



NEOM INTERIM ENVIRONMENTAL STANDARD

نيوم NEOM

Restricted Materials



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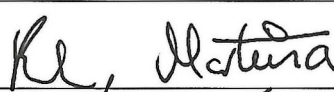
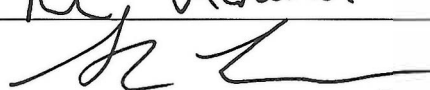
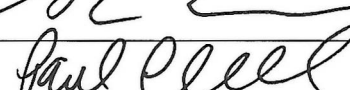
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Approvals

The document requires the following approvals:

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Distribution

This document has been formally distributed to:

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ENVIRONMENTALLY HAZARDOUS MATERIALS GUIDELINE

PART 1 INTRODUCTION

Sustainability is one of the core visions of NEOM, and each party involved in the project shares the responsibility for achieving targets related to sustainability.

The NEOM Environment Department (NED) is responsible for developing NEOM's sustainability policies and procedures, establishing NEOM-wide sustainability targets (and performance measures), and providing overarching compliance auditing and reporting for NEOM at a corporate level.

This NEOM Environmentally Hazardous Materials Guideline is part of the NEOM-wide Sustainability Standard. It will be reviewed and updated, as and when required. This Guideline is intended to reduce the environmental impacts of harmful substances, materials and products to air quality, environment and human health.

The building material selection has a significant contribution to the environmental impact and performance, not only during the construction, but also during the operation and end of life of a project. The NEOM Environmentally Hazardous Materials Guideline is intended to provide guidance for Designers, Contractors and Operation teams for the construction and maintenance of the NEOM development components. Operational materials will be added at a later stage.

This Guideline is mandatory and must be implemented on all NEOM projects to eliminate hazardous materials.

PART 2 GENERAL

2.1 SUMMARY

- A. NEOM's Sustainability vision is to lead the change to city scale Circular Economy. Circular Economy is fostered by designing out waste and pollution from the onset of the project. NEOM also considers potential contribution to Climate Change. Hence it is important to review the Embodied Carbon and environmental footprint as part of the material selection process. NEOM aims to keep products and materials in long use within the development, and to maintain their value.
- B. NEOM's Environmentally Hazardous Materials Guideline shall support sustainable supply chain management and material selection processes during design, construction and operation to minimize potentially harmful waste during construction, maintenance, or operation of the development. This document shall encourage a whole-life-cycle approach and enable a circular economic transition.
- C. This Guideline includes requirements related to restricted materials at NEOM. Adherence to the requirements of the NEOM Environmentally Hazardous Materials Guideline is mandatory for all temporary and permanent projects for the NEOM Development. Designers and Contractors are encouraged to contribute to innovative sustainable practices and approaches to delivering the project and work using environmentally conscious materials and products. We invite you to engage with us on this ongoing work to unlock the economic, social, and environmental benefits that a circular economy can bring to NEOM, the Kingdom of Saudi Arabia, and the wider region. We highly value ideas that initiate innovation, cross-sectoral collaboration, and new material solutions.
- D. This document does not replace or supersede the contract scope of work, applicable codes and regulations standards, which take precedence in the event of any conflict with this guidance document.

2.2 MATERIAL SELECTION

- A. The careful selection of building materials is a critical component of sustainable design. The wide range of extraction, processing and transportation steps to deliver a material from its raw constituents to its application in a finished building involve activities that may pollute the air, water and soil, destroy natural habitats, and deplete finite natural resources. NEOM therefore encourages the use of materials that minimize the depletion of finite natural resources and use of virgin material; materials



that apply a cradle-to-cradle and circular economy approach, are durable, adaptable, modular, and are easy to maintain and repurpose. Materials shall be locally sourced to minimize emissions and impacts from transport. Materials shall ideally be from renewable feedstock, reusable, compostable, or recyclable. Upcycling potential should be prioritized over downcycling or disposal. Potentially harmful ingredients can carry risks for people in the sourcing, manufacturing, use, and disposal stage, as well as to the environment. They shall be identified and avoided at the project design stage to reduce risks and eliminate potentially hazardous waste.

- B. Materials play a critical role in the indoor air quality of the finished building. Specifying materials that release no or fewer harmful chemicals into the building's indoor environment is a simple, practical, and cost-effective method of preventing exposure of building occupants to these substances. This also minimizes the exposure to toxins for laborer during the construction application or maintenance.
- C. Materials selection during design sets up the pathway for procurement and installation of materials during construction, their durability, maintenance requirements, decommissioning and subsequent disassembly and reclamation for re-use, recycling or responsible disposal.
- D. The NEOM Environmentally Hazardous Materials Guideline provides guidance on those materials that are restricted and should not be used on the NEOM project without obtaining prior permission from the Environment Department. If in doubt about a material's eligibility or credentials, ask the NEOM Environmental Department. The NEOM Environmentally Hazardous Materials Guideline will evolve over time and it is therefore important to ensure that the most current version is being utilized. Not all harmful materials or substances may currently be restricted or captured in this Guideline; these materials are not necessarily deemed sustainable or environmentally-friendly. The NEOM Environmental Department welcomes recommendations for additions to the NEOM Environmentally Hazardous Materials Guideline (environment@NEOM.COM) Environmentally Hazardous Materials are listed in alphabetical order, not based on toxicity levels, or other qualitative or quantitative priorities.

PART 3 MATERIALS

3.1 NEOM ENVIRONMENTALLY HAZARDOUS MATERIALS

Material	Category	Reason for restriction	Examples of uses or application (not exhaustive)	Exemption	Reference (for guidance and additional info)
Aluminium (virgin)	Metals	Greenhouse Gases. Processing of aluminium requires tremendous energy. There are environmental impacts associated with each stage of aluminium production, from extraction to processing.	a. Vehicle production b. Electrical distribution (Power lines) c. Cladding d. Roofing e. Signs	Use aluminium with high recycled content instead.	https://enviroliteracy.org/special-features/its-elementary/aluminum/ http://www.world-aluminium.org/publications/tagged/life%20cycle/
Animal products from rare or endangered species (CITES listed species)	Plant and animal products	Legally protected species under CITES 1, 2 3 lists	Building or ornamental products from rare or endangered species (CITES listed species)		http://www.cites.org/
Asbestos (including materials)	Minerals	When asbestos fibres are inhaled, they may stay in the lungs for a very long time,	a. Insulators b. Fillers		https://www.epa.gov/asbestos



Material	Category	Reason for restriction	Examples of uses or application (not exhaustive)	Exemption	Reference (for guidance and additional info)
containing asbestos)		causing inflammation and eventually some very serious diseases, including cancer.			
Azo compounds (dyes)	Chemicals	Toxicity	a. Pigments used for the parts of products contacting human skin continuously		http://en.wikipedia.org/wiki/Diazo_dye
Benzene	Chemicals	Toxicity	a. Paints b. Plastics c. Rubber d. Ink		http://www.npi.gov.au/resource/benzene-0
Bitumen	Chemicals	Toxicity. Most bitumen contains Sulphur and several heavy metals such as nickel, vanadium, lead, chromium, mercury and also arsenic, selenium, and other toxic elements.	a. Primarily used for paving roads, b. Waterproofing products including the use of bitumen in the production of roofing felt and for sealing flat roofs.	a. Bitumen is acceptable for paving roads and runways in the interim, alternative solutions shall be tested and implemented soon. b. Bitumen is acceptable for below ground waterproofing in the interim, alternative solutions shall be tested and implemented soon.	http://en.wikipedia.org/wiki/Bitumen
Brominated organic compounds- Polybrominated biphenyls (PBB)	Chemicals	Toxicity	a. Flame retardants contained in plastics.		http://www.npi.gov.au/resource/biphenyl-11-biphenyl http://www.inchem.org/documents/ehc/ehc/ehc152.htm
Brominated organic compounds- Polybrominated Diphenylethers (PBDE)	Chemicals	Toxicity	a. Flame retardants contained in plastics.		http://www.epa.gov/oppt/pbde/ https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/polybrominated-diphenyl-ethers-pbdes
Cadmium and cadmium compounds	Chemicals	Toxicity	a. Paints, inks b. Packing parts c. Stabilizers, pigments, or dyes used for plastics (including rubber and the outer	Specialized items in the infrastructure application might require to be looked at in more detail in collaboration with	http://www.npi.gov.au/resource/cadmium-and-compounds



Material	Category	Reason for restriction	Examples of uses or application (not exhaustive)	Exemption	Reference (for guidance and additional info)
			plastic resins of electrical parts), d. Surface treatment, coating. e. Batteries	the Environment Department.	
CFCs	Chemicals	Ozone depleting	a. Aerosol cans		https://www.epa.gov/ozone-layer-protection#cfc
Chlorine (Gas)	Chemical	Toxicity	Water and Wastewater Treatment Plants		https://www.watersonline.com/doc/why-all-the-hype-about-chlorine-gas-safety-0001
Chlorinated paraffins (CP) Short-chain chlorinated paraffins with C = 10 - 13 and Cl >= 50% by weight.	Chemicals	Toxicity	a. Printed circuit boards		https://en.wikipedia.org/wiki/Chlorinated_paraffins
Chrome	Metals	Toxicity	a. Dyes & Paints b. Plating of Metals c. Forming of alloys d. Bricks for lining furnaces	b. Manufacturing shall meet EU standards and regulations	https://www.atsdr.cdc.gov/toxfaqs/tfacts7.pdf http://www.npi.gov.au/resource/chromium-vi-compounds
Cobalt	Minerals	Toxicity	a. Varnishes b. Paints c. Wear-resistant alloys		http://www.npi.gov.au/resource/cobalt-and-compounds
Concrete (without recycled content)	Composite (mineral based)	High environmental burden from extraction and disposal. Concrete shall include a minimum of 20% recycled content to reduce the environmental footprint and impact on Climate Change. Recycled content could be included in form of cement replacements with waste or manufacturing by-products such as GGBS or fly ash, or in form of recycled aggregate.	a. Structures from Ready-mix concrete b. Precast concrete elements c. Cladding panels, decorative elements	a. Concrete with a minimum of 20% recycled content	https://www.bbc.com/news/science-environment-46455844 https://en.wikipedia.org/wiki/Environmental_impact_of_concrete



Material	Category	Reason for restriction	Examples of uses or application (not exhaustive)	Exemption	Reference (for guidance and additional info)
Copper (virgin)	Metals	Copper is recyclable and can be obtained from recycled sources, however, sourcing must be done carefully	a. Plumbing b. Roofing c. Façade		http://www.npi.gov.au/resource/copper-and-compounds http://en.wikipedia.org/wiki/Copper
Corals (living, recently dead, and fossil)	Plant and animal products	Listed as Globally Threatened by the International Union for the Conservation of Nature (IUCN)	a. Building or ornamental products from corals b. Building, infill or dredge material and limestone deposits with extinct species of corals and other marine invertebrates c. Jewellery and lapidary articles		https://www.cites.org/ https://www.iucnredlist.org/
Dichloromethane	Chemicals	Toxicity	a. Solvents b. Blowing agents c. Paint Strippers		http://www.npi.gov.au/resource/dichloromethane
Expanded Polystyrene (EPS)	Chemicals	Expanded polystyrene is not easily recyclable because of its light weight and low scrap value. Expanded polystyrene foam takes a very long time to decompose in the environment. It can harm wildlife and marine life if consumed. It is also a principle component of marine debris. Expanded polystyrene used to contain CFCs.	a. Insulation materials b. Packaging materials	a. EPS and XEPS insulation is acceptable if no ozone depleting substances within the blowing agents are used and if a take-back/ recycling policy is in place from the supplier/ manufacturer.	https://www.epa.gov/snap/substitutes-polystyrene-extruded-sheet
Extruded Polystyrene (XEPS)	Chemicals	Greenhouse Gases	a. Insulation materials	a. EPS and XEPS insulation is acceptable if no ozone depleting substances within the blowing agents are used and if a take-back/ recycling policy is in place from the supplier/ manufacturer.	https://www.epa.gov/snap/substitutes-polystyrene-extruded-sheet
Glass fiber reinforced concrete (GRC)	Mineral based Composite	Environmental burden from disposal. GRC is difficult to recycle and reuse due to potential	a. Cladding panels b. Decorative elements c. Furniture	a. In structural elements with special environmental requirements, if a	



Material	Category	Reason for restriction	Examples of uses or application (not exhaustive)	Exemption	Reference (for guidance and additional info)
		health impacts from the glass fibers.		take-back/ recycling policy and procedure is in place from the supplier/ manufacturer.	
Granite (natural)	Minerals	Environmental damage from extraction is a concern, however reconstituted/recycled material is acceptable.	a. Furnishings b. Structural Material c. Countertops	Use of natural stone with a verified and approved EIA and quarry specific environmental management policy & procedure.	https://www.epa.gov/radiation/granite-countertops-and-radiation
Halons	Chemicals	Ozone depleting	a. Fire extinguishers		https://www.epa.gov/snap/substitutes-fire-suppression-and-explosion-protection
HCFCs	Chemicals	Ozone depleting (though less than CFCs) and Greenhouse Gas (IPCC 2007)	a. Aerosol cans b. Blowing Agents (e.g. insulation) c. Refrigerant		https://www.epa.gov/ozone-layer-protection/international-treaties-and-cooperation-about-protection-stratospheric-ozone https://www.epa.gov/ods-phaseout/trade-ban-rule-hcfc
Hexavalent chromium compounds	Chemicals	Toxicity	a. Packing parts.		http://www.osha.gov/SLTC/hexavalent-chromium/index.html
HFC	Chemicals	Ozone depleting (though less than CFCs) and Greenhouse Gas (IPCC 2007). Montreal Protocol on Substances that Deplete the Ozone Layer (and Kigali Amendment) agreed on a roadmap to phase down HFC; developed countries started with a freeze in 2019; the EU introduced regulations in 2014. HFC should be avoided where possible to reduce impacts and costs from phase out.	a. Refrigerants b. Aerosol propellants c. Foam and insulation blowing agents d. Fire extinguishing agents	To be discussed with Environment Department	https://ozone.unep.org/treaties/montreal-protocol



Material	Category	Reason for restriction	Examples of uses or application (not exhaustive)	Exemption	Reference (for guidance and additional info)
Lead	Metals	Toxicity	a. Lead based paints		http://www.npi.gov.au/resource/lead-compounds https://www.epa.gov/lead
Lead and lead compounds in plastics	Metals	Toxicity	a. Heat stabilizer		https://www.turi.org/TURI_Publications/TURI_Chemical_Fact_Sheets/Lead_Fact_Sheet/Lead_Fact_Sheet
Lead compounds (including lead acetate, lead nitrate, lead sulphate)	Metals	Toxicity	a. Drying agent in paints and varnishes		http://www.npi.gov.au/resource/lead-compounds
Lead in glass, ceramics, copper, aluminium or steel	Metals	Toxicity	a. Spark plugs		http://www.npi.gov.au/resource/lead-compounds
Lead, metallic lead and lead alloys	Metals	Metallic lead and lead alloys are not banned substances, but their use and concentrations are regulated pursuant to directives issued by government bodies. Metallic lead and lead alloys are materials that contain only elemental lead or lead alloyed only with other metallic elements or carbon.	a. Bearings b. Brass & Bronze c. Solder		http://www.npi.gov.au/resource/lead-compounds
Limestone	Minerals	Environmental damage from extraction is a concern, however reconstituted/recycled material is acceptable.	a. Cement & Mortar b. Quicklime c. Aggregate d. Building stone e. Fertilizer	Use of natural stone with a verified and approved EIA and quarry specific environmental management policy & procedure. Suitable quarry locations within short distance to NEOM project sites will be identified by the Environment Department.	
Marble (natural)	Minerals	Environmental damage from extraction is a	a. Structural material	Use of natural stone with a verified and	



Material	Category	Reason for restriction	Examples of uses or application (not exhaustive)	Exemption	Reference (for guidance and additional info)
		concern, however reconstituted/recycled material is acceptable.	b. Flooring c. Countertops	approved EIA and quarry specific environmental management policy & procedure.	
Mercury and mercury compounds	Chemicals	Toxicity	a. Packing parts b. Paints, pigments, inks	Mercury is acceptable in lighting when accompanied by a mercury removing and storage policy, accompanied by the required equipment.	http://www.npi.gov.au/resource/mercury-compounds https://www.epa.gov/mercury
Mirex (Chlordecone)	Chemicals	Toxicity	a. Pesticide b. Flame retardants contained in plastic, rubber, paints and electrical goods		https://www.atsdr.cdc.gov/ToxProfiles/tpp.asp?id=1190&tid=276
Organic tin compounds (tributyl tin compounds, triphenyl tin compounds)	Chemicals	Toxicity	a. Paints & inks b. Preservatives & fungicides		http://www.npi.gov.au/resource/organic-tin-compounds https://www.who.int/ipcs/publications/cicad/cicad_65_web_version.pdf
Phosphates in detergents	Household products	Excess Phosphate in wastewater can't be guaranteed to be removed by the Treatment plants and may accumulate in the environment leading to increased risk of Algae blooms	Dishwasher and Washing Power Detergents.	To within limits specified	https://chemicalwatch.com/9082/eu-member-states-agree-phosphate-detergents-ban
Plant products from rare or endangered species (CITES listed species)	Plant and animal products	Legally protected species under CITES 1, 2 3 lists	Building or ornamental products from rare or endangered species (CITES listed species)		http://www.cites.org/
Polychlorinated biphenyls (PCB)	Chemicals	Toxicity	a. Adhesives b. Carbonless copy paper c. Coolants and insulating fluids for transformers and capacitors d. Cutting oils e. De-dusting agents f. Flame retardants g. Hydraulic fluids		http://www.npi.gov.au/resource/polychlorinated-biphenyls-pcbs



Material	Category	Reason for restriction	Examples of uses or application (not exhaustive)	Exemption	Reference (for guidance and additional info)
			h. Paints i. Pesticide extenders j. Sealants (used in caulking, and other uses) k. Stabilizing additives in flexible PVC coatings of electrical wiring and electronic components l. Wood floor finishes		
Polychlorinated naphthalenes (PCN)	Chemicals	Toxicity	a. Rubber and Plastics additive b. Wood preservative c. Insulating coating for electric wire		http://www.unece.org/fileadmin/DAM/env/lrtap/TaskForce/popsxg/2005/EU%20polychlorinated%20naphthalenes.pdf
Polychlorinated terphenyls (PCT)	Chemicals	Toxicity - Bioaccumulative	a. Lubricants b. Plasticisers c. Hydraulic Fluids d. Waxes (Metal parts)		http://ec.europa.eu/environment/waste/pCBS/index.htm
PVC and uPVC	Chemicals	Toxicity. From its manufacture to its disposal, PVC emits toxic compounds. During the manufacture of the building block ingredients of PVC (such as vinyl chloride monomer) dioxin and other persistent pollutants are emitted into the air, water and land, which present both acute and chronic health hazards. During use, PVC products can leach toxic additives, for example flooring can release softeners called phthalates. PVC can be recycled but is difficult due to the high level of chlorine within PVC.	a. Cladding and roofing membranes b. Fencing c. Flooring and wall coverings d. Heavy duty flooring e. Pipes and ducts f. PVC for labelling pipes g. Warehouse roller doors h. Window and door profiles i. Wiring and cable insulation	e. PVC is acceptable for temporary construction use in dewatering under the condition that these pipes are used multiple times and recycled/ disposed of in the correct manner at the end of their life.	https://www.ecowatch.com/why-you-should-avoid-pvc-products-1881927242.html http://chej.org/polyvinyl-chloride-pvc/
Radioactive Substances	Chemicals	Toxicity.	a. Smoke detectors b. Naturally occurring		https://www.epa.gov/radtown/natural-



Material	Category	Reason for restriction	Examples of uses or application (not exhaustive)	Exemption	Reference (for guidance and additional info)
			radioactivity in rocks		radioactivity-building-materials https://www.epa.gov/radiation/technologically-enhanced-naturally-occurring-radioactive-materials-tenorm
Rayon	Wood products	Rayon, made from wood pulp, and rayon mills are huge consumers of rainforest resources, and puts pressure on old growth forests. Depends on sourcing of raw materials.	a. Soft furnishings b. Fabric		https://www.greenchoices.org/green-living/clothes/environmental-impacts
SF6	Chemicals	Green House Gas (GHG) issue	a. Electrical switch insulation	Exception only if an adequate SF6 management Plan is available which looks at deterioration and maintenance strategies of such a system for high-voltage circuit breakers.	https://www.epa.gov/sites/production/files/2017-02/documents/glaubitiz_presentation_2017_workshop.pdf https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1561387775026&uri=CELEX:32015R2066
Slates	Minerals	Environmental damage from extraction is a concern, however reconstituted/recycled material is acceptable.	a. Structural material b. Flooring c. Countertops	Use of natural stone with a verified and approved EIA and quarry specific environmental management policy & procedure.	
Stones	Minerals	Environmental damage from extraction is a concern, however reconstituted/recycled material is acceptable.	a. Aggregate b. Building material	Use of natural stone with a verified and approved EIA and quarry specific environmental management policy & procedure. Suitable quarry locations within short distance to NEOM project sites will be identified by the Environment Department.	http://www.stonefed.org.uk/index.php?page=publications
Timber (Non-sustainable forestry products)	Plant and animal products - Wood products	Depletion of rainforest environment from harvesting activities; purchase increases market pressure for exotic hardwoods and	a. Architectural woodwork b. Finish carpentry c. Heavy timber construction	Other certification organizations will be assessed and are subject to approval by the	https://www.fsc.org/ https://www.pefc.org/



Material	Category	Reason for restriction	Examples of uses or application (not exhaustive)	Exemption	Reference (for guidance and additional info)
		thus incentivizes clearing. Ensure all wood-based materials are produced from wood obtained from certified forests with either FSC or PEFC-accredited certification body to comply with FSC STD-01-001 (FSC Principles and Criteria for Forest Stewardship) or PEFC ST 1003 (Sustainable Forest Management Requirements). All non-sustainable products brought on to site shall be immediately removed and replaced with certified sustainable supplies at the contractors' sole cost. Formwork and scaffolding are often the main culprits brought onto site without proper paper documentation to demonstrate that they have come from sustainable sources.	d. Metal-plate-connected wood trusses e. Miscellaneous carpentry f. Rough carpentry g. Structural glued-laminated timber h. Wood decking i. Wood flooring j. Wood lockers k. Wood cladding and panelling l. Wood veneer wall covering m. Formwork	Environment Department.	
Tributyltin (TBT)	Chemicals	TBT slowly leaches out into the marine environment where it is highly toxic toward nontarget organisms.	TBT is used as an anti-fouling agent in paint, applied to the hulls of ocean-going vessels		https://en.wikipedia.org/wiki/Tributyltin http://www.panda.org/?145704/tributyltin-canned
Trihalomethane (THM's)	Chemicals	They are Cancer Group B carcinogens (shown to cause cancer in laboratory animals).	Solvents and refrigerants		https://water-research.net/index.php/trihalomethanes-disinfection
Urea-formaldehyde resins & adhesives	Chemicals	Formaldehyde is carcinogenic and an irritant to people when presented in high concentration.	Commonly used in composite wood and agrifiber products. Urea formaldehyde in glues may emit formaldehyde at room temperature		https://www.epa.gov/formaldehyde http://www.npi.gov.au/resource/formaldehyde-methylaldehyde



Material	Category	Reason for restriction	Examples of uses or application (not exhaustive)	Exemption	Reference (for guidance and additional info)
Volatile Organic Compounds (VOCs)	Chemicals	VOCs react with sunlight and nitrogen oxides in the atmosphere to form ground-level ozone, a chemical with detrimental effects on human health and ecosystems. Ozone damages lung tissue, reduces lung function, and sensitizes lungs to other irritants.	a. Adhesives b. Bituminous coatings and mastics c. Carpet systems d. Concrete curing and sealing compounds e. Fire-retardant f. Form release compounds g. Paints and coatings, including lacquers, primers & undercoats, and rusting proofings h. Sealants i. Water proofing sealers j. Wood preservatives	A special guidance will be provided on maximum acceptable VOC levels per product type. Kindly refer to LEED v4 EQ credit Low-Emitting Materials for now.	https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality
Water	Chemicals	Shortage of naturally occurring potable ground water, potential depletion and contamination of aquifers, environmental damage from extraction is a concern, however desalinated water from approved sources is acceptable.	a. Ingredient in manufacturing processes b. Cooling water c. Construction activities like dust suppression, concrete curing d. Human consumption	Water source approved by NEOM Environmental department.	

3.2 VOC LEVELS IN MATERIALS

- A. Kindly refer to LEED v4 EQ credit Low-Emitting Materials until further guidance is provided.

3.3 FUTURE PHASE OUT PLAN FOR MATERIALS

- A. Kindly refer to Cradle to Cradle Certified^{CM} Product Standard ‘Banned Lists of Chemicals’ for chemicals that could be phased out in the future.

END OF DOCUMENT