietors grew by 10%, while non-farm business owners grew by almost 20%.

TABLE 8: EMPLOYMENT CHANGE IN FRANKLIN COUNTY *2001 TO 2009*

	Jobs 2001	Jobs 2009	% change	# of Jobs
Total employment	39341	39225	0%	-116
BY TYPE				
Wage and salary employment	29155	27175	-7%	-1980
Proprietors employment	10186	12050	18%	1864
Farm proprietors employment	603	665	10%	62
Nonfarm proprietors employment	9583	11385	19%	1802
BY INDUSTRY				
Farm employment	983	1048	7%	65
Nonfarm employment	38358	38177	0%	-181
Private employment	32896	32924	0%	28
Forestry, fishing, and related activities	274	(D)	NA	NA
Mining	12	(D)	NA	NA
Utilities	(D)	77	NA	NA
Construction	2188	2340	7%	152
Manufacturing	6485	4273	-34%	-2212
Wholesale trade	920	802	-13%	-118
Retail trade	4085	4301	5%	216
Transportation and warehousing	820	1115	36%	295
Information	1007	720	-29%	-287
Finance and insurance	867	1157	33%	290
Real estate and rental and leasing	649	889	37%	240
Professional, scientific, and technical services	1738	2074	19%	336
Management of companies and enterprises	(D)	528	NA	NA
Administrative and waste management services	1236	1263	2%	27
Educational services	2353	2336	-1%	-17
Health care and social assistance	3923	4626	18%	703
Arts, entertainment, and recreation	1441	1728	20%	287
Accommodation and food services	1933	2134	10%	201
Other services, except public administration	2257	2231	-1%	-26
Government and government enterprises	5462	5253	-4%	-209
Federal, civilian	194	215	11%	21
Military	207	177	-14%	-30
State and local	5061	4861	-4%	-200
State government	(D)	1025	NA	NA
Local government	(D)	3836	NA	NA

D - Data withheld for confidentiality.

Source: Bureau of Economic Analysis, Regional Economic Information System

Table 9 compares the performance of sectors experiencing significant employment changes in Franklin County with State average performance of these industries from 2001 to 2009. It shows that the manufacturing sector suffered the heaviest losses. Over 2,200 manufacturing jobs were eliminated in the County between 2000 and 2009 -- a loss of 34% -- in line with the state average loss of 32% of manufacturing jobs during this period. The largest job gains in the County were in Health Care sector, where 700 new jobs were created, a gain of 18%, mirroring the statewide performance of this sector. Significant gains were registered in arts and entertainment establishments and in hotels and restaurants. Nearly 500 new jobs were created in these two sectors.

TABLE 9: EMPLOYMENT CHANGE IN SELECTED SECTORS IN FRANKLIN COUNTY COMPARED TO MA STATE AVERAGE % CHANGE IN JOBS - *2001 TO 2009*

	No. of Jobs Added 2001-2009	Franklin County	MA State Average
Self-Employed	1,864	18%	25%
Construction	152	7%	-8%
Manufacturing	-2,212	-34%	-32%
Retail	216	5%	-5%
Transportation & Distribution	295	36%	-9%
Finance & Insurance	290	33%	11%
Real Estate	240	37%	27%
Professional Services	336	19%	8%
Health Care	703	18%	18%
Arts & Entertainment	287	20%	18%
Hotels & Restaurants	201	10%	21%

Source: US Department of Commerce, Bureau of Economic Analysis, Regional Economic Information Series.

During a time when state and national construction sectors contracted significantly, Construction jobs in Franklin County actually grew by 7%, adding 152 jobs, contrary to the statewide loss of -8% during this period. Similarly, jobs in Franklin County in retailing grew by 5%, while statewide, Retail jobs declined by 5%. Transportation and warehousing added almost 300 jobs in Franklin County, a gain of 34%, compared with a 32% statewide loss in logistics and distribution. Real Estate added 240 jobs, also exceeding state average performance. Despite the financial crisis of 2007-2008, Finance and Insurance grew by 35% -- adding almost 300 new jobs – more than triple the 11% statewide growth rate in financial services. Professional Services grew by almost 20% in Franklin County, registering a gain of 336 new jobs, underscoring in increase in the college-educated population which is apparent in the demographic data presented at the beginning of this chapter.

Changing employment patterns underscore the shrinkage of employment in traditional manufacturing industries due to the Great Recession that began to set in late 2007. Employment can be expected to recover somewhat as the nascent recovery gains strength, but continuing efficiencies in production technology are likely to mitigate major future gains in manufacturing jobs. More labor-intensive service sectors centered on arts, entertainment, tourism, and healthcare should continue to add jobs and prevent population loss. Montague's economic development strategy should be targeted toward retention of manufacturing plants, while supporting the growth of the service sector by helping to facilitate the availability of premises in vacant downtown and mill buildings. The development of a new industrial park to accommodate expansion of existing manufacturing industries is a crucial component of an industrial retention strategy.

Unemployment in Franklin County

Table 10 compares the unemployment rate in Franklin County with that of other Massachusetts counties. It shows that, from October 2010 to October 2011, Franklin County's unemployment rate dropped from 7% to 6.1%, a decrease of 13%. Franklin County's 6.1% unemployment rate is the 5th lowest of the state's 15 counties. Lower rates exist only on the Islands (5.3% and 6%), in Middlesex County (5.6%) and in Hampshire County (5.4%), which is part of Franklin County's Labor Market area. It is well below the prevailing rates in most of the Boston metro area and of the abutting Worcester (7.5%) and Hampden Counties (8.3%).

TABLE 10: UNEMPLOYMENT IN MASSACHUSETTS BY COUNTY *OCTOBER 2010 - OCTOBER 2011*

	Oct 2010	Oct 2011
Nantucket County	5.6 %	5.3 %
Hampshire County	6.2 %	5.4 %
Middlesex County	6.5 %	5.6 %
Dukes County	6.4 %	6.0 %
Franklin County	7.0 %	6.1 %
Norfolk County	7.0 %	6.1 %
Berkshire County	7.3 %	6.4 %
Barnstable County	7.6 %	6.8 %
Suffolk County	7.8 %	6.8 %
Plymouth County	8.1 %	7.1 %
Essex County	8.2 %	7.3 %
Worcester County	8.6 %	7.5 %
Hampden County	9.3 %	8.3 %
Bristol County	10.1 %	9.1 %
Massachusetts	**7.8 %**	**6.8 %**
US Average	**9.7%**	**9.0%**

Source: Bureau of Labor Statistics

SWOT Analysis Findings

In order to evaluate the Strengths, Weaknesses, Opportunities, and Threats of the region's economic base, a SWOT analysis has been conducted using the Local Economic Assessment Package Model (LEAP). Using location quotients and shift-share analysis, this model evaluates and identifies strong, weak, promising, and threatened industries. The LEAP model also calculates the potential for job growth in industries that are under-represented in a region's economic base. The data used are from the Census County Business Patterns and exclude self-employment and public sector jobs.

Table 11 identifies the best-performing industries in Franklin County and compares the performance of these industries in Franklin County with state and national average performance. Data in the table reflect Compound Annual Growth Rates (CAGR's), not absolute changes. The Health Care sector, which is Franklin County's biggest employer, grew by 0.3% a year from 2001 to 2009. This is below the state and national average annual growth of 2% and 2.5% annual growth, respectively.

TABLE 11: BEST-PERFORMING INDUSTRIES IN FRANKLIN COUNTY *(3 DIGIT NAICS) (COMPOUND ANNUAL GROWTH RATE, 2000-2009)*

NAICS	Industry	No. of Jobs 2009	Franklin Co.	MA Avg.	US Avg.
111	Crop Production	583	2.1%	0.1%	-0.7%
115	Support for Farming	155	7.2%	18.3%	-0.5%
491-3	Mail Order & Delivery	577	13.8%	-8.2%	-4.9%
514	Internet & Support Services	78	17.8%	-8.2%	7.2%
562	Waste Mgt. & Remediation	118	16.2%	1.8%	1.4%
621-4	Health Care	4098	0.3%	1.9%	2.5%
813	Non-Profit Organizations	898	4.6%	2.2%	1.7%
813	Private Households	644	1.1%	2.1%	3.7%

Source: U.S. Census Bureau, County Business Patterns

Contrary to the national trend, both crop production and farming support industries grew significantly in Franklin County, in line with the Massachusetts average performance. The growth in the Agricultural sector was driven by demand generated by the local foods movements, by the growth in popularity of farmer's markets throughout New England, and by the increase in the retirement-aged population.

Fuelled by the growth of e-commerce, Mail Order & Delivery jobs added from 2001 to 2009, registering a CAGR of 14% in Franklin County. Significant rates of increase were also registered in Waste Management & Remediation) at 16.2%, in which jobs totaled 118 in 2009. Reflecting the region's entrepreneurial arts and create strengths and its tradition of grassroots community development, jobs in non-profit organizations in Franklin County grew by 4.6% a year from 2001 to 2009, over twice the state and national rates in this promising sector, which is expected to continue to gain jobs. Despite the aging population, jobs in private households in Franklin County grew at only half the state average and one-third of the national average.

Table 12 presents the findings of the LEAP shift-share model regarding the strengths, weaknesses, opportunities, and threats confronting the economic base of Franklin County. The strongest industry, which is growing faster than the national average, is Waste Management & Remediation, which has been given a boost by the growth of recycling and of green technologies for the clean-up of contaminated brownfield redevelopment sites. The Waste Management & Remediation sector is comprised of companies who collect, clean, recycle, and dispose of waste materials. There are three subsectors within this industry: waste collection; waste treatment and disposal; and remediation and other waste management. There were 170 jobs in Non-profit religious, civic, and professional organizations created between 2000-2009, placing it among Franklin County's top three industries. Internet and Data Processing, which have grown at a rate twice that of the state average, is the third top industry.

TABLE 12: SHIFT-SHARE MODEL RESULTS FOR FRANKLIN COUNTY

Strongest industries - Growing faster than the national average

- Waste Management & Remediation
- Non-profit Organizations
- Internet & Data Processing Services

Opportunities - Growing slower than nationally

- Health Care & Social Services
- Finance & Credit
- Insurance
- Real Estate
- Leasing of Intangibles
- Professional Services
- Administrative & Support Services
- Educational Services
- Amusement & Recreation
- Hotels, Restaurants, Bars

Threatened Industries - Growing locally, Declining nationally

- Crop Production
- Support for Agriculture
- Construction
- Printing
- Electrical Equipment
- Transportation Equipment
- Chemical Mfg.

Weakest Industries - Declining faster than nationally

- Forestry & Logging
- Utilities
- Food Products
- Computer & Electronics
- Fabricated Metals
- Machinery Mfg.
- Miscellaneous Mfg.
- Wholesale Trade

Sources: County Business Patterns

Industries that offer opportunities for future job growth are those that are growing more slowly than the national average. These are service industries and include Health Care, Financial services, Professional Services, Education, Amusement & Recreation, and Hotels and Restaurants (See Figure 13). Industries that are growing locally, but are declining nationally are considered to be threatened. These include crop production and support services, construction, printing, chemicals, and electrical and transportation manufacturing. The weakest industries are those that are declining in Franklin County faster than the national average. These include Forestry, Food Processing, Utilities, Computer & Electronics, certain Manufacturing, and Wholesale Trade.

Figure 13 displays jobs growth potential in the most-promising sectors for Franklin County that was calculated by the LEAP model. In evaluating potential for new jobs, the model considers only industry performance relative to the national average. It doesn't consider variations in demographics, labor skills, natural resources, and transportation links. If an industry in the region under-performs the national average growth rate, the model calculates new jobs that would occur if growth were closer to the national average.

FIGURE 13: SECTORS WITH THE GREATEST JOB GROWTH POTENTIAL IN FRANKLIN COUNTY (POTENTIAL ADDITIONAL JOBS)

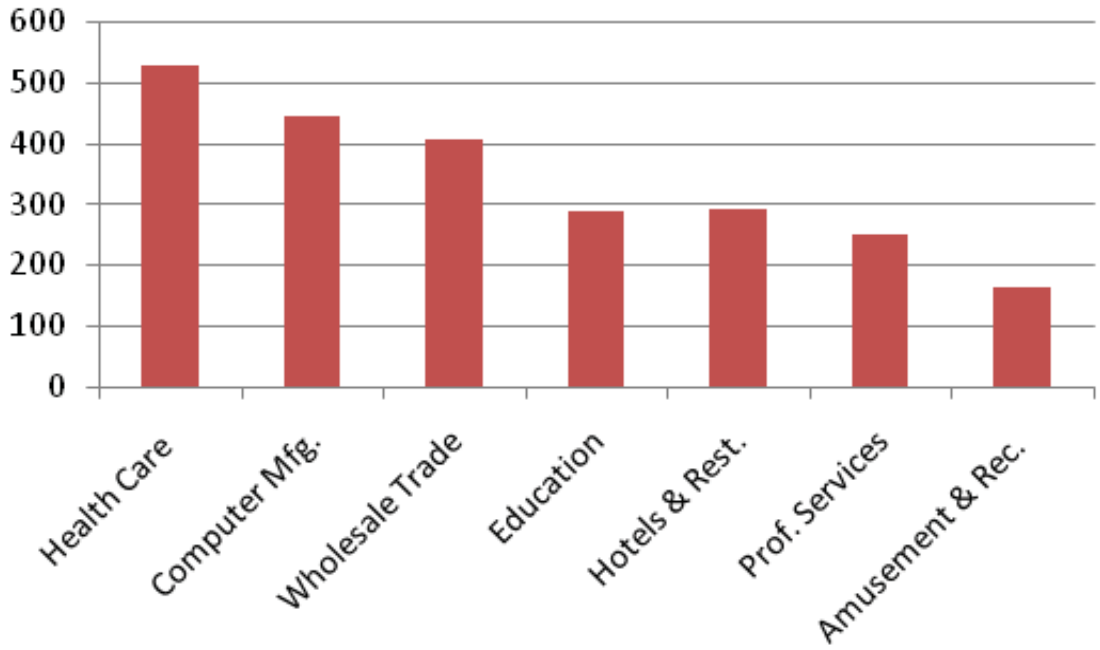


Figure 13 shows that Health Care is forecast to have the most potential for future growth, with opportunities for 526 new jobs over the next ten years. Computer manufacturing could add nearly 450 jobs and over 400 jobs could be created in Wholesale Trades. Other industries offering opportunities for future growth in Franklin County are Education, Hotels & Restaurant, Professional Services, and Amusement & Recreation, in which the potential for new jobs ranges from 160 to 300.

CHAPTER 3

Industrial Real Estate Market Analysis

This report focuses on the supply and demand for industrial park sites in the local Montague market area and in the broader Franklin County region. Data on firms in the Montague Airport Industrial Park and in Franklin County's other industrial parks are presented for comparisons and trends. Cluster analysis is performed to identify trends in clusters concentrated within the local area and the region and to assess targets for future growth. Trends in annual absorption of industrial space are reviewed and the likely timeframe for absorption of the current supply of remaining industrial sites in the region is projected. The regional competitiveness of Montague is assessed vis-à-vis competing locations in the region for industrial attraction. Finally, recommendations are advanced regarding the most suitable target industries and the sizes and mixes of parcels in a new industrial park.

LOCAL MARKET CONDITIONS IN MONTAGUE

In this first section of this chapter, trends in the supply and demand for industrial properties within the town of Montague are assessed. Section II evaluates Franklin County's regional market for the industrial sector.

Firms in the Airport Industrial Park

Table 1 lists the firms in Airport Industrial Park and provides details regarding their employment and site and building sizes. There are presently fifteen firms within Airport Industrial Park (AIP) with a total of 512 employees. They occupy 623,565 sq. ft. built on 97 acres of land. The largest employers – Heat Fab with 120 staff and LightLife with 110 workers – expanded into AIP from Greenfield. New England Naturals, a Greenfield bakery, expanded into a rental flex space of 10,000 sq. ft. in AIP because no suitable buildings were available in Greenfield. NutriSystems Meals on Wheels is expanding to the AIP from Leyden. A 4000 sq. ft. building to house this operation is currently under construction in the cul-de-sac just south of Turbo Systems. Field Services/Atlantic Golf & Turf expanded to AIP from their facility in Sunderland and is now looking to expand again. This operation and New England Naturals are the only tenants in the AIP – all of the other firms own their units. At present, only one vacant building is available for sale – the 30,420 sq. ft. former Hallmark Imaging building at the corner of Industrial Blvd. and Millers Falls Road.

Hassay-Savage, which makes industrial clasps, is planning an expansion and may expand in-situ but is also considering moving to a larger site elsewhere in the region. Mayhew Tools/ Deerfield Packaging recently completed an expansion at their cul-de-sac site within the park and have relocated workers from their former Shelburne facility to AIP, where their workforce now totals 80. Importantly, five of the fifteen firms interviewed indicated that they do not have room on their sites to expand in-situ, if needed.

TABLE 1: FIRMS IN MONTAGUE AIRPORT INDUSTRIAL PARK

Company	Product	Site (ac)	Bldg. (sf)	Employees
Heat Fab	HVAC mfg	24.7	141,890	120
Australis	Barramundi Fish farm	4.5	66,600	55
Light Life	Imitation meat soy products	5.6	75,000	110
Hassay Savage	Tool mfg.	2.3	8,500	18
Mayhew Tool & Deerfield Pkg.	Tool mfg. and distribution	6.5	68,650	80
Turbo Steam	Recycled Energy steam turbines	4	20,000	20
New England Naturals	Bakery Warehouse	5.3	10,000	2
Field Services/Atlantic Golf & Turf	Ag. Services & Fertilizer Distrib.	1	5,000	16
Pioneer Aviation	Aircraft service & R.E. Leasing	5.3	6,800	1
New England Extrusion (NEX)	Plastic film for packaging	7.3	125,000	65
Yankee Environmental Systems	R&D - Meteorological Sensing Equip.	7.1	4430	6
NutriSystems Meals on Wheels Store	Equipment for transporting meals	3.4	4,000	8
JaDuke	Pre-School/Performance Art Venue	3.2	8,500	10
Pioneer Comcast	Cable TV	3	NA	NA
Hallmark Institute School	Photography School	6.3	37,089	NA
Hallmark Institute Admin	Photography School	3.8	11,686	NA
Former Hallmark Imaging	Vacant - For lease	4.1	30,420	NA
Totals		**97.4**	**623,565**	**511**

Sources: Cambridge Economic Research, Survey of Firms in AIP, 2011; FRCOG, Inventory of Industrial parks in Franklin County, 2010-2011 Update

Total Industry in Montague

In addition to the fifteen firms within the AIP, there are another three major industrial employers on sites outside of the AIP. These include Hillside Containers, with 130 jobs, which expanded into Montague from Sunderland, and Judd Wire, an indigenous company which employs 250 abutting the proposed Turnpike Road Energy Park site. Over the past two decades, Montague Machinery has contracted from 100 to 25 staff. This is the only manufacturing firm interviewed which had lost staff. As shown in Table 2, the three major manufacturing employers provide a combined total of nearly 500 jobs on sites outside of the AIP. As Table 1 shows, firms within Airport Industrial Park provide 511 jobs, for a total of over 1000 manufacturing jobs in Montague. This is nearly 50% of the town's total workforce (excluding self-employed persons). This far exceeds the state average of 8%-9% state and national average for percent manufacturing labor force. It significantly exceeds the average for Franklin County, which stands at 11% manufacturing employment.

The large proportion of Montague's workforce engaged in manufacturing indicates potential vulnerability to further job losses in this vital sector, in which capital may continue to be substituted for labor. It points to the importance of an economic development strategy aimed at retention of existing industries. Assuring a future supply of industrial park sites is a vital component of an industrial retention strategy.

TABLE 2: MANUFACTURING FIRMS WITHIN & OUTSIDE OF AIRPORT INDUSTRIAL PARK

	No. of Firms	Acres	Floor space (sq. ft.)	Jobs	Sq. Ft. per Job
Industry Inside of AIP *	15	97.4	544370	511	1065
Industry Outside of AIP	3	39.4	519171	490	1060
Total	18	97.4	1063541	1001	1062
Housing Units	3616	3934	-	9%	
Median Housing Value	$ 113,400	$ 204,700	$185,400	81%	

* Floor Space Excludes Hallmark Institute

Source: Cambridge Economic Research, Survey of Industrial Land Uses in Montague, 2011

Employment per square foot for Montague manufacturing firms averages 1062 sq. ft. per job, which is typical for industrial uses. By contrast, employment densities for office and retail average 2 to 3 jobs per 1000 square feet of floor space.

Clusters in Airport Industrial Park

Table 3 shows that the main concentrations of industry in the AIP are Fabricated Metals and Food Processing. All of the largest firms in the Park are in one of these two sectors. Together, metals and food processing provide nearly 400 jobs - over three-quarters of the total jobs in the AIP.

TABLE 3: CLUSTERS CONCENTRATED IN AIRPORT INDUSTRIAL PARK

Cluster	Company	Product	Site Size	Jobs
Metals	Heat Fab	HVAC mfg	24.7	120
Metals	Mayhew Tool / Deerfield Pkg.	Tool mfg. and distribution	7.5	80
Metals	Hassay Savage	Tool mfg.	2.3	18
Subtotal Metals		*9.8*	*98*	*9%*
Food	Austraillus	Barramundi Fish Farm	4.4	*55*
Food	LightLife	Soy Entrees	5.6	120
Food	New England Naturals	Bakery Warehouse	2.1	2
Subtotal Food Processing			*12.1*	*177*

Sources: Franklin County COG, An Inventory & Analysis of Industrial properties in Franklin County 2010-2011, Validated and confirmed by field surveys and interviews.

Metals fabrication clusters stem from the Pioneer Valley's tradition of blacksmiths, farriers, and tool makers. Most local metals firms have been established for 50 to 100 or more years. The large food processing establishments – Australlis and LightLife – are not integrated into the region's agricultural or natural resources base. Opportunities to get more value-added from the region's agricultural products; including vegetables and forages, should be explored.

Remaining Supply of Industrial Sites in the Airport Industrial Park

Table 4 lists the three parcels remaining to be developed in the AIP. There are two small parcels of just over 2 acres, which are too small to offer expansion space for most operations. The major opportunity is the 14.6 acre parcel on the north side of the Industrial Boulevard cul-de-sac, just south of the Connecticut River. Some of this area is too shallow to develop and it is estimated that there are 9.6 usable acres on the site. These sites could be subdivided and could be ideal for office space development, given the spectacular river views that they afford.

TABLE 4: YEARS SUPPLY OF INDUSTRIAL SITES IN AIP

Parcel	Total Acres	Usable Acres	Location
13A	14.6	9.6	North Side of cul-de-sac on River
13C	2.3	2.3	Between Heat Fab & LightLife
55	2.1	2.1	Between JaDuke & Heat Fab
Totals	***19***	***14***	***Acres now available***
		3.1	Annual Absorption (acres per year)
		4.5	**Years Supply Remaining**

Sources: CER Survey of Firms in AIP, Mark Abramson, Maseillo Group.

FRCOG, Inventory of Industrial parks in Franklin Co., 2010-2011 Update

A total of only 14 developable acres are left in the AIP. At the 31-year-average absorption rate of 3.1 acres a year, this is 4.5 years supply. This indicates the need for planning and budgeting now for future industrial development in order to assure a constant supply of industrial sites to capture expanding firms in the region.

Typical Parcel Sizes

Seventy percent of the parcels that have been absorbed in the AIP over the past 30 years have been in the 3 to 6 acre size range, with the median size being 4.5 acres. The median parcel size in the AIP is 4.5 acres. There is only one large site in the park, which is occupied by the 142,000 sq. ft. Heat Fab plant. Most of the parcels in the new Energy Park should be in the 3 to 6 acre size range, with a limited number above 6 acres and below 3 acres.

Fiscal Impact of Industrial Properties

Table 5 shows that properties classified by the Town Assessors' as Industrial Properties, both within and outside of the AIP, contribute significantly to Montague's tax base. Industrial properties pay 15% of total real and personal property taxes in Montague, while they occupy .007% of the total land area. Clearly, taxes from industrial properties are a vital source of revenue from the town which must be retained for future fiscal strength.

TABLE 5: TAXES PAID BY INDUSTRIAL PROPERTIES IN MONTAGUE

Company	Real Estate Value	Personal Property Value	Taxes Paid
Within industrial Park	24,167,700	3,678,390	665,522
Outside of Industrial Park	14,709,100	0	351,547
Valuation of Industrial Land	***38,876,800***	***3,678,390***	***1,017,069***
Taxes from Industrial Properties	929,156	87,914	1,017,069
Total Property Tax Receipts	6,216,343	551,243	6,767,586
Industrial as Percent of Total Taxes	15%	16%	15%
Percent of Total Industrial Land	0.007%	-	-

Source: Montague Assessor's Office

SECTION II – REGIONAL MARKET CONDITIONS IN FRANKLIN COUNTY

The past section reviewed local trends in the Montague industrial real estate market. This section looks at the regional supply and demand for industrial park sites in Franklin County. Since Montague competes in an essentially regional market with the County's other five industrial parks, the regional perspective is the most instructive in identifying future needs and opportunities for industrial development in Montague.

Regional Market Demand

There are a total of six industrial parks in Franklin County: Deerfield; Whately; I-91 Greenfield; Orange; Russell Pond; as well as Airport Industrial Park. Table 6 lists the businesses and sites occupied by firms in Franklin County's five other industrial parks.

TABLE 6: FIRMS IN OTHER INDUSTRIAL PARKS IN FRANKLIN COUNTY

DEERFIELD INDUSTRIAL PARK

Firm	Business	Site (ac)
Fleetpride	Truck parts & Service	4.2
Philip Goulet	Trucking	4
Pro Pel Plastechs	Plastic Film Recycling	4.8
Pioneer Valley Grower's Assn	Distribute produce (coop)	0.33
Development Associates	Multi-tenant industrial & office space	7.7
Yankee Candle	Candle Mfg.	8.9
Tiger Packaging	Now leased by 2 plumbers & For Sale	9.77
Disston Company	Hand power tools -drills, saws	30
Total Deerfield Industrial Park		*69.7*

TABLE 6: FIRMS IN OTHER INDUSTRIAL PARKS IN FRANKLIN COUNTY *cont.*

DEERFIELD INDUSTRIAL PARK		
Firm	**Business**	**Site (ac)**
WHATELY INDUSTRIAL PARK		
Pioneer Valley Growers Assn.	Distribute produce (coop)	1.9
Philip Goulet	Trucking	4.6
Fairview Farms	Flowers & Ornamental Nursery	5.3
Veterinary Clinic	Animal health services	3
Western Mass Library System	Book Storage/processing	3.4
Klinger Enterprises	Composite Materials Design and Mfg.	2
Bayer Material Science	Film Extrusion	10
Total Whately Industrial Park		30.2
I-91 INDUSTRIAL PARK - GREENFIELD		
Argotec	Lamination films	22.3
Northeast Biodiesel	Biofuels - recycled veg. oil	27
Summit Ice	Ice mfg.	6.5
FW Webb & Co.	Plumbing Supplies Distributor/Retailer	3.9
CJBW Stamp LLC	Steel marking devices for parts	4.8
Blake Equipment Co	Industrial Boilers & pumps	2.3
Pristine Orientals	Oriental rug cleaning	2.9
Alan Dretal	Pump Supply Operation Planned	3.2
Applied Dynamics Corp.	Distributor of electric motors, & cranes	3.6
Russell Haddleton	Investor, not occupant	1
Small Corp	Museum Display Cases & Art Framing	5.1
Channing Bete	Publish Healthcare Information	5.1
LifeSkills, Inc.	Adult daycare for disabled people	5.3
Bete Fog Nozzle	Nozzles for Industrial Applications	13.9
US Post Office	For sale - 7728 sf - 12'-14' ceilings	3.75
Klondike Sound Co.	Equipment & Engineering for Concerts	2.4
Thin Film Imaging Technologies	Contact lens mfg.	2.5
Gettens Electric Supply	Lighting materials distributor	1.7
Main Street Millwork	Custom Molding & Flooring	5.5
Coke Bottling Plant	Soft Drink Bottling & Distribution	19.7
Total I-91 Industrial Park		142.45
RANDALL POND INDUSTRIAL PARK, ORANGE		
PHA Industries	Chemical & Pharmaceutical Mfg.	2.6
Clear View Composting	Waste Processing	1.7
Data Center	New data center on #129-7	4.5
Town of Orange	Developed #13	6.4
eRolls Inc.	Machine Rolls (Metal Fab.)	2
Athol Savings Bank	Fin. Services	1.9
Echo Industries	Die cutting, metal stamping, machining	2.65
Deans Beans	Organic kosher coffee bean roaster	2.1
Total Randall Pond Industrial Park		23.85

TABLE 6: FIRMS IN OTHER INDUSTRIAL PARKS IN FRANKLIN COUNTY *cont.*

ORANGE INDUSTRIAL PARK

Firm	Business	Site (ac)
Seaman Paper	Industrial and gift wrapping paper	16.2
Precision Benchworks	Cables, cords, & wiring	1.8
Castine Moving & Storage	Moving & Storage	3.5
Quabbin, Inc.	Die cutting, metal stamping, machining	10.2
Production, Tool, & Grinding	High speed steel and carbide cutting tools	2.8
Princeton Forest Products	Lumber, Millwork, & Moldings	5.8
KRH Rolls	Machine rolls for paper & plastic film	9
Total Orange Industrial Park		*49.3*

Sources: Cambridge Economic Research Survey of Firms in Franklin County Industrial Parks; Franklin County COG, An Inventory & Analysis of Industrial properties in Franklin County 2010-2011; Mark Abramson, Broker, Masiello Group; Kim Levitch, Commercial Property Appraiser.

The region's parks contain a total of 413 acres of developed industrial sites. The largest is the I-91 Industrial Park in Greenfield, with 142 acres, one-third of the region's total industrial park acreage. The AIP is the second-largest, with nearly 100 developed acres, followed by Deerfield Industrial Park with 70 acres. The last 3-acre site in the upscale Whately Industrial Park has just sold to a veterinary clinic and the park is now full. Other recent investments include Northeast Biodiesel, an energy recycling venture which is currently building a 6600 sq. ft. building on a 26-acre site in Greenfield's I-91 Industrial Park. Also under construction in the Greenfield Park is an F.W. Webb plumbing distributorship.

Clusters in Franklin County Industrial Parks

Table 7 lists firms in key clusters that are concentrated in Franklin County's six industrial parks. Key clusters with concentrations of firms include Metals, Distribution, Materials Science, Food Processing, Woodworking, and, to a lesser extent, Energy. Over half of the 66 firms who occupy the region's industrial parks are concentrated in one of these seven sectors. Metals industries, which include Fabricated Metals and Machinery, are the leading cluster in the region's industrial parks. These two sectors have lost one-third of their employment since 2001, or 515 jobs.

TABLE 7: KEY CLUSTERS CONCENTRATED IN FRANKLIN COUNTY INDUSTRIAL PARKS

Park	Cluster	Company	Product	Site Size
Greenfield	Metals	Franklin County Fabricators	Metals fabrication	3.9
Greenfield	Metals	CJBW Stamp LLC	Steel marking devices for parts	4.8
Greenfield	Metals	Bete Fog Nozzle	Nozzles for Industrial Applications	13.9
Orange	Metals	Quabbin, Inc.	Die cutting, metal stamping, machining	10.2
Orange	Metals	KRH Rolls	Machine rolls for paper & plastic film	9
Randall Pond	Metals	eRolls Inc.	Machine Rolls	2
Randall Pond	Metals	Echo Industries	Die cutting, metal stamping, machining	2.65
AIP	Metals	Mayhew Tool & Deerfield Pkg.	Tool mfg. and distribution	7.5
AIP	**Metals**	Hassay Savage	Tool mfg.	2.3
AIP	Metals	Heat Fab	HVAC mfg	24.7
Deerfield	Metals	Disston Company	Hand power tools -drills, saws	30
Orange	Metals	Production, Tool, & Grinding	High speed steel & carbide cutting tools	2.8

TABLE 7: KEY CLUSTERS CONCENTRATED IN FRANKLIN COUNTY INDUSTRIAL PARKS *cont.*

Park	Cluster	Company	Product	Site Size
AIP	Distribution	Mayhew Tool & Deerfield Pkg.	Tool mfg. and distribution	6.5
AIP	Distribution	Field Services/Atlantic Turf	Ag. Services & Fertilizer Distrib.	1
Whately & DF	Distribution	Philip Goulet	Wholesale Farm Distribution	8.6
Deerfield	Distribution	Pioneer Valley Growers Assn.	Distribute produce (coop)	1.9
Greenfield	Distribution	JW Webb & Co.	Plumbing Supplies Distributor/Retailer	3.9
Greenfield	Distribution	Applied Dynamics Corp.	Distributor of electric motors, & cranes	3.6
Greenfield	Distribution	Gettens Electric Supply	Lighting materials distributor	1.7
Greenfield	Distribution	Coca-Cola	Soft Drink Bottling & Distribution	19.7
AIP	Materials	New England Extrusion (NEX)	Plastic film for packaging	4.2
Deerfield	Materials	Pro Pel Plastechs	Plastic Film Recycling	4.8
Greenfield	Materials	Argotec	Lamination films	4.7
Whatley	Materials	Klinger Enterprises	Composite Materials Design and Mfg.	2
Whatley	Materials	Bayer Material Science	Film Extrusion	10
AIP	Food	Australis	Barramundi Fish farm	4.4
AIP	Food	Light Life	Imitation meat soy products	5.6
AIP	Food	New England Naturals	Bakery Warehouse	2.1
Randall Pond	Food	Deans Beans	Organic kosher coffee bean roaster	2.1
Greenfield	Distribution	Coca-Cola	Soft Drink Bottling & Distribution	19.7
Greenfield	Wood	Small Corp	Museum Quality Cases	5.1
Greenfield	Wood	Main Street Millwork	Custom Molding & Flooring	5.5
Orange	Wood	Princeton Forest Products	Lumber, Millwork, & Moldings	2.9
AIP	Energy	Turbo Steam	Recycled Energy steam turbines	4
Greenfield	Energy	Northeast Biodiesel	Biofuels - recycled veg. oil	27

Sources: Franklin County COG, An Inventory & Analysis of Industrial properties in Franklin County 2010-2011 & CER

The LEAP model analysis described in the previous chapter showed that these sectors are considered to be among the county's weakest industries since jobs in them are declining faster in Franklin County than in the US. This is particularly an issue with the Metals industries.

Tools, metals, and machining have traditionally been among the Pioneer Valley's leading industries and will continue to have a crucial role in the region's future development. Most companies were established 50 to 100 years ago or more as blacksmiths and ironmongers and have successfully developed new products and technologies to serve new industries and applications. It is imperative, that a strategy aimed at retaining the healthy Metals Fabricators that have survived the recent recession be pursued in order to stem further job losses in this important sector.

The second-highest concentration of firms in the region is found in the Distribution sector, with seven firms. Most of these firms are in the Greenfield, Whately, and Deerfield industrial parks. This is the only sector that is related to the region's natural resource base. It includes distributors of farm produce, fertilizer and seed, forages, lime, and other agricultural supplies. Other products distributed from Franklin County's industrial parks include plumbing and electrical supplies, lighting, tools, and soft drinks.

The Materials Science cluster is well-represented in the region's industrial parks. Materials firms are concentrated in film extrusion and lamination, and in composite manufacturing. Food is another significant cluster in Franklin County, with five firms in the food and beverage industries, including fish farming, soy entrees, bakeries, coffee, and soft drinks. Drawing on the region's tradition of fine millwork and cabinet making are a small group of firms specializing in high quality custom molding, flooring, and manufacture of display cases for museums.

Just two firms in Franklin County's industrial parks are in the Energy sector. These include Northeast Biodiesel, a startup firm with a 6600 sq. ft. facility currently under construction in the I-91 Greenfield Industrial Park and Turbo Steam in the AIP, a systems integrator of turbine steam engines that recycle energy for power and heating. Turbo Steam has benefitted from energy recycling initiatives under government stimulus programs. Industrial park operators report that a number of solar farms are considering sites, so this sector may be more prominent in the future.

Supply of Industrial Park Space in the Region

Table 8 contains information on the amount of space developed in Franklin County's industrial parks and analyzes the remaining supply of industrial sites in the region. There are presently 413 developed acres in the six industrial parks. There are 147 acres in public ownership that remain undeveloped, but the development of 96 acres of this is significantly constrained by access, ground conditions, or slopes that make the parcels too cost-prohibitive to develop. The net supply of good buildable sites in the county therefore totals 51 acres.

The average annual absorption of industrial sites over the past 31 years (since the inception of AIP, the region's first industrial park) has been 13.3 acres per year. If this rate continues into the future, then the current supply of 51 acres can be expected to last less than four years. This underscores the urgency of planning for the next phase of industrial park development in Montague.

As discussed, there are just 14 acres of good, buildable sites left in the Airport Industrial Park. The Deerfield, Whately, and Orange Parks are now completely built out. Twenty acres remain undeveloped in Randall Pond Industrial Park and eighteen acres of sites are available in Greenfield's I-91 Industrial Park.

TABLE 8: SUPPLY OF THE FUTURE DEVELOPMENT SITES IN FRANKLIN COUNTY INDUSTRIAL PARK

	Developed	Not for Dev't.	Undeveloped Private Owner	Undeveloped Public Owner	Significant Constraints	Net Supply of Good Sites	Total Acres
Airport IP	97	29	1	19	5	14	146
Deerfield IP	70	1	0	4	4	0	75
Whatley IP	30	0	0	0	0	0	30
I-91 IP	142	1	18	99	79	20	260
Orange IP	49	0	7	0	0	0	57
Rand. Pond IP	24	14	4	25	8	18	67
Totals	413	44	31	147	96	51	635
Absorption Time Frame 1980 to 2011	**31 Years**					**13.3**	**Annual Absorption in Acres/Year**

Sources: Cambridge Economic Research Survey of Firms in Franklin County Industrial Parks; Franklin County COG, An Inventory & Analysis of Industrial properties in Franklin County 2010-2011;

Typical Parcel Sizes

Developed parcels in Franklin County's industrial parks range from 0.3 acres up to 30 acres. The median parcel size is 4.5 and the most-common size is 5.3 acres. Fifty percent of the parcels developed are between 3 and 6.5 acres. Twenty-eight percent of parcels are less than 3 acres. Fifteen percent of the parcels which contain 40% of the total acreage are sites of over 10 acres. Five percent of sites with 25% of the total developed acreage are sites of 20 to 30 acres.

Regional Competitiveness

Table 9 assesses Montague's competitiveness as an industrial location in view of access, tax rates, infrastructure, land prices, and the remaining supply of buildable sites. Since the supply of industrial sites in Orange, Deerfield, and Whately Industrial Parks have been depleted, Montague's main competitors are the I-91 and the Randall Pond Industrial Parks.

In terms of access, Montague is further from major highways than the other sites. The town's property tax rate is significantly higher than the other five communities and is over 25% higher than Greenfield, which has the second-highest tax rate. On the plus side, Montague and the two industrial parks in Orange have natural gas utilities. The other three parks do not. Heating with piped gas offers significant cost savings over propane, which must be used at the other Franklin County Industrial Parks.

TABLE 9: FRANKLIN COUNTY INDUSTRIAL PARKS REGIONAL COMPETITIVENESS

Distance from Highways, Property Tax Rates & Availability of City Gas

Industrial Park	Distance from I-91 (mi)	Distance from Rte 2 (mi)	Tax Rate (per $1000)	City Gas (per acre)	Industrial Land Price		Remaining Supply (ac)
AIP, Montague	7.1	3	$23.05	Yes	$ 20,000	$ 25,000	14
Orange	18	0.5	$16.58	Yes	$ 22,500	$ 27,500	0
Randall Pond, Orange	18	0.8	$16.58	Yes	$ 22,500	$ 27,500	18
I-91 Greenfield	2.6	0.7	$18.14	No	$ 22,500	$ 30,000	20
Deerfield	0.8	NA	$12.32	No	$ 50,000	$ 60,000	0
Whatley	0.8	NA	$15.47	No	$ 60,000	$ 70,000	0

Sources: Franklin County COG, An Inventory & Analysis of Industrial properties in Franklin County 2010-2011; Mark Abramson, Broker, Masiello Group; Kim Levitch, Appraiser.

Industrial land prices in the AIP are the lowest in the region. Prices in the Orange and the Greenfield Industrial Parks are 10% to 15% higher than those in Montague. Prices in the Deerfield and the Whately parks, which are less than one mile from I-91, are more than double those in Montague, but these parks are now fully built out and sites for new development are no longer available.

RECOMMENDATIONS FOR FUTURE INDUSTRIAL DEVELOPMENT IN MONTAGUE

Montague's best prospects for development of its industrial clusters lie in pursuing a strategy to retain existing industry needing to expand from locations both within Montague and from other industrial parks and properties within the Franklin County region. Most of the large manufacturing plants that are now in Montague were relocations from towns within the county, in particular, Greenfield and Sunderland.

By far, Montague's most-dominant industrial clusters are Metals, including fabricated metals and machinery. The threat of further job losses cloud the outlook for this sector, but Montague's remaining metals firms serve specialized niches and

are nimble at re-aligning products and applications when the market demands it. Many have been established for 100 or more years and are likely to continue to flourish, having survived the current recession.

Other prominent clusters in the region are Distribution, which has a low employment impact; Material Science, particularly plastic film extrusion; Food and Beverage Processing; and Wood Working. There presently two firms in the region in the Energy sector, which are focused on renewable energy and recycling. Although this cluster is not yet very well developed, it is a good fit for the culture and values of the region, where conservations and ecology are well understood by Pioneer Valley's society. The concept of an industrial park offering renewable energy options to a range of tenants in energy and non-energy sectors is the subject of the case studies described in Chapter XX.

Recommended Site Mix

Based on the sizes of sites that have been absorbed in existing industrial parks in Franklin County, the following mix of sites is recommended:

			Example 30-Acre Industrial Park	
Parcel Size	**% of parcels**	**% of area**	**No. of Parcels**	**Acreage**
Under 3 Acres	29%	13%	2	4
3-6.5 Acres	57%	62%	4	18.5
6.5-10 Acres	14%	25%	1	7.5
	100%	100%	7 Parcels	30 Acres

The largest parcels should be divisible into smaller lots. The example above is the recommended mix of parcel sizes and land area devoted to each of the size groups for a 30-acre industrial park. The percentages apply to larger parks.

CHAPTER 4

Case Studies of Eco-Industrial Parks

CASE STUDIES OF ECO-INDUSTRIAL PARKS

An **eco-industrial park** is a development based on businesses sharing resources and processes to reduce and recycle waste. A high level goal is to reduce the costs of materials in production by sharing waste and by-products from one process to feed another production line, with minimal transportation costs. Sharing and recycling of energy, infrastructure, water, by-products and waste is what differentiates these eco-parks from standard industrial parks, whose operations are normally independent of one another. The idea is to achieve a coordinated, sustainable development, which in total consumes minimal resources while recycling wastes on site.

One of the Town's goals is to create an Energy Industrial Park that is efficient, sustainable and attractive to industrial users. There are several ways to accomplish this goal and it must be determined what the methods and benefits will be to create these conditions.

Other industrial parks have developed according to a similar energy or ecological themes and can be reviewed to determine the ways to implement these ideas at Turnpike Road. In order to refine the themes and potentially target industries for the proposed Turnpike Road Energy Industrial Park, the following developments in the region and in comparable rural areas were reviewed as case studies:

- Londonderry, NH Ecological-Industrial Park,
- New Bedford, MA Energy Park,
- Jackson County, NC, Green Energy Park,
- Cape Charles, VA Sustainable Technology Park,
- Kalundborg Eco-Industrial Park.

Londonderry is the oldest of the Massachusetts eco-industrial themed parks, while Jackson County and Cape Charles are more rural locations. The Kalundborg Eco-Industrial Park is an important study in that this is the park that reportedly gave birth to the concept of industrial ecology where businesses integrate processes, production and waste streams with the other businesses. While none of these represent situations that are exactly the same as Montague's, all offer useful lessons for planning and design of the new Turnpike Road Energy Industrial Park.

KALUNDBORG ECO-INDUSTRIAL PARK, DENMARK

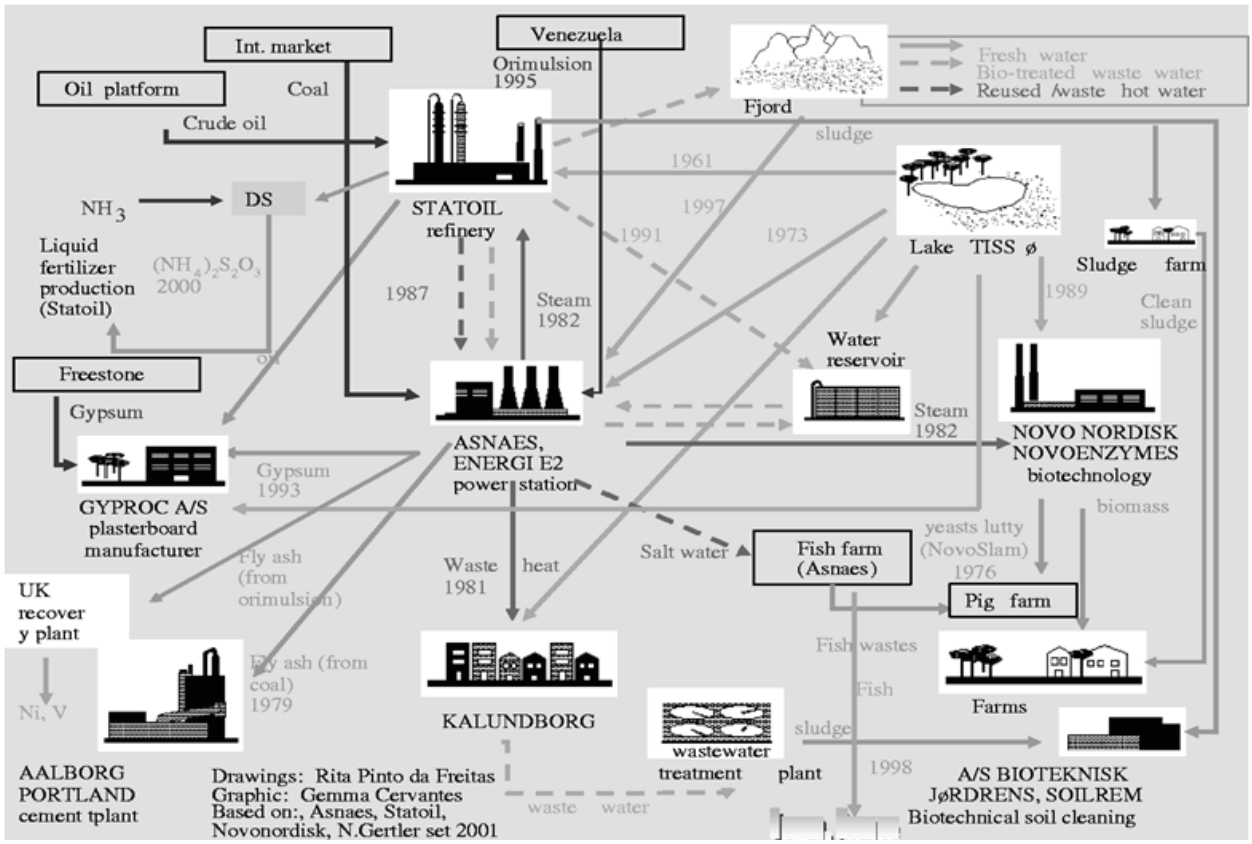
The global model for eco-industrial parks is located in the town of Kalundborg in Denmark, 5 miles west of Copenhagen, where companies exchange a complex web of waste materials and energy sources. The exchanges were originally motivated by cost-savings when the park was initiated 30 years ago. Eventually, the environmental benefits that the park generated came to be appreciated as the concept of sustainable development came into vogue.

Kalundborg has five main industries that exchange wastes, energy, and materials:

1. Asnæs, a coal-fired power plant ,
2. Statoil, a refinery,
3. Novo Nordisk, a pharmaceuticals and enzymes maker,
4. Gyproc, a plasterboard manufacturer, and,
5. An assortment of smaller businesses.

The Asnæs power company supplies residual steam to the Statoil refinery and, in exchange, receives refinery gas. The power plant burns the refinery gas to generate electricity and steam. It sends excess steam for heating and power to an on-site fish farm and to the Novo Nordisk plant. Sludge from the fish farm and some of the organic wastes from Novo Nordisk become fertilizer for nearby farms. The power plant sends fly ash to a cement company, while gypsum produced by the power plant's desulphurization process goes to a company that produces gypsum wallboard. The Statoil refinery removes sulfur from its natural gas and sells it to Kemira, a sulfuric acid manufacturer.

The chart below illustrates how the complex web of energy and materials exchanges among these industries:



Source: G. Cervantes

Kalundborg's complex system of waste and energy interchanges developed entirely through market forces. While Kalundborg is misinterpreted as a model for planning a sustainable eco-park, it needs to be recognized that consultants did not design, nor did Danish government officials plan or finance, Kalundborg's industrial symbiosis. The industrial ecology achieved at Kalundborg was the result of numerous separate deals between companies seeking to reduce the costs of waste disposal, materials, energy, and transportation. There has never been any formal planning or management of the park – either private or public sector -- that has incentivized or regulated the exchanges that occur at the site. Jorgen Christensen, a spokesperson for Novo Nordisk, commented: "You ask us how 'how you plan a Kalundborg.' We didn't plan it all. It happened organically over time".

Lessons from Kalundborg

Several lessons are learned for the development of a true industrial ecology park:

- The industrial symbiosis cannot be forcefully implemented from a public sector plan. It happens within the private sector as firms realize the benefits of transportation, energy, and waste disposal cost-savings.
- In order to identify opportunities for industrial symbiosis, businesses in an industrial park must interact closely, exchanging information about processes and materials and energy needs. This requires a secure exchange to protect the businesses' proprietary data.

- Waste, materials, and energy exchanges must be commercially sound and profitable for both parties to warrant the link. This will impact the required quality and quantities of materials and the scheduling of delivery or exchange.

LONDONDERRY ECO-INDUSTRIAL PARK

The Londonderry Eco Park in New Hampshire was started in the mid-1990's when the town acquired 100 acres of tax-delinquent land and subdivided the land as an industrial park. The town planner worked with Stonyfield Organic Products, an abutter of the site, to develop by-laws for sustainable design and construction, which were then adopted by the community. The town then sold the park to a private developer; Sustainable Design, which is a consortium of local design and development professionals.

During the late 1990's the park attracted the following operations:

- AES power plant, a peaking power plant, that took a 50 acre site and brought 35 jobs,
- Gulf South Medical Supplies, a manufacturer of medical supplies, with 80 jobs,
- Bosch Thermotechnology, a German manufacturer of HVAC equipment, employing 50.

Bosch, which located in the park in the early 2000's, was the last business to take a site in the park. By then, the park was 70% built out and had a total of 165 jobs. Three other vacant sites of 13 acres, 4 acres, and 4.5 acres are still vacant. Sustainable Development, which owns and operates the park, blames the recession for the lag in absorption. But considering that the park was 70% built out within its first few years of operation, its long term performance is impressive. The remaining parcels are valued at around $80,000 per usable acre.

The initial concept for the park was the Kalundborg model, with companies exchanging waste materials and energy. It was hoped that industries would be able to use waste heat from the AES plant. But, since the AES installation is a peaking plant, it doesn't operate around the clock. Businesses still need a back-up 3- phase power supply, which is very expensive.

According to the park's operators, firms locating in the park need to at least make a "nod" to sustainability. All proposed buildings in the park are reviewed in view of LEED™ standards. However, rather than requiring a higher, Gold or Platinum level of LEED building certification, the park's owners encourage new buildings to adhere to the lower Silver level LEED standards, which are focused on practical cost-savings measures. Town funds from the sale of the park to its private developers were put in escrow to help pay for these sustainability reviews. Firms are encouraged to make design changes if the recommendations would involve long-run cost savings by implementing such measures as:

- Encouraging use of Energy-Star lighting and appliances,
- Super-Insulating building shells,
- Putting building and site lighting on timers,
- Collecting rainwater and recycling for landscape irrigation on the site,
- Using low VOC paints and certified, natural materials for indoor air quality,
- Xeriscaping with plants that require little or no irrigation,
- Installing porous paving to reduce runoff and heat island effects.

Lessons for Montague

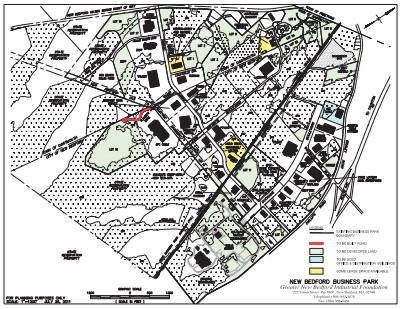
The Londonderry eco-industrial park has fallen short of original aspirations for the park, which were – naively -- for the recycling of materials, waste, and power based on the model working at Kalundborg. Regardless, the 100-acre Park attracted

three companies during its initial years that took large sites. These are major multinational and national companies from outside of the region and the country. These companies provide a total of 165 jobs. While this is far short of the 500-2000 jobs that have been forecast for the park, these were additions to the local employment rolls.

The park's early success in attracting major multinational and national firms is likely due to the publicity it received during the late 1990's, when a number of similar concepts for industrial ecology parks were unleashed. Sustainable Development, the company who owns and operates the Park says that the "green" branding was a definite asset in marketing the site, which filled much faster than expected. Where an industrial development is supported by market demand and a good location, green branding adds value that expedites take up of industrial sites.

NEW BEDFORD ENERGY AND BUSINESS PARKS

New Bedford, an hour's drive from Boston, has two industrial parks: The New Bedford Business Park and the New Bedford Energy Park. According to the Greater New Bedford Industrial Foundation, the entire 60-acre Energy Park is now under agreement for development of a number of solar farms under a master developer of solar projects. The Foundation would not disclose details of the deal but said that the state and federal tax credits for solar energy are selling for .30 to .60 per kWh – two to four times the retail price of electricity, making the energy production economically viable.



Possibly more interesting is the New Bedford Business Park, which has attracted companies in the energy and life sciences sectors. The 700-acre park, strategically located about five miles from both I-93 and I-95, is now 60% built-out. Since the recession began in 2008, the park has attracted 17 new companies, many of which are in energy sectors and are constructing facilities of over 100,000 sq. ft. including:

- Maximum – making instruments for wind turbines
- Konarka Technologies – making thin film solar photovoltaic products
- Gold Peak Industries – a Hong Kong-based manufacturer of electric, emissions-free motor scooters
- EPEC Engineered Technology – Designs and manufactures light-weight battery packs.
- Con-Edison – a 10-acre, 8000-panel solar farm

Two non-energy firms in New Bedford Business Park have adopted green technologies in the recent past. Titleist, which makes golf balls in the park, installed a 2 MW co-generation plant and installed energy-efficient lighting and manufacturing equipment. Lighthouse Masonry, a construction firm which has won U.S. Green Building Council awards for energy efficient projects, has installed solar panels on the roof of its building in the New Bedford Business Park. Commonwealth Energy generates 3.5 MW of electricity from gas from a former landfill at the site, enhancing the Park's green image.

Lessons for Montague

The New Bedford Business Park has successfully targeted and recruited a number of large businesses in alternative energy technologies despite the recession that has stalled other similar developments. The park markets the region's low blue and white collar workforce, with wages at 20% to 40% below Boston; low housing costs (50% of the Boston market); easy commuting because of access to I-93 and I-95; a 30-day state permitting process, and a 30-60 day local permitting process.

Montague could not expect to compete with parks in Southeastern Massachusetts with their large supply of low-cost labor, interstate highway links to major markets, and abundant large sites. The New Bedford case does, however, illustrate the current vitality of the alternative energy sector, even in the worst economic conditions.

JACKSON COUNTY GREEN ENERGY PARK

The Jackson County Green Energy Park is in Dillsburg, NC, a rural town of 200 people in North Carolina's Smoky Mountains, where the median age is 60 and the median family income is $13,125 – just one-fifth of the national average. Forty-four percent of families live below the poverty line. Dillsboro is a two-hour drive from Knoxville, TN, a city of 176,000.

Dillsboro, a stop on the Smoky Mountain Railroad, is a popular tourist destination, with a historic hotel and several good restaurants and shops. Planning for the park commenced in the early 2000's in response to the tourist demand for locally-made artisan goods in the region. A funding package of $1.2 million was assembled from USDA, the Appalachian Regional Council; Golden Leaf Fund ; Handmade in America; North Carolina Rural Center; NC State Energy Office; Jackson County; and private donors.

The 16-acre park consists of a 9-acre landfill which produces 40 cubic feet of gas per minute, which collected yields roughly 1.2 million Btu of heat per hour. This is roughly equal to the amount of heat generated by 20 residential gas furnaces burning simultaneously. This is sufficient to supply power for the park's tenants who occupy two spec buildings: a 4500 sq. ft. metals and glass building and a 7500 sq. ft. greenhouse. The supply of landfill gas is expected to last for 15-20 more years.

Half of the greenhouse is devoted to growing shrubberies for the county, saving them $50,000 to $60,000 in nursery bills. Two fulltime artists are employed: a glass blower and a blacksmith, and 8 part-time artists work at the site. A $10,000 outdoor pottery kiln was recently installed. Future plans call for an 8000 sq. ft. ceramics building, which will provide 16 additional workspaces for artists. Artists sell goods to tourists in the on-site gallery.

During the first ten years of the park's operation, it was subsidized by a $220,000 annual grant from the County. But, due to a change in political leadership, the project has seen funding cuts of 20% for the past two years and expects this trend to continue. A 501(c)3, non-profit corporation has been established to raise funds from foundations and private donors.

Rental of workspaces to metal and glass artisans provides a small stream of income as do gallery sales, of which the Park gets 30%. Construction of the new ceramics studio is expected to produce a more robust revenue stream from rentals of 16 spaces to artists and additional gallery sales. But other private funding sources will need to be tapped in order to cover operating costs.

The Green Park has been successful in attracting tourists to Dillsboro. Over 1,000 people a year visit the highly-publicized park, providing a market for artisan goods made at the site. Visitors come from 20 counties in North Carolina, 12 states, and 8 countries. Some spend money at local hotels and restaurants and buy artisan goods from the on-site gallery.

Lessons for Montague

Jackson Green Energy Park is a small scale effort to recycle methane gas from a landfill to support businesses that in turn support tourism by filling the demand for locally-made artisan goods. A creative package of funding was tapped to finance the small park, consisting of a mix of private and public funds. Since the development incorporates shared workshop and incubator space, operating costs are high and require subsidies. Since the County is withdrawing its funding support, the future of the development is uncertain.

While the option to create an artist's center may be of interest in Montague, the Energy Industrial Park is not considered appropriate to solely market for this purpose. Fortunately, there is a good basis for capturing expanding or relocating businesses in the Franklin County region. The building program for the Energy Industrial Park should also be phased to eliminate the need for regular public subsidies.

CAPE CHARLES SUSTAINABLE TECHNOLOGY PARK

Cape Charles is at the southern tip of Virginia's Eastern Shore, in a remote corner of Chesapeake Bay. This town of 1300 people lies within rural Northampton County with a population of just 13,000 and an employment base of 7000 jobs. Although Cape Charles is just one hour's drive from the Hampton Roads metro area, with a population of 1.7 million, the community is geographically isolated. Access to the Chesapeake metropolitan area is via the 18-mile-long Kellam Bridge Tunnel across Chesapeake Bay with a $24 round trip toll.

In the early 1990's, a public charrette was engaged to plan a new industrial park in the town. It was agreed that, in view of the fragile ecology of the region, a sustainable eco-industrial park would be ideal for their community. In late 1995, EDA approved a grant for $400,000 for the County of Northampton to create "America's Premier Eco-Industrial Park" on a 200-acre brownfield site which contained a 25-acre abandoned town dump on a site overlooking Chesapeake Bay. The grant was used for infrastructure improvement, including roadways, water and sewer mains, landscaping, and lighting to serve the 200-acre park. The project also received $200,000 assistance from EPA and NOAA as a Pilot Brownfield Demonstration project.

Phase I of the project was expected to accommodate at least 10 new businesses that utilize sustainable processes in their operations. This was expected to create 400 new jobs upon build out. Construction of a 31,000 sq. ft. state-of-the-art green building was completed on speculation in March 1999, financed by a bond issue. Sources interviewed could not recall the price of the building, but acknowledged that it was very high.

The building attracted only one tenant, which was the science firm, Wako. This bio-tech company captured horseshoe crabs from Chesapeake Bay and extracted their blood. A blood extract is used to test endotoxin levels in human blood. The crabs were then released back into the sea, so the operation qualified as sustainable. Wako, which employed only four lab technicians, stayed at the park for about 20 years, but eventually moved. The park was eventually sold to a local yacht builder but still lies vacant.

Lessons for Montague

Cape Charles Park floundered due to a very isolated location, inadequate marketing, and the lack of an industrial base in the region. Montague is also relatively isolated, being several miles from four lane roads. The need to traverse bridges between Montague and most of the rest of the state reinforce this sense of isolation. Due to poor connections to national employment centers, recruitment of firms from outside of the Pioneer Valley region is not a realistic target for the Energy Industrial Park.

Unlike Cape Charles, however, the region is supported by its own strong industrial tradition and a relatively robust mix of industries. Capturing expanding manufacturing firms needing to relocate from their present sites either within or outside of Franklin County's industrial parks is a realistic target for the new Energy Industrial park. This is underpinned by the success of the present Airport Industrial Park in attracting firms that have expanded from other locations within Franklin County.

SUMMARY OF CASE STUDY FINDINGS

The major findings of the five cases reviewed in this section and their implications for Montague's proposed Turnpike Road Industrial Park are important to the thinking on the Energy Industrial Park:

» The industrial symbiosis that has been achieved at Kalundborg was spontaneous and unique. Neither public nor private sector officials could realistically be expected to plan for just the right mix of industries

to achieve high levels of industrial ecology. The Montague Energy Industrial Park should be marketed for other benefits and potential.

- "Green branding" an industrial park and the media attention that it attracts can accelerate absorption of industrial sites. The idea of calling the park the Energy Industrial Park could be important to the marketing. Highlighting the inclusion of green building guidelines will also help give the participating park businesses a market niche.
- Companies locating in a green industrial park can be expected to use sustainable design and manufacturing processes and technologies in cases where this will result in efficiency enhancement and cost savings in operations. These design elements can be required as part of the site plan design guidelines for the park.
- The energy sector in Massachusetts has been counter-cyclical, expanding during the current recession while other sectors have contracted. However, it is not anticipated that businesses in this sector will relocate to Montague from outside the region.
- Business incubators, managed workshops, and spec rental buildings require operating subsidies which are hard to sustain. These are not recommended for the Energy Industrial Park.
- An eco-industrial park in an isolated location with no industrial base is unlikely to attract investment – either from outside or inside the region. Conversely, with its relatively isolated location, but strong industrial base and tradition, Montague's new industrial park is well-positioned to attract expanding firms relocating from elsewhere in the Pioneer Valley.

CHAPTER 5
Public Works Facility

INTRODUCTION

The Montague Department of Public Works (DPW) is responsible for maintenance, repair and construction of the town's infrastructure, public building and property including its parks, playgrounds, streetscapes, sewers, drainage systems, street lighting and 108 miles of public road ways. There are 15 full time employment positions in the department.

Currently the DPW has its main garage, administrative office space, and support facilities and equipment at 500 Avenue A. The main building is a former utility company facility with seven bays, three offices, mechanics and other workspaces, showers, break room, and storage areas for maps, files, materials and equipment. Each of the garage bays are deep enough for up to 3 trucks in a stacked parking configuration, but the bays are not pass through. After visual inspection of the exterior and interior, it was determined that the building conditions show a need for significant maintenance. In particular, the building's ventilation and electrical systems reportedly require upgrades for building code compliance.

In addition to the main facility, the DPW houses equipment at Town Hall in the former Police Station garage and the adjacent storage building. Lastly, the DPW operates a bulk goods transfer station, leaf composting, fuel pumps, and dog pound at the site of the proposed Energy Industrial Park off of Turnpike Road.

As noted, these facilities are widely spread through town and not easily managed from a single office. By visual inspection it is apparent that all of these buildings and facilities require some form of maintenance, including significant upgrades for building code compliance. Consequently, the purpose of this study was to consider the consolidation of DPW offices, facilities and functions to improve management efficiency and cost effective delivery of services to the public. The method used for this study was to determine DPW space needs for facilities and buildings, consider site options with a goal of consolidating facilities for better management, and calculate a project budget for the preferred alternative. This report reviews the results of those analyses.

LAND AND FACILITY SPACE NEEDS

Scope

This task was used to determine the Montague Public Works Department [DPW] building and facility space needs and how that program could be sited in new facilities as a complex or on separate sites if appropriate to the function. Through an understanding of the facility needs and their operation, the location and siting becomes an integrated process.

Building Space Program

The building needs of a modern DPW are different from almost any other land use. The operations and facilities are industrial in nature and require a large range of equipment and functional spaces to enable the completion of the municipal services missions. This includes structures of different types and different types of open operations areas for materials storage and movement, separate yet integrated with equipment storage and movement.

The method to define the building program for the Montague DPW was to collect information about the existing facilities and operations and then in an iterative process, "build" the DPW facility by listing the function and spaces and then adding up the floor space or site area requirements associated with those functions and spaces. For this study the spaces were broken up into three components:

- Administrative, Maintenance and Employee Support Spaces – These are the spaces that require climate control, because they are work areas for offices, showers, and maintenance.
- Garage and Vehicle Storage Spaces – These are spaces for heavy and light equipment of which pieces could be housed in differing levels of protection and climate control [See next section on Types of Buildings and Facilities].

- Other Facilities – These are the outdoor facilities such as fuel pumps and certain material storage, and special and separate buildings such as the salt storage shed and dog pound.

The spaces and space requirements are summarized in the following table with details included in Appendix B.

TABLE: SUMMARY FACILITY SPACE REQUIREMENTS

Component	Space Requirements	Comments
Administrative, Maintenance and Employee Support	6,375 SF	Should be attached to the Garage and Vehicle Storage but can be placed separately
Garage and Vehicle Storage	18,336 SF	For all equipment which should be sheltered
Other Facilities	65,313 SF	Includes open storage areas, closed storage, and waste handling

The construction of these facilities could vary according to siting requirements and operations. In particular, the level of building enclosure and climate control could vary significantly between the Administrative and Garage spaces. Code requirements will also vary depending on the type and design of the enclosure for vehicle storage. The analysis of different building options is found in the next section.

Options for Buildings and Facilities

Recent public works facility designs have attempted to maximize the protection of the significant capital investment in the equipment through maximizing the weather cover over the equipment – protect the equipment from the elements. By providing higher levels of climate control, the facilities also improve the operation of the equipment – a warmed engine starts more quickly and takes less time to start running. However, these garage facilities are typically large and hence a potentially significant capital burden in a municipal budget. Therefore the options for the range of building options, most of which provide some level of protection for the equipment, were reviewed and examples were located from around the state for comparative purposes. Furthermore, comparative evaluations are provided for costs, utility and protection of equipment. These options are summarized in the following table.

TABLE: DPW FACILITY BUILDING AND CONSTRUCTION OPTIONS

Construction Options				Comparative Criteria		
Building Type	Construction Type	Building Issues	Example	Cost	Usefulness	Equipment Protection
Town Showcase Building – Fully Enclosed LEED Certified, Etc.	New Office Building of Conventional Construction, Steel Frame Garage/ Storage Building w/ special features	Sophisticated design and engineering for integration of systems	Town of Lexington	High	High	High
Fully Enclosed Facility w/ Separate Offices	New Office of Conventional Construction, Steel Frame Garage/Storage Building	HVAC and equipment costs for fully enclosed garage/ storage	Town of Belmont	High	High	High
Fully Enclosed Facility w/ Partitioned Offices	New Steel Frame Space Building that includes Garage/Storage and Offices	HVAC and equipment costs for fully enclosed garage/ storage	Town of Chelmsford	High	High	High
Partially Enclosed Facility w/ Partitioned Offices	New Steel Frame Space Building that includes Garage/Storage and Offices (Does not include all vehicles/ equipment)	HVAC and equipment costs for fully enclosed garage/ storage	Town of Weston	High	Moderate	Moderate

Construction Options				Comparative Criteria		
Building Type	**Construction Type**	**Building Issues**	**Example**	**Cost**	**Usefulness**	**Equipment Protection**
Enclosed Offices, Open Sided Vehicle Storage (Phase-able to Fully Enclosed)	New Office Building of Conventional Construction, Steel Frame Open Structure for Garage/Storage able to be fully enclosed	No HVAC or equipment (overhead doors) required for garage/ storage		Moderate	Moderate	Moderate
Enclosed Offices, Partially Open Sided Vehicle Storage	New Office Building of Conventional Construction, Steel Frame Open Structure for Garage/Storage	No HVAC or equipment (overhead doors) required for garage/ storage	City of Cambridge	Moderate	Moderate	Moderate
Addition to Existing Facility	Addition of office or garage/storage space as needed	Entirely dependent upon type and condition of existing facilities	Town of Wellesley	Low	Moderate	Moderate
Open Sided Vehicle Storage	Open sides for garage/ vehicle storage	No HVAC or equipment (overhead doors) required for garage/ storage	Montague Public Safety Complex	Low	Low	Moderate
Renovation of Existing Facility	Renovation of existing office or garage/storage space as needed	Dependent upon type and condition of existing facilities	Town of Lunenburg	Low	Moderate	Low

Source: The Cecil Group, Inc.

To provide additional detail, the table below lists eight projects that have been recently built or programmed. As noted, some of these projects include choices to reduce costs by limiting the number of vehicles to be housed in fully-covered storage.

TABLE: OTHER COMMUNITY DPW BUILDING PROJECTS

Town	Project [SF]	Fully-covered Storage [SF]	Store all Vehicles?
Bedford	41,400	20,600	Yes
Belmont	79,283	45,398	Yes
Chatham	28,900	18,200	Yes
Danvers	58,800	31,000	Yes
Dennis	28,700	12,300	No
Lunenburg	13,120	8,436	No
Sudbury	28,000	20,000	No
Wayland	38,400	20,800	Yes
Weston	40,674	16,992	No

Source: Town of Weston and The Cecil Group, Inc.

With a total program of 24,711 SF for the main facilities, the Montague project is currently programmed as one of the smaller public works projects in the state.

PRELIMINARY DESIGN

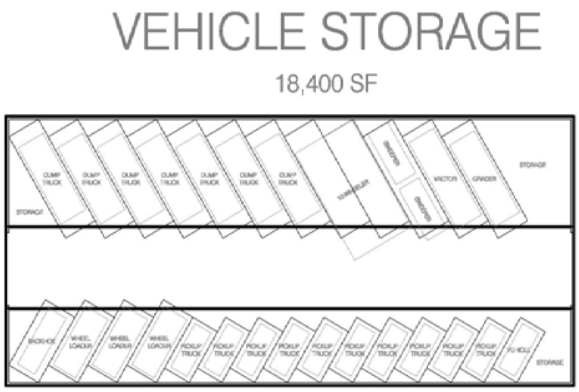
Scope

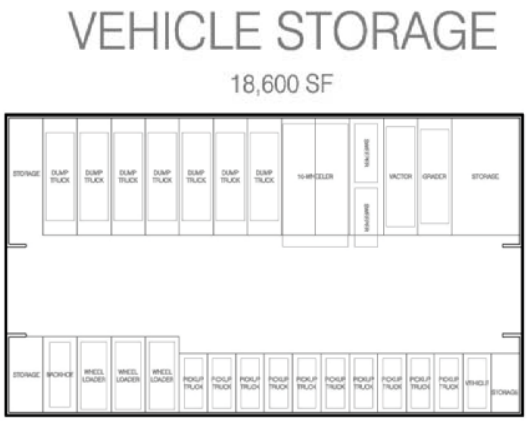
The design concept is prepared to provide a compact and cost effective solution to organizing the facilities included in the space program as department facility and operational needs. The building program presented here was translated into building elements and then those building elements were organized on a site to determine approximate area requirements.

Organization and Area Requirements

To determine the most appropriate design and organization of the DPW complex, the individual components were conceptualized and then placed on an idealized site to determine the total area requirements for the facility.

The concept for the vehicle storage element was prepared first because it is the largest structure and therefore potentially the most costly component. The most efficient floor plan was considered to be a one-way pass-through building, with angled parking spaces. The program is for 30 vehicle storage spaces for the primary pieces of equipment listed by the DPW. The size of the vehicle storage floor plan would be 18,400SF according to this concept (see Figure). The option for two-way flow and perpendicular parking for the same number of vehicles results in a floor plan of 18,600SF, which is 200SF more than the first option.





The garage and other components included in the preliminary design concept are listed in the following table.

TABLE: DPW PROGRAM ELEMENTS

Element	Size [SF]	Comments
Vehicle Storage	18,400	One-way drive-through building concept
Administrative Offices and Support	6,300	Includes mechanic's bays and staff support
Salt Shed	2,000	Sand and salt storage and loading
Bulk Storage	4,000	Transfer station and dog pound
Parking	12,000	30 surface lot parking spaces
Uncovered Storage	**30,000**	**No buildings; for equipment, materials, and other vehicles**

The determination was that for a site to accommodate the major building and operational areas, and allow circulation around and between the building and spaces, an area of approximately 3.7 acres is required. The option for organization of the facilities that was used to make this determination is shown in the following figure. Multiple points of egress from the lot provide the most efficient use of any frontage or access easement. Internal circulation and operations are designed to allow turning movements into and out of the buildings and operation areas.

PRELIMINARY BUDGET PLANNING

Scope

The preliminary budget is intended to help establish the most cost effective option for construction of the DPW facilities. Costs of other public works complexes built in other communities in Massachusetts were collected and summarized. These were used to determine the approximate value of the DPW facility as planned here.

Cost Factors

The first step was to determine unit cost factors that would be appropriate for this initial planning stage. A study of comparative public works projects in other communities; Belmont, Chelmsford, Lunenburg, Weston, and Lexington was completed to determine appropriate unit costs for similar construction. Deductions were made based on addition of more costly features such as truck washes and hydraulic lifts.

TABLE: PLANNING COST FACTORS – UNIT COSTS FOR FACILITY TYPES

Program Element	Unit Costs*
Administrative office and support	$ 329/SF
Vehicle/Equipment Garage – climate controlled	$ 259/SF
Vehicle/Equipment Storage – non-climate controlled	$ 159/SF
Vehicle/Equipment Shed	$ 60/SF
Existing garage renovation	$ 150/SF
Site Work	$ 6-8/SF

** Based on comparative projects from other communities; see Appendix C. Shed Storage based on shed built for the Montague Public Safety complex. Site work based on averages for grading with additional cost for partial paving and drainage improvements.*

Potential Costs

The costs of the combined DPW building were determined for four different scenarios. These scenarios are based on the amount of garage space that is fully enclosed and climate controlled balanced with the amount of space with more limited shelter. The Administrative/Support facility element includes the mechanic's bays which would be additional, climate-controlled garage space.

TABLE: COST COMPARISON FOR GARAGE STORAGE

Combined Facilities: Key Vehicles 30% Fully Garaged	SQUARE FOOTAGE	UNIT COST	COST	
Administration/Support	6375	$ 329	$ 2,097,375	
Garage, Climate Controlled	5500	$ 259	$ 1,424,500	
Shed Storage	12836	$ 60	$ 770,160	
Total Facility	24711		$ 4,292,035	**TOTAL COST**
Combined Facilities: Key Vehicles 50% Fully Garaged				
Administration/Support	6375	$ 329	$ 2,097,375	
Garage, Climate Controlled	9200	$ 259	$ 2,382,800	
Shed Storage	9136	$ 60	$ 548,160	
Total Facility	24711		$ 5,028,335	**TOTAL COST**
Combined Facilities: Key Vehicles 75% Fully Garaged				
Administration/Support	6375	$ 329	$ 2,097,375	
Garage, Climate Controlled	13750	$ 259	$ 3,561,250	
Shed Storage	4586	$ 60	$ 275,160	
Total Facility	24711		$ 5,933,785	**TOTAL COST**
Combined Facilities: Key Vehicles 100% Fully Garaged				
Administration/Support	6375	$ 329	$ 2,097,375	
Garage, Climate Controlled	18336	$ 259	$ 4,749,024	
Shed Storage	0	$ 60	$ 0	
Total Facility	24711		$ 6,846,399	**TOTAL COST**

Cost for Site Work

The open areas for circulation, operations, and outdoor storage must be improved with positive drainage and grading to prevent hazardous conditions and to control stormwater quality. In addition, some landscape treatments may be needed to buffer certain areas for habitat mitigation and neighbors. With up to 80,000 SF of area needed for the yard and operations area, approximately $560,000 is recommended to be budgeted for site work.

Cost for Renovation of the Existing Garage

Based on the unit cost factors and the size of the existing DPW garage on Avenue A, which is approximately 12,000 SF, the estimated cost for the renovation of the building would be $1,800,000. This would not provide covered storage for the 30 vehicles requested for storage, would continue to require the use of private property for storage of public works vehicles, and would not provide any consolidation of facilities. In addition, the separate equipment and vehicle storage at Town Hall in Turners Falls would still be located in buildings that need repair and maintenance.

Total Project Cost

Under the scenarios included here, the total project cost varies depending on the choices for the type of vehicle storage. With about 50% of the key part of the fleet in fully-covered storage, the main components of the building program, offices and garage, would be approximately $5,000,000, with approximately $560,000 in site costs, and additional costs to move existing structures and facilities, such as the salt storage shed and the dog pound. An allowance of $500,000 is added

for moving other facilities and operations. With a contingency factor of 10-percent, construction of the DPW facilities as programmed is estimated at approximately $6,666,000.

TABLE: PROJECT COST SUMMARY; 50% FULLY GARAGED

Element	Estimated Cost
Admin, Office, Support and Vehicle Storage	$5,000,000
Site Improvements	$ 560,000
Remaining facilities allowance	$ 500,000
Subtotal	$6,060,000
10% Contingency	$ 606,000
Project Total	***$ 6,666,000***

With the 30 key vehicles all fully garaged, the estimated cost for the total project is approximately $8,646,000 as summarized in the following table.

TABLE: PROJECT COST SUMMARY; 100% FULLY GARAGED

Element	Estimated Cost
Admin, Office, Support and Vehicle Storage	$6,800,000
Site Improvements	$ 560,000
Remaining facilities allowance	$ 500,000
Subtotal	$7,860,000
10% Contingency	$ 786,000
Project Total	***$ 8,646,000***

Caveats to Preliminary Cost Estimate

These numbers are preliminary estimates and subject to change as more detailed design concepts are developed and the costs are more narrowly defined. As an example, space buildings can be purchased in prefabricated, ready to erect, options that reduce the cost of the building on a square-foot basis, where the building size and dimensions may not meet the optimum design. In addition, if certain site improvements can be completed by the town, this will reduce the site improvement costs.

SITING

Scope

The principal goal in siting a new DPW Facility complex is to first determine whether and how to include it in the Energy Industrial Park. Certain DPW operations and facilities already exist at the future industrial park; bulk waste storage and transfer, a dog pound, a leaf composting area, and vehicle fuel dispensers. The location of these facilities is at the point of current entry from Turnpike Road into the town-owned property. Consequently the DPW facilities there will require improvements and relocation to permit proper and safe access into the Industrial Park. Other than this option for locating the complete complex, the other site options raised in the study process included rebuilding on the existing DPW property at Avenue A, and locating the facilities beside the new Public Safety building on Turnpike Road.

Siting Options

There are three options considered for locating the new consolidated DPW complex; within the proposed Energy Industrial Park, beside or near the recently constructed Public Safety building, and at the existing property of the DPW on Avenue

A. While the inclusion in the future industrial park was originally preferred, testing of the site constraints suggests that this option will require a premium either in more difficult and costly site preparation costs or the use of a higher value portion of the industrial park. Consequently the other options were considered for comparison including the possibility of designing the complex as dispersed facilities but with the most important facility elements combined at one location.

Energy Industrial Park Site

Within the Energy Industrial Park the new consolidated DPW complex could be located on one of the future subdivision lots. Frontage access must be provided from the future subdivision road. A concept for this option is illustrated in the following figure.

However, because the DPW facilities do not provide any revenue for the future subdivision, the more valuable lots would not be recommended for siting these facilities. The more valuable lots are parcels with easy access, flat topography, and having regular shaped lot lines for most efficient use of the area.

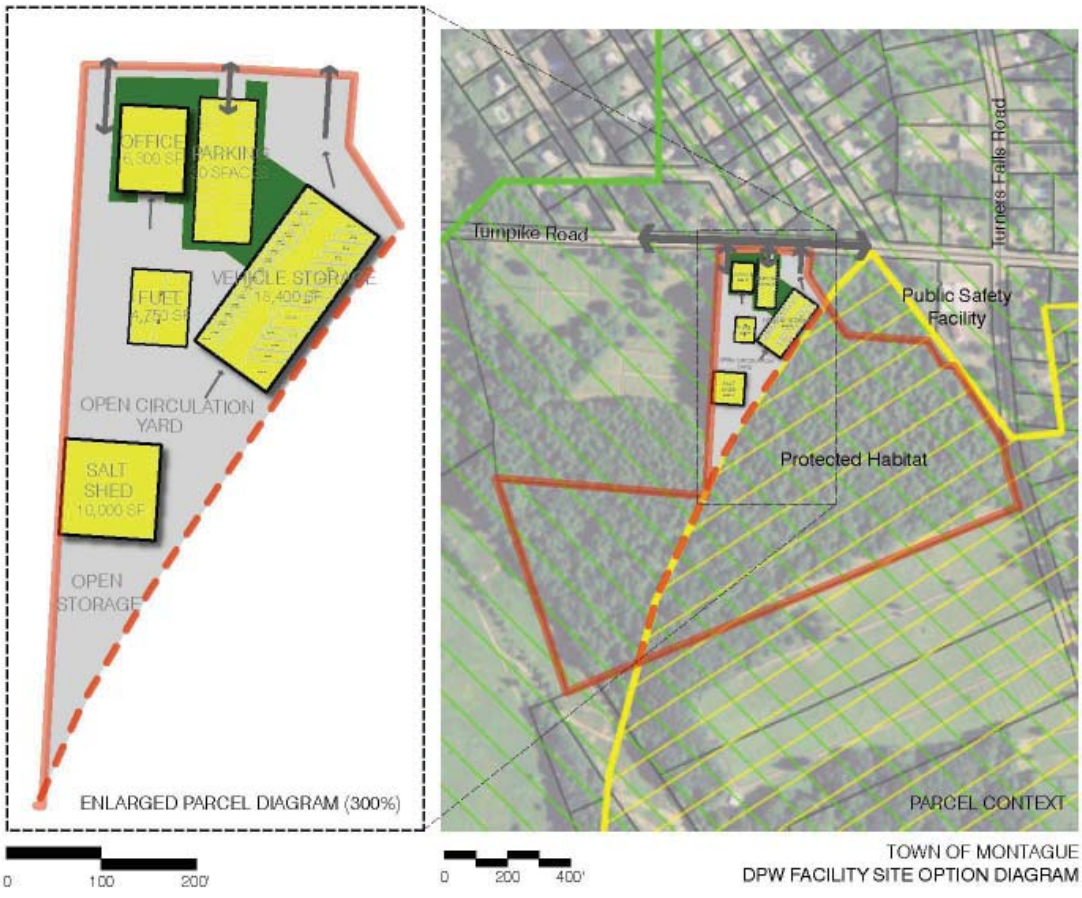
This study explored the option for siting the DPW facilities near or on the landfill and burn dump areas as these are considered sites with the least market value. Another factor to consider is that the Judd Wire facility indicated that any future expansion would be preferred at the rear of the building and into the new subdivision. This area covers the northern most edge of the burn dump and would be one constraint. Other physical constraints include the 200-foot buffer from the perennial stream that runs north to south through the industrial park property in between the burn dump and the landfill. The remaining areas could accommodate the DPW facilities with the addition of fill to help level the site.

Town Property Beside the New Public Safety Building

The new Public Safety Building was completed in 2009. It includes the Police Department and Fire Department headquarters. The 23.9 acre town property where the facility is located is at the southwest corner of Turnpike Road and Turners Falls Road. Of that total property, approximately 1.6 acres was used to construct the complex. This leaves approximately 22.3 acres of property, including land with frontage on Turners Falls Road and Turnpike Road.

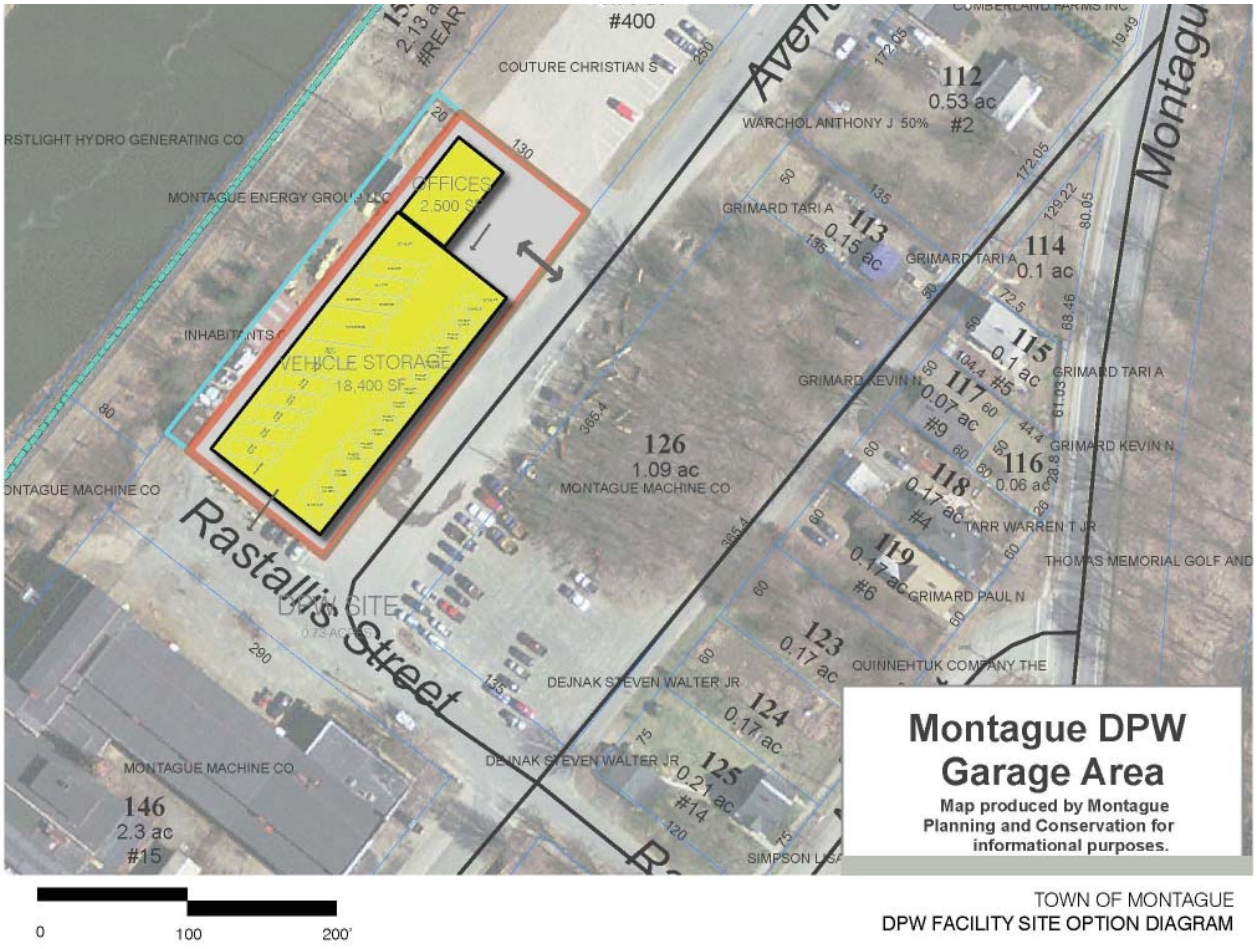
A significant portion of the land has been designated by the Natural Heritage and Endangered Species Program (NHESP) as Priority Habitat for Rare Species, and all of the property lies under the NHESP designation as Living Waters Critical Supporting Watersheds. Consequently, development of the site requires habitat impact mitigation. The development of the Public Safety Building resulted in an impact to habitat of 1.016 acres which was attached to a requirement for mitigation. Because this mitigation was deferred at the time of the permitting for the Public Safety complex, this area in addition to any mitigation required for the new DPW complex would be added to the program for the new project.

A portion of the 23.9 acres of town property that fronts on Turnpike Road and lies between the Public Safety Building and the Springdale Cemetery might be appropriate for other town facilities. With approximately 2 acres of land outside the Priority Habitat area, the site is sufficient for most of the DPW facilities. The Administrative and Support elements together with vehicle storage and fuel dispensing would be the most appropriate facilities in the program to locate at this site. The site provides direct vehicle access to the Turnpike Road and is near the intersection with Turners Falls Road. The continued operation of the existing facilities in the proposed Industrial Park would potentially remain and be moved and upgraded within the new industrial park. A concept for this option is shown in the following figure.



Rehabilitation and Reuse of the Existing DPW Garage Site

As noted in the previous section on Options for Buildings and Facilities, one option is the renovation of the existing DPW garage and offices at 500 Avenue A. Based on the quality of the building which will result in an investment that requires the need for full building code compliance, the restricted and more difficult organization of the site for typical public works operations, equipment and functions, the full reconstruction of the building is warranted. Availability of basic infrastructure; water, sewer, electricity, communications, and previous site development may reduce the cost of reconstruction below that of a fully new facility. However, existing site constraints limit the development of the full program for the consolidated complex. In particular, the site is only 0.73 acres and the full program as conceptualized in this study would require approximately 3.7 acres.



A conceptual plan for the DPW facilities at the existing site is shown in the following illustration. This indicates how only a portion of the building program could be sited at this location. However, this would consolidate vehicle storage and maintenance at the present location from other dispersed locations, thereby freeing up storage space at the former Police Station and Town Hall property.

ENERGY EFFICIENT DESIGN

Scope

The town wants the facility to be energy efficient and to consider renewable energy options for reducing long term operating costs. The DPW building could generate supplemental power through use of renewable energy sources; in particular, photovoltaic (PV), wind turbines, heat pump/exchanger, or a combination of these methods. However, there are several design and operational issues that must be addressed with these options.

PV panels could be located as part of the shade structures for vehicles, on top of the roof of the new DPW building, or ground-mounted PV panels. While a fourth option would be to utilize and tie into the energy generated from a new PV field that may be located on the capped landfill, the logistics for this option cannot be determined until the town has completed its assessment of the potential of private energy production. With an approximate ratio of land area required to generate power as 6 acres for each 1 megawatt of PV generated power, the demands of the DPW building could be met, but only if the proper storage capacity is provided in the project development. Similarly, a wind turbine would also require energy storage within the development. The MassGIS Wind Energy Screening Tool does identifies the sites reviewed as "lower wind energy sites" and not priority sites. The data also suggests a 1,000FT residential buffer which would impact options for the facility location. Geothermal heat pump options do not require energy storage in the same way as PV's or wind. However, the system options would require additional plumbing for the heat pumps. In addition, while an air to air heat exchanger is typically more efficient than current ground source systems, much depends on the design of the heat exchanger as to its efficiency and value.

Regardless of alternative energy options there are a number of site and building improvements, which would lower the life cycle and operational costs of the facility. The following design elements are recommended:

- Siting of building east/west to maximize seasonal heating and cooling benefits – this works best on the larger site within the Industrial Park.
- White reflective roof to reduce heat island effect and reduce cooling requirements or other roof covering to reduce heating and cooling loads – this is possible with all configurations and sites
- Interior lighting on daylight sensors – while this is a current code requirement, the quality of the system must be specified
- Automatic natural ventilation (windows on automatic natural flushing timers)
- Sky lighting for 40% of the floor area – this could be accomplished easily within the garage areas with a clerestory
- A super-insulated building envelope with:
  - R20 under slab insulation
  - R20 foundation wall insulation
  - R45 walls
  - R 60 roofs
  - R5 fiberglass windows (triple insulated, low-e, operable units—U value of 0.19)
  - Detailing to avoid air infiltration and thermal loss

These items are dealt with in the design stages but should be included in the initial conceptual planning for later consideration. At the time of the design, the applicable Building Codes may require certain design elements that will affect the overall performance of the building. As a consequence, while specific design elements are recommended, the final design must be a comprehensive and integrated design for highest efficiency and value.

CONCLUSIONS

Based on the information collected and analyzed in this study, the conclusions include program, siting and costs that are reasonable for a public works facility in a town the size of Montague.

Facility Program

The DPW facility program is presented as a pragmatic organization of work and storage spaces associated with a current and code-compliant public works operation. This includes sufficient space to allow movement of the vehicles and equipment within and around the facility as needed for the multiple functions associated within the department's operations.

The total program includes 27,800SF of building space and 67,000SF of site improvements as summarized in the following table.

TABLE: RECOMMENDED DPW PROGRAM

Element	Size [SF]
Admin, Office and Support	6,300
Vehicle Storage	15,500
Salt Shed	2,000
Bulk Storage	4,000
Total Buildings	*27,800*
Parking	12,000
Operations and fueling	10,000
Uncovered Storage	30,000
Site buffers (as needed)	15,000
Total Site Improvements	***67,000***

Certain structures, such as the salt storage shed may be able to be relocated and reused instead of being built as new construction. So while the total program is summarized in the calculations, the actual project may not be all new construction.

Siting

The recommended siting is to use the property within the town-owned land where the Public Safety complex was constructed because there is approximately two acres of land outside the Priority Habitat, this area is sufficient to consolidate most of the structures, vehicles and operations areas, the site is located at a major crossroads, and the site is close to the landfill and burn dump. Other operations such as the leaf composting, white goods transfer, and dog pound could remain within the areas of the burn dump and landfill within the future subdivision.

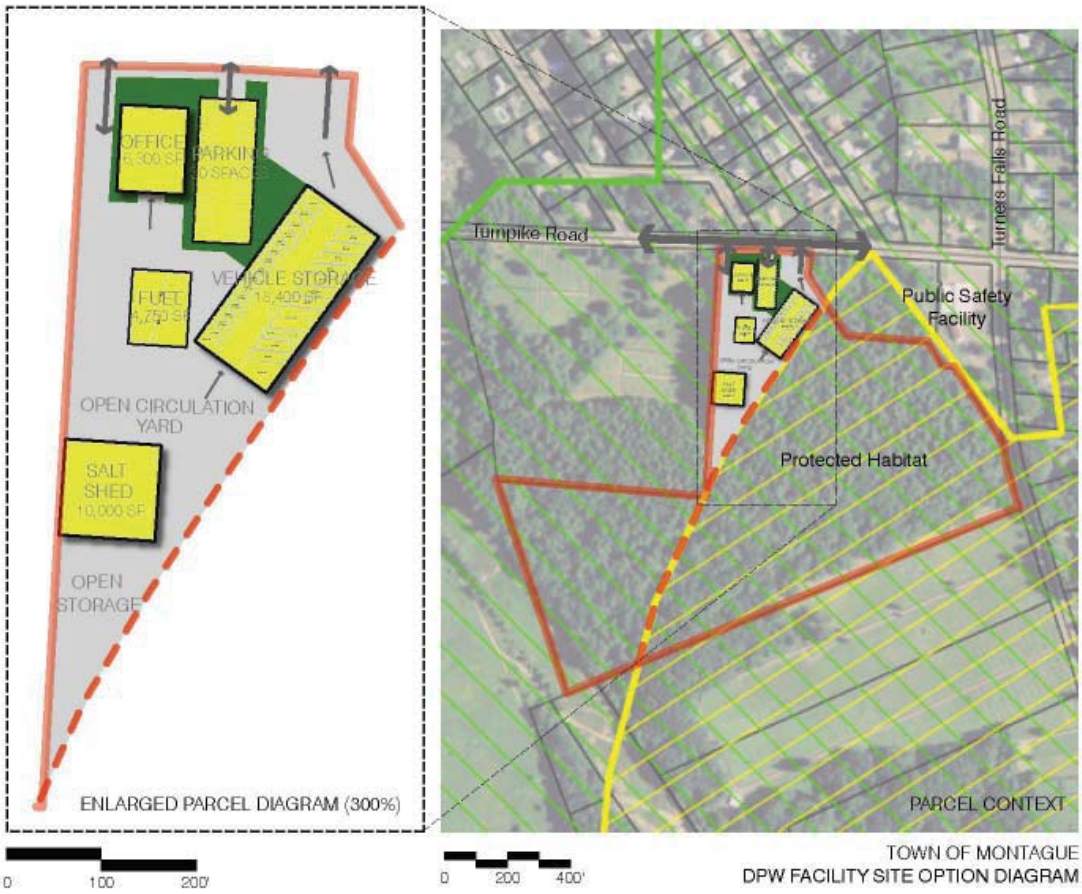


TABLE: DPW FACILITY LOCATIONS

Element	Location
Admin, Office and Support	Turnpike Road
Vehicle Storage	Turnpike Road and Avenue A
Salt Shed	Turnpike Road
Bulk Storage	Energy Park
Parking	Turnpike Road
Operations and fueling	Turnpike Road
Uncovered Storage	Energy Park
Site buffers	As needed

Costs

Construction of the DPW facilities as planned in this study is estimated at approximately $5,900,000 with a portion of the key vehicles garaged under climate-controlled conditions.

TABLE: COMBINED FACILITIES: KEY VEHICLES 30% FULLY GARAGED

Element	SF/Area	Cost/SF	Cost
Administration/Support	6,375	$ 329	$2,097,375
Garage, Climate Controlled	5,500	$ 259	$1,424,500
Unheated Garage Storage	10,000	$ 60	$600,000
Total Facility	*21,875*		*$4,121,875*
Site Improvements	80,000	$7	$560,000
Remaining Facilities Allowance			$510,000
10% Contingency			$530,000
Total Project Cost			*$5,821,875*

Methods to Reduce Project Costs

These numbers are preliminary estimates and subject to change as more detailed design concepts are developed and the costs are further developed. However, this provides a reasonable starting point for considering the cost of the project – and indicates ways to engineer the project to be more efficient. The cost-saving options include:

- Reduce garage costs through purchase of prefabricated, ready to erect, buildings, even though the building size and dimensions may not meet the optimum design.
- Consider an unheated but fully enclosed garage. This still requires a ventilation system but reduces the costs for mechanical equipment.
- Complete certain site improvements with town equipment to reduce the site improvement costs.
- Reduce the quality/cost of finishes in the buildings; particularly the more costly finishes in the Administrative/ Support building.

APPENDIX A: DPW EQUIPMENT LIST

VEH#	YEAR	MAKE	MODEL	VIN	PLATE #	NOTES
1	2010	FORD	F 350 4WD PU	1FTWF3B57AEB31501	M 75296	PU
2	1997	JOHN DEERE	544-G LOADER	DW544GD559678	M 56962	23' WITH PLOW, BUCKET
3	2003	INTERNATIONAL	7400 10 WHEEL DUMP	1HTWHADT33J068291	M 68104	38' W/ PLOW, SANDER
4	2001	DODGE	W-1500 RAW 2 WD	1B7HC16X11S330479	M 66064	PU
5	2002	FORD	F-250 4WD PU	1FTNF21L12ED46153	M 75295	PU
6	2008	FORD	F-350 1-TON DUMP	1FDWF37Y88EE22985	M 82317	PU 1 TON
7	2005	INTERNATIONAL	7400 VACTOR	1HTWCAAR25J014362	M 72443	34'
8	2010	INTERNATIONAL	7300 DMP TRK	1HTWAAAR2AJ243298	M 82664	30' W/ PLOW, SAND
9	2000	STERLING	L-7501 DMP TRK	2FZHAJBBXYAB57397	M 63633	30' W/ PLOW, SAND
10	2010	INTERNATIONAL	7400 DMP TRK	1HTWDAAR1AJ243302	M 83248	28' W/ PLOW
11	1996	FORD	L-8000 DMP TRK	1FDYK82E8TVA13960	M 61079	28' W/ PLOW
12	2008	INTERNATIONAL	7400 DUMP TRK	1HTWDAAR28J570009	M 80587	28' W/ PLOW
13	2002	INTERNATIONAL	4900 DMP TRK	1HTSDAAR52H523540	M 67113	30' W/ PLOW, SAND
14	2011	UD/EIGIN	EAGLE SWEEPER	JNAPC81L3AAC80267	M 87867	SEASONAL
15	1997	FORD	L-8000 DMP TRK	1FDYK82E6VVA00627	M 56177	28' W/ PLOW
16	1980	FORD	L-8000 DMP TRK	R80UVGG9950	M 34483	SEASONAL
17	2001	DODGE	3500 1-TON DUMP	3B6MF36671M585014	M 64191	PU I TON
18	1981	JOHN DEERE	A-670 ROAD GRADER	JD670AG011029	M 53719	AS NEEDED
19	2008	KOMASU	W-156 BACKHOE	A73048	M 76500	20'
20	2011	KOMATSU	WA-250-6 LOADER	76308	M 87865	23' W/ PLOW, BUCKET
21	1988	BOWMAG BW154	6-8 TON ROLLER	820123	M 109	SEASONAL
22	1997	ELGIN EAGLE	STREET SWEEPER	FO812D	M 57878	SEASONAL
23	1998	NEW HOLLAND	ALAMO FLAIL	078304B	M 58658	SEASONAL
24	1989	SRECO	SEWER RODDER	L 891688	M 42385	AS NEEDED
25	2006	DODGE	DOKATA 4WD PU	1D7H-W22N46S683085	M 84072	PU
26	1984	LEROI	COMPRESSOR	2116X27	M 30086	AS NEEDED
27	1987	PB	POWER PAVER	PB87E3277	XXXXXX	SEASONAL
28	1986	WOOD CHUCK	CHIPPER	1W9CE891XFS4D6603	M 80595	AS NEEDED
29	1971	SICARD	SNOWBLOWER	29097	XXXXXX	SEASONAL
30	2009	KONATSU	WA-250-6 LOADER	A76196	M 78669	23' W/ PLOW, BUCKET
31	1995	STOW	ROLLER	R 2000	XXXXXX	SEASONAL
32	2006	FORD	F 350 4WD PU	1FTWF31P86EA36388	M 75294	PU
33	2005	FORD	F 450 2-TON DUMP	1FDXF47PX5ED25848	M 72431	PU 1 TON
34	1979	STONE	CEMENT MIXER	2591242	M 35840	AS NEEDED
35	2004	CHEVROLET	2500 HD PU	1GBHK24U94E158310	M 78663	PU
36	2002	GRACO	LINE LAZER 5900	BA 316	XXXXXX	SEASONAL
37		DELETED				

VEH#	YEAR	MAKE	MODEL	VIN	PLATE #	NOTES
38	2009	GRACO	3400 LINE PAINTER	BA 4685		SEASONAL
39	1991	GRACO	3500 LINE PAINTER	231-140	XXXXXX	SEASONAL
40		DELETED				
41		DELETED				
42		DELETED				
43		DELETED				
44	1991	GMC	BUCKET TRUCK	1GDJC34KXME511826	M 75298	BUCKET TRK
45		DELETED				
46	1998	EXMARK	SULKY MOWER	TT4817KAC		PARKS
47	2008	JOHN DEERE	0' TURN MOWER	DM997SC023395		PARKS
48	1990	JOHN DEERE	770 TRACTOR	M0077A001213	M 46016	PARKS
49	2001	JOHN DEERE	4600 TRACTOR	LV4600H460704		PARKS
50		DELETED				
51		DELETED				
52		DELETED				
53		DELETED				
54	1969	ALLIS CHALMERS	FORKLIFT	126000	XXXXXX	10'
55		DELETED				
56	1975	TRAILER	HOMEMADE	1000001	M 48065	TOWED
57	1987	WRIGHT	10-TON TRAILER	40ET30203GAJ00102	M 62426	TOWED
58	1998	HUDSON	3-TON TRAILER	10HHSE16W1000139	M 58426	TOWED
59	1998	HUDSON	3-TON TRAILER	10HHSE16W1000139	M 58426	TOWED
60	1997	HOMEMADE	UTILITY TRAILER	LE4000	M 54050	TOWED
61	1989	PAINT TRAILER	HOMEMADE	XXXXXXXXXXX	M 14574	TOWED

LIST OF PUBLIC WORKS VEHICLES PLANNED FOR GARAGE STORAGE

# of Vehicles	Vehicle #	Type of Vehicle	Notes
1	#3	10 Wheeler w/ plow and sander	38' Straight Blade; 42' Angled Blade (long) 23' (width) w/ wing down
1	#7	Vactor	34' width - 10' (doors open)
7		All 6 wheel dump trucks	28' to 30' with plow and sander (long); width 10' (doors open)
	#18	Road Grader	32'
3	#20; #30; #2	Wheel Loaders	23' w/ plow or bucket (long); width w/ bucket 9'
10		Pick Ups	1 ton and bucket truck
2		Street Sweepers	In garage Apr-Nov (avg months); storage Dec - Mar
1		Backhoe	
Total to be garaged year-round 30 Vehicles Minimum			

APPENDIX B: DPW BUILDING PROGRAM

The following Building Program was developed based on interviews with town personnel, analysis of existing facilities, industry standards, and building code requirements. Office capacities are based on projected demands at full employment.

DPW FACILITIES: OFFICES AND MAINTENANCE

Room Name/Use	Capacity	Square Footage	Units	Total Square Footage
Supervisor's Office	4	220	1	220
Foreman	2	180	1	180
Mechanic	2	180	1	180
Clerk	1	90	1	90
Reception Area	2	30	1	30
Small Equipment Storage		500	1	500
File and Map Storage		150	1	150
Vehicle Maintenance		1650	1	1650
Vehicle Maintenance Support		250	1	250
Break Room	10	150	1	150
Showers/Changing - Men	20	400	1	400
Showers/Changing - Women	10	200	1	200
Mechanical/Storage		250	As needed	250
			Total Net Square Feet	*4250*
			Net to Gross Factor .5	*2125*
			Proposed Gross Square Footage	***6375***

DPW FACILITIES: GARAGE AND VEHICLE STORAGE

Vehicle/Use	Square Footage	Units	Total Square Footage	Vehicle Dimension
Pickup Truck	180	10	1800	17' L x 6.5' W
Grader	750	1	750	32' L x 10' W (doors open)
Dump Truck	300	7	2100	30' L x 10' W (doors open)
10-Wheeler	1000	1	1000	42' L x 23' W
Vactor	410	1	410	34' L x 10' W (doors open)
Wheel Loaders	250	3	750	23' L x 9' W
Sweepers	250	2	500	20' L x 8' W
Backhoe	250	1	250	22' L x 7' W
Misc vehicles (forklift, trailers, etc)	1000	1	1000	17' L x 6.5' W
Vehicle work stations	300	3	900	
Mechanical/Storage	2000	As needed	2000	
		Total Net Square Feet	*11460*	
		Net to Gross Factor .6	*6876*	
		Proposed Gross Square Footage	***18336***	

DPW FACILITIES: OTHER FACILITIES

Room Name/Use	Capacity	Square Footage	Units	Total Square Footage
Salt Storage Shed		4000	1	4000
Fuel Dispenser	2 pumps	1500	1	1500
Bulk Storage		5000	1	5000
Other Uncovered Storage		30000	1	30000
Dog Pound		2000	1	2000
Employee Parking	25	325	25	8125
Visitor Parking Spaces	5	325	5	1625
			Total Net Square Feet	*52250*
			Net to Gross Factor .25	*13063*
			Proposed Gross Square Footage	***65313***

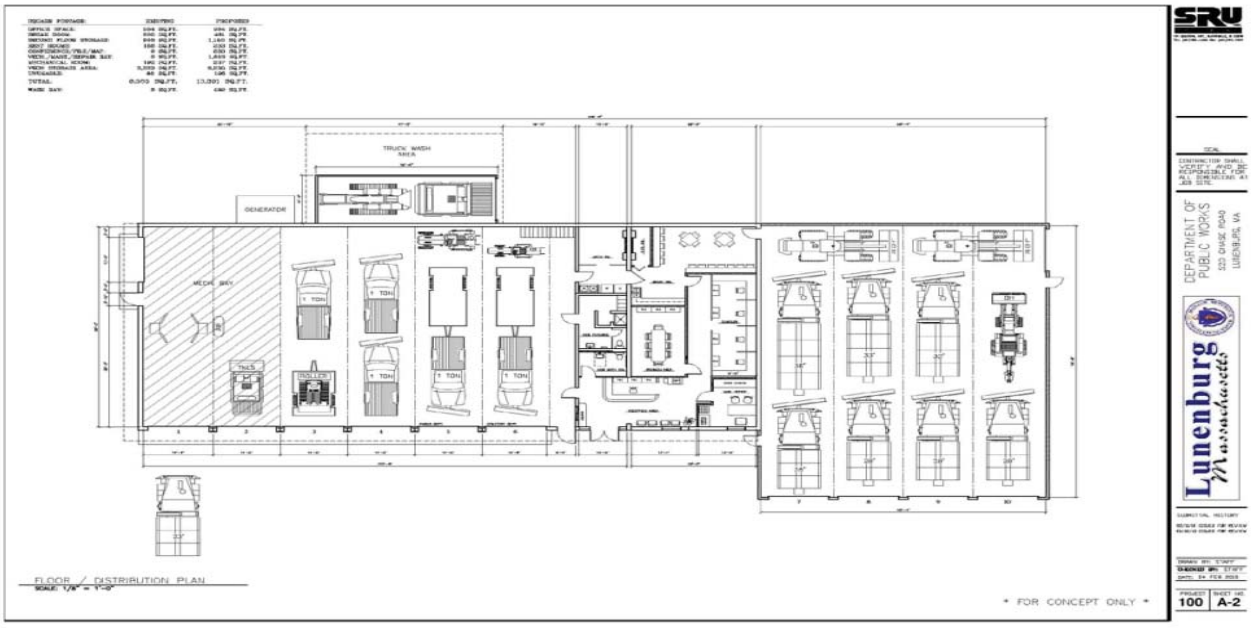
APPENDIX C. OTHER MUNICIPAL DPW FACILITY PROJECTS

Three representative projects are summarized here to allow a comparison with the Montague options. These projects are not exactly similar but include some of the same building components and provide some lessons about project costs.

A. The newly constructed Lexington Public Services Facility combines the Department of Public Works and Department of Public Facilities. It opened on August, 2009 as a LEED Silver Certified building. The project includes a two story building with offices, break rooms, staff lockers, and meeting spaces, a large salt storage shed, a cold storage lean-to, and a large garage with maintenance bays with lifts, wash bays. Landscape and site improvements were made to improve the adjacent Minuteman Bikeway. The total project cost was $27.5 million. The town was able to afford a significant and highly detailed facility. The Montague facility must be a basic facility with minimal extras to stay within a reasonable budget.

B. The Weston Department of Public Works facility was completed in March 2011. The facility was designed for maintenance bays with hydraulic lifts, a washing bay, offices, lockers and staff support, and a vehicle storage area of 175x96x26 (16,800 SF) that can hold up to 28 trucks. The original design was estimated with a program of 40,700 SF at a cost of $16 million. The final design reduced the program to 26,300 SF with an actual construction cost of about $11.2 million. The project was reduced in size to a program similar in size to Montague, but by keeping all of the more expensive elements of the building program, the unit cost in Weston went from $393/SF to $426/SF. The program for the Montague facility includes similar storage capacities but limits the special building elements to bring down the potential costs.

C. The Lunenburg Department of Public Works is just about to open (March, 2012). The original plan consisted of improvements to the existing office space and garage of 6,286 SF and a garage addition of 6,834 SF on an 8.75 acre parcel. The new garage was intended for 10 vehicles or pieces of equipment. The original plan also included a vehicle maintenance area of 1,653 SF added within the existing garage. The original budget estimate was for $1.1 million with the expectation that the town could receive just the basic facility. The lowest bid for the garage addition alone was $1.414 million. The project eventually was built with an unheated garage addition of 4800 SF at a cost of about $700,000. Total project cost ended up at $1.8 million. As the lowest cost facility found among the recent and current public works projects, the Lunenburg project is of interest. The cost of the heated garage was $207/SF and the unheated garage was $145/SF. In comparison, the unit costs used for estimates in this study for Montague are $259/SF and $159/SF for similar facilities, respectively, which are recommended at this stage of study and design. In addition, the garage space is a third of the Montague program and the total project in Lunenburg is half the size programmed for Montague. Because the Lunenburg project included renovation of existing space as well as the new construction, the price estimate provided in this study is again considered appropriate at this stage of study and design.



CHAPTER 6
Burn Dump

The burn dump is situated in such a way that it will not have a significant impact on the potential industrial subdivision of the property. However, the land under and around the dump may provide an opportunity for supportive facilities and uses. Without closure, the dump remains as a liability for the town and, with closure, a potential asset. Consequently, the town should consider closure of the dump and the possible reuse options as a beneficial component of the industrial park.

CLOSURE REQUIREMENTS

The burn dump was last used in 1979 for the disposal of bush, stumps, bulky waste and demolition material. Prior to 1970, this area was used to dispose and burn solid waste. The Town of Montague intends to close the active landfill permit for the site. Since the burn dump is permitted as a solid waste management facility, the Massachusetts Department of Environmental Protection [MassDEP] requires the landfill to be capped before it may be closed. Options considered to cap the landfill include: a high evapotranspiration soil cover system, MassDEP specified HDPE final cover system, and a bituminous concrete cover system.

The high evapotranspiration soil cover system option consists of a high organic soil layer that is designed to hold moisture to increase evapotranspiration. Appropriate vegetation for the cover system that minimizes erosion and promotes transpiration will need to be evaluated. In order to conform to the MassDEP's landfill regulations, found in 310 CMR 19.00, the burn dump will need to be regraded to a maximum 3:1 side slope and a minimum 5% top slope. Stormwater drainage systems such as drainage swales, drains and detention/sedimentation basins will need to be provided to control remaining stormwater discharge from the site. A conceptual diagram of a soil cover system as described by the EPA can be seen below:

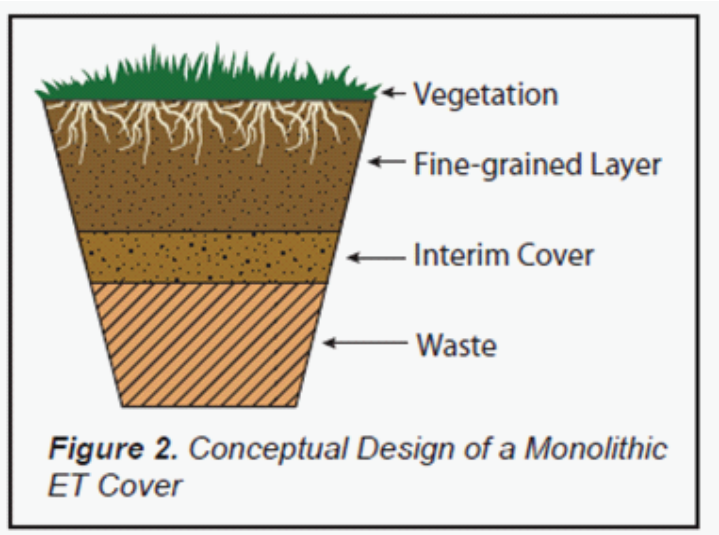


Figure 2. *Conceptual Design of a Monolithic ET Cover*

(http://www.clu-in.org/download/remed/epa542f11001.pdf)

Another cover system specified by the MassDEP is an HDPE Final Cover system (310 CMR 19.112). The layers of the HDPE cover system would consist of a vegetation/topsoil layer, a sand drainage layer, HDPE liner, a gas venting layer, and a compacted subgrade layer immediately above the waste. The burn dump area will need to be regraded to a maximum 3:1 side slope and a minimum 5% top slope. Stormwater control measures include infiltration toe drains.

The bituminous concrete cover system option consists of a bituminous concrete layer on top of a compacted subgrade layer. Shallow venting trenches are needed around the perimeter of the landfill. Since the concrete cover system will increase runoff, appropriate stormwater measures such as drainage swales, drains, catch basins or detention/sedimentation basins will need to be designed.

LANDFILL REUSE OPTIONS

Post-Closure reuse of landfills is strictly regulated, and is specifically discussed in the State regulations at 310 CMR 19.143 Section 4. A landfill must meet post-closure requirements as outlined in 310 CMR 19.142 before post-closure use can be proposed.

The reuse of the site is dependent on the engineered cover. A bituminous concrete cover system would allow the town to use a portion of the site for alternative uses such as parking, composting, recycling or storage for supplies and equipment. The HDPE final cover system could be reused as, under MassDEP approval; a park, athletic field, a renewable energy project site, parking, or an above ground structure.

Differential settlement will be the biggest issue for any use, and will need to be monitored under the closure permit requirements. Generally, structures should be located on native soil. If it is not possible to build foundations on native soil, pile supports will be required to support any structures. Design solutions such as hinged slabs at entryways, flexible utility connections, and hangers embedded in the slab which attach to utility pipes, will help ease the building and utilities during any settling of the refuse. Parking areas located on refuse could also be affected by settlement. For example, drainage patterns can be altered and utilities that rely on gravity could shift.

A variety of projects have been constructed on top of closed landfills. Below is a table listing Massachusetts landfill post-closure uses.

Town	Owner Type	Statues	Post Closure Permit	Port Closure Use
Chilmark	Municipal	Capped	Approv 7/24/2003	Department of public works storage
Chilmark	Municipal	Capped	Approv 7/24/2003	Department of public works storage
Essex	Municipal	Not capped	Approv 8/20/2004	Dpw garage
Holyoke	Private	Capped	Approv 7/10/1997	Shopping mall parking lot
Orleans	Municipal	Capped	Approv 3/9/2005	Department of public works structures and portions of transfer station
Tisbury	Municipal	Capped	Approv 9/16/1999	Parking lot

Source: Massachusetts Landfill Profiles: http://www.mass.gov/dep/energy/landfill.htm, June 16, 2009.

Additional information on burn dump/landfill re-use may be found at the following links:

Landfill Settlement

http://www.bvsde.paho.org/bvsair/e/repindex/repi49-50/lesson10/lesson10.html

Building on Landfill/Vegetated Landfills

http://waste360.com/mag/waste_landfill_closure_longterm

Landfill Grading Preparation

http://140.194.76.129/publications/eng-pamphlets/ep415-1-261%28volume5%29/c-3-2.pdf

CHAPTER 7

Proposed Industrial Park Master Plan

The proposed Turnpike Road Energy Industrial Park is an opportunity for new industrial users within the County to grow their business in a location attractive because of its developable land and flexibility for designing industrial facilities. The preliminary concept for a subdivision plan provides the following elements:

- Of the approximately 163 acres of land owned by the town, 93.5 acres is proposed to be subdivided for industrial development. The plan creates 21 lots fronting on a new subdivision road of about 4400 feet in length. The lots vary in size from about 2.5 acres to over 14 acres with the sizes and number of lots matching the projected market demand.
- The subdivision leaves one large out-parcel set aside for the closed landfill, on which leaf composting for the town would be possible. The large out-parcel also includes conservation land along the stream corridor that could be preserved.
- One lot, Lot 4 of about 5.27 acres, is set aside for the closed burn dump, certain public works activities, and possibly parking depending on the potential settlement of the burn dump area. Relocation of the current parking lot for Judd Wire, which is now situated in Lot 1, could be to this lot. However, ownership should remain with the town so that some of the displaced public works functions; dog pound or bulk waste transfer, could be sited there. State permitting of the site chosen for waste handling will be needed.
- One lot, Lot 5 of about 3.6 acres, is set aside for potential future expansion of Judd Wire, the existing and adjacent manufacturer.
- The main access into the site would be off Sandy Lane, the current driveway for Judd Wire. Emergency access could be provided at the western end of the property.
- Utility connections would come off of Sandy Lane, with the water main looped to maintain flows and quality, and the sewer constructed as a gravity line.
- Site design standards are proposed for adoption to reduce the impact of development within the subdivision and on adjacent properties. These would be part of the convents for developers in the subdivision.
- The subdivision provides an opportunity to construct an alternative energy generating facility on either the landfill or burn dump, where the land costs are the lowest.
- Development of the subdivision could be accomplished in phases as recommended in Chapter 8, Development Strategy.

Build-out, Job Creation, and Taxes

Based on current industrial development within the town (see Table 2, from Chapter 3), with the 84.6 acres of land within the developable lots, the remainder from the total of 93.5 acres in the subdivision lots after subtracting the 5.27 acres committed to the burn dump and the 3.67 set aside for possible expansion of Judd Wire, this project could generate 657,758sq. ft. of industrial floor area and 619 jobs at build-out.

Modified Table 2, from Chapter 3: Manufacturing Firms Within and Outside of Airport Industrial Park

	No. of Firms	Acres	Floor space (sq. ft.)	Floor space per Acre	Jobs	Sq. Ft. per Job
Industry Inside of AIP *	15	97.4	544,370	5,589	511	1065
Industry Outside of AIP	3	39.4	519,171	13,176	490	1060
Total	18	136.8	1,063,541	7,774	1001	1062
Energy Industrial Park	19**	84.6(93.5)	657,758	7,774	619	1062

** Floor Space Excludes Hallmark Institute*

*** 19 lots after excluding lots for burn dump and Judd Wire*

Sources: The Cecil Group, Cambridge Economic Research, Survey of Industrial Land Uses in Montague, 2011

The value of the existing, improved industrial real estate is $38,876,800, which is equivalent to $284,187 per acre or $36.55 per square foot of floor area. The resulting municipal taxes, at a mil rate of 23.90, are $929,156 (see Table 5 in Chapter 3).

For the estimated build-out of 657,758sq.ft, on the 84.6 acres, the assessed value would be approximately $24,041,054 by floor area, or, $24,042,220 by acreage. Rounding to $24 million and using the previous mil rate of 23.90, the total municipal yearly tax rolls at build-out would be $573,600.

Addressing Pre-existing Conditions

There are pre-existing conditions on the property; both man-made and natural, that must be addressed for full development of the Industrial Park. The manmade conditions include the prior uses of this property for two small landfills and a fuel distribution facility. Operation of the landfills also required cover material that was excavated from the middle of the site leaving a sand quarry of about ten feet in depth. The natural conditions include the intermittent and perennial waterways that are present on the southeast portion of the property, and the certified and potential vernal pools that are located in the central portion of the site. Other restrictive conditions include the topographic relief that could add a premium to site development for many of the proposed lots.

The landfills have potential environmental liabilities that will be addressed in their closure through application of the state and federal closure and remediation standards. The sand quarry will require an approach to grading that controls costs through smart design approaches. Because stormwater management is a significant design element, the use of the depression for storage of stormwater should be included in the site design process.

The fuel distribution facility is recommended for closure at the current site and reconstruction at the proposed, separate DPW site. This will allow the construction of a state-of-the-art fuel system to improve safety, reduce environmental impacts and reduce town liability.

A natural element is the small hill on the western side of the subdivision and lying under proposed Lots 16-21. This land form is expected to be composed of till soils which are a poorly sorted and poorly drained soil type, therefore potentially challenging for both grading and construction. A previous suggestion was to use this material to fill the sand quarry depression. This is a significant undertaking and not without certain impediments because of cost. However, completion of the subdivision will be dependent on a reasonable alteration of the grades.

As noted, the property contains mapped and certified vernal pool and in another location, a potential vernal pool. Regulated under state wetland law, these are subject to seasonal inundation and provide habitat for amphibian species. The mapped vernal pool has been certified by the state and is located on the property boundary between Lots 13 and 14. A 200-foot setback buffer is indicated on the plan as a ‘no alteration’ area, except for nature trail linked to the open space. This still leaves substantial area for upland development on the lots.

Utility Connections

The estimates of water demand and wastewater flows are based on a review of the flows from the Airport Industrial Park, which suggests a factor of 0.24 Gal/SF/Day be used to estimate water demand, and about two-thirds of that flow as estimated wastewater discharge. For the 685,900sq.ft estimated for the Energy Industrial Park build-out, the water demand would therefore be about 165,000GPD, and wastewater flows would average 111,000GPD. These flows could vary significantly depending on the actual industries, the processes the industries use, and the potential for on-site water supply wells and wastewater discharge permits.

With the proposed grading plan, the sewer system could be installed as a gravity system. However it should be noted that, food processing and metal fabrication are the clusters anticipated, so industrial process wastewater flows are anticipated. The town has industrial wastewater pre-treatment regulations and allows the municipal treatment plant to accept industrial flows after meeting town specifications. Sewers may be connected to the town system.

The lots are to be connected to the town water and sewer connections. Currently the town water line in Turnpike Road is a cast-iron, unlined 10" main and runs through Sandy Lane as an 8-inch main. A recent hydrant test in Sandy Lane at Judd Wire indicated a flow of 1700GPM and a pressure rating of 80psi (telecom with Michael Brown, Montague Water Department). This indicates a potential to supply the new industrial park with no unusual cost premiums. However, the 8" main could be replaced with a larger or separate waterline to the Turnpike Road main. If a still larger supply is needed, a 16" waterline lies approximately 800' east of Sandy Lane in Turnpike Road from which a 12" water main could be connected and run into the subdivision. This would be the preferred option.

These utilities would require permitting with the state Department of Environmental Protection.

Stormwater Management and Area Requirements

Stormwater drainage controls will be an important element of the plan. The sustainable quality of the Industrial Park will require a well-functioning and maintainable system. While the subdivision road will require a drainage system, the majority of the Industrial Park runoff will come from the development of the individual parcels. However, Low Impact Development criteria include ways to reduce the impacts of the development. The basic calculation is the volume of runoff that must be controlled, and the methods for reducing the total stormwater flows, distributing the stormwater management system to smaller elements, and if possible, recycling or directly using the captured stormwater for landscape maintenance.

Stormwater management area requirements were calculated based on a site specific approach. All stormwater runoff generated from each site will be conveyed to a stormwater detention basin by the use of vegetated swales and drainage pipes and catch basins. TR-55 was used to determine an estimate of stormwater runoff that needs to be captured. For these calculations the assumed conditions were an average 4 acre lot, with 1 acre developed, over a Hydrologic Soil Group B. Based on these conditions the composite curve number for each site is 66. The design storm analyzed was 125% of the 100 year storm, which accounts for snow melt in the spring months. This resulted in a rainfall of 6.5". The runoff depth, according to TR-55, for 6.5" of rainfall was 2.82".

Area x (Runoff (in inches) x 1 ft / 12 inches) = Total Runoff

(4 acres x 43,560 SF / 1 acre) x (2.82 inches x 1 ft / 12 inches) = 40,946 CF

If we assume a 3 foot depth and a single detention area on each site to store the 100 year storm event, the size of the storage area would be roughly 13,648 SF. This equates to 8% of each parcel. Of course each development and lot will have a different design but will be able to accommodate the stormwater mitigation required. Specific ways to reduce the amount of storage required include the use of porous paving in parking areas and reducing the amount of impervious surfaces on each parcel, and reuse for landscape irrigation.

ALTERNATIVE ENERGY PROJECT POTENTIAL

The Town was interested in determining the viability of a solar Photo Voltaic (PV) project on and around the landfill. Many towns across the Commonwealth have already installed PV arrays on land otherwise unsuitable for development. The intent would be to take advantage of the favorable regulations here in Massachusetts such as net metering (as created by the passage of the Green Communities Act in 2008) and a special "carve out for PV generation in the state's program for Solar Renewable Energy Credits. These regulations would permit an adequate return on investment in a large-scale array situated on this site and connected to the local grid through its own designated meter. The Town would then receive "credits" against its electricity consumption in other municipal buildings and loads.

A preliminary "desktop" review of the site without very much in the way of specifics suggested that a 1.3-1.5 MW (DC) system would be possible given the size of the property, its varying topography, its history and use, as well as its proximity to shading and other southerly obstructions. This estimate was determined using straightforward online estimating tools including Google Earth, NREL's "In My Back Yard" and PVWatts. This initial estimate assumed that the arrays would be fixed at latitude (42.5 degrees), oriented due south with a total system derate factor (the losses associated with converting DC to AC power) of 0.77. In larger, ground mounted projects it is oftentimes possible to achieve more favorable derate factors since the efficiencies of commercial scale invertors are typically better. It was expected that any proposal might include a system with lower array tilts in order to mitigate the impacts of wind shear, but that this loss of power from a lower tilt angle would be almost offset by the use of larger, more efficient invertors, uniform components and professional installation.

Alternative Energy Project Implications

A large-scale PV array at this site could make real, long-term sense for the Town. Such a project would lock in electricity prices for the next 20 years providing a real hedge against future and inevitable price increases for energy. No one knows for sure where the wholesale power market will be in 20 years time, but it is safe to assume that carbon emissions will factor more significantly in energy prices overall. A project like this would permit the Town to plan for and predict its budget for energy for two decades and then have the infrastructure in place to replace these solar panels with future ones for a much lower unit and overall cost.

In addition, given the availability of land, other alternative energy options could be explored, such as a wind turbine, as well as considering individual site planning options such as solar heated hot water supply.

DESIGN GUIDELINES

The Turnpike Road Energy Industrial Park is intended to create a campus with a positive image in which business operations may be conducted with minimal impact on the natural environment and adjacent land uses. The town wishes to create this sense of a unified campus through standards for common site design elements. Design guidelines are currently included in the Airport Industrial Park convents, of which most are applicable to the Energy Industrial Park [see Appendix]. However, to clarify and better define the newer environmental standards, a set of design standards and guidelines are recommended, such as follows.

Recommended Design Guidelines

- For lots abutting residential properties, the design must limit the visual, noise, and lighting impact of the new construction. The design will consider building orientation, building and site lighting, location of loading docks and operations areas, grading, berms, and landscaping as the means to reduce and mitigate impacts.
- Buildings should fit into the natural topography of the site and preserve major topography and islands of natural site vegetation, where appropriate.
- The site circulation design should reduce conflicts between vehicles and pedestrians, and landscaping should provide obvious routes to the principal building entries.
- Create safe and convenient pedestrian walkways between building entrances and parking areas. Walkways should be defined by pavement treatment, landscaping and lighting. Pathways should link to the open space areas adjacent to the subdivision.
- Trees should used preserved or planted to create a comfortable exterior environment for employees.
- Use of plants with strong forms and large masses is preferred. Plantings should be simple and restrained.
- Pedestrian paving should be simple. If sidewalks are added they should be a minimum of six feet wide.
- Landscape materials should emphasize simple, but substantial plantings of a limited number of species. Shrub beds should planted in "drifts" that will allow maintenance with large lawn mowers – no complex shapes.

- Native plants should be used in the landscape design. Plant materials shall be tolerant of specific site conditions, including but not limited to wind, drought and road salt.
- Landscaping at entries, seating/activity areas should provide shelter from prevailing winds and should emphasize passive solar design.
- Utilities, transformers, emergency generators, junction boxes, meters and trash enclosures should be located in inconspicuous locations and screened from public view with fencing and/or shrubs. Landscape screening material shall be at least half the height of the object to be screened at the time of installation. These elements should not be located in the front yard setback if possible.
- Lighting should be designed to foster security, but not to shine on adjacent properties. Lighting should not produce glare on neighboring properties, roads or to the sky.
- Where site lights follow a drive or walk they should be placed in straight rows on one or both side, but not in a staggered, alternating pattern. Lighting for drives, service areas and parking lots shall use a simple, inconspicuous design with a shielded light source.
- Exterior lighting of buildings should be limited to entrances and loading docks.

Standards for Parking Lots

- Parking lot design should incorporate methods of storm water management utilizing Low Impact Development techniques.
- Site circulation should be designed reduce conflicts between vehicles and pedestrians. Traffic calming techniques should be employed to insure pedestrian safety.
- Parking lot design should provide safe and convenient through-routes for pedestrians. Walkways should be attractive and well-defined by pavement treatment, landscaping and lighting.
- Parking lots should be subdivided into a series of smaller, connected lots with raised landscaping strips, pedestrian paths with special pavement treatment and shade trees. A minimum area equal to 10% of the gross interior parking area shall be landscaped.
- Berms and evergreen tree screening should buffer views of parking areas where space allows.
- Landscaping within the parking areas should consist of a combination of end-row islands and linear islands between rows of parking stalls. No parking row should be longer than twenty-five parking stalls without a curbed planting area. Linear islands shall be no less than six feet wide and a minimum seven foot wide, densely planted area should be provided at the end of each parking aisle.
- Trees shall be evenly distributed within the parking lot so that at tree maturity, forty percent of the parking stalls, backup and loading areas will be shaded at noon. Shrubs should form a continuous, unbroken mass between trees.
- Eighty percent of the available landscape island and perimeter zone shall be planted with trees shrubs, grasses and groundcovers.
- Trees shall be provided at no less than one, three inch caliper tree per thirty linear feet of perimeter length. Shrubs shall be provided at a ratio of one shrub per thirty-five square feet of the perimeter landscape area and shall be a maximum of three feet tall when viewed from the interior of the parking lot. Screening in the parking lot perimeter shall be continuous and shall be effective year-round.
- Plantings supplemented with walls and fencing consistent with security requirements are strongly encouraged.
- Landscape materials should emphasize simple, but substantial plantings of a limited number of species. Mature size of tree and shrub species should be large enough to match the scale of the installation.
- Parking lot bays, aisles and perimeter landscaping should be laid out with due consideration for snow plowing operations. Areas for snow storage should be sited at appropriate aisle-end locations. Plant species at these locations should be salt-tolerant and have a robust, horizontal branching structure that will not be damaged by snow load. Snow melt-water should be directed to drainage control devices such as bio-swales to prevent contamination of community water courses.
- Curbing design should allow passage of storm water into planted receiving areas and buffer strips (bio-swales) before discharge to a drainage system.

Standards for Bioswales

- Bio-swales manage the volume and speed of localized storm water runoff and enhance the land's natural ability to absorb, clean and store storm water.
- Minimize impervious surfaces in new construction to reduce amount of runoff and improve infiltration.
- Design drainage systems in a way that allows as much water as possible to infiltrate naturally into the ground.
- Any water that does not infiltrate should be stored in a safe and environmentally sound manner and released from the site at the same volume, velocity and water quality as under pre-development conditions.
- Bio-swales should be incorporated in drainage system near the source of the runoff whenever space permits. Landscape edges of parking lots and property lines are acceptable locations. Landscaped islands and perimeter plantings may be designed with bio-retention cells to manage storm water flows.
- Use native wetland plants in the bio-swales. Match plant materials in bio-swales to expected frequency, duration and level of inundation by stormwater.
- Bio-swales should follow the natural drainage pattern of the land as much as possible.
- Treatment system should be designed according to Best Management Practices operations and maintenance to ensure systems function properly.

SUBDIVISION COST FACTORS

The cost of the 4,382 foot long subdivision road, estimated at $225/LF, would be about $1 million. Earthmoving costs at $3 per cubic yard (CY) for substantial regarding and filling the depression/borrow pit would add $555,000. The 12" waterline extension down Turnpike Road would add about $872,000. Subdivision costs therefore are estimated at $1,627,000.

For the 19 lots, this would be equivalent to about $85,600 per lot. With an average of 4.67 acres per lot this is equivalent to a little over $18,000 per acre. With previous sales at $20,000 to $25,000 per acre in the town's industrial park, the cost factors appear comparable to the current market.

Closing the Burn Dump and capping with parking is estimated at about $1.5 million. The costs for the new DPW facilities are estimated in this report at $5.5 million. If added directly, these costs would burden the sales price of lots in the proposed subdivision.

CHAPTER 8 DEVELOPMENT STRATEGY

There are several approaches to developing the site and then attracting the proposed cluster of industries to expand in the Turnpike Road Energy Industrial Park. We suggest a phased approach that prepares and organizes the site for short-term development, while providing options for future development. To prepare for a consistent path in the process, the basic parameters of development and the development plan should be clarified as follows:

Tenets of Development for the Energy Industrial Park

1. Given the history of industrial growth in the County, this subdivision could provide more than a twenty-year supply of industrial land. Infrastructure costs should be phased in concert with the projected and actual growth and built in concert with the development of the lots, or, subsidies should be applied to advance more of the subdivision infrastructure to make multiple lots available for development.
2. Phased and temporary construction will be necessary to allow the subdivision to build out over the projected timeframe.
3. The ease of construction on the lots improves their value. Site preparation is important to the attractiveness of the property and in this case requires substantial regrading.

4. Flexibility in town approvals to accept different design options for projects is important because each industrial process requires a unique design approach.
5. The relocation of the Public Works facilities and functions will allow the proposed development. Otherwise the subdivision must be amended. This will reduce the private development potential. However, certain functions may be sited within the proposed lots.

PROJECT PHASING

Completing the subdivision and opening the Energy Industrial Park for new users requires a series of steps to advance the project. Below are the recommendations for the phases and actions. Some of the steps suggest concurrent actions, such as permitting. However, final agency or board decisions may not occur within the expected timeframe. Therefore, flexibility in the sequence of steps should be considered necessary.

Phase 1

Preparation:

- Finish site assessments for the Burn Dump and Fuel Station using EPA, State or County Brownfield Program funds, where available.
- Complete a ground-truth survey of the property within the bounds of the subdivision, which includes information necessary for the closure of the burn dump, and shows wetland resource boundaries.
- Determine the final location(s) and configuration(s) for the DPW facilities through a public process before the Selectmen.

Preliminary Design:

- Prepare a preliminary Burn Dump Closure Plan in consultation with the designer of the proposed subdivision. This will provide a more definitive project cost to consider in the pricing of the subdivision lots.
- Prepare a Preliminary Subdivision plan. The design will be based on the Preliminary Burn Dump Closure Plan and new survey, with grading, utilities and road layout, and should conform to the Montague Subdivision Regulations. Again, the cost estimate may be refined to determine price points for the subdivision lots.
- Complete an architectural and engineering feasibility study for the DPW facilities relocation as proposed. This will entail preliminary site and building design and may include foundation soil tests.

Permitting:

- Initiate subdivision review and platting with the Town Planning Board. Determine design issues to address in the Final Subdivision through the public meeting and hearing process.
- Initiate wetland resource permitting with the Montague Conservation Commission for the subdivision and DPW facilities modifications, if necessary.
- Complete the Burn Dump Closure plan and prepare filing for the MassDEP. The details of the Burn Dump Closure plan may be negotiated with the MassDEP to permit the reuse for parking and DPW functions. Additional testing for settlement may be needed to allow reuse.
- Obtain separate MassDEP permission to use closed Landfill area for the remaining DPW functions; dog pound, bulk waste transfer, and leaf composting.

Administrative Steps:

- Contact the State Natural Heritage and Endangered Species Program office regarding the status of amendments to the Priority Habitat Maps in this area.
- The U.S. Economic Development Agency has two financial assistance programs; Public Works Economic Development Facilities and Economic Adjustment Assistance that could be of assistance to the town. Submit grant request(s) for funding of the subdivision land preparation and road construction through the Franklin County COG.
- Contact MassDevelopment to determine availability of funds for preparation and preliminary design steps.

Phase 2

Design:

- Prepare a Final Subdivision plan based on the recommendations of the Planning Board and any additional information generated during the other permit reviews.
- Complete project conceptual designs for the DPW facilities relocation.

Permitting:

- Complete the Burn Dump Closure plan and prepare filing for the MassDEP.
- Obtain State DEP permission to use closed Landfill area for DPW functions.

Administrative Steps:

- Remain in contact with the State's NHESP office regarding amendments to the Priority Habitat Maps around this area.
- Amend and update the Airport Industrial Park covenants with design guidelines for application in the new Energy Industrial Park.

Phase 3

Design:

- Complete design of the Burn Dump Closure plan.
- Prepare construction drawings for the DPW facilities.
- Prepare construction drawings for the subdivision road.

Permitting:

- Finalize permit conditions for proceeding to construction.

Administrative Steps:

- Determine the process for marketing, sales and review of proposals.
- Prepare the covenants for property transfer.

Phase 4

Construction:

- Bid and construct the subdivision.
- Relocate the leaf composting, dog pound and bulk waste transfer to the DPW parcels.
- Build and then move the main facilities; Administrative offices and Garage, and other DPW facilities to the site adjacent to the new Public Safety building on Turnpike Road.
- Refurbish and use the existing DPW garage on A Street for cold storage of equipment

Administrative Steps:

- Initiate the process for marketing, sales and review of proposals.