EXPRO National Manual for Projects Management

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Codes, Standards & References

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1.0 PURPOSE

The purpose of this document is to provide a guidance to the Entity in the selection of building codes and regulations. Also, this document provides the Entity the guidance on the consideration needed in the design of its Infrastructure projects to be in line with its Project Sustainability and Environmental requirements.

2.0 SCOPE

Entity shall implement the guidelines outlined in this document on all its projects. Changes to these guidelines will require concurrence of EXPRO before use on Entity's Projects.

3.0 DEFINITIONS

3.1 Definitions

Terms	Description
Berm	Shaped dike or mound of material that separates two areas. When used for containment the berm construction shall be impervious to material that it is separating
Cultural Resource	Historic physical objects such as remains, architecture, artwork, or other items as designated by the Saudi Commission for Tourism and Antiquities.
Hazardous Material	Materials harmful to human health and/or the environment that is solid, semi-solid, liquid, or gas and may include hazardous wastes.
Impermeable	Not allowing a fluid to pass through
Landfill	A place, location, tract of land, area, or premises used for the disposal of solid wastes. The term is synonymous with "solid waste disposal site" and is also known as garbage dump and trash dump.
Life Cycle	A series of stages through which a material or project passes from the beginning of its existence to the end.
Life Cycle Assessment	An assessment that analyzes and quantifies the life cycle(s) of a material, facility, or process during its production, use, and disposal.
Mitigate	An act to make impacts less severe.
Pollutant	A substance, condition, or energy introduced into the environment that has undesired effects, or adversely affects the usefulness of a resource.
Release	Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers and other closed receptacles containing any hazardous substance, pollutant, or contaminant).
Secondary Containment	Safeguarding method used to prevent unplanned releases of compounds into uncontrolled areas and which is external to and separate from primary containment.
Solid Waste	Any garbage, refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded materials including solid, liquid, semi-solid, or contained gaseous material, resulting from industrial, commercial, mining and agriculture operations and from community activities.
Source	The point of emission or discharge of a pollutant or effluent.
Wastewater	Water that (1) is or has been used in an industrial or manufacturing process, (2) conveys or has conveyed sewage, or (3) is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant.

3.2 Acronym

Terms	Description
ACEEE	American Council for an Energy-Efficient Economy
A/E	Architect & Engineer
BPEO	Best Practicable Environmental Option
CTW	Central Treatment Works
EIA	Environmental Impact Assessment
EPP	Environmental Permitting Plan
ESQ	Environmental Screening Questionnaire
HVAC	Heating, Ventilation, and Air Conditioning
KSA	Kingdom of Saudi Arabia
LCA	Life Cycle Assessment
NMPM	National Manual for Project Management
MRF	Material Reclamation Facility
PP	Pollution Prevention
PME	Presidency of Meteorology and Environment
PPE	Personal Protective Equipment
US EPA	United States Environmental Protection Agency
WAC	Waste Acceptance Criteria
WAP	Waste Acceptance Procedure

4.0 REFERENCES

1. EPM-S00-PR-000003 – Project Environmental Impact Assessment Procedure
2. EPM-KE0-GL-000011 – Definitions and References
3. EPM-KE0-GL-000001 – Environmental Guideline
4. EPM-KEA-GL-000002 – Architectural Design Aids
5. EPM-KU0-GL-000001- Sustainability Guideline
6. EPM-S00-GL-000003 - Project Initial Planning Introduction

5.0 RESPONSIBILITIES

Entity shall implement the guidelines outlined in this document on all its projects. The changes in the implementation of these guidelines will be subject to approval of the owner of the project.

6.0 BUILDING CODES

Compliance with Saudi Arabia laws, regulations and applicable codes and standards is mandatory. The Saudi Building Codes shall be the prevailing documents to be used in conjunction with the Design Aids (checklists, templates, Specifications, Design Guidelines, Lists, Procedures and Standard Drawings). In addition, all construction shall conform to Planning and Zoning Regulations applicable for the project site.

The provisions of the adopted Codes shall not be construed to prohibit the use of any material or method not specifically included therein, provided that the material or method may be shown to be satisfactory for the intended purpose. The Entity may approve such materials or methods where the Architect & Engineer (A/E) finds that they meet the intent of the code, or the A/E may prescribe requirements for their use to assure that acceptable Standards are met.

In all cases, the Entity reserves the right to require the use of specific Codes and Standards for systems and facilities for which continuity of practice is considered necessary for safe and efficient operation.

7.0 ADDITIONAL STANDARDS

In the absence of published Saudi Arabian Codes and Standards, the A/E shall use Codes, Standards and publications published by the organizations listed in each part of National Manual for Project Management

(NMPM), Volume 6, Chapter 5 and Chapter 7. The A/E may propose other International Codes and Standards, provided two different types of Codes and Standards are not mixed for the same building or facility. Proposals shall be accompanied by an English language translation of the Codes or Standards but their use shall not be allowed unless accepted in writing by the Entity.

Following Code Hierarchy shall be employed:

- Royal Decrees
- Saudi Building Codes
- International Building Code (IBC)
- International Mechanical Code
- International Plumbing Code
- International Energy Conservation Code
- International Electrical Code
- International Fuel Gas Code
- International Fire Code
- International Green Construction Code
- National Fire Protection Association (NFPA) Codes and Standards

Above Codes are comprehensive and detailed documents. They cover a wide range of building types, occupancies and hazards. Their purpose is to establish minimum Standards to safeguard life, health, property and public welfare. They are not intended to impose bureaucratic or financial burdens or set Standards of elegance, lifestyle or quality.

8.0 LAND USE AND ZONING REGULATIONS

The function of Zoning is to provide a control mechanism and regulate the use of land within areas under a specific jurisdiction. These are implemented through regulations laid out by the Municipal Government Departments or the Entity/Authority having Jurisdiction (AHJ). The zoning applied to an area is intended to convey the specific land use permitted for proposed facilities and will provide initial guidance on design parameters related to such uses.

The Entity is responsible for ensuring that all proposed developments are in line with the most current city and local area plan, where compliance is a primary consideration.

Land use/Zoning compliance should be considered with the Entity's 5-Year Projects Portfolio Plan further addressed during Stage 2 - Initial Planning (refer to document No. EPM-S00-GL-000003- Project Initial Planning Introduction).

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9.0 COORDINATION WITH THE REGIONAL MASTERPLAN

Similarly, to that described in 5.0, coordination with the Project Land Use outside metropolitan areas requires consideration against the most current Regional Masterplan. As with Metropolitan Area Masterplans Plans, Regional Area Plans depict the specific land uses on a wider scale.

At regional level, the Entity is still responsible for ensuring that all development is in line with the most current Regional Masterplan, where compliance is a primary consideration from the Initial Portfolio Stages.

10.0 ACCESSIBILITY

Accessibility is integrated into the design and construction of projects to promote equal access for all persons, especially those with disabilities or mobility limitations to access sites and buildings. Accessible design responds to the physical conditions presented by site and structure allowing access across sites and through buildings, accommodating all pedestrians practically and universally.

Accessibility design deals with varying scales of design over a project. The design must consider the large-scale of the overall site; its accessibility, circulation routes and pathways to and from the site; to the small-scale of the approach to the building, entry, exit and navigation through the building itself. Thus, allowing pedestrians to comfortably and independently traverse the site to access adjoining plots or access all the sites facilities including buildings, supporting parking lots and site amenities. Careful thought flows from small-scale plans to large-scale details including access and circulation where a rigorous scrutiny of changes in levels, turning spaces, material surfaces, hardware, signage, automation and their specifications is required to create a holistic design to reinforce a dignified, independent and truly universal accessibility for all users.

11.0 SUSTAINABILITY

Sustainable design aims at reducing environmental impact, improve health & wellbeing of building occupants, reduce consumption of nonrenewable resources, improve performance of the development, waste minimization and improve biodiversity. Internationally recognized green rating systems help the design teams to develop strategy to identify and establish sustainability goals at the early stage of the project. The design development process deviates from traditional approach requiring integrated development team comprising of Entity, Architect & Engineer (A/E), Commissioning engineer and Sustainability Adviser. Green developments promote system thinking, while setting goals and developing practical, cost effective solutions. Development of green infrastructure and buildings is an integrated approach that has transformed the way developments are designed, constructed, managed and operated.

Engineering plays key role in a sustainable design development. The design & construction of an infrastructure or buildings is significantly influenced by appropriate solutions and options provided by engineers. The engineering team is required to identify the sustainability foot print of the project prior to setting sustainability goals. To support the decision-making process for setting the goals, the team to conduct a risk analysis at planning stage. Environmental, Health & Safety, Social & Cultural Risks associated with project that need to be analyzed for efficient use of resources, management of emissions, waste, pollution, ecosystems & biodiversity and community relations. The outcome of risk analysis shall support to define the project's sustainability goals. Multidisciplinary engineering streams work together to provide solutions along with non-engineering disciplines for a sustainable development. Engineering solutions impact the design, construction, procurement, commissioning, operations & facility management elements of the overall development. It is important for the engineering team while selecting green goals during predesign stage to focus at the minimum on site selection, ecology, orientation, energy, water & waste management, indoor & outdoor comfort & water, commissioning, selection of less harmful, recycled and sustainable material. Refer to document no. EPM-KU0-GL-000001 on sustainability for its inclusion in Infrastructure Projects.

12.0 ENVIRONMENTAL PROTECTION

This section provides guidance for Codes and Performance Standards related to environmental protection and preservation. The Codes, Standards, and Guidelines apply to:

- Environmental Regulations and Project Permitting
- Archeological and Cultural Resource Clearances
- Hazardous Materials Management
- Pollution Prevention

13.0 ENVIRONMENTAL REGULATIONS & PROJECT PERMITTING

13.1 Recognized Environmental Regulation and Standards

The following standards shall be used for reference along with other recognized regulations as a basis for technical justification in the following order:

- Saudi National Presidency of Meteorology and Environment (PME) Standards and General Environmental Law

- Internationally recognized and accepted regulatory bodies
- U.S. Environmental Protection Agency (US EPA)
- U.S. State environmental protection rules and guidelines
- European Union members environmental rules and guidelines

13.2 General Environmental Law and Rules for Implementation

The General Environmental Laws and Rules for Implementation aim to preserve, protect, and develop the environment and safeguard it from pollution and Protect public health from activities and acts that harm the environment.

This guideline provides general environmental protection regulations in additions to details on Environmental Impact Assessment in the Kingdom of Saudi Arabia. Projects that may cause negative effects on the environment are conducted at the project feasibility stage. For more details on Environmental Impact Assessment (EIA) requirements refer to MPWB, Volume 3 (Project Initial Planning).

13.3 Saudi National PME Standards

- In 2012 the PME developed twenty (20) Environmental Reference Standards to represent the National Environmental Guidance Documents for KSA. The reference standards revise the current General Standards for the Environment issued by the PME.

13.3.1 Material Recovery and Recycling of Waste

- The document relates to the recovery and recycling of waste materials and follows the internationally recognized waste management 'hierarchy' of:
    - Prevention (incorporating waste avoidance and waste reduction);
    - Recycling (incorporating reuse, recovery and waste utilization);
    - Treatment;
    - Disposal (as the last resort).
- Implementation of initiatives on waste prevention and minimization should be taken as a first step before relying on waste recovery and recycling schemes to divert waste from disposal.
- This guidance is applicable for municipal, commercial, institutional, and industrial wastes (classifications can be found in the PME Waste Classification Standard).
- This document provides essential guidance related to forming a successful recovery and recycling program including the following key topics:
    - Advantages of Implementation
    - Considerations in Designing a Recovery and Recycling Program
    - The Recycling Process
    - Preparing an Effective Recycling Program
    - Waste Recycling Materials
    - Hazardous Waste Recycling

13.3.2 Mobile Source Emissions

- This standard introduces emission limits for individual pieces of equipment used outdoors and aims to protect, maintain and improve the Kingdom's quality of life, human health, occupational health and natural ecosystems including croplands, forests and deserts whilst maintaining appropriate economic and social development.
- This standard refers to air emissions from non-road diesel (compression- injection) engines, small and large petrol (spark-ignition) engines and non-road recreational vehicles and engines. This includes sources such as mobile generators, agricultural machinery and large earth-moving equipment. It is applicable to all new engines produced after the date of transposition for the standard.

- This standard includes emission limits for diesel (compression-ignition) engines, small and large petrol (spark-ignition) engines, and other recreational vehicles not included in Saudi Standards, Metrology and Quality Organization (SASO) standards.
- This standard does not include emissions from road vehicles, marine vessels, locomotives, aircrafts, and emergency services for fire and medical.
- This standard sets out emission limit values depending on engine type and capacity.

13.3.3 Environmental Noise

- The purpose of the General Environmental Standard for Noises to provide a basis for statutory control to restrict and reduce the nuisance caused by environmental noise. The framework does not address the issue of occupational noise which falls under the jurisdiction of National Health and Safety Law.
- This standard relates to the following types of environmental noise:
    - community noise;
    - noise from industrial units in areas set aside primarily for industrial facilities;
    - noise from construction activities;
    - noise from vehicles (including motorized vessels and recreational craft); and
    - noise from equipment used outdoors.
- The standard does not extend to noise from public transportation, including highways, railways and noise from commercial and private aircraft, including helicopters, both in flight and operating on the ground. Other exemptions can be found in PME General Environmental Standard for Noise Article 1 Section 5.
- If any of the prescribed noise limits have the potential, or will be exceeded a noise permit must be obtained. Reference PME General Environmental Standard for Noise for more detailed permitting requirements.

13.3.4 Control of Emissions to Air from Stationary Sources

- The objective of this standard is to set out point source air quality Standards for the Kingdom of Saudi Arabia for sustainable management of air quality within the Kingdom.
- This standard introduces emission limits for individual facilities, and assists in the protection of the Kingdom's public health, occupational health and natural ecosystems, including cropland, forest, desert and wetlands whilst allowing economic and social development.
- This standard shall obligate operators to apply effective process controls or best available pollution abatement techniques to meet emission limit criteria.
- This standard will establish individual facility monitoring program that provide information to both operator and regulator and facilitate more effective pollution control activities.
- These standards apply to any facility, site, or premises whose activities give rise to air emissions from a stationary source.
- The scope of this standard does not include emissions from residential properties, natural events or mobile pollutant sources.
- Stationary source emission controls defined in this regulation include but are not limited to; dispersion zone and stack height limits; monitoring and analysis requirements; sampling procedures; management controls for fugitive emissions and ozone depleting substances; permitting requirements.

13.3.5 Prevention of Major Accidents

- This standard is aimed to prevent major accidents, such as the release of toxic materials, the release of flammable materials, fires, explosions, major structural failures and those which involve dangerous substances.
- Where accidents do occur, this standard sets out a framework and controls for the mitigation of the impact on human health and the environment.
- This standard applies to all facilities irrespective of size or location, that produces, processes, uses, stores or otherwise handles dangerous substances in quantities equal to or in excess of those specified in the Standard.

13.3.6 Storage and Material Reclamation Facilities - Design & Operation

- The Standard for Storage and Material Reclamation Facilities Design and Operation has effect for purposes connected with the regulation of waste and hazardous waste, and in particular for the purposes of the:
    - Design of new Storage and Material Reclamation Facilities which accept waste of all types from across the KSA whether a material or substance is inert, non-hazardous or a hazardous waste, as the case may be;
    - Operation of Storage and Material Reclamation Facilities to ensure that the site is managed in a manner which will have least possible impact upon the neighboring environment or human health; and accordingly, the Storage and Material Reclamation Facilities Design and Operation Standard shall be recognized and used for those purposes.
- The Standard guides those developing and operating Storage and Material Reclamation Facilities to:
    - Understand the best practice requirements with respect to Storage and Material Reclamation Facility (MRF) design and operation;
    - Develop new storage and MRF sites with due regard to international best practice; and
    - Understand the necessary site development requirements for storage and MRF sites dealing with different waste types.
- The Standard is intended for use as a default position for Storage and MRF design and operation. The Standard applies to all new Storage and MRFs pre-development. However, existing storage and MRF operators must, as far as practicable, implement the relevant best practice measures contained within this Standard.
- This Standard sets out the design parameters and operational requirements for Storage and MRFs in the Kingdom of Saudi Arabia.
- This Standard does not apply to the:
    - Management of Radioactive waste;
    - Management of liquid wastes; or
    - Management of sludges, including sewage sludges and sludges from dredging operations.
- This Standard does not provide detailed information or guidance on the operation of different facilities, but instead concentrates on setting out the Standards for the design and operation of generic MRFs and Treatment Storage and Disposal (TSD) Facilities.

13.3.7 Thermal Treatment and Incineration - Design & Operation

- The Standard applies to all new incineration plant pre-development. However, existing incineration plant operators must, as far as practicable, implement the relevant best practice measures contained within this Standard.
- This Standard sets out the design parameters and operational requirements through to site closure for non-mobile thermal treatment and incineration processes in the Kingdom of Saudi Arabia.
- This Standard applies to mass burn incineration techniques, waste to energy facilities and the advanced thermal treatment processes of pyrolysis and gasification.
- An environmental assessment will be required prior to the development of an incineration plant to identify and minimize impacts on the environment.
- Site specific design considerations should include (but are not limited to):
    - Topography;
    - Size and shape of the property area
    - Subsurface geological and hydrogeological conditions
    - Surrounding land use
    - Seismic considerations
    - Access and ease of transportation to the site.
- This Standard also provides guidance on:

- Site Layout
- Site infrastructure requirements
- Thermal treatment and incineration design requirements
- Operations requirements
- Records Keeping.

13.3.8 Waste Acceptance Criteria

- This standard applies to waste Generators and TSD facility operators.
- This standard extends to all waste types including hazardous, non-hazardous and inert waste.
- This standard provides Waste Acceptance Criteria (WAC) and Waste Acceptance Procedures (WAP).
- Where all the limit values for WAC are met, the waste will be acceptable for final disposal at a hazardous waste landfill site. Where the limit values are not met, then the waste must be treated to bring it within the required acceptance limits or an alternative disposal route must be sought.
- A waste material identified as a hazardous waste in the Waste Classification Standard will not necessarily be accepted into a hazardous waste landfill. Waste classification and WAC are not linked. The Waste Classification Standard classifies the waste, whereas the WAC Standard defines what class of landfill a waste is eligible for.
- This standard outlines a nationally consistent approach for KSA for the disposal of waste to landfill. It provides WAC for three classes of landfills (hazardous, non-hazardous and inert), including concentration limits covering a greater range of contaminants than those specified in the Waste Classification Standard.
- Under this standard, hazardous wastes will only be accepted at hazardous waste landfills after it has been treated or stabilized to minimize hazards and then disposed of at landfills that offer an appropriately high standard of environmental protection.
- There are three kinds of WAC including leaching limit values, limit values for other parameters and a list of inert wastes which may be accepted without testing.
- There are a number of special provisions relating to stable, non-reactive hazardous wastes, asbestos and gypsum wastes, and underground storage.
- This Standard provides guidance on the following topics related to WAC:

    - Waste Generator Responsibilities
    - Waste Characteristics
    - Waste Treatment
    - Landfill Facility Operator Responsibilities
    - Landfill Facility Criteria
    - Hazardous Waste Landfill Criteria
    - Non-Hazardous Waste Landfills
    - Inert Waste Landfills Requirements
    - Underground Storage Requirements

13.3.9 Waste Classification

- These Standards guide those generating, storing and handling wastes in assessing their classification in terms of:
    - The origin of the waste: whether waste is industrial, commercial or municipal;
    - The physical form of the waste: whether waste is a liquid or a solid (gaseous waste is outside the scope of this standard);
    - The character of the waste: whether waste is hazardous, non-hazardous or inert.
    - The type of hazardous waste: whether it is a listed hazardous waste, contains a hazardous constituent or displays a hazardous property.
- The assessment of waste will enable Waste Handlers to determine the overall manageability of the waste to ascertain the level of control necessary and allow for responsible practice to meet any associated environmental obligations.
- This Standard defines and classifies waste to be managed in KSA with respect to the form of the waste material and its associated impact on human health or the environment.

- This Standard is relevant to all waste types currently produced within KSA as well as any other waste streams which may be produced throughout the period of operation of this Standard.
- This standard does not apply to the following waste streams:
    - Discharges of industrial and municipal wastewater to central treatment works or directly to the environment - The Industrial and Municipal Wastewater Discharges and Ambient Water Quality Standards control and manage wastewaters discharges.
    - Radioactive waste, other than that produced in the course of healthcare treatment procedures.

13.3.10 Drinking Water Quality

- With the exception of bottled or packaged water, the standards shall apply to any water intended for drinking irrespective of the source (municipal supplies, rainwater tanks, boreholes, etc.) or where it is consumed (including the home, restaurants, camping areas, shops).
- These standards do not address water used for specialized purposes such as renal dialysis and some industrial purposes where water of a higher quality may be required.
- The quality of drinking water shall be regulated up to the point at which the distribution system enters the boundary of a private property. The quality of water should however be measured from the point of use (e.g. a kitchen tap).
- Where more than one agency manages the water supply. Each individual agency will be responsible for the quality of drinking water within and up to the boundary of its network and the quality of drinking waters arising from its actions.
- These standards do not apply to private water supplies on the condition that the volume of that supply does not exceed $10m^3$ per day on an annual average.

13.3.11 Biological Treatment - Design & Operation

- This Standard applies to all new biological treatment pre-development.
- This Standard sets out the design parameters and operational requirements for biological treatment facilities in the KSA.
- This Standard applies to commercial and/or publicly operated biological treatment facilities. The provisions of this Standard are therefore not applicable to domestic biological processes such as home composting initiatives operated by householders at their place of residence.

13.3.12 Waste Regulatory Control and Compliance

- This standard applies to all Generators, Transporters and TSD Facility operators in KSA.
- This standard extends to all waste types including hazardous, non-hazardous and inert waste.

13.3.13 Waste Handling and Storage

- This standard guides those handling and storing waste in good operating practices, in managing effective waste storage and segregation systems, and in detecting, containing and cleaning up any leaks that may occur.
- This standard applies to Waste Handlers who handle and store waste from the point of generation through to the storage of waste where it is held at a facility prior to its onward transfer for recycling, treatment or disposal. This Standard must therefore be read in conjunction with the specific requirements for dedicated storage facilities which are detailed further in the Waste Storage and Material Recycling Facilities – Design and Operation Standard.
- The handling and storage of waste at recycling, treatment and disposal facilities are covered in the design and operation waste standards for these facilities that accompany this series of Waste Standards.
- This Standard does not detail the requirements of protecting employees from the effects of handling hazardous wastes in the workplace such as risk assessments, monitoring, Personal Protective Equipment (PPE) or ventilation systems. These requirements must be complied with separately as per health and safety related Standards.

13.3.14 Waste Training and Assessment of Technical Competence of Operators

- This standard is to be applied by PME or other PME approved body with responsibility for assessing the technical competence of designated facility operators.
- The standard extends to all TSD Facilities required to be licensed under the Waste Regulatory Control and Compliance Standard
- This standard does not apply to industrial waste water facilities, sewerage systems and waterworks treating liquid wastes, or to facilities used solely for the disposal of liquid municipal or industrial wastes.
- This Standard defines the following:
    - Responsibilities
    - Certification Requirements
    - Training Requirements
    - Assessment of Technical Competence.

13.3.15 Waste Transportation

- This Standard utilizes the waste classification and definitions as stated in the provisions of the Waste Classification Standard and does not extend to provisions covering radioactive waste or explosives.
- For the purposes of this Standard, three main modes of transport have been addressed, namely, transport by road, rail and sea.
- This Standard does not apply to the on-site transportation of waste within a facility's property boundary.
- This Standard incorporates the international requirements for dangerous goods and substances in relation to the transportation of hazardous waste to ensure consistency is achieved.
- Requirements relating to the packaging, labelling, loading, stowage, placarding and transportation of hazardous or dangerous substances apply as much to hazardous wastes as they do to pure chemical substances. There are also certain provisions that apply to hazardous wastes which take account of particular problems encountered in dealing with dangerous goods for transportation.
- Waste classifications detailed in this Standard are specifically for the purposes of labelling and packaging for transportation and, as such, are distinct from the classification of waste as detailed in the Waste Classification Standard.
- This Standard makes provision for vehicle specifications, which have been determined for minimum requirements to ensure the safety of hazardous waste transport operation.
- Transboundary waste movement provisions in this Standard are in line with multilateral environmental requirements to establish a framework of control, in relation to international recognized practice, whereby waste is disposed of in a controlled manner. The provisions aim to prevent the unauthorized disposal of international waste shipments and the unregulated recovery of waste shipments, without hindering the legitimate trade in waste.

13.3.16 Landfill - Design & Operation

- This Standard sets out the design parameters and operational requirements through to site closure and aftercare for solid waste landfill in the Kingdom of Saudi Arabia.
- This Standard does not apply to the:
    - management of radioactive waste
    - management of liquid wastes
    - spreading of sludges, including sewage sludges and sludges from dredging operations for the purposes of fertilization or land improvement; or
    - remediation of existing landfill sites.
- This Standard provides guidance on the following landfill design criteria:
    - Landfill Classification
    - General Provisions
    - Site Infrastructure Requirements
    - Landfill Design Standards
    - Record Keeping

- Site Closure and Aftercare.

13.3.17 Industrial and Municipal Wastewater Discharges

- Discharges shall include any liquid effluents or process water which is not classified as clean unpolluted surface runoff including storm water. This may include but is not restricted to:
  - Waste chemicals, including oils
  - Liquid process wastes
  - Detergents
  - Condensate water
  - Cooling water
  - Biodegradable substances
  - Wash water
  - Ballast water
  - Liquid wastes or wash waters, domestic sewage, wastewater discharged using sinks, basins or toilets
  - Contaminated mine or quarry water
  - All sanitary wastewaters
  - Treated effluents from Central Treatment Works CTW (municipal and industrial)
  - Desalination reject water.

- These standards shall apply to any installation, site or premises that produce discharges as defined in the Standard. These standards control discharges into CTW, unplanned emergency events (overflows) and discharges to coastal waters, surface water, land and wadis.
- It is the responsibility of the CTW to ensure that the final discharge from their facility does not exceed any of the prescribed concentrations and values in Appendix B of the Standard when processing domestic, commercial and / or industrial wastewater.
- Sanitary Wastewater discharges from off-shore facilities shall be governed by the relevant regional marine discharge requirements.

13.3.18 Best Practicable Environmental Option (BPEO) for Waste Disposal

- For each waste stream, as classified in the Waste Classification Standard, there are a variety of alternative approaches available to ascertain the BPEO for waste disposal.
- The BPEO for a particular waste stream may vary determined by local circumstances affecting the practicality, cost, and environmental and social benefits that take into account national objectives for sustainable waste management. The choice is therefore complex and considers many different factors when recommending the preferred BPEO.

13.3.19 Ambient Air Quality

- This standard relates specifically to the ambient air quality.
- This standard prescribes limit values; limits; monitoring and analysis requirements for ambient air quality parameters.
- This standard establishes the responsibilities of the Competent Agency with regards to managing ambient air quality in the Kingdom.

13.3.20 Ambient Water Quality

- These Standards refer to the safety, aesthetic, physical and chemical aspects of ambient waters for the protection of human uses and the environment including ecology and recreation.
- These standards apply to all coastal and underground waters and include any surface freshwater that may be present permanently or temporarily.

14.0 ARCHAEOLOGICAL AND CULTURAL RESOURCE CLEARANCES

To avoid unnecessary interruptions during construction, and to prevent damage to existing historic, archeological and cultural resource sites, the Entity is encouraged to plan accordingly starting from the planning stage of its projects. Appropriate identification of cultural resources shall be conducted at the planning phase of a project. The Saudi Commission for Tourism and Antiquities (SCTA) is the government agency responsible for the inventory and protection of the archeological treasures and rare historic sites of ancient civilizations across the Kingdom. The SCTA is the national authority responsible for assessing how planning and development projects could impact the archaeological and cultural resources.

The Entity shall review historical information sources, seek information from knowledgeable parties, and conduct additional studies as necessary or requested. Sites include not only visible architecturally-significant sites, but also early human habitation sites, monuments, culture, and underwater and other non-visible sites.

Depending on the results of the pre-project planning background review further studies or plans to avoid, minimize or mitigate the adverse impacts of the project to the archeological and/or cultural resource site(s) may be necessary.

If a historic site or object is encountered during construction or operation of a facility, intrusive or destructive work in the area shall stop immediately and the SCTA shall be notified by the Entity immediately to address the finding.

15.0 HAZARDOUS MATERIALS MANAGEMENT

15.1 Description

- This Subsection pertains to the management of materials defined as hazardous that are used, but not limited to, manufacturing and industrial processes. In the absence of national level hazardous materials management guidance any applicable regional or local regulations shall be adhered to.
- As a standard practice to cover any gaps the “International Finance Corporation General Environmental, Health and Safety Guidelines, Hazardous Materials Management” document should be followed as a best practice. This guideline covers two main topics:
    - General Hazardous Materials Management: Guidance applicable to all projects or facilities that handle or store any quantity of hazardous materials.
    - Management of Major Hazards: Additional guidance for projects or facilities that store or handle hazardous materials at, or above, threshold quantities, and thus require special treatment to prevent accidents such as fire, explosions, leaks or spills, and to prepare and respond to emergencies.

15.2 General Hazardous Materials Management

Projects that manufacture, handle, use, or store hazardous material should establish a management program to protect the workforce; prevent and control any release or accident. Management plans should include the following topics as applicable:

- Hazard Assessments
- Management Actions
    - Release prevention and control planning
    - Occupational Health and Safety
    - Process knowledge and documentation
- Preventative Measures
    - Hazardous materials transfer
    - Overfill protection
    - Reaction, fire and explosion prevention
- Control Measures

- Secondary containment (liquids)
- Storage tank and piping leak detection
- Underground storage tanks

15.3 Management of Major Hazards

Projects involving production, handling, and storage of hazardous materials at or above threshold limits should prepare a Hazardous Materials Risk Management Plan with the objective to prevent and control a catastrophic release of toxic, reactive, flammable, or explosive chemical. Hazardous Materials Risk Management Plans should include the following as applicable:

- Management Actions
  - Management of change procedures
  - Compliance audits
  - Incident investigation
  - Employee participation
  - Contractor compliance
  - Training
- Preventative Measures
  - Process Safety Information
  - Operating Procedures
  - Inspection and maintenance of process equipment; piping; and instrumentation
  - Hot work operations
  - Pre-Start Review
- Emergency Preparedness and Response
- Community Involvement and Awareness.

16.0 POLLUTION PREVENTION

16.1 General

16.1.1 Basic Understanding

- Pollution Prevention (PP) is concerned with avoiding the creation of pollution and waste, rather than trying to clean it up or manage it after the fact.
- Pollution prevention is essential on all projects and it is beneficial to all aspects of the environment. Designers should incorporate PP into all project designs.
  Some examples of the benefits of PP are:
  - Minimizes or avoids the creation of pollutants;
  - Accelerates the reduction and/or elimination of pollutants;
  - Minimizes health risks; and
  - Avoids costly future cleanup and disposal.

16.1.2 Design

Consider the following topics in the following paragraphs for pollution prevention during concept design, process development, and project development.

16.2 Life Cycle Assessments (LCA)

16.2.1 LCA Implementation

- These assessments are created to quantify inputs, internal processes, and outputs for a facility and are useful for industrial applications. Having accurate knowledge of an industrial facility allows processes to be targeted for PP measures. Used properly, an LCA with application of PP technologies and techniques during the planning phase of a project has the potential to make the Environmental Permitting Plan (EPP) less complicated.
- Many questions in the Environmental Screening Questionnaire (ESQ) pertain to aspects of an LCA, making it beneficial to perform a thorough LCA before filling out an ESQ to start the EPP.
- More detailed information on LCAs and implementation thereof can be found in the US EPA National Risk Management Research Laboratory's Life Cycle Assessment: Principles and Practice.

16.3 Material Reduction, Substitution and Elimination

16.3.1 Reduction

- The first step in PP is to reduce the material inputs to the process based on LCA findings. Waste-generating processes within the facility shall be targeted for process modifications that reduce input materials and subsequently reduce waste generation.

16.3.2 Substitution

- After material input reduction, the next step is to substitute hazardous materials with less- or non-hazardous materials that have less stringent regulations. There are many naturally-derived substitutes that have the potential to perform industrial functions as well as chemically-derived materials.
- Example: Dyeing products with chemically-created dye produces wastewater that may need to be pre-treated before discharge to wastewater treatment plants.
- Chemical dye may potentially be replaced with a natural dye that may require little to no pre-treatment onsite before discharge.

16.3.3 Elimination

- A step beyond reduction and substitution can be eliminating materials from a process entirely. Thorough analysis of industrial processes can sometimes yield information suggesting that some material inputs are unnecessary for a specific process.

16.4 Material Reuse

- Reusing materials might reduce required raw material stock and waste generation. As long as the reused material still meets Standards, Specifications and Regulations, this option shall be considered when planning, designing and operating a facility.

16.5 Material Recycling

16.5.1 Recycling

- Recycling occurs when the use of a process-specific material is complete and it is reformed to perform the same or equivalent function. The most desirable materials and processes are ones where a material and application can be recycled indefinitely without loss of quality.
- Example: Used shoe rubber reformed to create shoe rubber for new shoes.

16.5.2 Upcycling

- Upcycling occurs when a material at the end of its process-applicable life is reformed to serve a purpose that is considered of higher quality than its prior use.

- Example: Used shoe rubber reformed to serve as a material stock for industrial product production.

16.5.3 Downcycling

- Downcycling occurs when a material at the end of its process-applicable life is reformed to serve a purpose that is considered lower quality than its prior use.
- Example: Used shoe rubber reformed to create an athletic surface for walking or running.

16.5.4 Objectives

- An industrial facility pursuing recycling objectives shall strive for true recycling or upcycling. In this way material inputs and waste generation are minimized with the highest objective of the facility being to operate as a closed loop system.

16.6 Energy Use

16.6.1 Wasted Energy

- Industrial processes use a large amount of energy. Identifying processes requiring significant energy and addressing inefficiencies decreases energy production at electricity generation facilities and thus decreases the pollution that the industrial plant is indirectly creating. If electrical generation is onsite, fuel inputs and onsite point source pollution can be reduced.
- Areas to be considered to reduce energy demand:
    - Lighting
    - Motors
    - Utility Services (compressed air, cooling water, etc.)
    - HVAC
    - Refrigeration
    - Insulation.
- The American Council for an Energy-Efficient Economy (ACEEE) provides publications, workshops, and further information on energy-efficient industries.

17.0 SAFETY STANDARDS

Safety in design is a process that encourages designers to "design out" health and safety risks during design development. The concept supports the view that along with quality, program and cost; safety is determined during the design stage.

Designing for safety is a requirement of all new work under the jurisdiction of the Entity. Safety as it relates to design covers a wide range of components and topics including but not limited to:

- Asbestos
- Brownfields
- Carcinogens
- Chemical Hazards and Toxic Substances
- Computer Workstations
- Confined Spaces
- Crane, Derrick and Hoist Safety
- Demolition
- Extremely Low Frequency Radiation
- Electric Power Generation, Transmission and Distribution Industry
- Emergency Preparedness and Response
- Ergonomics
- Fall Protection

- Fiberglass
- Fire Safety
- Formaldehyde
- Green Roofs
- Hazardous Waste
- Healthcare
- Highway Work Zones and Signs, Signals, and Barricades
- Indoor Air Quality
- Laboratories
- Lead
- Mold
- Occupational Heat Exposure
- Occupational Noise Exposure
- Personal Protective Equipment
- Radiation
- Radon
- Scaffolding
- Sealant & Waterproofing
- Waste Management and Recycling
- Welding, Cutting and Brazing.

17.1 Safety in Design

With regards to safety, the Entity is responsible to use competent and adequately resourced A/E to address the health and safety issues likely to be involved in the design who can demonstrate that they are aware of their duty with regards to safety before starting design.

Principles of Prevention requires the Designer to first attempt to eliminate hazards and then to reduce the remaining risks following the “E.R.I.C.” method:

E - Eliminate: If an identified hazard that is not a mandatory requirement or specific obligation may be eliminated, it shall be eliminated so far as reasonably practical.

R - Reduce: Reduce remaining risks associated with the hazard so far as reasonably practical.

I - Inform: Provide information on the risks.

C - Control: Typically, control is a responsibility that resides with the Construction in the field.

Following safety considerations shall be taken into design with regards to the safety:

- Avoid risks, evaluate risks that cannot be avoided
- Avoiding foreseeable risks to those involved in the construction and future use of the structure, and in doing so, eliminate or reduce hazards and the likely risks associated with those hazards.
- Providing information to the Entity in writing about remaining hazards or risks associated with the design.
- Coordination of design work with other Designers and stake holders to improve management and control of hazards and risks. Regular reviews with the Design Team are required.
- Creating a design that may be constructed, maintained, used, and/or demolished with reasonable safely.
- Applying health and safety requirements of applicable Codes and Standards.
- Providing permanent and safe means of access without fall arrest/restraint equipment to support regularly planned maintenance activities unless not possible for a documented reason. This includes avoiding access by means of removing ceiling tiles
- Design hazards or risks must be weighed against other relevant design considerations including cost, purpose, aesthetics, constructability, maintainability, environmental impact, etc.
- Where identified hazards or risks cannot be eliminated, they are to be reduced as much as practical weighing other design considerations. Methods for achieving this reduction may include reducing the

likelihood of harm, the potential severity of harm, the number of people exposed to harm, and/or the frequency or duration of exposure to harm

- The greater the degree of risk, the greater effort the Designer shall expend to eliminate or reduce that risk
- If a design contains a specific or unusual hazard or risk that may not be apparent to a reasonably trained or competent person, the Designer must provide written information explaining the hazard or risk to the Entity.