ENVIROMENTAL SITE MANAGEMENT & REHABILITATION AWARENESS COURSE
management level

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Construction activities on construction sites need to be strictly regulated to ensure that all projects are developed and implemented according to sound environmental standards and norms.

In pursuit of this, a need was identified by DEAT and DWAF to develop and implement an Environmental Management Plan (EMP) and Environmental Site Management and Rehabilitation Specification (ESM&RS) tools, and subsequently an Environmental Site Management and Rehabilitation Awareness Course so as to inform and educate all levels of construction site personnel as to why the desired environmental standards are necessary as well as to explain how such is achieved on the construction site.

It is believed that with a background of basic environmental awareness and an understanding of basic environmental issues and sensitivities, construction personnel may be motivated and empowered to do their share in helping to maintain the integrity of the environment on the construction site through environmental impact management.

The goal of this course is therefore to enable a shared understanding and common vision of the environment, the impact of a construction project on the environment (and why this is important) and the role of construction personnel in terms of environmental management and compliance.
THE ENVIRONMENT

- The living natural environment
- The non-living natural environment
- The man-made environment

These environments depend on one another, and man depends on them all for his survival. Damage to one will be felt by the others, so we must try to protect the components, as well as their interactions with one another as they occur in nature.

When we undertake a development, we must keep this concept in mind, and plan and implement all development in such a way that we benefit today without compromising the ability of future generations to benefit as well.

This is known as sustainability.
PHASES OF A CONSTRUCTION PROJECT

Project Planning Phase

Pre-construction Phase

Construction Phase

Post-construction / Rehabilitation Phase
COMPONENTS OF A CONSTRUCTION PROJECT

- Contractors' Yards
- Access Roads
- Spoil Areas & Stockpiles
- Cut & Fill Areas
- Quarries & Borrow Areas
- Batching Plants
- Crusher Plants & Sand Washing Plants
- Housing & Recreation Areas
- Pipelines
- Tunnels
- Canals
- River Diversions
- Weirs
- Dam Walls & Impoundments
WHAT IS AN ENVIRONMENTAL IMPACT

- An environmental impact is the result, either good or bad, of man’s actions on the natural environment. This results in one or many changes in the environment and may also affect the availability of resources and the environment’s capacity to function.

- Impacts can occur as a result of:
  
  - Foreseen (clearing of the construction site)
  - Unforeseen (flooding after heavy rains)
  - Avoidable (spillage of diesel)
  - Unavoidable (road & trench disturbance)
  - Simple (littering of the construction site)
  - Cumulative (pollution of the river system)

- Impacts can be:

- The Use of a Resource
- The Pollution of a Resource
Typical environmental impacts that occur on a construction site include the following:

- Loss of plants
- Loss of animals
- Soil pollution
- Lowering of aesthetics
- Dust liberation
- Soil compaction & erosion
- Water pollution
- Loss of health & personal injury
- Loss / creation of livelihood
- Loss / creation of access
- Loss of heritage & culture
CAUSES OF ENVIRONMENTAL IMPACTS

These environmental impacts are caused primarily by inadequate planning & not adhering to the Environmental Management Specifications:

- Inadequate planning & preparation of the construction site
- Uncontrolled expansion of the construction site footprint
- Uncontrolled activity of construction staff
- Injudicious removal / disturbance of vegetation
- Unnecessary loss of soil
- Uncontrolled vehicular movement & circulation
- Haphazard storage of vehicles, equipment & materials
- Uncontrolled servicing, repair & refueling of vehicles
- Unclear policy on solid waste management
- Unclear policy on waste water
- Uninformed use, storage & disposal of hazardous material
- Erosive power of storm water & runoff
- Unintentional fires
- Lack of follow up action after the completion of construction works
Impact Mitigation

- These Environmental Impacts may, however be mitigated through proper and appropriate impact management. The Environmental Management Plan is a Specification containing all the necessary Environmental Management actions necessary on site:

GENERAL STAFF LEVEL

MANAGEMENT STAFF LEVEL
Impact Management

- Pre-construction preparation (management level):
  - Compile an ESM&R Plan in conjunction with the EP
  - Set up the construction camps / areas
  - Identify all significant features
  - Fence in significant features
  - Plan roads around significant features
  - Draw up a surface water management plan
  - Identify slopes that need protection & protect these

Develop a construction programme & inform I&AP’s

Set up a monitoring & auditing protocol
Impact Management

Site establishment (general):

- Do not cross any site fences or cordoned off areas
- Do not walk, drive or store material in rehabilitating areas
- Use only areas designated for certain construction activities
- Do not access any stream or water body without permission
- Report any access into fenced off areas to the foreman
- Report any headstones, graves or human remains you may find to the foreman
Impact Management

- Site establishment (management level):
  - Cordon off construction areas according to the ESM&R Plan
  - Declare rehabilitating areas out of bounds to all staff
  - Define construction activity areas (e.g. for mixing concrete)
  - Cordon off any areas in which headstones, graves or human remains have been discovered
  - Declare all streams and water bodies out of bounds to all staff
  - Install and / repair fences demarcating out of bounds areas as this is required
Impact Management

Construction staff management (general):

- Only eat, cook, sleep & recreate in the areas designated on site.
- Do not bathe anywhere except in the designated areas on site.
- Do not hunt, kill or injure any animals anywhere on site.
- Do not leave any food or rubbish where scavengers can get at it.
- Inform the foreman of any dangerous or problem animals.
Impact Management

- Construction staff management (management level):
  
  - Cordon off all staff housing & Recreation areas according to the ESM&R Plan
  
  - Define staff cooking & eating areas
  
  - Regularly monitor the site and camp for snares, traps and signs of poaching
  
  - Arrange to have any problematic animals removed in the proper manner
Impact Management

- Heath and Safety (general):
  - Always use the toilet & hand washing facilities provided.
  - Only use the water provided on site – do not collect water from or dispose water into a natural water course.
  - Make use of the specified protective gear for noisy and dusty conditions.
  - Always wear proper protective head and foot gear while on site.
  - Know where to find a list of emergency numbers in the event of one.
  - Report accidents, injuries and unsafe site conditions to the Safety Officer.
Impact Management

Health and Safety (management level):

- Provide adequate ablution & washing facilities for staff & maintain these in a suitably hygienic state.
- Provide a suitable and adequate source of potable water & monitor use and safety.
- Ensure safe working conditions & that staff make use of specified site safety measures.
- Ensure that staff wear proper protective head and foot gear while on site.
- Keep a first aid kit and a list of emergency numbers in an accessible place on site.
- Appoint a Safety officer and monitor site safety.
Impact Management

- Vegetation clearing (general):
  - Do not damage, destroy or remove any significant tree that has been marked.
  - No firewood may be harvested without permission.
  - Newly planted trees may not be disturbed in any way.
  - Do not excavate beneath the crown of any tree that has been marked.
  - No conserved tree may be used to support or hang anything in.
  - Report to the foreman any damage to any significant tree that has been marked.
Impact Management

- Vegetation clearing (management level):

  - Locate all marked trees & clumps (ESM&R Plan) & fence these as out of bounds areas.
  - Do not damage, destroy or remove vegetation wherever possible.
  - Only clear areas of vegetation before construction work begins there—not before.
  - Remove all invasive / exotic vegetation as this emerges.
  - Ensure that newly planted trees are not disturbed—declare these areas out of bounds.
Impact Management

- Soil removal and storage (general):

  - Only excavate material from designated areas.
  - Stockpile soil only as instructed and at the time it is instructed.
  - Do not make new stockpiles without permission.
  - Do not use soil or remove soil from any stockpile without permission.
  - Do not walk, drive or store any equipment, machinery or material on any stockpile.
Impact Management

- Soil removal and storage (management level):
  - Strip topsoil from work areas (ESM&R Plan) only as necessary - not before.
  - Stockpile topsoil only in designated areas (ESM&R Plan).
  - Stockpile excess soil from excavations - no haphazard dumping is allowed.
  - Only import backfill from approved stockpiles & borrow pits.
  - Only use topsoil imported from approved stockpiles.
  - Ensure that no stockpiles exceed specified heights & slopes (i.e. max 1:3).
  - Ensure that stockpiles are protected from wind, rain, & traffic.

![Stockpiling Procedure Diagram]

FIG 2: Stockpiling Procedure
Impact management

- Access and transport (general):
  - Only drive on designated roads & tracks
  - Move obstacles out the way rather than drive around them
  - Only cross drainage lines at designated points
  - Always stay within the specified speed limit
Impact management

- Access and transport (management level):

  - Construction roads may only be built in approved locations according to the ESM&R Plan.
  - Construction roads must comply with drainage & surfacing specifications.
  - Construction roads must be wet regularly.
  - Construction roads must be monitored for potholes & rutting & maintained.
  - Illegal routes & shortcuts must be closed off immediately.
Impact management

- Storage of vehicles, equipment & materials (general):
  - Store machinery, vehicles & materials only in demarcated areas.
  - Do not leave machinery & equipment standing around if not in use.
  - Only park vehicles in designated areas.
  - Do not park heavy vehicles or store equipment under or near trees.
  - Do not store machinery, vehicles or materials in undisturbed or rehabilitating areas.
Impact management

- Storage of vehicles, equipment & materials (management level):
  - Demarcate sites for the storing of machinery, vehicles & materials as per the ESM&R Plan
  - Ensure that all deliveries are taken directly to the designated storage areas
  - Provide enough shaded temporary parking on the construction site
Impact Management

- Servicing, repair & refueling of vehicles (general):

  - Only service machinery & vehicles in designated areas.
  - Regularly check your vehicle for fuel & oil leaks.
  - Inform the foreman of leaking vehicles & machinery so that he can schedule repairs.
  - Immediately clean any accidental fuel & oil spills – do not hose spills into the natural environment.
  - Only refuel by means of a pump & on the bund created for that purpose.
  - Dispose of contaminated soil as hazardous waste in the correct location on site.
Impact Management

- Servicing, repair & refueling of vehicles (management level):

  - Designate vehicle servicing areas on the construction site as per the ESM&R Plan.

  - Ensure that all refueling areas are equipped with a pump & a bund.

  - Ensure that all service areas for machinery, & vehicles are equipped with the specified pollution control mechanisms.

  - Immediately schedule repair work for any leaking vehicles & machinery.

  - Ensure that all vehicles & machinery are maintained in good working order.

  - Ensure that all service areas for machinery, & vehicles are equipped with the specified pollution control mechanisms.
Impact management

- Solid waste management (general):

  - Do not litter – make use of refuse bins provided
  - Concrete may only be mixed in designated areas & not directly on the ground
  - Do not hose spills into the natural environment - inform the foreman of spills you are unable to clean yourself
  - Dispose of construction rubble only in specified storage areas – if in doubt, ask
  - Do not bury, hide or burn any waste of any nature
  - Inform the foreman of any illegal litter or dumping site that you encounter
Impact management

- Solid waste management (management level):
  - Designate areas for the storage of various waste – ensure this is adequate
  - Provide adequate numbers of specified refuse bins – empty these regularly
  - Immediately remove any illegal litter or dumping site that is reported
  - Regularly remove various wastes to licensed off-site landfill sites
  - Reported spillages of construction waste are to be cleaned immediately
  - Regularly remove various wastes to licensed off-site landfill sites
Impact Management

- Waste water management (general):
  - Do not use any natural water course to wash machinery, vehicles or equipment
  - Only wash machinery, vehicles or equipment in designated areas
  - Conserve water and report any leaks & overflows to the foreman
Impact Management

- Waste water management (management level):
  - Empty sumps regularly & immediately
  - Fix any reported leaks
  - Ensure that all designated wash areas for machinery, vehicles & equipment are equipped with specified pollution control mechanisms
  - Maintain all waste and grey water disposal facilities in an acceptable & operational state
Impact Management

Management of hazardous material (general):

- Make sure that you know how to handle all hazardous substances.
- Do not access stores for hazardous substances without permission.
- Immediately clean any minor accidental spills and leaks.
- Do not hose any leaks or spills into the natural environment.
- Dispose of hazardous waste in specified storage areas – if in doubt, ask.
- Immediately report any major leaks & spills to the foreman.
Impact Management

Management of hazardous material (management level):

- Ensure that staff know how to handle all hazardous substances.
- Ensure that hazardous substance stores are secure & equipped with specified pollution control measures.
- Immediately clean any reported spills and leaks.
- Regularly remove hazardous wastes to a licensed off-site hazardous waste disposal site.
- Ensure that hazardous waste disposal areas are equipped with specified pollution containment measures.
Impact management

- Erosion protection (management level):
  
  Ensure that all required storm water drainage measures (ESM&R Plan) are installed & maintained.

  Ensure that all required energy dissipation mechanisms are installed & maintained.

  Ensure that cut & fill slopes are safe & according to specification (usually 1:3).

  Correct any causes of erosion as soon as erosion becomes evident.

  Keep the drainage ways of access routes open and functional.

  Initiate rehabilitation measures as soon as or before erosion begins.
Impact Management

- Fire management (general):

  - Do not make open fires except in permitted areas at permitted times.

  - All cooking is to be done on gas/electric stoves & only in the areas provided.

  - NEVER leave fires unattended on site. Extinguish these before you leave.

  - Ensure that you know where fire fighting equipment is located.
Impact Management

- Fire management (management level):

  - Maintain a firebreak around the perimeter of the construction site (ESM&R Plan)
  - Adequate fire fighting equipment must be in place at all fuel stores (ESM&R Plan)
  - Immediately extinguish any fires that break out
  - Take out fire insurance in high risk areas.
Impact Management

- Aesthetics (management level):

  Ensure that all plans (including plant plans and rehabilitation plans) are implemented properly.

  Ensure that suitable equipment & manpower is available to carry out all specified tasks.

  Implement all design and rehabilitation specifications so that the development blends in with the natural surrounding landscape.
Impact Management

- Social issues (management level):

  Ensure that social representation, upliftment, empowerment & needs training commitments are met. Make use of existing social structures & communication channels.

  Ensure that an incidents register is kept up to date and that it is made available.

  Ensure that a complaints register is kept up to date.

  Ensure that all pest control is carried out as specified.

  Ensure that dust is controlled on site.
Impact Management

- Post construction rehabilitation (management level):

- Remove all construction infrastructure completely from the site
- Rework all stockpiled soil back into the landscape as per specification
- Shape, rip and scarify compacted areas as per specification
- Reintroduce indigenous vegetation & control alien plants as per specification
- Maintain firebreaks for a year
- Monitor the rehabilitation site for at least a year & implement corrective work where required
Environmental Legislation is in place to protect the environment and the people that use it from harm as a result of damaging activities caused through both ignorance and indifference.

**POLICY**
- Integrated Environmental Management (IEM) is a code of practice for ensuring that environmental considerations are adequately and effectively incorporated into all the phases of the planning, development and implementation process of a project in order to achieve a desirable balance between resource protection and development, and further to this to enable informed, accountable decision making and setting of environmental quality goals.

**ACTS**
- The National Environmental Management Act (NEMA), Act 107 of 1998, legislates the National Environmental Management principles and focuses specifically on co-operative governance, sustainable development and public participation.
- The Environment Conservation Act (ECA), Act 73 of 1989, identifies and regulates activities which may have a detrimental impact on the environment.
- The National Water Act (NWA), Act 36 of 1998, aims, through management, to achieve sustainable and equitable use and supply of water for the benefit of all users.
- The National Heritage Resources Act (NHRA), Act 25 of 1999, informs / restricts development on or near heritage resources.

**PROCEDURES, GUIDELINES AND PROCESSES**
- Strategic Environmental Assessments (SEA’s)
- Environmental Impact Assessments (EIA’s)
- Sustainable Utilisation Plans (SUP’s)
- Environmental Management Plans (EMP’s)
- Environmental Best Practice Guidelines and Specifications (for Planning, Construction, Operations and Decommissioning)
- Environmental Monitoring and Auditing Guidelines
ENVIRONMENTAL APPROVAL

Every facility, service and road which has ever been developed has had and continues to have an effect on the surrounding environment, both during construction and during operation.

As a result of this, a number of specific activities have been listed in the Environment Conservation Act, which are likely to result in significant environmental impacts, and will require Environmental Authorization. Such activities that may be encountered on a Construction site include the following:

- Change of land use
- Roads, railways and airfields
- Cableways
- Canals and channels
- Dams, levees and weirs
- Reservoirs and pipelines for public water supply
- Public and private resorts
- Sewage treatment plants
- Tunnels
- The reclamation of land below the high water mark

Only once the governing authority has decided that the environmental impacts anticipated are of an acceptable nature and level, may construction begin.
Ultimately the purpose of Environmental Awareness is to support and the Vision and Mission of the Department of Water Affairs and Forestry.

VISION:
- A democratic, people-centred nation working towards human rights, social justice, equity and prosperity for all.
- A society in which all our people enjoy the benefits of clean water and hygienic sanitation services.
- Water used carefully and productively for economic activities, which promote the growth, development and prosperity of the nation.
- A land in which our natural forests and plantations are managed in the best interests of all.
- A people who understand and protect our natural resources so as to make them ecologically stable and safeguard them for current and future generations.
- A Department that serves the public loyally, meets its responsibilities with energy and compassion and acts as a link in the chain of integrated and environmentally sustainable development.
- Development and co-operation throughout our region of playing our part in the African Renaissance.

MISSION
- Conserving, managing and developing our water resources and forests in a scientific and environmentally sustainable manner in order to meet the social and economic needs of South Africa, both now and in the future.
- Ensuring that water services are provided to all South Africans in an efficient cost-effective and sustainable way.
- Managing and sustaining our forests, using the best scientific practice in a participatory and sustainable manner.
- Educating the people of South Africa on ways to manage, conserve and sustain our water and forest resources.
- Co-operating with all spheres of Government in order to achieve the best and most integrated development in our country and region.
- Creating the best possible opportunities for employment, the eradication of poverty and the promotion of equity, social development and democratic governance.
CONCLUSION

With this background of environmental awareness and your understanding of basic environmental issues and sensitivities, you are now empowered to do your share in helping to maintain the integrity of the environment on the construction site through environmental impact management.

Remember too, that these principles of environmental management are not only of importance on a construction site, as they can also be carried through to your daily lives, in everything you do, for better quality of life. The onus is on everyone to help to protect South Africa’s natural resources and to maintain the sustainability for future use, development and services.