



Environmental Management Plan (EMP)

Status	Issue	Date	Prepared	Reviewed	Approved	Remarks
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Form: &AZ-W-SC 9622 (EN) / Issue 01 dated 01.03.2019

Status: X / Prepared: Métivier, GCH / Reviewed: Gransee, GCH / Approved: Gransee, GCH / Remarks: replaces &AZ-W-PQ 9601A (EN)

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1 Purpose

This Safe Work Procedure defines the applicable environmental protection requirements to which the Project must adhere to avoid, minimize and mitigate environmental impacts associated with project construction activities.

It outlines planned activities to avoid, minimize or mitigate the impacts of relevant environmental aspects as low as reasonably possible and to ensure that the environmental requirements given by authorities, CLIENT, COMPANY and CONTRACTOR will be fulfilled.

2 Scope and validity

This Safe Work Procedure applies to any activities carried out during construction, pre-/commissioning and start-Up phases as well as for repair work and small-scale modifications.

In case activities are executed by COMPANY (e.g. during pre-commissioning), then the stated requirements shall be performed by COMPANY instead of CONTRACTOR.

3 Definitions and Abbreviations

Bunds	A type of secondary containment, usually an impermeable construction designed to hold potentially polluting substances that have leaked or spilled from a primary within it.
CLIENT	BOC UK
COMPANY	Linde Engineering Dresden (LEDD)
CONTRACTOR	Non-Linde third party performing work for the Engineering Division on one of its LE Entity Sites or Project Construction Sites. Couriers providing a delivery service (for example DHL, UPS or FedEx) are not regarded as Contractors.
Discharge	Release of water into surface waters, groundwater, or drainage / sewer systems.
Drip trays	A type of secondary containment, generally used for drums, small containers and to catch spillages during refueling out on site.
EMP	Environmental Management Plan
Environment	Surroundings in which an LE Entity operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation.
Environmental Aspect	Element of an organization's activities, products or services that interacts or can interact with the Environment.
Environmental Impact	Change to the Environment, whether adverse or beneficial, wholly or partially resulting from an organization's Environmental Aspects.
Environmental Impact Assessment (EIA)	Analytical process that systematically examines the possible Environmental Impacts of the implementation of projects, programs and policies or execution of activities, products or services.
Interceptors	Mechanism added to or included in drainage system to intercept pollutants. Different interceptors can be used for different substances (e.g. silt and oil).
OWNER	The OWNER is the operator and/or owner of the [e.g. Petrochemical Complex, Steel Mill] wherein CLIENT's construction site is located.
Runoff	Flow of water, rainwater or melted snow over the ground surface to a drainage system or direct to waterways. This occurs if the ground is impermeable, is saturated or if rainfall is particularly intense.

Secondary containment	Container in which a primary container is located. It is impermeable to the product being stored and water, and designed to catch spills, leaks or overflows from the container (its pipework and equipment) in everyday use, accidents and emergencies. Bunds and drip trays are examples of secondary containment.
Sewage (Sanitary water / Foul water)	Type of wastewater containing a community's liquid and solid waste carried away in sewers
Sewer / Drain	Pipe or channel that takes away wastewater or surface waters from buildings or installations and associated paths and hard standings and having a proper outfall.
Significant Environmental Aspect	Environmental Aspects that has or can have one or more Environmental Impact and that is determined as "significant" by applying one or more criteria related to the organization and its context.
Silt	fine sand, clay, or other similar material.
Stormwater	Water which falls as rain during a storm and which is cleared by stormwater drains.
SUB-CONTRACTOR	Non-Linde third party performing work for the Engineering Division under a contractual agreement with one of its Contractors
Surface waters	Waters from waterways (e.g. rivers, lakes, loughs/lagoons, reservoirs, ponds, streams, canals, ditches incl. those that are temporarily dry, estuaries and coastal waters up to 5 km offshore.)
Wastewater (or waste water)	Any water affected by human use or by any combination of domestic, industrial, commercial or agricultural activities, surface runoff or stormwater, and any sewer inflow or sewer infiltration.

AC	Air-Conditioning
AQI	Air Quality Index
BRM	Blast Resistant Modules
CFCs	Chlorofluorocarbons
CO	Carbon Monoxide
EIA	Environmental Impact Assessment
ERT	Emergency Response Team
ES	Environmental Statement
FSC	Forest Stewardship Council
GHG	Greenhouse gas
GRIS	Global Register of Invasive Species
HBFCs	Hydrobromofluorocarbons
H-CFCs	Hydro- Chlorofluorocarbons
HID	high-intensity discharge (outdoor lights)
HVAC	Heating, Ventilation and Air-Conditioning
IUCN	International Union for Conservation of Nature
IUCN SSC	IUCN Species Survival Commission
JSA	Job Safety Analysis
LDS	Leak Detection System
LED	Light Emitting Diode
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen oxide
O ₃	Ozone
ODS	Ozone Depleting Substances
PCBs	Polychlorinated biphenyl
PEFC	Pan European Forest Certificate Council
PM / PM ₁₀	Particulate Matters
PPE	Personal Protective Equipment
SDS	Safety Data Sheet

SFI	Sustainable Forestry Initiative
SO2	Sulfur Dioxide
SWMP	Site Waste Management Plan
SWPPP (or SW3P)	Stormwater Pollution Prevention Plan
VOCs	Volatile Organic Compounds
WEEE	Waste Electrical and Electronic Equipments

In the following referenced document numbers with the originator code "&AE" in this project always refer to project documents with entity originator code of this document.

3.1 “Must” and “Should”

Within this Environmental Management Plan, the terms “must” (as well as “must not” and “shall not”) indicate a mandatory requirement. The term “should” indicates a best practice.

4 References

4.1 Environmental Legislations

The applicable home country environmental legislation can be obtained from the following referenced sources. If the required environmental legislation cannot be obtained, COMPANY's Lead Construction & Commissioning HSE should be contacted for further assistance and check on alternative sources of information.

Country / Org.	Main Environmental Legislations (non-exhaustive list)
Linde	<ul style="list-style-type: none"> Linde online EHS regulatory service - Global EHS Intelligence Portal (YGP)
UK/Linde	<ul style="list-style-type: none"> <i>Environmental Protection Act 1990</i> <i>Hazardous Waste Regulations 2016</i> <i>The Waste (England & Wales) Regulations 2011</i> <i>Wildlife & Countryside Act 1981</i> <i>Radiological protection, ionising radiation Regulations 2019 (ROI)</i> <i>The Control of Asbestos Regulations 2012</i> <i>Control of Substances Hazardous to Health (Amended) Regs 2003</i> <i>Health & Safety at Work Act 1974 (Application to Environmentally Hazardous Substances) (Amendment) Regs 2005</i> <i>Environmental Permitting Regulations 2016</i>

4.2 CLIENT's Environmental Requirements

No.	Title
MS-63474	Waste Administration
MS-62187	Waste Storage, Drainage and Incidents
MS-64794	Waste Electrical and Electronic Equipment (WEEE)
MS-62178	Environmentally Hazardous Liquid Chemical Storage & Transfer Systems
EPR Permit BJ7522IJ	Environmental Permitting Regulations 2016

4.3 Contractual Environmental Deliverables

Following environmental deliverables must be produced during the project:

No.	Title
1	No significant chemical spillages
2	All waste is managed in accordance with legislative requirements in terms of the process and documentation.
3	No environmental nuisance complaints

5 Specific site environmental restrictions and requirements

5.1.1 Outline of requirements

Construction of this LIC plant is on a brownfield development on the site of a former ICI Chemicals Cumene Plant. A soil survey carried out by Client identified a small amount of contamination (primarily hydrocarbons) being present. Given the site's proposed commercial land use, the levels of contamination recorded on site are unlikely to pose a risk to the current and future users of the site provided appropriate environmental and personnel protection measures are in place.

As a result of the land lease agreement, Client must prevent any migration, exacerbation etc of contamination as a result of any construction activity carried out on site. Client and our partners are not allowed to carry out any invasive alterations or works below the ground surface without the prior written consent of the site Landlord. As we undertake specific construction activities, CLIENT is liable to monitor via borehole sampling and remediate/prevent any movement of contamination detected in any of the monitored boreholes around our proposed project site.

As Principal Contractor, we must advise to our Client and our Client must advise Advisian (acting on behalf of the Landlord) in advance when we undertake specific listed construction activities. Risk assessments and method statements and associated documentation must also be provided and require Advisian approval in advance.

The Client will construct three new boreholes and associated monitoring wells and carry out pre-sampling and subsequent ongoing analysis. LIC Plant Construction Works cannot proceed unless these works are complete, and the final ground investigation report issued.

5.1.2 Design phase considerations

Principal Contractor shall provide the following information to Client in advance to enable them to seek approval from Advisian for work to proceed.

We must provide to the Client and the Client will provide Advisian with piling designs, including the proposed methodology, size and depth.

- The Client is to be advice and will provide Advisian of any changes to the previously supplied drawings for approval, including:
 - Sewer Layout;
 - Paving layout;
 - Foundation layout;

- Plot plan.

- Details of proposed additional site investigations (if required) including the location, size and angle of any trial pits or boreholes and associated RAMS;
- Drainage Repair Works: Client has been permitted to undertake repair, renewal, replacement and maintenance of the Drainage system (including all drains leading to the Interceptor), as is required to ensure that the Drains comply with British Standards and recommendations in the Drainage Survey, including carrying out a repeat leak test of the system following completion of such works.

5.1.3 **Civils Contractor mobilisation phase**

Principal Contractor shall provide:

- Piling Risk Assessment (in accordance with the EA technical guidance document on Piling in Contaminated Land) shall be required in advance and approved by Client and Advisian;
- Materials management plan (where re-use of excavated materials is proposed) including laboratory test results for the proposed materials and screening to demonstrate that the material is suitable for its proposed use. Also confirmation whether the CL:AIRE Definition of Waste Code of Practice is being followed and provide the associated declaration;
- Written risk assessments and method statements (RAMS) for all activities to include and identify those which could affect the ground or contamination within the ground;
- Details of the proposed methodology to manage, treat and dispose of water and non-aqueous phase liquids encountered during the construction works;
- Details of the proposed methodology for preventing contamination of the underlying ground from stockpiling of materials;

5.1.4 **Construction phase**

During construction phase Principal Contractor shall provide:

- Details of materials to be brought onto site for the purpose of infilling excavations or changing ground levels including the sources, chemical and geotechnical composition and proposed use.

6 Risk Management

6.1 Environmental Studies

Following project specific environmental studies have been conducted by CLIENT or COMPANY as per project and legal applicable requirements:

- &BOC-AXX-N-T 500001 (EN)_1.0 Utility survey drawing
- &VD-C-RT 1002 (EN)_1.0 Phase 2 Site Investigation
- &VD-C-RT 1001 (EN)_1.0 Phase 2 Site Investigation report

Control measures defined in the project specific environmental studies to warranty risk management are integrated in this EMP document.

6.2 Environmental Impact Assessment (EIA)

To ensure that all potential environmental impacts related to this project are adequately addressed, an Environmental Impact Assessment (EIA) (&AZ Q LX 1050.400B) has been completed by COMPANY for the environmental aspects relevant for its construction and commissioning activities.

Environmental impacts foreseen for this project are following:

- Air Pollutants Emissions (NO_x, SO₂, CO, VOC, CFC, GHG, PM, etc.)
- Air Pollution
- Air quality degradation
- Cultural heritage sites damaged or destroyed
- Dust generation
- Energy Consumption
- Environmental incident
- Erosion
- Hazardous Materials spillage/Leakage
- Inappropriate disposal of waste
- Increase of Waste Loading
- Interaction with vicinity or surrounding Area
- Land Contamination
- Land Disturbance / Alteration
- Noise Disturbances
- Public Health Effects
- Raw Material wastage
- Release of ozone depleting substances (ODS)
- Site Hygiene Condition
- Social Disruption
- Soil erosion
- Stormwater run-off
- Uncontrolled Releases of Material
- Water resource depletion

Cumulative environmental impacts as a result of several construction activities occurring simultaneously are seen to be limited to impacts on air quality, land, noise, vibration and traffic. Therefore, measures included in this EMP for noise, vibration and traffic and measures identified for air quality are meant to be implemented to mitigate any cumulative impacts.

6.3 Environmental Statement (ES) / Environmental Impact Register

An Environmental Statement (ES) / Environmental Impact Register is established by COMPANY as part of the Environmental Impact Assessment (EIA) (&AZ Q LX 1050.400B). It summaries the findings of the EIA process with emphasis on the Significant Environmental Aspects and is used primarily to inform CLIENT regarding the environmental implications of the project execution.

CONTRACTOR and Subcontractors' Environmental Statement / Register are subject to formal acceptance by COMPANY.

6.4 Environmental Risk Assessment

An HSE risk assessment (&AZ W QR 9602) of the key environmental aspects relating to the project has been undertaken by COMPANY. The assessment considered the risk to the environment as a result of the project, both with and without mitigation measures in place. Relevant actions to eliminate or mitigate the environmental risks/impacts have been defined and transferred into this EMP.

6.5 BeSafe Daily (BSD) - Daily Pre-Start Risk Assessment & Safety Talk

The BeSafe Daily (BSD) or Daily Pre-Start Risk Assessment must be prepared daily by CONTRACTOR's supervisors and discussed with their respective teams daily before start of work.

The environmental component of the BSD will include any environmental issues that could potentially be impacted by, or impact on, the day's activities. Topics to be covered will be focused on issues relevant to upcoming works, works in or near sensitive receivers or environmentally sensitive areas or incidents that have occurred. These will include, but not be limited to: noisy works inside normal working hours, environment incidents, water management, water quality and sediment controls, changes to previously communicated environmental mitigation measures, exclusion areas including heritage and protected vegetation, etc....

The BeSafe Daily Card and Daily Pre-Start Risk Assessment can either be according to COMPANY's form (see &AE W-QR 9607 "BeSafe Daily") or to CONTRACTOR's standard

6.6 Specific Risks related to Pre-/Commissioning and Start-Up

Activities associated with pre-/commissioning and start-up will potentially create a greater risk for releases and significant environmental impacts.

As a result, CONTRACTOR's must ensure following controls, when relevant, are applied:

- Prior filling permanent plant equipment with a hazardous material, for example Amine solvent or Ammonia, CONTRACTOR will prepare a JSA verifying that proper planning and precautions have been implemented and submit it for approval to COMPANY's pre-commissioning Lead prior start work. In this case COMPANY shall share such details in advance with CLIENT and agree/seek approval for this activity prior to commencement.
- Prior to filling or flushing any equipment containing lubricants, CONTRACTOR will ensure that spill kits are provided in the immediate area and perform training to their team to verify that they know how to respond to any potential incidents.
- CONTRACTOR to check if the structures of the secondary containments are in good state prior using equipment housed within the secondary containment. (see 8.5.2)
- Gauges used on tanks must be calibrated using the correct density material to what will be stored within the tank before a tank is filled. Safety and environmental control devices shall not be by-passed to speed up any activity.
- Any venting, de-pressuring, start-up and shutdown emission rates must be as per CLIENT/applicable legislations emission limit values.
- Hydrostatic test water must be used and discharged as per CLIENT specifications and procedures, and if none, as per COMPANY's specifications.

7 Environmental Permitting

If relevant, CONTRACTOR must, prior to the commencement of the works on site, make any necessary application(s) for permit, license, authorization etc. to CLIENT/OWNER or authorities (e.g. diesel generator, wastewater discharges, noise, ozone depleting compounds, waste storage or disposal, delivery outside working hours, etc.) and provide a copy to COMPANY, CLIENT/OWNER upon request.

Following project specific environmental permits/licenses/authorizations have been granted to CLIENT/OWNER, COMPANY, CONTRACTOR (*to be selected*) to control activities that have been identified as causing harm to the environment or human health during the project phases. They define legally binding requirements for individual sources of significant environmental impact.

PERMIT/LICENSE REFERENCES	REQUIREMENTS / RESTRICTIONS DESCRIPTION	REFER TO CHAPTER
EPR Permit BJ7522IJ	There are no emissions permitted to land, water or to any sewer from this installation. Except controlled emissions to Effluent Sewer System.	MS-36814 rev3.3
EPR Permit BJ7522IJ	Waste materials must be stored on site only in the skip provided. Recovery and disposal is to be carried out only by an authorised waste disposal unit.	MS-36814 rev3.3

8 Environmental Management

Information related to environmental leadership and commitment, policy, objectives, organisation and roles and responsibilities are specified in the project specific HSE Program (&AE W-PQ 9601).

8.1 Land Contamination and Disturbance

8.1.1 Land Contamination

Sites may be contaminated with pollutants as a result of known or unknown historical releases of hazardous materials, the presence of abandoned infrastructure formerly used to store or handle these materials, including underground storage tanks. Common pollutants include asbestos, hydrocarbons (such as oils and fuels) and hazardous heavy metals and solvents. They might be present in either the soil or groundwater or both.

- If site is classed as “contaminated land” by CLIENT/OWNER, CONTRACTOR must implement control measures defined by CLIENT/OWNER and COMPANY. These control measures must be directly integrated into the project specific risk assessment (&AZ W QR 9602).
- If a possible contamination of land is suspected, CONTRACTOR must stop work and immediately inform COMPANY. Work will resume once control measures have been defined and agreed with COMPANY and CLIENT/OWNER.

8.1.2 Stockpiles and Exposed Ground

Stockpiles can cause dust pollution from windblown dry material while exposed ground and materials stored on site (e.g. soils, hardcore and sand) can pollute water and air with silt and dust.

- When possible, CONTRACTOR should consider ways to minimize stockpiles and exposed ground on site and agree them with COMPANY.
One option may be *phasing work* what refers to a specified work schedule that coordinates the timing of land disturbing activities and the installation of sediment control practices. (e.g. disturbing only part of a site at a time to limit the potential for erosion from dormant parts of a site.)
- CONTRACTOR must locate stockpiles away from waterways, ditches and drains to minimize the risk of water run-off or dust.
- CONTRACTOR must locate contaminated stockpile in an appropriate area with an impermeable surface, bunded, at least 10m from waterways and covered to prevent contaminated run-off. Contaminated run-off must be contained and disposed of as per requirements for waste management from CLIENT/OWNER and local applicable regulations.
- CONTRACTOR must segregate excavated materials, topsoil and subsoil for later reuse if appropriate or required. Topsoil must be stored for reuse in piles less than 2m high to prevent damage to the soil structure.

8.1.3 Erosion, Sediment Run-off

Erosion and sediment run-off may be caused by exposure of soil surfaces to rain and wind during site clearing, earth moving, and excavation activities. The mobilization and transport of soil particles may, in turn, result in sedimentation of surface drainage networks, which may result in impacts to the quality of natural water systems and ultimately the biological systems that use these waters.

- CONTRACTOR must ensure stability of stockpiles' slope (e.g. no greater than 2:1 horizontal / vertical) and must prevent steeply sloping land or high piles (e.g. not higher than above the height of the site boundary) that can slip causing pollution and habitat destruction.
- CONTRACTOR must cover or damp down stockpiles to prevent them from drying out and reduce dust. If stockpiles are planned to remain for more than 28 days, CONTRACTOR should consider stabilizing them by covering them with appropriate sheeting or seeding with fast growing vegetation (e.g. mulch, anchored fabrics, seeding, stabilization/binding products, etc.).
- CONTRACTOR must prevent stockpiles and exposed ground from being eroded by rain water or surface water (e.g. by providing cut-off trenches, temporary earth banks, diversion channels, silt traps to intercept run-off from silty water, silt fencing around the base of stockpiles). CONTRACTOR must maintain and regularly check these control measures preferably after every storm. Any defects must be repaired immediately.
- CONTRACTOR must establish safe erosion-free access point for vehicles across the site (e.g. temporary waterway crossing access, stabilized construction exits, crusher runs in areas with heavy vehicles, etc.).

8.2 Water Pollution Control

Wastewater from construction sites can be divided into construction site surface runoff, wastewater from vehicle washing, wastewater from site toilet, canteen and facilities and wastewater from civil works (such as boring, etc.). Discharge of untreated or contaminated wastewater of construction sites can not only cause flooding resulting from blockage of drainage but also damage the ecosystem of the downstream water bodies. Waste water from temporary welfare units shall be collected by small container and decanted in to the temporary toilet waste collect tank for disposal off site.

8.2.1 Water Contamination

If water in excavation is suspected to be contaminated with anything other than silt, CONTRACTOR must stop work immediately, inform COMPANY and, if necessary or required, take samples to have them lab tested before pumping water out. (Signs of contamination can include color, smell or an oily sheen; but visual examination or smell alone can't detect some sorts of contamination). If the water isn't contaminated, CONTRACTOR may be able to discharge as per selected treatment and disposal options (see 8.2.2). If it is contaminated, CONTRACTOR must identify and agree with COMPANY a discharge option (see 8.2.2).

8.2.2 Drainage

Drainage systems can act as a pathway to spread pollutants. Small amounts of pollutants (e.g. oil) can spread large distances in water. Drains can also make pollution invisible as large-scale pollution incident can happen on site without even knowing it.

- CONTRACTOR must inquire about drainage systems solution in place with COMPANY before proceeding. If required, CONTRACTOR will apply for necessary discharge permission(s) from CLIENT/OWNER or local sewerage provider. As authorization/permit/license can take time, CONTRACTOR must do the necessary applications in a timely manner. In case of unclarities, CONTRACTOR must seek advice from COMPANY and CLIENT/OWNER before proceeding with any drainage operations.
- CONTRACTOR must know, for the drains they are intending to use, where they are located on site, where they lead (e.g. surface water, sanitary water), what drains color code is used, what type of pollution could enter the drains and identify if drains have existing protection (e.g. oil separators, interceptors or silt traps) or are combined (i.e. sewers that collect both sanitary water and surface water run-off).
- CONTRACTOR must protect drains identified at risk from spills, contamination or misuse during pollution risky activities (e.g. works carried out at oil/fuel/chemical/waste storage areas, refueling areas, vehicle/cement mixing or washing out, dewatering, excavation, etc.) by providing as required and necessary appropriate control protections (e.g. gullies and silt traps and oil separators.)
- CONTRACTOR must inspect existing protection measures, repair, empty and clean out before start work on site the drains present in their working areas and they are using for their activities.

- If any pollutant enters a drain present in their working areas, CONTRACTOR must immediately stop the pollution with a physical block (e.g. gullies and silt traps and oil separators, inflating cushion, etc.), stop the activity causing the pollution, then notify COMPANY and CLIENT/OWNER or the local sewerage provider. CONTRACTOR must keep records of all occasions when pollutants have entered drains and/or watercourses and/or un-made up ground and the action taken and provide a copy to COMPANY and CLIENT/OWNER upon request.
- If there is a spill, accident or emergency, CONTRACTOR must try to prevent pollutants entering the drains (see 8.5.4). CONTRACTOR must report and investigate all pollution incidents to COMPANY.
- CONTRACTOR must discharge their effluents at site as per selected drainage options below: (*select relevant options for pre-treatment and drainage system solutions with COMPANY responsible for civil and structural activities or with CLIENT/OWNER*):

POLLUTANTS TO BE DISCHARGED	CLIENT/OWNER's DISCHARGE PERMISSION REQUIRED	PRE-TREATMENT OPTIONS REQUIRED	DRAINAGE OPTIONS REQUIRED
Clean Rain Water	No	No pre-treatment required	Surface water drain
Sewage / Sanitary Wastewater	Yes	No pre-treatment required	Tanker offsite, via hired in septic tank.
Silt, Concrete, Cement	Yes	No pre-treatment required	Cement and concrete wastes will be contained in dedicated impervious container (skip) for waste removal off site. TBC Silt removal as part of the initial ground preparation is the contractual responsibility of the appointed civils contractor.
Oily water sewer	Yes – but unknown quantity from drains (TBC).	No pre-treatment required	Tanker offsite
Paint, Chemicals, Detergents	Yes – small quantities.	No pre-treatment required	Suitable containers/possible use of site effluent system in agreement with BOC.

8.2.3 Sewage Discharge

CONTRACTOR must use permanent or temporary sanitary facilities provided at site during the project execution so sanitary wastewater or sewage is collected and discharge it as per defined drainage options (see 8.2.2).

8.2.4 Silt and Silty Water Discharge

Silt (e.g. fine sand, clay, or other material, etc.) and silty water can be generated from movement and maintenance of equipment and vehicles on site, rain water run-off from exposed ground, trenches or foundations (e.g. earthworks, excavations), and even from equipment, wheel and boot wash facilities.

- CONTRACTOR must use defined drainage options to discharge silt or silty water (see 8.2.2).
- During excavation, CONTRACTOR must

- use cut-off trenches to minimize the amount of water coming onto site, to minimize the potential for silt,
 - minimize the amount of exposed earth to reduce silt transportation.
 - maintain vegetation corridors adjacent to watercourses. These act as a buffer strip and prevent pollution by suspended solids.
 - protect waterways with silt traps to prevent run-off silt entering them and establish inspection and maintenance schedules for silt treatment systems. CONTRACTOR' personnel must report any damage to silt treatment systems to allow for immediate repair.
- If during excavation, the base of the excavation needs to be free of water, it is considered best practice for the CONTRACTOR to dig a small sump for the head of the pump and surround it with a perforated pipe and a suitable grade of clean stone. Water produced may still be silty. Where possible, CONTRACTOR should switch off the pump before it begins to suck up the last dregs of water as these are likely to contain high levels of silt.

8.2.5 Washing Station Discharge

- CONTRACTOR must carry out washing of equipment and wheels in CLIENT/OWNER's designated area(s) when existing.
- CONTRACTOR must locate temporary washing station(s) at least 10m from any surface waters, ensure that ground is protected and have the approval from COMPANY or CLIENT/OWNER. CONTRACTOR must ensure that the washing stations are sized with sufficient quantity and volume to contain all liquid and solid waste generated by washout operations and are lined with plastic sheeting (e.g. polyethylene) of at least 10mm free of holes, tears, or other defects that compromise the impermeability of the material to avoid any contamination to groundwater. (See further details under "Reference Specification for Tire Wash Station" (&AA W SX 0105 (EN))
- CONTRACTOR should collect in a storage equipment that is suitable (size and volume) and in good conditions (water tight) any equipment and wheels washing run-off, with settled solids removed regularly and water recycled and reused where possible (e.g. for mixing and washing).
- CONTRACTOR should discharge any excess water as per selected drainage options (see 8.2.2).

8.2.6 Cement, Concrete and Grout Discharge

Cement, concrete and grouts are highly alkaline and corrosive and can cause serious pollution to the ground and waterways. Water wildlife, such as invertebrates and fishes, are very sensitive to changes in pH (acid/alkaline) levels. Whereas oil in water is easy to see, changes to pH are not, so pollution can occur for some time before the extent of damage to wildlife is noticed.

- When carrying works or activities involving cement, concrete and grout, CONTRACTOR shall not allow treated or untreated washings or wastes of concrete mixing equipment, ready mix concrete lorries and tool and equipment wash-outs to enter directly into any drain, surface water or onto the ground without a permit/authorization from CLIENT/OWNER.
- When concreting in water, CONTRACTOR must obtain from COMPANY specifications for suitable concrete mixes that minimize pollution and must ensure that the concrete used is as specified and that required controls are defined and applied (e.g. in the method statement).
- CONTRACTOR should site concrete and cement mixing on an impermeable designated area at least 10m away from a waterways or surface water drain, to reduce the risk of run-off entering a waterway.
- CONTRACTOR should send back excess concrete to the batching plant or use surplus dry concrete, cement and grout elsewhere on site if possible, or as inert rubble, and if not, it should be disposed of off-site as a waste (see 8.4.5). CONTRACTOR must pay attention not to over-order materials and must consider timing of deliveries to prevent waste cement and concrete.

- CONTRACTOR must wash out any equipment (e.g. chutes, portable mixers, barrows, pump lines, shovels, etc.) in a designated washing area/station that has been specifically designed to contain wet concrete/wash water. Collected wash-outs must be discharged as per selected drainage option (see 8.2.2). Concrete mixing and delivery trucks must return to their batching plant for washout. CONTRACTOR must inform truck drivers about designated washout stations and their locations as well as the cement, concrete and grout discharge requirements.

8.2.7 Dewatering

- For long term excavations or large jobs, CONTRACTOR considering well point dewatering technique must inform COMPANY and CLIENT/OWNER as this method removes the groundwater directly from the ground before it reaches the excavation what can affect the local water table and the stability of ground.

8.3 Air Quality Control

Construction site most common air emission is dust and exhaust fumes that is generated during site clearing, grubbing, grading, trenching material screening, loading/transport of bulk materials and other general construction operations such as construction traffic and equipment operations (generators, compressors, grinders, etc.). In addition, wind erosion may generate dust from construction material storage piles and exposed surfaces.

8.3.1 Vehicle Control

- CONTRACTOR must ensure that all vehicles carrying loose material capable of spillage or which has the potential to give rise to dusty emissions from the vehicles during transit are sheeted.
- CONTRACTOR driving vehicles on-site must obey posted speed limits to minimize dust generation and drivers should be instructed on the benefits of driving practices (e.g. measured acceleration) that reduce fuel consumption.
- If vehicles wheels are significantly muddy or dirty, CONTRACTOR must clean vehicles wheels prior to exiting the project site.
- CONTRACTOR vehicles and equipment must be serviced in accordance with the manufacturer's recommendations. Vehicle's service documentation must be produced to COMPANY or CLIENT/OWNER upon request. CONTRACTOR equipment found to be continuously emitting "excessive smoky" exhaust fumes will not be allowed to operate onsite until fully repaired/serviced.
- CONTRACTOR must prevent engine idling time by not leaving engine of construction plant or vehicle running when not directly in use, except where CLIENT/OWNER considers that there are operational or other reasons to justify an exception.
- CONTRACTOR are encouraged to use vehicles and equipment that meet the latest emissions regulations (e.g. diesel generators exhaust with low emission generators, construction equipment with emissions control devices such as catalytic converters, etc.)

8.3.2 Water Spraying

CONTRACTOR must apply water sprays to control dust on the main on-site unpaved roads (i.e. any road within the site having a vehicle passing rate higher than 4 in any 30 minutes) and other exposed areas as needed. During dry and windy weather conditions, the frequency of water application will be based on weather and soil conditions. It is encouraged to reuse the treated wastewater for wheel washing or in agreement with COMPANY, surfactants/soil stabilizers or binders may be used to minimize the use of water when necessary.

8.3.3 Prevention of wind-blown dust arising from stockpiles

CONTRACTOR must profile stockpiles to reduce erosion where the nature of the material could lead to being rain washed or windblown. Stockpiles must be kept sufficiently damp to prevent wind-blow unless and until the surface is sprayed, sealed or stabilized by means of vegetation. Material that have the potential to give rise to dust emissions over the fence must be stored as far away from the site boundaries as is reasonably practicable.

8.3.4 Paving/Graveling

CONTRACTOR must compact or apply gravel around COMPANY's temporary site offices and, when specifically required by COMPANY, in other unpaved areas on-site so that dust will be kept to a minimum. Gravel cover will be regularly maintained through regrading and reapplication as needed and required.

8.3.5 Soil Handling Practices

CONTRACTOR are encouraged to control amount/frequency of soil material handling operations as reasonably practicable as possible to minimize air emissions. This can include the minimization of the frequency of stockpile disturbance and the reduction of the size of areas disturbed or also to keep material drop height when loading-out to stockpiles and trucks to a minimum.

8.3.6 Volatile Organic Compounds (VOCs)

Volatile organic compounds (VOCs) are compounds that easily become vapors or gases. VOCs are released burning fuel such as gasoline, wood, coal, or natural gas. Typical sources of VOCs emissions come from equipment and activities including solvents, paint, thinners, disinfectants, cleaners, construction materials, vehicle exhaust, etc.

- For VOC emissions associated with handling of chemicals, CONTRACTOR should use substances with less volatile substances (e.g. aqueous solvents or water-based paints). If not possible, CONTRACTOR should, when practicable, work in tent or booths where VOC emissions are collected, filtered or treated.

8.3.7 Ozone Depleting Substances (ODS)

Ozone Depleting Substances (ODSs) are substances, mainly compounds containing chlorine and/or bromine, that destroy the earth's protective ozone layer. Most known ODS are regulated under the Montreal Protocol. They can be found typically in air conditioners, fire extinguishers, foam, aerosol propellants and fumigation chemicals used for import/export.

- CONTRACTOR shall not use or install any new systems using CFCs, halons, 1,1,1-trichloroethane, carbon tetrachloride, methyl bromide or HBFCs nor related materials (i.e., substances included in Annexes A, B, C and E of the Montreal Protocol on Substances that Deplete the Ozone Layer - UNEP).
- CONTRACTOR should only consider Hydro-CFC (H-CFCs) as interim/bridging alternatives.
- CONTRACTOR must comply with all requirements stated on Ozone Depleting Substances in contracts for the purchase, service or disposal of equipment or refrigerant that contains Ozone Depleting Substances.

8.4 Waste Management

Waste management at project site helps reducing and mitigating the project environmental impact and contribute to sustainability by using natural resources in a manner that guarantees future projects have enough and not fully consumed natural resources.

CONTRACTOR must implement a site waste management process that comply with local applicable regulations and that provide a structured approach to waste minimization, treatment and disposal as the type of activities ongoing, the total workforce employed and the equipment working on site will influence the volumes and types of waste generated along the project execution phases. Principal Contractor shall control all waste transfer documentation in conjunction with Client for all materials removed from site as waste.

8.4.1 Wastes Identification and Categories

Construction site and project facilities/offices most common main waste streams generated during the project execution phases have been identified as follows:

Waste Types	Short description
Cardboard	Sheet rolls, packaging and storage boxes
Concrete Debris	-
Electrical wiring scrap	Combination of copper wires and PVC
Household	garbage, paper, cardboard, plastic, cans, etc.

Insulation materials falls	Rockwool, etc.
Metal scrap	Binding wire, HVAC duct sections, cable trays, aluminum sheets, etc.
Paper	Laminated paper sheets, packaging, office papers
Plastics	Polythene, pipes, warning mesh, safety cones, plastic buckets, tarpaulin, transportation package
Sewage	From camp and site facilities
Soil	Stockpile
Steel scrap	Reinforcement bars, buckets and barrels, steel strips from packaging, steel pipes, etc.
Wood scrap	Timber, plywood, formwork, crates, plates, pallets, etc.
Cleaning detergents	-
Hydro-test water	From pressure test activities
Medical waste	-
Oil waste	Equipment oil, lubricants, PCBs, etc.
Paints	-
Printer toners and cartridges	-
Used oil filters	Generators, etc.
Waste Electrical and Electronic Equipments (WEEE)	Batteries, lighting, electrical and electronic tools and equipments, etc.

- CONTRACTOR must ensure following information is available, as a minimum, for each waste they generated during their activities along the project: waste types and characteristics according to the table-list above, waste classification (e.g. non-hazardous waste, hazardous waste, domestic waste, *to be specified if information available*) as per CLIENT/OWNER and local applicable regulations on waste classification and amount generated throughout the project.
- CONTRACTOR must communicate in writing to COMPANY any significant or new waste stream(s), not yet listed in the table above and any significant changes in the classification of their wastes.

8.4.2 Waste Minimization

Minimizing the amount of waste produced will reduce the need for waste disposal, its potential environmental impact on the environment and save time and money in managing, handling and disposing of waste. It will also mean that raw materials are use more efficiently.

- CONTRACTOR should consider implementing waste minimization's good practices that help reducing waste load discharged by construction activities, offices and lunch tents/BRM's. These good practices may include following:
 - **Avoid waste** (e.g. obtain construction materials, paints, lubricants and other liquids in reusable packaging or containers, etc.)
 - **Reducing waste** (e.g. good housekeeping, process or technical or organisation changes, improving staff awareness with training)
 - **Re-use of waste** (e.g. use contaminated water out of sediment dams for dust suppression and irrigating adjacent vegetated land, etc.)
 - **Recycle of wastes** (e.g. paper, cardboard, glass, plastic bottles, metal scrap, concrete chutes lubricating oil, etc.)
 - **Waste recover or recycled for a secondary purpose** (e.g. use noise barriers made from recycled materials or overburden to construct temporary noise barriers)

8.4.3 Waste Segregation

- CONTRACTOR must segregate and collect, as per CLIENT/OWNER specifications and requirements of the local applicable waste regulations. At Least, following waste fractions must be collected:

- paper and cardboard,
 - glass,
 - plastics
 - metals,
 - wood, timber,
 - Insulation material
 - Bituminous mixtures
 - Gypsum-based building materials
 - Concrete
 - bricks, tiles, ceramics
 - biodegradable wastes (kitchen, canteen, vegetation),
- CONTRACTOR must use on-site waste storage areas that features enough and clearly labelled skips, bulk bags or wheelie bins for waste generated by construction activities, offices and lunch tents/BRM's.
 - With consideration of local and applicable definitions for hazardous wastes and non-hazardous wastes, CONTRACTOR shall not mix hazardous wastes nor mix hazardous waste with non-hazardous waste or other substances and materials.
 - CONTRACTOR must train their employees in project specific waste segregation procedures to ensure they follow them.

8.4.4 Waste Storage

Proper arrangements for storing and dealing with waste will prevent any pollution and risk of harming employees' health.

- CONTRACTOR must install a designated temporary waste storage area for wastes that are pending transport to final disposal location. The waste storage area must include, but not limited to:
 - a clear demarcation into hazardous and non-hazardous waste areas with clear signage to indicate the designated areas,
 - receptacles (containers, bins etc.) clearly marked specifying which type of waste they contain and their hazards
 - liquid hazardous waste must only be stored in secure, bunded areas, with an impervious base, able to hold the contents of 110% of the largest container stored in it (or 25% of the total volume stored – whichever is the larger)
 - storage areas must be open to the air, but hazardous wastes must be protected from the elements (e.g. from sun, rain etc.) by protective coverage
 - suitable spill clean-up materials must be kept available close to the designated storage area
 - eyewash bottles must be provided only in case hazardous wastes are present
 - firefighting equipment and first aid equipment must be available
 - Temporary waste storage areas must be controlled by a designated responsible person.
- CONTRACTOR must maintain necessary protection to waste storage areas to prevent contamination of surrounding stockpiles or underlying ground, by the different types of wastes identified as arising from the works.
- CONTRACTOR shall not exceed the maximum retention time for temporary storage on project site of generated waste of 90 days.
- CONTRACTOR must make available, when applicable] to COMPANY and CLIENT/OWNER, upon request / on a monthly basis and at the end of their activities on site a copy of their waste inventory for all wastes. (See 9.3)

8.4.5 Waste Disposal

- CONTRACTOR shall not burn, bury, dump, tip or dispose of onsite waste unless they have a permit or registered exemption with COMPANY or responsible Authorities.
- CONTRACTOR must ensure that any waste designated for offsite disposal is labelled and transferred in full compliance with any specific requirements of the CLIENT/OWNER's

- CONTRACTOR must develop an appropriate schedule for the haulage of waste. Appropriate scheduling is required to prevent run over of waste containers and contamination of soil and groundwater.
- CONTRACTOR using external lower tier subcontractors for haulage and disposal of waste should regularly inspect / audit the performance of the subcontractor and provide a copy of the report to COMPANY.

Following indicative elements can be used to support the audits / inspections at waste management facilities: existing environmental management system, validity of existing environmental protection permits, waste register/account, existing sub-contract(s) with waste treatment/management companies, waste storage conditions, storing waste documentation, license for handling of hazardous waste, collect of packaging and packaging waste, fees of environmental pollution for taxable waste products and packaging waste, complaints, accidents, incidents and cases of non-compliance, etc.

8.5 Hazardous Material

All chemicals and hazardous substances or materials (e.g. oils, cleaning products, solvents and pesticides) stored and used could cause pollution if they spill onto land, enter surface waters or groundwater or are released into the air.

8.5.1 Identification and labelling

- CONTRACTOR must provide and maintained up-to-date a list/register of all their hazardous material used at site.
- CONTRACTOR must have current Safety Data Sheet (SDS) for any chemicals and hazardous material provided by suppliers or manufacturers. If CONTRACTOR receive chemicals and hazardous material without an SDS, they must contact their suppliers to find out whether they must provide one or not. They can also get it from other sources such as internet. It is highly recommended to store Safety Data Sheet in close proximity to the emergency plans or in an area that might not be impacted in case of fire in the storage area. In addition to material safety data sheets, CONTRACTOR must carry out a suitable risk assessment as required by the Control of substances hazardous to health (COSHH) Regulations 2002 detailing use, handling and storage. This should be documented and available with users trained in the hazards and control measures.
- CONTRACTOR must clearly identify containers of chemicals and hazardous substances at least with name and information about the hazards including symbols, signal words and hazards statements. Labels must be legible and in English (at least). Information in other languages can be available.
- CONTRACTOR must ensure that no container will be released for use until this identification information is verified.

8.5.2 Storage

CONTRACTOR must comply with oil storage regulation requirements, when storing any kind of oil including petrol, diesel, heating oils, biofuels, lubricating and hydraulic oils, synthetic and mineral oils, biodegradable, shuttering and cutting oils, and waste oils.

8.5.2.1 Storage area

- CONTRACTOR must store chemicals and hazardous substances away from all sources of ignitions (e.g. welding, smoker areas, etc.), away from high risk locations (e.g. spring/well, waterways, ditches and drains, tank vent pipe outlet, roofs, area at risk from flooding, etc.) and locate them on an impermeable surface (e.g. heat, solvent or water-resistant material) in a designated area to avoid damage (e.g. collision) from site traffic. If this cannot be avoided or if there is a risk that equipment or vehicles could collide with the storage facilities, CONTRACTOR must consider installing heavy-duty barriers.
- CONTRACTOR must provide sufficient lighting to discover discharges occurring during the hours of darkness.
- CONTRACTOR must lock the storage area to prevent unauthorized access and reduce the risk of vandalism (e.g. fuel theft).

- CONTRACTOR must ensure that a responsible person is designated to control the issuing of chemicals and hazardous materials. It is recommended to establish a logbook.

8.5.2.2 Storage container

- CONTRACTOR must store chemicals and hazardous substances in suitable containers that are securely sealed to prevent spills, resistant to the effects of the chemical and strong enough to be handled.
- CONTRACTOR must securely cap and/or lock openings when not in use.
- CONTRACTOR must equip tanks with a direct vision gauge that clearly indicates the liquid level within the primary tank, with overflow prevention equipment set at 95% of the primary tank volume (e.g. high liquid level alarm or high liquid level flow cut off device).

8.5.2.3 Secondary containment

- CONTRACTOR are required to use secondary containment under chemical storage tanks or drum storage areas where chemicals, hazardous substances, flammable or toxic liquids are held to ensure that any major spill or incidental leaks are contained before they hit the ground. Incompatible substances should always have separate bunds.
- CONTRACTOR are required to provide secondary containment (e.g. drip trays) to prevent drip from connection points or other possible overflow points at hazardous materials containers (incl. fueling operations).
- CONTRACTOR must ensure that secondary containment is sized to hold 110% of the maximum capacity of the tank or drum in the storage area. In case of multiple containers/drums stored, the secondary containment capacity should be 110% of the volume of the largest container or 25% of the total volume stored – whichever is the larger.
- CONTRACTOR must routinely inspect secondary containment (e.g. damage, rusting, pitting, etc.) and their ancillaries (e.g. valve, gauge, etc.) and maintain them by replacing them (e.g. damaged or faulty pallets) or draining them, especially for external uncovered bunds which are open to the elements and will fill with rainwater.

8.5.2.4 Safe Storage

- CONTRACTOR must segregate incompatible chemicals from each other as following:
 - Acids: keep away from water, alkalis (bases) and reactive metals, products containing chlorine or cyanide.
 - Alkalis: keep away from acids and aluminum products.
 - Flammable solvents: store away from sources of heat, sparks, oxidizers and strong inorganic acids (sulphuric acid, nitric acid).
 - Oxidizers: keep separate from all other types of chemicals.
- CONTRACTOR must separate hazardous chemicals from unsuitable conditions (e.g. flammable materials from high temperatures)
- CONTRACTOR must provide adequate ventilation for their storage to reduce the build-up of toxic, noxious or flammable vapors. (e.g. chemical cabinets)
- CONTRACTOR must secure pressurized gas containers (gas cylinder) against falling over or down by means of lashing straps or bars. The valves are to be protected by the safety devices provided by the gas suppliers (e.g. protective cap, protective hood or collar). These protective devices shall not be removed under any circumstances during storage.
- If placing bound material on racks, CONTRACTOR must secure it by stacking, blocking, or interlocking to prevent it from sliding, falling or collapsing.

8.5.3 Transfer

Transfers of hazardous chemicals include operations such as fueling, discharging, filling in and out and also include the use of hoses, pumps, valves, etc.

- CONTRACTOR must provide warn/safety signage at stationary transfer locations (e.g. fueling stations) to warn personnel of fuel transfer operations about potential hazards such as fire hazard, static electricity spark explosion hazard, electrical device hazards, health and safety hazards related to the presence of fuel or hazardous chemicals, etc.
- CONTRACTOR must use transfer equipment that are specific to materials (e.g. all acids use one type of connection, all caustics use another) and prevent addition of hazardous materials to incorrect tanks (e.g. safe work procedure, logbook, etc.)
- CONTRACTOR must ensure, prior start of transfer, that overfilling equipment or devices are in place and active (e.g. gauges on tanks to measure volume inside, dripless hose connection for vehicle tank, fixed connections for storage tanks, automatic fill shutoff valves on storage tanks, etc.).
- CONTRACTOR must ensure a drip tray is used at ends of each appliance used for the transfer to collect spills.
- CONTRACTOR must ensure that motor control for fuel dispensing is locked in the off position, except when fueling is being conducted, and only accessible to authorized personnel.
- CONTRACTOR must routinely inspect transfer equipment (e.g. fittings and hoses) and their ancillaries and maintain them by replacing them if damaged.
- CONTRACTOR must provide eyewash bottles and spill kits (see 8.6) in close proximity to stationary transfer locations.

8.5.4 Using Hazardous Material

- CONTRACTOR must ensure that any legally applicable conditions of prohibition pertaining to use, or conditions of restriction on use, or specific notification or permit requirements on hazardous material are strictly observed.
- CONTRACTOR should try to reduce quantities of chemicals and hazardous substances on site – there are also health and safety and financial benefits associated with this - and attempt to replace hazardous products with non-hazardous alternatives when possible.
- CONTRACTOR must keep containers sealed on site when not directly being used, limit the quantity of chemicals and hazardous substances to what is needed for the daily activities at site, place them, when in use on site, in suitable secondary containment to contain any spillage and return any unused quantities to storage at the end of the day.
- CONTRACTOR must deal with waste from chemicals and hazardous substances appropriately. (see 8.4.1)
- CONTRACTOR must train and inform any worker planned to work with chemicals and hazardous substances at site to recognize and respond to workplace hazardous substances hazards as well as to the project specific Emergency Preparedness and Response Plan. CONTRACTOR must carry out a suitable risk assessment as required by the Control of substances hazardous to health (COSHH) Regulations 2002 detailing use, handling and storage. This should be documented and available with users trained in the hazards and control measures.

For further information on Chemical Safety, refer to HSE Program Site (&AE W PQ 9601)

8.6 Spill Prevention and Response

- CONTRACTOR must provide spill kits for:
 - trucks, heavy mobile equipment (e.g. cranes) and utilities equipment (e.g. compressor, generator, etc.) containing any kind of oils such as petrol, diesel, heating oils, lubricating and hydraulic oils, synthetic and mineral oils,
 - hazardous chemicals storage/transfer/fueling areas and equipment (e.g. tanks) containing oils such as petrol, diesel, shuttering and cutting oils, waste oils and fluids including paint, solvent,
 - parking areas for mobile equipment containing gasoline, petrol, diesel, hydraulic oils, synthetic and mineral oils
- CONTRACTOR must include, at least, following content in the spill kits:

- Absorbent granules, pad or sand for all liquids and oil (except acids and alkalis)
- Absorbent booms to prevent liquid from moving
- Neutralizing material for acids and alkalis,
- Plastic bags to safely dispose of used adsorbent or sand and neutralizing material
- Container or bin with lid to store the spill kit or spill waste once used
- Shovel or bucket to safely pick up adsorbent or sand and neutralizing material
- Gloves (*preferably Nitrile safety glove*) for personal protection
- Safety goggles for personal protection
- Overalls and shoe cover for personal protection
- Safety Signage to indicate the area where cleanup is in progress

Further spill kit contents appropriate to the substance that may be unintentionally released must be determined during a risk assessment.

- CONTRACTOR must adapt the spill kits numbers and sizes to the substances at risk of spilling. Spill kits must be preferably placed near hazardous substances storage, transfer or usage areas.
- CONTRACTOR must routinely inspect spill kits and maintain them by replacing their content if damage or used.
- CONTRACTOR must first **isolate** the spill from the surroundings. This includes evacuating other personnel from the area and going to a location that is upwind and updrift of the spill. This also includes stopping any nearby work from occurring, if it is safe and necessary to do so. For larger spills, signs or tape should be used to prevent others from entering the spill vicinity. If the spill is significantly large and leaches into drain systems, contaminates the groundwater, or forms a vapor cloud then additional resources must be required as specified in the emergency response plan.
- CONTRACTOR must **assess** the size of the spill and **identify** the spilled substance to understand the hazards posed by the loss of containment (for example whether the material is flammable, carcinogenic or can form a vapor cloud etc.)
- CONTRACTOR must **contain** the spill by locating the source(s) of the spill and stop the leak, if it is safe to do so, by shutting supply valves or redirecting material to another storage area. At any point during the response to a spill, should the hazards or spill response become too challenging for the current responder, additional resources should be informed as specified in the emergency response plan.
- CONTRACTOR must **confine** the spill to the area it was in to begin with. This is necessary to prevent minor spills from polluting the ambient air or migrating into waterways or drains hence potentially contaminating the groundwater. In the event of rainfall, it is important to cover the spill to prevent ingress into the soil and groundwater. It is important during the confinement stage to notice the grading of the site; where possible, manmade barriers/dikes using clay or absorbents should be used to maintain the spill in one location.
- CONTRACTOR must **clean-up** spilled material and equipment used for spill isolation, containment and confinement. Appropriate PPE as per the SDS must be worn when cleaning up or neutralizing the spill for personal safety. Absorbents should be used to absorb spilled materials in consultation with the SDS.
 - Minor spills should be cleared immediately, or neutralized if appropriate for chemical spills, by site trained personnel and properly transferred to waste management areas.
 - For Moderate and Serious spills, clean up should be performed by additional resources as specified in the emergency response plan, and areas outside of the contained area should be diked with absorbent, clay or soil to prevent liquid from reaching drainages, buffer areas, storm sewers or other bodies of water.
 - In case of chemical spills, refer to SDS for special hazards associated with spilled chemicals, especially for reactivity with other materials in the spilled area and for required PPE.
 - For spill of highly flammable hazardous material (e.g. Naphtha, hydraulic or lube oil, petrol) that could create an explosive atmosphere, sources of heat, sparks, flames, friction and electricity should be removed immediately.
- Once the spill has been cleaned, CONTRACTOR must align with COMPANY to decide whether personnel involved in the spill response intervention may require decontamination.

- CONTRACTOR must place equipment used in the response to spills including PPE, absorbents, shovels and brooms etc. in trash bags or oil spill response kit containers for disposal and decontamination. These bags/ containers must be clearly labelled with the spilled material and sent to site specific Waste Management areas for appropriate disposal.
- CONTRACTOR must **notify** all spills to COMPANY and CLIENT/OWNER and any relevant authorities as per project specific and local applicable regulations requirements.
- CONTRACTOR must **report** and **investigate** spills as per COMPANY Incident Reporting and Investigation procedure (&AX Q PR 1050.520.010).

8.7 Deliveries and Vehicles on site

Deliveries to site can be a common cause of pollution. Vehicles can cause water, noise and dust pollution as they enter and exit site, (e.g. by spreading mud or contaminated material on neighboring roads). Pollution can also be caused at the point of delivery, especially with fuels, oils and hazardous materials (e.g. a fuel hose not correctly connected and leaking, or when the area is unsuitable for storing that material.)

- COMPANY, CONTRACTOR and SUPPLIERS must use defined delivery and material storage areas and communicate their requirements (e.g. signage, times for deliveries) to suppliers and those working on site.
- CONTRACTOR must ensure any tanks, drums or containers coming to site are in a satisfactory condition by checking for any damage or leaks. In case of damage or leak, CONTRACTOR shall not allow the site entry and must inform CLIENT/OWNER for further instructions.
- CONTRACTOR must ensure that deliveries of polluting materials are delivered directly to a safe storage area (area with secondary containment for material to be stored (e.g. oil and hazardous chemicals), and not left anywhere else on site.
- CONTRACTOR must ensure that all material deliveries will be supervised, especially hazardous materials.
- CONTRACTOR must take necessary arrangements to reduce mud leaving the site on delivery vehicles (8.2.) and to reduce dust (see 8.3).
- CONTRACTOR must prepare for deliveries by checking any bunds, or drip trays for maintenance requirements (e.g. emptying drip trays) and carry out tool box talks to site workers on deliveries and preventing pollution.

8.8 Nuisances

8.8.1 Noise

Operation of construction equipment / machineries or movement from transportation vehicles can cause a noise nuisance to surrounding land users. The noise levels due to construction and commissioning activities will not be continuous but vary from low-levels during periods of minimal activities (e.g., grading) to high levels of noise and offsite impact during times of peak activity (e.g., pile driving, impact wrenches). The tolerance of noise will vary due to the proximity of the sensitive receptor, and line-of-sight between construction activities and the receptor.

- CONTRACTOR must identify, before work start and if required during project execution, which of their activities (e.g. piling) generate noise above the baseline and/or boundary noise levels defined by local legislation and/or established CLIENT/OWNER.

Maximum noise levels allowed near the project site are following:

Type of affected premises	Maximum Permitted Noise Levels in dB(A) <i>(reckoned as the equivalent noise level over 5 minutes)</i>		
	Day Time	Evening Time	Night Time
Noise sensitive area	N/A	N/A	N/A
Residential area	N/A	N/A	N/A
Commercial area	N/A	N/A	N/A
Industrial area	75	70	65

<i>Other (specify)</i>			
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- CONTRACTOR must comply with any baseline and/or boundary noise levels.
- CONTRACTOR must evaluate (e.g. by means of measurements or data-based evaluations), if their activities are below maximum permitted noise levels.
- If based on measurements or evaluations, baseline and/or boundary noise levels are exceeding the maximum permitted levels, noise levels must be reduced, and CONTRACTOR must:
 - restrict activities to be undertaken during daytime when necessary and possible. Where, for practical reasons, the activity is unavoidable (e.g. concrete pour, deliveries that need to be made outside normal working hours to avoid major traffic hazard, etc.) CONTRACTOR must inform COMPANY and CLIENT/OWNER prior work start.
 - employ temporary and suitable noise suppression or abatement measures (e.g. earthen embankments or other noise screens) over extended durations, when possible,
 - use vehicle, powered machinery and equipment on-site with noise control measures (e.g. silencers, mufflers, acoustic covers) and shut down between work periods any machines and vehicles (such as trucks) that may be in intermittent use or should be throttled down to a minimum.
 - plan, in consultation with COMPANY and CLIENT/OWNER, traffic flows in and out of project site, so that transportation activities with the greatest potential to generate noise through community areas are avoided or minimize (e.g. severe traffic snarls or any danger to other vehicles). This can include advising residents when unavoidable out-of-hours traffic will occur.
- Where, for practical reasons, the noise level cannot be reduced as required, CONTRACTOR must inform COMPANY prior work start.
- CONTRACTOR must notify COMPANY Site Manager prior to any planned atypical noise event (e.g. steam blows, blasting, etc.)
- CONTRACTOR must observe for trucks and other engine-powered equipment all posted speed limits and limit idling. Truck engine braking (e.g. 'Jake brake' or 'Exhaust brake') that generate excessive noise (comparable to a firing machine gun) must be limited for emergencies only. Vehicles horns must only be used when absolutely necessary. Radios and other personal equipment must remain at the lowest, most effective volume.
- If required, CONTRACTOR should monitor any identified acute, atypical noises generated during the construction, pre-commissioning, commissioning and start-up activities (see 9.3).

8.8.2 Vibration

Construction activities such as piling, or traffic can give rise to high levels of ground vibrations. The magnitude of the nuisance created by vibrations depends on the nature of soils transmitting the vibration and the distance to the nearest facilities.

- CONTRACTOR must consider, during planning phase, the potential impact of vibrations on existing facilities and running equipments and align with CLIENT/OWNER for the suitable control measures.
- When affordable and technically practicable:
 - CONTRACTOR should limit activities creating vibration to daytime working hours to prevent nuisance in the direct neighborhood to daytime.
 - CONTRACTOR should prefer hydraulic jack-in piling method since generating low vibrations.
 - CONTRACTOR should check vibration inspection points as defined by the Original Equipment Manufacturer (e.g. for cranes, baggers, trucks, etc.)
- If required, CONTRACTOR must take the necessary arrangements to have vibrations of equipment or at site boundary monitored/measured during construction project (see 9.3).

8.8.3 Light Pollution

Light pollution is defined as any outdoor or artificial lights that are excessive, misdirect or obtrusive and that reduce the ability to see the night sky, disrupt ecosystems, harm general health and waste energy-production resources.

- CONTRACTOR must limit lighting on the project site to areas where required for safety and security and should prevent visual impact or pollution from public view through screening to the greatest extent possible.
- CONTRACTOR should avoid night-time backscatter illumination by directional shielding of lights as far as reasonably practicable. They should direct lights onsite so that significant light or glare will not be created. CONTRACTOR should prefer, when possible, highly directional, metal halide fixtures or outdoor light technology that incorporates LEDs in place of older high-intensity discharge (HID) outdoor lights.

8.8.4 Invasive plants

Some plants are designated as invasive non-native species. These are plants that don't naturally occur at project site location but, when introduced, establish themselves very quickly. They have a significant impact on construction sites as they spread easily, are difficult to eradicate, can damage structures, contaminate soil and damage the natural ecology in project area. Invasive plants can be either land or water based (e.g. Japanese Knotweed, Himalayan Balsam and Giant Hogweed).

- If CLIENT/OWNER of project site is required by law to manage and prevent the spread of invasive plants, CONTRACTOR must inform himself about these and CONTRACTOR shall not cause any legal offence by knowingly spreading or allowing invasive plants to spread, through their activities. CONTRACTOR can check the list of invasive plants for their area on the Global Register of Invasive Species (GRIS) developed by the IUCN SSC Invasive Species Specialist Group (ISSG) (www.griis.org)
- CONTRACTOR should clearly indicate (e.g. poster, signs, etc.) and communicate (e.g. induction training or toolbox talk) to site personnel on invasive plants areas of concern and license/consent conditions to ensure they understand the potential issues.
- When invasive plants are discovered or found on site, CONTRACTOR should stop immediately work in their area, report to COMPANY immediately and support the implementation of control measures defined by COMPANY or its representatives.

8.8.5 Wild Animals and Protected Species

- If CLIENT/OWNER of project site has identified wild animals, protected species and/or and high-quality habitats, CONTRACTOR must inform themselves about these.
- CONTRACTOR must clearly indicate (e.g. poster, signs, etc.) and communicate (e.g. induction training or toolbox talk) to site personnel areas of concern and license/consent conditions to ensure they understand the potential issues.
- When wild animals or protected species are discovered or found on site, CONTRACTOR must report to COMPANY immediately and shall not attempt to catch the animals before arrival of qualified personnel to capture and remove and must only resume work after approval is obtained from the COMPANY or representatives.
- If working with heavy equipment is to be carried out nearby the living area of wild animals, CONTRACTOR must comply with instructions given by COMPANY or representatives.

8.9 Unanticipated Discoveries

- During construction activities, and especially during excavation, CONTRACTOR must immediately stop work in the concerned area(s) in the event of unanticipated uncovers or discovers of unknown cultural or archaeological material, bones, artefacts, buried tanks or containers, ammunitions or bombs, structures or signs of contamination (soils with discoloration or odors, drums).
- CONTRACTOR will immediately notify COMPANY Project Site Manager or Site HSE Manager who will notify CLIENT/OWNER whenever any pre-existing contamination or archaeological or cultural artefacts are discovered.

- CLIENT/OWNER will retain the responsibility to identify, evaluate, and take necessary arrangements to remediate the situation as well as for the handling and disposal of all pre-existing contamination that is found at the work site.
- CONTRACTOR will cooperate and support COMPANY regarding how to manage the situation. Work may only resume after written authorization is received from CLIENT/OWNER.
- CONTRACTOR must ensure that those excavating the site are aware they might find contaminated ground, especially in brownfield (previously developed) sites or unknown cultural or archaeological material received a tool box talk on what to look out for and what to do if they find contamination.

8.10 Natural Resources

8.10.1 Water Conservation

Although the major challenge that might currently be faced is a lack of understanding and quantification of water used on construction sites, key water using activities considered are project construction site offices and temporary facilities, tool, equipment and vehicle washing, wet trades such as concreting, groundworks such as grouting and drilling, dust suppression including road and wheel washing, commissioning and testing of equipment and plant.

- CONTRACTOR should consider implementing water conservation measures to promote the continuous reduction of water consumption and achieve savings in the water related costs by:
 - Eliminating water wastage on site (e.g. fixed leak, fit robust trigger guns to hoses so that flow can be controlled at the point of use, use a high pressure low volume efficient spray pattern to reduce water use when washing out concrete truck, adjust or replace the inlet valve of toilets, consider the installation of a hydraulic valve or motion sensor to control flushing based on actual usage for urinal flushing, etc.)
 - Improving efficiency of water using processes (e.g. hydraulic spinning system can be 90% more water efficient than a splash plate, use a closed loop wheel wash to reuse the water for the wheel washing process, adapting taps by either fitting a flow regulating or aerating tap insert for running taps, etc.)
 - Offsetting consumption of mains water with alternative sources (e.g. rainwater harvesting, wash out water could be re-used at concrete batching plants when washing out concrete truck, fan misting system is mains fed electrically powered efficient alternative for dust suppression, etc.)

8.10.2 Energy Efficiency

CONTRACTOR should consider and implement where possible energy efficiency measures and greener energy sources to assist with cutting carbon dioxide emissions. This may include:

- Construction site and equipment to be maintained to maximize fuel efficiency
- Energy consumption to be minimized (e.g. by using energy-efficient materials such as Energy Star Program, Blue Angel or equivalent label for AC, hand tools, printers or by considering savings techniques for load reduction and distribution of compressed air systems or with improvements of temporary installations with the aim of reducing electric energy consumption or in equipment, lighting and air conditioning systems on sites, etc.)
- Energy use during construction to be monitored (e.g. by establishing an energy management programs for any auxiliary systems, compressed air and heating systems, ventilation and HVAC systems and lighting systems consuming energy, etc.)
- Utilize energy from renewable sources where practicable (e.g. sun panels for traffic light / signal on site, etc.)
- Incorporate and source local materials to minimize associated transportation
- Minimize workforce travel to the necessary essential, when practicable.

8.10.3 Material Consumption

- To actively prevent any material wastage and reduce material losses during the carrying out of services, deliveries, internal transport, storage, and handling of materials on sites, CONTRACTOR must provide appropriate storage area and conditions to material supplied, implement security measures to prevent theft, use material close to workplace and prevent settlement of unused material.
- CONTRACTOR using timber (e.g. for pallets, scaffold boards etc.) must prefer timber from sustainably managed sources with recognized timber labelling (e.g. Sustainable Forestry Initiative (SFI), Pan European Forest Certificate Council (PEFC), Forest Stewardship Council (FSC), etc.) or from re-use.
- Where possible, CONTRACTOR should source local materials to minimize associated transportation and employ procurement procedures that involve purchasing materials based on their environmental impact.

8.10.4 Nature Conservation

- CONTRACTOR shall not fell any plant in the construction site without CLIENT/OWNER's permission and must comply with instructions given by CLIENT/OWNER or representatives on trimming and transplanting of plants.

8.11 Notices, Complaints and Non-Conformities

- If CONTRACTOR are served by a local authority with an 'abatement notice' caused by a statutory nuisance, or with an environmental complaint, work must be stop immediately, COMPANY and CLIENT/OWNER must be informed without delay and work can only resume when restrictions imposed on execution of work have been identified, communicated and are strictly observed. Any received environmental notice or complaints must be documented and communicated to COMPANY and CLIENT/OWNER within 24 hours maximum.
- In case of environmental non-conformities raised by CLIENT/OWNER against CONTRACTOR, they must inform COMPANY Site Manager who may delegate responsibility to the Project site HSE Manager for prompt investigation. Environmental non-conformities must be documented as per CLIENT/OWNER requirements

8.12 Environmental Incidents

CONTRACTOR must determine the spill category (see table below) as per COMPANY environmental incident classification (&AX-Q-PR 1050.520.011) to adapt the required response actions and notifications to spills.

Minor	Limited risk to workers and environment causing localized damage and that can be easily contained by employee	less than 1m ² OR less than 200 liters OR less than 50kg of gas OR oil/chemical sheen on media surface
Moderate	Limited risk to workers and environment causing localized damage and requiring additional resources, e.g. fire brigade from site Emergency Response Team (ERT)	between 1 to 10m ² OR between 200 to 1000L OR between 50 to 500kg of gas OR limited oil/chemical staining of (aquatic) flora
Serious	Spill that is contained locally (still within site facilities) but requires regional aid/equipment from external resources/companies and the government	between 10 to 100 m ² OR greater than 1000L OR greater than 500kg of gas OR oil/chemical staining of (aquatic) flora and killed (aquatic) fauna

Major	Spill that cannot be contained/ has a significant impact potential and requires substantial additional response on a global scale.	greater than 100 m ² OR visible dieback of vegetation OR greater than 40.000 liters Extensive oil/chemical staining of (aquatic) flora and killed (aquatic) fauna
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For further details on incident management, refer to HSE Program &AE W PQ 9601.

8.13 Training

Refer to HSE Program &AE W PQ 9601.

8.14 Best Practices

8.14.1 Dust Collection during Cutting and Grinding works

If cutting and grinding are not carried out in an enclosure, CONTRACTOR should, when available, use tools that are fitted with dust collection devices (excluding small tools which require a continuously wet working surface).

9 Environmental Assurance

9.1 Site Walks and Inspections

The implementation of all environmental protection requirements will be checked on regular basis as follow:

Inspections	Frequency	Participants	Focus on	Documentation
Environmental Inspection	weekly	COMPANY's - Site HSE manager	Inspection of construction site for environmental performance and compliance	&AZ-W-RF 9603
Management Safety walk (followed by a wrap-up meeting)	weekly	COMPANY's - Site Manager, - Constr. Manager, - Site HSE Manager CONTRACTOR's - Constr. Manager CLIENT's - Project Manager*, - Site HSE Coordinator* further personnel on demand	Inspection of construction site	&AZ-W-RF 9601

* optional participation

9.2 Audits

Refer to HSE Program &AE W PQ 9601.

9.3 Monitoring

Environmental monitoring must be undertaken by CONTRACTOR during the construction phase as required by CLIENT/OWNER, AUTHORITY, permit in cooperation with COMPANY for following:

- Waste (see 8.4.4)

- Water effluent discharges
- Dust,
- Noise
- *Others specify*

Results from the monitoring will be compared to relevant applicable requirements to ensure compliance of the Project and documented and a copy will be addressed to COMPANY and CLIENT, upon request.

10 Documentation and Records

This document and relevant records must be controlled as defined in "Preparation of Internal Documents" (&AZ-Q-PP 1050.060.010 (EN)), "Distribution of Documents" (&AZ-Q-PP 1050.063.010 (EN)) and "Archiving of Documents" (&AZ-Q-PP 1050.066.010 (EN)).

10.1 COMPANY's Documents

Reference	Title
XXX	Emergency Preparedness and Response Plan
&AE W PQ 9601	HSE Program
&AX Q PR 1050.520.010	Incident Reporting and Investigation procedure
&AX Q PR 1050.520.011	Incident Detailed Definitions
&AZ Q LX 1050.400B	Environmental Impact Assessment (EIA)
&AZ W QR 9602	General Risk Assessment
&AZ W QR 9607	BeSafe Daily (BSD)
&AZ-W-RF 9601	Safety Walk-Through Record
&AZ W RF 9603	Environmental Inspection Checklist
&AA W SX 0105	Reference Specification for Tire Wash Station
Montreal Protocol	Montreal Protocol on Substances that Deplete the Ozone Layer – UNEP
WHO Air Quality Guidelines	2005 World Health Organization Air Quality Guidelines Values

10.2 CLIENT's Documents

No.	Title
MS-63474	Waste Administration
MS-62187	Waste Storage, Drainage and Incidents
MS-64794	Waste Electrical and Electronic Equipment (WEEE)
MS-62178	Environmentally Hazardous Liquid Chemical Storage & Transfer Systems
EPR Permit BJ7522IJ	Environmental Permitting Regulations 2016

11 Revisions

Proposals for revisions of this Safe Work Procedure should be forwarded in writing to the Global Construction department 'Construction and Commissioning HSE'.

12 Distribution

This document will be administered and distributed by the Global Construction department 'Construction and Commissioning HSE'.

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