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PROTECTING AGGREGATE RESOURCES IN THE TWIN CITIES METROPOLITAN AREA

REPORT OF THE AGGREGATE RESOURCES ADVISORY COMMITTEE TO THE MINNESOTA LEGISLATURE

For the Purpose of a Public Meeting:
Oct. 15, 1985; 7 p.m.

Metropolitan Council of the Twin Cities Area
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SUMMARY

BACKGROUND, CHARGE AND MEMBERSHIP OF THE COMMITTEE

Aggregate--sand, gravel and crushed rock--is an essential material used in most types of construction, but it is not found everywhere in the Twin Cities Metropolitan Area. Because aggregate is limited to certain locations, its availability can be affected by surface land use, particularly in an urbanizing area. In recent years, the aggregate industry and interested public agencies have indicated a concern as to the future availability of aggregates in the Metropolitan Area due to expanding urbanization.

In 1984 the legislature passed S.F. 881 establishing an Advisory Committee on Aggregate Resources for the seven-county Metropolitan Area. The 15-member committee consists of representatives of the aggregate industry, local governments, citizens, the Metropolitan Council and the commissioners of the Departments of Natural Resources and Transportation. The legislature gave the committee three charges:

1. Identify whether currently available information on aggregate resources is adequate to determine whether local comprehensive plans and land use controls should protect aggregate resources.

2. Recommend a procedure for identifying the degree of protection desirable for the long-term availability of aggregate resources.

3. Recommend a method to protect aggregate resources for the long term.

MAJOR COMMITTEE CONCLUSIONS

CHARGE NO. 1: SUFFICIENCY OF CURRENT INFORMATION

1. Existing information on the location and volume of potential aggregate resources is sufficient to determine whether aggregates in the Metropolitan Area should be protected. The data indicates there is a supply of 4.6 billion tons of potential sand and gravel and crushed rock resources with a demand for 15 million tons per year. Other undelineated potential resources are located in Sherburne and Wright counties adjoining the region.

2. Existing site-specific data is generally inadequate for identifying and protecting specific aggregate deposits, but more detailed surveys are not necessary at the present time, given the large potential resources. These surveys are costly and should be undertaken by the aggregate industry in selecting commercially viable deposits for mining.

CHARGE NO. 2: NEED TO PROTECT AGGREGATE RESOURCES

3. There is no need for legislation mandating regulations for broad-scale protection of aggregate resources or requiring local communities to plan for mining at the present time. There is potentially a 200-year supply of unencumbered aggregate resources in the region, based on known consumption and supply estimates.

4. The aggregate mining industry has been successful historically in identifying and developing commercially viable resources adequate to meet the region's needs and has the capacity to do so in the foreseeable future. The industry has been able to obtain sufficient permit approvals in recent years for new or expanded mines to maintain a 10-year supply of reserves.

5. The diversity and lack of specific standards in many local mining and reclamation controls is a problem for the industry and the communities. There is little certainty or consistency for the industry on how mining permits will be evaluated and regulated and how this will affect the feasibility of an operation. At the same time, many local governments lack adequate standards for minimizing the impact of mining activity. Uniform, state-mandated standards administered by local governments would provide more certainty and consistency for the industry and strengthen the ability of local governments to control mining and reclamation.

RECOMMENDATIONS

1. The legislature should establish a committee of technical experts to recommend standards for mining and reclamation to be administered by local governments in evaluating operations and reviewing and setting conditions for permits. The committee should recommend maximum standards for both rural and urban environments for such concerns as noise, dust, hours of operation, haul routes, vibrations and safety. If the legislature were to adopt these standards, they would be mandated. Communities could choose to adopt less restrictive standards or exclude standards altogether, but they could not adopt additional or more restrictive standards.

2. The Metropolitan Council should provide various types of technical information to local governments to assist them in planning for mining, including information as to the location and importance of aggregates, the potential impacts of mining and measures to minimize these; and alternative approaches to planning for aggregate resources; and examples of ordinances and standards to manage mining.

3. The current state-wide inventory of potential aggregate resources should place a high priority on the identification of resources in Sherburne and Wright Counties.

ABOUT THIS REPORT

This report examines the need to protect aggregate resources in the Twin Cities Metropolitan Area and makes recommendations to improve local permitting and planning for mining operations.

Aggregate--sand and gravel and crushed rock--is an important resource for the continued development of the Twin Cities Metropolitan Area. Aggregate is an essential material used in most types of construction concrete and asphalt, as well as in fill or surfacing material. Aggregate is a major component in the construction of public roads, streets and highways. The specific use of aggregate is determined by its quality--its physical and chemical characteristics.

Aggregates do not occur everywhere. Their location and availability are determined by the geologic forces that produced the material. For example, sand and gravel occur where glacial forces produce it or flowing water deposits it. Because the resource is limited to certain locations, its availability is affected by surface land use. In urbanizing areas, access to the resource can be significantly reduced by residential, commercial and other intensive land uses.

In recent years, the aggregate industry and interested public agencies have indicated increasing concern as to the effect of continued development in the Twin Cities Metropolitan Area on the availability of aggregate resources.

LEGISLATIVE CHARGE

In 1984, the legislature passed S.F. 881, establishing an Advisory Committee on Aggregate Resources for the seven-county Metropolitan Area, for the purpose of determining the need to protect these resources as part of local comprehensive planning and land use controls (Appendix A). The committee was given three charges:

1. Identify whether currently available information on the quality, quantity and distribution of the aggregate resource is adequate to allow reasoned decisions on the need to introduce aggregate resource protection into local comprehensive planning and land use controls.

2. Recommend a procedure for identifying the degree of protection desirable for the long-term availability of aggregate resources.

3. Recommend a method to protect aggregate resources for the long term.

This report summarizes the work, conclusions and recommendations developed by the committee between November 1984 and August 1985.

ADVISORY COMMITTEE SELECTION

The legislature established a 15-member advisory committee appointed by the Metropolitan Council consisting of the designee of the chair of the Council, three members of metropolitan county government, three members from the aggregate resource industry, two members from municipalities that use aggregate resources, two members from municipalities that produce aggregate resources, and the commissioners of the Department of Natural Resources (DNR) and the Department of Transportation (Mn/DOT) or their representatives.

The Council appointed the 15-person advisory committee, including two citizen members, on Oct. 25, 1984, after consulting with appropriate metropolitan interest groups, including the Metropolitan Inter-County Association, Aggregate Ready-Mix of Minnesota, Association of Metropolitan Municipalities and the Minnesota Asphalt Pavement Association.

ADVISORY COMMITTEE MEMBERSHIP

Chair	Dottie Rietow, Metropolitan Council member
Municipal Aggregate User	Bill Barnhardt, Intergovernmental Relations Representative, City of Minneapolis
Municipal Aggregate User	Jan Haugen, City Council, City of Shorewood
Municipal Aggregate Producer	John Gretz, Community Development Director, City of Apple Valley
Municipal Aggregate Producer	Rick Lewis, Assistant Administrator, City of Cottage Grove
Industry	Harvey Becken, Secretary-Treasurer, Cemstone Products Co.
Industry	Gary Sauer, President, Barton Sand and Gravel
Industry	Peter Dunning, Vice-President and General Manager, J. L. Shiely Co.
Dakota County	Steve Loeding, County Commissioner
Scott County	William Koniarski, County Commissioner
Washington County	Sally Evert, County Commissioner
Minnesota Department of Transportation (Mn/DOT)	Richard H. Sullivan, Assistant Division Director, Technical Services Division

Department of Natural Resources (DNR)	Kathleen Wallace, DNR Metro Regional Administrator
Citizen	Charles Brady, Bloomington
Citizen	Raymond Heinonen, Brooklyn Park

COMMITTEE STUDY PROCESS

The Aggregate Resources Advisory Committee began meeting in November 1984 and met bimonthly through August 1985. The committee invited testimony from representatives of local governments, state agencies and aggregate industry concerning the problems of protecting and mining aggregates in the Metropolitan Area, the impacts on local communities and suggestions for solving the problems.

The committee heard testimony from Warren Pladsen and Rudy Ford, Office of Materials Engineering (Mn/DOT); Mark Jirsa, Minnesota Geological Survey (MGS); Tom Campbell, City of Maple Grove; Virginia Harris, Carver County; Rick Kelly, City of Apple Valley, Gordon Hughes, City of Edina; Dwight Picha, Woodbury; Anne Hurlburt, City of Cottage Grove; Richard Schiefer, George Hoff, municipal attorneys; Dean Johnson, City of Rosemount; Terry Swor, Twin City Testing; Glenn Bolles, Shakopee Sand and Gravel; Joseph Beaton, attorney; and Rudy Hoagberg, consulting geologist.

The committee also received a report from Morris Eng, Department of Natural Resources, as to the progress of the statewide program to identify and classify aggregate resources outside of the Twin Cities Metropolitan Area (see S.F. 881, Appendix A).

The committee toured the J. L. Shiely Co. quarry and gravel mining operations in Grey Cloud Twp. and Cottage Grove, and viewed two smaller gravel operations in Cottage Grove on May 9, 1985.

Metropolitan Council staff provided a number of background papers to the committee for review and discussion covering related subjects including a summary of previous reports on the region's aggregate resources and current information on aggregate resources in the Metropolitan Area, the supply and demand for aggregates; the economic impacts of aggregate costs, the effect of governmental programs on the supply of aggregates, the impact of protection on local and regional development, the legal framework for resource protection and the alternative methods of resource protection.

A subcommittee looked more specifically at the need for site-specific data to delineate potential deposits and the estimated costs of accomplishing the work including necessary field and laboratory work (Appendix B).

A public meeting was held Oct. 15, 1985, to receive public comments and suggestions regarding the draft report. Following these meetings the advisory committee met to review and discuss a summary of the public comments and proposed changes to the report. The advisory committee approved a final report and recommendations for presentation to the legislature _____, 1985.

ORGANIZATION OF THE REPORT

The report is presented in several sections. Each summarizes the work of the committee in addressing the legislative charges and the findings from that work and the final conclusions and recommendations.

The first section summarizes the work and findings of the committee as to the sufficiency of existing data about aggregate resources. The discussion summarizes the existing information reviewed by the committee, the need for additional data and the methods and estimated costs of obtaining it.

The second section summarizes the work of the committee and the findings related to the second charge--the need to protect aggregate resources and the level of protection. The section summarizes about the supply and demand for aggregates in the region and subregions and the factors that affect the available supply. Problems which affect local government permit approvals for aggregate mining are presented.

The third section summarizes the findings relative to the third charge--determining the method of protection. It discusses the legal issues that must be considered if local governments are required to protect aggregate resources, as well as the alternative methods of protection and their limitations are discussed.

The fourth section presents the conclusions of the committee based on the findings in the preceding sections. The final section presents the recommendations of the committee.

LEGISLATIVE CHARGE NUMBER 1: SUFFICIENCY OF CURRENT INFORMATION

This section reviews currently available information on the quality, quantity and distribution of aggregate resources to determine whether there is sufficient information to decide whether local governments should be required to protect aggregate resources. Four studies of aggregate resources in the seven-county region are available. Representatives of local governments and the aggregate industry were consulted to define the type of information needed to protect the resource and to ascertain the availability of the data.

FINDINGS

1. Current information indicates there are approximately 3 billion tons of potential sand and gravel resources and 1.6 billion tons of potential crushed rock resources in the seven-county region. Additionally, there are potential aggregate resources in adjoining counties which have not been delineated or quantified but some of which are being mined for export to the Metropolitan Area.

2. Estimates of the permitted reserves owned or leased by the industry indicate there may be a 10-year supply available to the region. These estimates do not reflect unpermitted reserves on other industry-owned lands or the potential aggregate resources not owned by the industry.

3. There is a general data base for the potential aggregate resources in the region and each of the seven counties. The approximate location of potential sand and gravel and crushed rock deposits, and their general physical characteristics (thickness of overburden, thickness of deposit and percent of gravel) are identified.

4. Site-specific data is lacking for many of the potential resource areas. Data about the quality of the potential aggregate resources such as the percent of foreign material (shale) and the volume of the material, is generally not available for specific sites. This information is necessary to determine the commercial viability of a specific deposit.

5. The basic data that would be necessary for local governments to delineate suitable deposits to plan for protection includes the depth of overburden, thickness of the deposit, gradation of particles (percent of coarse gravel) and percent of deleterious material such as shale.

6. Additional field surveys involving sampling and laboratory testing would be necessary to provide the basic data. One estimate of the costs of obtaining the minimum data necessary to eliminate areas ranges from $30,000 to $40,000 per square mile.

7. Currently available data is not sufficient to plan for the protection of specific sites, but the available data as to the location and general physical suitability of the resource is adequate for local governments to undertake more general planning for the future of the resource.

GEOLOGY AND SOURCES OF AGGREGATES IN THE REGION

Aggregates in the region are either of glacial origin (sand and gravel or natural aggregates) or are produced by crushing limestone or dolomite rock. Sand and gravel deposits are found in ice contact deposits (kames and eskers) or fluvial deposits (the terraces along the rivers).

The limestone and dolomite used for crushed rock underly much of the seven-county Metropolitan Area at varying depths. The Prairie du Chien, a dolomite, provides much of the crushed stone whereas the Platteville, a limestone, is hardly used now. Much of these two rock formations are overlaid by glacial drift and other rock formations ranging from a few to several hundred feet in thickness.

CURRENTLY AVAILABLE AGGREGATE INFORMATION

Four recent studies examined the availability of aggregate resources in the seven-county Metropolitan Area. These were prepared for the DNR, Mn/DOT, the J. L. Shiely Co.--a local aggregate producer--and the Metropolitan Council between 1979 and 1983.[1]

The DNR report, Industrial Minerals in Minnesota--A Report on Sand, Gravel and Crushed Rock, contains a general statewide assessment of the availability of aggregate resources. The report examines the economic aspects of the aggregate industry, related environmental and land use conflicts and governmental programs and rules that affect the mining of aggregates.

The DNR report identifies and maps the general location and distribution of potential aggregate resources in the region, primarily sand and gravel, based on their geologic origin and general knowledge of aggregate mining operations in the area. The report provides no estimates of the total quantity of potential aggregates in the region. The quality of aggregate resources is discussed for some deposits, but only in general terms based on geologic origin.

The report raises the concern that potential aggregate resources are being lost to urban development. According to the study, 86 percent of the land with potential sand and gravel resources within 10 miles of downtown Minneapolis and St. Paul have been encumbered by urban development, and 33 and 28 percent at distances of 10 to 15 and 15 to 20 miles

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[1] See bibliography for complete reference.

respectively.[2] The report is useful in portraying problems with aggregate mining, but it is of limited value in protecting the resource because of the broad brush description of the location and quality of the resource.

The second study, Minnesota Aggregate Resource Study Volume II: Report, was prepared for the Local Road Research Board and Mn/DOT. It provides an estimate of the volume of permitted reserves and the rate and causes of depletion of the aggregate supplies in four pilot areas in the state. Permitted reserves include areas owned or leased by the industry for which local government permits have been obtained.

Hennepin County is one of the four pilot areas. The volume of permitted reserves in the county and the eight surrounding counties which currently supply Hennepin are estimated and compared to the potential demand. The eight counties include the other six metropolitan counties and portions of Sherburne and Wright to the northwest of Hennepin.

According to the report, the remaining permitted reserves in the Hennepin County supply area amount to 126 million tons of sand and gravel and 94 million tons of crushed rock. In addition to this Mn DOT holds probable and proven reserves of an estimated 1.2 million tons of natural aggregates. Based on the estimated depletion rate, the report concludes that the permitted reserves supplying Hennepin County construction would last another 10 to 12 years.[3] As in the DNR report, the Mn/DOT report points to a concern for the continued loss of aggregate resources to urban development, particularly in close-in areas.

The report indicates the general distribution and extent of potential sand and gravel resources in the nine counties based on the geology of the area. However, no information as to the potential quantity or quality of these resources is provided. Potential crushed rock aggregates are not mapped.

The third study of aggregate resources, Inventory of Regionally Significant Aggregate Resources, Twin Cities Metropolitan Area, was prepared for the J.L. Shiely Co., one of the major producers in the region, by an author of the Mn/DOT report. The study identifies the general location of "regionally significant" aggregate deposits in the "supply area". The "supply area" includes the seven-county region and portions of 11 surrounding counties.

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[2] M. Eng and M. Costello. Industrial Minerals in Minnesota: A Status Report on Sand, Gravel and Crushed Rock. Minnesota Department of Natural Resources. 1979.

[3] R. K. Hoagberg and V. Rajaram. Minnesota Aggregate Resource Study Volume II Report: Local Road Research Board Minnesota Department of Transportation. 1981, p. 28.

An aggregate resources map defines 18 regionally significant aggregate districts. Knowledge of the existing mining operations and the geologic origin of the land features is used to delineate the districts. No site specific data are presented on the location, volume or quality of the aggregate. Each of the 18 districts includes areas containing commercially valuable deposits, as well as areas which may not.

The study identifies other potential sand and gravel resource areas in the 18-county supply area based on more general geological information. No estimates of the potential volumes in these areas are given. The report concludes that up to a 10-year supply of permitted aggregate reserves may be available.[4]

The fourth study was prepared by the Metropolitan Council with the assistance of the MGS. The report, Aggregate Resources in the Twin Cities Metropolitan Area, contains a summary of a detailed inventory of the potential resources, compares the potential aggregate supply with the estimated demand and evaluates the impact of transportation costs on the price of aggregate and the cost of construction. The report also reviews the effect of government land use programs (federal, state, region and local) on the availability of aggregates.

Potential sand and gravel and crushed rock resources in the seven-county region were inventoried and mapped using geologic data, county soil maps and topographic maps. Figures 1 and 2 represent the general distribution of potential aggregate resource in the region.

The report estimates there are 3.0 billion tons of potential sand and gravel and 1.6 billion tons of potential crushed rock resources in the seven-county region (Table 1). Estimates of the potential resources in each county are also provided, but no estimate of permitted reserves is indicated. Little data is reported on the quality of deposits identified.

ESTIMATES OF AGGREGATE RESOURCES IN THE REGION

Approximately 3 billion tons of potential sand and gravel and 1.6 billion tons of crushed rock resources are located in the Metropolitan Area (Table 1). Additional potential resources in the surrounding counties have only been partially and generally delineated and have not been quantified. Some of these resources are presently being mined for markets in the region.

The existing information provides a general data base about the potential aggregate resources in each of the seven counties. Potential unencumbered deposits of both sand and gravel and crushed rock are mapped, regional and county volumes are estimated, and the geologic origin and

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[4] R. Hoagberg, Inventory on Regionally Significant Aggregate Resources Twin Cities Metropolitan Area Mnnesota Minneapolis. 1982. p. 18.

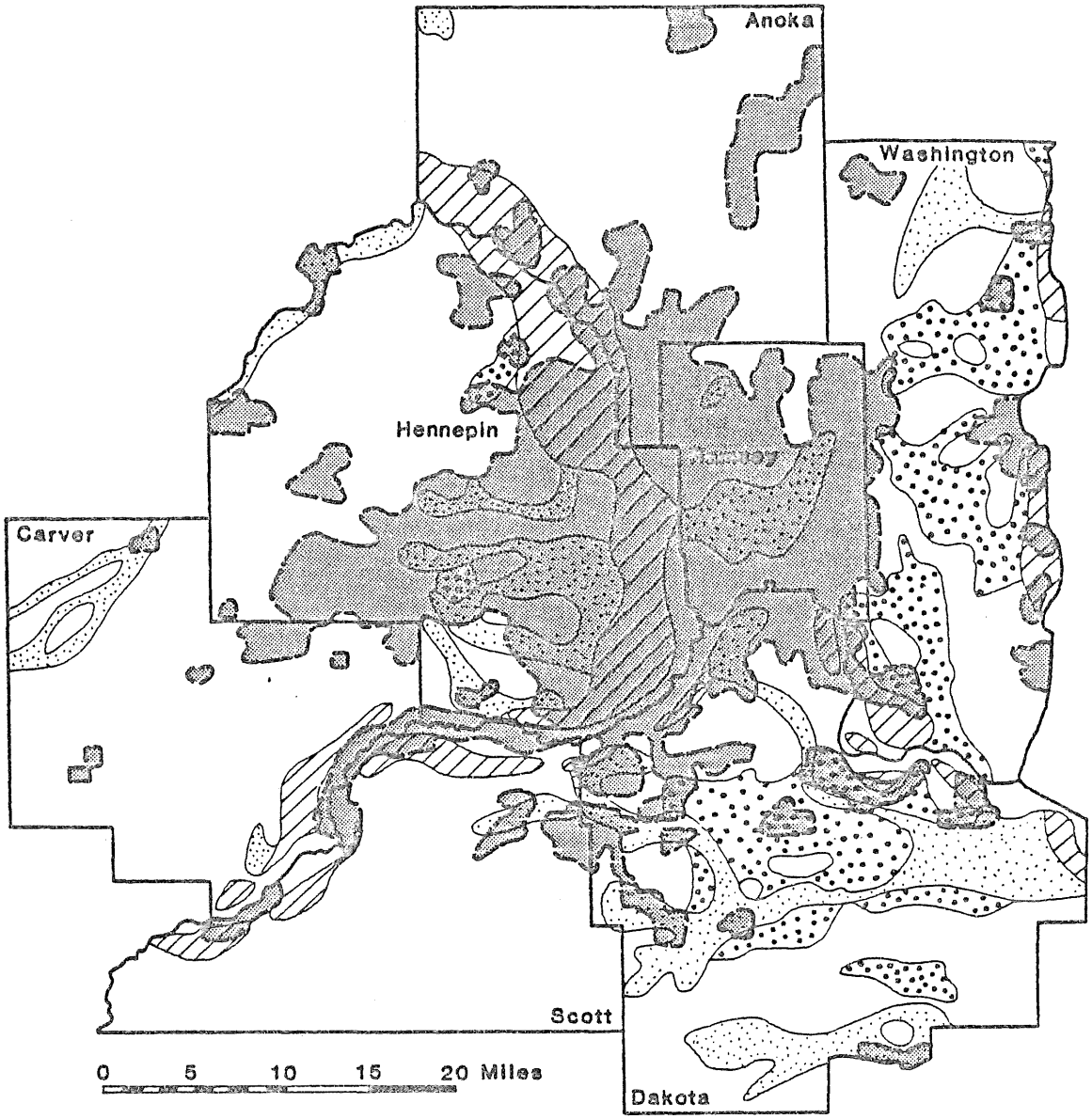

Figure 1.

GENERALIZED DISTRIBUTION OF MAJOR SAND AND GRAVEL DEPOSITS IN THE TWIN CITIES METROPOLITAN AREA

Terrace Sand and Gravel (mixture of northwest and northeast source areas)

Des Moines Lobe and Grantsburg Sublobe Sand and Gravel (northwest source area, mixed with variable amounts from northeast source area)

Superior Lobe Sand and Gravel (northeast source area)

Generalized Urban Land, 1978 (including approved public open space)

Sources: Minnesota Geological Survey, Aggregate Resources Inventory of the Seven-County Metropolitan Area; Metropolitan Council.

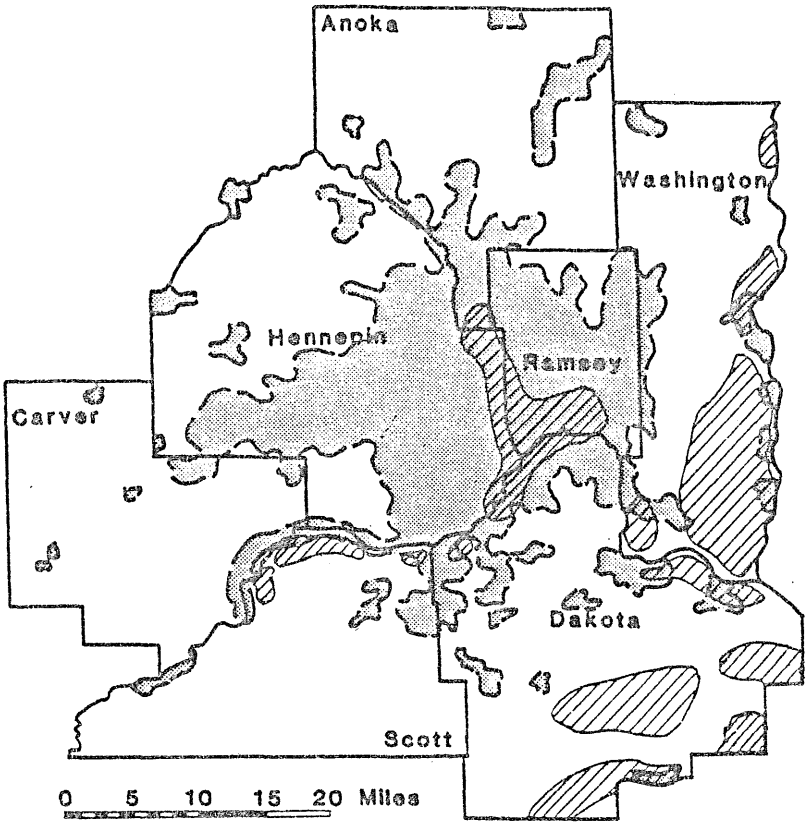

Figure 2. GENERALIZED DISTRIBUTION OF BEDROCK AGGREGATE SUBREGIONS IN THE TWIN CITIES METROPOLITAN AREA

Generalized Urban Land 1978
(Including approved public open space)

Generalized Bedrock Aggregate Subregions

Sources: Minnesota Geological Survey, Aggregate Resources Inventory of the Seven-County Metropolitan Area; Metropolitan Council.

Table 1
ESTIMATED POTENTIAL AGGREGATE RESOURCES OF THE METROPOLITAN AREA
(in short tons)

Aggregate Source	Total Resources	Encumbered by Land Uses	Unencumbered Resources	Potential Resources Available[1]
Bedrock				
Prairie du Chien				
- Significant	765,900,000	396,500,000	369,400,000	277,100,000
- Potentially significant	2,368,300,000	780,600,000	1,587,700,000	1,190,800,000
Platteville[2]				
- Significant	150,400,000	135,350,000	15,050,000	11,300,000
- Potentially significant	362,450,000	167,450,000	195,000,000	146,200,000
Sand and Gravel				
Significant	434,400,000	280,650,000	153,750,000	76,900,000
Potentially significant	7,993,600,000	2,158,000,000	5,835,600,000	2,917,800,000

[1] Quantities have been reduced by a 25 percent and 50 percent waste factor for bedrock and gravel, respectively.

[2] Because of its susceptibility to deterioration upon weathering (primarily freezing and thawing), Mn/DOT considers Platteville limestone rock to be of inferior quality and prohibits its use in many types of roadway construction, such as concrete, aggregate, riprap and some roadway base, drainage or granular material application.

general physical characteristics (depth of overburden, thickness of deposit, percent of gravel) of individual deposits are identified. However site specific data is limited. Site specific data as to the quality and volumes of material present are needed to determine which deposits are commercially viable. The quality and quantity of the aggregate determine the costs of mining and processing and will affect the operator's decision to buy or lease a particular site.

INFORMATION NEEDS FOR PROTECTION

To determine the suitability of a deposit for protection it is necessary to have basic data about the physical characteristics of the deposit. The data includes:

- Thickness of overburden
- Thickness of deposit
- Gradation of particles (percent of coarse aggregate) for gravel deposits
- Percent of deleterious material such as shale.

The industry has a need for additional site specific information to determine the commercial viability of a specific deposit before purchasing or leasing a site. The additional data would include the horizontal extent and thickness of a deposit, the percent of gravel with depth, soundness, resistance to abrasion, and potential reactivity; the depth to water table, the distance to use, availability of the site and highway access.

If local communities were required to protect specific deposits other types of data would be necessary including quality--relative to other deposits, the economic feasibility of extraction, the demand or market, environmental data including depth to water table, the impact of noise, dust, and vibrations, traffic impacts, impact on vegetation, wildlife habitat and land use; fiscal/service implications including revenue generated and service requirements. Additionally, the communities would need to have information on the interim use potential (until mined) and reclamation/end use information including the staging/timing of mining, final elevations or contours and assurance of restoration.

Much of the environmental, traffic, fiscal and reclamation data can be obtained when a permit application is made for a specific site and the local community assesses the potential impacts of a new or expanded mine. The commercial viability of a specific deposit will also change over time depending on the market so economic data is of short-term value to a community.

COSTS OF ADDITIONAL SURVEYS

The basic data necessary to determine the suitability of a potential deposit is not always available. Little quality data is available for the region and for many potential deposits there is only one data point per square mile. Field surveys of the potential deposits would be

necessary to obtain the data. Drilling would be required, samples would be collected and laboratory tests performed. The number of samples and tests would depend on the homogeneity of the area. Access to sites would have to be obtained for sampling. The work would be costly because of the extensive areas involved.

Because of the concern for cost the best approach would be to collect and test only enough samples to eliminate potential areas (Appendix B). The number of borings and laboratory tests to do this would be much less than that required to characterize the quality of a deposit. The process would involve two stages (Appendix B). Stage I would involve reconnaissance of the area using existing data. This would assist in defining geological subfeatures and locating additional boring locations. Stage II would involve field borings and necessary lab analyses to eliminate areas as potential deposits. The number of borings and costs would vary with the size of the area being surveyed. The estimated costs for Stages I and II is $30,000-40,000 per square mile including 30 to 40 borings and a minimal level of laboratory testing. Given the hundreds of square miles of potential resources in the region, such an effort would be expensive.

The amount of data needed and any requirement for additional ones depend on the level of planning and protection that might be required. If it is necessary to coordinate the timing and staging of mining, reclamation and development to protect the resource (remove it before urban development), site specific data about the quality and quantity of material would be needed to ascertain that the resource is worth the additional administrative burden. If, however, the proposed level of planning and protection is more general and the responsibility for selecting specific sites is left to the industry, site specific data is not necessary and the present level of information is satisfactory for this purpose.

LEGISLATIVE CHARGE NO. 2: NEED TO PROTECT

This section discusses the need for local governments to protect aggregate resources and to what extent. The primary issue is whether the region has an adequate supply of aggregates to meet future needs and whether the industry will be able to continue to supply the region. This section examines the potential quantity of aggregate in the region and the future demand, as well as how such factors as imported aggregates from adjoining counties, conservation, the private market, transportation costs, land use and governmental programs, particularly local plans and land use controls, might affect the availability of aggregates in the future. This section also looks at the potential effect of resource protection from the regional and local government viewpoint and some of the potential problems.

FINDINGS

1. A 200-year supply of aggregates is available in the region, based on 4.6 billion tons available and an annual demand of 15 million tons.

2. This supply could be further extended if the downward trend in the demand for aggregate continues and consideration is given to the potential resources located in adjoining counties, particularly in Sherburne and Wright, as well as the use of substitutes or the recycling of highway pavement.

3. While the permitting process is full of uncertainties for the industry, the issuance of permits for mining in recent years has maintained a 10-year supply in permitted reserves.

4. Potential aggregate resources are concentrated in Washington and Dakota Counties. However, the long-term demand will exceed the potential resources in Anoka, Hennepin and Ramsey Counties. Aggregates are currently being imported from other counties to supply these markets and will continue to meet their future demands.

5. The private market and aggregate mining industry have been generally successful in the past in identifying, securing access and developing commercially viable reserves adequate to meet the region's demand for aggregate and have the capacity to do so in the foreseeable future.

6. Federal, state, regional and local government programs, plans and regulations affect land use and the long-term availability of aggregates in the region. In some instances these programs preclude access to potential resources.

7. The primary responsibility for land use decisions and determining whether the industry will be able to supply the region in the future lies with cities, counties and townships under their planning zoning and permitting authorities. However, there is no certainty that local governments weigh the impact of their decisions on the region as a whole.

8. Most local comprehensive plans and land use regulations neither recognize the importance of aggregate resources nor provide for their protection or mining. This is due in part to the lack of readily available information as to the economic importance and location of the resources, as well as the general complaint that mining is a nuisance.

9. The general reliance of local governments on special mining permits to control mining and lack of planning allows land uses adjacent to potential mining sites that may conflict with or preclude mining.

10. Expanded or new mining permits are difficult for local governments to approve for several reasons, including:

    a. The lack of planning for protection or mining to minimize impacts and conflicts.

    b. The lack of information as to the location and importance of aggregate resources.

    c. The limited economic incentives (property tax and aggregate production tax revenues) to offset the potential negative effects on local communities.

    d. The intense political pressure placed on local elected officials to "protect" residents and property owners from the potential effects of mining.

    e. The possibility that the nuisances and impacts from mining cannot always be controlled and that reclamation, even when prior bonding is required, is difficult to enforce.

    f. The lack of adequate regulations and standards for mining and reclamation in some cases to protect the community and property owners.

11. There have been some problems for the industry in obtaining local government permits for new or expanded operations. This is due to:

    a. The potential and perceived effects of mining and reclamation on the environment, local land use and property owners. Mining is perceived as a locally unwanted land use.

    b. The lack of knowledge in local communities as to the location of aggregate resources and the economic importance of the resource to the region and community.

c. The lack of recognition in most local comprehensive plans given to mining and the lack of planning to minimize the impact on land use and orderly urban development.

d. The local political pressures to deny special permits for mining in order to "protect" the community's interests versus the regional need for aggregate.

12. There are procedural and other problems in the local special or conditional permitting process for mining approvals. These include:

a. Utilizing the permitting process to resolve both planning and regulatory issues rather than dealing with the former through the planning process. Issues such as the location and extent of mining and land use compatibility can be addressed in the comprehensive plan. Regulatory issues such as operating hours can be resolved at the time of permitting.

b. The legal requirement for making a finding of fact in a permit decision may not always be followed, providing the opportunity for an arbitrary decision based primarily on political pressures.

c. Local standards for permit approval are not always defined, clear or consistent. As a result, the industry, local governments and the public do not know how each permit proposal will be judged and decided.

d. Most mining permits are subject to annual renewal, allowing maximum local control and opportunity to change the conditions for approval but forcing the operator to respond continually to changing and sometimes increasingly restrictive permit conditions.

e. Occasionally, unusual or additional conditions are placed on a permit that make it difficult or impossible for the applicant to operate.

f. The approval and conditioning of permits is not always consistent.

13. Local standards for the review and control of mining/reclamation range from very broad to comprehensive, specific requirements. The diversity and lack of specificity are a problem for the industry in that there is room for inconsistency and arbitrariness in local permit decisions. According to the industry, there may affect the competitiveness of individual operations. At the same time many local communities do not have adequate standards for evaluating and regulating mining/reclamation or have difficulty enforcing local requirements. The current system provides uncertain and uneven protection for the industry and local communities.

14. If public protection is necessary, the role of government in identifying, developing and marketing aggregate would be increased, accompanied by a transfer of the risks from the marketplace to the public sector. A larger-than-local body would be necessary to coordinate and implement a broad-scale protection policy.

THE SUPPLY OF AGGREGATES

Approximately 3 billion tons of sand and gravel and 1.6 billion tons of crushed rock may be available in the region. These estimates do not include aggregates covered by urbanization or restricted by special land use district regulations which prohibit the extraction of the material (Table 1). The volumes represent conservative estimates of the region's potential resources.

However, much of these resources are yet uncontrolled. A recent estimate of permitted industry reserves includes only 126 million tons of sand and gravel and 94 million tons for crushed rock. Mn DOT controls another 1.2 million tons of sand and gravel.[5] Some 12,500 acres of land were identified as permitted sites including sites outside the region (Figure 3).

More recent data obtained through a survey of local governments indicate that approximately 1,300 acres have been approved or permitted by local governments since 1980. This represents new or expanded mining activity (see Table 2).

Over the last 15 years, the Metropolitan Area has received an estimated 600,000 to 1.3 million tons of aggregates annually from adjoining counties in Minnesota and Wisconsin.[6] Substantial deposits are being mined, however, no specific estimates of the volume of the potential resources in these areas are available.

The availability of the region's aggregate resources can be extended through conservation. Perhaps the most important approach in terms of the potential volume and economic benefits involves the recycling of materials or industrial process by-products. An estimated 2 million tons of sand and gravel could be saved annually through the use of recycled waste materials and highway pavement.[7] The use of substitute materials in the future will depend on the cost savings, the quantity available, the quality of the material and the awareness of designers, contractors and construction officials.

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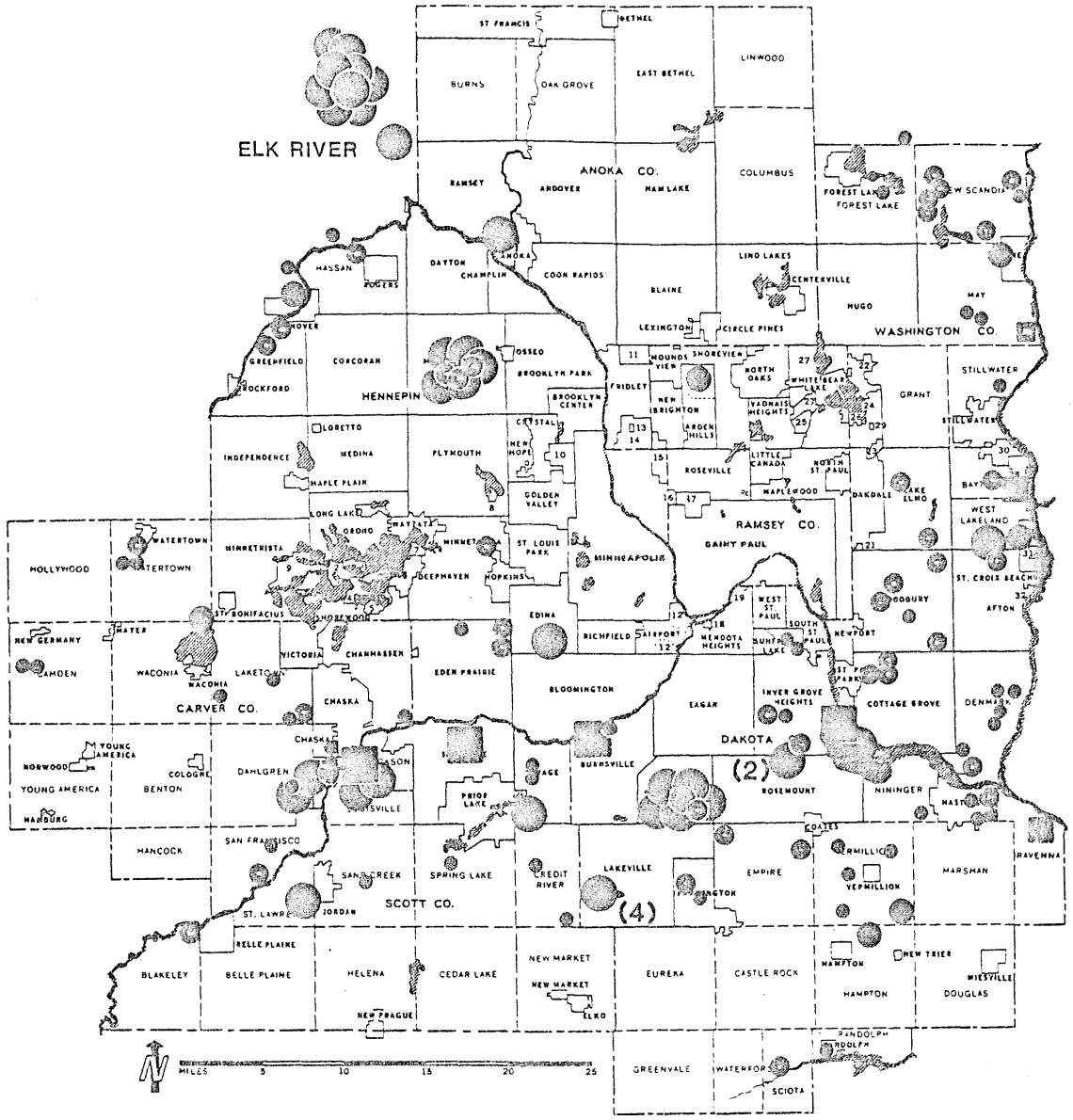
[5] R.K. Hoagberg and V. Rajaram. Minnesota Aggregate Resource Study Volume III, ibid. p. 28.
[6] C. Schenk and M. Jouseau, Metropolitan Council, ibid. p. 17.
[7] C. Schenk and M. Jouseau. Metropolitan Council, ibid. p. 24.

Figure 3. AGGREGATE OPERATIONS IN AND AROUND THE TWIN CITIES METROPOLITAN AREA [1]



Size and Type of Operation

Sand and Gravel	Crushed Rock	
●		Less than 10 acres, or unknown
◉	■	10-50 acres
◉	■	50-100 acres
◉	■	100 acres or more

Numbers in parentheses refer to number of operations in a cluster for which individual acreage data is not available.

[1] Includes MnDOT owned and leased acreage; data on minor operations incomplete or not available in unincorporated areas.

Sources: Metropolitan Council survey, May 1985; Inventory of Regionally Significant Aggregate Resources, Twin Cities Metropolitan Area, Hoagberg, 1982.

Table 2. PERMITS FOR NEW AND EXPANDED MINING OPERATIONS APPROVED SINCE 1979

County	New Operations Only			Total Permitted Operations (new and existing)	Notes
	Number of Permit Applications	Number of Permits Issued	Area Estimates[1] (includes MnDOT)		
Anoka	0	0	0	1	
Carver	11	10	450 acres	17	Permit for a major operation denied in 1984 due to insufficient information; reapplication pending in 1985.
Dakota	9	9	296 acres (includes 80 acres crushed rock)	31+ (includes 2 crushed rock quarries)	Data on existing operations in some unincorporated areas not available.
Hennepin	0	0	200 acres (see note)	16	Estimate of the mining area of Maple Grove revised upward 200 acres; estimated volume revised upward 35 million tons. Revisions indicate 25-30 year supply.
Ramsey	0	0	0	1	Operation on leased federal land; lease expires end of 1985, may not be renewed. Operator claims 'unlimited' supply available.
Scott	3	2	53 acres (includes 40 acres crushed rock)	10+ (includes 1 crushed rock quarry)	County has no records of grandfathered operations. One permit application for a 150-acre quarry denied three years ago; reapplication pending.
Washington	3	3	40-45 acres	41 (includes 9 crushed rock quarries)	One permit issued for sand; material found to be unsuitable - operation stopped. 1200+ acres previously permitted remain unexcavated.
Sherburne	N.A.	N.A.	230 acres	N.A.	2182 acres permitted, approximately 800 acres of which are not yet active.
Wright	1	1	61 acres	4	Permit issued 4-16-85.
Regional Total	27	25	1335 acres (includes 120 acres crushed rock)	121+ (includes 12 crushed rock quarries)	Totals do not include many minor operations for which no data are available.

[1]MnDOT operations are not permitted as are other, privately owned operations. They are owned or leased by the State and are used as needed for highway maintainence and construction. MnDOT-leased land accounts for 320 acres of the total for new operations.

Source: Metropolitan Council telephone survey, May 1985.

DEMAND VERSUS SUPPLY

According to data from the U.S. Bureau of Mines, the production or demand for aggregates in the region has leveled off and followed a general downward trend from the peak years during the late 1960s and early 1970s (Figure 4 and Table 3). Following a long period of sustained growth during the 1950s and 1960s due to the post-World War II boom in urban development and highway construction, aggregate demand showed a cyclical pattern of growth, decline and growth in the 1970s. Demand peaked in 1969 at 16.8 million tons and again in 1973 at 17 million tons. Demand declined again as the economic recession began in 1980. The demand averaged 14.9 million tons a year during 1970-80.[8]

Based on this demand and the estimated potential aggregate resources, the region has more than a 200-year supply of aggregate. If conservation becomes significant and/or the demand for aggregates continues to decline as in the recent past, the potential resources could last much longer. The estimates assume that local permits can be obtained to allow mining, the loss to urban development will not be significant and the material is of suitable quality for use.

Because the potential resources and the demand are unequally distributed, the future demand in several subregions cannot be met by local supplies (Table 4).

Because of the size of the region, the distribution of aggregate resources and transportation costs, there are several local markets for aggregates. The local markets are represented by the seven counties. These divisions approximate the major areas or centers of future construction activity and aggregate demand. The potential resources in Anoka, Hennepin and Ramsey Counties represent less than or close to a 25-year supply (Table 4). Aggregates are being transported by truck and barge into these markets now, and this activity will likely expand in the future to meet construction needs.

CONSTRAINTS ON THE AGGREGATE SUPPLY

There are a number of factors which will affect the future development and availability of aggregate resources. These include the capacity of the marketplace and industry to support the development of commercially viable deposits, the cost of mining and transporting the material and governmental programs such as local planning and land use controls which affect the opportunity to mine the material.

The aggregate industry has demonstrated a capacity to meet the region's need for aggregate in the past, and there is no indication that the industry will not continue in this role in the future.

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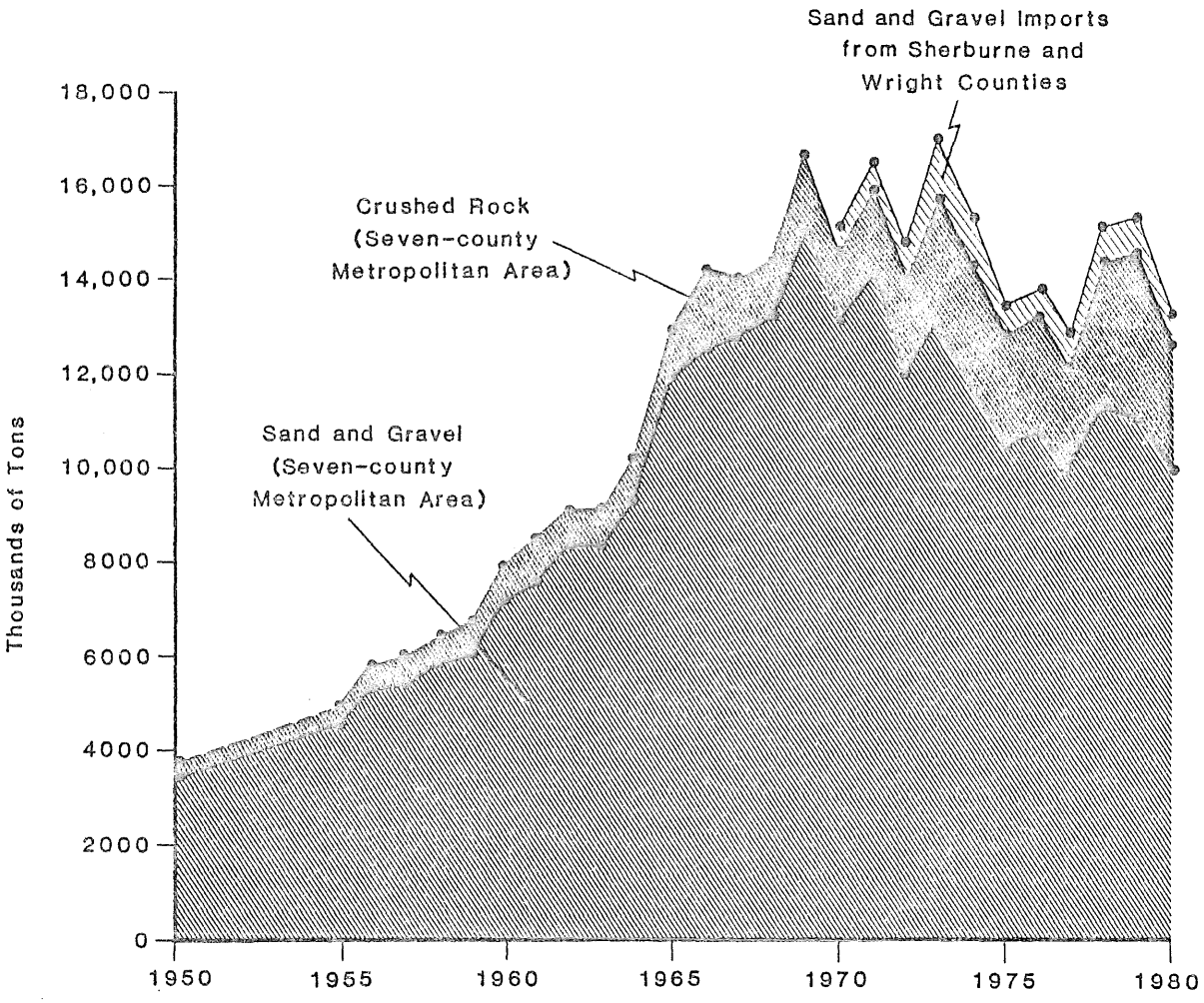
[8] C. Schenk and M. Jouseau, p. 22.

Figure 4.
HISTORICAL AGGREGATE PRODUCTION,
1950-1980



Sources: U.S. Bureau of Mines, Minneapolis;
Metropolitan Council estimate for imported aggregate.

Table 3
AGGREGATE PRODUCTION IN THE METROPOLITAN AREA
(short tons in thousands)

Year	Seven-County Production: Sand and Gravel[1]	Seven-County Production: Crushed Rock	Seven-County Production: Total Production	Imported from Sherburne and Wright Counties[2]	Metro Aggregate Demand
1950	3,480	159	3,639		3,639
1955	4,541	363	4,904		4,904
1956	5,366	487	5,853		5,853
1957	5,553	481	6,034		6,034
1958	5,980	484	6,464		6,464
1959	6,175	622	6,797		6,797
1960	7,272	738	8,010		8,010
1961	7,748	877	8,625		8,625
1962	8,487	681	9,168		9,168
1963	8,387	835	9,222		9,222
1964	9,391	902	10,293		10,293
1965	12,031	1,206	13,237		13,237
1966	12,694	1,614	14,308		14,308
1967	12,816	1,267	14,083		14,083
1968	13,263	1,241	14,504		14,504
1969	15,235	1,596	16,831		16,831
1970	13,174 (13,796)	1,475	14,649	622	15,271
1971	14,167 (14,745)	1,815	15,982	578	16,560
1972	11,959 (12,606)	2,190	14,149	647	14,796
1973	13,170 (14,443)	2,605	15,775	1,273	17,048
1974	11,807 (12,765)	2,621	14,428	958	15,386
1975	10,593 (11,262)	2,262	12,855	669	13,524
1976	10,862 (11,508)	2,394	13,256	646	13,902
1977	10,020 (10,688)	2,227	12,247	668	12,915
1978	11,376 (12,190)	3,006	14,382	814	15,196
1979	11,081 (11,964)	3,523	14,604	883	15,487
1980	10,139 (10,716)	2,574	12,713	577	13,290

[1] Totals (in parentheses) include Sherburne and Wright Counties sand and gravel production.

[2] Sherburne and Wright Counties totals are estimated based on county data and the estimated portion shipped to the Metropolitan Area.

Source: U.S. Bureau of Mines, Minneapolis.

Table 4
AGGREGATE DEMAND VERSUS SUPPLY, BY COUNTY
(millions of tons)

County	Projected 25-Year Demand	Potential Resources	
		Sand and Gravel	Crushed Rock
Anoka	34	40	0
Carver	12	124	0
Dakota	65	1,691	799
Hennepin	144	37	0
Ramsey	68	22	0
Scott	14	167	107
Washington	35	913	720

Source: C. Schenk and M. Jouseau, Aggregate Resources in the Twin Cities Metropolitan Area. Metropolitan Council. St. Paul, 1983.

Historically the industry has assured the region of an adequate supply of aggregate at competitive prices. As the demand for aggregate expanded, the industry explored and acquired new deposits, obtained local permits and opened new mines. Sites were selected with the objective of staying competitive with other operators by minimizing production costs (sites close to local markets). Because of the competition and the distribution of the resource, the region has probably benefitted from relatively inexpensive aggregate materials.

The market will continue to affect the supply as it has in the past. If If the supply of aggregates is limited in the future due to urban development or governmental regulation, prices may rise. If prices increase, deposits which are more costly to produce would become more competitive. This includes lower quality and deeper deposits. Although the transport costs for outlying deposits would be higher, the delivered price might be competitive because lower acquisition and processing costs could make up the difference. An increase in the price of aggregates could also make substitute materials more competitive.

To some extent transportation costs affect the availability of aggregates or determine whether a deposit is competitive. Aggregate is a heavy, low-value material. As a result, transportation costs are a significant factor in the delivered price of the material. Trucking costs in 1982 ranged from 14.7 cents to 12.3 cents per mile depending on the distance traveled. Based on these rates and an average price of $2.56 per ton, the delivered price of class five aggregate would double at approximately 19 miles.[9]

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[9] C. Schenk and M. Jouseau, p. 35.

Although transportation costs are significant in determining the price of aggregate, aggregate costs appear to be a major factor only in highway construction due to the high content of aggregates. For a single-family house valued at $100,000, the cost of aggregate ranges from 0.8 percent ($780) at a hauling distance of five miles compared to 1.5 percent ($1,460) at a distance of 30 miles. For a seven-story office building the cost of aggregate ranges from 1.0 percent ($195,000) to 1.4 percent ($280,000) at hauling distances of five and 30 miles, respectively. In contrast aggregate costs range from 7.3 ($275,000) to 13.3 percent ($534,000) of the cost of a divided four-lane urban highway at hauling distances from five to 30 miles, respectively.[10]

EFFECT OF GOVERNMENTAL PROGRAMS ON SUPPLY

Federal, State and Regional Programs

Governmental plans and regulations affect land use and therefore future access to the underlying aggregate deposits. Some regulations such as the federal Clean Water Act impose conditions on mining permits. Other programs limit access to aggregate resources directly by precluding mining in environmentally sensitive areas. Such is the case with the federally managed Minnesota Valley National Wildlife Refuge and the state wild and scenic rivers program.

The Mn DOT program of leasing aggregate deposits for highway purposes is the only state program with the purpose of assuring access to aggregate.

Council plans for airports and regional parks and reserves also affect major land areas that may contain potential aggregate resources. Regional plans for metropolitan sewer interceptors and highways encourage urban development, which encumbers the underlying aggregate resources.

The Council's plan for regional development--the Metropolitan Development Framework--establishes two geographic planning areas, the urban and rural service areas. The urban service area is the land area planned for urban density development served by metropolitan systems. Some 10,000 acres of potential aggregate resources are located within the urban service area and may be lost.[11]

The Metropolitan Development Framework minimizes conflicts with most of the potential aggregate resources in the rural service area by encouraging low-density development (one dwelling unit per 10 acres) and the preservation of commercial agricultural lands (Figures 5 and 6). However, currently the Council has no specific policy which addresses the protection of aggregate resources in the region.

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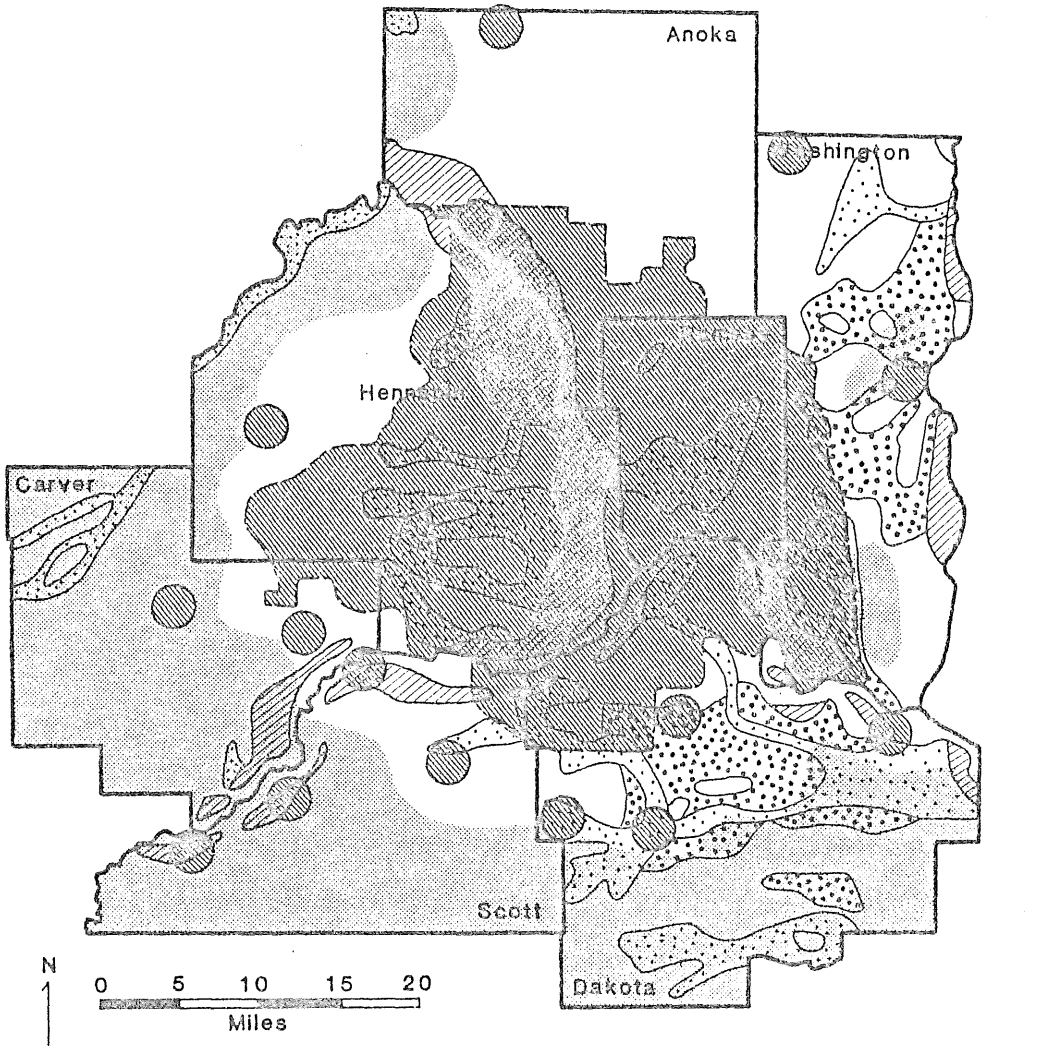
[10] C. Schenk and M. Jouseau, p. 41.
[11] Metropolitan Council, 1985.

Figure 5.

METROPOLITAN DEVELOPMENT FRAMEWORK PLAN AND POTENTIAL SAND AND GRAVEL RESOURCES



1990 Urban Service Area

Freestanding Growth Center

Commercial Agricultural Region

General Rural Land Use

Terrace Sand and Gravel (mixture of northeast and northwest source areas)

Des Moines Lobe and Grantsburg Sublobe Sand and Gravel (northwest source area, mixed with variable amounts from northeast source area)

Superior Lobe Sand and Gravel (northeast source area)

Sources: Minnesota Geological Survey, Aggregate Resources Inventory of the Seven-County Metropolitan Area; Metropolitan Council.

Local Government Planning and Regulation

The primary responsibility for land use decisions is given to local governments under their planning and zoning powers. Carver, Scott and Washington counties are responsible for most of their unincorporated areas, elsewhere planning and zoning is exercised by the cities and townships. Most local comprehensive plans do not provide for protection of the resource or mining. Reasons for this shortcoming include the lack of information as to the location of potential aggregate deposits, the lack of understanding of the importance of the material to local and regional development and a general perception of mining as a nuisance.

The lack of local planning for aggregate results in land uses that conflict with or preclude protection or mining of the resource. Planning for urban development also raises land values, which discourages protection and mining.

Local land use controls treat aggregate mining as a nuisance to be controlled rather than a resource to be protected. Only a few communities have established exclusive zoning districts for the purposes of preservation or mining. And these districts include only a small portion of the region's potential resources. An exclusive district allows mining by right and prohibits the development of other conflicting land uses.

Most local governments regulate mining by requiring the approval of a conditional or special use permit. Certain criteria or conditions for mining and reclamation are imposed to make the use compatible with other uses in the district and the permit must be renewed annually in most instances.

The special permit approach has several disadvantages. Protection and mining must compete with other land uses allowed by right that may develop first and preclude or conflict with mining. Annual permit renewal allows local communities to impose new or more restrictive conditions that may ultimately limit or discourage mining. The public hearing, which is held to receive comments on the permit, may be used as an opportunity for local residents to press for denial of the permit. The special permit system provides little assurance that the resource will be protected or that mining will be allowed.

Although local governments by law cannot deny a permit arbitrarily without a finding of fact, there is no assurance that this requirement is always satisfied. If the applicant is not satisfied, the alternative is to seek a solution in the courts. Thus far, the courts have established few requirements as to the findings of fact for a permit denial.

In effect, most local governments use a special permitting process to decide two issues on a case-by-case basis: 1) planning issues such as where mining of the resource is to be permitted, consistent with other community objectives for land use, environmental protection and transportation; and 2) the specific conditions for mining and reclamation.

Emphasis on the local control of mining provides for the review of local concerns but little opportunity for the consideration of regional needs. This lack of consideration for regional needs may become increasingly a concern in view of the concentration of potential resources in a few areas.

Mining permit decisions are difficult to make for local governments. Mining is generally viewed as a locally unwanted land use by the public and officials because of the perceived and potential impacts. The "host" community bears most of the potential impacts such as dust, noise, traffic, unsightliness, safety hazards and erosion. At the same time, there is little economic incentive to accept mining. Mining land is classified as relatively low value for property tax purposes, and little of the current state aggregate production tax reaches the host town or city. Sixty percent of the revenue goes to the county road and bridge fund, and the 30 percent designated for local governments is shared with the other communities in the county. For example, approximately 1,000 acres of aggregate reserves are being mined in Apple Valley. In 1983 the city received $19,000 from the estimated $268,000 in aggregate tax revenues collected in Dakota County or $19 per acre.

Mining and reclamation is perceived by local governments as difficult to control and manage. This is due to several reasons. Accurate information regarding the impact of mining is not available to many communities. Many communities in the region lack adequate ordinances and standards with which to review and regulate the use. There is some feeling that even with strong controls, mining cannot always be controlled. There is a local perception that reclamation cannot be enforced even when bonding is required. The community is concerned that it will be left with an unusable piece of land. Finally, intense political pressure is frequently placed on local, elected officials to deny a permit and protect residents and property owners from the potential effects of mining.

As a result, it is generally difficult for the industry to obtain the necessary local permits to expand or open a new mine. There are a number of reasons for this, not the least of which is the image that some in the industry have created by abandoning mined out areas without reclamation. Additionally, there is little local knowledge of where the potential resources are located or understanding of the importance of the resource to the region or community. Few local comprehensive plans recognize the importance of the resource and the need for mining as a necessary land use. The potential and perceived impacts of mining on local properties and residents produce a negative reaction to any proposal whether warranted or not. The industry argues for and pressures for each permit approval, to which local residents and property owners respond by pressuring local officials to deny permits in order to protect the community's interest rather than the region's need for aggregate.

The reliance of local governments on the special or conditional-use permit to locate and control mining allows conflicting uses to develop adjacent to existing and potential mining sites. As the conflicts develop, a negative image develops in the community. Pressure is placed on the local government to restrict the use. If the conflicts continue, pressure will be brought to restrict the use further or exclude it when permit renewal is considered.

Despite the difficulties with the current local permitting system, the record of permit decisions in the region in recent years seems to indicate that the industry is generally receiving approvals for applications for new and expanded mining activity. According to a survey of local governments, 25 out of 27 permits applied for were approved (Table 2) during the period 1980 until mid-1985. There is no information as to how many applications were not made because of the local response to such a proposal.

Local Standards for Mining/Reclamation

Standards for evaluating and controlling mining and reclamation vary greatly among local governments in the region. Some communities have adopted comprehensive standards for reviewing and regulating mining/reclamation. However, most communities have established few or very general standards--for example, referring to the effect on the safety, health and welfare of the public.

The diversity and lack of specific standards presents several problems for the industry. The aggregate industry must respond to the requirements of each local government and adjust their plans, operations and practices to satisfy each community. The industry indicates that in some instances the standards may result in higher operating costs, which affects the competitiveness of an operation. The lack of specific standards allows the community more flexibility in tailoring the permit to the local land use and environmental conditions, but the lack of standards also allows greater opportunity for arbitrary decisions in denying a permit. The lack of standards may also allow the local government more freedom to "load on" additional permit conditions in response to public pressure, regardless of the justification. The latter can be used to discourage an operator particularly where the operator's permit must be renewed annually.

Under a system with specific standards, the local government would be required to base a permit decision on the facts--does the proposal meet the standards or not? The lack of specific local standards in many communities provides the industry with little certainty on how a permit application will be reviewed and judged and whether all applications will be evaluated consistently according to the same criteria.

The lack of specific standards can also be a problem for local communities. Vague or general standards provide little indication to potentially affected residents as to how the proposed mining activity will be judged and what the requirements for the operator will be. Without

specific standards to evaluate the proposal, local officials are required to make subjective judgments denying, approving or conditioning a permit. These judgments may be difficult to defend if the applicant challenges the decision in court.

The 1979 state Uniform Building Code, which governs all construction in the Metropolitan Area, was adopted in part to achieve consistency in the local regulation of construction and encourage more efficient construction. The building code standards cannot be exceeded by local governments. A similar approach in which all local governments would be required to adopt state-mandated uniform standards for mining/reclamation would benefit the industry and local communities. The industry would benefit from greater consistency and objectivity in the review and conditioning of permits and perhaps in some instances cost savings. Limiting the local government's authority to subtract from but not add to the standards would also make it difficult to "load on" unnecessary permit conditions in response to political pressure.

The adoption of uniform state-mandated standards throughout the region would be advantageous to local communities in a number of ways. State-mandated standards would depoliticize the permit review process for local governments. Local officials could point out to residents and permit applicants that the standards are a state law and not a local requirement. State standards would have greater weight with the industry than local standards and would diminish the chances for a court challenge. Additionally, the state would be involved actively in enforcing the standards, which would assist local governments. Local governments would also have the benefit of applying a set of standards based on technical data and expertise that might not be available to all communities in the process of developing local standards. Also, it would be more efficient for each local government to adopt a uniform set of standards rather than to develop its own.

Recognizing that not every community would have the same concerns about the effects of mining/reclamation, local governments could be allowed to adopt a lower standard in some instances or not to adopt a particular standard. The standards could also be developed to incorporate the varying concerns and potential effects of mining/reclamation in both urban and rural environments.

EFFECT OF RESOURCE PROTECTION

Protection of aggregate resources would have a number of economic, planning, land use, development and intergovernmental impacts.

Protection by government acquisition or leasing of the land not controlled by the industry could have a substantial impact on local finances as costs could be substantial where extensive land areas are involved. Some of the costs would be recouped in the future, however, when the land is sold or leased for mining purposes. Furthermore, it may only be necessary to use this tool where resources are threatened by imminent urban development. Additional financial burdens would

arise from long-term protection resulting from the delay in or loss of development. Local revenues from property taxes and special assessments would be impacted, particularly in communities where the resources are concentrated (Table 5).

Protection of resource areas could constrain the supply of land for development and could significantly affect the price of other developable lands where protection of aggregates reduces the land planned for development. This could happen in a number of growing communities in the region (Table 5). Such effects could be mitigated by adding land for urban use within the sectors affected.

Under the Metropolitan Land Planning Act, local governments in the region have adopted comprehensive plans to coordinate the staging and timing of urban development and expansion of public facilities and services. Protection of aggregate resources within the urban service area could result in significant delays and disruptions in the timing and staging of local development, particularly where the potential resource is extensive (Table 5). This would require some communities to alter local plans for the timing and staging of development and redirect development and public services to other areas where possible. Potential mining activity may also effect local land use patterns by affecting the suitability or value of adjoining lands for certain uses.

Extensive protection of aggregate resources could constrain development in some sub-regions. This suggests some dislocation of development and public investment from one sub-region sector to another could occur (Table 5). However, protection need not be unnecessarily broad in scale; a more selective approach to either protect only the best aggregates or the resource needed for a limited period of time might limit this disruption.

The potential disruption to local plans and the delay or loss of development would be difficult to resolve. The market and industry determine how much, when and what aggregate resources are mined and marketed. This adds further uncertainty to local and regional plans for the reuse of protected areas.

Adoption of a public policy of resource protection infers that the public or government would play a larger role in the areas which have been the responsibility of industry and where it has been the most successful--for example, identifying suitable deposits, estimating the future market and, perhaps, acquiring or leasing long-term supplies. At the same time, some of the risk-taking and associated costs would be transferred to the public sector from the private market and industry.

The implementation of a broad-scale protection policy for the region implies that a larger-than-local or regional governmental body would play a principal role in the future. The problems and costs of implementing and coordinating a protection policy are beyond the resources and authority of a single local government.

Table 5
POTENTIAL IMPACT OF SAND/GRAVEL PROTECTION
ON LAND NEEDED FOR URBAN DEVELOPMENT,
1980-2000
(in acres)

Sectors/Communities	Land Supply[1]	Unencumbered Sand and Gravel Resources[2]	Supply Minus Sand and Gravel	Urban Demand[1] with Five-Year Average
Southeast St. Paul				
Cottage Grove	3,043	1,540	1,503[3]	2,157[3]
Woodbury	7,449	1,280	6,169	2,595
Other	3,890	---	3,890	1,270
Sector Total	14,382	2,820	11,562	6,022
South St. Paul				
Apple Valley	3,360	380	2,980	2,985
Eagan	12,846	1,110	11,736	5,588
Inver Grove Heights	2,418	260	2,158	1,988
Rosemount	1,496	950	546[3]	863[3]
Other	2,826	---	2,826	2,306
Sector Total	22,946	2,700	20,246	13,730
South Minneapolis				
Burnsville	5,696	1,125	4,571[3]	5,023[3]
Eden Prairie	7,497	350	7,147[3]	7,240[3]
Lakeville	2,856	1,050	1,806[3]	2,118[3]
Farmington	593	500	93[3]	553[3]
Savage	2,720	150	2,570	1,728
Shakopee	2,187	130	2,057	1,605
Other	5,161	---	5,161	5,161
Sector Total	26,710	3,305	23,405	23,372

Source: Metropolitan Council, 1985.

[1]Estimates based on local comprehensive plans and revised Metropolitan Council forecasts, 1980-2000.
[2]Significant and potentially significant areas identified by the Minnesota Geological Survey and not presently urbanized.
[3]Denotes adjusted supply is less than demand.

LEGISLATIIVE CHARGE NO. 3: METHODS OF PROTECTION

This section summarizes the legal framework for protecting or controlling aggregate resources, and the alternative methods for protection and their limitations.

FINDINGS

1. Long-term protection of aggregate resources is uncertain or expensive unless a deposit has been acquired or is controlled by the industry. Major difficulties arise when it is necessary to protect the extensive resources on private lands not owned by the industry.

2. Public acquisition or leasing of aggregate resources is the most certain method of long-term protection but potentially the most expensive, given the large resource areas involved.

3. Including the consideration of aggregate resources in local comprehensive plans would recognize the importance of the resource to the region. This provides the local government with the opportunity to balance protection and other community development goals and plans and minimize long-range land use conflicts.

4. Most local comprehensive plans do not currently consider the question of aggregate resource protection or mining and there is no requirement that they do.

5. The use of land use controls to achieve long-term protection of aggregate resources is uncertain because of the rights of property owners to a reasonable use and return on their investment.

6. A new dual approach to protection adopted in California and Colorado involving state legislation and local government plans for protection may be effective in the long-term protection of aggregate resources, but it has not been tested in the courts.

7. Local communities presently have difficulty protecting existing mining operations from conflicting land uses.

LEGAL FRAMEWORK FOR PROTECTION

Most of the land containing potential aggregate resources is not currently owned by the industry. Protection of the resource, unless the industry is willing to acquire threatened deposits would involve the protection of resources owned by other private individuals or organizations. Land owned or leased by the industry is reasonably protected until mining occurs, assuming that local permits can be obtained. It is in the operator's best interest to limit the use of the land until mining is completed.

The important issue is how to protect resources or land owned by private individuals and organizations for other purposes. The landowner may want to develop housing, a shopping center or other use that would provide an immediate investment return, and may not be willing to wait for the eventual extraction of the aggregates, that may not occur for several decades.

Local governments may protect the resource through acquisition of the land by condemnation or from a willing seller or through regulating, preventing or delaying the development of aggregate resources lands until mining removes the resource.

Local governments are authorized to regulate land use under their general police power authority given to local governments by the state. The use of the police power has evolved over time until it is generally understood that local government is the protector, planner and mediator of land use. The use of the police power has been extended gradually from the regulation of land use to the protection of the environment, agricultural preservation, historic preservation and open space protection.

The use of the police power in the regulation of land use is limited by the constitutional requirement of due process. Under this due process, individuals have the right to use their property as they see fit except where a public purpose requires that this use be limited. A police power regulation, such as zoning, must be substantially or reasonably related to a lawful and legitimate public purpose. The purpose must be related to the public health, safety or general welfare and may not be arbitrary or capricious. The method selected must be reasonably calculated to achieve that purpose. Due process requires that government establish that aggregate resource protection is consistent with the police power and that the method chosen is reasonable in terms of the purpose of the regulations. Under Minnesota law, the property owner must be allowed a reasonable use of the property and return on the investment. Otherwise the regulations may be found unconstitutional and the action found confiscatory. Ordinarily courts are reluctant to invalidate an ordinance except where there has been permanent and extreme diminution in property value, which is usually called a "taking" or regulatory taking. Depreciation of property value as a result of land use controls will not necessarily make them unconstitutional.

There is increasing concern among local governments about the payment of monetary damages for regulatory takings. Property owners are increasingly seeking financial relief from excessively burdensome land use regulations rather than mere invalidation of the regulations. Since land use controls affect constitutional rights such as due process, landowners are increasingly seeking redress for improper or burdensome land use controls through civil rights lawsuits.

In recent cases the Minnesota Supreme Court has distinguished between the "arbitration" and "enterprise" functions of government. The court held that where land use controls are adopted for the benefit of a governmental enterprise, the standard for determining whether a compensable "taking" has occurred is whether there has been a substantial diminution in the value of the affected property. In McShane v. City of Fairbault, 292 N.W. 2d 253 (Minn. 1980), the court invalidated an airport safety zoning ordinance, determining that it was for the sole benefit of a governmental enterprise. In this case the Court decided that the public should pay for the decrease in property value.

Local governments must be careful in adopting land use controls for the purpose of protecting aggregate resources. Land use controls that limit property owners' rights must be developed carefully, keeping in mind the principles of the police power. A public purpose must be established in developing the controls. If the use of private land is limited to protect the resource, landowners must be allowed a reasonable use of the land and a reasonable return on the investment in the interim. The longer the period of protection, the more difficult it will be to limit the use of land, particularly in urbanizing areas where the economic forces will create pressure for more intensive land uses.

METHODS OF RESOURCE PROTECTION

There is a variety of potential protection methods, including fee acquisition, regulatory schemes, planning and special legislation. Some of these represent traditional methods for guiding or controlling local land use and others represent new approaches that have not as yet been tested as to their effectiveness or constitutionality.

ACQUISITION

The purchase or lease of aggregate resource lands by a public body is the most certain method of long-term protection. A public body acquires fee title to the land or leases the land and limits the use until the aggregates are marketable or mined. Another approach would involve the acquisition of the development rights to the land. This would preclude the development of conflicting land uses, but allow the owner to retain title and limited use. The government would have to determine beforehand that the resource is a commercially valuable deposit. In each case the landowner would have to be a willing seller or the public would have to condemn the property.

Acquisition would be a costly method of protection. Suburban land in developing areas costs as much as $15,000 per acre in large tracts. Agricultural land in rural areas costs $1,000 to $2,000 per acre. Leasing the land could cost substantially less over the short term, but it could be expensive if the holding period is lengthy. Depending on the potential area involved, the costs could be significant.

Some or all of the costs could be recouped when the deposit is mined. In the meantime, public funds would be tied up until the deposit can be marketed. This could be a long period depending on the market and length of time necessary to complete the mining. Under this method the risks of the marketplace are borne by the public rather than the industry.

There are local precedents for public ownership of aggregate resources. Local governments (counties, cities and townships) are permitted by state law to acquire lands for the purpose of securing road building materials (Minn. Stat. 160.11 and Mn/DOT have similar authority).

COMPREHENSIVE PLAN

Planning alone cannot protect an aggregate resource, but the process and plan encourage protection and provides the basis or rationale for the application of specific protection methods such as land use controls. Most important, planning for the future of the resource and mining allows the local government to balance the need for the resource with the goal of orderly community development. Rather than attempting to deal with the conflicts for each permit, planning allows local government to provide for orderly mining and reclamation consistent with its plans for transportation, land use and environmental protection.

The inclusion of an "aggregate resource plan" in the local comprehensive plan could serve three purposes. The first purpose would be to include basic information about the resource in the community. A map indicating the extent of the potential deposits and information about the quality, quantity and demand (regional and local) for the aggregate would indicate the importance of the resource. The industry could provide specific information about specific sites that could be included. The information would enable the local community to assess the impact of other land use decisions on the resource and determine areas which the community might protect or consider permits for mining.

The second purpose of the aggregate resource plan is to indicate the local government's goals and policies toward resource protection, mining of the resource and reclamation. In developing this portion of the plan the community might indicate those areas among the potential resource which are to be protected or in which the community would consider a mining permit. Areas could be delineated based on considerations such as existing and future land use (plans), transportation facilities, the impact on the orderly extension of public services and environmental protection. The plan could include policies to minimize the future conflicts with existing mining activity.

The third purpose of the plan is to provide a rationale or basis for resource protection and mining/reclamation controls. A major consideration in the adoption and implementation of such controls is whether the ordinance meets the requirements of the law. The plan provides the information, data and rationale for specific controls or regulations.

The plan is the defense against the potential legal challenge to the city's regulations. The information in the plan establishes the public purpose for protection and reasons why the particular protection scheme and resource areas were chosen.

Current state enabling legislation for county, city and township planning and zoning is vague as to the authority of local governments to plan for aggregate resources protection or mining. Counties are authorized to apply official controls to protect "unconsolidated material or bedrock" from potentially damaging development and to require reclamation (Minn. Stat. 394.25). Minn. Stat. 462.357 authorizes municipalities to regulate the use of land for trade, industry, conservation and other purposes,but makes no specific mention of protection or mining.

Local governments are required to prepare comprehensive plans to meet the requirements of the Metropolitan Land Planning Act, but the act requires only that plans address mining and reclamation not protection. The Council can only make advisory comments regarding the adequacy of these plans. As a result, few plans provide for protection or mining/reclamation at the present time.

There is no regional plan for the protection of aggregates or mining but Council plans and local plans indirectly provide some protection of aggregate resources in portions of the region. The MDF encourages local governments to adopt policies and controls limiting residential development and preserving commercial agriculture in the rural service area where much of the region's potential aggregate resources are located (Figures 5 and 6). Many local governments have incorporated these policies in their comprehensive plans and land use controls for rural areas particularly in Dakota, Scott and Carver Counties and limited areas of Washington and Hennepin.

LAND USE CONTROLS

Land use controls provide less certainty in long-term protection of aggregate resources. The effectiveness of controls depends on their ability to limit or control the development of conflicting land use. If the land is leased or owned by an operator for the purpose of future mining, restrictive land use controls would be acceptable and probably requested by the owner. Where the resource is owned by a nonoperator for the purpose of developing the land for housing, a shopping center or other intensive use, restrictive controls would not be acceptable and may be resisted by the owner. Currently most of the region's potential resources are owned by nonoperators.

Under the limitations of the police power, local land use controls must allow a property owner a reasonable use of land and return on the investment. Restricting or limiting land use to protect the resource may limit the nonoperator's plans to develop the land particularly if the protection extends for many years. The property owner may view the controls as unreasonable in view of the uncertainty of future mining and the use restriction and bring suit claiming the controls are a

taking. Local governments need to be concerned not only that the regulations could be overturned by the court but that the community could also be liable for damages. Additionally, the community would bear the costs of defending the controls in court. These problems indicate that land use controls may not be an effective method of long-term resource protection in every situation and must be applied carefully with attention to the characteristics of the particular area and the legal ramifications.

The types of land use controls that might be considered include:

Special Extraction Districts

The simplest method is to designate the area as an exclusive extraction or mining district. Only mining is permitted by right. Other compatible uses may be permitted by a special permit. This approach is advantageous to owners of adjoining property because it clearly indicates the community's intention to permit mining. Unless the land is owned by an operator the property owner may resist or challenge the designation.

Overlay Districts

Under this approach the aggregate resources are placed in an overlay district or zone. The overlay zone allows mining as a permitted use subject to a local permit, while maintaining the uses allowed by the underlying district designation for the area. For example, the mining of sand and gravel is permissible under the overlay district while the underlying zoning would allow industrial or commercial development. The overlay zone must be drawn carefully so as to avoid conflicts with other permitted land uses which would be sensitive to mining. Sacramento County, Calif., confines the designation to agricultural, industrial and floodplain zones to minimize potential conflicts. The performance standards in the regulations also minimize the impact on adjoining land use.

This approach also provides some warning for adjoining property owners that mining might occur but less than the special district. Although this method encourages mining, it will not assure long-term protection. Unless an operator owns or leases the resource, it could be preempted by other permitted land uses. In Sacramento County, Calif., the designation of an overlay zone encouraged operators to acquire deposits in the affected areas.[12]

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[12]Telephone conversation with Alcides Freitas, Environmental Coordinator, County of Sacramento, California.

Protection of Aggregates in Existing Zoning Districts

This approach involves mapping mining into existing zoning districts. Use districts which could be compatible with mining or minimize conflicting development such as agriculture and industry are included in the designation. Most residential and some commercial use districts would preclude future mining because of the potential conflicts or costs of removing the existing uses. Mining is allowed only by the approval of a special or conditional permit. Unless the operators own the land the potential resources will not be protected for long, particularly in an urbanizing community. This approach provides less warning to adjoining property owners because of the lack of certainty.

PROTECTION LEGISLATION

Two states--California and Colorado--have passed significant legislation for the protection of aggregate resources.[13] The California Surface Mining and Reclamation Act and the Colorado Mineral Land Reclamation Act were passed in the early 1970s. The Colorado law applies only to the nine urbanizing counties in the Denver metropolitan area. The California legislation applies to several urbanizing areas. The legislation appears to have been passed in response to increasing industry and public concern that significant portions of the remaining resource were being lost to urban development and mining permits were becoming increasingly difficult to obtain due to local public pressure. The legislation is unique in that the protection of aggregates and other minerals has been made a matter of public policy in recognition of their importance to the states economies.

Both laws require that local governments include plans for the protection of the resource in local comprehensive plans. Both states provide information as to the location, general type and quality of the resource in the local community.

The California Mining and Geology Board classifies the potential resources and designates deposits of regional or state-wide importance. Deposits in urbanized areas are excluded. Areas are classified based on the estimated 50-year market and a minimum threshold value for all deposits. The information must be included in the local plan and the state must approve the local policies and any amendments before they can be adopted by the local government. Local plans are to emphasize the conservation and development of identified significant mineral deposits.

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[13] Telephone conversation with Richard Morris of the National Sand and Gravel Association, March, 1985.

Under the Colorado legislation, local governments are also to consider such factors as other master plans, the impact on the surrounding area, the ability to reclaim the land, maximization of the extraction and the quality of life of surrounding residential areas. Once the plan is adopted, the local government is prohibited from allowing a use of land in an area containing a commercial mineral deposit which would interfere with mining. Zoning the deposits for agriculture and other uses which do not include a permanent structure is allowed.

An official of a local mining company in Colorado indicates that the legislation and planning effort has failed to meet its objectives. In particular, local governments failed to identify specific areas for protection and rezone the land to conserve the deposits. This means the operator must attempt to secure the rezoning for specific sites. This generates all the usual political pressures to deny the change.[14]

In both instances, the specific method for protecting aggregates is left to the local governments. If the local government controls only those lands owned by the industry, then long-term protection is probably assured. If the regulations do not allow a reasonable interim use and return on the land of nonoperators, owners may resist controls or bring suit claiming the taking of property rights or overregulation. Until the law has been tested in court, its effectiveness cannot be evaluated.

The legislation does establish the protection of the resource as a public purpose and may give added support to the adoption and implementation of plans and land use controls for resource protection. The legislation may also give the industry more leverage in seeking local government approvals for mining. Whether the law achieves long-term protection will be determined in the future.

PROTECTION OF EXISTING MINING OPERATIONS

Existing mining operations sometimes need protection by local governments in order to maintain their long-term viability. The problem is due to changing local land use patterns. Mines are frequently located in rural or undeveloped areas to avoid conflicts. As urban development occurs in the surrounding area, conflicts develop. If the land use changes to residential, the conflicts may become acute. The growing residential population may be sensitive to the truck traffic and the nuisances associated with mining. At the time of permit renewal, which occurs annually in most communities, there will be pressure from the surrounding property owners and residents to deny the permit or limit the operations.

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[14] Letter to Carl J. Schenk, Metropolitan Council from James B. Cooley, President, Cooley Gravel Co., Dated Aug. 7, 1981.

Local governments can provide for the protection of existing mines in order to maintain their long-term viability. First, in permitting mining operations local governments can evaluate the potential for land use changes in the surrounding areas and place or add conditions to the permit to minimize conflicts, for example, requiring additional screening or wider setbacks from adjoining property. Second, the potential for conflicts can be addressed in the local comprehensive plans. Land use plans for areas adjoining existing mines can designate future uses that are less sensitive to the potential impacts of mining, for example, industrial or commercial development rather than residential development.

The protection of existing mines is sometimes difficult because of pressure from surrounding landowners. Individual landowners seek to achieve the highest and best use of their property rather than to minimize the conflicts with the neighboring land uses. There is no requirement that communities protect the viability of the mining operation.

CONCLUSIONS

SUFFICIENCY OF CURRENT INFORMATION

1. Existing information on the location and estimated volume of potential aggregate resources is sufficient to determine whether there is a need to protect the resource in the Metropolitan Area. The data indicates there is a supply of 4.6 billion tons of potential sand and gravel and crushed rock resource in the seven-county region whereas the demand is 15 million tons per year. Additionally, undelineated, potential resources are located in the surrounding counties outstate and in Wisconsin and could provide a portion of the region's future needs.

2. Existing site-specific information for the Metropolitan Area is inadequate for the purpose of protecting specific areas. More detailed surveys of the potential resources in the region to delineate commercially viable deposits are not necessary at the present time, given the large volume of potential resources. These surveys are costly and are typically undertaken by the industry in selecting specific deposits for mining.

3. Existing information on the approximate location, general suitability and extent of aggregate resources is sufficient to assist local governments in planning for the mining of the resource to minimize future conflicts and the impact on community development.

NEED TO PROTECT THE RESOURCE

4. There is no need for legislation mandating regulations for broad-scale protection of aggregate resources at the present time. There is potentially a 200-year supply of unencumbered aggregate resources in the Metropolitan Area, based on known consumption and supply estimates. This supply could be extended by the importation of aggregates from outside the region and the use of substitute materials or recycled aggregates such as highway pavement.

5. The private market and aggregate mining industry have been successful historically in identifying and developing commercially viable resources adequate to meet the region's needs and have the capacity to do so in the forseeable future. Recent information indicates the industry is able to obtain permit approvals for sufficient new or expanded mines to maintain a 10-year supply of reserves.

6. The process of obtaining local permits is at times difficult and uncertain for the industry. However, the industry has been successful generally in obtaining the necessary approvals.

7. The long-term protection of aggregate resources not owned by the industry would be costly or uncertain. Public acquisition or leasing would insure protection of the resource, but the costs could be high due to the extensive area and land values involved. The effectiveness of local land use controls such as zoning is uncertain because of the potential conflicts with the rights of private landowners to a reasonable use and return on their investment.

PLANNING FOR MINING

8. Aggregate is an essential resource for the continued economic development of the region.

9. Local governments with potential aggregate resources should share the task of providing the region with access to an adequate supply of aggregate for future needs. Potential aggregate resources are concentrated in some subregions while the resources in other areas may not be adequate to supply the local demands in the future.

10. Although the industry has been generally successful in obtaining local government permits to mine, this has not been without difficulty and uncertainty particularly for major, long-term operations. Mining is perceived as a nuisance--a locally unwanted land use.

11. Local land use decisions in the form of comprehensive plans and land use controls will affect the industry's ability to supply the region with aggregate in the future. Most local comprehensive plans do not recognize the location and regional importance of aggregates or provide for the mining of the resource. Most local land use controls view mining as a nuisance rather than the protection of a resource.

12. Despite the lack of consideration for aggregate resources and mining in most local comprehensive plans, the industry has been generally successful in obtaining permits for new and expanded operations. There is no need to require local communities to plan for aggregate resources and mining at the present time.

STANDARDS FOR MINING AND RECLAMATION PERMITS

13. The diversity and lack of specific standards in many local mining/reclamation controls are a problem for the industry and local communities. There is little certainty or consistency for the industry as to how permits will be reviewed and evaluated, what conditions will be placed on them and how this will affect the feasibility of a proposed or existing operation. At the same time many local governments lack adequate standards for evaluating and minimizing the impact of proposed mining activity. Uniform, state-mandated standards administered by local governments would provide increased certainty and consistency for the industry and strengthen the ability of local governments to evaluate and control mining/reclamation activity.

RECOMMENDATIONS

1. The legislature should establish a committee of appropriate technical experts to review and recommend appropriate standards for mining and reclamation to be used by local governments in evaluating operations, reviewing permit applications and setting conditions for permits. The committee should recommend standards appropriate to mining operations in both rural and urban environments, determining maximum standards for such concerns as noise, dust, hours of operation, haul routes, vibrations and safety. If the legislature were then to adopt these standards, they would be mandated. Communities should be allowed to adopt less restrictive standards or exclude standards, but communities may not exceed the standards or add to them.

2. The Metropolitan Council should provide the following materials to assist local governments in planning for mining:

   a. Information regarding the location, importance and regional need for aggregates.

   b. Information on the potential impact of mining/reclamation and on measures to mitigate these.

   c. Examples of or model ordinances and standards for the management of mining and reclamation of aggregate resources.

   d. Information indicating alternative approaches to preparing local aggregate resource plans.

3. The statewide study to identify and classify potentially valuable outstate aggregate lands should give a high priority to delineating and estimating the volume of potential resources in Sherburne and Wright Counties.

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Appendix A

STATE OF MINNESOTA

SEVENTY-THIRD SESSION

S. F. No. 881

Introduced by Schmitz.
Read First Time May 5, 1983 and Referred to the Committee on Environment and Natural Resources.
Committee Recommendation and Adoption of Report: To Pass as Amended Apr. 11, 1984.
Read Second Time Apr. 11, 1984.
Unofficially engrossed and printed for the House to include committee amendments of Apr. 11, 1984.

A bill for an act

relating to local and urban government; providing for the inventory, classification, and protection of aggregate deposits or resources within the state; creating an advisory committee within the metropolitan area; proposing new law coded in Minnesota Statutes, chapter 84.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MINNESOTA:

Section 1. [84.92] [AGGREGATE PLANNING AND PROTECTION.]

Subdivision 1. [PURPOSE.] It is the purpose of this act to protect aggregate resources; to promote orderly and environmentally sound development; to spread the burden of development; and to introduce aggregate resource protection into local comprehensive planning and land use controls.

Subd. 2. [DEFINITION.] For the purpose of this act, "municipality" means a home rule charter or statutory city, or a town.

Subd. 3. [IDENTIFICATION AND CLASSIFICATION.] The department of natural resources, with the cooperation of the state geological survey, departments of transportation, and energy, planning and development, outside of the metropolitan area as defined in section 473.121, shall conduct a program of identification and classification of potentially valuable publicly or privately owned aggregate lands located outside of urban or developed areas where aggregate mining is restricted,

without consideration of their present land use. The program shall give priority to identification and classification in areas of the state where urbanization or other factors are or may be resulting in a loss of aggregate resources to development. Lands shall be classified as:

(1) Identified resources, being those containing significant aggregate deposits;

(2) Potential resources, being those containing potentially significant deposits and meriting further evaluation; or

(3) Subeconomic resources, being those containing no significant deposits.

As lands are classified, the information on the classification shall be transmitted to each of the departments and agencies named in this subdivision, to the planning authority of the appropriate county and municipality, and to the appropriate county engineer. The county planning authority shall notify owners of land classified under this subdivision by publication in a newspaper of general circulation in the county or by mail.

Subd. 4. [LOCAL ACTION.] Each planning authority of a county or municipality receiving information pursuant to subdivision 3 shall consider the protection of identified and important aggregate resources in their land use decisions.

Sec. 2. [METROPOLITAN AREA APPLICATION.]

Subdivision 1. [ADVISORY COMMITTEE.] An advisory committee on aggregate resources within the metropolitan area, as defined in section 473.121, is created. There shall be 15 members of the advisory committee who shall be appointed by the metropolitan council after consultation with appropriate metropolitan interest groups. At least two members of the advisory committee shall be members of municipalities that use aggregate resources, two members shall be from municipalities that produce aggregate resources, three members shall be from metropolitan county government, three members from the aggregate resource industry, the commissioner of natural resources or his or her designee, the commissioner of the department of

transportation or his or her designee, and the chairman of the metropolitan council or his or her designee who shall be the chairman and shall provide administrative support to the advisory committee. Members of the advisory committee shall serve without per diem compensation.

Subd. 2. [REPORT REQUIRED.] By December 31, 1985, the advisory committee shall submit a report to the legislature that:

(1) identifies whether currently available information on the quality, quantity, and distribution of the aggregate resource is adequate to allow reasoned decisions on the need to introduce aggregate resource protection into local comprehensive planning and land use controls;

(2) recommends a procedure for identifying the degree of protection desirable for the long term availability of aggregate resources; and

(3) recommends a method to protect aggregate resources for the long term.

Appendix B

METROPOLITAN COUNCIL
Suite 300 Metro Square Building, St. Paul, Minnesota 55101
612-291-6359

DATE: March 25, 1985

TO: Aggregate Resources Advisory Committee

FROM: Carl Schenk, Parks and Environmental Planning Department

SUBJECT: Technical Subcommittee on Field Survey Needs and Costs

A technical subcommittee met on Mar. 20, 1985, to review and refine the estimates of the amount of additional field data and cost of obtaining it as previously discussed by the Aggregate Resources Advisory Committee.

Present were Peter Dunning, J.L. Shiely Co.; Gary Meier, Minnesota Geological Survey; Warren Pladsen and Rudy Ford, MnDOT; Gary Sauer, Barton Sand and Gravel; Terry Swor, Twin City Testing and Carl Schenk, Council staff.

The consensus was that the best approach was to estimate the amount of data necessary (borings and lab tests) to eliminate an area. This approach recognizes the problems inherent in attempting to estimate the amount of data needed before knowing what the homogeneity or heterogeneity of the area is (sand and gravel deposits may vary significantly over short distances).

The subcommittee suggests the following approach to the problem: Stage I in the process would involve some reconnaissance time--a review of the existing data such as aerial photos, topographical maps, soil maps and soil borings. The area would also be physically inspected. The purpose is to define the geological subfeatures and plan the location of additional borings.

Stage II in the process would involve the elimination of areas as potential aggregate deposits. The amount of data necessary would be much less than that required to characterize the quality of a deposit. For example, it might be necessary to do six to eight borings to characterize the quality of a 40-acre parcel, but only three to four borings (660-foot centers) to eliminate the parcel.

The number of borings and costs would vary with the size of the area being surveyed. For example, it might be possible to survey a square mile area with 30 to 40 borings or substantially less than three to four per 40-acre parcel. (Four borings per parcel equal 64 per square mile). Stage I would assist in minimizing the number of borings.

A minimal level of laboratory testing of some of the samples taken would be necessary to characterize the gradation and amount of deleterious material. This is consistent with the types of data the Aggregate Resources Advisory Committee concluded to be necessary for a local community to delineate potential deposits.

The following cost estimates would result from this approach. These costs do not include the time and costs for obtaining access to the property to do borings and to locate utility alignments which may be a hazard. The local community may have the latter information.

40-Acre Parcel	Square Mile
$3,000-$4,000 Includes Stage I (review of existing information and field inspection) and Stage II (3-4 borings and lab tests for gradation and percent of deleterious material. Borings would be 40-45 feet deep with a 10-inch auger.	$30,000-$40,000 Includes Stage I costs and Stage II with 30-40 borings and lab tests.

Related Question

Would the survey work be done in all potential, unencumbered resource areas or only in those areas identified by local governments through local planning?

03.25.85