

TECHNICAL GUIDELINE DOCUMENT

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN TEMPLATE AND GUIDELINE

NEOM-NEV-TGD-602, Rev 01.00, June 2021

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**Document history**

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**Document approval**

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|  | **Prepared by** | **Reviewed by** | **Approved by** |
| Name | Emma Samson  | Peter Caron | Damien Trinder |
| Job Title | Environmental Assessment Specialist | Manager Assessment and Approvals | (Acting) Chief Environmental Officer |

**DELETE THIS PAGE UPON FINALISATION OF THE ESMP**

1. Background

This Environment and Social Management Plan (ESMP) Template and Guideline provides a framework and structure appropriate for guiding the development of an ESMP and includes sections describing:

* *Activities and work sites*
* *Environmental roles and responsibilities*
* *Environmental and social impact and risk control measures to be implemented*
* *The program for demonstrating compliance with control measures*
* *Training and awareness requirements to ensure worker competency and understanding of environmental and social impacts and risks*
* *Reporting requirements*
* *Environmental quality standards*
* *Related plans and procedures to support the above functions.*

NEOM ESMPs must set out the environmental control measures to avoid, minimise, or offset likely environmental and social impacts and risks. They must reflect the applicable requirements of the NEOM Environmental and Social Codes of Practice for Construction (NEOM-NEV-TGD-702) and the environmental management system (EMS) processes (i.e. training, communication, audit, emergency response) necessary to support continuous improvement and to achieve the intended environmental outcomes.

1. User guide for this document
	1. *Black text should remain as text for the ESMP. It should be noted that black text in a section does not preclude the author from adding additional text to the ESMP (i.e. black text is the minimum standard text).*
	2. *Red text is guidance to the author that must be deleted once the project-specific information is provided under each respective heading.*
	3. *Please liaise with the NEOM Environment Department – Assessment and Monitoring Team if you have any queries or concerns regarding the use of this template for developing ESMPs.*

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# Acronyms and Abbreviations

|  |  |
| --- | --- |
| **Acronym / Abbreviation** | **Definition** |
|  | *List all acronyms and abbreviations used in the ESMP* |
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# Project Introduction

## Proponent Details

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| --- | --- |
| **Project Title** | *[Insert name of Masterplan Area / Project] [Insert Construction or Operations or Decommissioning] Environmental and Social Management Plan* |
| **Integrated Assessment Process Details*(if applicable)*** | *Provide details of all related NEOM approved Environmental and Social Risk Assessments and Management Plans including, but not limited to:*1. *Strategic Environmental Assessment (SEA) associated with a Sector Strategy or Structural Plan*
2. *ESIA associated with a Masterplan or Major Asset Development*
3. *Overarching ESMP submitted with the SEA or ESIA noted above*
4. *ENVID workshop report associated with the work to be undertaken under this Plan.*
 |

|  |
| --- |
| **Applicant Details**  |
| **NEOM Proponent** |
| **Company** |  | **Department** |  |
| **Name** |  | **Position** |  |
| **Email** |  | **Phone** |  |
| **NEOM Primary Contact**  |
| **Company** |  | **Department** |  |
| **Name** |  | **Title** |  |
| **Email** |  | **Phone** |  |

## Project Overview

*Insert brief overview of the development / project that represents the full scope of the ESMP and provide the planning context.*

*Planning context should cite compliance with all relevant NEOM Strategic Planning Documents, Regional Plan and Masterplans. For example, “This ESMP aligns with the requirements of the NEOM Regional Plan and supports implementation of the approved NEOM Industrial City (NIC) Detailed Masterplan”.*

*Insert description of the general development / project location and a figure(s).*

### Assessment History

*Insert assessment history for the development / project.*

*Briefly summarise previous permitting activity including revisions to this ESMP as well as any additional permits and approvals issued from National Regulators, Tabuk Municipality and any other Ministry within KSA.*

### Environmental Management Framework

#### Regulatory Requirements

Environmental issues in the Kingdom of Saudi Arabia (KSA) are regulated by the National Centre for Environmental Compliance (NCEC), part of the Ministry of Environment, Water and Agriculture (MEWA).

The main national environmental regulations in the KSA are the General Environmental Regulations 2001 (GER 2001). The GER contains the following sections, which are applicable during the work:

Articles 1-18 describes the roles and responsibilities of the Competent Authority and the licensing agencies, requirements for new and existing facilities, requirements for compliance with standards and protection of the environment and fines and penalties

Environmental protection standards namely for Ambient Air Quality and Wastewater Pre-Treatment and Direct Discharge Standards and Receiving Water Guidelines (Annex 1 of the GER 2001)

Basis and Procedures for Environmental Evaluation of Developmental and Industrial Projects (Annex 2 of the GER 2001)

Manual of Environmental Rehabilitation Procedures details the various environmental activities (services) that require certification from the Competent Authority (Annex 3 of the GER 2001)

Rules and Procedures for Hazardous Waste Management (Annex 4 of the GER 2001)

National Contingency Plan for Combating Marine Pollution by Oil and Other Harmful Substances (Annex 5 of the GER 2001)

Types of Contraventions and Nature of Fines (Annex 6 of the GER 2001).

This legislation forms the basis of environmental management within the KSA. The environmental protection standards were updated in 2012-2014.

In addition to KSA Regulations, environmental quality standards from the World Health Organization (WHO) and International Finance Corporation (IFC) are applicable to the work. Where the standards or limits set for an environmental quality parameter differ between KSA, WHO or IFC requirements, the most stringent of the three apply to the work.

The relevant emissions, discharge and ambient environmental quality standards applicable to the work are set out in Appendix A.

#### NEOM Requirements

The following NEOM documents are also relevant and applicable to the work:

NEOM Environmental Codes of Practice for Construction (NEOM-NEV-TGD-702)

Environmental Code of Conduct (NEOM-NEV-GGD-801)

Environmental and Social Risk Management Training and Awareness Program (NEOM-NEV-TRP-801)

Environmental Communications Procedure (NEOM-NEV-PRC-708)

Environmental Management of Change Procedure (NEOM-NEV-PRC-702)

Environmental and Social Compliance Assurance Standard (NEOM-NEV-TGD-701)

Environmental and Social Risk and Opportunity Assessment Procedure (NEOM-NEV-PRC-601)

Incident Identification, Investigation and Reporting Procedure (NEOM-NEV-PRC-704)

NEOM Environmental Management System (EMS) Template and Guidance (NEOM-NEV-TGD-703).

*Update the document list above as required so it is current.*

#### Supporting Execution Plans

*This section is required for ESMPs where overarching management or monitoring plans are developed that apply to all Contractors undertaking works that are within the scope of the ESMP.*

The execution plans applicable to the work are listed in Table 1‑1 below and provided in Appendix B. The attached plans have been developed in accordance with NEOM’s requirements and have been approved by the NEOM Environment Department.

*Populate the table below and add or remove rows as required. Please note the following:*

*The plans listed in black text are the minimum required*

*If you don’t believe the plans in black text are applicable to the work, please liaise with the NEOM Environment Department*

*The plans listed in red text are examples only*

*If management plans, monitoring plans or other procedures were identified in the SEA/ESIA, ENVID or in control measures in the ESMP, they should be listed here and provided in Appendix B*

*If you are unsure about the plans that must be developed and included, refer to the relevant SEA/ESIA and ENVID reports for the project, or contact the NEOM Environment Department*

*Ensure the list in this table aligns with the content of Appendix B.*

Table 1‑1: Execution Plans

| Title | Appendix |
| --- | --- |
| Waste Management Plan |  |
| Environmental and Social Emergency Response Plan |  |
| *Example: Greenhouse Gas Emissions Reduction Plan* |  |
| *Example: External Grievance Procedure* |  |
| *Example: Traffic Management Plan* |  |
| *Example: Archaeology Chance Find Procedure* |  |
| *Example: Environmental Surveillance Plan* |  |
| *Please list all other plans identified during the impact assessment process* |  |
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#### Contractor ESMPs

All Contractors conducting activities under this ESMP are required to adhere to the requirements of this ESMP. Contractors will have their own ESMP (or similar document) in place prior to the commencement of works, which aligns with the requirements of this ESMP.

### Management of Change

Where a change to the designs, activities or conditions associated with the work has the potential to result in adverse impacts to the environment, the NEOM Environmental Management of Change Procedure (NEOM-NEV-PRC-702) will be used to ensure all environmental and social sustainability impacts and risks associated with the change are assessed and managed to NEOM’s standards.

### Review

This Plan shall be reviewed by the Proponent on an annual basis or more frequently if required. If changes are required as a result of the annual review (i.e. through lessons learnt following Non-Conformance Reports (NCRs), incidents, continuous improvement, etc.) the Proponent shall resubmit the revised Plan for review and approval within 30 days of the annual review date.

## Project Organisation

### Management and Personnel

*Briefly describe the organisational hierarchy for the work (refer to Figure 1-1 for an example). Include an organisation chart that identifies the key personnel (Figure 1-1).*

*In Table 1-2, provide a description of the environmental responsibilities relevant to implementation of this Plan for the following key roles as a minimum:*

1. *Project Director*
2. *Construction Manager*
3. *Environment Manager*
4. *All personnel.*

*Describe the key reporting lines and provide additional roles and supporting functions in the organisation chart including points of contact for key associated functions.*

Proponent Project Director

EPM/PMC Project Manager

Contractor Project Director

Contractor Construction Manager

Contractor Environmental Manager

Contractor Personnel

Insert organisation chart. Note this is an example chart only. The organisation chart inserted should reflect the organisational structure for the organisations conducting the works that are covered by the Plan.

Figure 1‑1: Organisation Chart

Table 1‑2: Key Personnel, Roles and Responsibilities

Add or remove rows as necessary to reflect the key roles with environmental responsibilities that are displayed in the organisation chart (Figure 1-1). The responsibilities listed in the table are examples only. The lists must be expanded on and must be relevant to environmental management and the implementation of this Plan.

| Role | Responsibilities |
| --- | --- |
| Proponent Project Director | Responsible for:*• Ensuring resources are provided to implement this Plan**• Ensuring this Plan is implemented according to the requirements detailed within it**• Ensuring this Plan is reviewed and updated annually or more frequently if required**• Liaising with the NEOM Environment Department regarding any potential changes to the works and any updates to this Plan**• Ensuring environmental incidents are reported and investigated in accordance with Section 5 of this Plan**• [Insert details].* |
| EPM/PMC Project Manager | Responsible for:*• Monitoring Contractor environmental performance**• Liaising with the Proponent on any potential changes to the works**• Reporting all environmental and social issues and incidents to the Proponent**• Ensuring environmental incidents are reported and investigated in accordance with Section 5 of this Plan**• [Insert details].* |
| Contractor Project Director | Responsible for:*• Ensuring resources are provided to implement this Plan**• Reporting all environmental and social issues and incidents to the EPM/PMC**• Ensuring environmental incidents are reported and investigated in accordance with Section 5 of this Plan**• [Insert details].* |
| Contractor Construction Manager | Responsible for:*• Ensuring compliance with legislation and the requirements of this Plan**• Identifying any potential changes to the works and liaising with the Contractor Project Director and the EPM/PMC**• Ensuring environmental records relevant to the works are generated and maintained**• Ensuring daily inspections and audits are undertaken in accordance with Section 3 of this Plan**• Ensuring all environmental incidents and non-conformances are recorded, reported, investigated and corrective actions tracked until they are closed* *• [Insert details].* |
| Contractor Environment Manager | Responsible for:* *Ensuring compliance with legislation and the requirements of this Plan*
* *Liaising with Managers/Supervisors on the day to day management of environmental risks and issues*
* *Monitoring implementation and compliance with the Contractor EMS*
* *Ensuring sufficient resources of suitable qualification and experience to implement the environmental and social requirements in this document*
* *Ensuring personnel are made aware of their requirements under this Plan*
* *Coordinating environmental training and inductions*
* *Coordinating any environmental monitoring required by this Plan*
* *Ensuring environmental records relevant to the works are generated and maintained*
* *Leading environmental site inspections and systems audits and ensuring corrective actions are closed out*
* *Leading environmental incident investigations and ensuring corrective actions are closed out*
* *Environmental and social reporting*
* *[Insert details].*
 |
| All personnel | Responsible for:*• Undertaking activities in an environmentally responsible manner and in accordance with relevant legislation, this Plan and any relevant procedures or work method statements**• Understanding the environmental risks and control measures that apply to their work**• Attending environmental training and inductions relevant to their role**• Immediately reporting all environmental issues and incidents to their Supervisor**• [Insert details].* |

### Communications

Environmental communications – both internally and externally, will be conducted in accordance with the NEOM Environmental Communication Procedure (NEOM-NEV-PRC-708).

## Work Description

### Site Activities and Locations

Provide a description of the planned work activities, noting the more detailed activity descriptions required in Sections 3.2 to 3.7.

Ensure that relevant dimensions and specifications are included for infrastructure and facilities (e.g. disturbance areas, lengths, widths of roads, materials used, etc.). Clarify both the infrastructure footprint and the disturbance footprint (e.g. a road may be 10 m wide (infrastructure footprint), but the disturbance footprint required to construct it may be 15 m wide).

Provide one or more figures illustrating the areas where activities will take place, key infrastructure, and all associated facilities. Figures and location maps must be clear and legible. GIS coordinates for infrastructure and/or disturbance footprints must be included (either on figure(s), in this section or in an appendix as appropriate).

Associated facilities may include workers accommodation camps, workshops, concrete batching plants, material extraction areas, parking and laydown areas, offices, stockpile locations, storage areas, workshops, access roads, etc. as agreed during the assessment process.

Please cross-reference to the relevant sections in Section 3 as needed to direct the reader for further details.

Insert figure(s).

Figure 1‑2: General Site Layout and Work Activity Locations

### Timing

Provide the timing and duration of the works (start and end dates), highlight all key milestones and provide duration for major works (e.g. blasting will occur for X months, dredging and spoil disposal activities are anticipated to take X months, etc.).

# Environmental and Social Values

Provide a description of the environmental and social values potentially affected by the work, including their proximity to relevant activities.

Please structure subsections in a simple, logical manner. If in doubt, please structure in a similar manner to the relevant subsections of any ESIAs that are applicable to the work (e.g. Climate and Oceans, Landform and Functions, Environmental Quality, Terrestrial Ecosystems, Marine Ecosystems, etc.).

Please simply refer out to the relevant sections of any existing SEA/ESIAs that are applicable to the work, rather than reproducing the content in detail here.

Insert figures or cross-reference to figure(s) in relevant SEA/ESIAs that show the presence/location of relevant environmental and social values.

Figure 2‑1: Location of Potentially Affected Environmental and Social Values

# Environmental and Social Impacts and Risks Management Program

## Program Overview

The following sections summarise the environmental and social impacts and risks associated with the works and lists all mandatory and best practice control measures to be implemented to mitigate identified impacts and risks.

Where relevant, Contractor Work Method Statements (or similar procedural documents) will be developed to ensure the Environmental and Social Impacts and Risks Management Program set out in this section is implemented.

## Demolition, Site Clearance and Earthworks

### Activity Description

Describe the following:

*The demolition, site clearance and earthworks activities being undertaken. For example:*

* + *Vegetation clearance, grubbing and topsoil removal*
	+ *Building demolition and rubble removal*
	+ *Excavation, cut and fill including trenching*
	+ *Stockpiling, crushing, screening*
	+ *Compaction and stabilisation including temporary road maintenance.*

*The plant and equipment that will be used to conduct the work (e.g. loaders, dump trucks, graders, rollers, excavators, rock breakers, water trucks, etc.).*

### Environmental and Social Impacts and Risks

Populate the table below with the activities, drivers and values recorded in the ENVID for this scope of work. Please note that those shown in the table below are examples only and should be deleted from the table.

Table 3‑1: Summary of Environmental Impacts and Risks for Demolition, Site Clearance and Earthworks

| Activities | Driver | Value |
| --- | --- | --- |
| *Example: Plant movement leading to ground erosion* | *Erosion*  | *Landform and Function* |
| *Example: Clearing and earthworks activities, vehicle movements generating noise* | *Noise* | *People and Communities* |
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### Control Measures

Please list all applicable mandatory requirements, which are consistent with those discussed in the ENVID and that will be implemented for these activities.

Please include specific engineering or procedural controls as identified in the ENVID and consistent with the NEOM Environmental and Social Codes of Practice for Construction (NEOM-NEV-TGD-702).

Table 3‑2: Mandatory Control Measures for Demolition, Site Clearing and Earthworks

| **Driver** | **Control Measures** |
| --- | --- |
| *List all drivers* | *List all control measures* |
| *Example: Erosion* | *List erosion control measures* |
|  |
|  |
| *Example: Noise* | *List noise control measures* |
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## Blasting and Tunnelling

### Activity Description

*Describe the following:*

*Blasting method(s) and activities*

*Use of explosives*

*Tunnel boring operations*

*Dewatering activities*

*The plant and equipment that will be used to conduct the work (e.g. tunnel boring machines, drilling rigs, excavators, dump trucks, ancillary equipment such as lighting towers, etc.).*

### Environmental and Social Impacts and Risks

*Populate the table below with the activities, drivers and values recorded in the ENVID for this scope of work. Please note that those shown in the table below are examples only and should be deleted from the table.*

Table 3‑3: Summary of Environmental Impacts and Risks for Blasting and Tunnelling

| Activities | Driver | Value |
| --- | --- | --- |
| *Example: Use of explosives leading to noise impacts on sensitive receptors* | *Noise* | *People and communities* |
| *Example: Hazardous material use leading to groundwater contamination* | *Chemical releases* | *Groundwater* |
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### Control Measures

Please list all applicable mandatory requirements, which are consistent with those discussed in the ENVID and that will be implemented for these activities.

Please include specific engineering or procedural controls as identified in the ENVID and consistent with the NEOM Environmental and Social Codes of Practice for Construction (NEOM-NEV-TGD-702).

Table 3‑4: Mandatory Control Measures for Blasting and Tunnelling

| **Driver** | **Control Measures** |
| --- | --- |
| *List all drivers* | *List all control measures* |
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## Drilling, Piling and Construction

### Activity Description

*Describe the following:*

*Onsite drilling, piling and underpinning*

*In-situ concrete works, precast/composite concrete*

*Masonry and structural metalwork*

*Mechanical, electrical and plumbing*

*Insulation, fire stopping and fire protection*

*Floor, wall, ceiling and roof finishing*

*Sheeting, glazing and architectural*

*Lifting operations and scaffolding*

*The plant and equipment that will be used to conduct the work.*

### Environmental and Social Impacts and Risks

Populate the table below with the activities, drivers and values recorded in the ENVID for this scope of work. Please note that those shown in the table below are examples only and should be deleted from the table.

Table 3‑5: Summary of Environmental Impacts and Risks for Drilling, Piling and Construction

| Activities | Driver | Value |
| --- | --- | --- |
| *Plant and equipment use*  | *Greenhouse gas emissions* | *Climate* |
| *Use of paints, chemicals, fuels and wastes* | *Hazardous materials releases* | *Groundwater, Terrestrial ecology* |
| *Night activities requiring lighting* | *Light emissions* | *Terrestrial fauna* |
|  |  |  |
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### Control Measures

Please list all applicable mandatory requirements, which are consistent with those discussed in the ENVID and that will be implemented for these activities.

Please include specific engineering or procedural controls as identified in the ENVID and consistent with the NEOM Environmental and Social Codes of Practice for Construction (NEOM-NEV-TGD-702).

Table 3‑6: Mandatory Control Measures for Drilling, Piling and Construction

| **Driver** | **Control Measures** |
| --- | --- |
| *List all drivers* | *List all control measures* |
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## Marine and Coastal Works

### Activity Description

*Describe the following:*

*Dredging*

*Marine infill*

*Shoreline contouring works*

*Shoreline armouring*

*Marine vessels, plant and equipment required to conduct the work.*

### Environmental and Social Impacts and Risks

Populate the table below with the activities, drivers and values recorded in the ENVID for this scope of work. Please note that those shown in the table below are examples only and should be deleted from the table.

Table 3‑7: Summary of Environmental Impacts and Risks for Marine and Coastal Works

| Activities | Driver | Value |
| --- | --- | --- |
| *Night activities requiring lighting* | *Light emissions* | *Marine fauna* |
| *Invasive species transported in vessels or ballast water* | *Invasive species*  | *Marine ecology* |
| *Deposition of dredged material smothering benthic habitat* | *Sedimentation* | *Marine habitat* |
|  |  |  |
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### Control Measures

Please list all applicable mandatory requirements, which are consistent with those discussed in the ENVID and that will be implemented for these activities.

Please include specific engineering or procedural controls as identified in the ENVID and consistent with the NEOM Environmental and Social Codes of Practice for Construction (NEOM-NEV-TGD-702).

Table 3‑8: Mandatory Control Measures for Marine and Coastal Works

| **Driver** | **Control Measures** |
| --- | --- |
| *List all drivers* | *List all control measures* |
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## Site and Facility Operations

### Activity Description

*Describe the following:*

*Site administration and support buildings and activities*

*Site housekeeping workshops, services and security*

*Internal road, parking and laydown area and marine jetty operations*

*Power generation, water supply and wastewater treatment*

*On-site waste storage, segregation and management*

*Hazardous materials storage including refuelling assets.*

Associated facilities that should also be described, unless managed under a separate approved management plan, include but are not limited to:

*Offsite warehousing, site offices, vehicle maintenance workshops and fabrication shops*

*Quarries, borrow pits, batching plants, asphalt plants, crusher plants.*

### Environmental and Social Impacts and Risks

Populate the table below with the activities, drivers and values recorded in the ENVID for this scope of work. Please note that those shown in the table below are examples only and should be deleted from the table.

Table 3‑9: Summary of Environmental Impacts and Risks for Site and Facility Operations

| Activities | Driver | Value |
| --- | --- | --- |
| *Hazardous materials and fuels storage and handling* | *Chemical and hydrocarbon releases* | *Groundwater, Terrestrial habitats* |
| *Emissions generated from fuel use (generators) for day to day activities in offices, toilets, accommodation*  | *Greenhouse gas emissions* | *Climate* |
| *Noise from generator operations*  | *Noise* | *People and communities* |
|  |  |  |
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|  |  |  |

### Control Measures

Please list all applicable mandatory requirements, which are consistent with those discussed in the ENVID and that will be implemented for these activities.

Please include specific engineering or procedural controls as identified in the ENVID and consistent with the NEOM Environmental and Social Codes of Practice for Construction (NEOM-NEV-TGD-702).

Table 3‑10: Mandatory Control Measures for Site and Facility Operations

| **Driver** | **Control Measures** |
| --- | --- |
| *List all drivers* | *List all control measures* |
|  |  |
|  |
|  |
|  |  |
|  |
|  |
|  |  |
|  |  |
|  |  |

## Transport and Logistics

### Activity Description

Describe the following:

*Personnel transport to surrounding worker accommodation, airports*

*Road logistics including heavy haulage, material supply and waste transport*

*Marine shipping (excludes marine installation and survey vessels)*

*Aircraft transport (only for movements to the work site, including helicopter movements).*

### Environmental and Social Impacts and Risks

Populate the table below with the activities, drivers and values recorded in the ENVID for this scope of work. Please note that those shown in the table below are examples only and should be deleted from the table.

Table 3‑11: Summary of Environmental Impacts and Risks for Transport and Logistics

| Activities | Driver | Value |
| --- | --- | --- |
| *Emissions generated from fuel use* | *Greenhouse gas emissions* | *Climate* |
| *Vessel strike of marine fauna* | *Physical Interaction* | *Marine ecology* |
| *Traffic accidents resulting in human injury or fatality* | *Physical Interaction* | *People and communities* |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

### Control Measures

Please list all applicable mandatory requirements, which are consistent with those discussed in the ENVID and that will be implemented for these activities.

Please include specific engineering or procedural controls as identified in the ENVID and consistent with the NEOM Environmental and Social Codes of Practice for Construction (NEOM-NEV-TGD-702).

Table 3‑12: Mandatory Control Measures for Transport and Logistics

| **Driver** | **Control Measures** |
| --- | --- |
| *List all drivers* | *List all control measures* |
|  |  |
|  |
|  |
|  |  |
|  |
|  |
|  |  |
|  |  |
|  |  |

# Monitoring

The monitoring requirements for the works are summarised in Table 5‑1. Contractors and consultants responsible for monitoring must keep records for all required monitoring, including visual monitoring.

Please note that this section must only include **environmental** monitoring (i.e. noise, dust, flora and fauna, water quality monitoring, light, etc.). It is not meant to cover compliance assurance activities such as maintaining records, checks of records, waste tracking or the general implementation of procedures.

For works with more complex monitoring programs, please include more detail (e.g. include subsections explaining each monitoring program) and if deemed required, please attach (in Appendix B) any monitoring plans that have been developed for the works (e.g. Dredging and Spoil Disposal Management and Monitoring Plan, Site Reinstatement and Rehabilitation Monitoring Plan, etc.).

Table 5‑1: Monitoring Requirements

| Driver | Description | Method | Frequency | Location(s) |
| --- | --- | --- | --- | --- |
| *Dust emissions* | *Visual spot checks for fugitive dust emissions. Also record wind speed and direction using an anemometer.* | *Visual check, anemometer* | *Daily* | *At each site boundary* |
| *Noise emissions* | *Short term (15-minute average) noise measurements against KSA and IFC noise limits (see Appendix A)* | *Class 1 or 2 noise meter* | *Daily* | *At each site boundary* |
|  | *List all monitoring requirements* |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

# Compliance Assurance Program

## Overview

The following sections set out the Compliance Assurance Program for the works, which will ensure the requirements of this Plan are being effectively implemented.

The Compliance Assurance Program will comprise site inspections and systems audits, conducted in accordance with the NEOM Environmental and Social Compliance Assurance Standard (NEOM-NEV-TGD-701). The Standard also covers performance management and the management of non-conformance.

The Proponent must notify NEOM Environment 14 days prior to the mobilisation of each Contractor conducting work under this ESMP.

## Site Inspections

An environmental site inspection schedule will be developed prior to mobilisation and maintained for the works. All site inspections required under this Plan shall be completed by the Environmental Manager or a member of the Environment Team.

Environmental inspections shall be conducted across the site on a daily basis.

All site inspections shall be conducted using the NEOM Contractor Environmental Inspection Checklist (NEOM-NEV-FRM-004).

Where non-compliant conditions are found during environmental inspections, the Contractor will detail these in an Environmental Inspection Report. The Report shall include, but not be limited to the following information:

a description of the condition observed on site

what corrective actions need to be taken to rectify the condition

a time-stamped photograph of the issue observed

the responsible party for implementing the corrective actions

by when the corrective action should be completed.

Periodic, but no less than monthly environmental inspections will be conducted for the associated facilities listed in Table 4‑1.

Populate the table below and add additional rows as required. Associated facilities may include workers accommodation camps, workshops, concrete batching plants, material extraction areas, parking and laydown areas, offices, workshops, access roads, etc. as agreed during the assessment process.

Table 4‑1: Associated Facilities Subject to Periodic Environmental Inspections

| No. | Associated Facility Name | Frequency of Inspection |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |

Non-compliant conditions and environmental risks identified during site inspections shall be addressed in line with the performance management requirements in Section 5.4.

## System Audits

A system audit schedule will be developed prior to mobilisation and maintained for the work, to review the implementation and recording keeping required for all management plans, monitoring plans and procedures and to assess the effectiveness of this Plan. The system audit schedule shall, prior to distribution, be provided to NEOM Environment for review and approval.

The Contractor Environmental Manager shall lead Contractor system audits. Any non-conformances identified must be managed in accordance with the requirements in Section 5.5.

The NEOM Environment Department will also conduct system audits. Audits will be undertaken in accordance with the NEOM Environmental and Social Compliance Assurance Standard (NEOM-NEV-TGD-701).

## Performance Management

All works shall be executed in compliance with NEOM environmental requirements. Contractor environmental performance will be managed in accordance with the NEOM Environmental and Social Compliance Assurance Standard (NEOM-NEV-TGD-701). Where performance issues are identified, change management tools will be applied to realign Contractor’s performance with NEOM environmental requirements.

Assurance processes generate Contractor environmental Key Performance Indicators (KPIs). Should minimum standard environmental KPIs not be achieved, Senior Management will take immediate action to address performance deficiencies in an expedient and effective manner by applying the requirements of the NEOM Environmental and Social Compliance Assurance Standard (NEOM-NEV-TGD-701).

## Management of Non-conformance

Environmental non-conformances must be managed in accordance with the NEOM Environmental and Social Compliance Assurance Standard (NEOM-NEV-TGD-701). Non-conformances could be identified through audit findings, breaches of environmental accord conditions of approval, breaches of legislation, breaches of contractual agreements, etc.

In the event of any non-conformances being identified, a Non-Conformance Report (NCR) will be issued. In response to the NCR, the Contractor shall describe what corrective actions they will take to address the non-conformance. The Contractor will be required to demonstrate completion of the required actions.

# Training and Awareness Management Program

## Overview

The NEOM Environmental and Social Risk Management Training and Awareness Program (NEOM-NEV-TRP-801) will be implemented for the works. The Program includes:

Inductions

Code of Conduct

Professional and corrective training

Awareness.

## Inductions

All workers, consultants, suppliers and visitors expected to spend more than 24 hours at the work site will undergo a site environmental induction within 24 hours of arriving at the site.

Environmental inductions will follow the NEOM Environmental and Social Risk Management Induction and be delivered by the Environmental Manager or a nominated environmental representative with suitable qualifications and experience for the task.

Inductions shall be provided in the language of the workforce, but as a minimum shall be in Arabic and English.

Detailed records of all persons that have completed environmental inductions will be retained and all workers who attend the environmental induction will receive a project-specific hard hat environmental induction sticker.

## Code of Conduct

Each worker shall read or have read to them, a copy of the NEOM Environmental Code of Conduct (NEOM-NEV-GGD-801) which sets out their agreement to abide by the behaviors required by NEOM in relation to the protection of environmental and social values.

## Training

A comprehensive environment training program shall be implemented for the Work that aligns with the NEOM Environmental and Social Risk Management Training and Awareness Program (NEOM-NEV-TRP-801). The training program shall include:

Maintenance of a training matrix for all personnel confirming the possession of current and appropriate job-specific training and qualifications

Delivery of NEOM environmental and social risk management training for professionals.

Training shall be undertaken in an air-conditioned room suitable and sufficiently large to accommodate the number of personnel being trained. All training shall be delivered in the language of the workforce, but as a minimum shall be in Arabic and English.

Training required for the work is detailed in the NEOM Environmental and Social Risk Management Training and Awareness Program (NEOM-NEV-TRP-801).

## Awareness

In addition to the site inductions, code of conduct and formal training, an awareness program will be implemented for the works, which will include:

Signage and fencing in appropriate locations

Posters and video in common areas

Pre-start briefings

Toolbox talks

Environmental notice board.

Posters and signage will be placed around the work site at locations where environmental risk or impacts may occur, including high value ecological and heritage areas that must not be disturbed by the works or by personnel.

Environmental posters and promotional videos shall be displayed in common areas around the site such as mess halls, training rooms, crib rooms, bus stops and offices, with the intent of promoting a culture of environmental responsibility, care and due diligence.

Environmental toolbox talks with all workers will be completed, at a minimum, on a weekly basis. A record of all environmental toolbox talk attendees will be documented and retained as records for audit by NEOM Environment.

Environmental requirements associated with the execution of the works will be regularly communicated to the workforce in the form of daily pre-start briefings (or equivalent). A daily pre-start briefing shall be provided prior to the start of each work shift. The daily pre-start briefing shall amongst other things, identify the relevant environmental and social risks for the work at the site on that day. Records of daily pre-start briefings shall be retained for audit purposes. The name and signature of each person present at the pre-start briefing; the date that the pre-start briefing was presented; and a documented copy of what information was presented at the pre-start briefing shall be recorded.

A dedicated environmental notice board shall be erected at site offices to display environmental related information including KPIs, environmental alerts, training information and a weekly recognition of individual workers for outstanding environmental performance.

# Emergency Response

In the event of an emergency, the Environmental and Social Emergency Response Plan (ERP) provided in Appendix B will be adhered to.

All Contractors must have their own Emergency Response Plan (ERP) in place prior to the commencement of works. Contractor ERPs must align with the ERP provided in Appendix B.

# Incident Identification, Investigation and Reporting

All environmental and social incidents occurring during the work will be managed and investigated in accordance with the NEOM Incident Identification, Investigation and Reporting Procedure (NEOM-NEV-PRC-704). Incidents are classified as follows:

Class A – Level 1 – Catastrophic / Severe Incident

Class A – Level 2 – Major / Moderate Incident

Class A – Level 3 – Minor Incident

Class B – Minor Harm Event.

A reporting threshold matrix is provided in the NEOM Incident Identification, Investigation and Reporting Procedure (NEOM-NEV-PRC-704).

The NEOM Environment Department shall be notified of all Class A environmental incidents immediately upon detection, but no later than 1 hour following the time of the incident.

The Environmental Manager will generate a report following the incident investigation. The report must be issued to the NEOM Environment Department within the timeframes specified in NEOM Incident Identification, Investigation and Reporting Procedure (NEOM-NEV-PRC-704).

The Environment Manager shall confirm in writing to the NEOM Environment Department upon the effective completion of corrective actions arising from incident investigations.

# Record Keeping and Reporting

All records arising from the implementation of this Plan, including meeting minutes, management of change records, Work Method Statements, toolbox talks, site inspections, system audits, incident investigations, inductions and training and disciplinary actions shall be retained, and copies provided to the NEOM Environment Department on a monthly basis.

The following reports shall be submitted to the NEOM Environment Department:

Weekly Environmental Compliance Reports shall be submitted on the first Sunday of each week

Monthly Environmental Performance Reports shall be submitted on the fifth day of each month

Where monitoring is conducted, monthly Environmental Surveillance Reports shall be submitted on the second Sunday of each month

Incident Investigation Reports shall be submitted within the timing outlined in the NEOM Incident Identification, Investigation and Reporting Procedure (NEOM-NEV-PRC-704).

The reports must set out all relevant metrics and KPIs associated with the work, as detailed in the NEOM Sustainability Reporting Framework.

1. Environmental Quality Standards

The environmental quality standards applicable to the work have primarily been taken from the highest possible standard from either KSA Environmental Standards, WHO, or IFC Performance Standards.

Environmental quality standards are provided for the following:

1. Ambient Air Quality
2. Mobile Source Emissions
3. Noise Emissions
4. Light Emissions
5. Ambient Ground Water Quality
6. Soil Quality
7. Treated Wastewater Quality
8. Potable Water Quality
9. Marine Water Quality
10. Marine Sediment Quality
11. Marine Discharge Quality.

Please remove standards that do not apply to the scope of works covered by the Plan (e.g. if marine works are not relevant, remove the marine standards).

1. Ambient Air Quality

The national air quality standards for KSA were prescribed in 2012 (PME, 2012). These are shown in Table A1 together with World Bank Group standards (IFC / World Bank Group, 2007), (WHO, 2000), (WHO, 2005) and the NEOM Interim Industrial Air Pollution and Ambient Air Quality Standards (NEOM-NEV-STD-302-03.01).

The adopted standards are shown in bold type. In accordance with IFC Performance Standard 3, the highest standard from national and IFC guidelines has generally been selected as the NEOM standard. For particulate matter, national standards are proposed as the project standards because IFC standards are not expected to be achievable due to the naturally arid conditions in KSA. For sulfur dioxide, an interim target standard has been adopted as the project standard as progress toward meeting IFC guidelines.

Table A1: KSA / IFC Ambient Air Quality Standards

| Pollutant | Averaging Period | KSA (µg/Nm3) | IFC Guidelines (µg/m3) | NEOM Ambient Air Quality Standards (µg/m3) |
| --- | --- | --- | --- | --- |
| Sulphur DioxideSO2 | 10 minutes | - | 500 | **500** |
| Hourly | 730(1)- | - | **350** |
| Daily | 365(2) | 20125 (Interim target 1) 50 (Interim target 2) | **125** |
| Annually | 80 | - | **50** |
| Nitrogen DioxideNO2 | Hourly | 660(3) | 200 | **200** |
| Daily | - | - | **150** |
| Annually | 100 | 40 | **40** |
| Carbon MonoxideCO | Hourly | **40,000** | - | - |
| 8-hourly | **10,000** | - | - |
| Particulate Matter PM10 | Daily | 340(4) | 50150 (Interim target 1) 100 (Interim target 2) 75 ((Interim target 3) | **20(8)** |
| Annually | **80** | 2070 (Interim target 1) 50 (Interim target 2) 30 (Interim target 3) | - |
| Particulate Matter PM2.5 | Daily | 35(5) | 2575 (Interim target 1) 50 (Interim target 2) 37.5 (Interim target 3) | **35(8)** |
| Annually | 15 | 1035 (Interim target 1) 25 (Interim target 2) 15 (Interim target 3) | **15(8)** |
| OzoneO3 | Hourly | 235(3) | - | **235** |
| 8 Hourly | 157(6) | 100160 (Interim target 1) | **100** |
| Hydrogen Sulfide H2S | Daily | **150(7)** | 150 | - |
| Annually | **40** | - | - |
| Benzene | Hourly | - | - | **30** |
| Annually | 5 | - | **3** |
| Lead | Hourly | - | - | **1.5** |
| Daily | - | - | **0.5** |
| Monthly | - | - | **0.2** |
| Annually | 0.5 | - | **0.5** |
| Tetrachloroethane | Daily | - | - | **250** |
| Annually | - | - | **10** |
| Hydrogen Fluorides and inorganic gaseous compounds of fluorine | Hourly |  |  | **4.9** |
| Annually |  |  | **0.4** |

Notes:

1. Not to be exceeded more than twice per year.
2. Not to be exceeded more than once per year.
3. Not to be exceeded more than twice in 30 days.
4. Not to be exceeded more than 24 times per year. The average 90th percentile 24-hour concentration must not exceed 340μg/Nm3.
5. Not to be exceeded more than 24 times per year. The average 90th percentile 24-hour concentration must not exceed 35μg/Nm3.
6. Not to be exceeded more than 2 times in 7 days. Not to be exceeded more than 10 times per year.
7. KSA National standards from Environmental Standards Ambient Air Quality. Presidency of Meteorology and Environment, 1409-01, 24/03/2012.
8. Above ambient level.

IFC/WHO standards referred to:

International Finance Corporation / World Bank Group (2007) General EHS Guidelines: Environmental – Air Emissions and Ambient Air Quality, April 30th, 2007.

World Health Organization, 2000. Air quality guidelines for Europe. 2nd edition.

World Health Organization, 2005. Air quality guidelines for particulate matter, ozone, nitrogen dioxide and Sulphur dioxide, Global Update.

1. Mobile Source Emissions

The KSA mobile source emission standards published in 2012 are in Tables A2 to A4 below.

Table A2: Non-Road Petrol (Compression-Ignition) Engines (includes construction, agricultural, and industrial equipment)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Rated Power | CO(g/kW-hr) | HC(g/kW-hr) | NO(g/kW-hr) | PM(g/kW-hr) | Smoke% |
| 50 ≤ hp < 100 | n/a | n/a | 9.25 (ABT) | n/a | 20/15/50 |
| 100 ≤ hp < 175 | n/a | n/a | 9.25 (ABT) | n/a | 20/15/50 |
| 175 ≤ hp < 750 | 11.4 | 1.34 | 9.25 (ABT) | 0.54 | 20/15/50 |
| Hp = 750 + | 11.4 | 1.34 | 9.25 (ABT) | 0.54 | 20/15/50 |

Table A3: Non-Road Diesel (Spark-ignition Engines) (lawnmowers, forklifts, generators etc.)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Rated Power | CO(g/kW-hr) | HC(g/kW-hr) | NOx(g/kW-hr) | HC + NOx (g/kW-hr) |
| < 225cc (non-handheld) | 518.97 | n/a | n/a | n/a |
| ≥ 225cc (non-handheld) | 518.97 | n/a | n/a | n/a |
| <20cc (handheld) | 804.6 | 295.02 | 5.36 | 0.54 |
| ≥20cc >50cc (handheld) | 804.6 | 241.38 | 5.36 | n/a |
| ≥50cc (handheld) | 603.45 | 160.92 | 5.36 | n/a |

Table A4: Non-Road Recreational Vehicles and Engines

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Vehicle Type | Displacement(cc) | CO(g/kW-hr) | HC(g/kW-hr) | HC + NOx (g/kW-hr) | PM(g/kW-hr) |
| Specialty vehicle engines (<25hp) | < 225 | 469.35 | n/a | 16.1 | 1.21 |
| ≥ 225 | 469.35 | 13.41 | 1.21 |
| all | 134.1 | 4.29 | 0.34 |
| Specialty vehicles engines and go-karts | all | 134.1 | n/a | 4.29 | 0.34 |
| Off-road motorcycles and all-terrain vehicles | >90 | 20.12 | 1.61 | n/a | n/a |
| <90 | 20.12 | 1.61 |

1. Noise Emissions

Noise limits are shown in Tables A5 to A7. Table A5 below shows the national standards for construction noise, together with outdoor noise limits prescribed in World Bank standards (International Finance Corporation / World Bank Group, 2007).

The project standards are shown in bold type. In accordance with IFC Performance Standard 3, the more stringent standard from national and IFC guidelines has been selected as the project standard. As stated in the World Bank standards, noise impacts should not exceed the IFC limits presented in Table A5 or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site. Note that highly intrusive noises, such as noise from aircraft flyovers and passing trains, should not be included when establishing background noise levels.

Table A5: PME /IFC Noise Limits

|  |  |  |
| --- | --- | --- |
| Area Classification | PME1 | IFC2 |
| Daytime07:00-19:00 | Evening19:00-23:00 | Nighttime23:00-07:00 | Daytime07:00-22:00 | Nighttime22:00-07:00 |
| LAeq, 12h (dB) | LAeq, 12h (dB) | LAeq, 12h (dB) | One-hour LAeq (dBA) |
| A, B, C3 | 75 | 65 | 45 | - | - |
| D3 | 80 | 80 | 80 | - | - |
| Residential; institutional; educational | - | - | - | **55** | **45** |
| Industrial; commercial | - | - | - | **70** | **70** |

Notes:

1) Maximum permissible façade noise limits for general construction activities.

2) Outdoor noise limits at receptors beyond the property boundary of the facilities.

3) A: Quiet areas, B: Sensitive areas, C: Mixed areas, D: Non-Sensitive areas.

Table A6: Maximum Permissible Instantaneous Noise Levels for Vehicles

| Vehicle Type | Vehicle Type | Limit Value dB(A) |
| --- | --- | --- |
| Vehicles used for carriage of passengers | <9 seats | 74 |
| <9 seats, maximum authorized mass>3.5 tons, engine power <150 kW | 78 |
| <9 seats, maximum authorized mass>3.5 tons, 150 kW < engine power <320 kW | 80 |
| <9 seats, maximum authorized mass>3.5 tons, engine power <320 kW | 83 |
| Vehicles used for the carriage of goods | Maximum authorized mass <2 tons | 76 |
| 2 tons < maximum authorized mass <3.5 tons | 77 |
| Vehicles used for the transportation of goods | Maximum authorized mass >3.5 tons, engine power <75 kW | 77 |
| Maximum authorized mass >3.5 tons, 75 kW < engine power <150 kW | 78 |
| Maximum authorized mass >3.5 tons, 150kW < engine power <320 kW | 80 |
| Maximum authorized mass >3.5 tons, engine power >320 kW | 83 |

Table A7: PME Maximum Permissible Sound Power Limits for Equipment for Use Outdoors

| Type of Equipment | Net Installed Power P (kW), Electric Power Pel (kW), Mass of Appliance m (kg), Cutting Width L (cm) | Permissible Sound Power Level (dB/1pW) | Guideline Sound Power Level (dB/1pW) |
| --- | --- | --- | --- |
| Compaction machines(vibrating rollers, vibratory plates, vibratory rammers) | P<8 | 108 | 105 |
| 8<P<70 | 109 | 106 |
| P>70 | 89 + 11 lg P | 86 + 11 lg P |
| Tracked dozers, loaders, and excavator-loaders | P<55 | 106 | 103 |
| P>55 | 87 + 11 lg P | 84 + 11 lg P |
| Excavators and winches, hoists and motor hoes | P>15 | 96 | 93 |
| P>15 | 83 + 11 lg P | 80 + 11 lg P |
| Tower Cranes | - | 98 + lg P | 95 + lg P |
| Welding and power generators | Pel<2 | 97 + lg Pel | 95 + lg Pel |
| 2< Pel <10 | 98 + lg Pel | 96 + lg Pel |
| Pel>10 | 97 + lg Pel | 95 + lg Pel |
| Compressors | P<15 | 99 | 97 |
| P>15 | 97 + 2 lg P | 95 + 2 lg P |
| Handheld concrete breakers and picks | M<15 | 107 | 105 |
| 15<m<30 | 94 + 11 lg m | 92 + 11 lg m |
| m>30 | 96 + 11 lg m | 94 + 11 lg m |
| Wheeled dozers, loaders, excavator-loaders, dumpers, graders, loader type landfill compactors, combustion-engine driven counterbalanced lift trucks, mobile cranes, compaction machines (non-vibrating rollers), paver-finishers, hydraulic power packs | P<55 | 104 | 101 |
| P>55 | 85 + 11 lg P | 82 + 11 lg P |
| Lawn mowers/lawn trimmers | L<50 | 96 | 94 |
| 50<L<70 | 100 | 98 |
| 70<L<120 | 100 | 98 |
| L>120 | 100 | 103 |

1. Light Emissions

Light pollution is the misdirection or misuse of light, generally resulting from an inappropriate application of exterior lighting. Backlight creates light trespass onto the adjacent community and environment by directing light in the opposite direction of the area intended to be lighted. Uplight causes artificial sky glow. Glare is caused by high-angle front light.

Light pollution creates an abundance of environmental problems. Wildlife species that hunt or forage at night may be unable to feed. Some flora and fauna are unable to adjust to seasonal variations when exposed to light pollution. Migratory birds that rely on stars to guide them during migration may become disoriented. Finally, light pollution directed into the sky or into areas that do not need illumination is a waste of both energy and so unnecessary contribution to climate change.

Project teams must comply with the limits in Table A8 below.

Table A8: NEOM Permissible Illumination Level Change and Sky Glow per Environmental Zone for Exterior Lighting Control

|  |  |  |
| --- | --- | --- |
| Environmental Zones for Exterior Lighting Control | Maximum Illumination Level % Change, with Lights On and Off (1) | Sky Glow, ULR, [Max %] (2) |
| E1: Intrinsically dark landscapes – National Parks, Areas of Outstanding Natural Beauty, etc. | 5 | 0 |
| E2: Low district brightness areas Rural, small village, or relatively dark urban locations | 10 | 0 |
| E3: Medium district brightness areas Small town centres or urban locations | 10 | 0 |
| E4: High district brightness areas Town/city centres with high levels of night-time activity | 20 | 2.5 |

Notes:

1. Refer to method for Night Illumination Perimeter Measurement from the Light Pollution Reduction Credit from LEED Existing Building O&M – Sustainable Sites: Measure the night illumination levels at regularly spaced points on the project boundary, taking the measurements with the building’s exterior and site lights both on and off. At least eight measurements are required, at a maximum spacing of 30 metres apart. The illumination level measured with the lights on must not be more than 5-20% above the level measured with the lights off, depending upon the Environmental Zone’s sensitivity.
2. ULR = Upward Light Ratio of the Installation is the maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky. Some lighting schemes will require the deliberate and careful use of upward light – e.g. ground recessed luminaires, ground mounted floodlights, festive lighting – to which these limits cannot apply. However, care should always be taken to minimise any upward waste light by the proper application of suitably directional luminaires and light controlling attachments.
3. Groundwater Quality

KSA ambient groundwater quality values are provided in Table A9.

Table A9: KSA Environmental Quality Objectives for Ambient Groundwater Quality

| Parameter | Unit | Groundwater |
| --- | --- | --- |
| *Chemical indicators and nutrients* |
| BOD | mg/l | n/a |
| COD | mg/l | n/a |
| Total Oil and Grease | mg/l | 0 |
| TKN (organic N) | mg/l | 5 |
| TOC | mg/l | ABD |
| Phosphorus (total) | mg/l | 0.03 |
| Phosphorus (PO4) | mg/l | n/a |
| Ammonia (as NH3) | mg/l | 0.03 |
| Chloride (as Cl) | mg/l | n/a |
| Total inorganic nitrogen (as NO2 and NO3) | mg/l | 30 |
| Sodium | mg/l | 150 |
| Sulfate | mg/l | n/a |
| Sulfide | mg/l | 0.002 |
| *Heavy metals* |
| Aluminum | mg/l | 0.2 |
| Arsenic | mg/l | 0.005 |
| Barium | mg/l | 1 |
| Cadmium | mg/l | 0.005 |
| Chromium (total) | mg/l | 0.1 |
| Chromium (hexavalent) | mg/l | 0.005 |
| Cobalt | mg/l | 0.1 |
| Copper | mg/l | 0.05 |
| Iron | mg/l | 0.2 |
| Lead | mg/l | 0.005 |
| Manganese | mg/l | 0.1 |
| Mercury | mg/l | 0.001 |
| Nickel | mg/l | 0.02 |
| Silver | mg/l | 0.1 |
| Zinc | mg/l | 0.02 |
| *Organics and inorganics* |
| Benzene | mg/l | 0.005 |
| Carbon tetrachloride | mg/l | 0.005 |
| Chlorine (residual) | mg/l | <0.0 |
| Chlorinated hydrocarbons (total) | mg/l | 0.001 |
| Chloroform | mg/l | n/a |
| Cyanide (free) | mg/l | 0.001 |
| Fluoride | mg/l | 0.2 |
| Furans | mg/l | 1x10-8 |
| Hexachlorobenzene | mg/l | 0.007 |
| Lindane | mg/l | 0.0002 |
| Mirex | mg/l | 1x10-8 |
| MTBE | mg/l | 0.02 |
| PAH | mg/l | 0.0002 |
| PCBs | mg/l | 1.9x10-8 |
| Pentachlorophenol | mg/l | 0.0005 |
| - Aldrin | mg/l | 2.2x10-8 |
| - Chlordane | mg/l | 0.002 |
| - DDT | mg/l | 1.7 x 10-5 |
| - Dieldrin | mg/l | 4x10-8 |
| - Endrin | mg/l | 0.001 |
| - Heptachlor | mg/l | 0.0004 |
| - Toxaphene | mg/l | 0.002 |
| Phenols | mg/l | 0.005 |
| Dioxins | mg/l | 3x10-8 |
| Toluene | mg/l | 0.002 |
| TPH | mg/l | 0.2 |
| Vinyl chloride | mg/l | 0.001 |
| Xylenes | mg/l | 0.005 |
| *Microbial* |
| Cyanobacteria | count / 100ml | 5,000 |
| E coli | count / 100ml | <10 |
| Intestinal enterococci | count / 100ml | <5 |

1. Soil Quality Standards

In the absence of KSA, IFC or WHO standards for soil contamination, the Dutch soil target and intervention values (Dutch Ministry of Infrastructure and Water Management, 2013) will be used, as reproduced below. It should be noted that NEOM will adopt a case by case, risk-based approach to land contamination, therefore the values in Table A10 are indicative interim guideline values only.

Table A10: Interim Soil Quality Guide Values

| Parameter | Unit | Dutch Target Value | Dutch Intervention Value |
| --- | --- | --- | --- |
| *Physical and Chemical Parameters* |
| Antimony  | mg/kg | - | 2.00E-05 |
| Chloride | mg/kg | 100 | - |
| *TPH, VOC, PAH* |
| Anthracene | mg/kg | 7.00E-07 | 0.005 |
| Benzo[a]anthracene | mg/kg | 1.00E-07 | 0.0005 |
| Benzo[a]pyrene | mg/kg | 5.00E-07 | 5.00E-07 |
| Benzo (g,h,i) perylene | mg/kg | 3.00E-07 | 5.00E-05 |
| Benzo[k]fluoranthene | mg/kg | 4.00E-07 | 5.00E-05 |
| Chrysene | mg/kg | 3.00E-06 | 0.0002 |
| Fluoranthene | mg/kg | 3.00E-06 | 0.001 |
| Indeno (1,2,3-cd) pyrene | mg/kg | 4.00E-07 | 5.00E-05 |
| Naphthalene | mg/kg | 1.00E-05 | 0.07 |
| Phenanthrene | mg/kg | 3.00E-06 | 0.005 |
| Benzene | mg/kg | 0.0002 | 0.03 |
| Toluene | mg/kg | 0.004 | 0.15 |
| Ethyl Benzene | mg/kg | 0.007 | 1 |
| Xylenes | mg/kg | 0.0002 | 0.07 |
| Arsenic | mg/kg | 0.01 | 0.06 |
| Barium | mg/kg | 50 | 625 |
| Cadmium | mg/kg | 0.4 | 6 |
| Chromium | mg/kg | 0.001 | 0.03 |
| Cobalt | mg/kg | 0.02 | 0.1 |
| Copper | mg/kg | 0.00015 | 0.075 |
| Lead | mg/kg | 0.015 | 0.075 |
| Mercury | mg/kg | 5.00E-05 | 0.0003 |
| Nickel | mg/kg | 0.015 | 0.075 |
| Zinc | mg/kg | 65 | 800 |

1. Treated Wastewater Quality

**Note that NEOM will not allow any discharge of treated wastewater to marine waters.**

Table A11a: NEOM Treated Wastewater Limits Quality Data

| Design Treated Sewage Effluent (TSE) Quality Parameters | Unit | Limit |
| --- | --- | --- |
| pH | pH units | 6.5-9 |
| Oil and grease | mg/l | <5 |
| Total Suspended Solids (TSS) | mg/l | 50 |
| Chemical Oxygen Demand (COD) | mg/l | <80 |
| Biochemical Oxygen Demand (BOD5) | mg/l | <10 |
| NH4-N | mg/l | <1 |
| NO3-N | mg/l | <10 |
| Total Nitrogen | mg/l | <15 |
| Total Phosphorus (TP) | mg/l | <75 |
| Fecal coliform (arithmetic mean) | Count / 100 mL | <200 |
| Viable helminths ova | Per litre | <1 |

Table A11b: KSA Prescribed Concentrations and Values – Discharge Limits for Effluents prior to Discharge into Water Bodies

| Parameter | Unit | Limit‘Eco-sensitive’ Red Sea | Limit‘Surface Water’ |
| --- | --- | --- | --- |
| Important Note\* |
| *Physical chemistry* |
| Coarse Material | - | Absent | Absent |
| Temperature | Δ°C(from ambient)) | 5 | 5 |
| pH | pH units | 7.5-9 | 6.5-8.5 |
| TDS | mg/l | - | - |
| Turbidity | NTU | 5 | 5 |
| TSS | mg/l | 10 | 10 |
| *Indicators* |
| BOD5 | mg/l | 10 | 10 |
| COD | mg/l | 50 | 50 |
| Total Oil & Grease1 | mg/l | 2 | 5 |
| TKN (organic N) | mg/l | 5 | 5 |
| TOC | mg/l | 40 | 100 |
| Phosphorus (total) | mg/l | 1 | 5 |
| Phosphate (PO4)3- | mg/l | 0.5 | 1 |
| Ammonia (as NH3) | mg/l | 1 | 0.5 |
| Chloride (as Cl) | mg/l | - | 1500 |
| Total inorganic nitrogen (as N02 and N03) | mg/l | - | 15 |
| Sodium | mg/l | 800 | 800 |
| Sulfate | mg/l | 600 | 600 |
| Sulfide | mg/l | 0.2 | 0.2 |
| *Heavy Metals* |
| Aluminum | mg/l | 5 | 5 |
| Arsenic | mg/l | 0.05 | 0.1 |
| Barium | mg/l | 1 | 1 |
| Cadmium | mg/l | 0.005 | 0.001 |
| Chromium (total) | mg/l | 0.01 | 0.01 |
| Chromium (hexavalent) | mg/l | 0.05 | 0.05 |
| Cobalt | mg/l | 0.05 | 0.05 |
| Copper | mg/l | 0.2 | 0.2 |
| Iron | mg/l | 5 | 2 |
| Lead | mg/l | 0.1 | 0.1 |
| Manganese | mg/l | 0.2 | 0.2 |
| Mercury | mg/l | 0.001 | 0.001 |
| Nickel | mg/l | 0.2 | 0.2 |
| Silver | mg/l | 0.3 | 0.3 |
| Zinc | mg/l | 2 | 2 |
| *Organics and Inorganics* |
| Benzene | mg/l | 0.05 | 0.05 |
| Carbon tetrachloride | mg/l | 0.02 | 0.02 |
| Chlorine (residual) | mg/l | 0.1 | 0.3 |
| Chlorinated hydrocarbons (total) | mg/l | 0.1 | 0.1 |
| Chloroform | mg/l | - | - |
| Cyanide (free) | mg/l | 0.05 | 0.05 |
| Fluoride | mg/l | 15 | 15 |
| Furans2 | mg/l | 0.01 | 0.01 |
| Hexachlorobenzene | mg/l | 0.01 | 0.01 |
| Lindane | mg/l | 0.01 | 0.01 |
| Mirex | mg/l | 0.01 | 0.01 |
| MTBE | mg/l | 0.01 | 0.01 |
| PAH | mg/l | 0.01 | 0.01 |
| PCBs | mg/l | 0.01 | 0.01 |
| Pentachlorophenol | mg/l | - | - |
| Pesticides and insecticides (total) | mg/l | 0.05 |  |
| - Aldrin | mg/l | 0.01 | 0.05 |
| - Chlordane | mg/l | 0.01 | 0.01 |
| -DDT | mg/l | 0.01 | 0.01 |
| - Dieldrin | mg/l | 0.01 | 0.01 |
| - Endrin | mg/l | 0.002 | 0.002 |
| - Heptachlor | mg/l | 0.01 | 0.01 |
| - Toxaphene | mg/l | 0.01 | 0.01 |
| Phenols | mg/l | 0.1 | 0.1 |
| Dioxins3 | mg/l | 0.01 | 0.01 |
| Toluene | mg/l | - | - |
| TPH | mg/l | 5 | 5 |
| Vinyl chloride | mg/l | 0.02 | 0.02 |
| Xylenes | mg/l | 0.05 | 0.05 |
| *Microbiological* |
| E coli / Total Coliforms | count/100 ml | 2000 | 2000 |

Notes:

\* Consideration should be given to areas of natural high TDS. Any substance other than those mentioned in the above table may not be discharged at a concentration greater than 0.001 mg/l unless agreed in advance with the Competent Agency or receiving treatment works.

1) No sheen should be visible within the mixing zone.

2) Chlorodibenzo-furan cogeners.

3) Chlorodibenzo-p-dioxin and tetrachlorodibenzo-p-dioxin congeners.

1. Potable Water Quality

The potable water quality standards for KSA are provided in Table A12 below.

Table A12: KSA Prescribed Concentrations and Values for Potable Water1

| Parameter | Unit | Value (Health) | Value (Acceptability) |
| --- | --- | --- | --- |
| pH | pH units | None specified | 6.5-8 |
| Colour | Hazen Units | None specified | 15 |
| Conductivity | μS/cm at20oC | 2,500 |  |
| Taste and Odour | n/a | None specified | Unobjectionable |
| TDS | mg/l | - | 1500 |
| Turbidity | NTU | 5 | 1 |
| Gross Alpha activity | Bq/l | 0.1 |  |
| Gross beta activity | Bq/l | 1 |  |
| Radioactivity (excl. pottassium-40)2 | mSv/(annual RDL3) | 0.1 |  |
| CaCO3 | mg/l | 300 |  |
| DO | % | None specified | >85 |
| Nitrate (as NO3-) | mg/l | 50 |  |
| Nitrite (as NO2-) | mg/l | 1 |  |
| *Organic and inorganic chemical pollutants* |
| Acrylimade | μg/l | 0.5 |  |
| Alachlor | μg/l | 20 |  |
| Aldicarb | μg/l | 10 |  |
| Aldrin and Dieldrin | μg/l | 0.03 |  |
| Aluminium | μg/l |  | 200 |
| Antimony | mg/l | 20 |  |
| Asbestos | Million fibres / L | 7 |  |
| Arsenic | mg/l | 10 |  |
| Atrizine | μg/l | 2 |  |
| Barium | μg/l | 700 |  |
| Beryllium | μg/l | 200 |  |
| Benzene | μg/l | 10 |  |
| Benzo(a)pyrene | μg/l | 0.01 |  |
| Boron | μg/l | 1000 |  |
| Bromate | μg/l | 10 |  |
| Bromodichloromethane (BDCM) | μg/l | 60 |  |
| Bromoform | μg/l | 100 |  |
| Cadmium  | μg/l | 3 |  |
| Carbofurans | μg/l | 7 |  |
| Carbon Tetrachloride | μg/l | 2 |  |
| Chloral Hydrate | μg/l | 10 |  |
| Chlordane | μg/l | 0.2 |  |
| Chlorate | μg/l | 700 |  |
| Chlorine residual | μg/l | 500 |  |
| Chloride | μg/l | None specified | 250,000 |
| Chlorite | μg/l | 700 |  |
| Chlorophenol (2,4,6,T) | μg/l | 200 |  |
| Chloroform | μg/l | 200 |  |
| Chromium | μg/l | 50 |  |
| Copper | mg/l | 2 |  |
| Cyanide | μg/l | 70 |  |
| Cynazine | μg/l | 6 |  |
| 2,4 -D (2,4-dichlorophenoxyacetic acid)4 | μg/l | 30 |  |
| DDT and Metabolites | μg/l | 1 |  |
| Dibromoacetonitrile | μg/l | 70 |  |
| Dibromochloromethane (DBCM) | μg/l | 100 |  |
| Dibromo-3-chloropropane 1,2 (DBCP) | μg/l | 1 | 0.01 |
| Dibromoethane 1,2 | μg/l | 0.4 |  |
| Dichloroacetonitrile | μg/l | 20 |  |
| Dichlorobenzene, 1,2-  | μg/l | 1000 | 3 |
| Dichlorobenzene, 1,4-  | μg/l | 300 | 3 |
| Dichloroethane, 1,2-  | μg/l | 30 |  |
| Dichloroethene, 1,1-  | μg/l | 30 |  |
| Dichloroethene, 1,2- | μg/l | 50 |  |
| Dichloromethane  | μg/l | 20 |  |
| Dichloropropane 1,2 (1,2-DCP)  | μg/l | 40 |  |
| Dichloropropene 1,3  | μg/l | 20 |  |
| Dichlorprop (2,4 DP)  | μg/l | 100 |  |
| Edetic acid (EDTA) | μg/l | 600 |  |
| Endrin  | μg/l | 0.6 |  |
| Ethylbenzene  | μg/l | 300 |  |
| Fenoprop (2,4,5 T) | μg/l | 9 |  |
| Fluoride | μg/l | 1500 |  |
| Formaldehyde | μg/l | 60 |  |
| Haloacetic acids (HAA5) |  |  | 900 |
| Hexachlorobutadiene (HCBD) | μg/l | 0.6 |  |
| Isoproturon | μg/l | 9 |  |
| Iron | μg/l | 300 |  |
| Lead | μg/l | 10 |  |
| Lindane | μg/l | 2 |  |
| Manganese | μg/l |  | 400 |
| Mercury (inorganic) | μg/l | 1 |  |
| Methoxychlor  | μg/l | 200 |  |
| Metolachlor  | μg/l | 10 |  |
| Microcystin-LR  | μg/l | 1 |  |
| Molybdenum  | μg/l | 70 |  |
| Monochloramine  | μg/l | 3000 |  |
| MTBE | μg/l | None specified | 15 |
| Nickel | μg/l | 20 |  |
| PAH (sum total) | μg/l | 0.1 |  |
| Pentachlorophenol (PCP) | μg/l | 9 |  |
| Pesticides (total) | μg/l | 0.5 |  |
| Selenium | μg/l | 10 |  |
| Sodium | μg/l | None specified | 200,000 |
| Styrene | μg/l | 20 |  |
| Sulphate | μg/l | 500,000 | 250,000 |
| Tetrachloroethene | μg/l | 40 |  |
| Toluene | μg/l | 700 |  |
| TCBs (Total) | μg/l | None specified | 5 |
| Trihalomethanes (THM total) | μg/l | 100 |  |
| Trichloroethene, 1,1,1 | μg/l | 70 |  |
| Uranium | μg/l | 15 |  |
| Vinyl chloride | μg/l | 0.3 |  |
| Xylenes  | μg/l | 500 |  |
| Zinc | μg/l | None specified | 3000 |
| *Microbial* |
| *cryptosporidium*  | count / 100ml |  |  |
| E. Coli | count / 100ml | 0 |  |
| Total Coliform Bacteria | count / 100ml | 0 |  |

Notes:

1) Adapted from WHO Drinking Water Quality Guidelines 3rd Edition 2004 using benchmark data.

2) Is a measure of the effective dose of radiation the body may receive from drinking water. RDL is only measured if the screening values for gross alpha or beta activity are exceeded (see above). Radiation exposure from drinking water is very small against background contributions.

3) Reference Dose Level (RDL).

4) Applies to free acid.

1. Marine Water Quality

Marine water quality standards for the KSA are shown in Table A13 below.

The following KSA marine waters sub-divisions should be noted:

(C1) Marine– Coastal waters are those that are under the jurisdiction of KSA (the territorial coastal waters being 12 international nautical miles (22.2 kilometres) of the shoreline). The subdivision ‘marine’ is the default when the coastal water body does not meet the criteria for ‘high-value’ or ‘industrial ‘, detailed below.

(C2) High-value – Areas of coastal water shall be classified as ‘high value’ if they are designated as locally, nationally or internationally protected areas by any Concerned Agency (this includes but is not limited to the Competent Agency, ROPME, NCWCD and PERGSA).

(C3) Industrial – Water bodies shall be classified as industrial if they are adjacent to terrestrial zones or surrounding fixed offshore platforms that that are classified as industrial through local or national planning regulation. The extent of the aquatic environment classified as industrial will represent a seaward extension of the terrestrial boundary provided that it does not impinge upon high areas classified as C1 or C2. Furthermore, industrial ambient conditions will extend no more than a 500-meter radius from the edge of any mixing zone.

**Note that NEOM marine waters are designated as C2 for the purposes of applying these standards.**

Table A13: KSA Prescribed Concentrations and Values – Environmental Quality Objectives for Ambient Water Quality (Maximum Values) (Marine Water Quality Standards)

| Parameter | Unit | Red Sea |
| --- | --- | --- |
| Marine(C1) | High-value(C2) | Industrial(C3) |
| *Physical chemistry* |
| Temperature | oC | ∆3 | ∆2 | ∆4 |
| pH | pH Units | ∆0.2 | ∆0.1 | ∆0.3 |
| Salinity | % | ∆0 | ∆0 | ∆2 |
| TDS | mg/l | 37-45,000 | 37-45,000 | 37-45,000 |
| TSS2 | mg/l | 5 | 2 | 10 |
| Turbidity | NTU | 2 | 1.5 | 5 |
| Dissolved oxygen (DO) | mg/l | >5 | >5 | > |
| *Chemical Indicators and Nutrients* |
| BOD | mg/l | 10 | 10 | 15 |
| COD | mg/l | 25 | 20 | 35 |
| Total Oil & Grease | mg/l | 2 | <1 | 3 |
| TKN (organic N) | mg/l | 3 | 2 | 5 |
| TOC | mg/l | 10 | 10 | 15 |
| Phosphorus (total) | mg/l | 0.5 | 0.25 | 1 |
| Phosphorus (PO4) | mg/l | 0.1 | 0.05 | 0.2 |
| Ammonia (as NH3) | mg/l | 0.1 | 0.05 | 1 |
| Chloride (as Cl) | mg/l | 21,000 | 20,500 | 22,000 |
| Calcium (CaCO3) | mg/l | 1,200 | 1,200 | 1,200 |
| Total inorganic nitrogen (as NO2 and NO3) | mg/l | 1.5 | 1.2 | 2.0 |
| Sodium | mg/l | 14,000 | 14,000 | 14,000 |
| Sulphate | mg/l | 3,000 | 3,000 | 3,000 |
| Sulphide | mg/l | 0.002 | 0.002 | 0.5 |
| TPH | mg/l | 0.3 | 0.2 | 0.5 |
| *Heavy metals* |
| Aluminum | mg/l | 0.2 | 0.2 | 1 |
| Arsenic | mg/l | 0.05 | 0.05 | 0.1 |
| Barium | mg/l | 0.5 | 0.5 | 1 |
| Cadmium | mg/l | 0.005 | 0.002 | 0.05 |
| Chromium (total) | mg/l | 0.05 | 0.05 | 0.1 |
| Chromium (hexavalent) | mg/l | 0.005 | 0.005 | 0.02 |
| Cobalt | mg/l | 0.05 | 0.05 | 1 |
| Copper | mg/l | 0.05 | 0.05 | 0.15 |
| Iron | mg/l | 0.5 | 0.1 | 1 |
| Lead | mg/l | 0.05 | 0.005 | 0.2 |
| Manganese | mg/l | 0.01 | 0.01 | 2 |
| Mercury | mg/l | 0.0004 | 0.0004 | 0..1 |
| Nickel | mg/l | 0.05 | 0.05 | 0.2 |
| Silver | mg/l | 0.1 | 0.07 | 0.2 |
| Zinc | mg/l | 0.8 | 0.2 | 2 |
| *Organics and inorganics* |
| Aldrin\* | mg/l | 2.2 x 10-6 | 2.2 x 10-6 | 2.2 x 10-6 |
| Benzene | mg/l | 0.01 | 0.01 | 0.01 |
| Carbon tetrachloride | mg/l | 0.001 | 0.001 | 0.001 |
| Chlordane\* | mg/l | 2.3 x 10-6 | 2.3 x 10-6 | 2.3 x 10-6 |
| Chlorine (residual) | mg/l | 0.1 | 0.1 | 0.1 |
| Chlorinated hydrocarbons (total) | mg/l | 0.01 | 0.01 | 0.01 |
| Chloroform | mg/l | 0.13 | 0.13 | 0.13 |
| Cyanide (free) | mg/l | 0.01 | 0.01 | 0.01 |
| - DDT (and metabolites)\* | mg/l | 1.7 x 10-5 | 1.7 x 10-5 | 1.7 x 10-5 |
| - Dieldrin\* | mg/l | 4 x 10-6 | 4 x 10-6 | 4 x 10-6 |
| - TCDD – Dioxin\* |  | 3 x 10-8 | 3 x 10-8 | 3 x 10-8 |
| - Endrin | mg/l | 0.000006 | 0.000006 | 0.000006 |
| Fluoride | mg/l | 1.5 | 1.5 | 1.5 |
| Furans | mg/l | 1 x 10-6 | 1 x 10-6 | 1 x 10-6 |
| Helptachlor\* | mg/l | 5 x 10-6 | 5 x 10-6 | 5 x 10-6 |
| Hexachlorobenzene | mg/l | 0.007 | 0.007 | 0.007 |
| Lindane | mg/l | 1.2 x 10-5 | 1.2 x 10-5 | 1.2 x 10-5 |
| Mirex\* | mg/l | 1 x 10-6 | 1 x 10-6 | 1 x 10-6 |
| MTBE | mg/l | 5 | 5 | 5 |
| Pentachlorophenol | mg/l | 0.005 | 0.005 | 0.005 |
| PAH | mg/l | 0.003 | 0.003 | 0.003 |
| PCBs (total) | mg/l | 1.9 x 10-6 | 1.9 x 10-6 | 1.9 x 10-6 |
| Phenols (total) | mg/l | 0.05 | 0.05 | 0.1 |
| Toxaphene\* | mg/l | 1.2 x 10-5 | 1.2 x 10-5 | 1.2 x 10-5 |
| 2,4,5 TP (Silvex)  | mg/l | n/a | n/a | n/a |
| 1,1,1 Trichloroethane\* | mg/l | 0.01 | 0.01 | 0.01 |
| Toluene | mg/l | 0.002 | 0.001 | 0.002 |
| Vinyl chloride | mg/l | 0.002 | 0.002 | 0.002 |
| Xylenes | mg/l | 0.005 | 0.005 | 0.05 |
| *Microbial* |
| Cyanobacteria | mg/l | 5,000 | 5,000 | 5,000 |
| E coli | count/100ml | <500 | <250 | <500 |
| Intestinal enterorocci | count/100ml | <200 | <100 | <200 |

\* These chemicals are specified as a monthly average.

1. Marine Sediment Quality

In the absence of KSA, IFC or WHO standards for sediment quality, the Australian/New Zealand ANZECC/ARMCANZ Sediment Quality Guidelines (CSIRO Land and Water Science Report 08/07, May 2013) will be used. It should be noted that NEOM will adopt a case by case, risk-based approach to managing sediment quality, therefore the values in Table A14 are indicative interim guideline values only.

Table A14: NEOM Recommended Sediment Quality Guideline Values

| Contaminant | Unit | Guideline Value | SQG‐High |
| --- | --- | --- | --- |
| *Metals* |
| Antimony  | mg/kg (dry weight)a | 2.0 | 25 |
| Cadmium  | mg/kg (dry weight)a | 1.5 | 10 |
| Chromium  | mg/kg (dry weight)a | 80 | 370 |
| Copper  | mg/kg (dry weight)a | 65 | 270 |
| Lead  | mg/kg (dry weight)a | 50 | 220 |
| Mercury  | mg/kg (dry weight)a | 0.15 | 1.0 |
| Nickel  | mg/kg (dry weight)a | 21 | 52 |
| Silver  | mg/kg (dry weight)a | 1.0 | 4.0 |
| Zinc  | mg/kg (dry weight)a | 200 | 410 |
| *Metalloids* |
| Arsenic  | mg/kg (dry weight) a | 20 | 70 |
| *Organometallics* |
| Tributyltin  | μg Sn/kg (dry weight, 1% TOC) c, d | 9.0  | 70 |
| *Organics* |
| Total PAHse  | μg/kg (dry weight, 1% TOC ) b, c | 10,000  | 50,000 |
| Total DDT  | μg/kg (dry weight, 1% TOC ) b, c | 1.2  | 5.0 |
| p.p’‐DDE  | μg/kg (dry weight, 1% TOC ) b, c | 1.4  | 7.0 |
| o,p’‐ + p,p’‐DDD  | μg/kg (dry weight, 1% TOC ) b, c | 3.5  | 9.0 |
| Chlordane  | μg/kg (dry weight, 1% TOC ) b, c | 4.5  | 9.0 |
| Dieldrinf  | μg/kg (dry weight, 1% TOC ) b, c | 2.8  | 7.0 |
| Endrinf  | μg/kg (dry weight, 1% TOC ) b, c | 2.7  | 60 |
| Lindane  | μg/kg (dry weight, 1% TOC ) b, c | 0.9  | 1.4 |
| Total PCBs  | μg/kg (dry weight, 1% TOC ) b, c | 34  | 280 |
| Total petroleum hydrocarbons (TPHs)  | mg/kg (dry weight)g | 280  | 550 |

Notes:

a) Primarily adapted from the ERL/ERM values of Long et al. (1995).

b) Primarily adapted from TEL and PEL values of MacDonald et al. (2000) and CCME (2002).

c) Normalised to 1% organic carbon within the limits of 0.2 to 10%. Thus if a sediment has (i) 2% OC, the ‘1% normalised’ concentration would be the measured concentration divided by 2, (ii) 0.5% OC, then the 1% normalised value is the measured value divided by 0.5, (iii) 0.15% OC, then the 1% normalised value is the measured value divided by the lower limit of 0.2.

d) Basis of revision is described in Appendix A2.

e) The SQGV and SQG-High values for total PAHs (sum of PAHs) are described in Appendix A3 and include the 18 parent PAHs: naphthalene, acenaphthylene, acenaphthene, fluorene, anthracene, phenanthrene, fluoranthene, pyrene, benzo[a]anthracene, chrysene, benzo(a)pyrene, perylene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(e)pyrene, benzo(ghi)perylene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. Where non-ionic organic contaminants like PAHs are the dominant chemicals of potential concern (COPCs), the use of ESB approach is desirable, and is applied as outlined in Appendix A3, that includes a further 16 alkylated PAHs (generally listed as C1-/C2-/C3-/C4-alkylated).

f) Where dieldrin or endrin are the major COPCs, it is recommended that ESB approaches are applied as described in the Appendix A4.

g) Origin described in the Appendix A5.

The approach and methodology used in the derivation of the above Guideline Values and information about the use of the above Recommended Guideline Trigger Values, SOG-High etc. can be found in the following publication; Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines CSIRO Land and Water Science Report 08/07, May 2013.

1. Marine Discharge Quality

**Note that NEOM will not allow any discharge of treated wastewater to marine waters.**

The KSA marine discharge quality standards are shown in Table A15 below.

Table A15: KSA Prescribed Concentrations and Values – Discharge Limits for Effluents prior to Discharge into Marine Waters

| Parameter | Unit | Limit‘Marine’ Red Sea | Limit‘Eco-sensitive’ Red Sea | Limit‘Industrial’ Red Sea |
| --- | --- | --- | --- | --- |
| Important Note\* |
| *Physical chemistry* |
| Coarse Material |  | Absent | Absent | Absent |
| Temperature | Δ°C(from ambient) | 7 | 5 | 7 |
| pH | pH units | 6-9.5 | 7.5-9 | 6-10 |
| TDS | mg/l | - | - | - |
| Turbidity | NTU | 50 | 5 | 75 |
| TSS | mg/l | 15 | 10 | 15 |
| *Indicators* |
| BOD5 | mg/l | 25 | 10 | 25 |
| COD | mg/l | 150 | 50 | 150 |
| Total Oil & Grease1 | mg/l | 5 | 2 | 7 |
| TKN (organic N) | mg/l | 5 | 5 | 10 |
| TOC | mg/l | 50 | 40 | 50 |
| Phosphorus (total) | mg/l | 2 | 1 | 5 |
| Phosphate (PO4)3- | mg/l | 0.8 | 0.5 | 1 |
| Ammonia (as NH3) | mg/l | 1 | 1 | 3 |
| Chloride (as Cl) | mg/l | - | - | - |
| Total inorganic nitrogen (as N02 and N03) | mg/l | - | - | - |
| Sodium | mg/l | 800 | 800 | 800 |
| Sulfate | mg/l | 600 | 600 | 1000 |
| Sulfide | mg/l | 0.2 | 0.2 | 1.0 |
| *Heavy Metals* |  |  |
| Aluminum | mg/l | 10 | 5 | 15 |
| Arsenic | mg/l | 0.3 | 0.05 | 0.5 |
| Barium | mg/l | 2 | 1 | 2 |
| Cadmium | mg/l | 0.02 | 0.005 | 0.05 |
| Chromium (total) | mg/l | 0.5 | 0.01 | 0.5 |
| Chromium (hexavalent) | mg/l | 0.1 | 0.05 | 0.1 |
| Cobalt | mg/l | 0.2 | 0.05 | 0.2 |
| Copper | mg/l | 0.2 | 0.2 | 0.5 |
| Iron | mg/l | 5 | 5 | 10 |
| Lead | mg/l | 0.1 | 0.1 | 0.5 |
| Manganese | mg/l | 0.5 | 0.2 | 1 |
| Mercury | mg/l | 0.005 | 0.001 | 0.1 |
| Nickel | mg/l | 0.5 | 0.2 | 1 |
| Silver | mg/l | 0.3 | 0.3 | 0.5 |
| Zinc | mg/l | 3 | 2 | 5 |
| *Organics and Inorganics* |
| Benzene | mg/l | 0.05 | 0.05 | 0.1 |
| Carbon tetrachloride | mg/l | 0.02 | 0.02 | 0.04 |
| Chlorine (residual) | mg/l | 0.2 | 0.1 | 0.3 |
| Chlorinated hydrocarbons (total) | mg/l | 0.5 | 0.1 | 0.5 |
| Chloroform | mg/l |  | - |  |
| Cyanide (free) | mg/l | 0.05 | 0.05 | 0.1 |
| Fluoride | mg/l | 25 | 15 | 25 |
| Furans2 | mg/l | 0.01 | 0.01 | 0.01 |
| Hexachlorobenzene | mg/l | 0.01 | 0.01 | 0.01 |
| Lindane | mg/l | 0.01 | 0.01 | 0.01 |
| Mirex | mg/l | 0.01 | 0.01 | 0.01 |
| MTBE | mg/l | 0.01 | 0.01 | 0.01 |
| PAH | mg/l | 0.01 | 0.01 | 0.05 |
| PCBs | mg/l | 0.01 | 0.01 | 0.01 |
| Pentachlorophenol | mg/l | - | - | - |
| Pesticides and insecticides (total) | mg/l | 0.05 | 0.05 | 0.05 |
| - Aldrin | mg/l | 0.01 | 0.01 | 0.01 |
| - Chlordane | mg/l | 0.01 | 0.01 | 0.01 |
| -DDT | mg/l | 0.01 | 0.01 | 0.01 |
| - Dieldrin | mg/l | 0.01 | 0.01 | 0.01 |
| - Endrin | mg/l | 0.002 | 0.002 | 0.002 |
| - Heptachlor | mg/l | 0.01 | 0.01 | 0.01 |
| - Toxaphene | mg/l | 0.01 | 0.01 | 0.01 |
| Phenols | mg/l | 0.1 | 0.1 | 1 |
| Dioxins3 | mg/l | 0.01 | 0.01 | 0.01 |
| Toluene | mg/l | - | - | - |
| TPH | mg/l | 5 | 5 | 10 |
| Vinyl chloride | mg/l | 0.02 | 0.02 | 0.1 |
| Xylenes | mg/l | 0.05 | 0.05 | 1 |
| *Microbiological* |
| E coli / Total Coliforms | count/100ml | 2500 | 2000 | 3000 |

Notes:

\* Consideration should be given to areas of natural high TDS. Any substance other than those mentioned in the above table may not be discharged at a concentration greater than 0.001mg/l unless agreed in advance with the Competent Agency or receiving treatment works.

1) No sheen should be visible within the mixing zone.

2) Chlorodibenzo-furan cogeners.

3) Chlorodibenzo-p-dioxin and tetrachlorodibenzo-p-dioxin congeners.

1. Execution Plans

The Execution Plans attached to the ESMP must be those listed in Table 1-1.

1. Waste Management Plan

The Waste Management Plan shall set out how Contractors shall avoid or minimise the production of waste, and outline requirements for waste segregation, storage, handling, collection, transport and disposal.

The Waste Management Plan shall be developed to align with the NEOM Waste Management Procedure (NEOM-NEV-PRC-706) and shall include:

*A detailed description and estimation of all expected waste streams, classes and volumes for the works*

*Procedures to ensure waste generation is minimised as much as possible, that good housekeeping is maintained and no litter is present on the site, and that any hazardous waste generated is collected, stored, transported and disposed of in accordance with relevant laws.*

1. Environmental and Social Emergency Response Plan

The Environmental and Social Emergency Response Plan (ERP) shall outline the capabilities and actions for responding to environmental and social emergencies during the works.

The ERP shall define the probable worse-case environmental and social emergency scenarios that could potentially occur during the works including, but not limited to:

*Major spill of chemicals, hydrocarbons or untreated wastewater to land (including groundwater) or marine waters*

*Release of noxious or toxic air emissions, gases, aerosols or vapours*

*Disease outbreak or introduction of an invasive species to land or water.*

The ERP shall also cover the following as a minimum:

*Emergency Response Team organization and personnel*

*Roles and responsibilities*

*Emergency contact details including an emergency line/contact that is available 24 hours per day, seven days per week*

*Personnel and equipment available for immediate response actions*

*Personnel, equipment and other resources available on call for response escalation purposes*

*Response actions to be taken*

*Emergency reporting protocol including immediate, daily and ongoing reporting*

*Emergency response training, exercises and drills*

*Records that must be maintained during a response.*

The EERP shall also be in line with GAMEP Environmental Standard "Prevention of Major Accidents".

The EERP should also include identification of potential spill scenarios, procedures for responding to spills of oil, fuels and hazardous materials, fire and explosion, information on spill response equipment available on-site, roles and responsibilities of spill response personnel, containment, clean-up and disposal measures for contaminated material, and communication protocol with outside emergency personnel/agency. In addition, the EERP should include site evacuation procedures in event of large-scale emergencies such as fire, explosion and large release of hazardous material and should establish documented procedures for root cause analysis, devising preventive and corrective actions.