

Annex E.2

EDM Annex E.3

Note: This checklist may serve as a means of helping you consider potential environmental effects of proposed activities. However, it should not be considered exhaustive. Please consider using this (or other checklists) as a reference as you prepare your environmental documentation.

GUIDELINE DOCUMENT 5 CHECKLIST OF ENVIRONMENTAL CHARACTERISTICS

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1 INTRODUCTION

This checklist identifies environmental characteristics which may potentially be affected by development actions, or which could place significant constraints on a proposed development. The effect a development could have on an environmental attribute may be either positive or negative.

While the checklist has endeavored to include the major characteristics and linkages which should be considered by the environmental analyst or planner, it is not exhaustive and the user should be aware that other characteristics, significant to a particular situation, may occur. Assistance of experts may be required to assess certain potential impacts and to identify unlisted characteristics which may be affected in specific cases. It is important to stress that cumulative effects should always be borne in mind (see section 12).

2 PHYSICAL CHARACTERISTICS OF THE SITE AND ITS SURROUNDINGS

Could the proposed development have a significant impact on, or be constrained by, any of the following?

2.1 Land

- the nature of surface (e.g. old weathered surfaces)
- the nature of substrata (e.g. rock, soil deposit)
- unstable bedrock or fault lines
- seismic activity
- slope of the land
- water logging of depressions
- the binding or bonding of soils
- stability of site
- surface subsidence
- compressive strength of soils
- rates of erosion or siltation by wind or water
- the potential of soils to be used for formal/informal agricultural purposes
- the potential of soils to be used for commercial purposes
- access to mineral deposits
- the availability of or access to construction materials such as rock and gravel
- the availability of topsoil or fill material
- the management of excess soil or spoil material
- unique geological or physical features
- mobile sand dunes
- prominent landscape feature
- existing physical degradation of the local environment

2.2 Freshwater systems

- streams or river channels
- river flow
- natural drainage patterns
- engineered drainage patterns
- drainage limitations
- the water-table
- run-off as a result of the hardening of surfaces, or loss of the sponge effect of vegetation
- ability to absorb run-off
- changes to flood plains
- the quality or quantity of surface water, groundwater or public water supplies
- conservational or recreational value of rivers, streams, lakes, wetlands, dams or islands
- threats to hydrological functioning through existing or altered:
 - ! pollution

- ! turbidity
- ! salinity
- ! chemical processes or nutrient balances
- ! changes in sediment flows and siltation rates
- ! canalization
- ! impoundment construction
- ! water extraction

2.3 Marine and estuarine systems

- prominent coastal features such as coastal cliffs
- existing or altered processes such as:
 - ! wave and tidal action
 - ! deposition/removal of sand
 - ! sedimentation rates and patterns
 - ! turbidity
 - ! salinity
 - ! chemical processes or nutrient balances
- inherently unstable ecosystems such as mobile sand dunes
- sand sources such as mobile sand dunes
- rocky and sandy shorelines
- the seabed and subtidal areas
- coastal islands
- functioning of estuary systems
- river mouths

2.4 Climate

- wind strength, direction and frequency
- frequency of flash-floods
- rainfall patterns
- fluctuations in temperature or humidity
- intensity of inversions
- dispersal or influx of pollutants
- global warming and sea-level rise

3 ECOLOGICAL CHARACTERISTICS OF THE SITE AND ITS SURROUNDINGS

Could the proposed development have a significant impact on, or be constrained by, any of the following?

3.1 Vegetation

- survival of rare or endangered plant species
- diversity of plant communities
- sand-trapping vegetation such as that found on foredunes
- vegetation communities of conservation or scientific importance
- conservation of vegetation communities of particular recreational value
- the introduction or spread of invasive alien seeds and plants
- natural replenishment of existing species
- frequency of veld fires
- frequency of use of off-road vehicles
- amount of trampling of special areas of vegetation
- firewood collection
- overgrazing
- overexploitation
- genetically engineered organisms

3.2 Animals

- survival of rare or endangered animals
- diversity of animal communities
- animal communities of particular scientific, conservational or educational value
- natural migration of species
- survival of animal communities of particular recreational value
- non-resident or migrant species
- alien species (including invasive and domestic species)
- survival of animal communities due to:
 - ! frequency of veld fires
 - ! threat from poaching
 - ! frequency of use of off-road vehicles
 - ! intrusion of roads and fencing
 - ! overexploitation
- genetically engineered organisms

3.3 Natural and semi-natural communities

- local, regional or national importance of the natural communities (e.g. economic, scientific, conservational, educational)
- compatibility of the development and the natural communities
- appropriateness of conservation methods to be employed
- ecological functioning of natural communities due to:
 - ! physical destruction of the habitat
 - ! reduction in the effective size of the community
 - ! quality and flow of groundwater
 - ! quality of standing or flowing water
 - ! oxygen content of the water
 - ! salinity
 - ! turbidity
 - ! flow rate
 - ! temperature
 - ! level of chemical and other forms of pollution
 - ! eutrophication
 - ! toxins such as effluents or poisons
 - ! sitation patterns
 - ! air quality
 - ! levels of dust pollution and deposition
 - ! availability of food
 - ! the construction of access routes, roads and pathways
 - ! recreational pressure
 - ! secondary or cumulative impacts affecting other natural communities
 - ! presence or introduction of invasive alien species
 - ! rehabilitation potential
 - ! predator:prey relationships
 - ! barriers to animal movement or migration
 - ! altered fire regime

4 CURRENT AND POTENTIAL LAND USE AND LANDSCAPE CHARACTER

Could the proposed development have a significant impact on, or be constrained by, any of the following?

4.1 General considerations applicable to all development proposals

- compatibility of land uses within the area
- aesthetic quality of the landscape
- sense of place within the area
- character of the area
- compatibility with the scale of developments in the area
- compatibility with building materials used in the area
- preservation of scenic views and valued features
- revitalization of run-down areas
- landscaping plans and/or site restoration proposals
- need for buffer zones to allow for natural processes such as coastal erosion, windblown sand and changes in river channels
- political considerations such as land claims and historical rights
- legal considerations such as servitudes and rights of way

4.2 Urban open space, protected and recreational areas

- urban open space systems or recreational areas
- natural features such as streams and ridges
- natural heritage sites
- change in use or intensity of use
- pressures on recreational facilities and open space systems
- enhancement or linkage of facilities and open space systems
- rehabilitation of disturbed or degraded sites
- improved public amenity
- potential for harboring vagrants and criminals

4.3 Residential areas

- need to displace people or affect existing housing
- lifestyle, neighborhood character or stability
- quality of life within the residential area
- effect on views, overlooking and privacy
- effect of overshadowing causing loss of sunlight hours
- compatibility with the surrounding residential developments
- community cohesion
- the needs of the elderly, handicapped or other special interest groups
- community safety aspects such as lighting, open areas and policing
- adequacy of infrastructure to service the area (see also section 7)
- access and movement patterns
- change in the volume of through traffic
- property values and local tax base

4.4 Commercial areas

- character of urban centre
- volume of traffic and adequacy of vehicular access
- inappropriate siting
- provision of parking
- adequacy of pedestrian walkways

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- conflicts between vehicular and pedestrian traffic
- safety of the area and surveillance
- the rate of decay or change in character of the area

4.5 Industrial areas

- volume of traffic and adequacy of vehicular access
- provision of parking
- levels of pollution - gas emissions, effluent or solid waste
- polluted street run-off
- aesthetic quality of the area

4.6 Agricultural and sylvicultural areas

- use of high-potential farmland
- use of areas available for commercial forests
- a need for buffer zones or greenbelts to contain urban sprawl
- availability of water
- pollution levels of air and local water supplies by fertilizers, pesticides or feedlots
- disease control activities such as cropspraying
- levels of toxins, dust and bad smells in the air
- rate of soil erosion and sedimentation
- bush encroachment
- damaged land due to overgrazing or bad farming methods
- spread of invasive alien plants
- provision of housing and educational facilities

5 CULTURAL RESOURCES

Could the proposed development have a significant impact on, or be constrained by, any of the following?

- structures and sites of architectural, cultural or historic heritage
- sites of archaeological or palaeontological importance
- special attraction of local sites, traditions or events
- sites or areas of religious or spiritual significance
- sites or areas of special social or cultural interest
- the integrity of cultural resources

6 SOCIO-ECONOMIC CHARACTERISTICS OF THE AFFECTED PUBLIC

Could the proposed development have a significant impact on, or be constrained by any of the following?

6.1 Demographic aspects

- growth rate of the local population
- location, distribution or density of the population
- existing age or gender composition of the population
- existing biographical composition of the population
- existing migration movements
- inflow of tourists

6.2 Economic and employment status of the affected social groups

- economic base of the area
- distribution of income
- local industry

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- rate and scale of employment growth
- labor needs and the spare labor capacity of the area
- movement of labor away from existing employment in the area
- competition through non-local labor moving into the area
- non-local labor remaining in the area after completion of the development
- pressure placed on particular skills, age range or gender needs
- job opportunities for school-leavers
- short- and long-term unemployment trends

6.3 Welfare profile

- incidence of crime, drug abuse, or violence
- extent of homelessness and overcrowding
- adequacy of services
- adequacy of support systems such as creches and shelters for destitute children
- quality of life (see also section 7 on infrastructure and section 8 on community services and facilities)

6.4 Health profile

- availability of clinics/health services
- incidence of disease
- incidence of mental illness
- threats to health from pollution (see also section 9 on pollution)

6.5 Cultural profile

- existing lifestyles, household composition and family network
- religious and cultural attitudes, outlooks and expectations of the local population
- cultural or lifestyle diversity
- cultural or lifestyle stability

7 INFRASTRUCTURE SERVICES

Could the proposed development have a significant impact on, or be constrained by, any of the following?

7.1 Energy supply

- the demand for power and its effect on peak and base loads
- planned provision of power for the area
- power generation and associated infrastructure
- the need for new transmission lines
- the adequacy of emergency power facilities
- the danger to the local community and the environment or processing units in the case of a major power failure
- availability of alternative fuel source

7.2 Water

- water rights
- wasteful or excessive water requirements
- planned provision for water supply to the area
- adequacy and reliability of water supply
- adequacy of ground water reserves
- adequacy of emergency supply system
- need for additional abstraction schemes or construction of new supply reservoirs
- need for additional purification systems
- need for inappropriately sized or located impoundments

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- need for new pipelines
- danger to local people and industry in the event of a major water supply failure

7.3 Waste management

- efficiency and capacity of existing waste management facilities
- extent of contribution to centralized waste-processing facilities
- ability to provide necessary facilities
- need for new pipelines
- risk associated with waste transport
- adequacy of emergency waste disposal facilities
- risk to the community and the local environment should the facility break down
- hazard of groundwater pollution
- danger of rodents and scavengers at waste sites
- potential for windblown or waterborne refuse pollution
- visual and smell effects of waste sites and treatment works
- hazard of birds to air traffic near sewage ponds and landfill sites
- utilization of treated waste water and recycled materials
- on-site waste management potential

7.4 Transport networks

- existing transport systems
- present patterns of circulation or movement of people and/or goods
- generation of more private and public traffic
- adequacy of existing road network
- adequacy of existing parking facilities
- adequacy of existing traffic management schemes
- need for and desirability of additional road schemes over and above those which have been planned
- temporary access roads used for the development
- viability of the rail service
- rail capacity
- need for additional rail links
- adequacy of harbor facilities
- need for expanded harbor and related facilities
- adequacy of air transport facilities
- ability of commerce and social facilities to locate along route

7.5 Education

- demand for specific type of technical skills training
- demand for specific types of industrial training
- adequacy of existing technical institutions
- adequacy of nursery, junior and secondary education facilities
- need for additional education facilities
- demand which exceeds the planned provision of educational facilities
- preschool facilities

7.6 Housing

- property values and levels of rates
- potential conflict over land use
- availability of housing stock
- need to release additional land for housing developments
- acceptability of such land release
- adequacy of infrastructure for further housing developments
- ability of private or local authority to provide housing

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- compatibility of planned development with existing housing
- location for suitable housing sites
- sites suitable for construction camps
- standard of provision of facilities required by authority
- design and layout of site facilities
- use to which construction camp may be put after termination of the construction period

7.7 Telecommunication

- existing telecommunication network
- installation of additional telecommunication transmission lines or facilities

7.8 Financial implications to region

- job creation and economic opportunity
- enhancement of regional self-sufficiency
- financial programmes of responsible authority
- comparative wage rates between those of existing employment in the local area and those offered by the new development
- movement away from existing employment due to higher wage rates offered in the new development
- insurance rates
- cost implications of the supply of energy, water, waste management, transportation, education, housing and telecommunication

8 SOCIAL AND COMMUNITY SERVICES AND FACILITIES

Could the proposed development have a significant impact on, or be constrained by, any of the following?

8.1 Health service facilities

- adequacy of temporary facilities during construction phase of developments
- adequacy of on-site health facilities
- adequacy of facilities for primary health care (e.g. screening facilities for tuberculosis or AIDS, family planning advice)
- adequacy of the existing health services to cope with increased population
- projected provision of health service facilities
- need for additional facilities

8.2 Emergency services

- adequacy of existing emergency services (e.g. fire and ambulance services)
- projected provision of services to meet increased demand
- need for additional emergency services
- adequacy of the emergency and safety services provided by the developer
- ability of the local resources to deal with emergencies

8.3 Recreational facilities

- adequacy of existing facilities
- projected provision of facilities to meet increased demand
- need for additional facilities
- recreational and service facilities in the workplace

9 THE NATURE AND LEVEL OF PRESENT AND FUTURE ENVIRONMENTAL POLLUTION

Could the proposed development have a significant impact on, or be constrained by, any of the following?

9.1 Air pollution

- existing levels of atmospheric pollution
- the nature of air pollution, such as ozone-depleting gases, acidic compounds and toxic substances
- extent of the local build-up of pollutants due to inversions
- compounding of effects with existing pollutants or other chemicals in the atmosphere (e.g. photochemical smog production)
- smog formation and reduction in visibility
- quantity and type of particulate matter produced with reference to size, composition and chemical stability
- production of offensive odors
- pollution of adjacent sensitive areas
- effects on human health crops, wildlife, livestock and other potentially affected organisms
- effects on stonework, buildings or works of art

9.2 Water pollution

- level of water pollution
- high localized levels of pollution
- pollution of surface waters from polluted underground waters
- the concentration of pollutants due to variations of water flow
- localized pollution build-up through changes in salinity gradients and/or current movements
- effective dispersal mechanisms
- salinization of fresh waters
- synergistic or compounding effects with existing pollutants
- production of offensive odor
- effect of treated or untreated effluent on the flora and fauna of river, lake, canal, estuary or coastal waters
- effects on dependent natural communities through changes in aquatic fauna and flora
- effect on irrigation schemes
- effect on recreational activities

9.3 Noise, vibration and lighting

- increase in ambient noise, vibration or illumination levels
- length of time that there will be noise, vibration or lighting impact
- exacerbation of "creeping" ambient noise levels
- peace and quiet of residential areas either during day- or night-time
- change in the quality of life due to artificial lighting
- functioning of schools, hospitals and old people's homes or informal recreation areas
- the need for individual protection against noise
- levels of annoyance and discomfort due to vibration caused by such activities as blasting and pile-driving
- structural damage caused to buildings by vibration
- effects on wildlife of nature reserves, sites of special scientific interest, or high-quality habitat of local significance
- reduction of wilderness quality in declared wilderness areas

9.4 Visual pollution (see also section 4 on land use and landscape character)

- existing level of visual pollution
- reduction in aesthetic quality of the environment through:
 - ! sign-boards and advertising
 - ! overhead transmission cables and telephone wires
 - ! unsightly or inappropriate walls, buildings, roads or other installations

9.5 Solid or liquid waste and by-product disposal

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- existing or proposed water disposal plans
- choice of alternative means of disposal
- alternative treatment technologies
- choice of disposal sites
- biological and chemical characteristics of the leachates generated within the disposal site
- the quantity of leachates produced
- measures to reduce or treat leachates
- potential pollution of nearby surface waters
- potential groundwater pollution
- waste minimisation potential of process
- containment and treatment of wastes at site of generation
- final disposal option
- gas emissions from landfill
- allowance for physical and chemical variation in waste generated
- visual intrusion caused by waste disposal site or disposal plant
- potential health hazard to nearby residents
- suitability of traffic to transport the waste materials
- volume of traffic to transport the waste materials
- proposed after-use of the site and its management

10 RISK AND HAZARD

Could the proposed development have a significant impact on, or be constrained by, the following?

- the level and identity of hazard to the public
- probability of occurrence
- extent of effect - local, regional or panoramic
- standards required for process equipment in chemical and processing industries:
 - ! safety and design reviews
 - ! safety audits
 - ! hazard and operability reviews
 - ! failure mode and effect analysis
- workers' safety/degree of risk
- the level of risk and hazard for other living organisms

11 HEALTH AND SAFETY

Could the proposed development have a significant impact on, or be constrained by, any of the following?

- effects in the workplace through:
 - ! dust, fume and particulate matter
 - ! noise
 - ! odors
 - ! gases
 - ! vapors
 - ! use of dangerous chemicals
 - ! lighting
 - ! heat
 - ! cold
 - ! noise
 - ! vibration
 - ! radiation
 - ! protective clothing and equipment
 - ! access to recreational facilities
 - ! risk of workplace accidents
 - ! risk of major disasters involving multiple loss of life or injury
 - ! availability of services such as creches, factory-based health services, canteens, change-rooms, toilets
- effects in the surrounding areas through:
 - ! dust
 - ! fumes
 - ! particulate matter
 - ! noise
 - ! vibration
 - ! radiation
 - ! odors
 - ! gaseous emissions
 - ! vapors
 - ! use of dangerous chemicals
 - ! lighting
 - ! risk of major disasters involving explosions or major leaks of toxic liquids or gases
 - ! solid waste disposal techniques
 - ! liquid waste effluent and disposal

12 CUMULATIVE AND SYNERGISTIC EFFECTS

Could the proposed development have a significant impact on, or be constrained by, any of the following?

- the ability of the natural and social environments to assimilate cumulative stresses placed on them
- the likelihood of negative synergistic effects
- existing or future development rights because of a precedent being set

13 ENHANCEMENT OF POSITIVE CHARACTERISTICS

Could the proposed development be modified to enhance the positive aspects of the following?

- any of the characteristics listed in points 2 to 12 above