

# THE SOCIAL/ECONOMIC IMPACTS OF RESOURCE DEVELOPMENT AND ENGINEERING INTERVENTIONS ON LAND USE IN BOTH URBAN AND RURAL AREAS

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*Hierdie artikel dui die noodsaaklikheid aan om sosiale met ander waardebe- palings aaneen te skakel, en omskryf die sosiale impakbepaling met oorweging van sekere wanopvattinge oor sosiale impakbepalingswerk. 'n Tabel wat moontlike databronne aantoon, word gevolg deur 'n voorgestelde raamwerk vir die bepaling van grondgebruikim- pakte.*

*In hierdie raamwerk word aangedui watter grondgebruikinligting benodig word vir die voorbereiding van impak- verslae, onderverdeel in grondgebruik- aktiwiteite, verbeterings, grondgebruik- ekonomie en grondbesitstelsels en kon- trole. Benaderings en metodes vir die bepaling van grondgebruikimpakte word kortliks bespreek.*

*Ten slotte word 'n model voorgestel wat*

*die raamwerk vorm vir die aanbieding van die impakontleding, gevolg deur 'n hipotetiese voorbeeld en 'n gevolgtrek- king.*

Paper presented to Transvaal provincial planners in Jan. 1984 and to Natal regional branch of Eppic in Feb. 1984.

## INTRODUCTION

Human nature compels us to alter the natural environment for our benefit and seems to allow us to discount the future harmful effects of our actions. No one, who reflects on our increase in lifespan, in personal comfort and in material well-being can doubt that such alterations have created a better life for many. Less fortunate people have come to expect this progress. But these improvements come with a serious cost in environmental problems that affect all people, and we are beginning to pay that cost now without realising how great it is (Ruthawn, C. 1975).

With resource development and engineering interventions these environmental costs occur in both, natural (physical, ecological) and social, (urban, historical, cultural economic) areas.

The purpose of impact assessment is to measure the cost before it is incurred, thus enabling us to decide whether or not the promised benefits are worth their price (Ruthawn, C. 1975). For the Environmental Impact Assessment (EIS) to be meaningful and useful, the analysis must be done early in the planning stage, and in all cases prior to the agency decision to undertake the project or the action (Jain, R. K. 1978).

## LINKING SOCIAL AND OTHER ASSESSMENTS

To date in all studies of factors and aspects of the environment, those in the

human realm have been particularly troublesome, because human variables do not generally fit well if at all into the established analytic schemes of those who study non human environmental variables. Most troublesome of all has been the so called "social" area of the environment, an area which has been defined to include different combinations of societal, cultural, political and psychological variables (Gold, R. 1978).

In the human realm social pertains to interactions, relationships and whatever else goes on between and among people as they attempt to fit their behaviour together. Since "culture" refers to that which makes up social interaction (i.e. language, knowledge, artifact, etc.) it is evident that economic and political are special parts of the social and cultural and are thus subsumed thereunder. So too, is the psychological. It is conventional to hyphenate pairs of these terms, e.g. socio-economic, socio-biological, etc., and through this process of linkage to understand the linkages and interactions, in rural areas leading to impacts between people and the soil; watersheds; wildlife, the weather and aspects such as resource development i.e. open or mined coal development, construction of water reservoirs (dams), etc.

## WHAT IS A SOCIAL IMPACT ASSESSMENT (SIA)?

According to Gold (1978:107) this is:

- An analysis of past and present im-

pingements upon social conditions and processes.

- A projection of likely future consequences of proposed interventions upon these aspects of life.

Such interventions, which invariably affect social interactions and relationships, are ordinary combinations of natural resource and artifactual development.

The central question addressed in a social impact assessment is: What difference is the proposed development making and likely to make in the lives of residents of the area targeted for development? The question is asked from the points of view of:

- The residents of the target area
- Residents of areas adjacent to the target area
- Public Agency Officials (Municipal, Provincial, Escom, Rand Water Board, etc.)
- Business and industry if involved
- Construction workers
- Any others significantly involved in and with the development.

To answer the central question an attempt must be made to find out what changes are taking place and are likely to take place as a result of anticipated and actual development, and how these changes relate to and differ from those which would happen for other reasons.

The meanings that people give to these changes define the social costs, and adequate knowledge of social costs is a

necessary condition for achieving competence in social research, planning and decision making.

### MISCONCEPTIONS IN SIA WORK

Again according to Gold (1978:109) there are various misconceptions with regard to SIA and one of the most common is to confuse socio-economic with social phenomena. Ordinarily, a careful examination of the socio-economic impact will indicate that impacts are economic rather than social, or show 90 per cent economic and 10 per cent social. For example information gathered on community services usually consists of employment and operating cost figures. Whether these data are called social data or labelled as socio-economic these are usually treated separately without taking into account the relationships between them and the information which should have been collected on the social aspects of the community agencies. Some of the social aspects of the community are:

- The agencies objectives
- Methods of organising to achieve these objectives
- Methods of offering jobs and career opportunities
- Their functioning as social organisations
- Their presentation of themselves to the public and each other
- Their place in the total way of life of the community

Employment and operating cost figures only take on social relevance when given social meaning. Unless there is an effort to find out about these social meanings, data which are potentially socio-economic will continue to consist of economic facts about social organisations – facts which do not include the critical relationships between social costs and economic benefits.

The recent announcement by City Council of Pretoria, which favours high rise/high density development in parts of Hatfield is an example of where in an assessment it would be easy to show potentially large economic benefits, but to fail to assess the socio-psychological costs to residents of the area who:

- Have no desire to sell their property
- Have no desire to be surrounded by high rise development
- Have no capability of developing their own property
- Have a fear of increase in population,

**TABLE 1: DATA SOURCES FOR SOCIAL IMPACT ASSESSMENT**  
(Burge, R. J. et al 1978)

<p>I RSA Dept. of Stats.</p> <p>A Census of Population</p> <ol style="list-style-type: none"> <li>1 Area and Population size</li> <li>2 Urban population proportion</li> <li>3 Labour force composition</li> <li>4 Productivity of the population</li> <li>5 Extreme incomes</li> <li>6 Educational attainment</li> <li>7 In- and out-migration</li> </ol> <p>B Census of agriculture</p> <ol style="list-style-type: none"> <li>1 Value of farm products sold</li> <li>2 Average farm size</li> <li>3 Agriculture tenure classes</li> </ol> <p>D Census of business and industry</p> <ol style="list-style-type: none"> <li>1 Per capita retail sales</li> <li>2 Economic complexity</li> <li>3 Unemployment rate</li> <li>4 Government complexity</li> </ol> <p>II RSA State &amp; Provincial Records</p> <p>A Marriage rate</p> <p>B Birth rate</p> <p>C Death rate</p> <p>D School attendance records</p> <p>E Public assistance payments</p> <p>F Local educational expenditures</p> <p>G Permits for resource or mineral removal</p> <p>H Reported criminal activity</p> <p>III Private Records and Reports</p> <p>A Per capita disposable income</p> <p>B Median family income</p> <p>C Bank receipts</p>	<p>IV Provincial and other local Authority Records</p> <p>A Improved local highways</p> <p>B Record of deed transfers</p> <p>C Value of real property</p> <p>D Per capita local expenditure for education</p> <p>E Land use patterns</p> <p>F Relief expenditures</p> <p>G Other measures</p> <p>V State and agency reports</p> <p>A Co-operative extension service</p> <p>B Soil conservation service</p> <p>C Farmers droughts relief</p> <p>D Department of Health, Education and Welfare</p> <p>VI Archive information</p> <p>A Newspaper reports</p> <p>B Official transcripts of public hearings</p> <p>C Cost-benefit analysis of present and proposed projects</p> <p>VII Data from personal interviews</p> <p>A Personal and family background variables</p> <p>B Socio-economics status</p> <p>C Attachment to place and ancestral ties</p> <p>D Identification with community</p> <p>E Previous occupational and geographic mobility</p> <p>F Attitudes toward and knowledge of resource development and development in general</p> <p>G Quality of individual and family life</p> <p>H Participation in public decision making</p> <p>I Industrial variables</p>
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- noise, crime, traffic and air pollution
- Fear the thought of the necessity of ultimate relocation
- Fear disruption as a result of increased population on existing schools, bus services and other community organisations such as churches, youth organisations and other social organisations. These types of social costs though difficult to quantify by any standards, monetary or otherwise, are nevertheless very real.

One problem in linking social to non social data is the existing firm belief that “hard” data (i.e. numerical or quantitative) is always preferable and superior to “soft” data (i.e. narrative or qualitative) because the former is thought to be objective and the latter is considered subjective. This belief is not true because in its original, raw, in-the-life empirical form social behaviour is

qualitative and not numerical, thus it must be recognised that much of the social is distorted or lost in translation to any analytically convenient numerical form. This belief must be replaced with the assumption that the best data is that which is generated and presented to be most faithful to the empirical world under study (Gold, 1978:109 and 111). In social impact assessment the collection of social data may present problems. Table 1 suggests types of data required in assessing land use impact with possible sources.

### LAND USE IMPACTS: A CONCEPTUAL FRAMEWORK

Berns (1977) states that virtually every dimension of the human environment, that is our physical, psychological, social, and economic well-being is related in some manner to the use of land, thus

the relationships between land use and the size, distribution, and composition of human populations have long been of interest to sociologists, demographers and planners.

The field of community-environmental health has been concerned with the physical and psychological effects of land use on human populations, such as impacts from crowding, substandard neighbourhood conditions and proximity of incompatible land uses.

Of all the relationships between effects on land use and other categories of social impacts generated by resource development the most basic concept with which a person attempting to assess the social impacts of a development project in the preparation of an Environmental Impact Statement (EIS) is that "CHANGES IN LAND USE ARE BOTH THE CAUSE AND EFFECT OF IMPACTS ON OTHER SOCIAL VARIABLES", for example the construction, extension or improvement of highways may be immediately caused by increased traffic volume stemming from regional economic and population growth which in turn may reflect changes in land use such as the development of major industrial plants, shopping complex, etc.; conversely the highway project may be a direct cause of other significant social impacts such as the encouragement of land use conversion along transportation corridors with the attendant consequences of increased noise, aesthetic effects and changes in land values. (US Dept. of Transportation, 1972)

#### LAND USE INFORMATION IN PREPARATION OF IMPACT STATEMENTS

As there are no formulas or equations that can be "plugged in" to data concerning any proposed resource development or engineering intervention to identify specific land use impacts it is necessary to develop a conceptual framework to form the basis of any approaches or methodologies adopted in the preparation of the assessment. It must be emphasised that factors which affect the utilization of land must be examined from several perspectives to ensure a comprehensive identification and evaluation of potential impacts on land use. In addition the ways in which land use impacts may effect other

socio-economic phenomena must also be analysed and presented.

As is often the case when a subject encompasses a diversity of interests the concept of land use has evolved and expanded until there exists no clearly defined boundaries that distinguish land use from other social economic or environmental variables. Thus in response to the involvement of a broad spectrum of academic disciplines of planning, economics, sociology, political science, law and ecology, the concept of land use has undergone a transformation away from a narrowly defined concern with the type of human activity that takes place on land towards a broad multidimensional concept which attempts to deal with the entire range of human interrelationships with land (Clauson, M. et al 1965).

In the development of a conceptual framework for the assessment of land use impacts it is necessary to distinguish those aspects or dimensions of land use that are essential to an assessment of a project impact on human environment. These aspects are:

- Land use activities
- Improvements to land
- Land use economics
- Land tenure and controls (Berns, T. D. 1977)

#### LAND USE ACTIVITIES

Gold (1978:111) states that land use activities involve changes in the type of human activity that takes place on a particular piece of land. It is often referred to as land use conversion. These changes in activity can lead to conflicts between:

- Particular types of land use and the ecological capabilities of land (McHaig, I 1969; Pepper, J. E. 1972)
- Encroachment of urban land use activities into areas of prime agricultural land (Californian Government Code 1965)
- Changes in land use activities associated with development of large water resources
- Change in land use activities due to transportation projects (US Dept. of Transportation, 1972)

The impacts on land use activity attributable to development projects involve several distinct subcategories of changes in land use such as:

- The addition of new types of land use

activity and the deletion of existing uses

- The addition of compatible with existing activities resulting in multiple land use
- The development on the intensity of land use may be significant in that these changes will affect other social and environmental variables.

Impacts on the intensity of land use may be initiated in a variety of ways by a development project such as:

Agricultural use of the natural productive qualities of the land may be altered and increased by the provision of irrigation and drainage

The intensity of commercial, residential or recreational uses may be affected by availability of services and utilities such as improved roads, sewers, water, fire and police protection

Amenity factors (Weiss, S. F. et al 1966), which include:

- Aesthetically attractive natural or man made views,
- Availability of nearby recreational opportunities
- Pleasing climate
- Presence of unique historical or cultural areas

With most types of development projects there are likely to be two spatial levels or spheres of impacts on land use activity. A project may involve:

- An immediate conversion of land to new types of activity at project site
- Intensification of activities at the project site
- The second or macrosphere: Impacts likely to occur incrementally throughout the project area, which will be more difficult to link directly to the project.
- Outside of the immediate project site increases in productivity and changes in area cropping pattern may generate "stemming and induced" economic benefits which will involve further changes in land uses (Ekstein, O. 1958).
- Increased employment opportunities may stimulate demands for increased residential land use.

#### IMPROVEMENTS TO LAND

Berns (1977:113) holds that improvements to land can be defined as any modifications that affect the utility of land for a particular human activity.

This definition is clearly non-normative in the sense that improvement does not imply any increase or decrease in absolute social or economic benefits that may be associated with the alteration of land. The improvement of land for one activity will often render the land less attractive or totally unsuitable for other activities, e.g. improvements to a highway may necessitate the destruction of homes or businesses (US Dept. of Transportation 1972; Berns, T. D. 1977).

Although impacts on improvements to land will in most cases be very closely related to changes in land use activity patterns, it is important to distinguish these two categories of land use patterns, since each may have distinct consequences for other socio-economic variables which influence the human environment.

Social impacts associated with improvements to land has perhaps been most visible in regard to quality of:

- Residential
- Commercial
- Recreational

developments in urban and rural areas with particular regard to aesthetic effects, which may result from addition, removal or alteration to existing vegetation or land forms. Other impact factors are:

- The condition of residential or commercial development in terms of general state of repair
- The adequacy of insulation from weather and noise
- The provision of adequate privacy
- The provision of sufficient floor space all of which will have significant physical and psychological impacts
- Size and composition of both temporary and permanent population
- Prices and rents associated with improvements can be expected to have effects on demographic variables
- Historical and cultural values in the project area.

#### LAND USE ECONOMICS

The third major category of land use impacts involves the effect of development projects on the economics of land use. Perhaps the most significant determinant of the manner in which land is used, or misused, is the interplay of

economic forces that together account for area prices, rents, and market activity (e.g. large shopping centre replacing smaller shops) (Berns, 1977:115).

Before dealing with the economics of land use and other social impacts, it is necessary to introduce three basic concepts applied in land use economics, these being:

- Land rent which has been defined as “the economic return that accrues or should accrue to land for its use in production” (Raleigh, B. 1972)
- Use capacity of land resources. This refers to “the relative ability of a given unit of land resource to produce a surplus of returns and or satisfactions above its cost of utilisation” (Raleigh, B. 1972)
- Intensity of land use. This deals with the intensity of use in terms of the intensive and extensive margins of land use (Raleigh, B. 1972). The intensive margin refers to the factors of production as labour and raw materials that a parcel of land can utilize. The extensive margin of land use has been described as “the no rent margin at which land under optimum conditions will barely yield enough to cover the cost of production” (Ekstein, O. 1958).

#### THE ECONOMICS OF LAND USE AND OTHER SOCIAL IMPACTS

There are many relationships between impacts on land use economics and other categories of socio-economic impacts such as:

- The direct relationship between the timing rate and magnitude of land use conversion and various economic factors affecting land use (Weiss, S. F. et al 1966; Raleigh, B. 1972; Smid A. A. 1968).
- Prices and rents charged by owners will affect the composition and size of temporary and permanent populations.

#### LAND TENURE AND LAND USE CONTROLS

According to Berns (1977: 120, 123), with regard to land tenure, a plethora of socio-economic factors associated with ownership of land play a substantial role in land use decisions. For example an owner faced with potential

changes in use capacity of his land faces three options:

- He may choose to develop the property
- He may sell all or parts of the property
- He may choose the no development option

Any one of these options may be exercised for a variety of reasons. The socio-economic variables which can be expected to influence these decisions are:

- The age of the owner
- The length of ownership
- The ability of the owner to raise development capital
- The cost which would be incurred in land use conversion (Burley, R. J. III et al, 1972; Burley R. J. III 1971)

In addition to the role of the landowner a number of public and private controls may have significant effect on the type and intensity of land use.

The public controls in South Africa are usually of a statutory type in the form of legislation at various Governmental levels:

- |                  |  |
|------------------|--|
| Municipal        | – Building regulations, town planning schemes, etc.          |
| Provincial       | – Town Planning Ordinance and Regulations                    |
| State Government | – Mining, water resources, forestry, agricultural acts, etc. |

The private controls, include the various covenants, conditions and restrictions which may be attached to a parcel of land by the owner at the time the land is sold for development. A typical South African condition is the reservation of mineral rights.

Many deeds of transfer in South Africa still contain restrictive land use conditions in regard to size and value of dwelling which may be erected on the stand; type of roof and wall finishes and types of pets or other animals allowed. In the case of sectional titles development the owner is forced to pay a levy and other assessments to the Body Corporate.

A development project may affect land tenure and land use controls by:

- Purchases of property rights in the area
- Purchases of easement or servitude rights for rendering sewer or water lines
- Displacement of population

It is thus clear that the effect of a development project on land use planning within the project area is particularly important in an assessment of land use impacts.

### **APPROACHES AND METHODS FOR THE ASSESSMENT OF LAND USE IMPACTS**

The development of methodologies for identification and evaluation of land use impacts is still in its infancy. Numerous texts, articles and reports have dealt with relatively narrow problems concerning the identification and measurement of impacts on the human environment (Burley, R. J. III and Weiss, S 1972; Burley R. J. III 1971; Guttenburg, A. Z. 1967; Guttenburg, A. Z. 1965; Dickert, T. G. 1974; Isard, W. 1960; Schoenman, P. S. et al 1974).

The report by Schoenman, Phillip and Muller "Measuring Impacts of Land Development: An Initial Approach" (1974) provides an outline for the development and utilization of land use impact measures, and presents examples of methods and procedures for the collection and analysis of data that can be utilized for the assessment.

The remainder of this paper will suggest other approaches for the identification and evaluation of land use impacts.

### **STAGES IN LAND USE IMPACT ASSESSMENT**

The assessment of land use impacts may be viewed as a three stage process (Berns, T. D. 1977):

- 1 Analysis of existing land use within the target area.
- 2 Identification of all possible impacts on land use.

3 Evaluation of the nature and magnitude of land use impacts.

All four categories of lands use variables, viz.:

Land use activity

Improvements to land

Land use economics

Land tenure and land use control

should be examined at each of the three stages.

It is assumed that planners are familiar with methodologies for analysing existing land use within the target area. The importance of defining the target area, but of keeping an open ended area boundary in mind must be stressed.

Data for land use is available from numerous sources such as:

On site collection

Local authority records

Aerial photo

The description of existing state of improvements will require an on site survey.

An aspect of area land use that will often require the collection of primary data by on site surveys is the condition of the visual environment. Attempts to assess the aesthetics impacts of development projects have been plagued by a lack of method for portraying objectively the existing aesthetic environment. A methodology, applied at Lake Tahoe (McEvoy., J. III and Williams, S. 1970 & 1971), involves the division of the studied area into measured sections and on site recording and coding all visible artificial and natural objects within each section. From this recording and coding summaries are prepared for each field section including variables such as:

- The total amount of blocked footage from the road expresses in linear meters

- The total amount of open spaces expressed in linear meters

- The total linear meters of power lines

- The total number of objects recorded

- The preliminary land use type (activity) expressed to 2 digit level of the USA Federal Standard Land Use Code (or South African equivalent)

- The secondary land use type

- The total view potential of the section

Any survey of improvements to land should attempt to evaluate both the present condition of structures and the external effects of these structures on surrounding, where external effects are defined as those factors that effect the suitability or desirability of surrounding parcels for particular types of human activity.

Table 1 illustrates the variety of external effects that may be associated with existing improvements to land.

Collection of Data should be undertaken to assess land use economics and land use tenure and land use control.

Many sources of land use information provide data series that can be used to construct trends for particular aspects of and use for particular aspects of land use for example it may be possible to identify trends in:

Rates and types of new construction in the area

Vacancy rates

Land prices and rents

These trends should be presented as part of the analysis and impact assessment.

Table 1 External Effects Associated with Improvements to Land (Berns, 1977: 128-130)

SOURCE	NUISANCE OR HAZARD							Hazards to Morals and the Public Peace	Pollution of Land or Water
	Night Glare	Noise and Vibration	Objection- able Odors	Fire and Explosion	Smoke or Dust	Vermin, Rodents and Insects	Traffic Accidents		
<b>TRANSPORTATION</b>									
Railroads	●	●	***	***	●	***	●	***	***
Airplanes	***	●	***	●	***	***	●	***	***
Street traffic	●	●	●	***	***	***	●	***	***
<b>INDUSTRY</b>									
Metal products (extraction, processing)	●	●	●	***	●	***	***	***	***
Heavy machinery (manufacturing)	●	●	***	***	●	***	●	***	***
Light machinery (manufacturing)	●	●	***	***	***	***	●	***	***
Transportation (storage, servicing, repair)	●	●	●	●	***	***	●	***	***
Stone, clay and glass products (extraction and processing)	***	●	***	***	●	***	***	***	***
Building construction materials (manufacturing, storage)	***	●	***	●	***	***	●	***	***
Petroleum and coal products (extraction, processing, storage, servicing)	●	●	●	●	●	***	***	***	***
Forest products and paper (processing, manufactu- ring and storage)	***	●	***	●	***	***	***	***	●
Chemical and related products (manufacturing, processing, storage)	***	***	●	●	***	***	●	***	●
Textiles, leather and furs (processing, manufactu- ring, storage and repair)	***	●	●	●	***	***	●	***	●
Foods (processing, manu- facturing, storage, servicing)	***	●	●	***	***	●	●	***	***
<b>COMMERCE</b>									
Warehouses	***	●	***	***	***	●	●	***	***
Retail stores of various types	●	●	***	***	***	***	***	***	***
Poorly maintained food stores	***	***	●	***	***	●	***	***	***
Bars and taverns	●	●	***	***	***	***	***	●	***
Night clubs	●	●	***	***	***	***	***	●	***
Poolrooms, etc.	●	●	***	***	***	***	***	●	***
Houses of prostitution	***	***	***	***	***	***	***	●	***
Gambling places	●	●	***	***	***	***	***	***	***
Sports arenas and other large-scale commercial amusements	●	●	***	***	***	***	●	***	***
<b>MISCELLANEOUS</b>									
Refuse dumps	***	●	●	***	***	●	***	***	***
Junk yards	***	●	***	***	***	●	***	***	***
Storage of miscellaneous waste products	***	***	***	***	***	●	***	***	***
Sewage disposal plants	***	***	●	***	***	***	***	***	●
Garbage disposal plants	***	***	●	***	●	***	***	***	***
Improper waste disposal from off-site structures	***	***	***	***	***	***	***	***	●
Dilapidated abandoned structures	***	***	***	***	***	●	***	***	***
Vacant lots in insanitary condition	***	***	***	***	●	●	***	***	***

SOURCE	NUISANCE OR HAZARD								
	Night Glare	Noise and Vibration	Objection-able Odors	Fire and Explosion	Smoke or Dust	Vermin, Rodents and Insects	Traffic Accidents	Hazards to Morals and Peace	Pollution of Land or Water
Open land, unplanted (such as unsurfaced playgrounds and playfields and ploughed unplanted farm land)	***	***	***	***	●	***	***	***	***
Farms, especially dairy and animal husbandry	***	***	●	***	***	●	***	***	***

\* Additional traffic loads and hazards may result from the presence of industry, commerce, warehousing and large-scale entertainment in built-up areas. For that reason they should be considered sources of potential traffic accidents, although the actual accidents are caused by street or railroad traffic servicing the establishments.

The following model can form the framework for presentation of the impact analysis:

Land use	Existing land use	1 Direct conversion of land to new or multiple use activities
	Identification of Impacts	2 Alterations of land forms availability of services other factors affecting intensity of land use
	Evaluation of nature and magnitude of Impacts	3 Generation of demands for particular land use activities 4 External factors may affect present and potential land use activities 5 Significant evaluative criteria in each case
Improvements to land	Existing Improvements	1 Quantitative factors relating to improvements to land
	Identification of Impacts	2 Qualitative factors relating to improvements
	Evaluation of nature and magnitude of Impacts	3 Significant evaluative criteria
Land use Economics	Existing land use economics	1 Factors that may affect market prices of land
	Identification of Impacts	2 Factors that may affect the costs associated with land use activities
	Evaluation of nature and magnitude of Impacts	3 Significant evaluative criteria

## Land tenure and land control

Existing tenure and controls

Identification of Impacts

Evaluation of nature and magnitude of Impact

- 1 Factors affecting land ownership
- 2 Factors affecting land use control
- 3 Significant evaluative criteria

The following examples of impacts for the four categories of land use variables may be used as a guide to Impact Studies. These are given in summary form:

### Land Use

- Direct conversion of land to new or multiple use activities – consider both additions and/or deletions

Significant criteria –

- (a) Amount of land involved
- (b) Number and type of activities added or deleted
- (c) The significance of these changes in terms of land use patterns as a whole;
- (d) Location of areas to be converted in relation to the project location and to other significant area land use features

- Alterations of land forms, availability of services, accessibility and other factors affecting the intensity of area land use

Effective evaluative criteria:

- (a) Amount of land affected
- (b) Location of the impacts
- (c) Estimates of no. of persons and parcels affected
- (d) Measures of the potential magnitude of increase and/or decreases.

- Generation of demands for particular land use activity

Stemming and induced demands e.g. residential

Significant evaluative criteria:

- (a) Indicators of potential magnitude i.e. amount of in or out migration
- (b) Estimates of economic opportunities
- (c) Assessments of presently existing area capabilities

- External factors that may affect present and potential land use activities. Include external affects associated with construction and operation of a development project such as smoke, dust, glare, odours, noise.

Significant evaluative criteria:

- (a) Estimates of magnitude such as decibels of noise, amounts of particulate matter emitted
- (b) Estimates of amount of land affected
- (c) The number, types, intensities, and location of existing land use activities that may be affected
- (d) The nature and magnitude of any presently existing external affects that might be mitigated or eliminated.

### Improvements to Land

- Quantitative factors relating to improvements to land, include the number and rate at which the improvements are expected to occur

Significant Evaluative Criteria:

- (a) Measurement of number and types that are likely to occur
- (b) The amount of land that may be affected
- (c) The significance of the amount of land that may be involved

- Qualitative factors relating to improvements; these include the nature of improvements, addition or deletion of improvements, and changes in natural land forms and vegetation

Significant Evaluative criteria:

- (a) Technical specifications concerning improvements
- (b) Descriptions of land use activities either enhanced or restricted
- (c) Aesthetic significance

### Land use economics

- Factors that may affect the market prices of land:

Significant Evaluative Criteria:

- (a) Purchase price of land acquired for the development
- (b) Possible indicators of potential appreciation or depreciation
- (c) Possible indicators of effects on market prices

- Factors that may affect the costs associated with land use activities – these include the effects of the project on various costs of production that are necessary for land use activities.

Significant Evaluative Criteria:

- (a) Estimates concerning the nature and amount of changes in costs of production for various land use activities
- (b) Estimates concerning the amount and location of land that may be affected by changes in costs of production
- (c) Estimates of prices and rents charged for various land use activities

### Land Tenure and Land use Control

- Factors affecting area land ownership, such as property rights, mineral rights, servitudes, right of way, etc.

Significant Evaluative Criteria:

- (a) Estimates of number of fee and non-fee rights that might be affected
- (b) Estimates of number of owners affected
- (c) Location of purchases
- (d) Estimates concerning the effects of economies of scale on existing ownership pattern.

- Factors affecting area land use controls; these include possible consequences of external effects on present and future zoning; population

economic impacts on planning base studies and transportation.

#### Significant Evaluative Criteria:

- (a) Estimates of the nature magnitude and location of external effects
- (b) Consideration of the magnitude of demands for various land use activities
- (c) Descriptions of the effect of present land use controls on the project

### EVALUATION OF LAND USE IMPACTS

The evaluation of land use impacts remains a difficult problem. Various methodologies have been suggested, but it is not the intention to discuss these in this paper. Instead the reader is referred to Theodore D Berns: (1977). The assessment of land use impacts.

### SUMMARY AND CONCLUSIONS

All the ways in which development projects and engineering interventions can affect land use cannot be discussed in one paper. The purpose of the preceding discussion was hopefully to suggest that the person charged with assessing the socio-economic impacts of projects on the human environment can approach the assessment in a systematic and comprehensive manner, to identify and evaluate significant land use impacts.

### NOTES

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