

Annex 3
Result of Field Survey by Sub-Contract

ANNEX 3-1 LIST OF FIELD SURVEY

GENERAL LIST FOR RIVER DISCHARGE OBSERVATION, SPRING FLOW OBSERVATION AND WATER QUALITY ANALYSIS I & II

| AREA | CODE | REGION | TARGET NAME | FLOW | T & EC | WATER QUALITY (1) 9 ITEMS | WATER QUALITY (2) 10 ITEMS | WATER QUALITY (3) |
|--|------|--|-----------------------|------|--------|---------------------------|----------------------------|-------------------|
| N O R T H L E B A N O N | 101 | FNAIDQ | NABAA FNAIDQ | 1 | 1 | 1 | | |
| | 102 | | NABAA EL HOUEH | 1 | 1 | | | |
| | 103 | | NABAA EL BANAT | 1 | 1 | | | |
| | 104 | AKKAR EL ATTICA | AIN EL DBEK | 1 | 1 | | | |
| | 105 | | NABAA EL CHOUH* | 1 | 1 | | | 1 |
| | 106 | | NABAA EL JAOUZ | 1 | 1 | | | |
| | 107 | | NABAA ECH CHEIKH JNAD | 1 | 1 | | | 1 |
| | 108 | | NABAA OMAR KAYLO | 1 | 1 | | | 1 |
| | 109 | | AIN EL WATIEH | 1 | 1 | | | 1 |
| | 110 | | AIN EL HOMSIYE | 1 | 1 | | | |
| | 111 | | AIN AAIYAT | 1 | 1 | | | |
| | 112 | BOUQALAA | NABAA ES SAFA | 1 | 1 | 1 | | |
| | 113 | | MRAH ET TINE | 1 | 1 | | | 1 |
| | 114 | MASHTA HASSAN, MASHTA HAMMOUD AND CHADRA | NABAA EL JAOUZ | 1 | 1 | | | |
| | 115 | | AIN EL ABIAD | 1 | 1 | | | 1 |
| | 116 | | NABAA HMADE | 1 | 1 | | | 1 |
| | 117 | | NABAA EL CHARQI | 1 | 1 | | | 1 |
| | 118 | | NABAA EL GHARBI | 1 | 1 | | | 1 |
| | 119 | TANNOURINE | NABAA ECH CHEIKH* | 1 | 1 | | | 1 |
| | 120 | | AIN ES SAOUDA | 1 | 1 | | | |
| | 121 | | AIN EL BASHA | 1 | 1 | | | |
| | 122 | | NABAA EL MOGHRAQ | 1 | 1 | | | |
| | 123 | | NABAA EL KORSI* | 1 | 1 | | | 1 |
| | 124 | | NABAA ES SAHEB | 1 | 1 | | | |
| | 125 | | NABAA MAR SARKIS* | 1 | 1 | | | 1 |
| | 126 | | NABAA EL FOUAR* | 1 | 1 | | | 1 |
| | 127 | | NABAA EL HOUALIF* | 1 | 1 | | | 1 |
| | 128 | | NABAA EL ANBOUB* | 1 | 1 | | | 1 |
| | 129 | | AIN EL BAIDA | 1 | 1 | | | |
| | 130 | | NABA EL AHMAR | 1 | 1 | | | |
| | 131 | | NABAA EL ASFAR | 1 | 1 | | | |
| | 132 | | AIN HAZRITA | 1 | 1 | | | |
| | 133 | | NABA EL MOKHADA* | 1 | 1 | | | 1 |
| | 134 | | NABAA EJ JDID | 1 | 1 | | | |
| | 135 | KFARHILDA | NABAA DALLI | 1 | 1 | 1 | | |
| | 136 | ZGHARTA | NABAA RACHAINE | 1 | 1 | | | 1 |
| | 137 | | AIN EL KHALDIEH | 1 | 1 | | | |
| | 138 | | AAYOUN AACHACH | 1 | 1 | | | |
| | 139 | EHDEN | NABAA MAR SARKIS | 1 | 1 | | | 1 |
| | 140 | BCHARRE | NABAA QADISHA | 1 | 1 | 1 | | |
| | 141 | | NABAA EL BANAT* | 1 | 1 | | | 1 |
| | 142 | | NABAA MAR SEMAAN* | 1 | 1 | | | 1 |
| | 143 | | AIN EL HADDAD* | 1 | 1 | | | 1 |
| | 144 | | NABAA BOU JDID* | 1 | 1 | | | 1 |
| | 145 | | NABAA EL JOUANI* | 1 | 1 | | | 1 |
| | 146 | | AIN MABKHA | 1 | 1 | | | |
| | 147 | | NABAA EL AARBIT* | 1 | 1 | | | 1 |
| | 148 | TALL AABEAS EL CHARQI | AIN EL SOUAISSI | 1 | 1 | 1 | | |
| | 149 | SAADINE | AIN HADDAD | 1 | 1 | | | |
| | 150 | TILL HMAIRA | AIN EL QALMI | 1 | 1 | | | |
| | 151 | CHIR HMAIRINE | AIN BOUSTANE EL BURKE | 1 | 1 | | | |
| | 152 | EL KHOUAKHAT | AIN EL QOLOAS | 1 | 1 | | | |
| | 153 | BARGHOUNE | AIN EL KHOURY | 1 | 1 | | | |
| | 154 | BARGHOUNE | AIN ERRIBANE | 1 | 1 | | | |
| | 155 | BARGHOUNE | AIN AL OHAZAL | 1 | 1 | | | |
| | 156 | ALKATAMOUN | AIN EL TAMBEH | 1 | 1 | | | |
| | 157 | BT AABOURA | NABAA EL MRAH | 1 | 1 | | | |
| | 158 | AMIOUN | AIN MARLOUN | 1 | 1 | | | |
| | 159 | KFARHAZIK | AIN KAMAR EDDINE | 1 | 1 | | | 1 |

| | | | | | | | | |
|--|-----------------------|-----------------------|------------------------------------|----|----|---|---|----|
| M O U N T L E B A N O N | 201 | BAROUK | NABAA EL BAROUK | | | | | |
| | 202 | SAFA | NABAA ES SAFA | | | | | |
| | 203 | | AIN EL HACURA & AIN EZ ZAITOUNI | | | | | |
| | 204 | | AIN ET TBE | | | | | |
| | 205 | | AIN EL KHASSE | | | | | |
| | 206 | | NABAA ZOUAIYA | | | | | |
| | 207 | JAHILIYE | NABAA EL AKHOUAT | | | | | |
| | 208 | | AIN EL BARDE | | | | | |
| | 209 | | NAHR ABOU QACHAQICHE | | | | | |
| | 210 | | NAHR EL JAHILIYE | | | | | |
| | 211 | BATER ECH CHOUF | NABAA BATER | | | | | |
| | 212 | FAKAYA | NABAA EL AASSAL* | | | | | |
| | 213 | | NABAA EL LABAN* | | | | | |
| | 214 | | AIN EL DELBE* | | | | | |
| | 215 | MAIROUBA | NABAA EL MCHARA* | | | | | |
| | 216 | | NABAA EL QANA | | | | | |
| | 217 | | NABAA ECH CHEHAHIR & AIN ES SOUANE | | | | | |
| | 218 | | NABAA ES SANNOUR & AIN ET TANNOUR | | | | | |
| | 219 | BESKINTA | NABAA SANNINE | | | | | |
| | 220 | | NABAA JAOUZ EN NIML* | | | | | |
| | 221 | BIKFAYA | NABAA EL NAAS* | | | | | |
| | 222 | QARTABA | AIN EL GHABAT | | | | | |
| | 223 | | NABAA KHALAF | | | | | |
| | 224 | | RAS EN NABAA | | | | | |
| | 225 | | NABAA ECH CHARBINE | | | | | |
| | 226 | | NABAA EZ ZGHIR | | | | | |
| | 227 | | NABAA EL KBIR | | | | | |
| | 228 | | NABAA EL FOUAR | | | | | |
| | 229 | | NABAA EL ZEIN | | | | | |
| | 230 | | NABAA BOU SALHAB | | | | | |
| | 231 | | NABAA ET TOUTE | | | | | |
| | 232 | AAQOURA | NABAA ER ROUAISS | | | | | |
| | 233 | | AIN EL BARBRISSE | | | | | |
| | 234 | | AIN EL BAHA | | | | | |
| | 235 | | AIN EL QASSIS | | | | | |
| 236 | | AIN EL JAOUZ | | | | | | |
| 237 | | AIN RICHMI | | | | | | |
| 238 | | AIN SNITA | | | | | | |
| 239 | | AIN ELIAS | | | | | | |
| 240 | | AIN BLATA | | | | | | |
| 241 | | AIN EL QASSIS | | | | | | |
| 242 | | AIN MAQSAL | | | | | | |
| 244 | LASSA | NABAA AFQA | | | | | | |
| 245 | | AIN ES SAFRA | | | | | | |
| 246 | | AIN EL HUSSAN | | | | | | |
| 247 | GHAZIR | NABAA EL MADIQ | | | | | | |
| 248 | DAYSHOUNIEH | NABAA EL DAYSHOUNIYEH | | | | | | |
| 249 | ANTELIAS | TANNOUR EL SALTANE | | | | | | |
| 250 | | TANNOUR EL WADI | | | | | | |
| 251 | | FOUAK ANTELIAS | | | | | | |
| 252 | | NABAA EL MASTABE | | | | | | |
| 253 | ZOUK EL KHARAB-DBAYRH | AIN EL ZOUK | | | | | | |
| 254 | ALPIDAR | AIN ANNOUMOUR | | | | | | |
| 255 | BLAT | AIN EL WADI | | | | | | |
| | | TOTAL MOUNT | | 44 | 34 | 4 | 0 | 19 |

| | | | | | | | | |
|-----------------------|-----|-----------------------------|-------------------------|-----------|----------|----------|-----------|---|
| B E K A A | 301 | YAHFOUFA | NABAA HAM | 1 | 1 | | | |
| | 302 | | NABAA MAARABOUN | 1 | 1 | | | |
| | 303 | | NAER YAHFOUFA | 1 | 1 | | | |
| | 304 | RYAK | NABAA RAS EL MARJ | 1 | 1 | | | |
| | 305 | ZAHLE | QAA ER RIM | 1 | 1 | 1 | | |
| | 306 | | AIN TAALABAYA | 1 | 1 | | | |
| | 307 | | AIN EZ ZHOUR | 1 | 1 | | | |
| | 308 | | NABAA CHTAURA | 1 | 1 | | | |
| | 309 | OUADI NAHLE | NABAA ECH CHAGHOUR | 1 | 1 | | | |
| | 310 | | NABAA EL POUARA | 1 | 1 | | | |
| | 311 | | NABAA HAQL EL TEFFAHA | 1 | 1 | | | |
| | 312 | | NABAA OM MELHEM | 1 | 1 | | | |
| | 313 | | NABAA EL WATTA | 1 | 1 | | | |
| | 314 | LABOUE | NABAA ER ROUAISS | 1 | 1 | | | 1 |
| | 315 | | NABAA EL QAA | 1 | 1 | 1 | | |
| | 316 | | NABAA MATRAFE | 1 | 1 | | | |
| | 317 | | NABAA EL SOUAIKA | 1 | 1 | | | 1 |
| | 318 | RAS BAALBEK | NABAA RAS BAALBEK | 1 | 1 | | | |
| | 319 | FAKEHA | NABAA EL FAKHA | 1 | 1 | | | 1 |
| | 320 | BAALBECK | NABAA RAS EL AIN | 1 | 1 | | | |
| | 321 | YAMMOUNEH | NABAA EL YAMMOUNEH | 1 | 1 | | | |
| | 322 | HERMEL | NABAA EL JSR | 1 | 1 | | | |
| | 323 | | NABAA RAS EL MAL | 1 | 1 | | | |
| | 324 | | NABAA EL RAYSEH | 1 | 1 | | | |
| | 325 | SAADNAYEL | NABAA EL ZHOUR | 1 | 1 | | | |
| | 326 | JDITA | NABAA JDITA | 1 | 1 | | | |
| | | TOTAL BEKAA | 26 | 26 | 2 | 0 | 4 | |
| S O U T H | 401 | JEZZINE | NABAA JEZZINE | 1 | 1 | | | 1 |
| | 402 | | NABAA AAZZIBE | 1 | 1 | | | 1 |
| | 403 | WADI JEZZINE | AIN SABRA | 1 | 1 | | | |
| | 404 | | AIN EL ZAHLE | 1 | 1 | | | 1 |
| | 405 | BTEDDINE EL LIQCH | NABAA BTEDDINE EL LIQCH | 1 | 1 | | | |
| | 406 | MACHMOUCHE | NABAA EL DAUDIYE | 1 | 1 | | | |
| | 407 | HAYTOURA | AIN EL ZARQA | 1 | 1 | | | |
| | 408 | IOLIM AL TOUFFAH | AIN IEN AAQEL | 1 | 1 | | | |
| | 409 | | AIN EL QBAYA | 1 | 1 | | | |
| | 410 | | AIN BOU YOUNES | 1 | 1 | | | |
| | 411 | | AIN ABOU JAMAA | 1 | 1 | | | |
| | 412 | | AL AIN | 1 | 1 | | | |
| | 413 | | AIN EL FAOUQA | 1 | 1 | | | |
| | 414 | | AIN EL BAYAD | 1 | 1 | | | |
| | 415 | | AIN EL BOUSTANE | 1 | 1 | | | |
| 416 | | NABAA JLIKHA | 1 | 1 | | | | |
| 417 | | AIN AAQUITA | 1 | 1 | | | | |
| | | TOTAL SOUTH | 17 | 17 | 0 | 0 | 4 | |
| C O A S T | 501 | EL MINIEH | | | | | | 1 |
| | 502 | | | | | | | 1 |
| | 503 | ENFE | | | | | | 1 |
| | 504 | BATROUN | | | | | | 1 |
| | 505 | MALFOUN | | | | | | 1 |
| | 506 | | | | | | | 1 |
| | 507 | AMCHIT | | | | | | 1 |
| | 508 | | | | | | | 1 |
| | 509 | | | | | | | 1 |
| | 510 | HALAT | | | | | | 1 |
| | | TOTAL COASTAL SWINGS | 0 | 0 | 0 | 0 | 10 | |

| | | | | | | | | |
|----------------------------|-----|------------------------|--------------|------------|------------|-----------|-----------|-----------|
| R I V E R S | 601 | | EL KABIE | 1 | | | 1 | 1 |
| | 602 | | OSTOUENE | 1 | | | 1 | 1 |
| | 603 | | EL BARED | 1 | | | 1 | 1 |
| | 604 | | ABOU ALI | 1 | | | 1 | 1 |
| | 605 | | EL JOUZ | 1 | | | 1 | 1 |
| | 606 | | IBRAHIM | 1 | | | 1 | 1 |
| | 607 | | EL KIEB | 1 | | | 1 | 1 |
| | 608 | | BEIRUT | 1 | | | 1 | 1 |
| | 609 | | DAMOURE | 1 | | | 1 | 1 |
| | 610 | | AWALI | 1 | | | 1 | 1 |
| | 611 | | SAINQ | 1 | | | 1 | 1 |
| | 612 | | ZAHRAH | 1 | | | 1 | 1 |
| | 613 | | LOWER LITANI | 1 | | | 1 | 1 |
| | 614 | | UPPER LITANI | 1 | | | 1 | 1 |
| | 615 | | EL ASSI | 1 | | | 1 | 1 |
| | 616 | | ARQA | | | | 1 | 1 |
| | 617 | | AACHOCOUT | | | | 1 | 1 |
| 618 | | UPPER LITANI | | | | | 1 | |
| 619 | | CHADRA | | | | | 1 | |
| 620 | | JAOUZ | | | | | 1 | |
| | | TOTAL RIVERS | | 15 | 0 | 0 | 17 | 30 |
| W A S T E R | 701 | TRIPOLI | | | | | 1 | |
| | 702 | JOUNIEH | | | | | 1 | |
| | 703 | BEIRUT | | | | | 2 | |
| | 704 | SAIDA | | | | | 1 | |
| | | TOTAL SEA WATER | | 0 | 0 | 0 | 5 | 0 |
| | | GRAND TOTAL | | 175 | 160 | 12 | 22 | 90 |

* SPRINGS OF HIGH ELEVATION FOR QUALITY ANALYSIS (2) ONLY IN RAINY SEASON
MIDDLE ELEVATION SPRINGS
LOW ELEVATION SPRINGS
COASTAL SPRINGS
RIVERS

ANNEX 3-1 LIST OF FIELD SURVEY

GENERAL LIST FOR RIVER DISCHARGE OBSERVATION, SPRING FLOW OBSERVATION AND WATER QUALITY ANALYSIS I & II

| AREA | CODE | REGION | TARGET NAME | FLOW | T & EC | WATER QUALITY (I) 9 ITEMS | WATER QUALITY (I) 10 ITEMS | WATER QUALITY (I) | |
|--|------|--|-----------------------|-----------------------|--------|---------------------------|----------------------------|-------------------|--|
| N O R T H L E B A N O N | 101 | FNAIDEQ | NABAA FNAIDEQ | | | | | | |
| | 102 | | NABAA EL HOUEH | | | | | | |
| | 103 | | NABAA EL BANAT | | | | | | |
| | 104 | AKKAR EL ATTICA | AIN EL DEEK | | | | | | |
| | 105 | | NABAA EL CHOUH* | | | | | | |
| | 106 | | NABAA EL JACUZ | | | | | | |
| | 107 | | NABAA ECH CHEIKH INAD | | | | | | |
| | 108 | | NABAA OMAR KAYLO | | | | | | |
| | 109 | | AIN EL WATIEH | | | | | | |
| | 110 | | AIN EL HOMSIYE | | | | | | |
| | 111 | | AIN AAIYAT | | | | | | |
| | 112 | BOUQAIAA | | NABAA ES SAFA | | | | | |
| | 113 | | | MRAH ET TINE | | | | | |
| | 114 | MASHTA HASSAN, MASHTA HAMMOUD AND CHADRA | | NABAA EL JACUZ | | | | | |
| | 115 | | | AIN EL ABIAD | | | | | |
| | 116 | | | NABAA HMADE | | | | | |
| | 117 | | | NABAA EL CHARQI | | | | | |
| | 118 | | | NABAA EL GHARBI | | | | | |
| | 119 | TANNOURINE | | NABAA ECH CHEIKH* | | | | | |
| | 120 | | | AIN ES SAOUDA | | | | | |
| | 121 | | | AIN EL BASHA | | | | | |
| | 122 | | | NABAA EL MOGHRAQ | | | | | |
| | 123 | | | NABAA EL KORSI* | | | | | |
| | 124 | | | NABAA ES SAHEB | | | | | |
| | 125 | | | NABAA MAR SARKIS* | | | | | |
| | 126 | | | NABAA EL FOUAR* | | | | | |
| | 127 | | | NABAA EL HOUALIF* | | | | | |
| | 128 | | | NABAA EL ANBOUB* | | | | | |
| | 129 | | | AIN EL BAIDA | | | | | |
| | 130 | | | NABA EL AHMAR | | | | | |
| | 131 | | | NABAA EL ASFAR | | | | | |
| | 132 | | | AIN HAZRITA | | | | | |
| | 133 | | | NABA EL MOKHADA* | | | | | |
| | 134 | | | NABAA EJ JDID | | | | | |
| | 135 | KFARHILDA | | NABAA DALLI | | | | | |
| | 136 | ZGHARTA | | NABAA RACHAINE | | | | | |
| | 137 | | | AIN EL KHALDIEH | | | | | |
| | 138 | | | AAYOUN AACHACH | | | | | |
| | 139 | BHDEN | | NABAA MAR SARKIS | | | | | |
| | 140 | BCHARRE | | NABAA QADISHA | | | | | |
| | 141 | | | NABAA EL BANAT* | | | | | |
| | 142 | | | NABAA MAR SEMAAN* | | | | | |
| | 143 | | | AIN EL HADDAD* | | | | | |
| | 144 | | | NABAA BOU JDID* | | | | | |
| | 145 | | | NABAA EL JOUANI* | | | | | |
| | 146 | | | AIN MABKHA | | | | | |
| | 147 | | | NABAA EL AARBIT* | | | | | |
| | 148 | TALL AABAS EL CHARQI | | AIN EL SOUAISSI | | | | | |
| | 149 | SAADINE | | AIN HADDAD | | | | | |
| | 150 | TELL HMAIRA | | AIN EL QALMI | | | | | |
| | 151 | CHIR HMAIRINE | | AIN BOUSTANE EL BURKE | | | | | |
| | 152 | EL KHOUAIKHAT | | AIN EL QOLQAS | | | | | |
| | 153 | BARGHOUNE | | AIN EL KHOURY | | | | | |
| | 154 | BARGHOUNE | | AIN ERRIHBANE | | | | | |
| | 155 | BARGHOUNE | | AIN AL GHAZAL | | | | | |
| | 156 | ALKALAMOUN | | AIN EL JAMBH | | | | | |
| | 157 | BT AABOURA | | NABAA EL MRAH | | | | | |
| | 158 | AMOUN | | AIN MAKLOUN | | | | | |
| | 159 | KFARHAZIR | | AIN KAMAR EDDINE | | | | | |
| | 160 | KFARHAZIR | | AIN EL MAKIL | | | | | |
| | 161 | KFARHAZIR | | AIN EL SAFAFF | | | | | |
| | 162 | BHANNINE | | AIN EL BILAD | | | | | |
| | 163 | CHEKKA | | NABAA EL AAJOUZ | | | | | |

| | | | | | | | | |
|--|-------------|-----------------------|------------------------------------|-----------|-----------|----------|----------|-----------|
| M O U N T L E B A N O N | 201 | BAROUK | NABAA EL BAROUK | 1 | 1 | 1 | | |
| | 202 | SAFA | NABAA ES SAFA | 1 | 1 | 1 | | |
| | 203 | | AIN EL HAOURA & AIN EZ ZAITOUNI | 1 | 1 | | | |
| | 204 | | AIN ET TINE | 1 | 1 | | | |
| | 205 | | AIN EL KHASSE | 1 | 1 | | | |
| | 206 | | NABAA ZOUAIYA | 1 | 1 | | | |
| | 207 | JAHILIYE | NABAA EL AKHOUCAT | 1 | 1 | | | |
| | 208 | | AIN EL BARDE | 1 | 1 | | | |
| | 209 | | NAHR ABOU QACHAOICHE | 1 | 1 | | | |
| | 210 | | NAHR EL JAHLIYE | 1 | 1 | | | |
| | 211 | BATER ECH CHOUR | NABAA BATER | 1 | 1 | | | |
| | 212 | FARAYA | NABAA EL AASSAL* | 1 | 1 | | | |
| | 213 | | NABAA EL LABAN* | 1 | 1 | | | |
| | 214 | | AIN EL DELBE* | 1 | 1 | | | |
| | 215 | MAIROUBA | NABAA EL MOHARA* | 1 | 1 | | | |
| | 216 | | NABAA EL QANA | 1 | 1 | | | |
| | 217 | | NABAA ECH CHEHAHIR & AIN ES SOUANE | 1 | 1 | | | |
| | 218 | | NABAA ES SANNOUR & AIN ET TANNOUR | 1 | 1 | | | |
| | 219 | BESKINTA | NABAA SANNINE | 1 | 1 | 1 | | |
| | 220 | | NABAA JAOUZ EN NIMI* | 1 | 1 | | | |
| | 221 | BIKFAYA | NABAA EL NAAS* | 1 | 1 | | | |
| | 222 | QARTABA | AIN EL GHABAT | 1 | 1 | | | |
| | 223 | | NABAA KHALAF | 1 | 1 | | | |
| | 224 | | RAS EN NABAA | 1 | 1 | | | |
| | 225 | | NABAA ECH CHARBINE | 1 | 1 | | | |
| | 226 | | NABAA EZ ZGHIR | 1 | 1 | | | |
| | 227 | | NABAA EL KBIR | 1 | 1 | | | |
| | 228 | | NABAA EL FOUAR | 1 | 1 | | | |
| | 229 | | NABAA EL ZEIN | 1 | 1 | | | |
| | 230 | | NABAA BOU SALHAB | 1 | 1 | | | |
| | 231 | | NABAA ET TOUTE | 1 | 1 | | | |
| | 232 | AAQOURA | NABAA ER ROUAISS | 1 | 1 | | | |
| | 233 | | AIN EL BARBRISSE | 1 | 1 | | | |
| | 234 | | AIN EL BAHKA | 1 | 1 | | | |
| | 235 | | AIN EL QASSIS | 1 | 1 | | | |
| | 236 | | AIN EL JAOUZ | 1 | 1 | | | |
| | 237 | | AIN RICHMI | 1 | 1 | | | |
| | 238 | | AIN SNITA | 1 | 1 | | | |
| | 239 | | AIN ELIAS | 1 | 1 | | | |
| | 240 | | AIN BLATA | 1 | 1 | | | |
| | 241 | | AIN EL QASSIS | 1 | 1 | | | |
| | 242 | | AIN MAQSAL | 1 | 1 | | | |
| | 244 | LASSA | NABAA AFOA | 1 | 1 | 1 | | |
| | 245 | | AIN ES SAFRA | 1 | 1 | | | |
| | 246 | | AIN EL HISSAN | 1 | 1 | | | |
| | 247 | GHAZIR | NABAA EL MADIO | 1 | 1 | | | |
| | 248 | DAYSHOUNEH | NABAA EL DAYSHOUNIYEH | 1 | 1 | 1 | | |
| | 249 | ANTELIAS | TANNOUR EL SALTANE | 1 | 1 | | | |
| | 250 | | TANNOUR EL WADI | 1 | 1 | | | |
| | 251 | | FOUAR ANTELIAS | 1 | 1 | | | |
| | 252 | | NABAA EL MASTABE | 1 | 1 | | | |
| | 253 | ZOUK EL KHARAB-DBAYEH | AIN EL ZOUK | 1 | 1 | | | |
| | 254 | ALFIDAR | AIN ANNOUMOUR | 1 | 1 | | | |
| | 255 | BLAT | AIN EL WADI | 1 | 1 | | | |
| | | | TOTAL MOUNT | 54 | 54 | 5 | 0 | 13 |
| B | 301 | YAHFOUFA | NABAA HAM | 1 | 1 | | | |
| | 302 | | NABAA MAARABOUN | 1 | 1 | | | |
| | 303 | | NAHR YAHFOUFA | 1 | 1 | | | |
| | 304 | RYAK | NABAA RAS EL MARJ | 1 | 1 | | | |
| | 305 | ZAHLE | GAA ER RIM | 1 | 1 | 1 | | |
| | 306 | | AIN TAALABAYA | 1 | 1 | | | |
| | 307 | | AIN EZ ZHOUR | 1 | 1 | | | |
| | 308 | | NABAA CHTAURA | 1 | 1 | | | |
| 309 | OUADI NAHLE | NABAA ECH CHAGHOUR | 1 | 1 | | | | |
| 310 | | NABAA EL FOUARA | 1 | 1 | | | | |
| 311 | | NABAA HAQL EL TEFFAHA | 1 | 1 | | | | |
| 312 | | NABAA OM MELHEM | 1 | 1 | | | | |

ANNEX 3.2

TECHNICAL SPECIFICATIONS FOR THE FIELD SURVEY WORKS

The works shall be conducted under the Study on Water Resources Management Master Plan in the Republic of Lebanon by JICA Study Team. The objectives of the Study are:

- i) To formulate a master plan for water resources management of the whole area of the Republic of Lebanon, and
- ii) To pursue technology transfer to counterpart personnel in the course of the Study.

For the purpose, following five (5) works are to be carried out during the study period under the sub-contract basis.

1. OBSERVATION OF RIVER DISCHARGES

The Contractor shall carry out the Observation of River Discharges on the selected rivers in the target area (hereinafter called as "Work1") as described in the followings. "The Engineer" described in this paper shall be Mr. Toshinobu NAKANO, Hydrologist of the Study Team.

1.2. Contents of the Work1

The work is to measure the river flow (runoff) of total 15 rivers in the country. The river flow observation on each river shall be done two times, at August 2002, and January 2003.

1.3. Method of Observation and Equipment

Method of the observation shall be a velocity-area method as a rule, but the Contractor can propose his own method for approval of the Engineer. However, the cross-section of the river, at the observation point, must be surveyed once, to calculate the area and install into the database for further data arrangement. The Contractor can use the velocity meters brought by the Study Team, when he needs.

1.4. Target area and Observation Points

The target area is whole country, and the target rivers are 15 rivers listed below:

El Kabir, Ostouene, El Bared, Abou Ali, El Jouz, Ibrahim, El Kelb, Beirut, Damoure, Awali, Sainiq, Zahrani, Lower Litani, Upper Litani and El Assi.

Detail of the observation points is to be instructed in the field by the Engineer.

1.5. Bill of Quantities

The bill of quantities on Observation of River Discharge shall be as follows;

15 rivers x 2 times = 30 times

1.6. Reporting

The report shall include 1) database file and hard copy including all observation data, 2) daily works record, and 3) photo album for the field works.

Form and software to be applied on the database report is to be proposed by the sub-contractor for approval of the Engineer but it must include the name of river, observation point, date and time, method of observation, persons who observed, result of observation both numeral and graphical.

2. OBSERVATION OF SPRING FLOW

The Contractor shall carry out the Observation of Spring Flow in the target area (hereinafter called as "Work2") as described in the followings. "The Engineer" described in this paper shall be Mr. Ryoichi KAWASAKI, Hydro-geologist of the Study Team.

2.1. Contents of the Work2

The work is to measure the volume of large spring flows in the whole country.

The spring flow observation on each point shall be done two times, at August 2002, and January 2003.

2.3. Method of Observation

Method of the observation shall be a notch method as a rule, but the Contractor can propose his own method for approval of the Engineer. On the course of spring flow measurements, the Contractor shall measure Temperature and EC of the spring water by portable water quality checker. The cost of these measurements is to be included in the flow measurement. The Contractor can use the velocity meters and water quality checkers brought by the Study Team, if he needs.

2.4. Target area and Observation Points

The target area is whole country, and the target springs are the largest 160 springs in the country, which are perennial and having more than 1.0 lit/sec of spring flow. When the number of such springs does not reach to 160 points, the springs which have the longer life time in a year shall be followed.

The Contractor shall list up the relatively large springs as many as known through the study on

existing spring list, and submit an observation plan to the Engineer for his approval, prior to the actual observation work.

2.5. Bill of Quantities

The bill of quantities on Observation of Spring Flow shall be as follows;

160 springs x 2 times = 320 times

2.6. Reporting

The report shall include 1) database file and hard copy including all observation data, 2) daily works record, and 3) photo album for the field works.

Form and software to be applied on the database report is to be proposed by the sub-contractor for approval of the Team but it must include the name of river, observation point, date and time, method of observation, persons who observed, result of observation both numeral and graphical.

3. WELL INVENTORY SURVEY

The Contractor shall carry out the Well Inventory Survey in the target area (hereinafter called as "Work3") as described in the followings. "The Engineer" described in this paper shall be Mr. Ryoichi KAWASAKI, Hydro-geologist of the Study Team.

3.1. Contents of the Work3

The work is to prepare the well inventory of relatively large production wells which are pumping up more than 10 m³/day in an average. More than 10,000 of such wells are, supposedly, existing in the country, but only 2,000 wells among them are to be checked and mentioned in the inventory this time.

3.2. Method of the Survey

The inventory survey is conducted basically through hearing and measurement. And the survey must be concentrated in a certain river basin and shifted to the other basin after completion of survey in the basin. Method of the approach, number of survey party, form of inventory and database, etc., shall be proposed by the sub-contractor to the Team for his approval. The Contractor can use the GPS brought by the Study Team, when he needs.

The items to be mentioned in the inventory are as follows:

- Location (longitude and latitude by GPS), and elevation of well mouth,
- Owner (manager) and purpose of pumping,

- Constructed year, well depth, well structure, original water level,
- Type and capacity of pump installed and power source,
- Static and dynamic water levels (actually measures if possible),
- Average daily and monthly pumping rates,
- Well lithological log (if exist),
- History of repairing, tendency of water level and quality changes.

3.3. Target area and Observation Points

The target area is whole country, and the target wells to be listed are relatively large production wells of more than 10 m³/day of averaged pumping rate.

3.4. Bill of Quantities

Well inventory survey;

Preparation of well inventory listing 2,000 production wells.

3.5. Reporting

The report shall include 1) database file and hard copy including all observation data, 2) daily works record, and 3) photo album for the field works.

Form and software to be applied on the database report is to be proposed by the sub-contractor for approval of the Engineer.

4. WATER QUALITY ANALYSIS (1)

The Contractor shall carry out the Water quality Analysis for Environment in the target area (hereinafter called as "Work4") as described in the followings. "The Engineer" described in this paper shall be Mr. Sanpei NAKANISHI, Expert for Water Pollution and Environment of the Study Team.

4.1. Contents of the Work4

The work4 is to take water samples and carry out a series of laboratory water quality analysis on following targets, two times in the Study period, at August 2002 and January 2003.

Target rivers for water quality analysis are following 17 rivers, and the exact water sampling points shall be instructed by the Team:

El Kabir, Ostouene, El Bared, Abou Ali, El Jouz, Ibrahim, El Kelb, Beirut, Damoure, Awali, Sainiq, Zahrani, Lower Litani, Upper Litani, El Assi, El Arka, and Aachoqout.

Water sampling points for sea water shall be 5 points instructed by the Engineer. The target springs are each one spring in the above mentioned river basins for river water quality analysis.

selected and proposed by the sub-contractor for the Engineer's approval.

Items of the water quality analysis in the laboratory are as follows:

For river water; pH, BOD, COD, SS, DO, Coliform, Faecal Coliform, Total N, Total P, and Cl ion.

For sea water; 10 items same with above.

For spring water; pH, BOD, COD, Coliform, Coliform by excreta, Total N, Total P, Ammoniac N, and Cl ion.

Beside the laboratory analysis, the Contractor shall measure Temperature and EC of water at the sampling points by a portable water checker. The cost of these measurements is to be included in the sampling cost. The Contractor can use the portable water checkers brought by the Study Team, when he needs.

4.2. Target area and Observation Points

The target area is whole country. Number of target rivers is 17, target springs is 17, and the sea water sampling points is 5.

4.3. Bill of Quantities

| | | |
|------------------|------------------|--|
| Samplings: | for river water | 17 points x 2 times = 34 samples, |
| | for sea water | 5 points x 2 times = 10 samples, |
| | for spring water | 17 points x 2 times = 34 samples. |
| Laboratory Test: | for river water | 10 items listed above for each sample, |
| | for sea water | 10 items listed above for each sample, |
| | for spring water | 9 items listed above for each sample. |

4.4. Reporting

The report shall include 1) database file and hard copy including all analyzed data, 2) daily works record, and 3) photo album for the field and laboratory works.

Form and software to be applied on the database report is to be proposed by the sub-contractor for approval of the Team but it must include the name of targets, sampling point, date and time sampled and analyzed, method and volume of sampling, persons in charge of, result of analysis and remarks.

5. WATER QUALITY ANALYSIS (2)

The Contractor shall carry out the Water quality Analysis for Hydro-geological Study in the target area (hereinafter called as "Work5") as described in the followings. "The Engineer" described in this paper shall be Mr. Ryoichi KAWASAKI, Hydrogeologist of

the Study Team.

5.1. Contents of the Work5

The work5 is to take water samples and carry out a series of laboratory water quality analysis on spring/river water listed below.

Target springs for water quality analysis are seasonal springs at high elevation, perennial springs at middle and low elevations and coastal springs. River water sampling points are 20, at perennial rivers and their middle stream. Most of the sampling and water quality analysis shall be conducted two times in the Study period, at August 2002 and January 2003 except the high elevation springs, which shall be carried out only in rainy season.

Water sampling point at each target shall be instructed by the Team.

Contents of laboratory water quality analysis are as follows:



Beside the laboratory analysis, the Contractor shall measure Temperature, pH and EC of water at the sampling points by a portable water checker. The cost of these measurements is to be included in the sampling cost. The Contractor can use the portable water checkers brought by the Study Team, when he needs.

5.2. Target area and Observation Points

The target area is whole country. Number of target springs to be sampled is 70, number for rivers water sampling is 20.

5.3. Bill of Quantities

| | | |
|------------|-----------------------------|-----------------------------------|
| Samplings: | for spring (high elevation) | 20 points x 1 time = 20 samples, |
| | for spring (middle elev.) | 20 points x 2 times = 40 samples, |
| | for spring (low elev.) | 20 points x 2 times = 40 samples. |
| | for spring (coastal) | 10 points x 2 times = 20 samples |
| | for river (middle stream) | 20 points x 2 times = 40 samples |

Laboratory Test: 8 items listed above for each sample,

5.4. Reporting

The report shall include 1) database file and hard copy including all analyzed data, 2) daily works record, and 3) photo album for the field and laboratory works.

Form and software to be applied on the database report is to be proposed by the sub-contractor for approval of the Team but it must include the name of targets, sampling point, date and time sampled and analyzed, method and volume of sampling, persons in charge of, result of analysis and remarks.

Annex 3.3 (1)

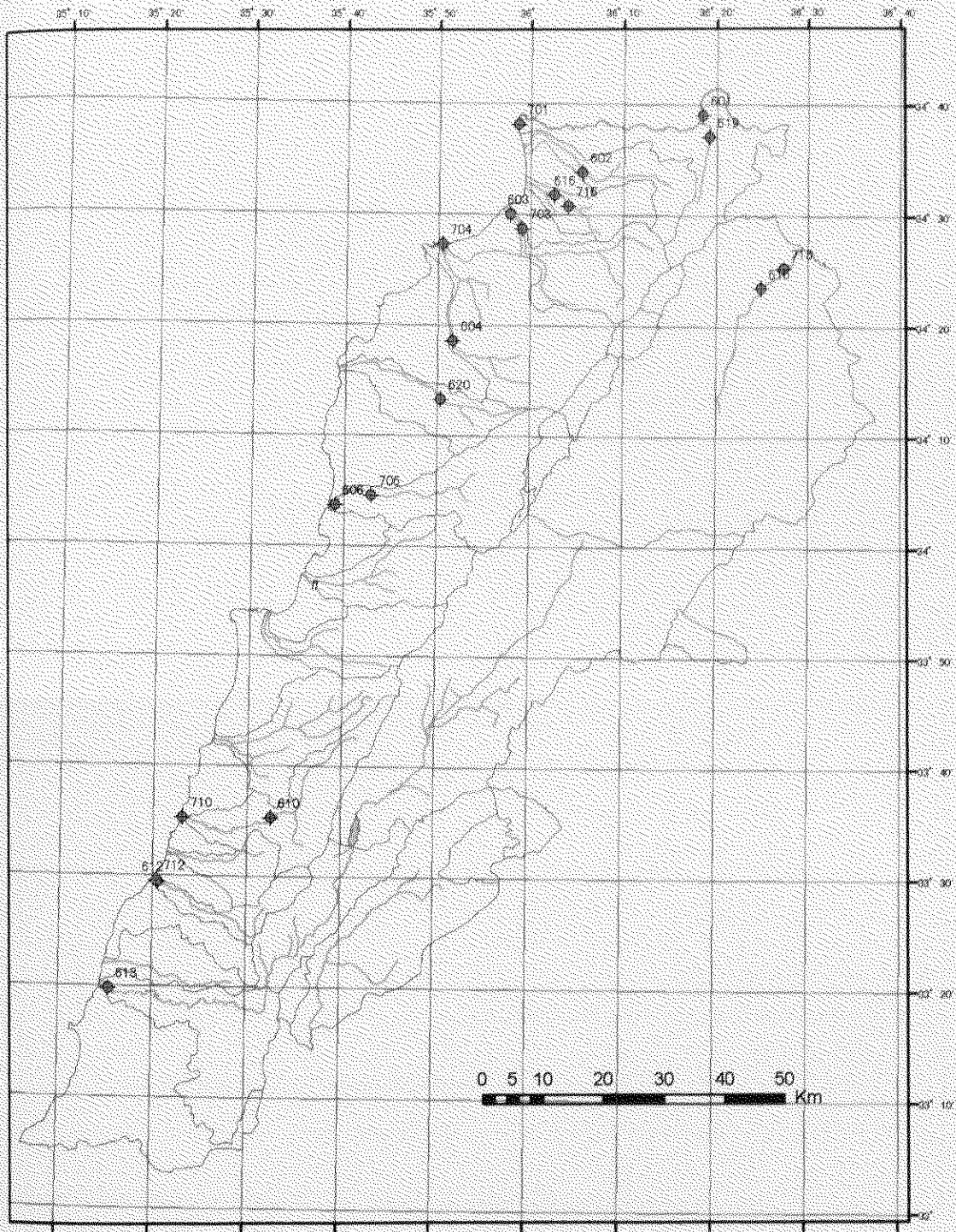


Figure 3.3-1. Location Map (1)

Measurement of River Discharge

Annex 3.3 (2)

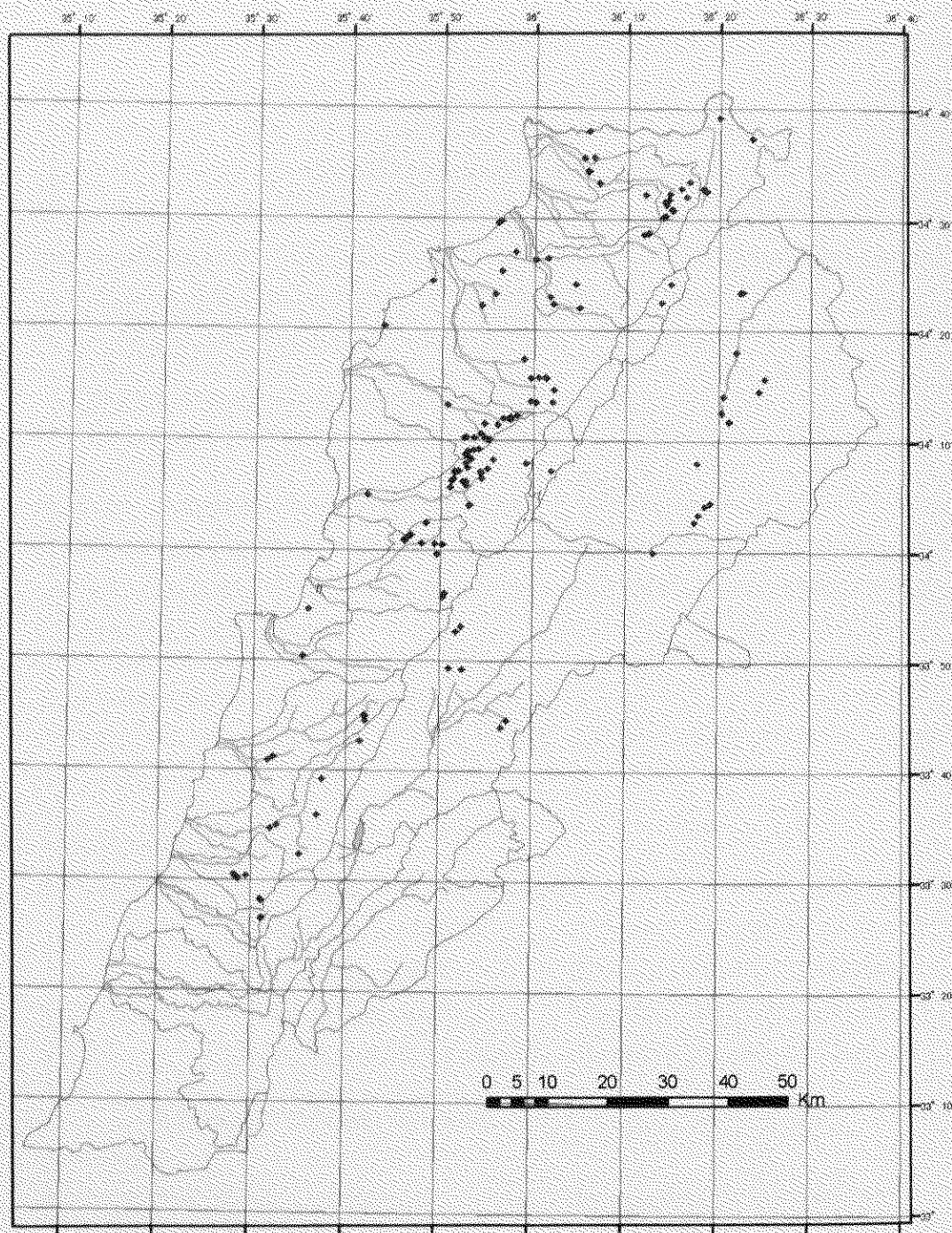


Figure H-2-2. Location Map (2)
Measurement of Spring Flow

Annex 3.3 (3)

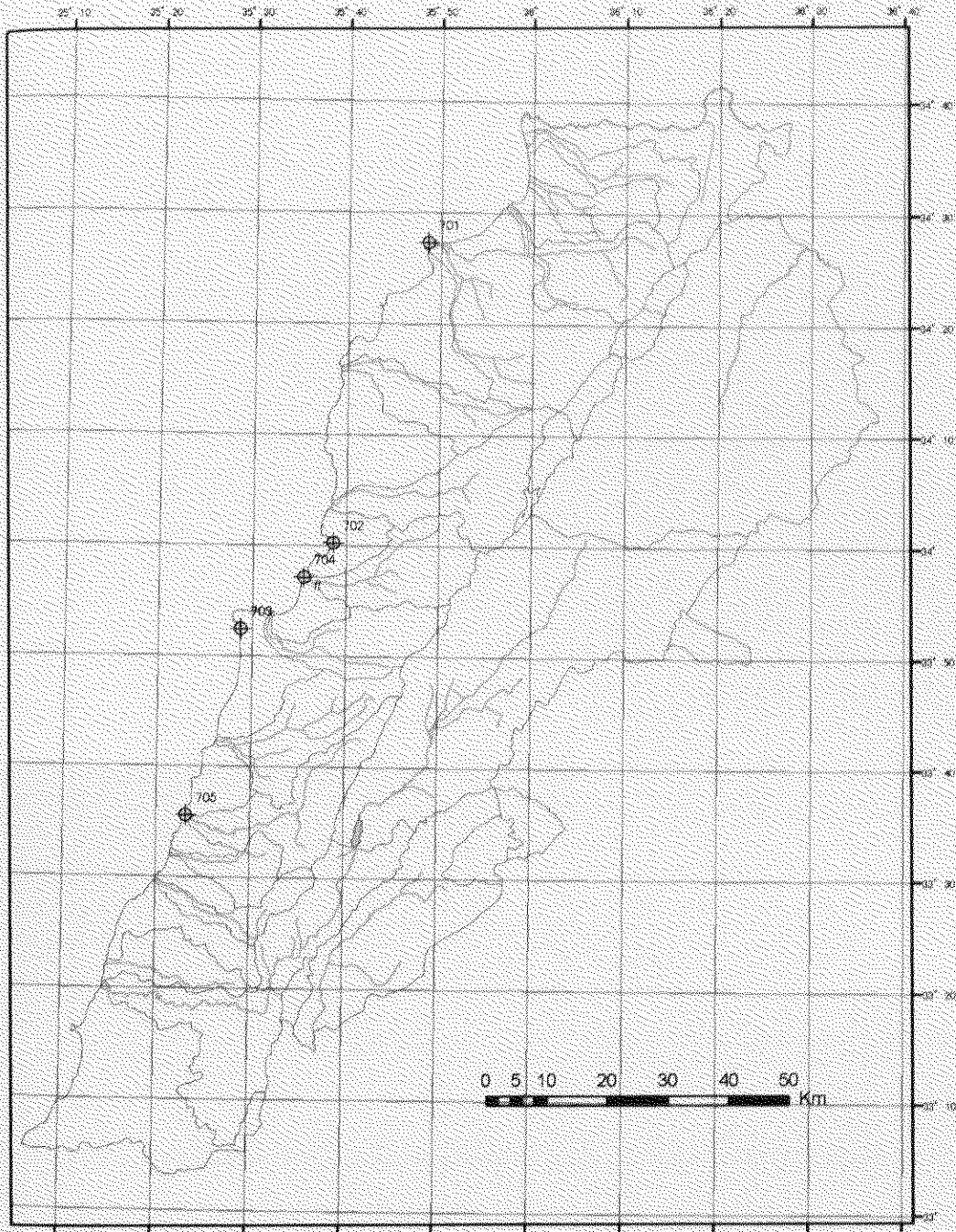


Figure H-2-3. Location Map (3)

Water Quality Analysis (1), Sea Water Sampling

Note: Sampling points of rivers and springs are shown in Fig H-2-1 and H-2-4.

Annex 3.3 (4)

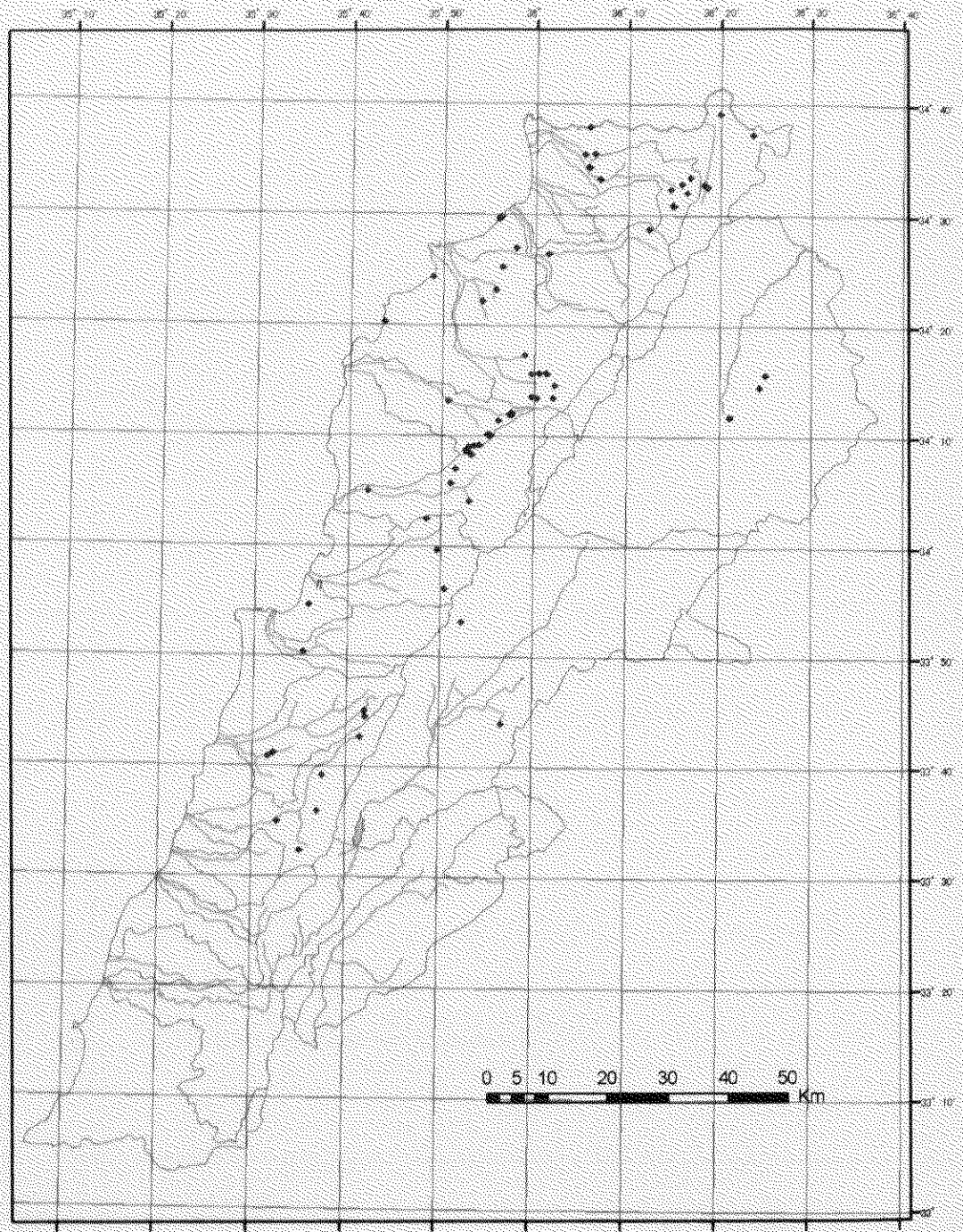


Figure H-2-4. Location Map (4)

Water Quality Analysis (1) & (2), Spring Water

Annex 3.3 (5)

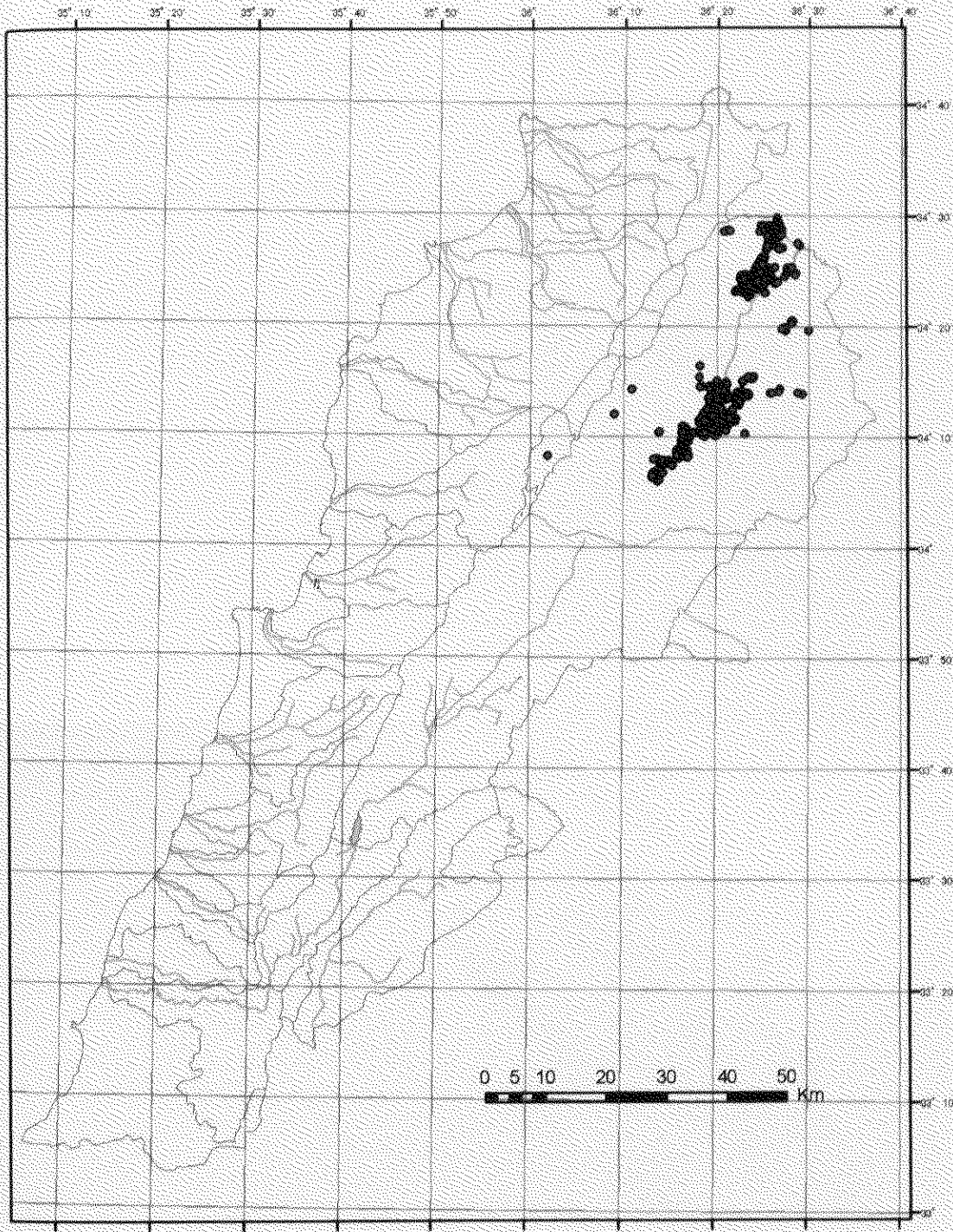
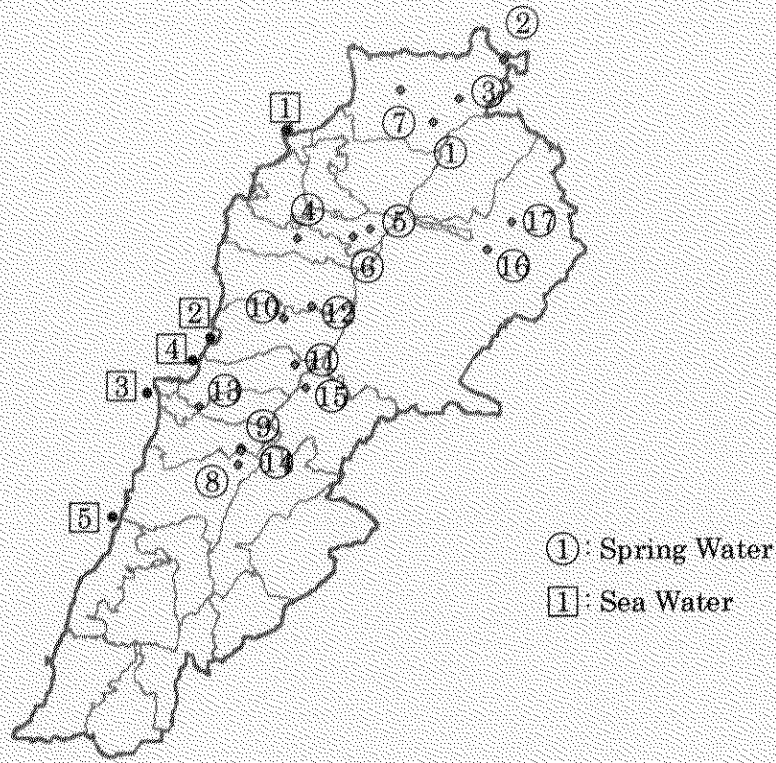


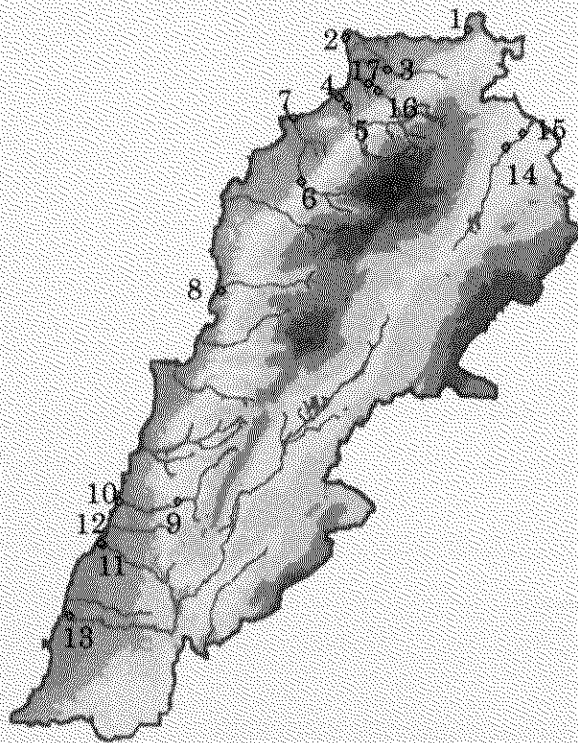
Figure H-2-5. Location Map (5)

Well Inventory Survey

Annex 3.3 (6) Location Map of Sampling Points for Water Analysis (1)



Sampling Points for Spring and Sea Water



Sampling Points for River Water

Annex 3.4 Results of Field Survey in August 2002

- 1. Measurement of River Discharge**
- 2. Measurement of Spring Flow**
- 3. Water Quality Analysis (1)**
- 4. Water Quality Analysis (2)**

Rivers Gauging Data Sheet

Month: AUGUST 2002

| Code | Name of the Spring | Instrument | Observation Point (in Degree) | | Altitude (m) | Discharge (m ³ /s) | Temperature (°C) | Electro-conductivity (µS/cm) |
|------|-----------------------|------------|-------------------------------|-----------|--------------|-------------------------------|------------------|------------------------------|
| | | | x | y | | | | |
| 601 | NAHR EL KABIR | UC-204 | 34°39'20" | 36°18'32" | 250 | 1.51 | 25.50 | 396.00 |
| 602 | NAHR OSTOUENE | UC-304 | 34°33'50" | 36°05'36" | 78 | 0.28 | 24.30 | 524.00 |
| 603 | NAHR EL BARED | UC-204 | 34°30'01" | 35°57'51" | 20 | 0.57 | 26.60 | 522.00 |
| 604 | NAHR ABOU ALI | UC204 | 34°18'33" | 35°51'43" | 265 | 0.51 | 17.30 | 403.00 |
| 605 | NAHR EL JAOUZ | | | | | DRY | | |
| 606 | NAHR IBRAHIM | UC304 | 34°03'41" | 35°39'07" | 16 | 0.37 | 26.30 | 303.00 |
| 607 | NAHR EL KELB | | | | | DRY | | |
| 608 | NAHR BEIRUT | | | | | DRY | | |
| 609 | NAHR EL DAMOUR | | | | | DRY | | |
| 610 | NAHR EL AWALI | UC-304 | 33°35'19" | 35°32'36" | 12 | 0.51 | 19.20 | 501.00 |
| 611 | NAHR SAINIQ | | | | | DRY | | |
| 612 | NAHR EL ZAHRANI | UC-304 | 33°29'29" | 35°20'39" | 6 | 0.02 | 22.70 | 793.00 |
| 613 | LOWER LITANI | UC-304 | 33°19'48" | 35°15'31" | 2 | 0.08 | 23.40 | 742.00 |
| 614 | UPPER LITANI | | | | | DRY | | |
| 615 | NAHR EL AASSI | UC-204 | 34°23'30" | 36°24'55" | 598 | 6.01 | 14.70 | 317.00 |
| | TOTAL MEASURED | | | | | | | |

REMARKS: NAHR EL JAOUZ
NAHR EL KALB
NAHR BEIRUT
NAHR EL DAMOUR
NAHR SAINIQ
NAHR ARQA
TOTAL DRY

Month: AUGUST 2002

| Code | Name of the Spring | Village | Instrument | Observation Point | | Altitude (m) | Discharge (l/s) | Temperature (°C) | Electro- conductivity (µS/cm) | Remarks |
|------|------------------------|-------------------|------------|-------------------|-----------|-----------------|--------------------|---------------------|-------------------------------------|---------|
| | | | | x | y | | | | | |
| 101 | NABAA FNAIDBO | FNAIDBO | UC-304 | 34°28'48" | 36°12'21" | 1325 | 91.40 | 9.70 | 464.00 | |
| 103 | NABAA EL BANAT | FNAIDBO | UC-304 | 34°28'38" | 36°11'48" | 1201 | 12.08 | 11.00 | 386.00 | |
| 104 | AIN EL DEEK | AKKAR EL ATTICA | BUCKET | 34°30'15" | 36°13'59" | 1272 | 8.02 | 9.80 | 404.00 | |
| 1051 | NABAA EL CHOUH EL ALI | AKKAR EL ATTICA | BUCKET | 34°30'12" | 36°13'57" | 1336 | 12.35 | 9.50 | 287.00 | |
| 1052 | NABAA EL CHOUH EL WATI | AKKAR EL ATTICA | UC-304 | 34°30'15" | 36°13'58" | 1271 | 60.80 | 9.60 | 408.00 | |
| 106 | NABAA EL JAOUZ | AKKAR EL ATTICA | UC-304 | 34°30'25" | 36°14'08" | 1183 | 38.86 | 10.10 | 384.00 | |
| 107 | NABAA BCH CHEIKH INAD | AKKAR EL ATTICA | WEIR | 34°30'56" | 36°14'51" | 998 | 21.55 | 11.00 | 411.00 | |
| 108 | NABAA OMAR KAYLO | AKKAR EL ATTICA | UC-304 | 34°30'52" | 36°14'59" | 1109 | 18.92 | 10.10 | 417.00 | |
| 109 | AIN EL WATBEH | AKKAR EL ATTICA | UC-304 | 34°32'21" | 36°14'38" | 864 | 27.79 | 14.70 | 625.00 | |
| 110 | AIN EL HOMSIYE | AKKAR EL ATTICA | BUCKET | 34°31'47" | 36°14'28" | 748 | 3.24 | 13.40 | 525.00 | |
| 111 | AIN AAYAT | AAYAT | BUCKET | 34°32'16" | 36°11'59" | 660 | 1.40 | 15.40 | 513.20 | |
| 112 | NABAA ES SAFA | BOQAIAA | UC-204 | 34°37'18" | 36°23'35" | 383 | 499.93 | 15.50 | 522.00 | |
| 113 | TAL ET TINE | BOQAIAA | UC-204 | 34°39'12" | 36°19'59" | 281 | 118.50 | 18.10 | 542.00 | |
| 115 | AIN EL ABLAD | QOBAIYAT | BUCKET | 34°32'50" | 36°15'50" | 672 | 3.66 | 15.10 | 616.00 | |
| 116 | NABAA HMADE | QOBAIYAT | 50/100 | 34°32'02" | 36°16'25" | 915 | 18.64 | 13.00 | 527.00 | |
| 117 | NABAA EL SHARQI | ANDQET | 50/100 | 34°32'32" | 36°18'37" | 790 | 4.71 | 17.70 | 534.00 | |
| 118 | NABAA EL CHARQI | ANDQET | BUCKET | 34°32'46" | 36°18'15" | 721 | 11.19 | 14.90 | 486.00 | |
| 119 | NABAA BCH CHEIKH | LAQLOUQ | BUCKET | 34°10'14" | 35°52'33" | 1571 | 3.36 | 9.00 | 261.00 | |
| 120 | AIN ES SAOUDA | ANNOURINE-HARISS | 50/100 | 34°11'25" | 35°56'09" | 1733 | 3.06 | 8.10 | 291.00 | |
| 122 | NABAA EL MOGHRAQ | FANNOURINE-BALAA | 50/100 | 34°10'18" | 35°52'44" | 1608 | 18.46 | 8.70 | 445.00 | |
| 123 | NABAA EL KORSI | WATA HOUB | 50/100 | 34°11'32" | 35°54'44" | 1519 | 31.77 | 10.00 | 358.00 | |
| 126 | NABAA EL FOUAR | LAQLOUQ | BUCKET | 34°09'10" | 35°53'34" | 1955 | 1.18 | 6.70 | 358.00 | |
| 127 | EL HOUALIF | NOURINE-WADI EL J | BUCKET | 34°10'09" | 35°54'57" | 1691 | 3.57 | 8.80 | 372.00 | |
| 128 | NABAA EL ANBOUB | NOURINE-WADI EL J | BUCKET | 34°10'07" | 35°55'08" | 1750 | 4.13 | 10.30 | 317.00 | |
| 129 | AIN EL BAIDA | ANNOURINE-HARISS | BUCKET | 34°12'17" | 35°58'15" | 1952 | 1.01 | 9.30 | 392.00 | |
| 130 | NABAA EL AHMAR | ANNOURINE-HARISS | BUCKET | 34°11'59" | 35°57'22" | 1767 | 1.97 | 9.10 | 399.00 | |
| 131 | NABAA EL ASFAR | ANNOURINE-HARISS | 50/100 | 34°11'57" | 35°57'19" | 1746 | 3.15 | 8.10 | 401.00 | |
| 132 | NABAA HAZRITA | NOURINE-WADI EL J | BUCKET | 34°10'18" | 35°53'38" | 1607 | 1.11 | 9.90 | 348.00 | |
| 133 | NABAA EL MOKHADA | TANNOURINE | BUCKET | 34°10'39" | 35°54'18" | 1460 | 2.58 | 13.50 | 231.00 | |
| 134 | NABAA EL JDID | ANNOURINE-HARISS | BUCKET | 34°11'55" | 35°57'32" | 1841 | 1.06 | 8.50 | 396.00 | |
| 135 | NABAA DALLI | KFARHILDA | UC-204 | 34°13'11" | 35°50'41" | 623 | 125.29 | 13.50 | 246.00 | |
| 136 | NABAA RACHAABINE | RACHAABINE | UC-204 | 34°23'15" | 35°55'50" | 157 | 210.33 | 11.20 | 281.00 | |
| 137 | AIN EL KHALDIEH | KHALDIEH | UC-304 | 34°22'14" | 35°54'20" | 147 | 9.81 | 18.50 | 524.00 | |
| 138 | AYOUN ACHACH | ACHACH | UC-304 | 34°25'20" | 35°56'29" | 220 | 63.76 | 19.60 | 537.00 | |
| 139 | NABAA MAR SARKIS | EHDEN | UC-304 | 34°17'21" | 35°58'58" | 1510 | 65.63 | 6.40 | 194.50 | |
| 140 | NABAA KADISHA | BCHARRE | UC-304 | 34°14'38" | 36°02'12" | 1708 | 293.41 | 6.60 | 202.00 | |
| 141 | NABAA NBAT | BCHARRE | BUCKET | 34°15'41" | 36°01'24" | 1768 | 13.95 | 9.50 | 234.00 | |
| 142 | NABAA MAR SEMAAN | BCHARRE | UC-304 | 34°15'43" | 36°00'34" | 1753 | 68.37 | 5.80 | 193.20 | |
| 143 | AIN EL HADDAD | BCHARRE | UC-304 | 34°15'41" | 35°59'42" | 1545 | 17.33 | 8.90 | 276.00 | |
| 145 | NABAA EL JOUANI | BEQAAKAFRA | BUCKET | 34°13'30" | 36°02'03" | 1931 | 2.61 | 10.40 | 269.00 | |
| 146 | AIN MABKHA | BAZOUN | UC-304 | 34°13'37" | 35°59'42" | 1732 | 5.97 | 7.60 | 303.00 | |
| 147 | NABAA EL AARBIT | BEQAAKAFRA | BUCKET | 34°13'27" | 36°00'17" | 1770 | 35.76 | 5.60 | 206.00 | |
| 148 | AIN EL FOUAR | ES SOUAISSI | UC-304 | 34°33'16" | 36°06'57" | 148 | 20.26 | 20.00 | 572.00 | |
| 149 | NABAA EL HADDAD | SAADINE | BUCKET | 34°35'30" | 36°05'17" | 51 | 2.32 | 20.70 | 655.00 | |
| 152 | NABAA EL QOLQAS | KOUAKHAT | 50/100 | 34°34'23" | 36°05'43" | 84 | 5.64 | 21.40 | 543.00 | |
| 164 | AIN EL AFSA | ANNOURINE-HARISS | BUCKET | 34°12'01" | 35°56'48" | 1663 | 5.62 | 10.60 | 356.00 | |
| 165 | ARID EL MSALJEM | ANNOURINE-HARISS | BUCKET | 34°12'10" | 35°57'33" | 1787 | 1.02 | 10.90 | 479.00 | |
| 166 | NABAA EL KORSI | NOURINE-WADI EL J | BUCKET | 34°10'14" | 35°54'46" | 1686 | 2.56 | 10.80 | 359.00 | |
| 168 | NABAA EL CHELLAL | LAQLOUQ | BUCKET | 34°09'14" | 35°54'07" | 1972 | 1.01 | 7.70 | 213.00 | |

| Code | Name of the Spring | Village | Instrument | Observation Point | | Altitude (m) | Discharge (m ³ /s) | Temperature (°C) | Electro- conductivity (µS/cm) | Remarks |
|------|----------------------|------------------|-------------|-------------------|-----------|-----------------|----------------------------------|---------------------|-------------------------------------|--|
| | | | | X | Y | | | | | |
| 169 | NABAA CHAJAA | NOURINE-WADI EL | BUCKET | 34°1'00" | 35°55'17" | 1748 | 1.16 | 9.40 | 352.00 | |
| 170 | NABAA EL TIME | AKKAR EL ATTICA | BUCKET | 34°31'39" | 36°1'403" | 655 | 8.40 | 15.10 | 297.00 | |
| 171 | AIN EL TAQIYEH | AKKAR EL ATTICA | UC-304 | 34°31'21" | 36°1'412" | 663 | 19.72 | 12.80 | 382.00 | |
| 172 | AIN EL SET | QOBAIYAT | 50/100 | 34°33'24" | 36°1'647" | 614 | 8.50 | 15.00 | 590.00 | |
| 173 | AIN EL TIME | ANDQET | BUCKET | 34°32'42" | 36°1'832" | 731 | 1.46 | 16.40 | 538.00 | |
| 174 | NABAA EL HARFOUCH | BCHARRE | BUCKET | 34°1'543" | 36°0'117" | 1773 | 19.89 | 5.50 | 176.10 | |
| 176 | NABAA EL HAMAM | CHIR EL HMAIRIEH | 50/100 | 34°37'55" | 36°0'549" | 22 | 47.34 | 21.60 | 678.00 | |
| 177 | NABAA GHZAILI | GHZAILI | 50/100 | 34°35'36" | 36°0'620" | 97 | 37.35 | 24.10 | 513.00 | |
| 178 | NABAA ABOU SHAWKAT | KOUAIKHAT | BUCKET | 34°34'20" | 36°0'551" | 84 | 17.65 | 21.50 | 493.00 | |
| 179 | NABAA SIR | SIR EL DANNIYE | UC-204 | 34°23'00" | 36°0'142" | 908 | 485.32 | 8.40 | 227.00 | Flow of a large number of pipes taking water from the spring is not included |
| 180 | NABAA QSSEM | BEQAARHABOUNE | 50/100 | 34°22'21" | 36°0'206" | 1094 | 36.27 | 7.20 | 202.00 | Flow of a large number of pipes taking water from the spring is not included |
| 181 | NABAA SUCCAR | BEQAARHABOUNE | 50/100 | 34°22'02" | 36°0'458" | 1676 | 195.31 | 5.50 | 179.00 | |
| 182 | NABAA CHQEQ | KFARBIENIT | 50/100 | 34°24'09" | 36°0'430" | 1134 | 15.15 | 11.60 | 435.00 | |
| 183 | AIN EL BORI | MINIEH | 50/100 | 34°29'51" | 35°56'20" | 10 | 24.14 | 19.40 | 1007.00 | |
| 184 | AIN EL CHARCHARA | MINIEH | BUCKET | 34°29'46" | 35°56'12" | 4 | 11.76 | 19.60 | 921.00 | |
| 185 | AIN MARKABTA | MARKABTA | 50/100 | 34°27'01" | 35°51'58" | 275 | 9.11 | 19.20 | 404.00 | |
| 186 | AIN MARMAR | OYOUN ES SAMAK | 50/100 | 34°26'29" | 36°0'127" | 243 | 12.56 | 16.90 | 506.00 | |
| 187 | AIN ES SAYED | OYOUN ES SAMAK | 50/100 | 34°26'21" | 36°0'010" | 216 | 14.10 | 15.60 | 515.00 | |
| 188 | AIN EL SAKHRA | MINIEH | 50/100 | 34°29'40" | 35°56'01" | 0 | 4.81 | 21.50 | 865.00 | |
| 189 | AIN EZ ZARQA | MINIEH | 50/100 | 34°29'40" | 35°56'09" | 27 | 67.60 | 19.90 | 893.00 | |
| 201 | NABAA EL BAROUK | BAROUK | UC-304 | 33°42'42" | 35°41'35" | 1089 | 620.45 | 10.30 | 260.00 | |
| 202 | NABAA ES SAFA | SAFA | UC-304 | 33°43'07" | 35°42'01" | 914 | 681.45 | 11.10 | 268.00 | |
| 207 | NABAA EL AKHOUAT | WADI BNEHLAY | UC-304 | 33°41'14" | 35°32'18" | 443 | 65.07 | 15.90 | 455.00 | |
| 208 | AIN EL BARDEH | WADI BNEHLAY | UC-304 | 33°40'55" | 35°31'43" | 389 | 10.36 | 17.00 | 571.00 | |
| 211 | NABAA BATER | BATER BCH CHOUF | UC-304 | 33°35'58" | 35°37'04" | 971 | 46.13 | 13.50 | 452.00 | |
| 212 | NABAA EL AASAL | FARAYA | UC-304 | 34°00'35" | 35°50'18" | 1551 | 471.48 | 5.40 | 186.30 | |
| 213 | NABAA EL LABAN | KFARDEBIAN | UC-304 | 33°59'42" | 35°49'42" | 1646 | 53.20 | 7.30 | 240.00 | |
| 214 | AIN ED DEHBE | FARAYA | UC-304 | 34°00'38" | 35°49'27" | 1279 | 26.51 | 8.80 | 329.00 | |
| 215 | NABAA EL MGHARA | HRAJEL | UC-304 | 34°00'43" | 35°48'02" | 1542 | 12.01 | 11.40 | 491.00 | |
| 216 | NABAA EL QANA | HRAJEL | UC-304 | 34°02'32" | 35°48'31" | 1580 | 33.38 | 10.00 | 403.00 | |
| 2171 | NABAA BCH CHHARIR | MAIROUBA | BUCKET | 34°01'03" | 35°46'05" | 1292 | 1.28 | 15.10 | 204.00 | |
| 2172 | NABAA ES SOUANE | MAIROUBA | BUCKET | 35°00'54" | 35°46'11" | 1308 | 2.64 | 13.30 | 350.00 | |
| 2181 | NABAA EL SANNOUR | MAIROUBA | BUCKET+UC-3 | 34°01'29" | 35°46'54" | 1332 | 5.11 | 15.30 | 363.00 | |
| 2182 | NABAA EL TANNOUR | MAIROUBA | BUCKET | 35°01'12" | 35°46'26" | 1319 | 1.75 | 12.60 | 702.00 | |
| 219 | NABAA SANNINE | BASKINTA | UC-304 | 33°56'12" | 35°50'31" | 1674 | 21.38 | 6.00 | 220.00 | |
| 220 | NABAA JAOUZ EL NEMEL | BASKINTA | UC-304 | 33°55'49" | 35°50'18" | 1655 | 6.88 | 8.80 | 268.00 | |
| 223 | NABAA KHALAF | QARTABA | BUCKET | 34°05'47" | 35°51'02" | 1189 | 1.04 | 13.60 | 465.00 | |
| 224 | RAS EN NABAA | QARTABA | 50/100 | 34°06'33" | 35°51'23" | 1329 | 1.78 | 14.50 | 387.00 | |
| 225 | NABAA BCH CHARBINE | BCH CHARBINE | 50/100 | 34°07'03" | 35°51'32" | 1578 | 4.28 | 12.10 | 386.00 | |
| 226 | NABAA EZ ZGHIR | BCH CHARBINE | BUCKET | 34°07'03" | 35°51'31" | 1565 | 1.51 | 12.60 | 317.00 | |
| 227 | NABAA EL KHIR | BCH CHARBINE | BUCKET | 34°07'14" | 35°51'58" | 1585 | 1.62 | 10.80 | 360.00 | |
| 228 | NABAA EL FOUAR | BCH CHARBINE | BUCKET | 34°07'16" | 35°51'33" | 1621 | 5.22 | 8.60 | 313.00 | |
| 229 | NABAA EZ ZEIN | MGHAIRI | BUCKET | 34°06'18" | 35°52'25" | 1237 | 1.06 | 16.80 | 472.00 | |
| 230 | NABAA BOU SALHAB | MGHAIRI | 50/100 | 34°06'18" | 35°52'44" | 1195 | 9.26 | 12.60 | 415.00 | |
| 231 | NABAA EL TOUTE | YANOUEH | 50/100 | 34°05'57" | 35°52'47" | 1106 | 2.76 | 12.80 | 631.00 | |
| 232 | NABAA EL ROUAISS | AAKOURA | BUCKET | 34°06'35" | 35°54'26" | 1300 | 116.25 | 9.00 | 271.00 | |
| 233 | AIN EL BARBRISSE | AAKOURA | BUCKET | 34°06'05" | 35°52'58" | 1904 | 2.46 | 9.00 | 313.00 | |
| 234 | AIN EL BAHRA | AAKOURA | UC-304 | 34°08'31" | 35°53'04" | 1861 | 1.87 | 10.40 | 366.00 | |

| Code | Name of the Spring | Village | Instrument | Observation Point | (in Degree) | Altitude | Discharge | Temperature | Electro-conductivity | Remarks |
|------|-----------------------|--------------|------------|-------------------|-------------|----------|-----------|-------------|----------------------|--|
| 235 | AIN EL QASSIS | AAKOURA | BUCKET | 34°08'44" | 35°52'37" | 1818 | 1.00 | 9.80 | 386.00 | |
| 236 | AIN EL JAOUZ | AAKOURA | UC-304 | 34°08'18" | 35°55'43" | 1658 | 13.15 | 9.70 | 278.00 | |
| 237 | AIN RICHME | AAKOURA | UC-304 | 34°07'28" | 35°55'06" | 1608 | 7.50 | 9.10 | 259.00 | |
| 238 | AIN SNITA | AAKOURA | UC-304 | 34°07'01" | 35°54'22" | 1307 | 7.77 | 11.70 | 536.00 | |
| 239 | AIN ELIAS | AAKOURA | BUCKET | 34°07'32" | 35°52'53" | 1500 | 2.14 | 12.50 | 272.00 | |
| 240 | AIN EL BLATA | AAKOURA | BUCKET | 34°07'57" | 35°52'43" | 1666 | 3.62 | 12.60 | 296.00 | |
| 241 | AIN EL DAIAA | AAKOURA | BUCKET | 34°07'14" | 35°54'16" | 1382 | 5.42 | 10.80 | 342.00 | |
| 245 | AIN EL SAFRA | AFKA | UC-304 | 34°04'13" | 35°53'13" | 1145 | 15.71 | 11.10 | 335.00 | |
| 246 | AIN EL HISSAN | AFKA | UC-304 | 34°04'08" | 35°53'06" | 1182 | 10.45 | 10.50 | 297.00 | |
| 247 | NABAA EL MADIQ | YAHCHOUGH | UC-304 | 34°05'03" | 35°42'07" | 170 | 513.10 | 15.40 | 406.00 | |
| 248 | NABAA EL DAYSHOUNIEH | DAYSHOUNIEH | UC-304 | 33°50'25" | 35°35'19" | 110 | 117.26 | 17.50 | 554.00 | |
| 250 | TANNOUR EL WADI | ANTELIAS | UC-304 | 33°54'43" | 35°35'52" | 32 | 34.96 | 16.20 | 486.00 | |
| 251 | FOUAR ANTELIAS | ANTELIAS | UC-304 | 33°54'42" | 35°35'55" | 30 | 261.68 | 16.00 | 425.00 | |
| 256 | NABAA EL QAA | SAFA | UC-304 | 33°44'57" | 35°42'05" | 981 | 32.98 | 11.50 | 267.00 | |
| 257 | NABAA ET TANNOUR | SAFA | UC-304 | 33°44'57" | 35°42'08" | 997 | 110.94 | 11.50 | 267.00 | |
| 258 | AIN EL DAIAA | AIN ZHALTA | BUCKET | 33°44'35" | 35°42'08" | 1082 | 1.10 | 13.50 | 571.00 | |
| 259 | NABAA EL MOUBARAK | DEIR DOURIT | UC-304 | 33°41'14" | 35°32'22" | 465 | 9.03 | 16.00 | 489.00 | |
| 260 | AIN ES SAOUDA | AAKOURA | BUCKET | 34°08'19" | 35°53'15" | 1820 | 1.03 | 10.50 | 393.00 | |
| 261 | DOUAR EL MARJEH | AAKOURA | BUCKET | 34°07'57" | 35°59'14" | 1703 | 1.05 | 12.40 | 179.00 | |
| 262 | NABAA EL HOUNIRI | QARTABA | BUCKET | 34°06'22" | 35°51'12" | 1301 | 1.27 | 15.40 | 330.00 | |
| 263 | NABAA EL WAHLI | QARTABA | BUCKET | 34°06'28" | 35°51'17" | 1314 | 1.01 | 18.90 | 339.00 | |
| 305 | QAA ER RIM | ZAHLE | UC-204 | 33°53'10" | 35°52'19" | 1227 | 129.65 | 8.00 | 191.10 | Flow of pipe 50mm taking water from the spring is not included |
| 308 | NABAA CHTOURA | CHTOURA | UC-204 | 33°49'25" | 35°51'03" | 929 | 344.45 | 13.50 | 355.00 | Flow of pipe 75mm taking water from the spring is not included |
| 309 | NABAA ECH CHAGHOUR | OUADI NAHLE | 50/100 | 34°02'44" | 36°17'26" | 1380 | 10.53 | 15.50 | 303.00 | |
| 310 | NABAA EL FOUARA | OUADI NAHLE | 50/100 | 34°04'26" | 36°19'11" | 1550 | 10.59 | 11.70 | 310.00 | |
| 311 | NABAA HAQL EL TEFFAHA | OUADI NAHLE | 50/100 | 34°04'09" | 36°18'32" | 1487 | 30.25 | 13.00 | 380.00 | |
| 312 | NABAA EM MELHEM | OUADI NAHLE | 50/100 | 34°03'24" | 36°17'49" | 1472 | 10.01 | 14.20 | 374.00 | |
| 314 | NABAA ER ROUAISS | LABOUE | UC-304 | 34°11'48" | 36°21'09" | 906 | 251.78 | 14.30 | 324.00 | |
| 315 | NABAA EL QAA | LABOUE | WEIR | 34°11'52" | 36°21'09" | 908 | 416.60 | 17.50 | 324.00 | Flows of 2 pipes 200mm and 150mm taking water from the spring are not included |
| 316 | NABAA MATRAFE | LABOUE | UC-304 | 34°11'51" | 36°21'07" | 903 | 179.02 | 14.20 | 323.00 | |
| 317 | NABAA SOUAIKA | LABOUE | UC-304 | 34°11'48" | 36°21'10" | 903 | 24.76 | 14.20 | 324.00 | |
| 318 | NABAA RAS BAALBECK | RAS BAALBECK | UC-304 | 34°15'38" | 36°25'02" | 989 | 18.69 | 17.80 | 477.00 | |
| 319 | NABAA EL FAKHEHA | FAKHEHA | UC-304 | 34°14'31" | 36°24'25" | 981 | 84.57 | 17.90 | 367.00 | |
| 320 | RAS EL AIN | BAALBECK | UC-304 | 33°59'58" | 36°12'59" | 1170 | 97.21 | 16.60 | 282.00 | Flows of 2 pipes 200mm and 150mm taking water from the spring are not included |
| 321 | NABAA EL YAMMOUNEH | YAMMOUNEH | UC-304 | 34°07'18" | 36°02'00" | 1360 | 1123.88 | 13.00 | 240.00 | eggs are collected into |
| 323 | RAS EL MAL | HERMEL | UC-304 | 34°23'25" | 36°22'17" | 786 | 149.17 | 11.40 | 258.00 | |
| 324 | NABAA EL RAYSEH | HERMEL | UC-304 | 34°23'31" | 36°22'28" | 759 | 18.36 | 11.70 | 266.00 | |
| 325 | NABAA EZ ZHOUR | SAADNAYEL | 50/100 | 33°49'18" | 35°52'30" | 910 | 7.15 | 18.60 | 576.00 | |
| 327 | EHDAAASHARIEH | HERMEL | UC-304 | 34°23'29" | 36°22'39" | 777 | 53.03 | 12.46 | 282.00 | |
| 328 | NABAA EL TAQA | ZAHLE | 50/100 | 33°52'42" | 35°51'49" | 1306 | 10.37 | 17.00 | 280.00 | |
| 329 | NABAA CHAMSINE | ZAHLE | UC-204 | 33°44'37" | 35°57'23" | 887 | 119.43 | 16.70 | 444.00 | |
| 330 | NABAA ANJAR | ANJAR | UC-204 | 33°43'59" | 35°56'46" | 881 | 202.52 | 14.90 | 417.00 | |
| 331 | NABAA AHLA | CHAAT | UC-204 | 34°08'02" | 36°17'42" | 992 | 33.56 | 17.40 | 319.00 | |

| Code | Name of the Spring | Village | Instrument | Observation Point | (in Degree) | Altitude | Discharge | Temperature | Electro-conductivity | Remarks |
|------|--|---------------|------------|-------------------|-------------|----------|-----------|-------------|----------------------|--|
| 332 | NABAA OM RAAD | LABOUE | 50/100 | 34°12'36" | 36°20'23" | 868 | 82.12 | 15.70 | 475.00 | |
| 333 | NABAA GHABSHOUN | LABOUE | 50/100 | 34°14'07" | 36°20'34" | 822 | 52.47 | 17.60 | 579.00 | |
| 334 | AIN EL JAMBAA | MARHINE | 50/100 | 34°24'13" | 36°14'47" | 1727 | 24.28 | 10.80 | 333.00 | |
| 335 | NABAA EL HAOUR | MARHINE | 50/100 | 34°22'31" | 36°13'46" | 1729 | 84.34 | 17.10 | 259.00 | |
| 336 | OYOUN TAQTAQ | OYOUN TAQTAQ | 50/100 | 34°18'02" | 36°21'57" | 761 | 37.76 | 16.90 | 461.00 | |
| 401 | NABAA JEZZINE | JEZZINE | UC-304 | 33°32'24" | 35°35'13" | 1036 | 10.63 | 13.20 | 398.00 | Flow of 1 pipe 75mm and 1 PIPE 100mm taking water from the spring are not included |
| 407 | NABAA EL ZARQA | HIDAB | UC-304 | 33°34'43" | 35°32'05" | 630 | 16.90 | 16.90 | 502.00 | |
| 409 | NABAA EL QOBAJAA | KFARMELKI | UC-304 | 33°30'22" | 35°28'30" | 343 | 3.89 | 17.20 | 731.00 | |
| 410 | AIN ABOU YOUNESS | KFARMELKI | UC-304 | 33°30'31" | 35°28'13" | 317 | 3.83 | 18.00 | 619.00 | |
| 415 | AIN EL BOUSTANE | AIN BOU SOUAR | BUCKET | 33°28'20" | 35°31'07" | 893 | 3.20 | 14.60 | 534.00 | |
| 418 | AIN EL BARDEH | BESRI | UC-304 | 33°35'04" | 35°32'44" | 343 | 25.10 | 17.90 | 628.00 | |
| 419 | NABAA MERCHED | MOUKHTARA | UC-304 | 33°39'14" | 35°37'31" | 808 | 66.24 | 14.20 | 486.00 | |
| 420 | SIN EL DOUARA | AIN BOU SOUAR | BUCKET | 33°28'16" | 35°31'08" | 879 | 1.47 | 15.50 | 533.00 | |
| 421 | NABAA SPINTA | WADY BERTY | BUCKET | 33°30'26" | 35°29'32" | 353 | 1.16 | 18.00 | 385.00 | |
| 422 | AIN BOU SOUAR | BOU SOUAR | BUCKET | 33°28'15" | 35°31'12" | 933 | 4.51 | 13.50 | 474.00 | |
| 423 | AIN EL DAIAA | KFARMELKI | BUCKET | 33°30'07" | 35°28'45" | 412 | 1.02 | 17.90 | 648.00 | |
| 424 | AIN EL DAIAA | JARJOUAA | BUCKET | 33°28'42" | 35°31'15" | 782 | 1.27 | 16.40 | 610.00 | |
| 425 | AIN EL HECHACHE | JARJOUAA | BUCKET | 33°28'35" | 35°31'13" | 716 | 1.04 | 16.50 | 587.00 | |
| 502 | NABAA BOU HALQA | BOHSAS | UC-204 | 34°24'25" | 35°48'56" | 1 | 290.18 | 18.90 | 615.00 | See given discharge a |
| 504 | NABAA EL AAOUZ | CHEQA | UC-304 | 34°20'20" | 35°43'46" | 1 | 2.99 | 16.90 | 581.00 | |
| | TOTAL NUMBER OF SPRINGS FOR FLOW MEASUREMENT | | | | | | | | | 0.00 |

Annex 3.4 LABORATORY RESULTS FOR WATER QUALITY 1 - RIVERS

Month: AUGUST 2002

| | | 601 | 601-1 | 602 | 603 | 603-1 | 604 | 604-1 | 606 | 610 |
|------------------|-----------|------|-------|------|-------|-------|------|-------|------|------|
| pH | pH Unit | 8.01 | 8.34 | 8.36 | 8.01 | 8.00 | 8.26 | 7.08 | 7.85 | 8.12 |
| BOD | mg/L | 2.15 | 0.6 | 1.61 | 2.4 | 0.2 | 2.24 | 13.6 | 1.9 | 8.54 |
| COD | mg/L | 11.2 | 7.3 | 5.4 | 49.2 | 0.6 | 8.4 | 195 | 4.2 | 31.9 |
| Suspended Solids | mg/L | 10.4 | 18.3 | 1.3 | 163 | 3.4 | 2.2 | 82.9 | 6.2 | 2.3 |
| Dissolved Oxygen | mg/L | 7.08 | 6.56 | 5.38 | 7.12 | 6.69 | 5.56 | 0.52 | 7.18 | 7.24 |
| Total Nitrogen | mg/L | 0.46 | 0.32 | 0.22 | 0.26 | 0.21 | 0.17 | 18.2 | 0.12 | 0.95 |
| Total Phosphorus | mg/L | 0.08 | 0.09 | 0.05 | <0.01 | 0.01 | 0.02 | 1.8 | 0.02 | 0.05 |
| Chloride, Cl | mg/L | 28.3 | 200.4 | 21.3 | 12.5 | 10.1 | 8.8 | 55.8 | 8.8 | 24.8 |
| Total Coliform | CFU/100ml | 420 | 1,650 | 580 | 4,600 | 920 | 100 | 4,200 | 100 | 125 |
| Fecal Coliform | CFU/100ml | 250 | 1,500 | 290 | 2,300 | 150 | 30 | 2,200 | 25 | 20 |

| | | 610-1 | 612 | 612-1 | 613 | 615 | 615-1 | 616 | 616-1 |
|------------------|-----------|-------|------|-------|------|-------|-------|------|-------|
| pH | pH Unit | 7.75 | 7.83 | 7.82 | 7.55 | 8.07 | 8.25 | 8.33 | 7.79 |
| BOD | mg/L | 0.5 | 3.75 | 0.7 | 3.16 | 0.8 | 5.1 | 1.27 | 0.2 |
| COD | mg/L | 7.2 | 8.6 | 5.1 | 8.1 | 1.3 | 1.4 | 6.1 | 1.3 |
| Suspended Solids | mg/L | 6.7 | 3.9 | 2.4 | 4.9 | 1.8 | 1.2 | 2.7 | 2.1 |
| Dissolved Oxygen | mg/L | 7.89 | 8.15 | 6.52 | 6.64 | 9.16 | 8.08 | 4.04 | 8.34 |
| Total Nitrogen | mg/L | 0.92 | 0.32 | 0.27 | 0.36 | 0.215 | 0.1 | 0.19 | 0.23 |
| Total Phosphorus | mg/L | 0.03 | 0.01 | 0.02 | 0.01 | <0.01 | 0.01 | 0.02 | <0.01 |
| Chloride, Cl | mg/L | 20.1 | 42.5 | 42.6 | 45.5 | 4.5 | 5.2 | 20.5 | 13.7 |
| Total Coliform | CFU/100ml | 110 | >200 | 350 | 150 | 125 | 440 | 580 | 200 |
| Fecal Coliform | CFU/100ml | 27 | >200 | 120 | 22 | 30 | 190 | 110 | 70 |

LABORATORY RESULTS FOR WATER QUALITY 1 - SEA WATER

Month: AUGUST 2002

| | | 701 | 702 | 703 | 704 | 705 |
|------------------|-----------|--------|--------|--------|--------|--------|
| pH | pH Unit | 8.12 | 8.08 | 7.92 | 8.12 | 8.08 |
| BOD | mg/L | 3.2 | 2.9 | 0.5 | 1.2 | 0.4 |
| COD | mg/L | 1,130 | 840 | 1,180 | 690 | 780 |
| Suspended Solids | mg/L | 3.2 | 2.9 | 6.5 | 1.4 | 16.2 |
| Dissolved Oxygen | mg/L | 7.68 | 5.34 | 1.86 | 3.64 | 2.84 |
| Total Nitrogen | mg/L | 0.25 | 0.14 | 0.69 | 0.42 | 2.95 |
| Total Phosphorus | mg/L | 0.11 | <0.01 | 0.14 | 0.01 | <0.01 |
| Chloride, Cl | mg/L | 16,266 | 18,325 | 21,999 | 19,020 | 18,670 |
| Total Coliform | CFU/100ml | 174 | 110 | 230 | 140 | 290 |
| Fecal Coliform | CFU/100ml | 24 | 80 | 150 | 16 | 30 |

LABORATORY RESULTS FOR WATER QUALITY 1 - SPRINGS

Month: AUGUST 2002

| | | 101 | 112 | 116 | 135 | 140 | 146 | 148 | 201 | 202 |
|------------------|-----------|-------|-------|-------|--------|--------|--------|--------|-------|--------|
| pH | pH Unit | 7.29 | 7.06 | 7.93 | 7.66 | 7.9 | 7.75 | 7.49 | 7.67 | 7.73 |
| BOD | mg/L | 0.4 | 1 | 0.7 | 0.4 | 2.1 | 0.3 | 1.2 | 0.2 | <0.1 |
| COD | mg/L | 1.8 | 3.2 | 1.2 | 0.7 | 5.8 | 0.5 | 1.4 | 1.2 | 0.4 |
| Ammonia | mg/L | <0.01 | 0.048 | 0.073 | 0.0244 | 0.0122 | 0.0368 | 0.0129 | <0.01 | 0.0244 |
| Total Nitrogen | mg/L | 0.046 | 0.09 | 0.102 | 0.139 | 0.074 | 0.105 | 0.136 | 0.01 | 0.07 |
| Total Phosphorus | mg/L | 0.04 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.07 | <0.01 | <0.01 |
| Chloride, Cl | mg/L | 7.1 | 14.5 | 14.0 | 5.5 | 2.5 | 4 | 26.8 | 19 | 5.3 |
| Total Coliform | CFU/100ml | 11 | 370 | 30 | 5 | 22 | 100 | 610 | 0 | 0 |
| Fecal Coliform | CFU/100ml | 4 | 100 | 18 | 0 | 4 | 0 | 580 | 0 | 0 |

| | | 216 | 219 | 246 | 248 | 258 | 305 | 315 | 318 |
|------------------|-----------|-------|--------|--------|--------|-------|--------|--------|--------|
| pH | pH Unit | 8 | 7.93 | 7.56 | 7.35 | 7.28 | 7.94 | 7.74 | 7.82 |
| BOD | mg/L | 0.9 | <0.1 | 0.65 | <0.1 | 0.7 | <0.1 | 0.3 | 1.3 |
| COD | mg/L | 2.5 | 0.7 | 0.3 | 0.2 | 2.2 | 0.9 | 0.4 | 5.2 |
| Ammonia | mg/L | 0.012 | 0.0112 | 0.0244 | 0.0424 | <0.01 | 0.0976 | 0.0241 | 0.0174 |
| Total Nitrogen | mg/L | 0.189 | 0.06 | 0.09 | 0.1 | 0.04 | 0.15 | 0.132 | 0.172 |
| Total Phosphorus | mg/L | <0.01 | <0.01 | <0.01 | 0.74 | 0.27 | <0.01 | 0.01 | 0.02 |
| Chloride, Cl | mg/L | 4.1 | 3.3 | 5.4 | 19.4 | 19.9 | 4.3 | 3.3 | 14.8 |
| Total Coliform | CFU/100ml | 160 | 0 | 120 | 91 | 26 | 0 | 0 | 370 |
| Fecal Coliform | CFU/100ml | 90 | 0 | 70 | 21 | 9 | 0 | 0 | 70 |

LABORATORY RESULTS FOR WATER QUALITY 2 - COASTAL SPRINGS

Month: AUGUST 2002

| CODE | | 183 | 184 | 188 | 189 | 502 | 503 | 504 | 508 | 509 | 510 |
|---------------------------------|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| pH | pH Unit | 6.8 | 6.67 | 7.02 | 6.71 | 7.17 | 7.12 | 7.36 | 7.83 | 7.14 | 7.22 |
| Chloride, Cl | mg/L | 25.8 | 26 | 21.5 | 12.3 | 20.6 | 47.8 | 39.6 | 338 | 2,247 | 206.7 |
| Sodium, Na | mg/L | 17.6 | 17.9 | 14.8 | 8.4 | 13.8 | 28.4 | 25.7 | 217.9 | 1,465 | 134.6 |
| Potassium, K | mg/L | 2.1 | 3.3 | 1.2 | 0.79 | 1.9 | 3.9 | 3.4 | 8.4 | 15.6 | 5.8 |
| Calcium, Ca | mg/L | 158 | 140.8 | 104.2 | 152.4 | 100.6 | 72.1 | 74.4 | 100.1 | 147.2 | 89.6 |
| Magnesium, Mg | mg/L | 17.1 | 14.1 | 37.6 | 15.8 | 14.4 | 16.9 | 13.4 | 52.6 | 165.3 | 22.3 |
| Iron, Fe | mg/L | 0.01 | 0.01 | 0.02 | 0.03 | 0.01 | 0.03 | 0.02 | 0.03 | 0.02 | 0.03 |
| Bicarbonate (HCO ₃) | mg/L as CaCO ₃ | 307.2 | 291.4 | 290.1 | 304.3 | 227.8 | 189.6 | 205.4 | 228.4 | 233.2 | 126.8 |
| Sulfate, SO ₄ | mg/L | 105.2 | 87.5 | 75.2 | 80.4 | 23.4 | 20.2 | 21.1 | 70.2 | 385.2 | 52.5 |

LABORATORY RESULTS FOR WATER QUALITY 2 - LOW ELEVATION SPRINGS

Month: AUGUST 2002

| | | 113 | 136 | 137 | 138 | 149 | 152 | 172 | 176 | 177 | 178 |
|---------------------------------|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| pH | pH Unit | 7.48 | 7.67 | 7.34 | 7.22 | 7.38 | 7.59 | 7.33 | 7.05 | 7.6 | 7.13 |
| Chloride, Cl | mg/L | 15.8 | 5 | 18.9 | 15.6 | 34.8 | 27.2 | 14.9 | 28.9 | 28.2 | 26.7 |
| Sodium, Na | mg/L | 10.4 | 3.4 | 12.3 | 10.1 | 25.6 | 21.2 | 9.3 | 20.4 | 20.9 | 21.6 |
| Potassium, K | mg/L | 1.2 | 0.42 | 1.5 | 1.2 | 0.58 | 0.52 | 0.65 | 0.56 | 0.64 | 0.59 |
| Calcium, Ca | mg/L | 68.8 | 46 | 108.4 | 103.9 | 64.1 | 56.2 | 97.6 | 60.8 | 46.4 | 47.2 |
| Magnesium, Mg | mg/L | 21.4 | 6.2 | 14.6 | 9.7 | 25.4 | 9.8 | 20.4 | 9.2 | 13.6 | 13.6 |
| Iron, Fe | mg/L | 0.02 | 0.01 | 0.05 | 0.02 | 0.09 | 0.10 | 0.03 | 0.08 | 0.01 | 0.02 |
| Bicarbonate (HCO ₃) | CaCO ₃ | 220.8 | 118.4 | 266.4 | 196.2 | 201.3 | 257.6 | 292.6 | 245.2 | 213.4 | 197.3 |
| Sulfate, SO ₄ | mg/L | 20.3 | 2.3 | 18.2 | 18.3 | 29.2 | 19.1 | 16.8 | 27.3 | 16.2 | 14.1 |

| | | 185 | 186 | 207 | 208 | 247 | 250 | 251 | 259 | 264 | 418 |
|---------------------------------|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| pH | pH Unit | 7.05 | 7.36 | 7.81 | 7.52 | 7.59 | 7.47 | 7.51 | 7.41 | 7.29 | 7.3 |
| Chloride, Cl | mg/L | 11.5 | 9.3 | 11.4 | 15.1 | 7.5 | 10.3 | 10.1 | 10.4 | 64.2 | 17.1 |
| Sodium, Na | mg/L | 7.6 | 6.2 | 7.4 | 11.4 | 4.9 | 7.8 | 7.6 | 6.9 | 42.6 | 11.4 |
| Potassium, K | mg/L | 0.89 | 0.72 | 0.96 | 3.2 | 0.5 | 1.19 | 1.12 | 0.92 | 3.9 | 0.92 |
| Calcium, Ca | mg/L | 76.2 | 76.1 | 88.3 | 90.1 | 55.9 | 80.1 | 78.4 | 94.2 | 178.9 | 102.4 |
| Magnesium, Mg | mg/L | 4.9 | 21.8 | 4.9 | 15.8 | 9.2 | 6.2 | 8.6 | 8.9 | 13.4 | 17.1 |
| Iron, Fe | mg/L | 0.01 | 0.01 | 0.03 | 0.02 | 0.01 | 0.03 | 0.04 | 0.04 | 0.05 | 0.03 |
| Bicarbonate (HCO ₃) | mg/L as CaCO ₃ | 178.2 | 239.6 | 202.8 | 208.7 | 215.4 | 180.2 | 171.6 | 198.5 | 272.8 | 253.2 |
| Sulfate, SO ₄ | mg/L | 10.2 | 29.1 | 24.1 | 28.1 | 13.2 | 25.6 | 24.3 | 24.2 | 102.5 | 72.8 |

LABORATORY RESULTS FOR WATER QUALITY 2 - SPRINGS AT MIDDLE ELEVATION

Month: AUGUST 2002

| | | 107 | 108 | 109 | 115 | 117 | 118 | 139 | 173 | 211 | 223 |
|---------------------------------|-------------------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|
| pH | pH Unit | 7.8 | 7.74 | 7.48 | 7.57 | 7.52 | 7.48 | 7.92 | 8.1 | 7.47 | 7.76 |
| Chloride, Cl | mg/L | 6.8 | 7.6 | 15.8 | 19.3 | 13.2 | 11.3 | 2.3 | 20 | 8.6 | 8.7 |
| Sodium, Na | mg/L | 4.2 | 5.1 | 10.5 | 12.7 | 8.5 | 7.4 | 1.47 | 13.2 | 5.8 | 5.6 |
| Potassium, K | mg/L | 0.58 | 0.62 | 1.4 | 1.62 | 1.1 | 0.88 | 0.18 | 1.7 | 0.59 | 0.7 |
| Calcium, Ca | mg/L | 58.1 | 56.2 | 79.9 | 96.1 | 75.2 | 80 | 42.2 | 67.2 | 66.4 | 70.2 |
| Magnesium, Mg | mg/L | 18.2 | 17.1 | 24.3 | 18.6 | 25.3 | 9.2 | 8.1 | 27.3 | 10.9 | 6.6 |
| Iron, Fe | mg/L | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.03 | 0.01 | 0.02 | 0.01 | 0.01 |
| Bicarbonate (HCO ₃) | CaCO ₃ | 200.3 | 192.4 | 282 | 298.2 | 262.4 | 204.5 | 87.1 | 239.1 | 238.5 | 183.6 |
| Sulfate, SO ₄ | mg/L | 6.7 | 1.4 | 13.1 | 16.1 | 20.2 | 22.1 | 1.2 | 16.2 | 13.8 | 64.2 |

| | | 225 | 226 | 314 | 316 | 317 | 319 | 330 | 401 | 406 | 419 |
|---------------------------------|---------------------------|-------|-------|-------|------|-------|-------|-------|-------|-------|-------|
| pH | pH Unit | 7.55 | 7.89 | 7.7 | 7.73 | 7.7 | 7.8 | 7.61 | 7.56 | 7.26 | 7.97 |
| Chloride, Cl | mg/L | 7.3 | 4.3 | 3.3 | 3.2 | 3.3 | 7.5 | 6.9 | 6.6 | 11.6 | 8.5 |
| Sodium, Na | mg/L | 4.7 | 2.7 | 2.3 | 2.3 | 2.4 | 5.6 | 4.3 | 3.9 | 7.2 | 5.4 |
| Potassium, K | mg/L | 0.42 | 0.29 | 0.5 | 0.51 | 0.53 | 0.59 | 0.39 | 0.33 | 1.09 | 0.58 |
| Calcium, Ca | mg/L | 70.2 | 48.2 | 46.4 | 43.2 | 43.8 | 43.5 | 31.2 | 59.2 | 96.3 | 80.2 |
| Magnesium, Mg | mg/L | 6.6 | 16.5 | 7.7 | 9.7 | 10.3 | 16.4 | 11.4 | 12.4 | 14.6 | 10.9 |
| Iron, Fe | mg/L | 0.01 | 0.02 | 0.01 | 0.01 | 0.02 | 0.05 | 0.02 | 0.01 | 0.01 | 0.02 |
| Bicarbonate (HCO ₃) | mg/L as CaCO ₃ | 238.2 | 198.3 | 134.4 | 138 | 130.4 | 135.2 | 201.2 | 209.3 | 250.6 | 246.5 |
| Sulfate, SO ₄ | mg/L | 1.2 | 2.1 | <0.1 | <0.1 | <0.1 | 9.4 | 16.3 | 2.1 | 16.2 | 13.7 |

LABORATORY RESULTS FOR WATER QUALITY 2 - RIVERS

Month: AUGUST 2002

| | | 601 | 601-1 | 602 | 603 | 603-1 | 604 | 604-1 | 606 | 606-1 | 610 |
|---------------------------------|---------------------------|------|-------|------|-------|-------|------|-------|------|-------|------|
| pH | pH Unit | 8.01 | 8.34 | 8.36 | 8.01 | 8.00 | 8.26 | 7.08 | 7.85 | 8.21 | 8.12 |
| Sodium, Na | mg/L | 18.1 | 132.6 | 13.6 | 8.7 | 7.1 | 5.6 | 36.9 | 5.2 | 5.8 | 15.9 |
| Potassium, K | mg/L | 2.2 | 5.2 | 1.7 | 0.94 | 0.84 | 0.7 | 3.9 | 0.6 | 3.7 | 1.9 |
| Calcium, Ca | mg/L | 45.2 | 58.8 | 68.8 | 76.0 | 66.5 | 56.1 | 124.1 | 36.8 | 0.42 | 73.6 |
| Magnesium, Mg | mg/L | 5.8 | 18.4 | 11.8 | 17.0 | 17.8 | 7.8 | 7.2 | 5.8 | 46.8 | 4.9 |
| Iron, Fe | mg/L | 0.12 | 0.03 | 0.03 | 0.09 | 0.02 | 0.11 | 0.22 | 0.02 | 14.8 | 0.02 |
| Bicarbonate (HCO ₃) | mg/L as CaCO ₃ | 170 | 235.2 | 210 | 216.2 | 211.8 | 169 | 319.4 | 122 | 0.76 | 163 |
| Chloride, Cl | mg/L | 28.3 | 200.4 | 21.3 | 12.5 | 10.1 | 8.8 | 55.8 | 8.8 | 178.6 | 24.8 |
| Sulfate, SO ₄ | mg/L | 13.1 | 55.1 | 17.2 | 45.2 | 35.1 | 17.3 | 59.8 | 14.2 | 137.5 | 33.6 |

| | | 610-1 | 612 | 612-1 | 613 | 615 | 615-1 | 616 | 616-1 | 619 | 620 |
|---------------------------------|---------------------------|-------|-------|-------|-------|-------|-------|------|-------|------|------|
| pH | pH Unit | 7.75 | 7.83 | 7.82 | 7.55 | 8.07 | 8.25 | 8.33 | 7.79 | 7.96 | 7.79 |
| Sodium, Na | mg/L | 12.9 | 27.0 | 28.9 | 29.0 | 3.4 | 3.3 | 13.1 | 8.9 | 16.5 | 7.8 |
| Potassium, K | mg/L | 1.2 | 3.3 | 2.5 | 3.5 | 0.35 | 0.41 | 1.6 | 1.1 | 10.6 | 5.1 |
| Calcium, Ca | mg/L | 1.2 | 113.6 | 56.6 | 108.8 | 44.8 | 49.3 | 57.6 | 60 | 1.3 | 0.6 |
| Magnesium, Mg | mg/L | 12.4 | 11.7 | 18.9 | 4.9 | 5.8 | 12.9 | 5.8 | 24.3 | 56.2 | 61.6 |
| Iron, Fe | mg/L | 0.04 | 0.03 | 0.03 | 0.05 | 0.02 | 0.02 | 0.16 | 0.01 | 6.8 | 8.2 |
| Bicarbonate (HCO ₃) | mg/L as CaCO ₃ | 175.3 | 216 | 256.4 | 214 | 140.8 | 165.4 | 178 | 217.2 | 0.2 | 0.15 |
| Chloride, Cl | mg/L | 20.1 | 42.5 | 42.6 | 45.5 | 4.5 | 5.2 | 20.5 | 13.7 | 195 | 171 |
| Sulfate, SO ₄ | mg/L | 37.1 | 35.3 | 39.2 | 37.5 | <0.1 | 1.3 | 16.4 | 16.3 | 17.1 | 13.4 |