

## Clay County Mining Alternatives

### E. Clay County Mining Alternatives for the Current Footprint and Contiguous Lands

Since the county is running out of material above the water table, the stewardship committee studied four alternatives for future operations of the county mine and the lands around it:

1. Continue to supply Class 5 out of the existing pit for county and township roads.
  - a. When surface supplies are depleted in 2001-02, mine below the water table and mix suitable overburden from the site to meet Class 5 specifications.
  - b. Purchase fines when the local supply of overburden is depleted.
  - c. Lease the mine to private industry after material accessible to a dragline is depleted and buy from the private market.
2. Continue to supply Class 5 from the county pit until the local supply of fines is depleted, then lease the mine to private industry.
  - a. When surface supplies are depleted in 2001-02, mine below the water table and mix suitable overburden from the site to meet Class 5 specifications.
  - b. Lease the mine to private industry after local fines are depleted and buy Class 5 from the private market.
3. Continue surface mining by expanding the footprint north or east.
4. Lease the existing pit to private industry immediately. Purchase Class 5 from the private market.

Each of these alternatives will have costs and timetables associated with it such as the supply of fines to mix with material mined below the water table. It is not certain that the overburden available onsite will be suitable for mixing Class 5. In that event, the county will need to import suitable fines. The first two alternatives assume the county will continue to mine the existing footprint for Class 5 until the local supply of fines is depleted from existing spoil piles. They differ in the duration of mining for local needs, and in strategies for the future.

#### **MINING ALTERNATIVE 1: Continue to Mine for County Use**

The county will begin mining below the water table in 2002 and the mined material will need to be crushed and mixed with fines available onsite from existing spoil piles (excavated overburden) to meet Class 5 specifications. Based on analysis of the overburden found in drill holes 5, 8, and 9 (Fig. 27), it should comprise 25% of the mix. The county mine in its present form is estimated to have 6.5 million cubic yards of aggregate after allowing for setbacks and slopes. A dragline will be used to mine material below the water table. Its effective reach is 30' deep yielding an estimated 3.3 million cubic yards. The supply of fines from overburden is approximately 400,000 cubic yards (c.y.). The county mines an average of 100,000 c.y. per year. Assuming the fines are suitable for Class 5 and the county can mix 3 parts gravel to 1 part fines, the local supply of fines will be depleted in 16\* years. In this time, 1.2 million c.y. of aggregate will have been excavated below the water table. The cost of this process is calculated based on **current dollar values**. This estimate was developed for comparison purposes only and should not be used for budgetary considerations.

\*400,000 c.y./25,000 yds per year = 16 years of material. Use will begin in 2002 and end ~2017.

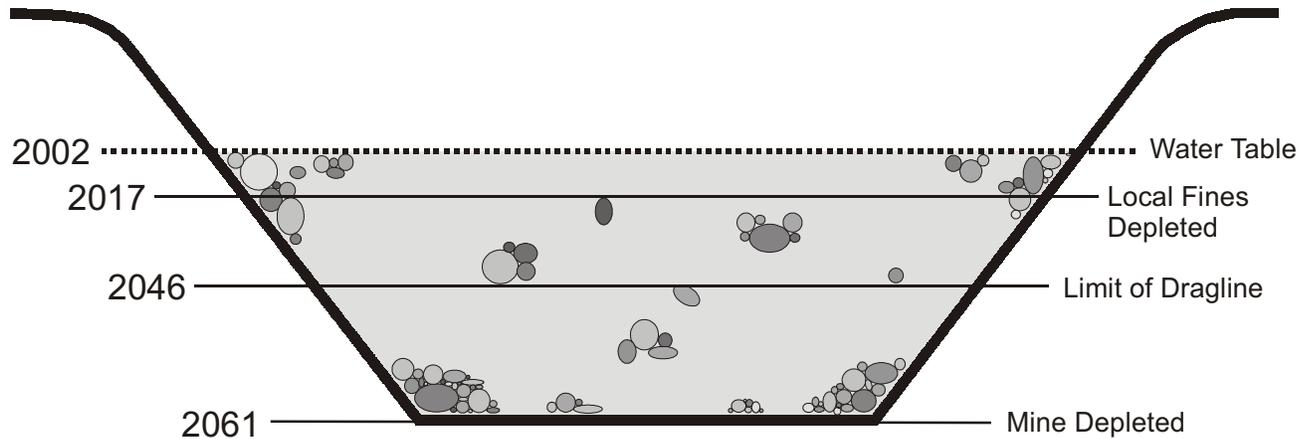


Figure 31: Diagram of mining sequence for Alternative 1

**a. Years 2002 through 2017:**

Mine aggregate below the water (75% of 100,000 cubic yards):

$$\$2.45/\text{yd} \times 75,000 \text{ yds} = \$183,750$$

Mine fine material (25% of 100,000 cubic yards):

$$\$1.45/\text{yd} \times 25,000 \text{ yds} = \$36,250$$

Crush and stockpile all materials:

$$\$2/\text{yd} = \$200,000$$

Blend all materials:

$$\$0.30/\text{yd} = \$30,000$$

Total cost:

$$\$450,000 \text{ per year or } \$4.50 \text{ per cubic yard}$$

Note that the costs will double what the county and townships currently pay because the county operator must mine below the water table (from 2.25/c.y. to \$4.50/c.y.). Table 7 calculates the estimated costs of this phase to the county and townships.

Township	Mat'l \$ /cu yd	miles	haul cost	Township total cost/yd	County
Georgetown	\$4.50	17	\$2.98	\$7.78	\$7.48
Viding	\$4.50	13	\$2.28	\$7.08	\$6.78
Felton	\$4.50	7	\$1.70	\$6.50	\$6.20
Hagen	\$4.50	7	\$1.70	\$6.50	\$6.20
Ulen	\$4.50	12	\$2.10	\$6.90	\$6.60
Kragnes	\$4.50	13	\$2.28	\$7.08	\$6.78
Morken	\$4.50	10	\$1.75	\$6.55	\$6.25
Flowing	\$4.50	5	\$1.70	\$6.50	\$6.20
Keene	\$4.50	8	\$1.40	\$6.20	\$5.90
Goose Prairie	\$4.50	13	\$2.28	\$7.08	\$6.78
Oakport	\$4.50	21	\$3.68	\$8.48	\$8.18
Moland	\$4.50	15	\$2.63	\$7.43	\$7.13
Spring Prairie	\$4.50	12	\$2.10	\$6.90	\$6.60
Average cost per yard				\$7.00	\$6.70
Annual cost (40,000 c.y.)				\$280,000	
County cost (60,000 c.y.)				\$402,000	
County royalty adjustment (\$12,000)				\$390,000	

Table 7: Compares costs for townships and county. Townships pay \$0.30 royalty per yard.

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**b. Mining Alternative 1: 2018 - 2045**

Once the local supply of fines is depleted, the county will need to import fines from other sources. The stewardship committee estimates that an additional 2.1 million c.y. will still be accessible to a dragline. At the current consumption level of 100,000 yards per year the county could mine out of the pit for 28 years with the addition of 700,000 c.y. of suitable fines from another location before the dragline limit would be reached. The calculations below estimate these costs based on current dollar values and assume the import of fines to the county mine site.

**Years 2018-2045:**

Extract material below the water (75% of 100,000 cubic yards):

$$\$2.45/\text{yd} \times 75,000 \text{ yds} = \$183,750$$

Import fines (25% of 100,000 cubic yards):

$$\$4.70/\text{yd} \times 25,000 \text{ yds} = \$117,500$$

Crush and stockpile all materials:

$$\$2/\text{yd} = \$200,000$$

Mix all materials:

$$\$0.30/\text{yd} = \$30,000$$

Production cost:

$$\$531,250 \text{ or } \$5.31 \text{ per cubic yard}$$

Table 8 calculates the estimated costs of this phase to the county and townships.

Township	Mat'l \$ /cu. yd.	miles	Township haul \$	County total cost/c.y.
Georgetown	\$5.31	17	\$2.98	\$8.29
Viding	\$5.31	13	\$2.28	\$7.59
Felton	\$5.31	7	\$1.70	\$7.01
Hagen	\$5.31	7	\$1.70	\$7.01
Ulen	\$5.31	12	\$2.10	\$7.41
Kragnes	\$5.31	13	\$2.28	\$7.59
Morken	\$5.31	10	\$1.75	\$7.06
Flowing	\$5.31	5	\$1.70	\$7.01
Keene	\$5.31	8	\$1.40	\$6.71
Goose Prairie	\$5.31	13	\$2.28	\$7.59
Oakport	\$5.31	21	\$3.68	\$8.99
Moland	\$5.31	15	\$2.63	\$7.94
Spring Prairie	\$5.31	12	\$2.10	\$7.41
Average cost per yard			\$7.81	\$7.51
Annual cost			\$312,000	\$451,000
County Royalty Adjustment (\$12,000)				\$439,000

**Table 8: Compares costs of importing fines for county and townships. Note that townships pay \$0.30 royalty per yard to the county. Transportation (haul) costs \$1.70 per yard up to 7 miles. Distances greater than 7 miles are calculated at \$0.175 per yard mile.**

**c. Mining Alternative 1: 2046-2061 (material from private pits)**

The remaining 3.2 million yards not accessible to the dragline could be leased to private industry. By setting up a sauerman, private industry could potentially mine 200,000 c.y. per year. If, for example, the county charged a royalty rate of \$1.25 per cubic yard, the county could realize annual royalty payments of \$250,000 in today's dollar value. If private industry mined 200,000 yards per year, the estimated aggregate volume would be depleted in ~16 years yielding the county approximately \$4 million.

**Years 2046 – 2061, lease the county mine to private industry:**

200,000 c.y./yr @ \$1.25/c.y. royalty to county

= \$250,000

Purchase 60,000 c.y. for county roads:

\$3.50/c.y. x 60,000 c.y. = \$210,000/yr

Total cost to county:

\$210,000 - \$250,000 royalty = surplus of \$40,000 /yr.

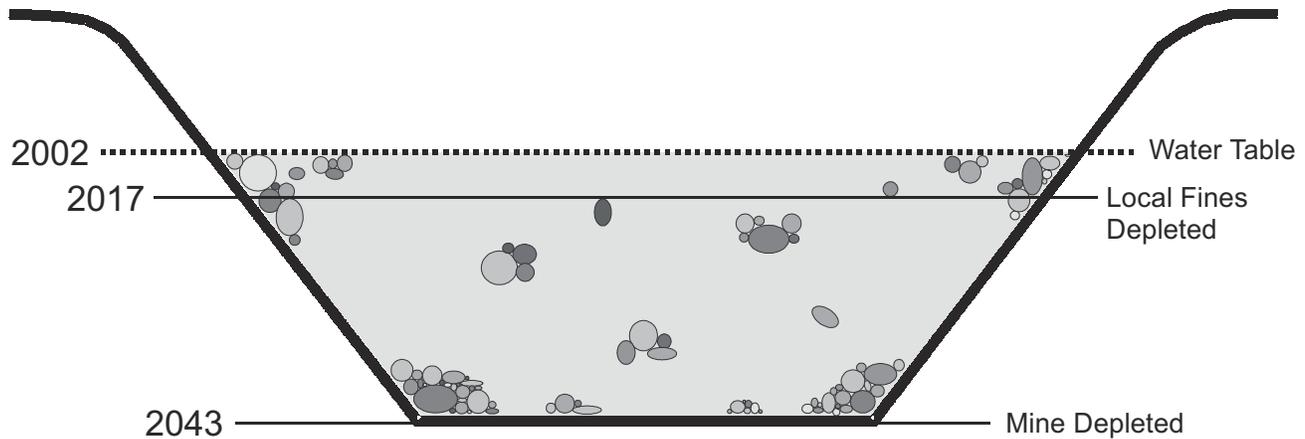
Table 9 calculates the estimated costs of this phase to the county and townships.

Township	Mat'l \$ /cu yd	miles	haul cost	Township & County total cost/yd
Georgetown	\$3.50	24	\$4.20	\$7.70
Viding	\$3.50	19	\$3.33	\$6.83
Felton	\$3.50	13	\$2.28	\$5.78
Hagen	\$3.50	8	\$1.40	\$4.90
Ulen	\$3.50	8	\$1.40	\$4.90
Kragnes	\$3.50	28	\$4.90	\$8.40
Morken	\$3.50	23	\$4.03	\$7.53
Flowing	\$3.50	14	\$2.45	\$5.95
Keene	\$3.50	6	\$2.10	\$5.60
Goose Prairie	\$3.50	6	\$2.10	\$5.60
Oakport	\$3.50	25	\$4.38	\$7.88
Moland	\$3.50	20	\$3.50	\$7.00
Spring Prairie	\$3.50	18	\$3.15	\$6.65
Average cost per yard				\$6.52
Annual cost to Townships				\$261,000
Annual cost to County				\$391,000
County Royalty adjustment (\$250,000)				\$141,000

**Table 9: Compares costs of leasing the county mine for county and townships**

If one compares the costs of each phase, importing fines is the most expensive, both in average cost and totals. It is unlikely that the townships will continue purchasing road gravel from the county once this happens, so the \$12,000 royalty fee will probably not be collected. From a general point of view, importing fines equates to hauling the material twice, thus increasing pollution, safety liability, and wear on the county roads. It is possible that fines may be available from the School Trust Fund if the estimated 270,000 c.y. of spoil (Walk, 1997) is not used for reclamation of the site. It is also not known if the material would be suitable for this use. If it were, the cost of importing material would be less than currently stated.

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**Figure 32: Diagram of mining sequence for Alternative 2.**

**MINING ALTERNATIVE 2: Lease to Private Industry 2018**

Supply Class 5 for county and township needs until the local supply of fines is depleted, then lease the pit to a private entity and purchase Class 5 road gravel from private sources. The cost for this will be the same as alternative one until the fines are depleted, then the county will lease the pit and buy Class 5 on the open market. The estimates below are based on today’s dollar value for comparison only. They cannot be used for budgetary considerations or valuation of the aggregate deposit.

**a. Years 2002 through 2017 (same as Alternative 1):**

- Extract material below the water (75% of 100,000 cubic yards):  
 $\$2.45/\text{yd} \times 75,000 \text{ yds} = \$183,750$
- Extract overburden (25% of 100,000 cubic yards):  
 $\$1.45/\text{yd} \times 25,000 \text{ yds} = \$36,250$
- Crush and stockpile all materials:  
 $\$2/\text{yd} = \$200,000$
- Mix all materials:  
 $\$0.30/\text{yd} = \$30,000$
- Total production cost:  
 $\$450,000 \text{ per year or } \$4.50 \text{ per cubic yard}$

Approximately 5.3 million yards would remain after the fines are depleted for private industry. At a mining rate of 200,000 yards per year, private industry could operate in the pit for ~26 years. Excluding compound interest the county would earn over \$6 million in royalties from a private lease of the mine. This money could be applied directly to gravel purchase or be invested in a gravel endowment to provide for future needs. Table 10 estimates the costs of this phase to the county and townships.

**b. Mining Alternative 2: 2018-2034 (material from private pits)**

Township	Mat'l \$		haul cost	Township	County
	/cu yd	miles		total cost/yd	
Georgetown	\$4.50	17	\$2.98	\$7.78	\$7.48
Viding	\$4.50	13	\$2.28	\$7.08	\$6.78
Felton	\$4.50	7	\$1.70	\$6.50	\$6.20
Hagen	\$4.50	7	\$1.70	\$6.50	\$6.20
Ulen	\$4.50	12	\$2.10	\$6.90	\$6.60
Kragnes	\$4.50	13	\$2.28	\$7.08	\$6.78
Morken	\$4.50	10	\$1.75	\$6.55	\$6.25
Flowing	\$4.50	5	\$1.70	\$6.50	\$6.20
Keene	\$4.50	8	\$1.40	\$6.20	\$5.90
Goose Prairie	\$4.50	13	\$2.28	\$7.08	\$6.78
Oakport	\$4.50	21	\$3.68	\$8.48	\$8.18
Moland	\$4.50	15	\$2.63	\$7.43	\$7.13
Spring Prairie	\$4.50	12	\$2.10	\$6.90	\$6.60
Average cost per yard				\$7.00	\$6.70
Annual cost (40,000 c.y.)				\$280,000	
County cost (60,000 c.y.)					\$402,000
County royalty adjustment (\$12,000)					\$390,000

**Table 10: Costs of mining below the water table**

**b. Years 2018-2034:**

Lease the county pit to private industry:

200,000 cubic yards/year @ \$1.25/yd royalty to county = \$250,000

Purchase ~60,000 yds for county roads from private market (see Table 11 for average cost):

\$6.52/yd x 60,000 yds = \$391,200 /yr

Royalty applied to road material costs:

\$391,200 – \$250,000 royalties = \$141,000 per year

The townships would continue to purchase Class 5 on the open market at the same cost.

Township	Mat'l \$/cu yd	miles	haul cost	total cost/yd
Georgetown	\$3.50	24	\$4.20	\$7.70
Viding	\$3.50	19	\$3.33	\$6.83
Felton	\$3.50	13	\$2.28	\$5.78
Hagen	\$3.50	8	\$1.40	\$4.90
Ulen	\$3.50	8	\$1.40	\$4.90
Kragnes	\$3.50	28	\$4.90	\$8.40
Morken	\$3.50	23	\$4.03	\$7.53
Flowing	\$3.50	14	\$2.45	\$5.95
Keene	\$3.50	6	\$2.10	\$5.60
Goose Prairie	\$3.50	6	\$2.10	\$5.60
Oakport	\$3.50	25	\$4.38	\$7.88
Moland	\$3.50	20	\$3.50	\$7.00
Spring Prairie	\$3.50	18	\$3.15	\$6.65
Average cost per yard				\$6.52
Annual Cost to county (60,000 yds/year)				\$391,000
Annual Cost to 13 townships (40,000 yds/year)				\$261,000
County royalty adjustment (\$250,000)				\$141,000

**Table 11: Costs of purchasing gravel from the private market and leasing the county mine.**

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### Comments:

This alternative is sound if an alternate source of Class 5 is available within a reasonable travel distance. Material that is suitable for concrete and in short supply regionally will be used for that purpose thus reducing longer haul distances from Becker County and Jamestown, ND to the Clay-Cass County markets.

### **Mining Alternative 3: Continue surface mining: expand the county mine north or east**

Since costs increase considerably when mining below the water table the county could expand the footprint north or east where additional aggregate resources lie above the water table. The county tried this in July of 2000 when officials applied for an endangered species takings permit from DNR to expand the pit north and west to the existing road. A permit was granted to expand the pit up to 9 acres, but only to the extent necessary to provide for the gravel needs of the county and the townships. The permit extends through the end of 2001. Under the terms of this permit, the county mitigated the loss of habitat and mortality for impacted species like the Dakota skipper by extending the lease on portions of Bicentennial Prairie SNA. Prior to issuing any future endangered species permits, the DNR and county agreed that the Felton Prairie Stewardship Plan must be completed and the county and state must have negotiated a long-term mining plan for area. This case illustrates the compromises and potential limitations to expansion of the existing footprint, especially to the north. Because of the species dependent on the prairie north of the current footprint, it is unlikely that the county will be able to negotiate a mitigation plan for the permit as advantageous as the last one issued. In addition to applying for a takings permit if the county expanded the mine north, the county would also need to prepare a fen management plan. The management plan is required under Minnesota law in order to determine whether proposed mining could be done without impacting the fens. According to the fen study conducted by DNR, this would require staying 10' above the water table. The quantity of gravel available above this level (Figure 29) may not justify the expansion costs and regulatory processes.

### **MINING ALTERNATIVE 4: Lease County Pit Immediately and Purchase from Private Market**

Lease the county pit to a private entity as soon as possible and purchase Class 5 road gravel from the private market. The estimates below are based on today's dollar value for comparison only. They cannot be used for budgetary considerations or valuation of the aggregate deposit.

#### **Years 2002 - 2034:**

Lease the county pit to private industry:

200,000 cubic yards/year @ \$1.25/yd. royalty to county = \$250,000

Purchase ~60,000 cubic yards for county roads

\$6.52/yd x 60,000 yds = \$391,200 /yr

Royalty applied to road material costs:

\$391,200 – \$250,000 royalties = \$141,000 per year

The townships would continue to purchase Class 5 on the open market at the same cost as above. See Table 11 for a cost estimate for private purchase of Class 5 road gravel.

**F. Assessment of Mining Alternatives:**

Below is a summary of the costs to the county drawn from the previous alternatives for each mining activity.

	Mine above Water	Mine below water & mix local fines	Mine below water & import fines	lease mine, private purchase
Avg. cost/c.y.	\$4.15	\$6.70	\$7.51	\$6.52
Annual Cost	\$249,000	\$402,000	\$451,000	\$391,000
Potential				
Royalty	\$12,000	\$12,000	\$12,000	\$250,000
Net Cost*	\$237,000	\$390,000	\$439,000	\$141,000

\*If royalty is applied to aggregate costs

Of the alternatives analyzed, surface mining is the least expensive, however it causes the most damage to habitat and rare species. The legal and administrative costs of applying for the necessary permits and mitigation have not been calculated and would be difficult to estimate, although they will be a legitimate expense for this alternative. Of the others, purchasing gravel from the private market is slightly less expensive (-\$10,800) than mining below the water and mixing local fines. Mining below the water table and importing fines would cost more than purchasing road gravel from private sources based on current market conditions. Leasing the county pit and applying the royalties to county gravel purchases would be the least expensive alternative. If the royalties from leasing the pit were invested into a gravel endowment fund, the return would vary based on the length of time the pit is leased out and the volume of aggregate mined from it. It is difficult to accurately estimate the cash flow from these royalties since the volume of material extracted is based on contemporary economic demand for the aggregate. The calculations below cover a range of potential revenues from a gravel endowment fund based on the mining alternatives (duration of royalty collection), the level of annual contributions (\$100,000 or \$200,000) and rates of return (4% or 6%).

- Lease the mine immediately (Mining Alternative 4):
  - 32 yrs @ \$200,000/yr. = \$6.5 million total
  - If the county invested \$200,000 annually for 32 years:
    - \$13,662,240 @ 4% compounded
    - \$20,651,590 @ 6% compounded
  - Invest \$100,000 annually:
    - \$6,831,120 @ 4%
    - \$10,325,795 @ 6%
- Lease after local fines are depleted (Mining Alternative 2):
  - 26.5 yrs @ \$200,000/yr. = \$5.3 million total
  - If the county invested \$200,000 annually for 26.5 years:
    - \$9,982,318 @ 4%
    - \$13,924,219 @ 6%
  - Investing \$100,000 annually:
    - \$4,991,159 @ 4%
    - \$6,962,110 @ 6%
- Lease the mine after material accessible to a dragline is depleted (Mining Alternative 1):
  - 16 yrs @ \$200,000/yr. = \$3.2 million total. \$200,000 invested annually for 16 years:
    - \$4,851,031 @ 4%
    - \$5,872,399 @ 6%
  - Investing \$100,000:
    - \$2,425,515 @ 4%
    - \$2,936,200 @ 6%

## Recommendations

### G. MINING RECOMMENDATIONS

Costs of mining out of the current footprint will continue to rise because surface supplies in the present mine have been exhausted. Mining below the water table will inevitably lead to higher production costs as seen in the calculations for Alternative 1. Since little information is available on the future availability of Class 5 road gravel, predicting the future purchase price from the private sector is difficult. However, the county has an opportunity to establish a fund that will provide for future gravel needs by:

- investing royalties earned from leasing the current mine; or
- investing proceeds from the sale of county land outside the current mine footprint.

Based on information available to the committee, it recommends the following management strategies for meeting county gravel needs and managing county lands.

#### 1. Current County Mine Management

The committee recommends two alternate courses of action concerning management of the current gravel pit for consideration by the Clay County Board of Commissioners.

a) The county should continue to mine Class 5 road gravel from the county pit until the production costs exceed the purchase price from a private supplier. When the production cost for county gravel exceeds the purchase price from the private sector, the mine should be leased to private industry. The royalties collected could be used to:

- offset the purchase price of road gravel, or
- be invested in a gravel endowment fund that would cover future purchases, or
- acquire an alternate mine site.

b) The county should lease the existing footprint immediately and purchase Class 5 road gravel from the private market. Royalties collected from leasing may be used in the same manner described above.

#### 2. Management of County Lands beyond the Current Footprint

The county owns and manages approximately 560 acres of land beyond the mine footprint. Some of this land holds aggregate resources according to the Aggregate Resource Evaluation (MN DNR, 2000). Most of the land supports important biological resources. The committee recommends two courses of action for the Clay County Board of Commissioner's consideration:

a) Follow the management recommendations for individual parcels described in the stewardship section of this report.

b) Appraise the value of county land beyond the mine footprint and explore its sale to a conservation entity. The proceeds of such a sale could be invested in a gravel endowment to provide for the county's future needs.

The committee hired a licensed appraiser with experience in aggregate resource assessment to offer a letter of opinion on the value of various Clay County parcels delineated in the Aggregate Resource Evaluation. A letter of opinion does not convey the same level of accuracy or confidence as an appraisal. See Figure 27 for the location of the units listed below:

Unit 1B:	\$1,980,855
Unit 1C:	\$2,773,950
NW 40 acres of Bicentennial:	\$2,549,571
Total:	\$2,771,571

These figures are based on an annual extraction rate of 200,000 c.y. and 9% annual depreciation. The total value appears low because it reflects the greater length of time required to mine the entire area thus increasing the depreciation amount.

An alternate method of valuing aggregate resource land is used by the industry for negotiating with landowners. Under this method the current market value of the estimated aggregate volume is calculated and the land valued at 25% of that product. The results of this calculation are given below based on volumes estimated in the Aggregate Resource Evaluation (summarized in Table 3 of this document) and a market value of \$1.25 per cubic yard:

Area 1B:	2,900,000(1.25)	=3,625,000(.25)	=\$906,250
Area 1C:	15,300,000(1.25)	=19,125,000(.25)	=\$4,781,250
Bicentennial:	5,800,000(1.25)	=7,250,000(.25)	=\$1,812,500
Total:			=\$7,500,000

Since the aggregate industry is aware of the environment sensitivity of the county's land and its potential for regulatory oversight, it is unlikely that this sum could be negotiated; however it may be referenced in negotiations with potential conservation parties concerning the value of the resource.

If the proceeds from land sales were deposited in a gravel endowment fund, the revenues generated over 32 years are estimated below:

- \$3 million purchase price would yield
  - \$10.8 million @ 4%
  - \$20.4 million @6%
- \$5 million purchase price would yield
  - \$17.9 million @ 4%
  - \$33.9 million @ 6%
- \$7.5 million purchase price would yield
  - \$26.9 million @ 4%
  - \$50.9 million @ 6%

Given the current regulatory environment and the general concern about future gravel supplies, the county should consider a range of alternatives for the use of lands beyond the current mine footprint. The income generated from sale of these lands could be used to acquire other aggregate resources in the county or purchase gravel from the private market.