

DRAFT GUIDELINES  
FOR BUILDING ENVIRONMENTAL PROTECTION  
AND ENHANCEMENT  
INTO  
NEW URBAN PLANS

for  
Shkodra, Vlore, Kamez, Durres, Korce, Gjirocaster, Berat,  
and Lushnje

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# **DRAFT GUIDELINES FOR BUILDING ENVIRONMENTAL PROTECTION AND ENHANCEMENT INTO URBAN PLANS**

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## **INTRODUCTION**

1. These draft guidelines explain how to assemble environmental baseline information that will be used to support the preparation of the new Urban Plans<sup>1</sup> for Municipalities in Albania.
2. The Draft Guidelines will be used by officers of the municipalities and by consultants who are being appointed to assist in producing the new Urban Plans.
3. A workshop will be held in the week beginning 7 January 2008 to test the Draft Guidelines. The Guidelines will be revised, as appropriate, in the light of the comments received and a final set of Guidelines will be circulated shortly afterwards.
4. The Draft Guidelines focus, at this stage, on the gathering of information and its presentation in GIS baseline maps. Further advice will be prepared on producing a scoping report for use in Strategic Environmental Assessment (SEA) as applied to plans and programmes.

## **PREPARATION OF THE GUIDELINES**

5. These guidelines have been prepared following a 16 day visit to Albania by the author in November 2007 during which the territories of the eight municipalities were inspected and discussions were held with members of the councils and planning and environmental officers from the eight municipalities (16 were interviewed in total). A separate report on the findings of these visits is being produced and will be circulated later.
6. Individual visits and discussions confirmed the importance of establishing more accurate information about the state of the environment within and surrounding each authority's area. The officers made it clear that very little information currently exists in an accessible form about the environment. Most authorities have only limited staff resources and expertise that can be directed towards this work. Four of the eight authorities have a member of

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<sup>1</sup> New Municipal Urban Plans are being introduced in Albania and will include a City Development Vision, Regulatory Plan, Structure Plan, Strategic Infrastructure Investment Plan and action plan.

staff with environmental qualifications but the others have no internal expertise to call upon.

7. The discussions also involved representatives from National Ministries and regional agency offices, (Regional Environmental Agency, District Forester, and Ministry of Health). These sessions confirmed the importance of ensuring that the environmental component of Regulatory Plans receives a major input from national and regional specialists. Environmental issues transcend arbitrary administrative boundaries and are often cumulative in nature. In consequence, development pressures which are remote from an authority's area are still capable of causing major environmental damage within it through dispersal of air and water pollution.

## **THE NEED FOR ENVIRONMENTAL INFORMATION**

8. There are a number of reasons for collecting and publishing environmental information. These include:
  - Preparing urban and rural development plans,
  - Creating sustainable development strategies,
  - Adopting environmental standards and developing indicators,
  - Controlling specific sources of pollution, and,
  - Regulating and monitoring large scale projects that require environmental impact assessment.
9. Different frameworks have been adopted in individual countries for managing these processes. These include the European Eco-Management and Audit Scheme (EMAS), Integrated and sustainable planning and management of the urban environment (ENVIPLAN), City and Local Environment Accounting and Reporting (CLEAR) and elements of Strategic Environmental Assessment and Sustainability Appraisal (SEA-SA). While these related processes have all been considered in preparing these guidelines, the conditions in Albania are sufficiently different to warrant its own process.
10. In view of the short timescale in which the new Regulatory and Urban Plans are to be produced, and the limited resources involved, the Draft Guidelines have been carefully tailored to meet the specific conditions in Albania. The aim is to provide a practical framework and set of tools that can deliver an appropriate level of information in a two-three month period. This will allow key environmental concerns to be included within the Urban Plans. In the longer term (i.e. by the time the first five year review is undertaken in 2013) the techniques should be refined to provide the level of information which is required in environmental surveying and modelling practises that are used in more developed European planning systems.
11. It is important to note that much of the information that is required for an environmental survey can also be viewed as essential baseline information for planning itself. Consequently, there will be a degree of overlap between the two sets of data. In this draft of the guidelines a comprehensive approach has

been taken to describing both environmental and planning needs and it may be appropriate to separate some of the elements at a later stage.

## **DESCRIPTION OF THE NEW PLANNING PROCESS**

12. Important changes are being made to Albania's planning system and a new Policy Paper on Territorial Planning has been prepared. Based on this, a new law on Urban Planning is being drafted. Each municipality will be charged with preparing a Municipal Urban Plan for its area. The authorities will be supported by international and local consultants who are being recruited and financed under a joint Albanian-World Bank Project.
13. The essential steps in the planning process to be used over the next year will include:
  - Preparing an Inception Report,
  - Assessing strengths, weaknesses threats and opportunities (SWOT analysis),
  - Formulating a City Development Vision and Strategy,
  - Preparing a Municipal Structure Plan,
  - Developing a Strategic Infrastructure Investment Plan,
  - Creating the Regulatory Plan,
  - Consolidating the results into a Municipal Urban Plan, and,
  - Developing an Urban Planning Guidance Manual.

## **THE ROLE OF ENVIRONMENTAL INFORMATION**

14. Environmental information will play an important role in setting the context for the Inception Report and subsequent SWOT analysis. Protection and enhancement of the environment should also feature strongly in creating the vision, determining investment priorities and ultimately ensuring that high environmental standards and a good quality of life is achieved for all citizens.
15. The environmental topic areas covered in the guidelines have been selected with reference to a number of sources including the European Union Directive<sup>2</sup>, the contents of the Law on Environmental Protection (2002), and the Law on Environmental Impact Assessment No 8990, (2003). These topics are:
  - Air Quality and Climate
  - Water and Drainage
  - Geology and Soils

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<sup>2</sup> The 'SEA' Directive (2001/42/EC) on the Assessment of the Effects of Certain Plans and Programmes

- Flora and Fauna (Biodiversity)
- Population and Human Health
- Land Use
- Transport
- Waste Disposal
- Recreation and Open Space
- Cultural, Archaeological, Historic and Architectural Value
- Urban Design Quality
- Hazards and Risk

## **DISCUSSION ON INDIVIDUAL TOPIC AREAS**

### **Air Quality and Climate**

#### ***Statement of Issues***

16. A number of factors influence air quality within urban areas. Of these the most critical are exhaust fumes from vehicles, although industrial air pollution remains a serious issue in towns that have heavy industries with gaseous emissions (this is not generally the case within the eight towns included in the current project). Other traffic nodes (like bus stations and airports) can generate high levels of air pollutants, and reference should be made to these facilities in Urban Plans where appropriate.
17. Climate also has a direct impact on environmental conditions. In summer and in drought conditions dust can become a significant health hazard.
18. Air quality monitoring does not appear to take place in most towns according to advice from those officers who have participated in the initial field visits.

#### ***Recommendations***

19. There is a clear need for mobile laboratory monitoring of air quality to be introduced to major urban areas in order to provide baseline information on CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>x</sub> and other gaseous emissions and on particulates (PM<sup>10</sup>). However, such equipment is expensive to hire and the data needs to be collected for several years before trends can be observed. It is unlikely, therefore, that any detailed analysis of air quality can be included in the current plans.
20. Nevertheless the issue is too important to ignore. Efforts should therefore be made at this stage to identify any industrial plant known to have substantial flue or chimney stack emissions and to mark these sites on a GIS base map.

21. In addition primary road corridors should be identified and all intersections where traffic congestion is common and vehicles remain stationary for long periods should be marked as potential sources of air pollution. These potential key sources of air pollution should be identified now so that the relevant research can be undertaken as soon as the financial resources become available.
22. As a first step in creating the framework for air quality monitoring, the following information should be recorded and plotted.

### **Industrial Sites**

Location	Description of Plant and likely emissions (e.g. products of thermal combustion / chemicals)

### **Transport - Areas subject to above-average air pollution risk**

Time Interval Minutes in any hour (between 06.00-22.00) when heavy traffic is stationary or near stationary	Description of Road Intersection, or constricted road corridor
10-15	
15-30	
30-45	
45-60	

### **Water and Drainage**

23. The heading 'Water and drainage' covers a wide range of natural and human environmental issues. These are broken down here into Natural Drainage, Water Supply and Waste Water Disposal.

#### **Natural Drainage**

##### ***Statement of Issues***

24. Under the natural hydrological cycle, rainfall either soaks into soils and rock to recharge underground aquifers and re-emerge in springs or it runs off the surface of the land. In many of the new urban areas in Albania, flooding

frequently occurs because new development prevents rain water from draining into the soil or following its natural course to the nearest river.

25. In addition, both deliberate and accidental clearance of vegetation (including trees and forests) on hill slopes has the effect of speeding up surface runoff, washing off the soil and clogging river channels with silt which adds to flood risk.
26. Many of the rivers in Albania are ephemeral (drying up in Summer) and the nature of the topography and geology results in two main types of river channel. These are fast flowing steep mountain streams and rivers and large braided channels which meander across the plateaux and plains. Some fast flowing rivers have been converted into hydro-power reservoirs, and there are few natural fast-flowing rivers within the eight municipal areas, although Berat is a notable exception. Slower flowing braided channels are more common within the municipalities, although these have often been canalised through the urban areas, or are heavily exploited for sand and gravel to make concrete aggregate.
27. In general, streams and rivers within the eight municipality areas are in very poor condition. Water quality is invariably poor due to the amount of untreated sewage effluent and industrial waste which is discharged to the rivers. In addition the deposition of waste and disturbance caused by mineral extraction and new development has destroyed much of the natural riverside and aquatic vegetation.
28. Studies are being undertaken by the Ministry of Environment with the aim of introducing a classification of the water quality and biological health of Albania's rivers but this classification has not yet been adopted. In the meantime a simple classification system is proposed for the Municipal Urban Plans which can be revised in the light of a future national survey.

**Recommendation**

29. All natural and artificial drainage channels which pass through existing or potential development areas should be identified on plan and zones which are liable to flooding should be clearly marked.
30. Natural and artificial drainage channels will be identified under the following classification.

**Table Water Quality in Channels and Water Courses**

Channel Width (at bank top level)	Artificial (excavated or canalised)	Natural (Streams / Rivers)
1- 2 metres		
2-5 metres		
5-10 metres		
Above 10 metres		

Note: Each section of channel should be given a grading from A-E

Basis of classification

Artificial (excavated or canalised)	Natural (Streams / Rivers)	Category / Quality Assessment
Free flowing. No obstructions. No debris or waste. Banks and channel well maintained.	Free flowing No evidence of pollution. Crystal clear water. Banks with vegetation undisturbed. Aquatic plants and fish known to be present.	A = Very Good
Channel largely unobstructed. Regular maintenance takes place. Channel functions well under normal and flood conditions	Channel largely unobstructed. No obvious sources of pollution. Water may be discoloured by sediments. Banks in reasonable condition. Aquatic plants and fish known to be present.	B = Good
Channel still functions for its designed purpose despite low maintenance and accumulation of debris.	Some obstructions to free flow may be present. Water is reasonably clear Banks retain some vegetation Aquatic plants and fish known to be present.	C = Moderate
Channel is blocked by debris and is seldom maintained. Water flow is seriously impeded under flood conditions	Channel may be partially blocked with debris. Water shows obvious signs of pollution. Waste tipping has occurred on banks. No evidence of aquatic plants and fish unlikely to be present.	D = Poor
Channel fails to meet its designed purpose. Choked with debris, flow prevented under both normal and flood conditions.	Much debris. Heavily polluted Strong odour No aquatic life (fish or plants)	E = Very Poor

## **Sewerage and Waste Water Disposal**

### ***Statement of Issues***

31. In most municipalities waste water disposal gives rise to significant environmental concerns. It is commonplace for waste water outfalls to discharge direct to watercourses, lakes or the sea without any form of treatment.
32. In some municipalities only a small proportion of residential and other properties are serviced with a network of waste water collection pipes. Much of the informal housing is likely to rely on septic tanks for waste water disposal or may have no sanitation at all.
33. Where waste effluent is collected by pipeline a problem may still remain that there is no secondary or even primary treatment before the effluent is finally discharged directly to open water.

### ***Recommendations***

34. It is recommended that maps are prepared, using GIS, to show three categories of waste water collection and disposal by area. These are:
  - a) Serviced areas: parts of the Municipality that are fully serviced with a network of waste water collection sewers to which every property has a legal connection.
  - b) Partially serviced areas: Areas where adequate septic tanks are known to exist even though these are not connected to any primary or secondary treatment facility.
  - c) Un-serviced areas: parts of the Municipality where no information exists about the type of waste water disposal or where it is known that waste water is discharged direct to the soil, a water course, lake or the sea.
  - d) Plans should also show the precise route of existing sewer pipes and any primary or secondary treatment works.
  - e) Attribute tables should be added to the GIS maps giving details of any primary or secondary treatment that is undertaken.

## **Water Supply**

### ***Statement of Issues***

35. Water supply is critical to the normal functioning of all settlements and water supplies need to be protected and improved in all municipal areas by controlling development at the source and along supply corridors.
36. Significant health hazards can arise where water supply pipes are laid alongside waste water sewers within the same land corridor, or even in a shared trench. There is always the risk that pipes may be fractured by the passage of heavy vehicles or ground movements which can lead to seepage of

sewage into the drinking water supply pipe. This problem may be exacerbated where illegal connections are made to either pipe. This situation is said to exist in Berat, and Kamez, but it may well exist in other municipality areas.

37. A bigger long term problem is likely to arise where the main water supply for a town is taken from underground sources which are exposed to development pressures as in the case of Vlore. Although the source of water may be remote from the settlement, informal building can result in a large number of septic tanks being created within the source zone, leading to deterioration in water quality.
38. Another example of a different type of risk is shown in the case of Durres which depends on taking water from an artesian aquifer to the north of the city. This aquifer is probably recharged by water flowing from a gravel outwash fan on a major river. The gravel is regularly extracted for aggregate production which could threaten the recharge capacity of the aquifer leading to both a fall in yield and deteriorating water quality.

### **Recommendations**

39. Regulatory Plans should show clearly the sources of water supplies (if necessary with inset maps for areas that are outside the municipality boundary), and should demarcate the lines of all major water supply pipes. Strict controls should be introduced to prevent unauthorised buildings in supply zones and to protect supply lines from accidental damage.
40. Water Sources and supply lines should be clearly shown on the GIS base plans.

## **Geology**

### **Statement of Issues**

41. The nature of the underlying geology can have an important bearing on stability of buildings in addition to affecting water storage (see previous section). In some of the more mountainous areas, removal of trees (pine forests or olive groves) can lead to landslips and mudslides.

### **Recommendation**

42. Areas that are vulnerable to erosion and landslips should be identified on the GIS base plan.

## **Soils**

### **Statement of Issues**

43. Agricultural soil is a valuable resource, which once removed is lost for ever. Unfortunately random building in Albania over the last ten years has destroyed many thousands of hectares of farmland. Loss of agricultural land

is an inevitable and necessary consequence of development, but it should be controlled so that high densities of development are achieved and the remaining land can still be used for food production rather than ending up with a patchwork of unusable parcels with sporadic groups of housing. Food prices are rising rapidly as the world experiences growing shortages and increased competition. As a result no country can afford to squander large areas of cultivatable land.

**Recommendation**

44. All areas of agricultural land occupying more than 0.5 hectares should be clearly identified on the GIS base map.

**Flora and Fauna (Biodiversity)**

**Statement of Issues**

45. Within the historic core of older towns there are often tree-lined streets and urban parks which are large enough to provide a refuge for birds and other animals. There may also be sections of streams and rivers that have not been canalised and support small mammals, birds and insects. These resources add significantly to the quality of urban living. Unfortunately, there are many other areas (especially within informal housing districts) where virtually all biological interest has been destroyed by recent development.
46. Existing levels of biodiversity are very low in many informal housing areas but opportunities could, and should, be created for establishing new ecological habitats. This requires the identification of open space (which can also serve for recreation) and potential wildlife corridors where trees and shrubs can be planted to link watercourses and urban parks together. It is important that action is taken now and a long term perspective is taken on this issue, because the recent urban sprawl which has taken place around many older towns will otherwise condemn future generations to live indefinitely in a poor quality environment.

**Recommendation**

47. Existing natural resources, including lines of street trees, urban and pocket parks and unlined sections of river channels should be identified and mapped on the GIS base plan.
48. Areas of vacant land still possessing natural soils which have the potential to form links between parks and other natural resource areas should be identified on the GIS base plan.

**Population and Human Health**

**Statement of Issues**

49. The European Union expects strategic environmental assessments to include a review of the population characteristics of the study area and this is

particularly relevant in Albania where there have been, and continue to be, significant internal movements of population. These have been driven largely by economic factors with rural inhabitants choosing to move to the towns in search of job opportunities. Migration within the region has also been a major issue both during and following the hostilities in parts of the Balkans which resulted in the displacement of many people from their homes.

50. Information on demographic characteristics is heavily dependent on the national census and it is expensive to organise separate surveys but it is important to establish the broad socio-economic characteristics of new development areas in order to plan for the required number of schools, doctor's surgeries and other community facilities.
51. Discussions with Ministry of Health representatives indicate that health statistics can reveal distinct environmental problems in a community. For example the number of cases of infectious diseases increases in summer in Vlore. This is due to the rise in population through tourism, increased discharge of untreated sewage from hotel along the coast and the spread of gastro-enteritis and diarrhoea through poor quality bathing water. (It should be noted, however, that new sewers are being introduced and a first stage treatment facility is being constructed).
52. Air pollution (including vehicle exhausts), excessive noise, contact with solid and liquid waste and lack of space for exercise and recreation (especially for young children) are all factors that affect the health of local populations and need to be considered when developing new plans.

### **Recommendations**

53. Data on health can help to pinpoint specific environmental problems like the existence of uncontrolled waste tipping but the information is aggregated to too high a level to make it possible to map the results on GIS. Nevertheless, it is important to capture health statistics to inform the urban plan. The area health office should be consulted to establish whether there are any known sources of pollution that lead to health hazards and the information should then be plotted on base maps.

## **Landscape, Townscape and Urban Design**

### **Statement of Issues**

54. The visual environment plays a major role in shaping the character of settlements and strongly influences peoples' quality of life. There are many attractive towns and villages throughout Albania, where the urban fabric creates an attractive and welcoming setting for everyday life. This includes not only the mountain towns of Berat, Gjirocaster and Korce with their distinctive building styles, but also the central areas of Shkodra, Vlore, Durres and Lushnje with their parks and street trees. Kamez is the only settlement

which lacks a strong visual identity, but even here there is the remnant of the old village centre which could become an attractive focus for the town.

55. There is plenty of evidence that citizens of these towns respect their heritage and old buildings and appreciate fine architecture, but sadly there are also many areas where the environment has been completely ignored while individuals struggle to build new homes and businesses and forge new livelihoods for themselves. Local authorities have insufficient staff or funds to combat illegal waste dumping, to construct and repair local streets or to create new parks and plant street trees. The result is that individual properties may be cared for but the general condition of the urban environment is sadly neglected.
56. Many different factors need to be considered when preparing inventories of the urban landscape or townscape. These include:
  - the density, height and character of individual buildings, and, the way in which individual buildings are grouped together.
  - the condition of footpaths, squares and paved streets which are accessible to all members of the public – sometimes called “the public realm”.
  - the location and condition of street trees,

#### ***Recommendation***

57. Surveys should be carried out to record the density and height of individual buildings in different districts (if this is not already known). In most municipalities it should be possible to define distinct zones according to the age and style of the buildings (for example – historic properties built of stone, wood or brick with stone, slate or tiled roofs; 1940-1970 tenement blocks of apartments; private villas etc.) Identifying these zones will make it easier to define planning policies that are relevant to the character of the properties. (In some cases, for example, Shkodra, Korce, Berat and Gjirocaster, plans have already been made for central historic areas).
58. The condition of pavements, footpaths and public spaces should be surveyed and noted on base plans which can be incorporated in the GIS database. In many municipalities there is a lack of clear demarcation between pedestrian areas and walkways and traffic routes. It has become common practice for drivers treat the pedestrian footways in Kamez as part of the roadway when traffic becomes really congested. This needs to be stopped in the interests of public safety.
59. A wide variety of trees are used to provide decoration and shade in main streets, including pine, lime, plane, magnolia and palms. However, the distribution and number of such trees needs to be greatly increased in order to improve environmental conditions in large urban areas. Trees provide shade, and help to filter out dust and reduce dust and other sources of air pollution.

## Recreation and Open Space

### *Statement of Issues*

60. One of the most essential requirements in planning for municipalities which are rapidly expanding is the creation of new parks and areas of open space where people can exercise and relax. There is also a need to build sports stadia and play spaces for children. Unfortunately this is seldom treated as a priority by local authorities but if a good quality of life is to be provided in Albania's new urban centres this must be tackled with a real sense of urgency.

### *Recommendation*

61. All existing open spaces and parks should be identified and shown on GIS base maps. In addition, vacant land which could potentially be used for these purposes should also be noted on plan.

## Cultural, Archaeological, Historic and Architectural Value

### *Statement of Issues*

62. Archaeological and historical sites and religious and other cultural monuments and sites are already protected under Albanian law but there is a need for constant vigil to ensure that illegal development does not damage either the sites or their setting. It is usually much harder to protect the setting of the historic core of a town, than it is to safeguard individual buildings especially when proposals for new development or the conversion of existing property is planned at some distance from the core area. There are, however, many examples of new development that has been permitted on the edge of the historic core of towns like Korce, Berat and Gjirocaster where tall buildings have interrupted important views or diminished the value of smaller two story historic houses

### *Recommendation*

63. All archaeological, historic, religious, and cultural monuments and sites should be clearly identified on the GIS base maps. Where architectural or other planning studies have been undertaken the boundaries of the relevant areas should also be shown. In cases where there has not been a recent survey but important assets are known to exist, these should be identified as important areas for investigation when funds allow.

## Land Use

### *Statement of Issues*

64. Most municipalities can be subdivided into different land use areas; for example – cultural and artistic, commercial, residential, industrial, sports and

recreation and education. The identification of such areas is an essential first step in starting to develop relevant policies to either preserve such uses or to start to change one use to another where this forms part of a new town vision.

**Recommendation**

- 65. In parallel with the preparation of zoning plans for buildings (see paragraph 57) distinct land use areas should be identified and plotted on base maps.

**Transport**

**Statement of Issues**

- 66. All forms of transport need to be considered within Urban Plans but road transport is undoubtedly the most critical for the eight municipality areas covered by these guidelines. Lack of proper road layouts has been one of the biggest casualties in the rapid expansion of informal housing areas, with some properties being built in locations that will prevent future widening of arterial routes. In some cases there will be no alternative but compulsory acquisition and demolition of such property. In addition, those roadways that do exist often consist of earth or gravel tracks without a hard surface, and without any provision for road drainage.
- 67. Railways also exist in some areas. These were built primarily to service industrial areas and are often disused. However, they should not be ignored as potential transport routes, even if it proves impractical to reintroduce trains. Railway corridors can often be developed as walkways, cycle ways or even bus and tram routes.

**Recommendation**

- 68. The entire transport network should be surveyed and the status, width and condition of all tracks and roads should be recorded, using colours to distinguish different features. Elements of the survey are shown in the table below:

Road Width (Metres)	Presence (Absence) of footpaths	Condition of the Surface: Unsurfaced / stone finish / tarmac	Presence (Absence) of Road Drainage

- 69. Within central urban areas the possibility of pedestrianising streets (i.e. banning the use of all but emergency vehicles) should be considered and shown on base plans where appropriate.
- 70. Major pedestrian routes linking housing areas and places of work or the town centre should also be distinguished on plan.

## Waste Disposal

### Solid Waste Disposal

#### *Statement of Issues*

71. Without exception, current practices for solid waste disposal are unacceptable in all the municipalities visited and pose a serious long term risk to the environment, health, social equality and long term local economic progress of people living in those areas where uncontrolled dumping takes place.
72. Most authorities have instituted a waste collection service which may be run privately, but street collection bins are poorly maintained and often left for long periods without being emptied which results in piles of waste being left in the street.
73. It is also common practice for businesses and private citizens to take waste of all types and to dump this along roadsides without regard for the environment or needs of local residents.
74. Collected waste is taken by truck to disposal areas which are often on the outskirts or beyond the boundaries of the authority area. These disposal dumps are not controlled. Waste simply accumulates unless it rots down or is burnt, either deliberately or through spontaneous combustion.
75. It is not uncommon for poor families to live on the edge of, or even within, dump sites and to scratch a living by recovering waste (plastic and aluminium cans). Pigs are also herded on these sites where they scavenge for food.
76. Most waste dumps are on former derelict industrial sites or on low lying land exposed to flood risk. Air pollution from continuous burning of waste including plastics, oil and chemical residues, wind blown dust and water pollution from leachates all contribute to deterioration in soil and water quality in the surrounding areas and pose health risks for people living in the vicinity. Vegetables grown in the area may be contaminated with heavy metals and pig meat eaten locally or sold in local markets adds the risk of transfer of intestinal and other diseases.

#### **Recommendations**

77. The solution to these environmental concerns requires a concerted effort by all authorities. Critical steps which need to be taken include:
  - Insisting on effective and regular collection of waste,
  - Encouraging sorting and recycling of waste at the point of origin and composting of organic material,
  - Containing and disposing of solid waste within safe and secure landfill sites.

78. Landfill sites need to be engineered so that waste is deposited in pits and covered daily with soil and other inert materials. In the case of larger municipalities with populations in excess of 100,000 people, serious consideration should be given within the lifetime of the new Regulatory Plan period, to introducing more refined treatment of residual wastes.
1. The location and boundaries of existing waste dumps should be clearly identified on the GIS base maps for the new Regulatory Plans.
  2. Existing waste dumps should be included in maps showing 1) potential constraints to new development and 2) areas requiring remedial treatment, given the high risk of land settlement, and the presence of hazardous waste substances within these sites.

## **Hazards and Risk**

### ***Statement of Issues***

79. Hazards constitute activities or events that could be damaging to human welfare, while risks represent the likelihood of such activities or events occurring. In the context of the Urban Plan, the aim should be to reduce both hazards and risks. Examples of potential hazards include:
- Landslides,
  - Flooding,
  - Spread of contagious disease from waste tips,
  - Traffic accidents,
  - Exposure to high levels of air pollution.
80. The amount of effort that needs to be put into combating potential hazards depends upon the complexity of the issue, the level of risk of occurrence and the costs of taking preventative or remedial action.
81. An important element in making this assessment is the proximity of sensitive receptor sites (for example, primary schools, hospitals, and drinking water collection areas) to the source of the hazard.

### ***Recommendation***

82. A base line map should be prepared showing hazards and the location of all sensitive receptors so that a judgement can be made about the degree of risk and measures that could be taken to reduce the risk.

