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DEPARTMENT OF MUNICIPAL AFFAIRS
بلدية مدينة العين
AL AIN CITY MUNICIPALITY

Emirate of Abu Dhabi
Department of Municipal affairs
Al Ain City Municipality
Infrastructure & Assets of the Municipality

GUIDELINES MANUAL

FOR

THE GEOPHYSICAL STUDY IN AL AIN

TECHNICAL REPORT DOCUMENTATION PAGE

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12. Abstract As a service authority, Al Ain City Municipality has been able to absorb the latest and most advanced scientific and professional standards of quality and excellence through development and upgrading work systems, taking benefit, in this respect, from the extensive development of the means of communications and information technology, as well as from the continuous development of its human resources with a view to render faster and more distinguished services for the population of Al Ain City. Such vision and practices followed in providing services by the Municipality have been met with satisfaction and appreciation by both citizens and residents of the Area. Within the global vision, Al Ain City Municipality has prepared a Guideline Manual of Geophysical Study to be carried out by Consultant and Contractor Bureaus/Companies within the limits of Al Ain. This Guideline Manual will be given to companies with excellent reputation and experience both within the UAE and abroad.			
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PREFACE

This Guideline Manual provides guidance for the preparation and execution of Geophysical Study, Data Acquisition, Processing and Interpretation. The goal of the manual is to promote the consistency in the generation and the execution of the geophysical survey from data acquisition to final geological interpretation. Therefore, helps in creating high quality geological information that will serve as a future database, which is one of the intended purposes of the geophysical study project.

Al Ain City Municipality (AACM) is pioneering a project of ground/soil study by geophysical investigation in order to have, in the future, a detailed geological/soil map of Al Ain region. The geophysical survey is considered as one of the goals to help the decision-makers and the environmental managers in various domains. The project is a cooperative effort of the Infrastructure Assets of the Municipality (IAM) Department under the authority of AACM.

The geological/soil map is the City's first standard geophysical project that will provide the scientific bases for identifying areas at high risk for the population. This will lead to minimizing the risk and using of new soil parameters that are most appropriate to the population’s needs. The geological data and all associated maps of Al Ain City Municipality ’s geophysical project will eventually be available on the Geographic Information System in the Town Planning Sector.

For the implementation of the project, all related AACM projects which are executed directly or through Contractors/Consultants are considered as part of the project. Other present and future projects not directly under the AACM authority are also considered as part of the main geophysical projects. Therefore the Contractors/Consultants of these projects are obliged to abide by the AACM regulations of this subject.

The Contractors/Consultants who will be directly or indirectly involved in any of the project in Al Ain shall at all times comply with the laws of the United Arab Emirates and the Emirate of Abu Dhabi. The Contractors/Consultants shall be fully aware of, and shall take account within this guideline, the impact of and ensure compliance with such laws. The agreement shall be governed by and construed in accordance with the laws of the Emirate of Abu Dhabi.

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ACRONYMS

AACM	Al Ain City Municipality
RDS	Research and Development Section
IAM	Infrastructure & Assets of the Municipality
GSG	Geophysical Study Guideline
EHSMS	Environment, Health & Safety Management System
KPI	Key Performance Indicators
GM	Guideline Manual

INTRODUCTION

Al Ain City Municipality constitutes one of three departments within the Municipal Affairs Authority. It is a government institution basically directed to serve Al Ain Area, which covers Al Ain City and the neighboring outskirts. Al Ain City Municipality Department was established in 1967. An Emiri Decree was issued in 1974 AD to control and regulate the city's affairs. It was after that date that Al Ain City Municipality started to function as a government department that is directed to provide wide range services to Al Ain City.
Al Ain City Municipality stands as a leading institution of development in the area. This is due to the role it plays and the programs and services it renders for improving the quality of life to the highest possible standards.

Al Ain City Municipality has also projected a clear strategy based on a vision entitled, " To be recognized as an efficient world class Municipal System ensuring sustainable development and enhancing the quality of life for the Emirate of Abu Dhabi.". This strategy is expected to be implemented through "Providing such distinguished municipal services and advanced infrastructure to Al Ain City and the surrounding areas, by qualified staff and advanced systems, while taking into account the peculiarity and genuineness of the City", abiding in the same time by the values stemming from heritage, leadership, credibility, quality, innovation, participation and community service within the aims of this strategy.

As a service authority, Al Ain City Municipality has been able to absorb the latest and most advanced scientific and professional standards of quality and excellence through development and upgrading work systems, taking benefit, in this respect, from the extensive development of the means of communications and information technology, as well as from the continuous development of its human resources with a view to render faster and more distinguished services for the population of Al Ain City. Such vision and practices followed in providing services by the Municipality have been met with satisfaction and appreciation by both citizens and residents of the Area.

Within the global vision, Al Ain City Municipality has prepared a Guideline Manual of Geophysical Study to be carried out by Consultant and Contractor Bureaus/Companies within the limits of Al Ain. This Guideline Manual will be given to companies with excellent reputation and experience both within the UAE and abroad.

Purpose of the Guideline Manual

The aims of this guideline manual are to assist the geophysicists, engineers and geophysics service companies to comply with Al Ain City Municipality requirements regarding the geophysical investigation. These include:

- The Fieldwork Data Acquisition
- Data Quality Control
- Data Interpretation (including Conclusions and Recommendations)

Scope of Practice

The following Guideline Manual has been prepared by the Geophysical Team under the authority of Al Ain City Municipality. The Guidelines must be implemented by all Contractors/Consultants not solely the geophysicists, but also the non geophysicists who use geophysical instruments in order to indicate their activities providing that they do not violate the exclusive scope of practice provision for Geophysics.

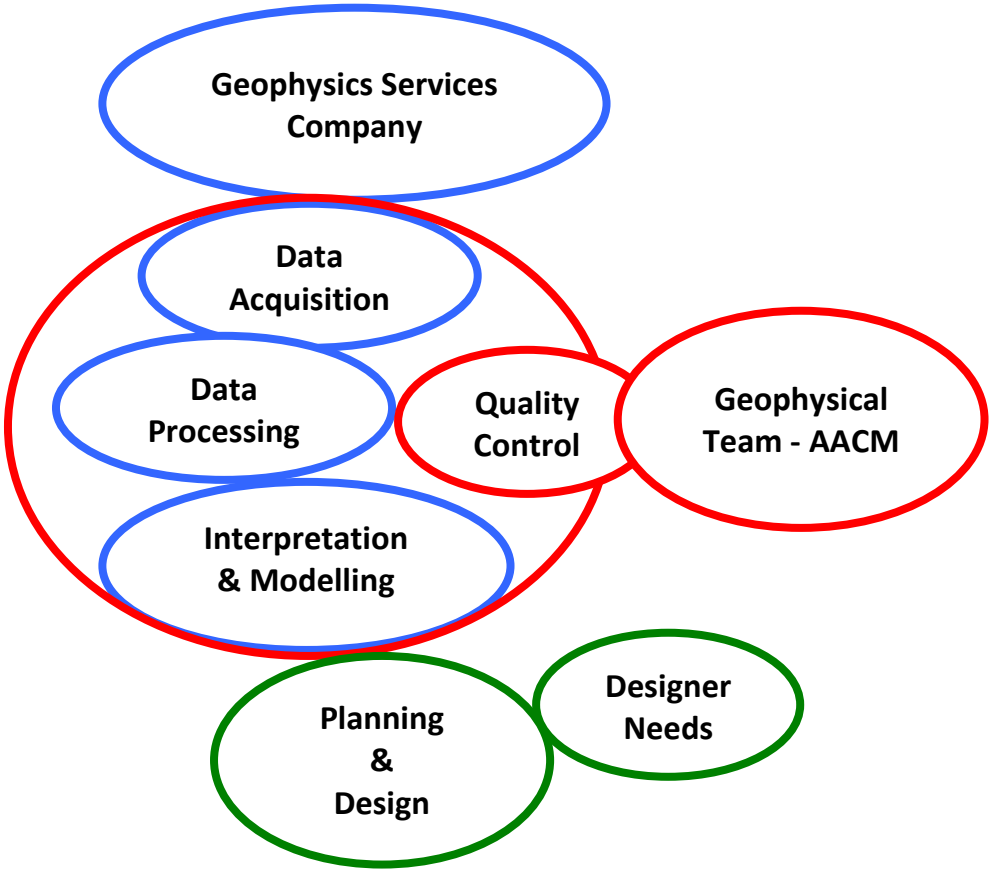
This guideline dedicated to near-surface application of geophysical investigation, and never to be used as means of interpretation. Certified geophysicists, engineers or geophysics companies who may conduct any geophysical study in Al Ain or when they prepare the geophysical study and the reports should follow these guidelines in order to avoid any unconformity or violation which might occur during the geophysical study throughout all its stages. The guideline should not be considered as normalisation or limiting factors which would discourage the Contractors/Consultants from further improvement and increase in efficiencies in their geophysical investigations.

Definition

The following words or expressions appear in this guideline manual shall have the meanings assigned to them unless otherwise stated in the text. The singular shall have the same meaning as the plural and vice versa.

	Definition
2D and 3D	2D (two-dimensions) consists of taking measurement in two different directions, example X and Y - the results is a map or a vertical section. The 3D comes by introducing the third dimension (e.g. the depth Z) in the consideration of the results - a volumetric data.
4D or Monitoring	Technique consist of collecting a 3D volumetrically data periodically during time (Time-Lapse). This technique allows monitoring the evolution of the subsurface.
Anthropogenic	Landscape, soil, terrain, etc… their formation is mainly due to the intervention of man.
Piezometer	Measurement by sampling underground-water depths and processing the corresponding data.
Bedrock mapping	Representation on a plane surface of the depth of solid rock either exposed at the surface or situated below surface soil.
Stratigraphy	The study of the history, composition, relative ages and distribution of bedrock.
Contamination mapping	The delineation of zones in which contaminants have moved.
Forensic work	The Geophysical can assist authorities in accident and criminal investigations.
Geophysicist	A scientist who is involved in the study of the physics of the Earth, especially electrical resistivity, gravitational and magnetic fields, propagation of elastic waves. Geophysicists perform a variety of competency, processing and interpretation of variety of Geophysical data; such interpretations enhance understanding of subsurface geology.
Groundwater	Water in the subsurface, is held in the pores of rocks
Near-surface	The volume of the rock may extend from a few meters from the ground surface and extending into hundreds meters deep in the earth. It includes soil, unconsolidated and consolidated rock, and hold or not groundwater aquifers that can be measured using appropriate geophysical applications.
Void detection	Detecting voids within near-surface, such as old Falajs or natural karsting.
Tomography	Mapping of geologic features from a set of data measurement representing of certain physical ground parameters.
Lithology	The macroscopic description of the mineral constitutes the rock based on grain size, texture and color.

Role of Al Ain City Municipality



Al Ain City Municipality (AACM) regulates and supervises the geophysical study in Al Ain City and surrounding areas; and provides support to the development of the near-surface geophysical investigation in order to ensure a healthy environment, in accordance with the objectives and the targets of the Environment, Health and Safety Management System (EHSMS). The goal of AACM is to insure the smoothness and the quality of any geophysical study in the area and to make sure of the consistency.

As AACM is a regulatory authority, AACM taking upon itself responsibilities to accept and review all geophysical subsurface fieldwork, reports and to issue approval letters. AACM has given unlimited authority to issue or not issuing permits for building constructions, which can affect cultural heritage, land, environment, water and other resources as they may incidentally affected by humans' activities.

Addendum Procedures

Any changes to this guidelines manual will be made by addenda by Municipality and will be sent by e-mail to everyone in the mailing list. Upon issuance, the addenda will be considered part of the guidelines manual and will prevail over inconsistent of conflicting previous contained in the original guidelines manual.
Contractors/Consultants shall acknowledge receipt of all addenda. Failure to do so may result in Contractors/Consultants exclusion from further consideration.

Geophysical Investigation Background

The application of geophysical methods is motivated by the need for the characterization of the physical parameters and/or processes that may control or be affected by the distribution, presence of subsurface structures like cavities, falajes, faults and other structures which may present a hazard if existed.

Geophysical methods are non-destructive and have the capacity to estimate the distribution of anomalies both horizontally and vertically, quickly and remotely over large areas.

Applied Geophysics, is the science that study the Earth's interior. The applications of geophysics are many and vary broadly. They include as example petroleum and mineral exploration, groundwater exploration, and environmental risk assessment. It is used to help the engineers to find right solutions. It also used for archaeological investigations and many other applications.

The AACM is tasked to implement and control the geophysical study project. The Research and Development Section (RDS); has the authority to control and monitor all stages of any project under the authority of Al Ain Municipal Affairs. The main objectives of the RDS are based on the Competent Authority vision which is to implement, control and assure the efficiency of the geophysical studies, and to assist the local decision-makers and developers in making wise use of the city land, water and related resources. The key objectives are:

- To protect people's land and properties
- To promote health, safety and general welfare of Al Ain City
- To preserve and enhance natural heritage and culture resources
- To abate any non-safety soil at high risk
- To improve quality and monitor groundwater table

GEOPHYSICAL INVESTIGATION IN AL AIN CITY

The Guidelines Manual has been prepared by the Geophysical Team under authority of Al Ain City Municipality. These Guidelines are to be used by Contractors/Consultants, Certified Engineering Geophysicist and/or other company who will conduct any Geophysical study in Al Ain City Municipality, or when preparing Geophysical study and reports.

Geophysical studies are being used in a variety of regional-scale environmental and risk management planning programs including the Environmental Impact Program, the General Plans, the Safety and groundwater Assessments, Sustained Yield Plans and Habitat Conservation Plans. These studies may describe the regional geology, identify the location, depth and dimension of cavities, structures and stratigraphy deposits, and show the location of faults, landslides and other geologic hazards. Geophysical investigation and reports can be used to assist users, engineers and land-use planners in making decisions that affect public health and safety, critical environmental habitats, water quality, use of public lands, and help identify areas where more detailed geologic studies are needed.

The purpose of the RDS Team's notes is to provide the authority and the Consultants/Contractors and other professionals with a general guidance on the preparation and use of the geophysical survey in regional scale environmental and resource management planning.

In order to evaluate the geologic hazards at regional scale, all geophysical data and results should be inline with the requirement of Al Ain City Municipality and submitted in GIS format compatible with the Geographic Information Systems (GIS) of the AACM. The guidelines manual also provides a general outline for documenting computer works, conclusions and recommendations of the geophysical reports and maps. In addition to the scientific contents, all documents should be prepared in such a way that they can be understood by both the authority and the public. Regional information can be incorporated into the detailed studies provided that the data are checked field.

While the following Guidelines suggest a format for geophysical studies to be used in regional-scale environmental and resource management planning documents, they do not include complete listings of techniques or topics, nor do they dictate that all elements of this guidelines manual be used in every project. In many cases, portions of these guidelines may not be applicable to the study when a geologic hazard or issue is absent.

Al Ain City Municipality Geophysical Team

Title	Geophysical Investigation Guideline in Al Ain	
Reference	24/December/2014	
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Objectives

The objective of the present Guidelines manual is to orient the geophysical study in Al Ain City, i.e. applied geophysical methods, map presentations, cross sections, figures and tables. In addition to the used format of the computerized databases and GIS maps and layers.

Guideline Manual provide the methodology for comprehensive requirements of Al Ain City Municipality, the adequate technology and the processes of the geophysical methods used for the execution of the projects by the Contractors/Consultants exercising in Al Ain City. These Consultants/Contractors, and in order to able to work within Al Ain area, must be registered in the UAE and have an office in Al Ain during the execution of any project.

The guideline is dedicated to Geophysical Study, to help Contractors and Consultants with an understanding of the kinds of necessary and needed information for the approval of reports submitted to the AACM. This guideline includes comprehensive discussions of the methodologies and/or the steps to be used, describes all the methods or the topics to be dealt with in every project. This guideline will be periodically updated to reflect the future needs and changes.

Concerning the Geophysical reports, it is required, in addition to the above mention points that they also include following hazards:

- Seismic hazard: identify faults or fractured zones in the study area, and should be clearly indicated on the map with coordinates.
- Landslide hazard: identification of the zones of moderately to high landslide risk within the lines of the area.
- Liquefaction hazard: Areas likely to present moderate to high liquefaction risk.

The purpose of this Guideline manual includes, but is not limited to, the following main objectives:

- A clear statement of the requirements to be met by the Contractors/Consultants. This includes the plan and the phases of the project, the required data, and the report.
- When contractors/consultants conduct geotechnical investigation, they should prepare a comprehensive geological mapping depicting stratigraphy/lithology, describing the standard characteristics of soil/rock and by correlating data's obtained from different borehole logs. It shall also identify the fractured rocks, weak zones, etc...
- Providing a digital topography for the site project with the exact; latitude and longitude of the site to three decimal places (example: 10.120°N, 50.458°E). This is a necessary for the Town Planning Department.
- If a non-standard method is used, contractors/consultants should attach a detailed description of the methodology along with the results of any calibration and validation studies.
- Detailed discussion should be given on any restrictions on collecting and reporting of data, such as access to or the condition of the site.
- The Consultants/Contractors should provide a range of geophysical survey methods which are adequate to the site and anticipate ground conditions
- The Contractors/Consultants should have an experience of undertaking a range of geophysical surveys in the UAE and worldwide.
- The contractor should have an adequate quality assurance procedures and minimum requirement of HSE procedures.
- To proactively educated to all types of Geophysical Investigations and site situations.

Scope of Manual

Contractors/Consultants who are considering undertaking any of the activities in Al Ain are strongly encouraged to include a geophysicist in their team. Choosing not to involve a geophysicist and/or being found to have performed the work in an unskilled manner could result in action being taken against such contractors/consultants under the Engineering, Geological and Geophysical Professions act or under another professional regulatory act where the person is registered under such an act.

The following sections outline the key functions of the Geophysical Survey. It is expected that Contractors/Consultants will address all sections accordingly within their interpretation report. Failure to address all sections will be detrimental to their report. Contractors/Consultants will be marked in their first year of geophysical implementation in Al Ain through a series of Key Performance Indicators (KPI) as indicated in Appendix D. Additional to addressing the key functions; Contractors/Consultants are required to complete, the submission questionnaire as part of this proposal and the template of proposal and Final Report Template in Appendix A & B, Contractors/Consultants are also recommended to review Appendix C, the Contractors/Consultants Summary of Needs. Contractors/Consultants are expected to communicate with IAM representatives for Al Ain City Municipality through the project owner.

Key Tasks

In order to make an appropriate Geophysical Study, the Contractors/Consultants should be an experienced geophysicist familiar with the investigative methods employed and the techniques available. Even so, evaluations before sending any report to AACM Geophysical Team, the reviewer must know his or her limitations, and at times ask for opinions of others more qualified in specialty fields (e.g., geophysics, mineral exploitation and economics, groundwater, foundation and seismic engineering, seismology).

Contractors are expected to conduct the following tasks:

- The Contractors during the fieldwork must be able to identify any anomalies, cavities, Falaj systems (live or abandoned), faults as well as weak zone or any lithological change. These kinds of anomalies should be clearly positioned on a risk map.
- The groundwater level and the salinity of the studied areas shall be indicated.
- To ensure that the works on any site within the district of Al Ain are carried out in accordance with the approved method statement in full compliance with each project's contract specification, drawings & methodology.
- Undertake a geophysical survey by adapting a technique, most suitable for the area under investigation, thereby identifying & locating the position & extent of cavities, if any, with 3D models.
- Conduct geotechnical investigation and prepare a comprehensive geological mapping depicting stratigraphy/lithology, describing the standard characteristics of soil/rock and by correlating data's obtained from different borehole logs. It shall also identify the fractured rocks, weak zones.
- To ensure that the equipment employed on any site within the district of Al Ain are in good working condition and are duly calibrated and meet international standards.
- Development of Legislation and Guidance Data Quality for each steps of Geophysical Survey.

Qualification Selection Criteria

There are many criteria's to select Contractors/Consultants; the selection based on the evaluation of Contractors/Consultants qualifications according to the following criteria:

- Technical credentials
- Relevant experiences to manage a projects
- Availability of experienced human resources and equipments
- Professionalism
- Methodology for project execution

Requirement for Geophysical Investigation

Owners/Contractors/Consultants wishing an approval for engineering establishment in Al Ain City and surrounding area must submit a technical geophysical proposal to explaining the details scope of work, the Contractors/Consultant are fully responsibility for his proposal and it is understood that Contractors/Consultants are fully comply with the regulation and legislative laws for AACM, including the EHSMS systems.

The following are the key project outputs that align with the key tasks within the project.

- Provide a brief summary of the model results and how the results will assist Civil Engineer to make a decision.
- Discuss future needed data and recommendations on the located anomalies in the site and to make a calibration borehole(s) in order to confirm and improve the results, including the relevant quality and quantity of the results.
- Plot on a map, the locations of borehole and field measurements points used in geophysical study, as well as cross sections.
- Weekly progress report must be presented to the Municipality. This report should contain an overview of the status of the deliverables, adherence to agreed timeframes and expected work for completion in the following week.
- Adequate final reporting to Al Ain City Municipality requirements - refer to Appendix B.
- Provision of guidance of Data Quality Control.
- Provide a detail scope of work to conduct welfare Geophysical investigation.
- The Consultants should be able to evaluate the weekly reports submitted by Contractors to the AACM.
- Programme which will include the timeframe when and how the geophysical survey will be conducted.
- Provide a Final Report according to the template Appendix B, accompanying with copy of all field and processed data in a GIS format compatible with the Municipality system.
- CV, Competency, and Skills for all personnel participating in the projects - using the template Appendix D.

The AACM requires that a competent Geophysicist, and/or Certified Engineering Geologist, or Certified person handling the interpretation shall exercise and maintain responsible charge and shall certify geologic reports must be working within his/her area of expertise. Inclusion of license numbers and/or official stamps shall be in accordance with the requirements of the licensing board, local authority requirements.

Recommended Geophysical site investigation

Assessments of subsurface conditions by using Geophysical methods depend on three important points:

- Used equipment’s
- Field procedure
- Interpretation.

The Consultants/Contractors are expected to provide a range of geophysical survey methods (geo-electric, seismic, magnetic, etc…) and are expected to undertake suitable geophysical survey by adapting the technique(s) most suitable for the area under investigation, thereby identifying, locating and characterizing all subsurface geological features as well as the groundwater within the investigated site.
However, for the use of the MASW survey, the Geophysical team of Al Ain City Municipality recommend the implementation of the parameters in the following table as a new requirement for site investigation.

Depth (m)	Source (kg)	Receiver (Hz)	Geophone Spread (m)				Lateral Move	Recoding		
			Length (m)	Source Offset (m)	Receiver Spacing		Lateral Resolution	dt (ms)	T (s)	Vertical Stack
					24 Geophones	48 Geophones	H			VN (very Noisy)
30 - 50	≥4.5	≤4.5	30 - 150	6 - 150	1.2 - 6.0	0.6 - 3.0	1 - 2	0.5 - 1.0	1.0 - 3.0	5 - 10
	9 or passive	4.5	70	15	3.0	2.0	1	1.0	1.0	10
>50	≥4.5	≤4.5	>50	>10	>2.0	>1.0	1 - 2	0.5 - 1.0	≥1.0	5 - 10
	9 Or passive	4.5	150	30	6.0	4.0	1	1.0	2.0	10

EHSMS Policies :

All the geophysical companies shall ensure that all their processes / activities /operations comply with all Abu Dhabi Environmental, Health & Safety laws and regulations.

GENERAL DATA QUALITY GUIDELINE

General

The Contractors/Consultants conducting field acquisition must submit field data as required in the data submission format section. This data should outline contractors/Consultants evaluation of their performance during the geophysical survey. The Contractors/Consultants should also exhibit flexibility in their responses in order to avoid any misunderstanding and to respond to all report evaluation changes made by the geophysical team of AACM.

Acquisition Scheme

During fieldwork, the field-geophysicist/geologist is expected to maintain documentations for all fieldwork. It is most important to provide a historical record for any future review and/or analysis of the usability of the collected data. However, it is known that most available Geophysical Instruments record automatically the data, therefore a large number of the information concerning the quality of the captured data may not be seen. In addition, some other filed conditions may affect the measurements.
These conditions should be recorded on the field logbook. It can range from topography, ground cover, obstacles and weather as well as much other interference. It is clear that such sources of contributing effects may not be obvious and can go unnoticed by less experienced people. It is known that in Geophysical Investigation, noise sources can affect dramatically the measurement.
The objectives of the Geophysical survey are the interpretation of geological conditions presented by the physical measurements. The reasonable expectation of how the geophysical data will be interpreted is ideally a partnership between the Geophysicist, Geologist and Geotechnical engineer.

Field Crew

During the field acquisition the AACM will conduct a field inspection. The inspection can be conducted during the fieldwork according to the specification mentioned in the proposal and not limited to it, in order to check whether:

- The field crew provided by Contractors/Consultants is a qualified geophysicist leading the field crew.
- The field measurement accuracy is within minimal tolerance of error?
- There is a minimum of one person with appropriate licence, e.g. first aid training in case of emergency.
- The equipments are working properly.
- A computer is available in the fieldwork. Leading Geophysicist should upload the data after each profile measurement to check the quality of data.
- The equipment used in the fieldwork is the same as what the Contractors/Consultants mentioned in his proposal.
- The Contractors/Consultants have certain permission since some projects need special permission.
- The data checked correctly? And by who?
- They have the field logbook, in which all significant events are recorded.
- The recorded data are checked periodically? Times and by who?
- The field crew is respecting the environment, referring to the EHSMS system.

Equipment and Field Computers

By noticing the importance of calibration and standardization of the Geophysical instrument that can affect the measurement; the Contractors/Consultants should maintain the instruments calibration remarks written in the field logbook. It is recommended that the calibration is carried out before each new project and preferably checked before the start of any fieldwork for each day.
To handle this situation it is mandatory to include periodic review of the digital data especially for Electrical measurement. A field personal computer should be available during the fieldwork period to insure the ability to read the field digital data that has been recorded. For different Geophysical methods a different procedure may be required.

Surveying

Achieving a good geophysical investigation is conditioned by the three points:

- Implementation of the geophysical survey at a very early planning stage of the project.
- Identifying the needs and designing the correct geophysical survey which corresponds to the objectives.
- Choosing the appropriate geophysical Contractors/Consultants.

The success of any geophysical survey depends not only on the design of the geophysical survey but also on the combination of the geology and the use of the adequate geophysical techniques. These factors include:

Factors	Description
Nature of the objective	The geophysical signature of the targeted geological features is different from that of the background.
Depth of burial of objective	Since the geophysical techniques have different response, therefore, the depth of burial of the geological feature is important. The depth of investigation for geophysical methods is technique dependant. However there is a strong relationship between depth of investigation and the resolution of the geophysical methods to take into consideration to achieve the target. Generally the vertical resolution decrease with depth of investigation.
Dimension	Estimation of the dimension of the geological features is very important; because it will help the designers to build their calculations accordingly.
Profiling and station separation	The geophysicist should build up the survey design according to the depth of investigation, the objective's dimension and in addition to proper selection of geophysical methods. Usually a geophysical investigation is conducted along profiles or in grids, thus the measurement station spacing along the lines must be calculated together with the line separation in order to cover all the surveyed area. Approximately a geophysical anomaly if existed will be double the actual size of the object causing the anomaly. This phenomenon, however, will help in calculating the maximum profiles' separation and stations' separation.
Data calibration	An important facture that can help in any geophysical investigation is the calibration of the geophysical data with calibration borehole. The calibration data may be provided by geotechnical investigation or down-hole geophysical logs.

Quality Control in the Field

Data Quality Control throughout all stages of the geophysical fieldwork is the key of a successful geophysical study. Field Quality Control should include:

- Calibration of the equipment.
- Field reporting during data acquisition.
- Uploading the data to a field computer in order to check for the quality after each profile measurement.
- Repeat measurements in case of bad data reading.

During the data processing, the quality control should include:

- Discussing the quality of data.
- Minimum and maximum tolerance.
- Processing steps notice.

DATA SUBMISSION FORMATS (DELIVERABLES)

The Contractors/Consultants, in their submitted interpretative report shall take into their consideration and should:

- Give a general description of the project area and the type and the scope of study.
- Discuss the purpose and objectives of the study; and clearly delineate and list the limitations of the work and of the data and results.
- Describe the general methods of analysis undertaken in the study.
- Acknowledge the contributions of others that provided data, funding, access, assistance and insight to the study.
- Provide an index map showing the general project location, including important roads and cultural features.
- Provide an overview of the Geophysical Study steps that indicates their understanding of the scope for the project and its purposes.
- List the individuals who will interfered on the Geophysical Study, describe their individual roles and what project work each of them will be responsible for. Include any subcontractors. CV's in attachment used the template Appendix D.
- Provide the standards regarding the Data Quality Control during the fieldwork and the laboratory processing, as well as, HSE policies procedures.

Media Types

Geophysical reports including the raw and the processed data, the parameters of inversion and the interpretation must be submitted in a digital format and as a hard copy. The following aspects are to be ensured for the digital media:

- Data integrity and traceability of the original hard copy report and digital media.
- The chronology and good structuring should be observed during the writing up of the report.

- All digital versions including the interpretation report and inversion parameters of the operations should be submitted on CD/DVD. The CD should be clearly labelled.
- A digital media backup copy of all digital information submitted to AACM should be kept with the Contractors/Consultants for a period of at least 5 years, covering the possibility of information corruption during transfer to AACM.

Data Formats

All digital interpretation report submitted to AACM should be in PDF format; this includes interpretation report or maps, tables, figures and all other media which can be embedded into the PDF document. The Contractors/Consultants should take into consideration the resolution and recommendations of this report.
Concerning the tabular digital Data information (such as listings of lines/stations/areas recordings, survey control points, permanent markers, borehole locations, and processing parameters) should be submitted as GIS format files. These files should include explanation of column headings, units and abbreviations as appropriate. The digital form of the report must be bookmarked to assist in rapid navigation through the document.

All the submitted digital data must be in complete agreement with the Town Planning Requirements.

Compression Files

In case where the Contractors/Consultants submit a data in compressed form; the following should be observed:

- Include an explicative note.
- The file should be in self-extractor format.
- Whenever the Contractors/Consultants are using other software than WINZIP, they are required to provide the software.
- Detailed list of all compressed files.

Conventional File Name

All digital media should be named following this example:

Project_Name_services (ERT_MASW_etc)_Name_of_Area_Client_Date.pdf
Photography_1_ services (ERT_MASW_etc)_Name_of_Area_Client_Date.jpg

Report limitation

The Contractors/Consultants when submitting the final report with digital data must:
- Inform the AACM of any limitations that the Contractors/Consultants met during the investigation.
- Mention the areas, which lack certain data and information or any significant uncertainty.
- Give reasonable and scientific assessments of how the conclusions and recommendations have been reached.

Delivery

All interpretation reports or digital media submitted pursuant to AACM should be marked to the attention of the Eng. Abdulla Sultan Al Darei, Research and Development Section Head and addressed as follows:

For hand deliveries:
Abdulla Sultan Al Darei
Al Ain City Municipality – Main Building
Infrastructure Assets of the Municipality
First floor, office 199
Al Ain

For postal deliveries:
Abdulla Sultan Al Darei
Al Ain City Municipality – Main Building
P.O. Box 1003
Al Ain City, Abu Dhabi, UAE

Geophysical reports can be submitted to the following:

Mai Rashed Al-Kaabi
mai.alkaabi@am.ae
Al Ain City Municipality – Main Building
Infrastructure Assets of the Municipality
First floor, office 1102. Al Ain

Karim Benhammam
karim.benhammam@am.ae
Al Ain City Municipality – Main Building
Infrastructure Assets of the Municipality
First floor, office 144. Al Ain

Archiving

Archiving is an important operation at the end of any study. Indeed they can help in future research. The Contractors/Consultants should archive all field and processed data at least 5years after completion of the geophysical study.

Data	Data Format	Remarks	Archiving
Report			
Report text including plans, tables and maps less than A3	PDF	The report should be in PDF format generated from word. Scanned to PDF format is not acceptable.	5 years
Map, plan and logs less than A3	PDF + GIS	The resolution more than 200dpi. Scanned files to PDF format are not acceptable	5 years
Fields raw and processed data			
All field data	ASCII (in GIS format)	Format should be the same as was originally recorded, including full header information	10 years
All processed data with processing parameters	ASCII (in GIS format)	Format should be the same as was originally processed, including full header information	10 years
For resubmitted data and for any given reason, the Contractors/Consultants must attach an explicative note on whether there are any differences between the resubmitted and the first submitted data.			