

## **Executive Summary**

### **The Proposed Development**

The new Port of Duqm is being developed on behalf of the Ministry of Transport and Communications (MOTC) to provide facilities for commercial, navy and coastguard vessels at a site approximately 450km south of Muscat in the Sultanate of Oman. The operation of the port will be managed by the Port of Duqm Company S.A.O.C, a 50: 50 joint venture between the Omani Government and the Consortium Antwerp Port (CAP). The Port's operations will include a variety of port activities (some of which are already taking place), principally comprising activities associated with operations at a dry dock area (for ship repair and maintenance), a commercial quay (for a container terminal, dry bulk terminal and multi-purpose terminal), government berths, a fast ferry terminal, liquid berths, a variety of storage areas, port gates and offices, utilities etc.

The Port of Duqm is to be developed in phases, with the first phase being the development and operation of the navigable areas within and outside the port, the commercial quay on the main breakwater (multi-use, container and bulk terminals), government berths, fast ferry terminal, finger pier, dry storage areas and all associated landside supporting infrastructure (e.g. gates, entry, buildings, offices, utilities, etc.). The second phase will see the development of the and operation of the liquid berth and liquid storage areas on the lee breakwater, whilst the third phase is envisaged to involve the increase mineral export, and the fourth phase will be when the commercial quay is fully operational as container terminal.

### **The Proposed infrastructure packages**

RH-K&A's involvement in this project includes port planning (macro planning), grading, roads and infrastructure as well as port facilities planning (micro planning) and design of buildings. The presented preliminary Environmental Impact Assessment covers the provision of certain infrastructure services for the development of the First Part of the Commercial Berths in terms of three packages as follows:

- Package (IP2): Construction, commissioning and maintenance of the Construction of Roads, Infrastructure & Buildings at the Commercial Terminal & Operational Zone Areas, Port of Duqm.

- Package (IP3): Construction, commissioning and maintenance of the Construction of Roads, Infrastructure and Buildings at the Commercial Pre-Gate, Gates and Inspection Zone, Port of Duqm.
- Package (IP4): Construction, commissioning and maintenance of the Construction of Roads, Infrastructure and Building Works at the Government Berth Area, Port of Duqm.

Tentatively the required manpower for construction phase of the three proposed packages in terms of technical, administration, skilled and non-skilled labors is about 900 to 1000. The time for completing the each Package is 30 months including mobilization and period for maintenance is 365 days.

### **Justification for Environmental Impact Assessment**

The primary environmental law in Oman is the Royal Decree No 114/2001 entitled 'Law on Conservation of the Environment and Prevention of Pollution' establishes a legal structure that controls the disposal of pollutants in a manner that minimizes environmental harm. The enforcement agency is MECA. Guidelines laid down by MECA set out eight groups which could require EIA. The proposed development falls into 'Group 6, Marine and Coastal Projects' as a commercial port.

### **Objectives of Preliminary Environmental Impact Assessment Study**

The main objective of this environmental study is to furnish the appropriate information about the outcome and Preliminary environmental impacts of this project for the following Environmental Impact Assessment to be conducted by the contractor. This will allow the assigned contractor(s) to start construction works with Preliminary Environmental Approval (EP) by MECA. Furthermore, the decision maker will want to know if the proposed project is likely to produce the stated results.

### **Sources of Information**

The project has been on running for a number of years, and there is existing data and reports available for use in the preparation of this PEIA report. The several key documents are: the 2007 Environmental Statement for the construction of the original

port design<sup>1</sup>, the 2010 Ship Repair Yard and Dry Dock Complex in Duqm<sup>2</sup>, Environmental Impact Assessment of the operation Phase the 2012 Port of Duqm Extension, Oman Environmental Scoping Report<sup>3</sup>. As far as possible, the data and reports were collected during the PEIA Study from data holders.

During the next phase of carrying out the Environmental impact Assessment of the proposed three packages, it's recommended to update and conduct measurements for noise and ambient air.

### **General Methodology**

The PEIA assignment of this task should be accomplished in 6 weeks, so rapid consultation has been undertaken through a series of meetings during December 2014. The PEIA techniques in the study include Identify impact of intervention (single impact), accumulative impacts and quantifying the impact using modeling technique when possible (such as noise and emissions impacts)

### **Findings of Preliminary Environmental Impact Assessment Study**

#### **Socio-Economic**

Positive impacts will be achieved from the project in terms of the employment of the local workforce and migrating workers. Employment opportunities will be available for both skilled and unskilled workers and vessel and equipment hire. Indirectly, the local economy will be enhanced due to the increase in personnel in the area (direct spending potential) and the associated opportunities for businesses and industries in the area (e.g. ship hiring, accommodation). Where possible, personnel should be pooled from the local community and within Duqm area. Overall the Project site will offer several thousand jobs directly serving the proposed new facilities and several times this amount for jobs indirectly linked to the port and industrial activities. Training will be necessary to prepare the new staff, ensuring that the new skills and techniques are also transferred to the local

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<sup>1</sup> Royal Haskoning, 2007: New Port and Dry Dock Complex, Duqm. Environmental Statement. Final Report 3H6503.

<sup>2</sup> COWI, 2010, Ship Repair Yard and Dry Dock Complex in Duqm, Environmental Impact Assessment of the operation Phase

<sup>3</sup> Khatib & Alami and Partners, 2012: Port of Duqm Extension, Oman Environmental Scoping Report, Ministry of Transport and Communications, Sultanate of Oman 17 January 2012, Final Report - 9S8605

market. The increase in available jobs will give the local economy a significant boost. There is minor impact of construction and operation phases on fisheries until new Fisheries Harbor is completed;

### **Wastewater**

The wastewater generated during construction is limited by the contractors' staff and manpower. The total manpower for three packages estimated at 900 to 1000 capita. The estimated generated wastewater is less than 100 m<sup>3</sup>/day and dry sludge is about 1.0 tons/day. The generated wastewater during construction will be treated through compact wastewater treatment unit similar to the one for the ongoing construction work as shown in the following Figure (STRABAG contractor). The assigned contractor has to try first if he can keep sending the pre-treated sludge by thickener to Duqm STP temporary during construction through an agreement. If not, the generated sludge can be treated by sludge thickener & air-drying using drying beds and composting. Mechanical devices to turn over the sludge in the initial stages of the drying process are also available on the market. The position of the drying beds should be downstream the wind and away of any community by at least 2.0 km or through other proposed treatment scenarios.

The generated wastewater during operation will be treated through Sewage left station and sewage treatment plant (STP) at (IP3 and IP4). The normal sewage effluents will be treated to acceptable standards for reuse at the facility's own sewage treatment plant and is not considered to pose an environmental problem. Normally, sewage from ships will be kept inside the ships but can, if specially requested by the customer, be treated at the on-site treatment plant. The treated sewage effluent (TSE) will be recycled for plantation and green belt. The current practice that the STP treats only the wastewater and wet sludge evacuated and transported to be treated in the Duqm STP. This situation is not sure for future by the Duqm STP operator because they cannot manage more sludge for treatment. They can receive dry sludge only (this issue has been raised through the environmental department of (SEZAD). So, it's recommended to treat the sludge using sludge thickener and dried through incinerator or drying beds. Other scenarios are proposed to treat the generated sludge. The treated sludge can be used for land application to improve soil characteristics for landscape and green belt matching

with Omani regulation MD 17/93. Other scenarios are proposed for recycling & disposing the treated generated sludge.

### **Solid waste**

Regular non-toxic solid waste generated due construction and operation works will be collected and dispose into dumping site. Other non-hazardous solid waste will be produced in office buildings, canteens and other general facilities for staff working at the site. This waste shall include food residues and other organic material, paper, cardboard etc. and will be collected at regular intervals, brought to an intermediate on-site storage area and from there be transported to the off-site landfill designated for disposal of the solid waste. The Project is yet to be awarded; the exact location of dumping yard will be defined by the employer during the mobilization period.

### **Oil, chemical and hazard wastes**

The oil water separators along the Commercial and Governmental Berths are mounted downstream the screen chamber and upstream the pump well. The separator shall be cleaned periodically to ensure proper separation efficiency. Other oil sources from leakage from workshops and accidental spills collected as well. The collected and treated oil can be recycled and others collected and stored in oil pit at temporary hazardous waste area with total served area 40,000 m<sup>2</sup> east of Pre-gate area (IP2). In later stage the disposed oil will be transported to the designed dump fill for the project area. Some chemical waste will be treated and recycled and other toxic and disposed chemicals will be collected and stored within the same temporary hazardous waste area to be transported to the designed dump fill for the project area.

In case the contractor cannot get approval or no objection for receiving all hazard wastes that would be generated from Duqm Port during construction and operation, treatment facilities should be provided to treat all the toxic wastes or get an approval from Be'ah for having hazard wastes dump site.

### **Traffic and transport demand forecast**

It is realized that there will be developed traffic due to the planning and development activities in the port and most generated and developed traffic will be heavy vehicles. This may average the percentage of the heavy trucks in the traffic mix on the proposed

road to about 60% while light traffic to about 40% of the total traffic. The average daily traffic volume on the proposed roads at ultimate year (2040) can be projected to be within 12,397 for the Duqm Port <sup>(4)</sup>, <sup>(5)</sup>. It is assumed that as a worst case scenario, 100% of the traffic generated by Commercial Berths (262 vehicles during the peak-hour in each direction) and 20% of the traffic generated by Commercial Quay (347 x 20% = 69 vehicles during the peak-hour in each direction).

### **Noise and vibration accumulation impacts**

The Federal Highway Administration (FHWA) of USA, Office of Natural and Human Environment, released the FHWA Traffic Noise Model (TNM 2.5, 2003), a state-of-the-art computer model for highway traffic noise prediction and analysis has been applied to three packages (IP2, IP3 and IP4) road network. Summary of maximum noise impact of the three packages at ultimate limit stage 2040 (Maximum traffic volume) for design speed 60 km/hr is as follows:

- Commercial Berths, IP2: 64.6, 57.9 and 53.2 (L10 , dB) at distance of 20, 50, 100 m respectively:
- Commercial Quay, IP3 (worst scenario): 68, 61 and 56 (L10 , dB) at distance of 20, 50, 100 m respectively:
- Governmental Berths, IP4: 57.8, 51.9 and 47.6 (L10 , dB) at distance of 20, 50, 100 m respectively:

The noise accumulation impacts results shows that:

- The noise level from operations are expected to be below 50 dB(A) at each package scheme boundary during operation.
- The impact of noise is very local to some operation facilities and doesn't impacting sensitive receptors. Workers in the immediate proximity of noisy tools and machinery to be protected from damage to their hearing by the use of PPE in accordance with Oman regulation.

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<sup>4</sup> Khatib & Alami and Partners and Royal Haskoning 2013 Traffic Impact Study for IP4, April 2013

<sup>5</sup> Khatib & Alami and Partners and Royal Haskoning 2014 Traffic Impact Study for Port of Duqm – Commercial Quay "Zones 1, 2, 3 & 4" October 2014

- There is no potential impact to other sites environment out of the three packages zone including the nearest industrial, commercial or residential areas due to operation work.
- There is no impact on three packages; Commercial Berths (IP2), Commercial Pre-Gate, Gates & Inspection Zone (IP3) and Governmental Berths (IP4) from the surrounding environment (the only facility on operation is the Dry Dock<sup>6</sup>):

### **Air Quality and emissions accumulation impacts**

The source of air pollution during operation of the proposed facilities of the three packages are roads carrying traffic flows greater than 5,000 vehicles per day) in-addition to number of small capacity pumps. The impact of the activities is estimated using the US-EPA AERMOD dispersion model. Output from model includes ambient HC, CO and NOx concentrations for ultimate stage (2040).

- **Surrounding environment impacts<sup>7</sup>**
  - The impacts of the repair and maintenance activities on ambient air quality outside the perimeter of the dry dock and shipyard premises have been assessed for dust resulting from blasting activities, organic solvents (represented by xylene) from hull painting processes, general air pollutants from stacks and exhausts (NO<sub>x</sub> and SO<sub>2</sub>) and dioxins (from the incineration plant).
  - For the general air pollutants it is found that the emissions are limited and do not result in violations of international criteria for ambient air quality outside the perimeter of the dry dock/shipyard and for dioxins the emissions are considered to be negligible.
  - With regard to dust, the standards for PM<sub>10</sub> will be exceeded up to 300 meters outside the perimeter in the worst case, i.e. if NIX blasting is carried out with- out any measure to mitigate the influence of wind.

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<sup>6</sup> COWI, 2010, Ship Repair Yard and Dry Dock Complex in Duqm, Environmental Impact Assessment of the operation Phase

<sup>7</sup> COWI, 2010, Ship Repair Yard and Dry Dock Complex in Duqm, Environmental Impact Assessment of the operation Phase

- For organic solvents (xylene) no Omani or internationally recognized (e.g. EU or US EPA) standards exist for ambient air and as such no limits or regulations are violated. However, if comparing with standards from Denmark and Ontario (Canada) the xylene levels are found to exceed the (Danish) standard for annual average concentrations at a distance up to 4.5 km from the source.
- **Proposed Packages impacts**
- No sources of other emission pollutants are expected where no real industrial activities within the three packages facilities which are limited by small capacity pumps with limited fuel consumption. The main source of emission due to operation of the three proposed packages is the Roads carrying traffic flows greater than 5,000 vehicles per day (IP2 and IP3: Commercial Berths and Quay).
- For the general air pollutants (HC, NO<sub>x</sub> and CO) it is found that the emissions are limited and do not result in violations of international criteria for ambient air quality outside the perimeter of and for dioxins the emissions are considered to be negligible.
- Dust and particulate emissions (PM<sub>10</sub>) that will result from the movement of site vehicles and mobile plant will be negligible where all roads will be well paved;
- There is no potential impact to other sites environment out of the three packages zone including the nearest industrial, commercial or residential areas due to operation work.

### **Cultural heritage**

The impact is limited to vehicle movements, personnel and tourists in the landside port areas out of the three packages zone. All sites remain vulnerable until mitigation measures have been implemented. Ideally pre-Islamic burial cairns can be built into landscaping works, that include appropriate barriers, notices etc. but with some interpretative material to explain to people the importance of each site and its local context. There is no site for cultural heritage has been found during land reclamation of the three packages. So, this impact can be classified as minor impact on cultural heritage and recreation landscape sites.



### **Recreation Landscape**

During construction activities, the site would not be in a suitable state for recreation. Construction machinery, movements of traffic on land, and the location of office buildings on site will give a different characteristic to the area from an undeveloped, pristine beach to a construction site. Bird watchers will not be able to continue their hobby in the area (at the time of construction) as the birds may temporarily move away to other areas, such as Ghubbat Quwayrat bay to the north. However, as this site is not frequently used by recreational users, the anticipated impact will be of minor adverse significance.

This impact during operation phase can be classified as minor to moderate positive impact on recreation landscape sites. Depending on the availability of space, the plans can incorporate development of recreational areas and tourist attractions for all age groups.

### **Soil and groundwater**

Site operations during construction phase may lead to impact of soil and or groundwater beneath. Potential areas of concern are recognized as follows:

- Fuel and lubricant storage areas and fuel stations;
- Maintenance areas and waste storage areas;
- Plant & equipment holding areas.

The soil in the Duqm area is not suitable for agriculture, as the area is mainly comprised of Quaternary sub-recent to recent Sabkha deposits, meaning that it is likely to be too saline for commercial crops. In addition, limited sites will be used to support construction activities and measures will be taken by the contractors to minimize leakage to soil and groundwater. So, there would be limited impact to soil and groundwater within the some facilitates within the three packages and no potential impact to other sites out of the three packages zone due to construction works.

### **Geology**

There is only one geological site (Ras Duqm) nearby the three packages found south of Commercial Berths. Ras Duqm has been protected and care has been taken during land reclamation of the proposed packages.

### **Hydrogeology**

The wadis channel and the rerouting path within the port area is not part of the proposed packages, however, uncontrolled wadis flow can cause slight to moderate damage to geological site and soil due to erosion. Moreover, it would impact the existing road network and any the development scheme to be implemented within the project area. Drainage hydraulic structures have been designed to allow smooth flow of water during the peak flow of the wadis. So, the proposed project will have major positive impacts in terms of wadis flow movement within project area.

### **Coastal and Aquaculture Ecology**

The impact is limited to landside works and potentially could be due effect of surface water run-off from the proposed development on water quality and accidental spillage and run-off of contaminants from onshore activities and ships during transit to the Port and inside the Port. The impact can be classified as a minor due to well design and mitigation measures will be considered.

### **Terrestrial Ecology and Ornithology**

The terrestrial and intertidal sand and mudflat habitats in the project area will be disturbed or removed due to the landside construction infrastructure works (roads, buildings etc) and operation. However, the three packages is contributing to limited impact on landside works and potentially could be due potential for the transfer of pollutants from port construction and operation activities, noise and light disturbance impacts. The impact can be classified as

minor to moderate in case well design and mitigation measures related to noise and light disturbance are considered.

### **Climate Change and Sustainability Assessment**

The potential impacts they may arise on the parameter as a result of construction and / or operational activities are

- Inefficient use of energy with implicit carbon dioxide emissions
- Selection of refrigeration plant not using coolants with high global warming potential
- Use of paints and solvents with high volatile organic compound content
- Incomplete treatment of sewage and consequent generation of methane

The potential impact can be classified as minor impact and measures and adaptation can reduce the impact further: