

## 1. Introduction

The Client is located in Safi Site, Jordan, 130 km south of Amman, and is a Jordanian Producer of Potash (KCL) extracted from Dead Sea minerals. APC is producing Potash by pumping the Dead Sea brine into a Solar Evaporation System consisting of Salt Ponds and Carnallite ponds. The raw Potash material: Carnallite is precipitated in the Carnallite ponds and harvested by special harvesters and pumped to the Plants for processing.

In Potash production process, Salt (NaCl) is precipitated first in the Salt Ponds. The amount of precipitated salt is around 15 million Tons per year. The salt is precipitated at ponds floor and in irregular forms called "Salt Mushrooms".

The Client is utilizing the Client Equipment to dredge this accumulated salt and store it into the Reclamation Areas within Salt Dikes inside and outside the Salt ponds.

## 2. Scope

The Client owns and operates five base stations located inside his premises; these base stations are connected to the Client's dredgers using a standard communication protocol (CMR, CMR+, or RTCM v3). The table below shows some technical information about the base stations:

Device function	Base Station		Rover Station		Radio	RTK Format
	Receiver Model	Antenna Model	Receiver Model	Antenna Model		
Trimble (x2)	SPS 858	Trimble Zephyr 3 Geodetic	SPS 858	Trimble Zephyr	Internal / Arwest / TRACSCOM (THALES)	CMR CMR+
			SPS 858	Trimble GA830		
			MPS865	Trimble Zephyr 3 Rugged		
Topcon	GB-3	Topcon PG-A1 GPS Antenna	GB-3	Topcon PG-A1 GPS Antenna	TRACSCOM(THALES)	
Leica	Biult-in Smart antenna	GS14 & GS18 T	Biult-in Smart antenna	GS14 & GS18 T	SATEL / HPR2	RTCM v3
Septentrio	ASTERXU	PolaNt*_MC Antenna	ASTERXU	PolaNt*_MC Antenna	UHF-EU-4G	

the Client wishes to procure one master base station that is capable to communicate with all the rover devices located onboard the dredgers.

The Vendor's Scope includes:

1. Design: The Vendor shall prepare and submit a detailed design of the Base Station that fits the Client's operational needs and climate conditions to be operational 24/7 without stopping.
2. Supply: The Vendor will then supply all the components of the Base Station to the Client's premises in preparation for assembly. all costs related to shipping and logistics shall be included in the Vendor's offer. the Client will only handle customs clearance and hand all material over to the transportation company assigned by the Vendor.
3. Install: The Vendor shall assign an expert to conduct all installation works inside the Client's premises in coordination with the Client's staff. it is preferred that the expert visits the site beforehand to provide notes/comments that are required before installation. noting that the Client will conduct all necessary site preparations as per the Vendor's recommendations.
4. Test and Commission: The Vendor shall test all equipment and connections to be at full working condition and then commission the equipment, systems, and all related to the Client. The Vendor shall also ensure a successful connection to the Client Dredgers.
5. Train: The Vendor shall train the Client's Engineers to operate, troubleshoot, and configure the base station.
6. Technical Support: The Vendor shall quote separately in his offer a technical support item for one year's duration for any issues that may arise with operating the Base Station other than the warranty for all hardware supplied.
7. Warranty: supplier will provide 1-year warranty for all supplied parts and will also warrant the complete function of the system according to the Client's described needs.

### 3. Technical Specifications

CHARACTERISTICS	SPECIFICATION
<b>Measurements Specification</b>	
Satellite Tracking	Should be Capable of tracking: GPS L1, L2, L5 GLONASS L1, L2, L3 Galileo E1, E5ab, E6 BeiDou B1, B2, B3 NavIC L5 SBASS L1, L5 QZSS L1, L2, L5, L6
No. of Channels	At least 120 Channels
Measuring Modes	Static, Real-time Kinematic, stop and go.
Measurement Technology	High Precision multiple co-relators for GNSS Measurements for low noise low multi-path error. RTK and DGNSS corrections. PPP for seismic applications.
<b>Accuracy</b>	
<b>Static</b>	
Horizontal	+ 3 mm + 0.1 ppm or better
Vertical	It should be twice the horizontal accuracy
<b>Real-Time Kinematic (RTK)</b>	
Horizontal	10mm + 1 ppm or better
Vertical	20mm + 1ppm or better
<b>GNSS Antenna</b>	Multi-frequency, high-gain External antenna with Sub-mm phase, Protection against water, sand: "IP rated"
<b>Communication Devices</b>	The receiver should support the following: GSM, GPRS, and UMTS. The receiver should support Internal GSM and Internet (available for two net providers).
<b>Communication ports</b>	Ethernet, USB Host, serial port/USB, Bluetooth, WIFI

<b>General Specification</b>	
<b>Power Port</b>	1 No. power port with input voltage of 12V DC external power input with over-voltage polarity protection
<b>Power Supply Connection Voltage</b>	220v
<b>Internal Batteries</b>	preferred
<b>Operating Temperature for all major RTK Components</b>	-30 <sup>o</sup> C to + 65 <sup>o</sup> C
<b>Storage Temperature for all major RTK Components</b>	-40 <sup>o</sup> C to + 75 <sup>o</sup> C
<b>Humidity</b>	70-100%
<b>Initialization Time</b>	Typically, less than 20 seconds
<b>Position Update Rate</b>	10Hz or higher
<b>RTK Data Formats for Transmission and Reception</b>	RTCM Versions 2. X, RTCM 3. X, CMR and CMR + input/output
<b>NMEA output</b>	Support for NMEA output
<b>Memory</b>	Memory of 8 GB "preferred more" through compact flash card/SD card
<b>Antenna Cable</b>	A 20-meter antenna cable should be provided for the Base
<b>Chargers</b>	Internal/External chargers to charge all the Batteries at the same time should be provided. And nursery accessories.
<b>External battery Cable</b>	A suitable External Battery cable should be provided For the Base station.
<b>Radio Modem</b>	
<b>External Base Transmitter</b>	
Output power	35 watts
Selectable channel	Two selectable power outputs of 2 watts and 35 watts.
<b>OFFICE POST-PROCESSING SOFTWARE</b>	
Importing Raw Data	The Client should be able to import Raw data and RINEX data from the receiver. Also, it should be able to import raw and precise ephemeris data via internet IGS data
Baseline Processing	It should be capable of processing GPS raw data.
Network Adjustment	Should be able to perform Network adjustment using the least square adjustment principle.
Export	Capable of Exporting the data in RINEX format and other related formats.
Reporting	Software should be capable of generating reports directly for the surveyed data
Feature Coding	Software should support feature coding
Integration with another type of antenna	Trimble, Leica, Topcon, or any other brands
IGS reference	The ability to achieve IGS requirements