Non-Technical Summary – Sub-Project 6
Engineering, Procurement and Construction (EPC)
Duqm Refinery Service Corridor to Liquid Jetty.

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ACRONYMS

AAQMS	Ambient Air Quality Monitoring Station
ALARP	As Low As Reasonable Practice
BAT	Best Available Technique
CO	Carbon Monoxide
CO2	Carbon Di Oxide
CSR	Corporate Social Responsibility
DG	Diesel Generator
DGEA	Directorate General of Environmental Affairs
EBR	Environmental Baseline Report
EIA	Environmental Impact Assessment
EIPPCB	European Integrated Pollution Prevention and Control Bureau
EMP	Environmental Management Plan
GHG	Greenhouse Gas
GM	Grievance Mechanism
IUCN	International Union for the Conservation of Nature and Natural Resources
MD	Ministerial Decisions
MECA	Ministry of Environment and Climate Affairs
NEO	National Engineering Office
NOx	Oxides of Nitrogen
NTS	Non-Technical Summary
PDD	Partnership and Development Department
PM	Particulate Matter
PMC	Project Management Contractor
QBG	Qurum Business Group
RD	Royal Decrees
ROP	Royal Omani Police
SEZAD	Special Economic Zone Authority
SEZD	Duqm Special Economic Zone
SO2	Sulphur Di Oxide
SPMT	Self-Propelled Modular Transport
USC	Utility Service Corridor
VOC	Volatile Organic Compounds

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1 INTRODUCTION

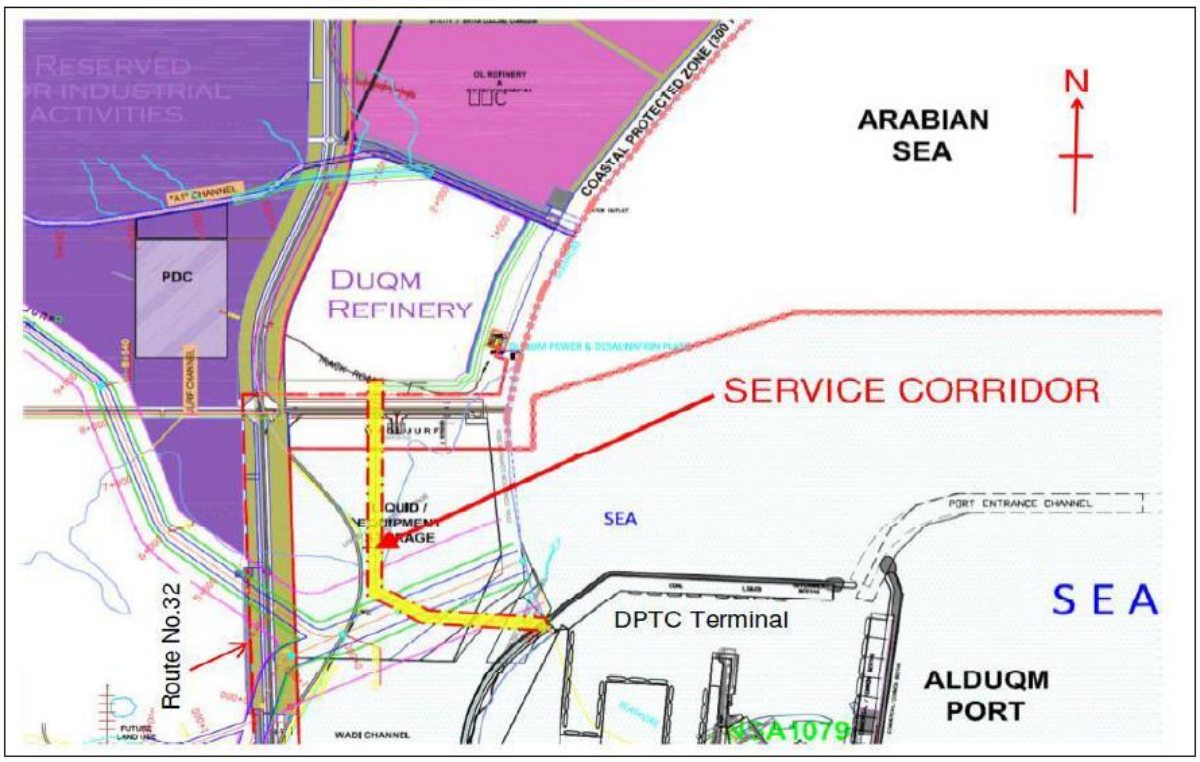
With a land area of 2,000 km2 and 70 km of coastline along the Arabian Sea, the Duqm Special Economic Zone (SEZD) is the largest in the Middle East and North Africa region and ranks among the largest in the world. The Duqm SEZ is a model of an integrated economic development composed of zones: a sea port, industrial area, new town, fishing harbour, tourist zone, a logistics centre and an education and training zone, all of which are supported by a multimodal transport system that connects it with nearby regions (e.g., the Arabian Gulf countries, Middle East, East Africa and Southeast Asia). The Port of Duqm is seen as a catalyst for the development of the Al Wusta region, in particularly, the Special Economic Zone at Duqm. The Port and the dry docks are being developed to increase cargo transhipments, ship repairs, manufacturing industry and tourism.

The Special Economic Zone is administered, regulated and developed by the Duqm Special Economic Zone Authority (SEZAD), a financially and administratively independent government entity. SEZAD was established as per the provision of the Royal Decree (RD) 119/2011 and is responsible for the management, regulation, and development of all economic activity in the SEZD.

1.1 PROJECT BACKGROUND – SERVICE UTILITY CORRIDOR PROJECT

Background of this project involves the construction of service infrastructure corridor of 37.2m (plus 50.3m at loop location) wide and 6 kilometres in length. The purpose of the Service Corridor is to allow Duqm Refinery to lay their product export pipelines from Refinery to the liquid jetty. The service corridor infrastructure will include pipelines, pipe supports, pipe sleepers, pipe bridges, service roads, etc. The project timeline of Service Utility Corridor Project shown below:

PROJECT	CONTRACT NO	ORIGINAL PROJECT EXECUTION PROGRAMME	CONTRACTOR	EXPECTED DATE OF COMPLETION
Service Utility Corridor Project	C80/2017	18 Months	Qurum Business Group	Q3 2019



Layout for the proposed Service Utility Corridor Project

1.2 ENVIRONMENTAL AND SOCIAL CONTEXT

An Environmental Impact Assessment Study (EIA) has been conducted as part of the SEZAD permitting process for the Service Utility Corridor project by MECA Approved Environmental Consultant - HMR Environmental Engineering Consultants in 2015. National Engineering Office (NEO) was awarded for the design review and construction project management consultant (PMC), while the EPC Contract for the detailed design and construction of the Duqm Refinery service corridor to the liquid jetty was awarded to the joint venture between Qurum Business Group ("QBG") and Patel Engineering Limited ("Patel Ltd."). No stakeholder consultation was conducted as part of the EIA report.

Through SEZAD Corporate Social Responsibility (CSR) section of the Partnership and Development Department (PDD), SEZAD provides access for communities to provide any grievance (written and in person) through the Grievance Mechanism (GM) form. The GM form is available on SEZAD website at https://www.duqm.gov.om/sezad/csr/grievance-form.

The ways grievance can be registered are as follows-

1. **Via Phone** - The Partnership & Development Department (PDD) can be contacted between the hours of operation (8am – 3 pm) Sunday to Wednesday on 24507216.
2. **Via Official Letter** - The Official letter can be directed to the Manager of the Partnership and Development Department and can be dropped of either directly to any one of our offices in DUQM or Muscat
3. **Via Email** - An Email can be sent to the Partnership & Development Department to CSR@duqm.gov.om
4. **Website Portal** - All information regarding the process of the grievance system is available as well as a form that can be filled online and sent directly to the Partnership and Development Department though https://www.duqm.gov.om/sezad/csr/grievance-form

All Grievance issues are handled by the Partnership and Development Department (CSR Section). In the event the department is unable to assist or respond, it will be raised to the Deputy CEO of SEZAD where responses will be answered within a 7 days from the date of the letter/ grievance received, however can change depending on the complexity of the grievance.

1.3 REGULATORY CONTEXT AND STANDARDS

1.3.1 Omani Legislation and Guidance

The proposed Service Utility Corridor Project is located within SEZD. While the SEZAD is the responsible authority for the Duqm SEZ, the Project was implemented in compliance with the "Guidelines on Environmental Impact Assessment" issued by the Omani Directorate General of Environmental Affairs (DGEA) at the Ministry of Environment and Climate Affairs (MECA).

Omani environmental law has two main legal instruments, viz., Royal Decrees (RDs) and Ministerial Decisions (MDs). Typically, an RD provides a general framework relating to a particular area in need of statutory control, while MDs provide specific regulation using the framework provided in the RD. Where Omani environmental regulations and standards were not available, acceptable international environmental regulations and standards has been referenced.

The Service Utility Corridor project will work within with the range of applicable laws and legislation in Oman.

1.4 DOCUMENTATION

The following environmental reports available for Service Utility Corridor project are as follows-

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- Environmental Impact Assessment Report (EIA) (Doc Ref: HMR/4054-EIA-1, July 2015, HMR Environmental Engineering Consultant)
- Environmental Baseline Report (EBR) (Doc Ref: HMR/4054-EBR-1, June 2015, HMR Environmental Engineering Consultant)

All the reports mentioned above are available with SEZAD Environment Regulatory Department and can be accessed on email request to ERD Manager Mr. Ahmed Harib Al Balushi at EMIPS @duqm.gov.om.

1.5 The Purpose And Content Of Non-Technical Summary (NTS)

This NTS provides an overview, in layman's terms, of the main environmental findings from the EIA of the Project. Content of the NTS is summarised below.

- Section 1 introduces about the project background, legal or laws and regulations, environmental and social context.
- Section 2 summarises the baseline conditions of the project.
- Section 3 briefs about the project description
- Section 4 summarises summary of environmental impact assessment and management plan for both the phases i.e. construction & operation
- Section 5 provides the findings and conclusions of the EIA.

It is important to note that this NTS does not, and is not intended to, convey all of the information relating to the aspects and impacts of the Project. Its intention is to present key information, describe the main findings and conclusions, enabling the reader to understand the significant environmental and social effects of the Project without needing to refer to the detailed assessments.

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2 PROJECT DESCRIPTION

2.1 PROJECT COMPONENTS

The Service Corridor Project is located south of Duqm Refinery; starts immediately after the section 4 road drainage channel and ends at the south entrance of the Liquid Jetty. The purpose of the Service Corridor is to allow Duqm Refinery to lay their product export pipelines from Refinery to the liquid jetty.

The Duqm Refinery pipelines within Service Corridor are partly on the ground (laid on the RCC sleepers) and partly elevated (on pipe bridges across the wadi Saay and the Channel. The pipelines from the Duqm Refinery to the entrance to the Service Corridor are buried.

The service corridor comprising of:

- 8m wide RCC Sleeper pipe racks for Phase-1 for product pipelines,
- Horizontal pipe loops at 6 locations for the product pipelines,
- 700m long RCC elevated Pipe Bridge across Wadi Saay;
- 300m wide RCC elevated pipe bridge for storm water drainage channel 5-1,
- 5.2m wide Asphalt Service (Maintenance),
- 5m wide un-surfaced patrol road,
- Provisional 2m wide trench for power cables,
- Provisional underground trench for communication cables,
- Security fencing on either sides in compliance with ROP requirement along with fence lighting,
- Security monitoring system in compliance with ROP.
- Corridor drainage system.

The export products pipelines (LPG, Diesel, Jet Fuel, HSFO, Naphtha) and future crude oil are installed on 8m wide RCC sleepers.

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3 BASELINE CONDITION

3.1 INTRODUCTION

A baseline study is a basic environmental study of the site and its buffer zone (study area) in the environmental impact assessment (EIA) process. Typically, an EIA is carried out in order to anticipate the environmental impacts of the project's activities in advance of its design, construction and implementation.

Comprehensive knowledge of the existing physical, chemical, and biological environmental conditions at the site, the present contamination levels and the environmental sensitivities are crucial not only for the permitting purposes, but also for the planning, design, construction and successful operation of the upcoming works of the service corridor. The baseline study helps to lay a foundation to a well-executed environmental impact assessment, paving the way for understanding the consequences to the environment in the future.

3.2 BASELINE ASSESSMENT SUMMARIES

Summary of the baseline study outlined below for the following environmental aspects was based on both primary and secondary data i.e. desktop assessment and review of the information available from previous studies that has been conducted in SEZD area. The following documents shown below are the secondary data extracted for the baseline studies

- Environmental Baseline Studies for the proposed Duqm Refinery & Petrochemical Industries Company (DRPIC) site (HMR, 2013a);
- Environmental Baseline Studies for Duqm Development and Surroundings for SEZAD (HMR, 2013b; HMR, 2013c; and HMR, 2013d); and
- Environmental Baseline Studies for Duqm Seawater Intake Project (SWIP) for Parsons/ CUC/ SEZAD. (HMR, 2015).
- Comprehensive Design Data Report (Doc No.: 021123-DES-GE-RP-2001, Date 28 Aug 2014, Parsons).
- Port of Duqm, Consultancy for Phase 1 Early Operations Environmental Services, Final Environmental Assessment Report (Rev 03), February 2012, Five Oceans LLC
- Duqm Industrial and Free Zone Masterplan - Final EIA Report, June 2011, Five Oceans LLC
- Climate and Environmental Impact Assessment for Duqm Frontier Town (Phase 1) Development, March 2010, Geo-Resources Consultancy / Coffey Environments

3.2.1 Climate and Meteorology

The climate of Duqm is mainly influenced by the summer and winter monsoons. While the winter winds are relatively gentle, the summer winds are quite vigorous especially during the month of June & July. Rainfall is scanty while the relative humidity along the coast is high.

The historical records for ambient air temperatures at Duqm Port show that the lowest temperatures occur in January with a mean of 20.7◦C and steadily increase to a peak of 31.1◦C in May. From June with the arrival of the summer monsoon, the temperatures begin a steady decline until December. The mean relative humidity is approximately 64% in most months.

Rainfall in Duqm area is low, with the region classified as between arid and hyper arid. However, high intensity storms, capable of producing significant run-off and recharge, occur infrequently at irregular times of the year. Historical rainfall records, for 1983 to 2010, at Duqm Port show that the historical monthly averages illustrate that the highest Mean Rainfall is in the month of December with 2.2 mm and the highest total Maximum Rainfall is 191.0 mm reported for the month of April.

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3.2.2 Topography

The topography of the project area is more or less flat terrain, with low-lying coastal and alluvium wadi plains. During the field surveys, observations of the project site were that, the area is an undeveloped area along the coast with ground surface features comprised of a generally low-lying topography which is relatively flat, with sabkah deposits and wadi coastal deposits that also encompasses mouths of wadis. The sabkah formation along the coastal strip is comprised of clay-silt deposits and fine-grained brown yellow to reddish brown sand with small gypsum crystals. The lagoon area is present in the south-east corner of the study site near to the Lee Breakwater.

3.2.3 Geology

Soils in Oman are usually thin, and thin soils do not provide much attenuation from pollution, and the most vulnerable strata are the un-cemented coarse wadi gravels in active wadi channels and fractured limestone. One of the key environmental management issues for the Duqm Service Corridor Project will be the alterations to ground conditions as surface soils may be disturbed during the construction of the foundations for the pipelines.

The site for the proposed corridor area is covered by sabkha and sand layers with thickness varying across the site. The alluvium consists of sand and gravel, cemented in some places and sandstone was encountered. The surface layer is underlain mainly by marl and marly limestone, and again the thickness of the marl layer varies across the project area.

3.2.4 Soil Quality

Soil samples were collected and analysed as part of baseline study to capture primary information on subsurface conditions within the geotechnical investigations that were carried out. Analytical results for the soils showed no indication of contamination and in particular no evidence of hydrocarbons.

3.2.5 Hydrology

The existing hydraulic condition of the SEZAD area consists of many channels with water flow from the western hilly region towards the sea. However, review of the existing hydrology information for the Project area shows the drainage system is influenced by the fluvial flow of sediments and rock debris during heavy rain, as Wadi Jurf has upper tributaries with numerous braided natural drainage channels.

3.2.6 Ambient Air Quality

Secondary data from previous EIA reports (Environmental Baseline Studies for the proposed Duqm Refinery & Petrochemical Industries Company (DRPIC) site (HMR, 2013a); Environmental Baseline Studies for Duqm Development and Surroundings for SEZAD (HMR, 2013b; HMR, 2013c; and HMR, 2013d) was sourced for comparing the ambient air quality around the project site. A number of ambient air quality monitoring surveys (AAQMS) has been conducted across the SEZD area.

Ambient air quality studies undertaken found that parameters are within the Omani Provisional Standards Limits, excluding O_3 at one location and SO_2 at two locations. Measurements of dust also showed compliance with the Omani Provisional Standards Limits.

3.2.7 Noise

Secondary data from previous EIA reports (Environmental Baseline Studies for the proposed Duqm Refinery & Petrochemical Industries Company (DRPIC) site (HMR, 2013a); Environmental Baseline Studies for Duqm Development and Surroundings for SEZAD (HMR, 2013b; HMR, 2013c; and HMR, 2013d) was sourced for comparing the noise quality around the project site. Noise levels were exceeding the threshold values and limits prescribed in MD 79/94 for industrial areas.

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3.2.8 Terrestrial Ecology

A Terrestrial ecological survey was conducted as part of the EIA study to identify the flora and fauna species present at the project site along with any endemic, threatened or sensitive species. The survey was conducted by walkthrough along the project site in order to identify plant and animal species by visual observation.

A rapid flora and faunal assessment of the project area documented a total of seventeen species of birds representing seven avian families, 16 species of plants representing 14 families were recorded during the survey period, however the taxonomy of most of these species has not yet been assessed for the International Union for the Conservation of Nature (IUCN) red list with the exception of a few species which are in the "least concern" category.

Pugmark of Feral dog's, grazing camels and wild donkeys were observed on the sabkha and coastal lagoon areas. In addition, six species of lizards were also observed across the study area.

3.2.9 Socio Economic

During the Duqm Service Corridor field surveys, and the area of the project site was categorized as predominantly open vacant sabkha land and the remainder is lagoon area and coastal foreshore sands. Limited Stakeholder Consultations were conducted and it was reported that the lagoon area is not utilized by the local community and nor is fishing conducted in this area. During the communications with the fisherman also revealed the same because this area is like a khawr area. The lagoon area is shallow with low biomass of small fingerlings and crabs, therefore no types of fishing occur in this area and as there are no large quantities of fish to yield. The area is mainly used by birds, including migratory birds, as a feeding ground.

3.2.10 Archaeology

Based on environmental baseline studies for the area in vicinity to the Service Corridor it is envisaged that there are no sites of archaeological or cultural interest along the USC (Utility Service Corridor) route and hence there will be no such impacts. However, if any object of cultural / archaeological significance is encountered during excavation, such area will be immediately cordoned off and the construction contractors will inform SEZAD and MHC (Ministry of Heritage & Culture) accordingly to obtain further advice from the Ministry.

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4 SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT PLAN OUTCOMES

4.1 INTRODUCTION

Impacts have been assessed as planned and unplanned impacts. Planned environmental impacts are those which result from routine operation and maintenance, while unplanned are those which will result from accidents or non-routine operation and maintenance.

4.1.1 Planned Impact

Planned impacts have been rated considering the duration of the impact, the area of influence and the intensity of the impact, while unplanned impact have been assessed considering their likelihood and severity. The impacts will be rated 'Low', 'Medium' or 'High' significance based on the area of influence, spread duration of the impacts. Further, mitigation measures will be proposed based on rated significance.

Table 1: Impact Assessment Matrix – Planned Impacts

Duration / Severity	Momentary 1 week	Short Term < 1 year	Medium Term 1 – 10 years	Long Term 10 – 50 years	Long Term > 50 years
Positive Effect			+	++	+++
Slight Effect	Negligible				
Minor Effect		Low Impact			
Moderate Effect			Medium Impact		
Major Effect				High Impact	
Massive Effect					

4.1.2 Unplanned/Accidental impacts

Unplanned impacts have been assessed in the ESIA considering the severity of the impact and likelihood of the impact.

Table 2: Impact Assessment Matrix – Planned Impacts

Duration / Severity	Very Unlikely	Unlikely	Likely	Very Likely	Certain
Slight Effect	Low Impact				
Minor Effect					
Moderate Effect			Medium Impact		
Major Effect				High Impact	
Massive Effect					

4.2 IMPACT ASSESSMENT

The Table 1 below summarise potential environmental impacts during construction phase of the Project.

The only activity during the operational phase of the Utility Service Corridor (USC) Project is transport of vehicles and eventually petroleum pipelines. This EIA addresses only the USC Project without the petroleum pipelines.

The operation of the Utility Service Corridor (USC) project will be unmanned. Periodic maintenance will be carried out by a small team of personnel and will be intermittent and for short duration, and is unlikely to result in generation of any significant amount of wastes or wastewater. This would include road and drainage maintenance activities and is not likely to generate hazardous waste. Operation of the USC will not require any natural resource except for refined petroleum products (fuel) for the inspection and maintenance vehicles. Hence the impact on natural resources is also minimal.

There will be no adverse impact on groundwater resources, since the freshwater required during the operational phase will be negligible. There will be no risk of soil and groundwater contamination, since no liquid effluents will be discharged on land and no hazardous wastes will be stored on land along the DSC route during the operation phase. However unanticipated events may lead to damage of the road conveying the petroleum products (eventually) resulting in soil and groundwater contamination. Accidental damage, usually by third party encroachment and natural catastrophes (floods, earthquake, land slide, etc.) can lead to contamination of soil and groundwater.

Thus the likelihood of accidental damage to the USC and associated environmental release / impacts is very unlikely.

4.3 ENVIRONMENTAL MANAGEMENT PLAN

The Environment Management Plan (EMP) describes both generic good practice measures and site-specific measures, the implementation of which is aimed at mitigating potential impacts associated with the proposed project operations. The EMP is prepared with a view to facilitate effective environmental management of the project, and implementation of the mitigation measures. The same is summarized in Table 1. This EMP includes mitigation and control measures proposed to reduce and keep the environmental impacts to below the As Low As Reasonably Practicable (ALARP) level during the construction and operation phases of the project.

4.3.1 GRIEVANCE MECHANISM

Through SEZAD Corporate Social Responsibility (CSR) section of the Partnership and Development Department (PDD), SEZAD provides access for communities to provide any grievance (written and in person) through the Grievance Mechanism (GM) form. The GM form is available on SEZAD website at https://www.duqm.gov.om/sezad/csr/grievance-form.

4.3.2 CLIMATE AFFAIRS

During the construction phase the major source of GHG emissions will be attributed to the movement and operation of the various construction or heavy equipment's. During the operation phase, there will be no GHG Emission due to nature of the project. The release of GHGs into the atmosphere contributes to global warming and consequently increasing the sea level, it is an on-going phenomenon globally, and historic rates are generally estimated to be in the range of 3.2 mm / year (or 0.16 m over 50 years). According to the study by the Arab Forum for Environment and Development, it is expected that only a fraction of the overall land area of the Sultanate of Oman will be impacted due to a 1 m rise in sea levels. It is anticipated, that the project will not be substantially impacted by these threats. The climate change adaptation has been highlighted in the EIA report.

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4.3.3 Environmental Monitoring Plan

In order to ensure that the quality of the environment within the work sites complies with the Omani regulations, periodic environmental monitoring will be carried out through a third party environmental consultant. All the monitoring data will be documented by the HSE Manager to demonstrate compliance. Environmental monitoring recommended for the various environmental components for the entire construction phase are reiterated in Table 1.

Table 3: Potential Environmental Impacts during Construction Phase

Environmental Aspects	Scope of Monitoring/Auditing	Method/Requirement	Frequency of Monitoring
Construction Phase			
Air Quality	PM10 concentrations at various locations along the USC route. NOX, SO2, VOC concentrations at various locations along the DSC construction route and nearby receptors	Using portable dust Analyzer Continuous Ambient Air Quality Monitoring Station (CAAQMS) or deploying diffusion tubes	Quarterly
Noise Levels	Sound pressure levels at several locations along USC construction route and near the Duqm settlement	Using handheld sound pressure level meter	Quarterly
Wastes	Quantity of each category of waste disposed from work sites	Volume / weight calculated based on tanker capacity	Monthly records to be maintained
Water	Quantity of potable and non-potable water received at the work site	Volume calculated based on tanker capacity	Monthly
Environmental auditing	Implementation of the EMP and HSEMS, control measures, waste (hazardous and non-hazardous solid and liquid), hazardous materials management, emergency response measures, applicable permits and status of compliance to the permit requirements, etc.	Site inspection, interviews with concerned EPC contractor personnel and review of documents and records	Quarterly audit and reporting
Operation Phase			
As per the EIA, only activity during the operation phase of the project that needs to be managed will be movement of trucks and equipment during maintenance, and as such the releases to the environment during the operation phase will be minimal. After completion of the construction phase, an operational phase environmental and social management plan will be developed before the operation phase of the USC project			

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Table 4: Potential Environmental Impacts during Construction Phase

#	Environmental Element	Issue	Severity	Duration	Likelihood	Impact Rating	Mitigations Measures
1	Natural resources	Fuel Supply and demand	Slight	Medium Term	-	Low	• Minimize fresh water consumption by identifying and implementing water conservation and re-use measures wherever feasible; • Identify opportunities for substitution of fresh water with treated wastewater from Municipality for dust suppression and construction activities; • Any water proposed for re-use should meet the criteria specified in MD 145/93; and • Maintain daily logs for water consumption and carry out periodic audits to identify conservation measures. • Try to source power requirements from the electrical grid, if possible; • Procure fuel efficient DG and construction equipment and vehicles; • Procure fuel from authorized retailers; and • Minimize idling time of fuel run heavy equipment by adequate planning of construction activity.
		Offsite groundwater supply	Minor	-	Likely	Low	
2	Ambient Air Quality	Impacts on Ambient Air Quality	Minor	Short Term	-	Low	• Maintain and regularly service the diesel generators and heavy construction machinery so that emissions remain within relevant air quality standards; • Provide stacks or flue pipes on DG sets so that the combustion gases from the generators are emitted at least 3 m above the ground level; • Use of ozone depleting substances shall be prohibited per MD 243/2005; • Periodically monitor dust levels and source emissions to demonstrate compliance with applicable standards. • Cover the vehicles transporting material to and from the site immediately after loading to prevent wind-blown dust emissions and spillages; • Stock piles to be wetted using treated wastewater before loading and unloading the materials to minimize dust; • Minimise the height of dropped material into truck and restrict the drop height to not more than 1m during loading and unloading, to minimise wind-blown dust emissions and spillages; • Install rumble grids at each site exit to remove excess mud and dust accumulated on vehicles and minimise material being transferred onto the public road;

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#	Environmental Element	Issue	Severity	Duration	Likelihood	Impact Rating	Mitigations Measures
							• Avoid or minimise dust generating activities (particularly cutting and excavating) during dry and windy conditions. Temporarily suspend dust generating construction works when instantaneous gust wind speeds exceed 25 knots (or 12 m/s);
3	Noise	Impacts on Noise Level	Minor	Short Term	-	Low	• Avoid night time operation of high noise generating construction machinery; • Plant and equipment to be used appropriately. This includes reasonable work practices with no extended periods of reviving, idling or 'warming up'; • Design suitable noise absorbing enclosures for the generator units, crushers / screening units, where it does not affect access and maintenance; • Provide appropriate silencers or mufflers to reduce noise; • Ensure that the equipment used is provided with suitable noise control systems and source noise levels conform to international standards; • Periodically monitor noise levels in workplace and ambient to check compliance with the standards MD 79/94 and MD 80/94; and • Minimize noise from vehicles by reducing speed limits and by using well maintained vehicles;
4	Soil and Groundwater	Impacts to soil and groundwater due to normal management of wastes	Minor	Medium Term	-	Low	• Solid waste handling, storage and disposal methods shall ensure compliance with MD 17/93; • The handling, storage, transport of any hazardous waste shall be carried out in accordance with MD 18/93; • Oil contaminated waste or soil shall be treated as hazardous waste, and handling, storage and disposal shall be according to MD 18/93; • Hazardous waste such as waste oils and lubes shall be appropriately packed, labelled and accompanied by a waste consignment note when transported to approved recyclers / management centres (MD 18/93); • Hazardous waste storage facilities will have restricted access; • Hazardous waste will be transported through be'ah licensed transporters and disposed at licensed treatment or disposal sites in accordance with MD 18/93; • Recyclable waste shall be stored separately onsite and handed over to waste recycling contractors; • In case of accidental spillage, contaminated area will be cleaned;
		Impacts to soil and groundwater due to accidental release	Major	-	Unlikely	Medium	

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#	Environmental Element	Issue	Severity	Duration	Likelihood	Impact Rating	Mitigations Measures
							• All non-hazardous and hazardous waste shall be handled by be'ah or be'ah approved contractor; • Solid non-hazardous waste will likely be disposed of to the existing landfill site, following approval from be'ah; • Non-recyclable waste shall be stored separately onsite and sent to the landfill. Waste consignment and 'Duty of Care' records shall be maintained; and • No hazardous waste shall be mixed with any other type of waste.
5	Ecology	Impacts on the flora and fauna along the pipeline route	Moderate	Medium Term	-	Medium	• Minimise the DSC impact by clearing vegetation only wherever required along working strip; • Minimise extraneous noise sources and use adequate noise attenuation on engines; • Vehicles and machinery used outside of project area shall be cleaned prior to commencement of work so as to avoid introduction of non-native species into the project area; and • Night time driving and off road driving will be restricted to emergencies only. • The drivers are to be adequately experienced and are to be provided with training on defensive driving. • The drivers transporting hazardous materials are to be provided with adequate awareness on the hazards of the material, emergency measures, contact numbers, etc.; • Appropriate vehicles, in good condition are to be used. The transport vehicles are not to be overloaded; • Maximum speed limits at the work site are to be specified and followed. The speed limit specified on the highway are to be strictly followed; and • Designated access roads are to be used at the work site. Off-road driving is to be avoided as far as possible.
6	Land Use and Local Community	Impact on Land Use	Slight	Long Term	-	Low	
		Impact on Settlements due to construction activities	Minor	Medium Term	-	Low	
		Impacts arising from/to other construction activities	Minor	Short Term	Likely	Low	
		Impacts on Duqm Settlement due to accidental releases	Major	-	Unlikely	Medium	
		Impact on existing traffic density and safety	Localized	-	Likely	Medium	
		Stress on Infrastructure	Localized	Medium Term	-	Medium	
7	Impact on Local Economy	Local Purchase of goods	Positive	Medium Term	-	Positive	• Procurement and purchasing shall consider availability and quantity of local supplies and local use of material; • Schedule the site preparation activities to avoid and minimise disturbance to the public/settlements in the area;
		Hiring of local people	Positive	Medium Term	-	Positive	

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#	Environmental Element	Issue	Severity	Duration	Likelihood	Impact Rating	Mitigations Measures
							• Project related community grievances shall be documented and appropriate measures shall be taken by SEZAD and its contractors; • Procurement of scarce or locally sensitive goods shall be conducted outside of the local area; and • Preference shall be given to locals for semi-skilled jobs.
8	Archaeology, Heritage and Culture	Accidental Damage to sensitive sites	Major	-	Very Unlikely	Low	• Workers shall be made aware about local culture and traditions to avoid socio-cultural issues; • Employees and contractors shall minimize their interaction with local residents and make efforts to minimize their disturbance in the community by timing the operations and transits through local communities to avoid disturbing worship, school, and other community gatherings; • Workers shall receive a briefing on recognizing archaeological artefacts and how to respond when found; • All archaeological sites or finds shall be reported to the Department of Excavations and Archaeological Studies, Ministry of Heritage and Culture; and • A chance finds procedure shall be developed and implemented in areas where there is potential for previously unknown cultural property to be found during construction.
		Cultural Conflict	Localized	-	Unlikely	Low	

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5 FINDINGS AND CONCLUSIONS

The proposed project covered under the EIA study involves construction of the foundations of the service corridor; this includes pipelines of various sizes ranging from 12" to 36" dia., heavy haul traffic road, service access road, pipe bridges, and buried power cables. As mentioned in various sections of the EIA report, the Project will implement appropriate control and mitigation measures to minimize the environmental impacts and to ensure compliance with applicable Omani Environmental Regulations.

The Service Corridor will provide centralized utilities and pipeline corridor for the proposed Duqm Refinery and several heavy/petrochemical industries coming within the proposed heavy industrial zone in SEZAD for the planning horizon: 2017 – 2045. The Project is expected to provide employment opportunities for Omani people during construction phase of the project.

Based on discussions in various chapters in the EIA report, it can be noted that upon effective implementation of the proposed mitigation measures and the EMP, the residual impacts can be reduced to ALARP levels making the project acceptable from an environmental standpoint within the context of local and internationally comparable environmental standards.

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