

## DUSUP GUIDELINES FOR DEWATERING WORKS

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## Approval

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**TABLE OF CONTENTS**

1 INTRODUCTION ..... 4

2 PURPOSE ..... 4

3 REFERENCES ..... 4

4 ABBREVIATIONS & DEFINATIONS ..... 4

    4.1 Abbreviations: .....4

    4.2 Definitions: .....5

5 DEWATERING WORKS..... 6

6 NOC TYPES & SUBMISSION REQUIREMENTS ..... 6

    6.1 Information NOC .....7

        6.1.1 Information NOC - Submission Requirements.....7

    6.2 Preliminary & Final Design NOC .....7

        6.2.1 Preliminary/Final Design NOC - Submission Requirements .....7

    6.3 Construction NOC.....8

        6.3.1 Construction NOC - Submission Requirements .....8

    6.4 Dewatering Types .....8

        6.4.1 Trenching and Sump Pumping .....8

        6.4.2 Well Point System .....9

        6.4.3 Deep Well Dewatering.....9

    6.5 Dewatering Effects.....10

    6.6 Dewatering Work Close to DUSUP Pipeline/Corridor .....10

    6.7 Dewatering Discharge line Crossing DUSUP Pipeline/Corridor.....11

    6.8 Contingency Risk Management Plan .....13

7 DUSUP GUIDELINES ..... 13

## 1 INTRODUCTION

Dubai Supply Authority (DUSUP) provides energy supply (Natural Gas) to Emirate of Dubai to meet the needs of electricity generation and water desalination through its pipeline network, Through the production of natural gas (which is processed into gas and condensate products), the purchase of pipeline gas and LNG (and its regasification), gas storage and the operation of the pipeline network, DUSUP plays a key role in the growth and development of Dubai.

DUSUP has assigned Dubai Petroleum Establishment (DPE) the responsibility for operating DUSUP assets and authorised DPE to manage all emergency events occurring on its own operated facilities, pipelines and assets within pipeline corridors in liaison with other governmental entities.

DPE-DUSUP designs operates and maintains DUSUP's onshore pipelines and related facilities to International Standards in order to ensure an uninterrupted flow of gas and other hydrocarbons across Dubai.

There are approximately 700 kilometres of onshore hydrocarbon pipelines operating in Dubai. The gas pipelines operate at high-pressures up to 960-psig and transport highly explosive and flammable natural gas. A number of jet fuel and fuel oil pipelines share the corridors with the gas and condensate pipelines.

## 2 PURPOSE

The purpose of this guideline is to assist DUSUP/DPE NOC staff for NOC review and field staff for monitoring dewatering work crossing or adjacent to DUSUP corridor, and a guide for NOC applicants (Consultants & Contractors) on the requirements for NOC application acceptance.

## 3 REFERENCES

DUSUP NOC Standard Conditions - DP-OPSON-0056

## 4 ABBREVIATIONS & DEFINATIONS

### 4.1 Abbreviations:

Abbreviation	Description
ALARP	As Low As Reasonably Practicable
DPE	Dubai Petroleum Establishment
EMARAT	Emirates General Petroleum Corporation
EMDAD	EMARAT, Air BP and Shell Joint Venture
ENOC	Emirates National Oil Company
e-NOC	Electronic NOC
GCS	Gas Control Station
HSE	Health, Safety and Environment
MS	Method Statement
MSRA	Method Statement and Risk Assessment

NOC	No Objection Certificate
PPE	Personal Protective Equipment
PTW	Permit to Work
RA/TRA	Risk Assessment/ Task Based Risk Analysis
ROW	Road Right of Way (of RTA)
RTA	Roads and Transport Authority

#### 4.2 Definitions:

Term	Definition
ALARP	In risk assessment when the risk is assessed and controlled the residual risk shall be reduced to ALARP(as low as reasonably practicable)
Berm	A soil bund built over the pipeline as a protection cover.
Construction	The erection of any new buildings or structures, or the variations to the Infrastructure facilities or existing asset.
Consultant	A natural or legal person who is offering advice/consultation on engineering, technical, or any other matter related to design and construction.
Contractor	An organization designated by the Owner or the Operator for the purpose of carrying out the works related to Construction, or execution of any work that requires obtaining of No Objection Certificates from the DUSUP.
Control Measure	Provisions to reduce identified risks.
DPE	Dubai Petroleum Establishment responsible for the Operation of DUSUP Asset.
DUSUP Corridor	DUSUP Corridor is the land allocated by Dubai Municipality or other statutory government authority to DUSUP for the construction, operation and maintenance of gas and fuel pipelines in the emirates of Dubai.
e-NOC	The electronic NOC application that can be submitted via the online system: <a href="https://noc.rta.ae/RTAeNOC/Webpages/common/login/login.aspx">https://noc.rta.ae/RTAeNOC/Webpages/common/login/login.aspx</a>
Hazard	A Hazard is any source of potential damage, harm or adverse effects on people, property environment or organization.
Lance	Metal pipe supplying a jet of water
No Objection Certificate (NOC)	A document approved by the DUSUP through e-NOC, for the technical design of proposed development or authorizing a contractor to carry out a Construction/Restricted Activity within the NOC Zones.
NOC Zone	DUSUP NOC Zones are :

	<ul style="list-style-type: none"> <li>• 60 meter either side from the center of pipelines or 60m from DUSUP Corridor limit, whichever is greater.</li> <li>• 10 meter either side of the pipelines located within DEWA or EGA (DUBAL) Plot limits.</li> <li>• 5 meter either side from the center of 8" Shell pipeline (Abandoned, Positively Isolated).</li> <li>• 300 meter for High Voltage Over Head Lines parallel to hydrocarbon pipelines/pipeline corridor.</li> <li>• 500 meter for Subsea Pipelines.</li> <li>• 500 meter for Land Use Planning adjacent to DUSUP Pipeline/Pipeline Corridor.</li> </ul>
Permit to Work (PTW)	A written or digital approval granted by DPE that authorises a person or persons to carry out specific work within a specified time frame within the proximity of DUSUP asset/plot boundary limit.
Risk	A situation involving exposure to danger
Risk Assessment	A report prepared by the Applicant/Customer seeking DUSUP NOCs, identifying potential risks and mitigation measures involved in carrying out any Construction or Restricted Activity within the DUSUP NOC Zones.
Safety	The absence of any risk of harm or damage to the people, DUSUP asset/Infrastructure that is deemed unacceptable as per the DUSUP/DPE Safety Regulation or Standard Operating Procedure.
Utilities	Utilities are means of supply of essential services such as electricity & communication through cables, water, drainage and natural gas or fuel oil through the pipelines.

## 5 DEWATERING WORKS

Dewatering provides dry and stable conditions for excavations, allows for increasing the stability of the soil slopes/excavation and ensures workers safety.

Most of the Dewatering NOCs processed by DUSUP is for the dewatering line crossing of DUSUP corridor or pipelines or crossing of pipeline patrol access or DUSUP corridor section at ROW.

However, DUSUP also process NOCs for the installation of dewatering systems outside the corridor and within the NOC zones.

## 6 NOC TYPES & SUBMISSION REQUIREMENTS

For the structure adjacent or close to DUSUP corridor limit, the following DUSUP NOC's are applicable:

- Information NOC
- Preliminary Design NOC/Final Design NOC
- Construction NOC

- Final Clearance / NOC Close-out

## 6.1 Information NOC

Existing and planned pipeline(s), pipeline facility information and corridor limits along with Standard DUSUP NOC Conditions are shared with the applicants (consultant or contractor) through e-NOC for the design and construction of proposed work.

### 6.1.1 Information NOC - Submission Requirements

- a) AutoCAD drawing on DLTM coordinates datum showing the proposed Project Limit Plan for issuing pipeline information.
- b) Pdf file of drawing showing proposed Project Limit Plan for issuing pipeline information.
- c) For issuing pipeline information, it is mandatory for the applicant to submit a confidentiality undertaking letter as per the DUSUP approved letter template. The Confidentiality Undertaking Letter template can be downloaded from DUSUP website using link: <https://www.dusup.ae/noc>
- d) Undertaking letter must be submitted with company stamp and signed by the authorized company representative.

Note: Information NOC will be issued with DUSUP Standard NOC Conditions, AutoCAD file of existing pipeline information, corridor limits, corridor fence and gate locations, desert crossings and other facilities and applicable guidelines.

## 6.2 Preliminary & Final Design NOC

A preliminary Design NOC is an initial design proposal seeking input and approval in order to proceed with the Final Design. A Final Design NOC is submitted after incorporating the Preliminary Design NOC conditions.

### 6.2.1 Preliminary/Final Design NOC - Submission Requirements

- a) Key Plan showing project location.
- b) General Layout Plan incorporating existing site condition, proposed work, DUSUP corridor limit, pipelines/ facilities as provided in Information NOC.
- c) AutoCAD file of General Layout Plan drawing prepared on DLTM coordinates datum.
- d) Cross Section drawing showing DUSUP corridor fence, proposed dewatering system adjacent /crossing DUSUP corridor, separation distance from nearest HC pipelines as provided through the Information NOC. Note, wells (from well point or deep well systems) shall not be located within DUSUP Pipelines 5 m No-Go Zone. Any deviation from this requirement shall require DUSUP review and approval.
- e) Dewatering design for ground water dewatering nearby DUSUP assets.
- f) Include applicable notes from the DUSUP Standard NOC Conditions and relevant DUSUP Guidelines in the drawing (refer to DUSUP webpage: <https://www.dusup.ae/noc>).
- g) The design and monitoring of the dewatering system shall be approved and reviewed by an entity licensed for similar activities in Dubai.

- h) Permanent dewatering of any proposed structure near DUSUP pipeline will not be accepted.

### 6.3 Construction NOC

Valid Construction NOC must be available at site before commencement of any construction activities within the DUSUP NOC Zones.

#### 6.3.1 Construction NOC - Submission Requirements

Construction NOC submission must include but not limited to following:

- a) Completed check list for Design NOC condition compliance, if applicable.
- b) Key Plan Showing Project Location.
- c) General Layout Plan incorporating existing DUSUP corridor limit, nearest DUSUP pipeline as provided in Information NOC and proposed dewatering work as approved in Final Design NOC.
- d) Detail Cross Section drawing showing: DUSUP corridor fence, existing nearest pipeline, proposed dewatering line/dewatering system, Crossing details at existing pipeline and patrolling access.
- e) Method statement and risk assessment for installation near DUSUP pipeline.
- f) Schedule of work.
- g) Include applicable notes from the DUSUP Standard NOC Conditions in the drawing.

Note: For temporary dewatering line crossing or parallel to DUSUP pipeline/corridor dewatering contractor may directly apply for Construction NOC.

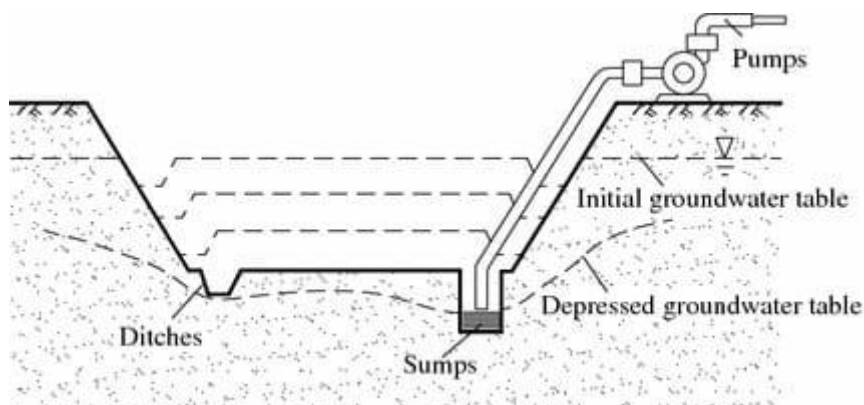
### 6.4 Dewatering Types

There are different types of groundwater dewatering methods. The most common in the region are Trenching and Sump Pumping, Well points and Deep wells.

#### 6.4.1 Trenching and Sump Pumping

Sump pumping is the simplest dewatering method, whereby a sump (ditch) is excavated to allow ground water to accumulate in sum pit and pumped away for disposal using a robust solid handling pump. This method is suitable for the areas where soil is gravelly or sandy and sump can be situated at a lower level than that of the excavation bottom.

Sump pump shall be located minimum 1.0 meter away from the edge of protected edge of excavation trench.





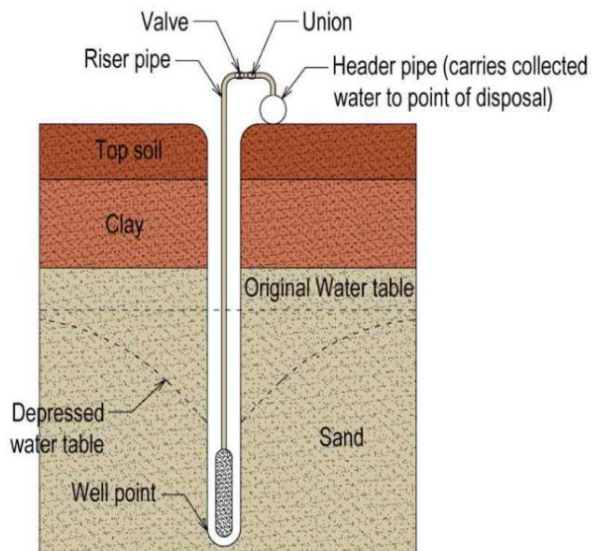
### 6.4.2 Well Point System

Well point systems consist of a series of small-diameter wells, connected by a header pipe to a centrally located suction pump. Groundwater is abstracted through the well points from a vacuum generated by the pump.

Well point dewatering consists of installation of UPVC riser pipes with a filter section on the lower portion, driven into the ground through the use of high pressure water. The jetting pump is connected to a lance through which the high pressure water is injected into the ground, forming a bore hole into which the well point can be installed. The lance is rotated to create a gap around the well point, which in turn is filled with suitable filter material.

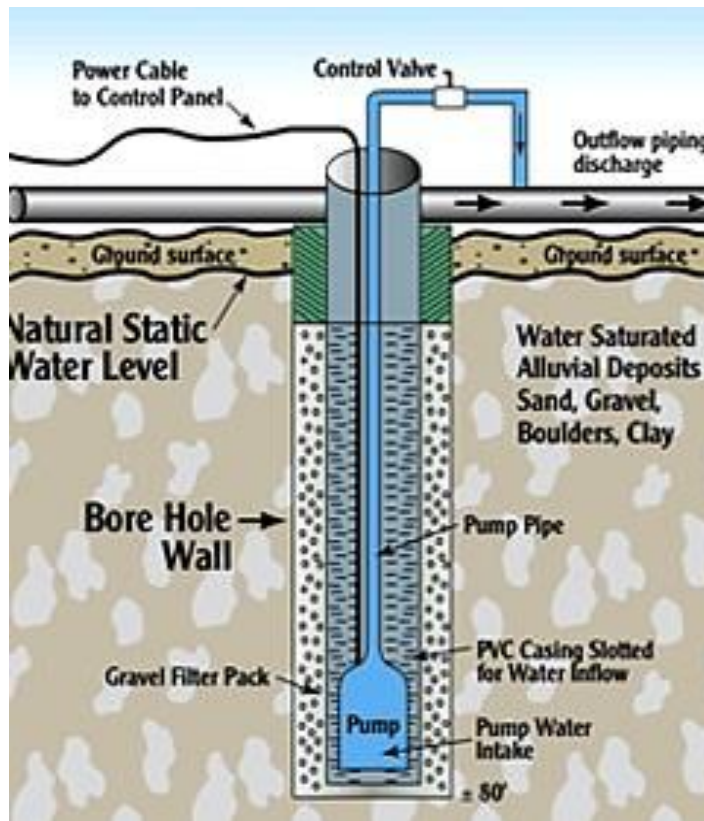
Well point systems using water jets can be installed where access with a drill rig is not possible. However, in case of hard soil or high in clay content water, jetting may not be feasible for well point installation in such case well point installation may require use of drilling rig for drilling by professional drilling team.

Well point systems are particularly suited for shallow excavation where drawdown depth is less than 15 feet (4.5m).



### 6.4.3 Deep Well Dewatering

This system is beneficial for dewatering to depths at which suction lift limitations prevent the use of a well point system. Deep wells also offer the ability to control large volume of water with the well depth up to 30 meters. Installation of the well can be far enough from the excavation so as to not to be obstructive as the wells can be spaced approximately 15 meters apart. Typical Deep well construction is shown in figure below:



### 6.5 Dewatering Effects

Dewatering can cause the ground to lose structural integrity, which causes ground settling. If the extent of ground settling is large, it can damage nearby property and structures. When groundwater is extracted from the soil, it causes the soil to compress. It can also be caused by small soil and ground particles being extracted with the ground water through the well.

Beneath a static horizontal water table, an underground structure will experience the same pore pressure on both sides (hydrostatic). If dewatering operations are commenced on one side of the structure, the side of the underground structure closest to the dewatering operation will experience a reduction in pore pressure. The difference in groundwater pressures between each side may generate significant structural forces within the underground structure.

Therefore, regardless of the type of dewatering, contractor shall ensure that the soil type is taken into account during excavation to ensure the excavation pit is appropriately protected against collapse.

### 6.6 Dewatering Work Close to DUSUP Pipeline/Corridor.

The key principles to minimize the impact of dewatering of groundwater upon adjacent DUSUP/DPE assets are as follows:

- a) Ensure groundwater drawdowns are limited to avoid potential settlement within DUSUP corridor and an appropriate filter is used so that fines are not drawn through the groundwater pumping system which may subsequently cause erosion and instability around the excavation.
- b) The dewatering designer shall demonstrate that the likely change in pore water pressures caused by dewatering will not significantly affect buried DUSUP pipeline / pipeline support foundation.

- c) Where the site investigation reveals the presence of cavities the dewatering designer shall consider the potential for settlement generated by collapse of existing cavities caused by groundwater drawdown.
- d) Standby equipment shall be required to operate during breakdown or maintenance periods. All standby equipment shall be periodically operated to ensure that it is ready to function in the event of a breakdown of the regular equipment. Measures shall be in place to indicate whether the pumping unit is operational or not (e.g. signal lights or warning buzzers). If control of the groundwater is critical to safety of the excavation or foundation, appropriate operating personnel shall be on duty at all times.
- e) The Applicant is required to clearly demonstrate in their submission how the above key principles will be achieved during construction of the proposed works.
- f) All practical measures shall be considered to avoid land subsidence and land subsidence adversely affecting adjacent assets. Dewatering shall cease or be modified if there is evidence of land subsidence.
- g) Identify the risk prior to the construction by estimating drawdown-induced ground settlement. Provide sufficient temporary support to excavations to maintain stability, where seeps might otherwise induce progressive collapse of the sides of the excavation.
- h) Where settlement sensitivity assessment identifies problematic total and differential settlements, a review of the appropriateness of the proposed dewatering methodology is required. Geotechnical investigation and laboratory testing may be required to enable refined estimation of potential dewatering settlements at the site.
- i) Dewatering in periods of intense, heavy rain, when the infiltrative capacity of the soil is exceeded, should be avoided.
- j) Surface discharge of dewatering near DUSUP corridor is not permitted to protect the corridor from flooding and erosion.
- k) Protection must be provided for any spillage or environment contamination from the drilling and dewatering activities.
- l) Dewatering water shall be disposed as per the requirements and approval of Dubai Municipality.

#### 6.7 Dewatering Discharge line Crossing DUSUP Pipeline/Corridor.

Dewatering discharge lines are either of flexible PVC hose or HDPE lines as per the duration of use. Following are the requirements for crossing DUSUP corridor and Pipelines:

- a) Dewatering discharge line crossing pipeline berm shall be installed on a purpose built temporary bridging unit; typically made of scaffolding system and flexible discharge pipe at the crossing shall be sleeved with the heavy duty PVC Sleeve to protect erosion of pipeline berm from any leak. As the bridge and pipelines are temporary, the CONTRACTOR shall provide details as to how the temporary bridge shall be removed once dewatering is completed, and shall provide a **date** as to when the dewatering line shall be removed. Extensions to the date for the removal of the dewatering line shall be relayed to the applicable Pipeline NOC Engineer for approval. It should be noted that temporary dewatering lines are temporary only, and shall not be left by contractor after decommissioning.

- b) The dewatering discharge line crossing patrolling access track shall be safely buried or protected in order that DUSUP routine patrolling and operation activities are not affected. See sample picture below:



- c) If the dewatering installation at DUSUP corridor to be extended beyond six months, the design & details of crossing may require further field verification by DUSUP staff.
- d) Long term dewatering lines installation (e.g. HDPE lines) crossing of corridor may be considered as permanent utility crossing and NOC review shall be carried out as per DUSUP Guidelines for Utility Crossing Hydrocarbon Pipelines: DPE-OPSON-0158. Installation of HDPE pipeline crossing over with scaffold as shown in picture shall only be utilised for short term dewatering. The bridge system shall not be accepted design for permanent dewatering lines.



- e) Stopping of dewatering during the progress of work may not be possible, because water table will come back to original state once the dewatering is shut. Therefore before shutting of dewatering operation risk must be analysed by the competent person.
- f) For dewatering lines that are kept in position for a significant time, an undertaking letter will be required from the Contractor / Client to DUSUP stating that the dewatering line will be removed, otherwise a more permanent solution will be required.
- g) Wells (from well point or deep well system) shall not be located within DUSUP Pipelines 5 m No-Go Zone. Any deviation from this requirement shall require DUSUP approval.
- h) Dewatering pumps themselves shall not be located within the pipeline corridor limit, due to their high propensity to leak and cause disruption / flooding to the DUSUP corridor. Pumps shall be located out with the pipeline corridor, and shall be positioned such that any discharge shall not affect the pipeline corridor.

- i) Should DUSUP feel the temporary dewatering line requires repair or maintenance, the contractor shall repair immediately (including any damage to DUSUP assets) at no cost to DUSUP to ensure that no leaks occur within the Pipeline Corridor.

### 6.8 Contingency Risk Management Plan

The contingency and risk management plans shall be in place to handle the following events but not limited to:

- a) Impacts posed by maintenance operations.
- b) Loss of power or other technical pump failure.
- c) Clogging of well screens and high sediment inflows.
- d) Inundation of water flows higher than anticipated (e.g. flooding, rainfall or the shutdown of other dewatering systems in the vicinity of the project).
- e) Pay special attention and discontinue dewatering if the area shows signs of instability, cracks, erosion or settlement.
- f) Broken or damaged secondary component (e.g. pipe) in the dewatering system.
- g) Instability of the temporary bridging unit above pipelines.

## 7 DUSUP GUIDELINES

Various Guidelines for DUSUP/DPE Onshore pipelines are being developed for use. Reference can be made to the following link: <https://dusup.ae/dusup-noc-guidelines/>