LARGE-SCALE HOUSING PROJECTS

1. Large-scale housing projects are residential developments with multiple units designed as integrated schemes on single tracts of land and cover a range of development types, from subdivisions to entire cities

   At the upper end of the scale the category would include the residential sectors of new towns and cities.

   Housing is an obvious and pressing human need. Until quite recently, the formidable task of providing sufficient housing for a burgeoning world population has overshadowed environmental considerations.
   However, with increasing pressure on land and resources has come a growing understanding of the major and severe environmental impacts generated by large-scale residential development. Many of the problems encountered in providing housing are themselves environmentally related, such as the increased costs of developing environmentally valuable, difficult, or hazardous sites.

Characteristics of housing construction

2. Depending on the needs of the community, and the local sociopolitical framework, housing may be provided by either the public or private sectors, or a combination of both. Frequently the formal process is inadequate for community needs, and people provide their own housing using whatever materials and land is available. Most governments ultimately legitimize this squatter process by providing services and legalizing ownership. In some instances, sites and services are provided by a government agency and the units are built by individual residents. Large-scale housing projects, therefore, can come in several forms, from

traditional public housing, government assisted private housing, upgrading of existing informal housing, and new sites and services projects, all of which are included in this section of the sourcebook. The lower end is more difficult to determine because of the ease with which housing schemes can be split into smaller phases to avoid categorization. However, 10 hectares are sometimes used as the lower limit of development size for compliance with certain environmental regulations, and this might be a reasonable working limit for single family detached housing, attached, courtyard, and other types of low-rise schemes, regardless of the number of units. When a number of small projects begin to aggregate into a larger neighborhood, they should be treated as a large project, since experience suggests that the environmental impacts will be just as severe as a single large project, and perhaps even greater, because there may be less enforcement of regulatory standards.

3. The housing issue is closely linked to the conditions of human life, and because of possible damage that may arise in case of poor planning of residential construction, it is important to pay particular attention to environmental and social assessments of housing projects construction

Potential Environmental Impacts

Direct Impacts

4. Impacts related to the project siteThere are many natural and manmade conditions that have serious negative impacts on the living environment and preclude the choice of a particular site; for example, flood dangers, unstable soil conditions, seismic or volcanically activity, highly saline soils, etc. Man-made conditions are related to waste disposal areas and land that has been subjected to industrial or

extractive processes, such as mining (for further explanation, see Table 1 at the end of this section).

5. Direct environmental impacts of housing, development occur at regional, local and site scales. The largest regional effects occur from the loss of land; prime agricultural land is often the major resource lost to development. Forests, wetlands, and habitats containing rare and endangered species, etc., are all threatened if adequate regional planning policies are not implemented. Care should therefore be taken to ensure that the long-term value of such lost or disrupted resources is identified and balanced against the need for housing.

6. Residential development contributes to air and water pollution from heating and cooling fuel use and sewage, etc. Increased solid wastes and traffic also can be expected.

7. Disruption of existing natural systems from poorly designed projects accelerate erosion and siltation, affecting both surface and groundwater quality. Groundwater quantity may be diminished due to extraction and decreased infiltration of rainwater. Increased runoff and flooding occur due to the increased impervious area (e.g., paving), and removal of vegetation and disruption of natural drainage patterns. Existing streams experience more extreme flood/drought cycles. Stormwater drainage and sanitary waste systems tax the absorption and treatment capacity of local soils and drainage networks, and groundwater becomes polluted. Erosion, subsidence, landslides, and other mechanical failure of soils and subsoils occur on improperly developed sites, particularly where there are steep slopes. Removal of vegetation may affect local climatic conditions, causing extreme temperature fluctuations and greater exposure to wind and solar radiation.

Construction Impacts

8. Building sites during construction are particularly vulnerable to environmental disturbance. . Therefore, many seriously damaging and unnecessary impacts to the environment occur. Vegetation is removed, exposing the soil to rain, wind, and other disturbances. Excavation and grading further exacerbate this situation. Runoff increases resulting in erosion and siltation. Heavy machinery and the storage of materials compact soils making them less permeable and destroying their structure. Vegetation that is not removed may be damaged by construction equipment. Construction activity also affects the immediate surroundings of the site, e.g., by the congestion of existing roads and access points and increased noise and dirt and also accident.

Indirect Impacts

9. 9The manufacture, extraction, or harvesting of materials, such as bricks, cement and aggregates, coral, lumber, etc., increases during construction. This may temporarily benefit the local economy, but it may also result in shortages, the wasteful exploitation of natural resources such as forests, or the overtaxing of the local labor force. Induced development may also occur due to changes in movement patterns caused by, for example, activities displaced by the new housing. Involuntary resettlement of existing populations may also be a factor

Indirect impacts associated with specific problems

The accommodation as type of development

10. While housing projects can consume considerable amounts of land they are composed of small individual units. The unitary quality of housing makes it very flexible, adaptable to almost any environment. This can be disadvantageous environmentally since it is relatively easy to build in unsuitable areas and ignore impacts and hazards at the outset. It also means that EA requires a broad knowledge of environmental impacts at many different scales..

11. In some countries and areas where such models are not necessarily adapted to local conditions and needs, the project did not sufficiently taken into account in an integrated way, the social and economic environment in the planning components and this either inhibited the development of the project or impacted significantly the natural and social environments.

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Cultural/Environmental Relationships

12. Assessments of environmental impacts of large-scale housing projects requires an understanding of indigenous lifestyles and preferences in order to achieve and maintain sustainability. New development can damage the existing cultural fabric of a region or neighborhood. A community derives its character from many generations of interaction between the people and their surroundings. Large-scale housing development introduces change not only to the natural environment, but to these living patterns, to people's relationship to the land; and the effects on the people can be significant.

13. In traditional societies, an enduring relationship between a community and the land it occupies normally indicates a relatively stable ecological balance. The relationship may not be as productive and symbiotic as in a natural ecosystem, but it is stable on a human time scale. Therefore, the extent to which a large project disrupts traditional relationships to the land should be assessed.

Mitigating Measures

The following measures suggested by the West African Development Bank constitute directives which the projects in which the bank invests should follow

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Choice of the site

Siting of projects to avoid ecologically sensitive, difficult, or unsafe areas is the best and most costeffective way to minimize environmental impacts. To properly evaluate choice available, a regional data-base should be developed to identify and map principal environmental resources, such as major drainage patterns, freshwater and coastal wet-lands, forests and other important natural habitats, prime agricultural land, etc. Where a regional database has not been developed, satellite data, aerial photography, data from academic or commercial sources, or local anecdotal information may provide a useful approximation. Such an analysis can eliminate the least suitable sites from consideration..

Site Analysis and Evaluation

14- After the initial site choice has been made, a site analysis and evaluation will identify potential environmental impacts. The goal is to understand how the site works; an extensive inventory is less important

than to understand the essential nature of the site. Usually, only a few factors are critical to providing this basic overview of the site terrain, water regimen, soils and vegetation. However, a good topographic base map, with equidistant curves of 60 cm, is essential to site analysis and should be required on all projects.

Flexibility strategies

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11. Once the site analysis and evaluation is complete, there are several possible approaches for ensuring that a project is environmentally sound. Regulations for the protection of environmental quality are

necessary, but at best, they can ensure only that minimum standards are achieved. A more effective approach is to design environmentally adaptive strategies that are built into the projects from the outset. Such strategies are derived from understanding and emulating natural models. Using permeable paving to allow percolation of water back into the soil, stabilizing steep slopes with vegetation, and treating wastewater with biological methods are examples of adaptive strategies that have been developed in recent years. Many others are possible and Assessments of environmental impacts should be designed to foster such innovative approaches..

This type of adaptive approach may be limited by the flexibility of local regulations, working customs, cultural expectations and affordable costs. However, experience has shown that it is invariably more cost effective than more conventional methods, once an appropriate idea is understood and accepted. For example, the preservation and use of natural drainage patterns for new projects, in lieu of piped or concrete channels with curbs and inlets, has been shown to improve flood control while lowering costs substantially. Such techniques following natural models gain economically because they require less maintenance usually.

Simplified site development guidelines to assist the developer and designer work with the site's natural characteristics should be written for all projects. The goal is to integrate environment awareness into the entire design of the project, minimizing the need for costly after-the-fact mitigation measures.

Design and Planning Standards

18. Evaluation of design and planning standards applied to a project may also be necessary to achieve environmentally sustainable performance, particularly if innovative adaptive strategies are to be encouraged. Building and planning standards in many developing countries were originally based on models from the industrial countries, and may be inappropriate. Standards for street widths, set backs, etc., may be overly generous, forcing consumption of too much land and increasing costs for roads and services. Reducing such requirements, provided open space set-asides are made to conserve critical environmental areas, should prove economical and environmentally beneficial as well, since less land is consumed per unit.: Management, Training, and Monitoring

16. Planners, designers, engineers, public officials in charge of project regulation and execution, developers and contractors should be educated to the environmental problems caused by many conventional development practices. Training is also required in effective site evaluation, for which an ecological perspective is needed. The person(s) conducting the EA should be familiar with the basic natural habitats of the region. After a project is complete, residents, managers, maintenance people and local officials, should be instructed in the purpose of its design and its recommended maintenance. Simplified guidelines for operation and maintenance should be distributed to encourage continuing support and understanding of the design and to build a sense of community in the new project.

Monitoring of environmental conditions is necessary to ensure that systems continue to operate as they were designed. Such monitoring requirements should be identified during the Assessments of environmental impacts, e.g., testing the quality of groundwater where wells are in use. Technical and institutional capability for monitoring should be established or strengthened as necessary, as part of the project requirements.

Agency Coordination .

Since environment has not been of great concern to governments in the past, environmental responsibilities are often fragmented between many different agencies. The trend has been to approach this problem by forming new environmental departments (e.g., ministries) in the government. The existence of such agencies will not necessarily ensure environmental quality. They may need to be supplemented with environmental units in the implementing ministry (e.g., the ministry of (housing) and at the site. Above all, effectiveness can be greatly enhanced by building grass-roots understanding and support in the affected communities and NGOs

Table 1. Impacts of large housing development and mitigation measures

Potential negative impacts	Mitigating Measures
direct impacts	
1. Displacement of land uses	Ensure that the siting of the project is done in a consensual manner and meets the regulatory requirements for land use in the country, find adequate alternatives to pre-occupation of the land

	• Review standards of planning and design to ensure that they are adapted to local conditions and avoid unnecessary waste land. •
2. Destruction of environmentally sensitive areas.	Identify and protect fragile ecosystems or international magnitudes (large forest areas, major water bodies and wetlands, habitats of rare or endangered species, etc.) by laws, ensuring that they will not put threatened by the project location.
3. People exposed to danger caused by natural conditions.	Ensure that the project site is not located in the following locations • floodplain importance • flooded coastal areas • unstable ground conditions or bad basement • land containing a high concentration of salt • land subject to landslides • excessively wet or steep places • where the presence of disease vectors pose a danger and regions where natural danger occur Develop plans adapted to the conditions it is not possible to move the project.
4. Populations exposed to anthropogenic risks	Identify and avoid areas become dangerous due to human activities such as land filled in the land where the basement is used, groundwater and mineral deposits, oil, etc.. and therefore are prone to subsidence.

	• Know the locations likely to be spilled or were dumped solid waste, or toxic liquids. • Inspect the site using appropriate geotechnical and chemical techniques. • Ensure that the financial provisions and technical skills are available to overcome some problems. • Investigate other possible locations
5. Populations exposed to air pollution, water and noise generated by certain types of uses of adjacent or nearby land.	• Ensure that the location is away from these sources. • Do not locate major sources of air pollution that produce, for example, clouds of smoke blown by the wind. • Identify cones noise around airports, major roads, etc.. • Provide sufficiently large buffer zones between residential areas of pollution sources. • Take steps to reduce, if possible, the pollution at the source by building, for example, noise barriers along the expressways. • Investigate other possible locations.
6. Populations exposed to air pollution due to the location of the land in an area subject to frequent reversals barometer.	6. • Find other locations if existing sources of pollution are difficult to control. • Establish, in addition, a project that is accompanied by methods of heating, cooking, etc.. which are non-polluting. If not consider other locations
7 . Disaggregation of existing communities.	Ensure that the displacement takes place in an appropriate and consensual manner,

8 . Destruction of historical or cultural heritage	• Consider alternative or provide for the protection of historic sites culturally rich locations. • Adapt the project design to include the historical and cultural heritage.
9 . Overloading of infrastructure and services in place	• Coordinate all planning programs and objectives for the region. • Improve, where possible, existing infrastructure and services. • Consider other possible locations
10 . Excessive depletion of resources such as timber or heat and pressure on local industries , brick , for example.	• Examine, if possible, the ability of local resources and industries to manage large construction and development • Select materials and develop project design using criteria based on local conditions and resources available in the region. • Develop techniques for using materials and energy with maximum efficiency. • Encourage the creation of anthropological studies of indigenous habits and technical construction to integrate them into the project design. • Import certain materials where local resources are limited and the production capacity of the industry is low
Impacts on the location and the local	

11 . Infringement of the community and damage to adjacent properties due to a disturbance of the natural environment and in particular of the soil, vegetation and drainage system (further details are provided below) .	• Determine, first, essential natural systems on the site and its surroundings and then protect preserving open spaces, rights of way, buffer zones, etc.. • Adjust the set up structures to natural rather than applying with rigid geometric structures
12 . Accomodation fragmentation leading to their degradation	Preserve and / or design the layout of green space network in order to meet the common natural features, the valleys of rivers, for example, by creating spaces of local or regional scale.
13. Worsening flood cycles / low flow , increase of erosion and siltation and degradation of freshwater biota and riparian vegetation due to increased water runoff issued by developed areas	• Protect existing drainage systems when the site is stable. • Maintain vegetation, especially if it is intact natural habitats. Develop a plan for stormwater management that takes into account the following: • Reduce impervious surfaces as possible • increase the infiltration capacity through the use of areas of recharge • • provide storm basins or retaining controlled water outlet.
14. Depletion and / or pollution of local groundwater resources	• Use engineering techniques "soft" to stabilize soils and banks, through vegetation, for example (soil bioengineering) in preference to building

	structures. • Avoid the use of open ditches, sprinklers or other expensive irrigation techniques in order to develop landscapes in areas with dry climate. • Use local vegetation including water demand is lower, use the techniques of drip. • Make sure the soil is adapted to receive septic tank or treatment system in a similar location. • Develop centralized networks that prevent leakage. • Develop a system of stormwater management as suggested above, using vegetation to retain, renew and purify rainwater.
15 . Degradation of soil cover by erosion , clearing / destruction of soil structure caused by compaction	• Provide plans against erosion which are both temporary (during construction) and permanent. • Temporary control plans should include: • filter sediment • temporary pools with sediment traps • protection of exposed soil with mulch or seed (on steep slopes, in particular) • the access of heavy equipment and materials storage restriction to avoid soil compaction • Permanent plans against erosion should focus on establishing stable set of native vegetation. • Ensure that the surface soil is on the site, cleared and set aside for future use rather than illegally being evacuated from the scene.

16. degradation of vegetation by excessive clearance with mechanical methods.	• Determine the importance of plant communities, contiguous forests and other natural habitats, vegetation on steep slopes, riverbanks and natural vegetated ditches. • Consider these places in the plans or provide open spaces. • Protect these areas of construction by installing temporary fences preventing the gear from getting into or storage materials are deposited there.
17. Accomodation degradation caused by improper installation or by the introduction of exotic species to spread rapidly .	• Protect natural habitats by avoiding the need for actions or destructive maintenance practices that include, for example, to remove vegetation undergrowth or excessively clear the banks of a watercourse water. • Have the necessary information on the species to be used in landscaping or reforestation plans