

## 8. Calcul de la contrainte sur le tuyau en amiante-ciment

La contrainte sur le tuyau en amiante-ciment existant s'obtient avec la formule ci-dessous. 0,5 t/m<sup>2</sup> est prévu comme charge associée, mais aucune charge active telle que camion n'est prévue. Les résultats obtenus par calcul inverse de la pression interne tolérée par emplacement de couverture du sol sont indiqués à la page suivante.

$$[P_H / (P_C / S)]^n + [H_p / (H_c / S)] = 1$$

$P_H$  (charge sur le tuyau due à la pression extérieure) =  $M / 0.318R$

$M$  (moment maximum)

$R$  (rayon du tuyau)

$P_C$  : charge de fissuration du tuyau

$n$  : coefficient de type et structure du tuyau

$H_p$  : pression interne donnant lieu à une rupture ou fissuration quand la pression extérieure est  $P$

$H_c$  : pression interne donnant lieu à une rupture ou fissuration quand la pression extérieure est 0

$S$  : taux de sécurité (1,2)

$M$  (moment maximum) =  $M_1 + M_2 + M_3$

$M_1$  (moment dû à la charge répartie perpendiculaire) =  $0.275WR^2$

$M_2$  (moment dû au poids de l'eau dans le tuyau) =  $0.26w_0R^3$

$M_3$  (moment dû à la charge horizontale latérale) =  $-(0.104P_1 + 0.146P_2)R^2$

$W$  (charge perpendiculaire) =  $W_1 + W_2$

$W_1$  (pression perpendiculaire du sol) =  $C \cdot W_s \cdot (B^2/H)$

$C$  (coefficient de pression du sol) =  $[1 - e^{-2K \cdot \mu' (H/B)}] / (2K \cdot \mu')$

$W_s$  (poids volumétrique unitaire du sol) =  $1.8 \text{ t/m}^3$

$B$  (largeur d'excavation) =  $1.0 \text{ m}$

$K$  (coefficient de pression du sol de Rankine) =  $0.406$

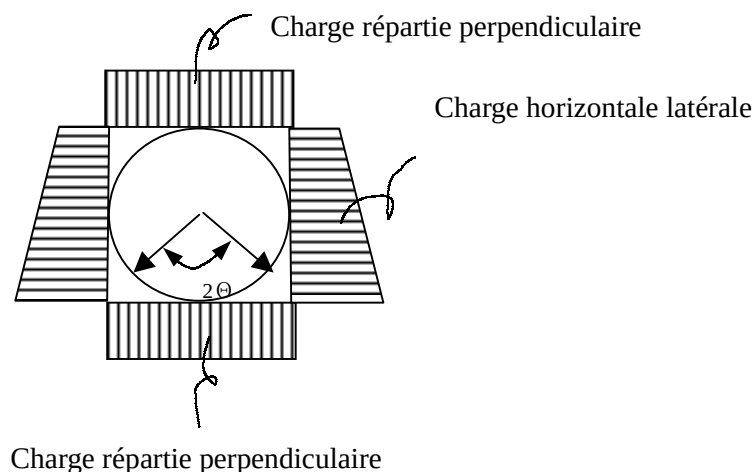
$H$  (couverture du sol)

$\mu'$  (angle de frottement interne entre le sol remblayé et le talus) =  $25^\circ$

$R$  (rayon moyen)

$w_0$  (poids volumétrique unitaire de l'eau) =  $1.0 \text{ t/m}^3$

$P_1, P_2$  (résistance horizontale à la pression du sol) =  $K \cdot W_s \cdot h$





\*\*\*\* Calcul de la structure du tuyau (tuyau opaque) \*\*\*\*

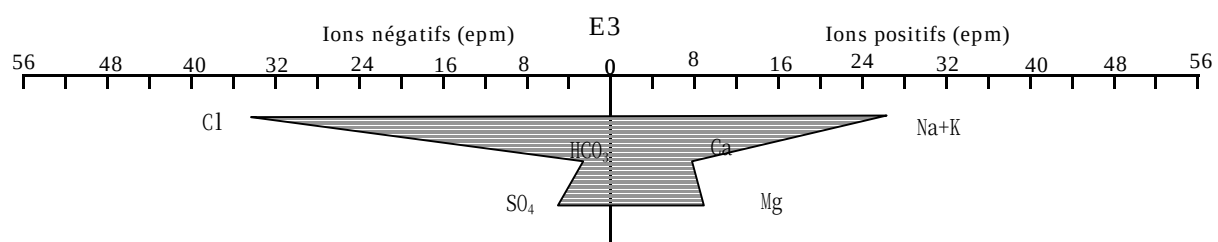
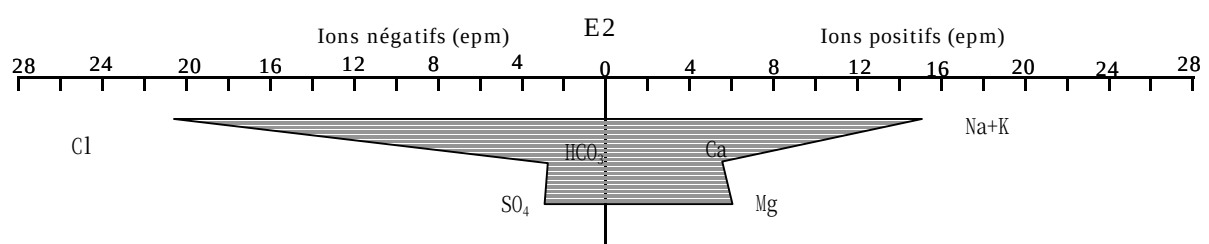
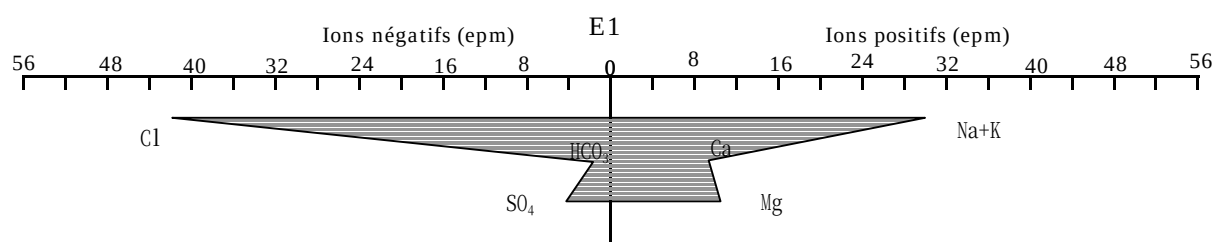
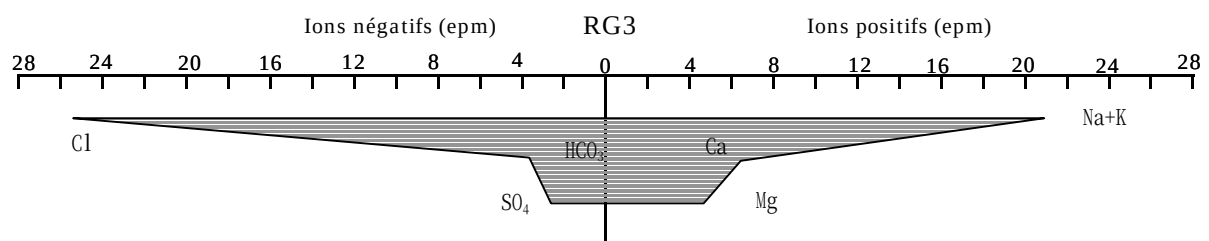
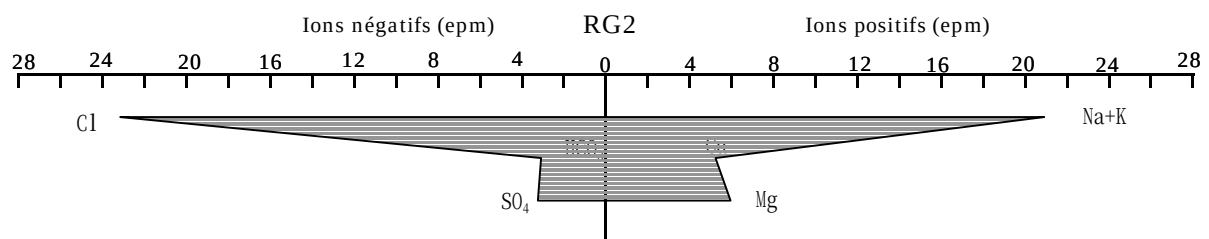
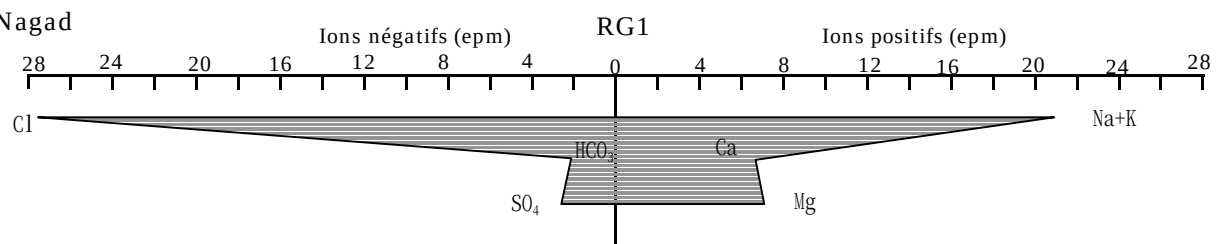
Cas: Type de tuyau: ACP - 2 types

| Diamètre nominal<br>Diamètre intérieur<br>Diamètre extérieur<br>Epaisseur du tuyau<br>Rayon moyen<br>Poids du tuyau<br>Poids unitaire du sol<br>Angle de frottement interne<br>Largeur de creusement au sommet du tuyau | Charge de la route               |        |       |                             |                             |                             |        |                               |                             |               | 500 (kg/m <sup>2</sup> )        |                 |               |                                           |       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------|-------|-----------------------------|-----------------------------|-----------------------------|--------|-------------------------------|-----------------------------|---------------|---------------------------------|-----------------|---------------|-------------------------------------------|-------|
|                                                                                                                                                                                                                         | Charges associées                |        |       |                             |                             |                             |        |                               |                             |               | fouille sans étayage (tranchée) |                 |               |                                           |       |
|                                                                                                                                                                                                                         | Entierement:                     |        |       |                             |                             |                             |        |                               |                             |               | 120° support libre              |                 |               |                                           |       |
|                                                                                                                                                                                                                         | Angle de portance de conception: |        |       |                             |                             |                             |        |                               |                             |               | K=0,406                         |                 |               |                                           |       |
|                                                                                                                                                                                                                         | Coefficient de pression au sol   |        |       |                             |                             |                             |        |                               |                             |               | e <sup>3</sup> =28,0            |                 |               |                                           |       |
|                                                                                                                                                                                                                         | Coefficient de résistance        |        |       |                             |                             |                             |        |                               |                             |               | rsd=0,70                        |                 |               |                                           |       |
|                                                                                                                                                                                                                         | Taux d'affaïssement              |        |       |                             |                             |                             |        |                               |                             |               | P=1,0                           |                 |               |                                           |       |
| H<br>(m)                                                                                                                                                                                                                | He<br>(m)                        | C      | *     | Wv<br>(kg/cm <sup>3</sup> ) | P1<br>(kg/cm <sup>3</sup> ) | P2<br>(kg/cm <sup>3</sup> ) | i      | Alpha<br>(1/cm <sup>3</sup> ) | Ww<br>(kg/cm <sup>3</sup> ) | Pc<br>(kg/cm) | Hc<br>(kg/cm <sup>3</sup> )     | M<br>(kg·cm/cm) | Ph<br>(kg/cm) | Pression tolérée<br>(kg/cm <sup>3</sup> ) |       |
|                                                                                                                                                                                                                         | 1.00                             | 0.52   | 4.491 | 2                           | 0.2789                      | 0.0000                      | 0.0000 | 0.0                           | 0.000                       | 0.0500        | 78.6                            | 28.0            | 24.6          | 4.80                                      | 13.79 |
|                                                                                                                                                                                                                         | 1.10                             | 0.50   | 4.954 | 2                           | 0.3077                      | 0.0000                      | 0.0000 | 0.0                           | 0.000                       | 0.0500        | 78.6                            | 28.0            | 26.7          | 5.20                                      | 13.75 |
|                                                                                                                                                                                                                         | 1.20                             | 0.49   | 5.416 | 2                           | 0.3363                      | 0.0000                      | 0.0000 | 0.0                           | 0.000                       | 0.0500        | 78.6                            | 28.0            | 28.7          | 5.60                                      | 13.72 |
|                                                                                                                                                                                                                         | 1.30                             | 0.49   | 5.878 | 2                           | 0.3650                      | 0.0000                      | 0.0000 | 0.0                           | 0.000                       | 0.0500        | 78.6                            | 28.0            | 30.8          | 6.00                                      | 13.67 |
|                                                                                                                                                                                                                         | 1.40                             | 0.48   | 6.337 | 2                           | 0.3935                      | 0.0000                      | 0.0000 | 0.0                           | 0.000                       | 0.0500        | 78.6                            | 28.0            | 32.8          | 6.40                                      | 13.63 |
|                                                                                                                                                                                                                         | 1.50                             | 0.47   | 6.800 | 2                           | 0.4223                      | 0.0000                      | 0.0000 | 0.0                           | 0.000                       | 0.0500        | 78.6                            | 28.0            | 34.9          | 6.80                                      | 13.58 |
|                                                                                                                                                                                                                         | 1.60                             | 0.47   | 7.257 | 2                           | 0.4506                      | 0.0000                      | 0.0000 | 0.0                           | 0.000                       | 0.0500        | 78.6                            | 28.0            | 36.9          | 7.19                                      | 13.53 |
|                                                                                                                                                                                                                         | 1.70                             | 0.47   | 7.721 | 2                           | 0.4795                      | 0.0000                      | 0.0000 | 0.0                           | 0.000                       | 0.0500        | 78.6                            | 28.0            | 39.0          | 7.60                                      | 13.48 |
|                                                                                                                                                                                                                         | 1.80                             | 0.46   | 8.183 | 2                           | 0.5082                      | 0.0000                      | 0.0000 | 0.0                           | 0.000                       | 0.0500        | 78.6                            | 28.0            | 41.0          | 8.00                                      | 13.42 |
| 1.90                                                                                                                                                                                                                    | 0.46                             | 8.641  | 2     | 0.5366                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 43.0            | 8.39          | 13.36                                     |       |
| 2.00                                                                                                                                                                                                                    | 0.46                             | 9.097  | 2     | 0.5649                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 45.1            | 8.79          | 13.30                                     |       |
| 2.10                                                                                                                                                                                                                    | 0.45                             | 9.558  | 2     | 0.5935                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 47.1            | 9.19          | 13.24                                     |       |
| 2.20                                                                                                                                                                                                                    | 0.45                             | 10.016 | 2     | 0.6220                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 49.1            | 9.58          | 13.17                                     |       |
| 2.30                                                                                                                                                                                                                    | 0.45                             | 10.483 | 2     | 0.6510                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 51.2            | 9.99          | 13.10                                     |       |
| 2.40                                                                                                                                                                                                                    | 0.45                             | 10.938 | 2     | 0.6792                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 53.2            | 10.38         | 13.02                                     |       |
| 2.50                                                                                                                                                                                                                    | 0.45                             | 11.402 | 2     | 0.7080                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 55.3            | 10.78         | 12.95                                     |       |
| 2.60                                                                                                                                                                                                                    | 0.45                             | 11.864 | 2     | 0.7368                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 57.3            | 11.18         | 12.87                                     |       |
| 2.70                                                                                                                                                                                                                    | 0.45                             | 12.314 | 2     | 0.7647                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 59.3            | 11.57         | 12.79                                     |       |
| 2.80                                                                                                                                                                                                                    | 0.44                             | 12.775 | 2     | 0.7933                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 61.4            | 11.97         | 12.70                                     |       |
| 2.90                                                                                                                                                                                                                    | 0.44                             | 13.234 | 2     | 0.8218                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 63.4            | 12.37         | 12.61                                     |       |
| 3.00                                                                                                                                                                                                                    | 0.44                             | 13.705 | 2     | 0.8511                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 65.5            | 12.78         | 12.52                                     |       |
| 3.10                                                                                                                                                                                                                    | 0.44                             | 14.163 | 2     | 0.8795                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 67.6            | 13.17         | 12.43                                     |       |
| 3.20                                                                                                                                                                                                                    | 0.44                             | 14.619 | 2     | 0.9078                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 69.6            | 13.57         | 12.33                                     |       |
| 3.30                                                                                                                                                                                                                    | 0.44                             | 15.075 | 2     | 0.9361                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 71.6            | 13.96         | 12.23                                     |       |
| 3.40                                                                                                                                                                                                                    | 0.44                             | 15.534 | 2     | 0.9653                      | 0.0000                      | 0.0000                      | 0.0    | 0.000                         | 0.0500                      | 78.6          | 28.0                            | 73.7            | 14.37         | 12.13                                     |       |

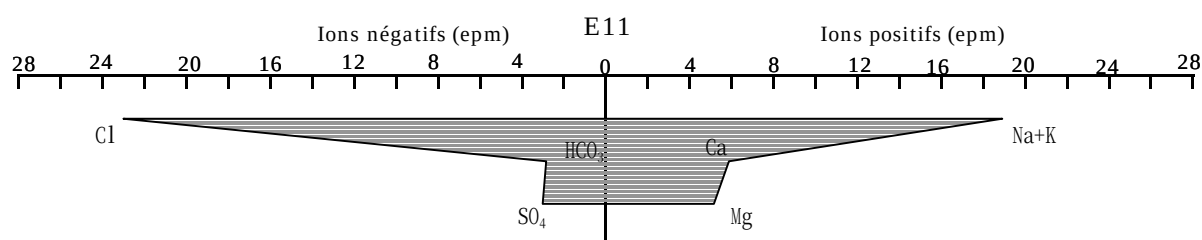
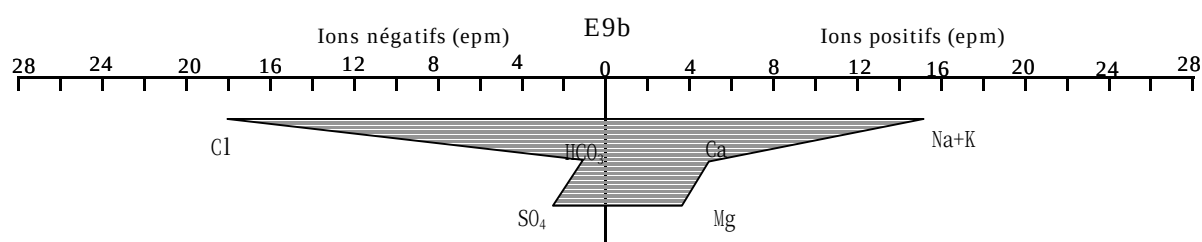
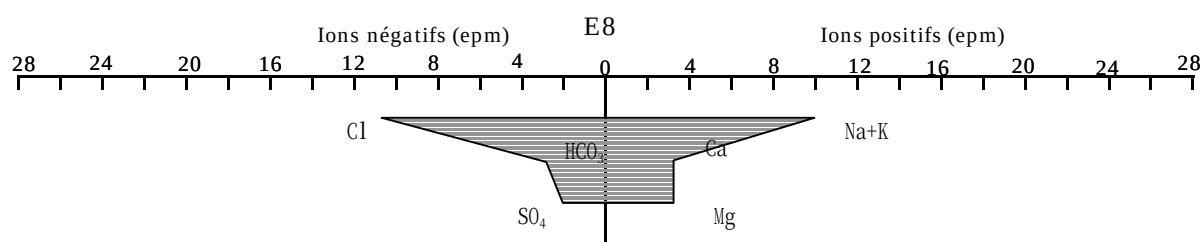
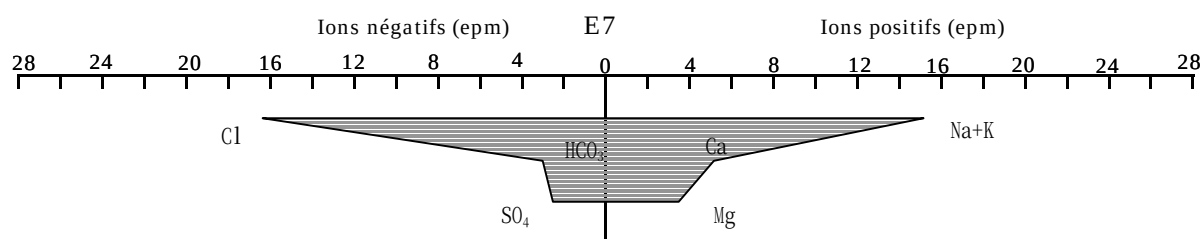
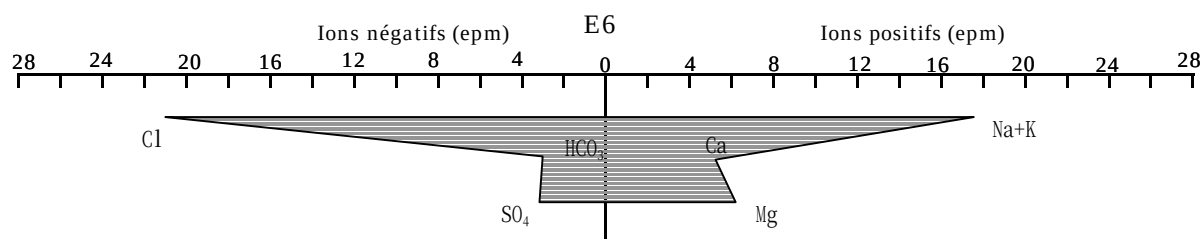
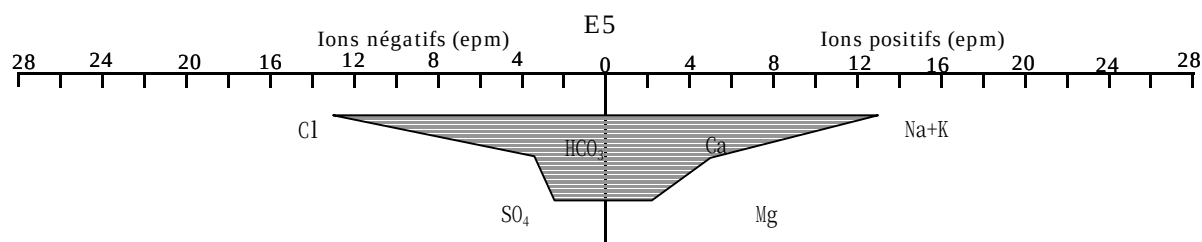


9. Qualité de l'eau des forages existants (modélisation s'appuyant sur les résultats d'analyse de qualité de l'eau)

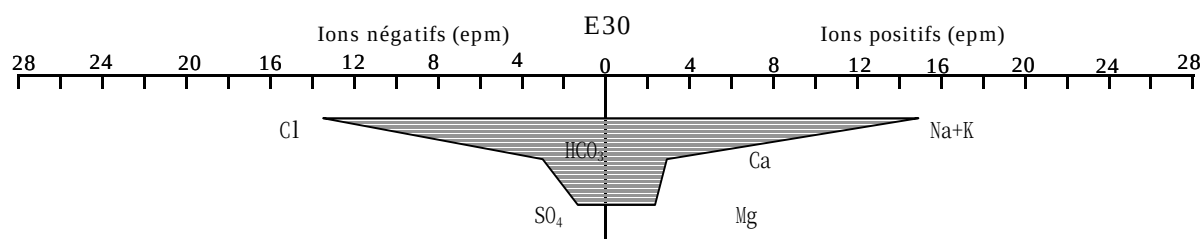
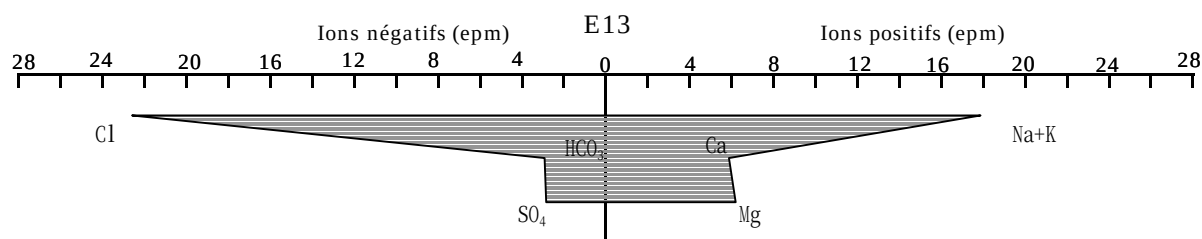
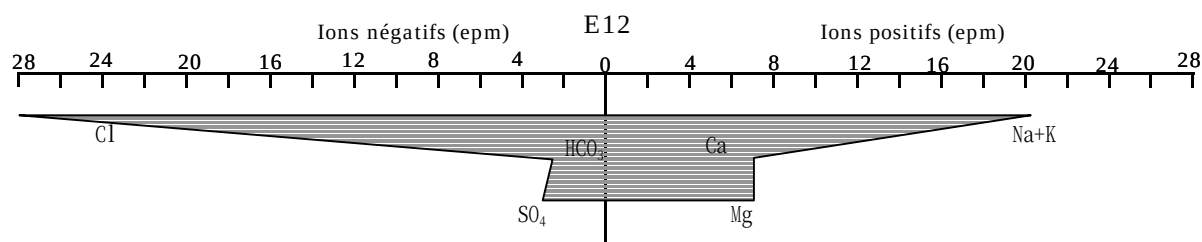
Nagad



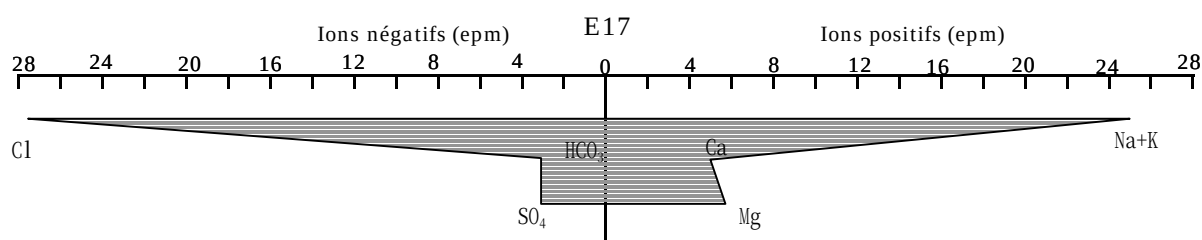
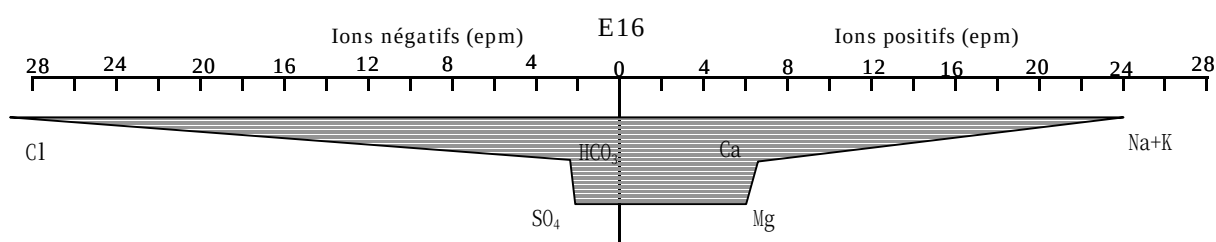
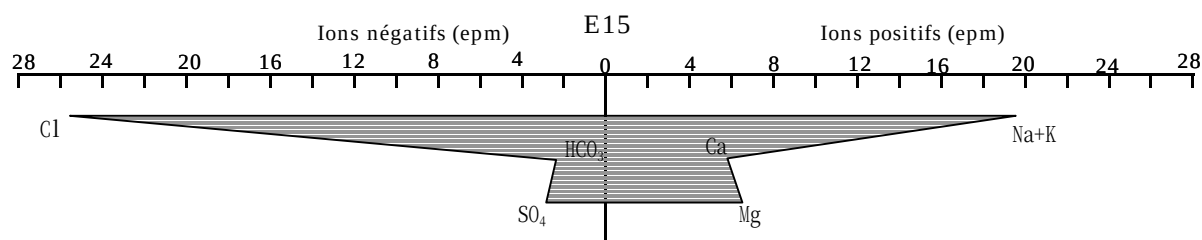
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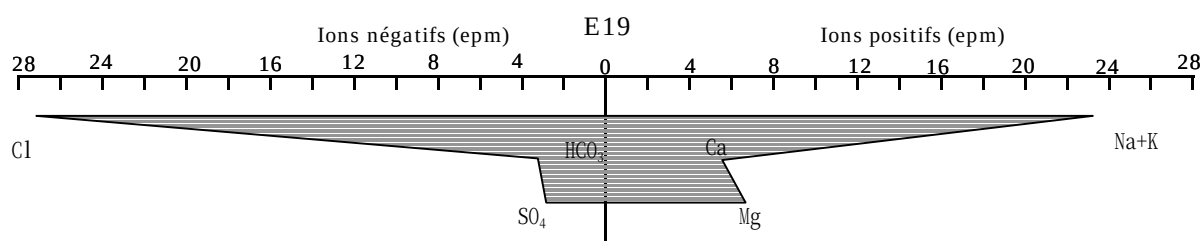
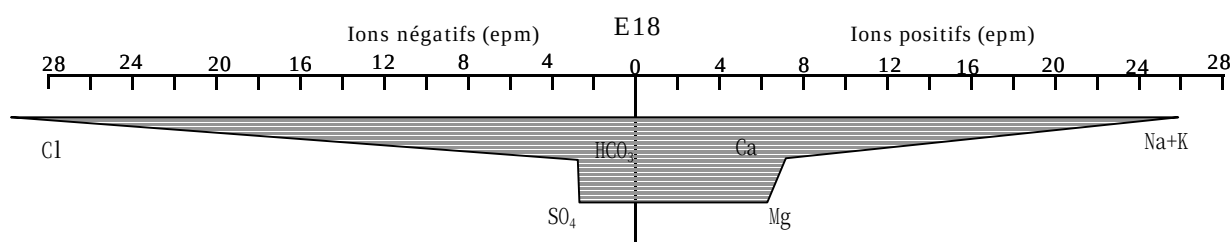
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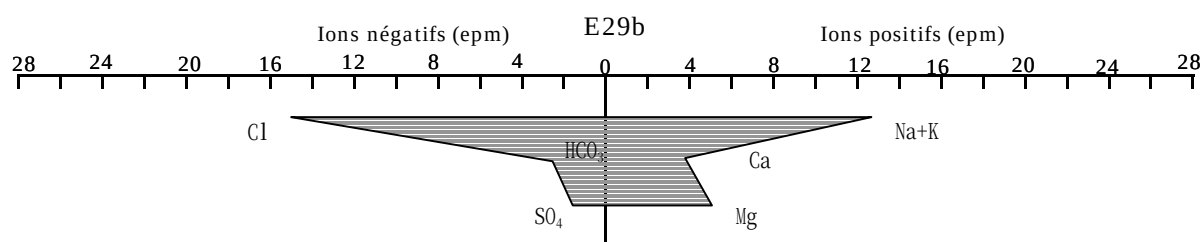
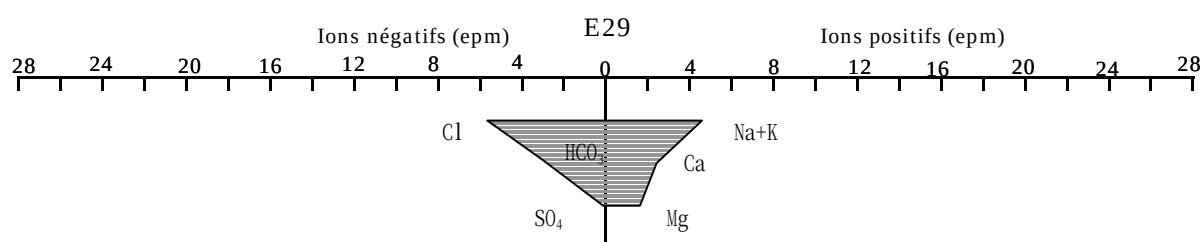
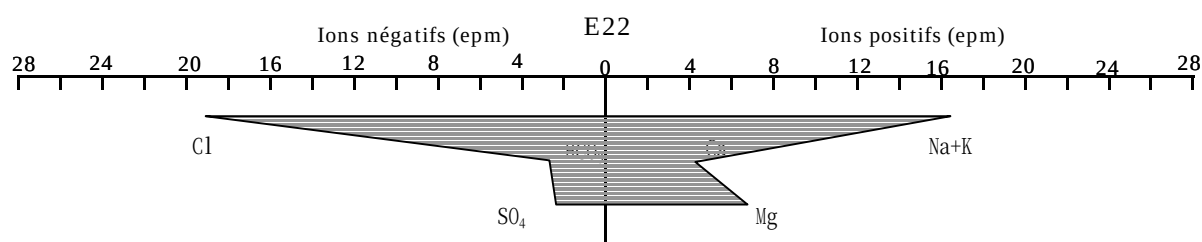
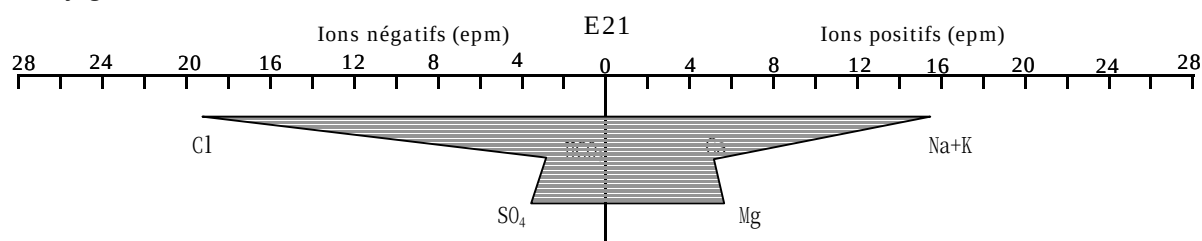
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Douda

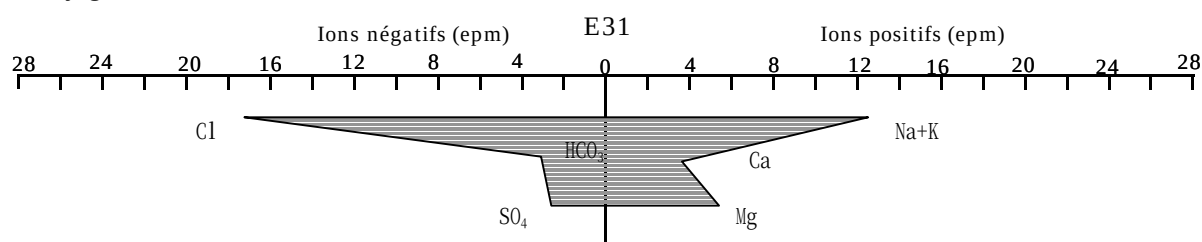


Damerjog

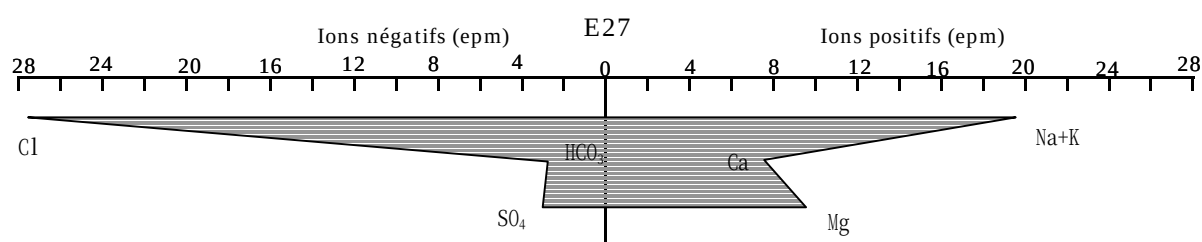
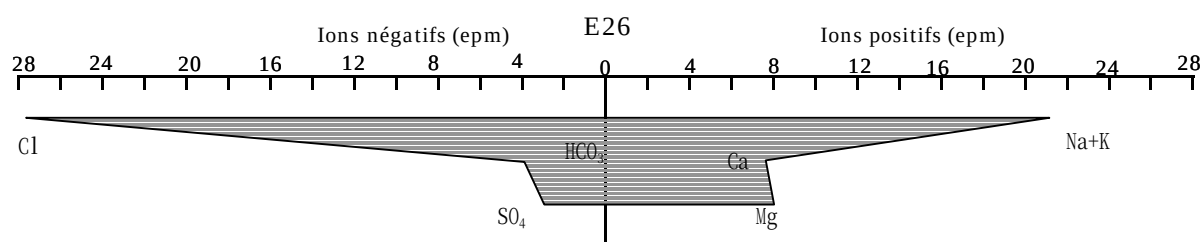
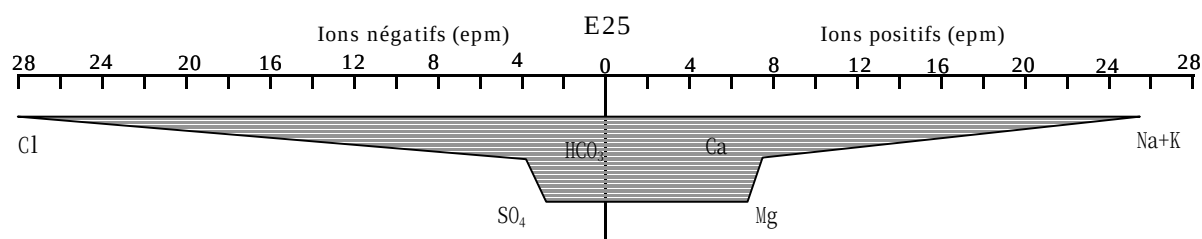
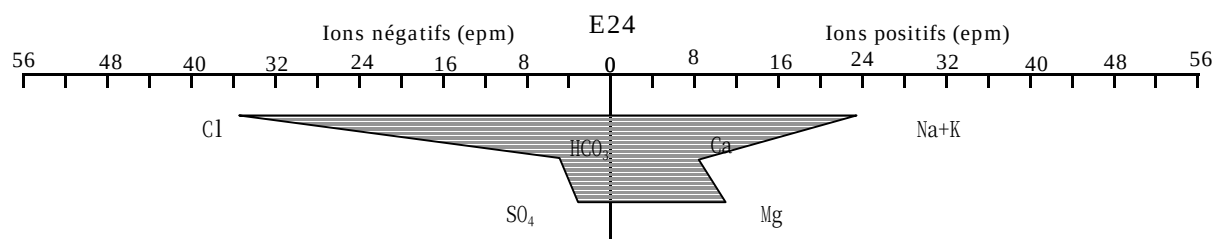




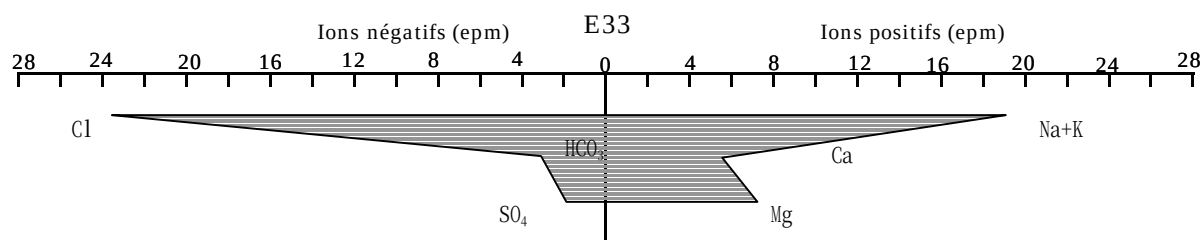
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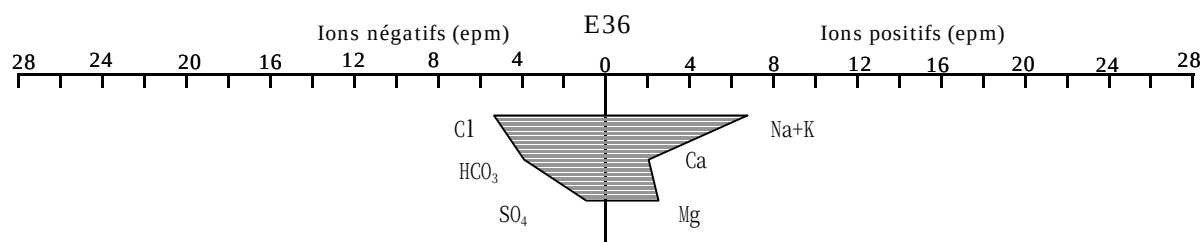
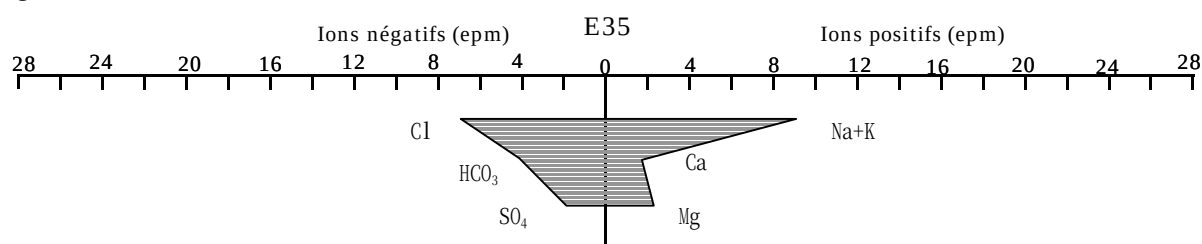
# Atar



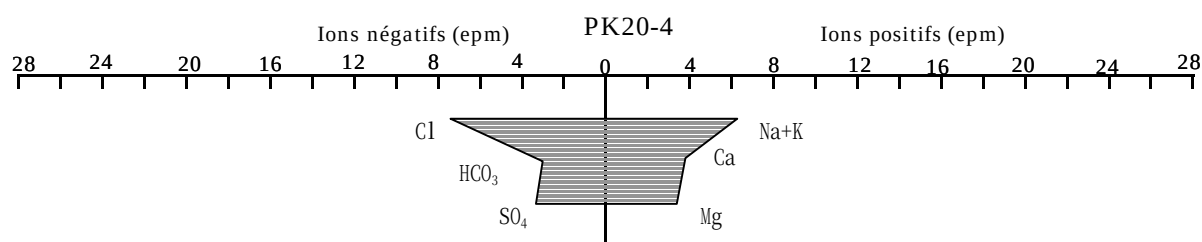
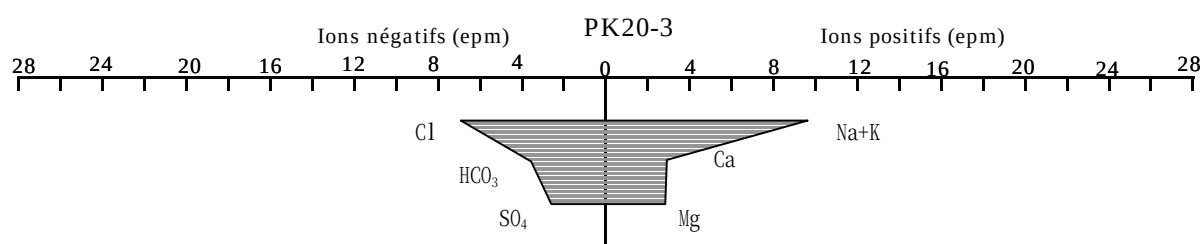
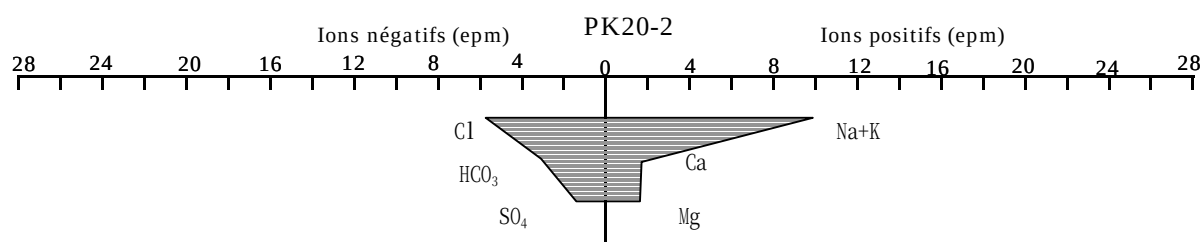
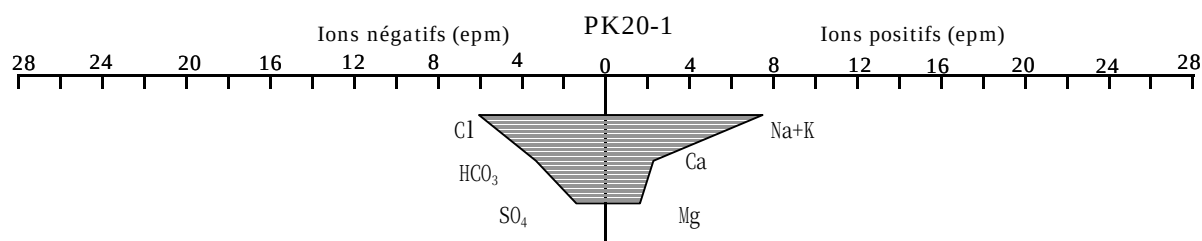
# Godchabel

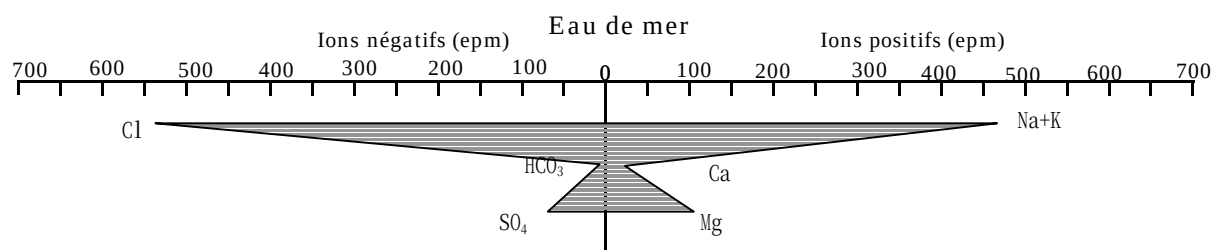


Gegada



PK20





## 10. Calcul du taux de dilution

### Abrégé des résultats des calculs

|                                                                     | Volume pompé (m3/an)             |                                 |            | Teneur totale en sel dissous (mg/l) |                                 | TDS (mg/l)                       |                                 | Effets                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------------|----------------------------------|---------------------------------|------------|-------------------------------------|---------------------------------|----------------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                     | Zone de distribution de Djibouti | Zone de distribution de Balbala | Total      | Zone de distribution de Djibouti    | Zone de distribution de Balbala | Zone de distribution de Djibouti | Zone de distribution de Balbala |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Cas (1) (situation actuelle)                                        | 13,367,760                       | 1,585,560                       | 14,953,320 | 1,801                               | 1,264                           | 1,829                            | 1,305                           | <ul style="list-style-type: none"> <li>Il faut utiliser les forages existants où la salinisation progresse, mais la teneur totale en sel dissous et les TDS devraient augmenter dans l'avenir.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Cas (2) (exécution de tout le projet + ajustement de la production) | 12,053,760                       | 2,803,200                       | 14,856,960 | 1,483                               | 790                             | 1,452                            | 832                             | <ul style="list-style-type: none"> <li>C'est le cas d'exécution dans toutes les zones, et la teneur totale en sel dissous et les TDS diminuent le plus dans les 3 cas.</li> <li>La dilution par exécution du projet dans la zone de Gegada et la diminution de la teneur en sel plus jusqu'aujourd'hui par réhabilitation et fermeture de forages dans la zone de Nagad seront assurées. La limite eau douce - eau salée baissera à long terme dans la zone de Nagad (arrêt de la salinisation).</li> <li>L'amenée d'eau de la station de pompage de Hambouli à la station de distribution de Balbala deviendra inutile, et le système de distribution d'eau deviendra: une zone de distribution par groupe de forages.</li> <li>Le volume d'approvisionnement de la zone de distribution de Balbala doublera pratiquement, ce qui constituera une amélioration importante.</li> </ul> |
| Cas (3) (Gegada + Nagad + PK20 + ajustement de la production)       | 11,939,880                       | 2,803,200                       | 14,743,080 | 1,535                               | 790                             | 1,568                            | 832                             | <ul style="list-style-type: none"> <li>En principe, l'amélioration sera similaire aux résultats du cas (2), mais il faudra utiliser quelques forages à valeur de la teneur totale en sel dissous élevée.</li> <li>Même si la zone de Godchabel n'est pas développée, la valeur objective de l'ONED sera assurée.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

Calcul d'amélioration de la qualité de l'eau cas (1):situation actuelle

|                               | Nom du Forage                       |        | Projet de fonctionnement | Débit du projet |               | Teneur totale en sel dissous |             | TDS (valeur mesurée par l'équipe de la mission) |             | Envoi d'eau vers Djibouti | Envoi d'eau vers Balbala | Total      |
|-------------------------------|-------------------------------------|--------|--------------------------|-----------------|---------------|------------------------------|-------------|-------------------------------------------------|-------------|---------------------------|--------------------------|------------|
|                               |                                     |        |                          | (m³/h)          | ①(l/h)        | ② (mg/l)                     | ①×② (mg/h)  | ③ (mg/l)                                        | ①×③ (mg/h)  |                           |                          |            |
| Groupe de forages de Djibouti | 1                                   | RG1    | En continu               | 8               | 8,000         | 1,957                        | 15,656,000  | 1,999                                           | 15,992,000  |                           |                          |            |
|                               | 2                                   | RG2    | En continu               | 57              | 57,000        | 1,835                        | 104,595,000 | 1,883                                           | 107,331,000 |                           |                          |            |
|                               | 3                                   | RG3    | En continu               | 35              | 35,000        | 1,983                        | 69,405,000  | 2,033                                           | 71,155,000  |                           |                          |            |
|                               | 4                                   | E01    | En continu               | 48              | 48,000        | 2,951                        | 141,648,000 | 2,909                                           | 139,632,000 |                           |                          |            |
|                               | 5                                   | E02    | En continu               | 32              | 32,000        | 1,605                        | 51,360,000  | 1,629                                           | 52,128,000  |                           |                          |            |
|                               | 6                                   | E03    | En continu               | 65              | 65,000        | 2,536                        | 164,840,000 | 2,578                                           | 167,570,000 |                           |                          |            |
|                               | 7                                   | E05    | En continu               | 4               | 4,000         | 1,199                        | 4,796,000   | 1,252                                           | 5,008,000   |                           |                          |            |
|                               | 8                                   | E06    | En continu               | 21              | 21,000        | 1,728                        | 36,288,000  | 1,765                                           | 37,065,000  |                           |                          |            |
|                               | 9                                   | E07    | En continu               | 37              | 37,000        | 1,383                        | 51,171,000  | 1,420                                           | 52,540,000  |                           |                          |            |
|                               | 10                                  | E08    | En continu               |                 | 0             | 1,009                        | 0           | 1,042                                           | 0           |                           |                          |            |
|                               | 11                                  | E09b   | En continu               | 40              | 40,000        | 1,316                        | 52,640,000  | 1,348                                           | 53,920,000  |                           |                          |            |
|                               | 12                                  | E11    | En continu               | 46              | 46,000        | 1,809                        | 83,214,000  | 1,842                                           | 84,732,000  |                           |                          |            |
|                               | 13                                  | E12    | En continu               | 38              | 38,000        | 2,026                        | 76,988,000  | 2,066                                           | 78,508,000  |                           |                          |            |
|                               | 14                                  | E13    | En continu               | 81              | 81,000        | 1,725                        | 139,725,000 | 1,759                                           | 142,479,000 |                           |                          |            |
|                               | 15                                  | E15    | Fermeture                |                 | 0             | 1,848                        | 0           | 1,889                                           | 0           |                           |                          |            |
|                               | 16                                  | E16    | Fermeture                |                 | 0             | 2,153                        | 0           | 2,183                                           | 0           |                           |                          |            |
|                               | 17                                  | E17    | En continu               | 21              | 21,000        | 1,887                        | 39,627,000  | 1,889                                           | 39,669,000  |                           |                          |            |
|                               | 18                                  | E18    | En continu               | 86              | 86,000        | 2,229                        | 191,694,000 | 2,269                                           | 195,134,000 |                           |                          |            |
|                               | 19                                  | E19    | En continu               | 84              | 84,000        | 2,041                        | 171,444,000 | 2,062                                           | 173,208,000 |                           |                          |            |
|                               | 20                                  | E21    | En continu               | 37              | 37,000        | 1,594                        | 58,978,000  | 1,638                                           | 60,606,000  |                           |                          |            |
|                               | 21                                  | E22    | En continu               | 69              | 69,000        | 1,512                        | 104,328,000 | 1,543                                           | 106,467,000 |                           |                          |            |
|                               | 22                                  | E24    | En continu               | 43              | 43,000        | 2,573                        | 110,639,000 | 2,592                                           | 111,456,000 |                           |                          |            |
|                               | 23                                  | E25    | En continu               | 53              | 53,000        | 2,218                        | 117,554,000 | 2,242                                           | 118,826,000 |                           |                          |            |
|                               | 24                                  | E26    | En continu               | 89              | 89,000        | 2,108                        | 187,612,000 | 2,128                                           | 189,392,000 |                           |                          |            |
|                               | 25                                  | E27    | En continu               | 164             | 164,000       | 2,043                        | 335,052,000 | 2,065                                           | 338,660,000 |                           |                          |            |
|                               | 26                                  | E29b   | En continu               | 76              | 76,000        | 1,251                        | 95,076,000  | 1,276                                           | 96,976,000  |                           |                          |            |
|                               | 27                                  | E30    | En continu               | 91              | 91,000        | 1,157                        | 105,287,000 | 1,186                                           | 107,926,000 |                           |                          |            |
|                               | 28                                  | E31    | En continu               | 61              | 61,000        | 1,377                        | 83,997,000  | 1,419                                           | 86,559,000  |                           |                          |            |
|                               | 29                                  | E33    | En continu               | 46              | 46,000        | 1,756                        | 80,776,000  | 1,788                                           | 82,248,000  |                           |                          |            |
|                               | 30                                  | F3     | -                        |                 | 0             | 1,500                        | 0           | 800                                             | 0           |                           |                          |            |
|                               | 31                                  | F4     | -                        |                 | 0             | 1,500                        | 0           | 800                                             | 0           |                           |                          |            |
|                               | 32                                  | F5     | -                        |                 | 0             | 1,500                        | 0           | 800                                             | 0           |                           |                          |            |
|                               | 33                                  | E35    | En continu               | 44              | 44,000        | 863                          | 37,972,000  | 900                                             | 39,600,000  |                           |                          |            |
|                               | 34                                  | E36    | En continu               | 50              | 50,000        | 713                          | 35,650,000  | 728                                             | 36,400,000  |                           |                          |            |
|                               | 35                                  | Z2     | -                        |                 | 0             | 650                          | 0           | 700                                             | 0           |                           |                          |            |
|                               | 36                                  | Z3     | -                        |                 | 0             | 650                          | 0           | 700                                             | 0           |                           |                          |            |
|                               | 37                                  | Z25    | -                        |                 | 0             | 650                          | 0           | 700                                             | 0           |                           |                          |            |
| Groupe de forages de PK20     | sous-total 1                        |        |                          | 1,526           | 2,748,012,000 |                              |             | 2,791,187,000                                   |             | 1,376                     | 150                      | 1,526      |
|                               |                                     |        |                          |                 |               |                              |             |                                                 |             | 90.2%                     | 9.8%                     | 100.0%     |
|                               | Teneur totale en sel dissous et TDS |        |                          |                 |               |                              | 1,801       |                                                 | 1,829       | 1,801                     | 1,801                    | 1,801      |
|                               | 38                                  | F3bis  | -                        |                 |               | 750                          | 0           | 780                                             | 0           |                           |                          |            |
|                               | 39                                  | F9bis  | -                        |                 |               | 750                          | 0           | 780                                             | 0           |                           |                          |            |
|                               | 40                                  | F10bis | -                        |                 |               | 750                          | 0           | 780                                             | 0           |                           |                          |            |
|                               | 41                                  | PK20-1 | En continu               | 56              | 56,000        | 733                          | 41,048,000  | 780                                             | 43,680,000  |                           |                          |            |
|                               | 42                                  | PK20-2 | En continu               | 36              | 36,000        | 751                          | 27,036,000  | 780                                             | 28,080,000  |                           |                          |            |
|                               | 43                                  | PK20-3 | En continu               | 23              | 23,000        | 895                          | 20,585,000  | 945                                             | 21,735,000  |                           |                          |            |
|                               | 44                                  | PK20-4 | En continu               | 66              | 66,000        | 908                          | 59,928,000  | 977                                             | 64,482,000  |                           |                          |            |
|                               | total de PK20                       |        |                          | 181             | 148,597,000   |                              |             | 157,977,000                                     |             | 0                         | 181                      | 181        |
|                               |                                     |        |                          |                 |               |                              |             |                                                 |             | 0.0%                      | 100.0%                   | 100.0%     |
|                               | Hambouli                            |        |                          | 150             |               | 1,801                        | 269,305,176 | 1,829                                           | 273,536,326 |                           |                          |            |
|                               | sous-total 2                        |        |                          | 331             | 417,902,176   |                              |             | 431,513,326                                     |             |                           |                          |            |
|                               | Teneur totale en sel dissous et TDS |        |                          |                 | 1,264         |                              |             | 1,305                                           |             | 1,264                     | 1,264                    | 1,264      |
| production annuel             |                                     |        |                          |                 |               |                              |             |                                                 |             |                           |                          | 14,953.320 |

cas (2):exécution de tout le projet + ajustement de la production

|                               |                                     | Nom du Forage | Projet de fonctionnement      | Débit du projet |               | Teneur totale en sel dissous |             | TDS (valeur mesurée par l'équipe de la mission) |             | Envoi d'eau vers Djibouti | Envoi d'eau vers Balbala | Total |
|-------------------------------|-------------------------------------|---------------|-------------------------------|-----------------|---------------|------------------------------|-------------|-------------------------------------------------|-------------|---------------------------|--------------------------|-------|
|                               |                                     |               |                               | (m³/h)          | ①(l/h)        | ② (mg/l)                     | ①×② (mg/h)  | ③ (mg/l)                                        | ①×③ (mg/h)  |                           |                          |       |
| Groupe de forages de Djibouti | 1                                   | RG1           | ※Fermeture                    | 0               | 0             | 1,957                        | 0           | 1,999                                           | 0           |                           |                          |       |
|                               | 2                                   | RG2           | Renouvellement (ajustement) ※ | 35              | 35,000        | 1,835                        | 64,225,000  | 1,883                                           | 65,905,000  |                           |                          |       |
|                               | 3                                   | RG3           | ※Fermeture                    | 0               | 0             | 1,983                        | 0           | 2,033                                           | 0           |                           |                          |       |
|                               | 4                                   | E01           | ※Fermeture                    | 0               | 0             | 2,951                        | 0           | 2,909                                           | 0           |                           |                          |       |
|                               | 5                                   | E02           | Renouvellement                | 30              | 30,000        | 1,605                        | 48,150,000  | 1,629                                           | 48,870,000  |                           |                          |       |
|                               | 6                                   | E03           | ※Fermeture                    | 0               | 0             | 2,536                        | 0           | 2,578                                           | 0           |                           |                          |       |
|                               | 7                                   | E05           | ※Renouvellement               | 30              | 30,000        | 1,199                        | 35,970,000  | 1,252                                           | 37,560,000  |                           |                          |       |
|                               | 8                                   | E06           | ※Renouvellement               | 30              | 30,000        | 1,728                        | 51,840,000  | 1,765                                           | 52,950,000  |                           |                          |       |
|                               | 9                                   | E07           | ※Renouvellement               | 30              | 30,000        | 1,383                        | 41,490,000  | 1,420                                           | 42,600,000  |                           |                          |       |
|                               | 10                                  | E08           | En continu                    | 40              | 40,000        | 1,009                        | 40,360,000  | 1,042                                           | 41,680,000  |                           |                          |       |
|                               | 11                                  | E09b          | En continu                    | 40              | 40,000        | 1,316                        | 52,640,000  | 1,348                                           | 53,920,000  |                           |                          |       |
|                               | 12                                  | E11           | ※Renouvellement               | 30              | 30,000        | 1,809                        | 54,270,000  | 1,842                                           | 55,260,000  |                           |                          |       |
|                               | 13                                  | E12           | ※Fermeture                    | 0               | 0             | 2,026                        | 0           | 2,066                                           | 0           |                           |                          |       |
|                               | 14                                  | E13           | En continu                    | 81              | 81,000        | 1,725                        | 139,725,000 | 1,759                                           | 142,479,000 |                           |                          |       |
|                               | 15                                  | E15           | Réhabilitation                | 30              | 30,000        | 1,848                        | 55,440,000  | 1,889                                           | 56,670,000  |                           |                          |       |
|                               | 16                                  | E16           | Réhabilitation                | 30              | 30,000        | 2,153                        | 64,590,000  | 2,183                                           | 65,490,000  |                           |                          |       |
|                               | 17                                  | E17           | ※Fermeture                    | 0               | 0             | 1,887                        | 0           | 1,889                                           | 0           |                           |                          |       |
|                               | 18                                  | E18           | ※Fermeture                    | 0               | 0             | 2,229                        | 0           | 2,269                                           | 0           |                           |                          |       |
|                               | 19                                  | E19           | En continu                    | 80              | 80,000        | 2,041                        | 163,280,000 | 2,062                                           | 164,960,000 |                           |                          |       |
|                               | 20                                  | E21           | Réhabilitation                | 37              | 37,000        | 1,594                        | 58,978,000  | 1,638                                           | 60,606,000  |                           |                          |       |
|                               | 21                                  | E22           | En continu                    | 70              | 70,000        | 1,512                        | 105,840,000 | 1,543                                           | 108,010,000 |                           |                          |       |
|                               | 22                                  | E24           | ※En continu (ajustement)      | 40              | 40,000        | 2,573                        | 102,920,000 | 2,592                                           | 103,680,000 |                           |                          |       |
|                               | 23                                  | E25           | ※En continu (ajustement)      | 40              | 40,000        | 2,218                        | 88,720,000  | 2,242                                           | 89,680,000  |                           |                          |       |
|                               | 24                                  | E26           | ※En continu (ajustement)      | 40              | 40,000        | 2,108                        | 84,320,000  | 2,128                                           | 85,120,000  |                           |                          |       |
|                               | 25                                  | E27           | ※En continu (ajustement)      | 40              | 40,000        | 2,043                        | 81,720,000  | 2,065                                           | 82,600,000  |                           |                          |       |
|                               | 26                                  | E29b          | ※Renouvellement               | 76              | 76,000        | 1,251                        | 95,076,000  | 1,276                                           | 96,976,000  |                           |                          |       |
|                               | 27                                  | E30           | En continu                    | 91              | 91,000        | 1,157                        | 105,287,000 | 1,186                                           | 107,926,000 |                           |                          |       |
|                               | 28                                  | E31           | En continu                    | 61              | 61,000        | 1,377                        | 83,997,000  | 1,419                                           | 86,559,000  |                           |                          |       |
|                               | 29                                  | E33           | Réhabilitation                | 46              | 46,000        | 1,756                        | 80,776,000  | 1,788                                           | 82,248,000  |                           |                          |       |
|                               | 30                                  | F3            | Nouveau                       | 40              | 40,000        | 1,500                        | 60,000,000  | 800                                             | 32,000,000  |                           |                          |       |
|                               | 31                                  | F4            | Nouveau                       | 40              | 40,000        | 1,500                        | 60,000,000  | 800                                             | 32,000,000  |                           |                          |       |
|                               | 32                                  | F5            | Nouveau                       | 40              | 40,000        | 1,500                        | 60,000,000  | 800                                             | 32,000,000  |                           |                          |       |
|                               | 33                                  | E35           | En continu                    | 44              | 44,000        | 863                          | 37,972,000  | 900                                             | 39,600,000  |                           |                          |       |
|                               | 34                                  | E36           | En continu                    | 50              | 50,000        | 713                          | 35,650,000  | 728                                             | 36,400,000  |                           |                          |       |
|                               | 35                                  | Z2            | Nouveau                       | 45              | 45,000        | 650                          | 29,250,000  | 700                                             | 31,500,000  |                           |                          |       |
|                               | 36                                  | Z3            | Nouveau                       | 45              | 45,000        | 650                          | 29,250,000  | 700                                             | 31,500,000  |                           |                          |       |
|                               | 37                                  | Z25           | Nouveau                       | 45              | 45,000        | 650                          | 29,250,000  | 700                                             | 31,500,000  |                           |                          |       |
|                               | sous-total 1                        |               |                               | 1,376           | 2,040,986,000 |                              |             | 1,998,249,000                                   |             | 1,376                     | 0                        | 1,376 |
|                               | Teneur totale en sel dissous et TDS |               |                               | 1,483           |               |                              | 1,452       |                                                 | 1,483       | 1,483                     | 1,483                    |       |
| Groupe de forages de PK20     | 38                                  | F3bis         | En continu                    | 45              | 45,000        | 750                          | 33,750,000  | 780                                             | 35,100,000  |                           |                          |       |
|                               | 39                                  | F9bis         | En continu                    | 45              | 45,000        | 750                          | 33,750,000  | 780                                             | 35,100,000  |                           |                          |       |
|                               | 40                                  | F10bis        | En continu                    | 45              | 45,000        | 750                          | 33,750,000  | 780                                             | 35,100,000  |                           |                          |       |
|                               | 41                                  | PK20-1        | En continu                    | 56              | 56,000        | 733                          | 41,048,000  | 780                                             | 43,680,000  |                           |                          |       |
|                               | 42                                  | PK20-2        | Renouvellement                | 40              | 40,000        | 751                          | 30,040,000  | 780                                             | 31,200,000  |                           |                          |       |
|                               | 43                                  | PK20-3        | En continu                    | 23              | 23,000        | 895                          | 20,585,000  | 945                                             | 21,735,000  |                           |                          |       |
|                               | 44                                  | PK20-4        | En continu                    | 66              | 66,000        | 908                          | 59,928,000  | 977                                             | 64,482,000  |                           |                          |       |
|                               | sous-total 2                        |               |                               | 320             | 252,851,000   |                              |             | 266,397,000                                     |             | 0                         | 320                      | 320   |
|                               | Teneur totale en sel dissous et TDS |               |                               | 790             |               |                              | 832         |                                                 | 790         | 790                       | 790                      |       |
|                               |                                     |               |                               |                 |               |                              |             |                                                 | 100.0%      | 0.0%                      | 100.0%                   |       |

12,053,760

2,803,200

※:production ajustement

production annuel

14,856,960

Cas (3) (Gegada + Nagad + PK20 + ajustement de la production)

|                                     | Nom du Forage |        | Projet de fonctionnement      | Débit du projet |             | Teneur totale en sel dissous |               | TDS (valeur mesurée par l'équipe de la mission) |             | Envoi d'eau vers Djibouti | Envoi d'eau vers Balbala | Total      |
|-------------------------------------|---------------|--------|-------------------------------|-----------------|-------------|------------------------------|---------------|-------------------------------------------------|-------------|---------------------------|--------------------------|------------|
|                                     |               |        |                               | (m³/h)          | ①(l/h)      | ② (mg/l)                     | ①×② (mg/h)    | ③ (mg/l)                                        | ①×③ (mg/h)  |                           |                          |            |
| Groupe de forages de Djibouti       | 1             | RG1    | ※Fermeture                    | 0               | 0           | 1,957                        | 0             | 1,999                                           | 0           |                           |                          |            |
|                                     | 2             | RG2    | Renouvellement (ajustement) ※ | 35              | 35,000      | 1,835                        | 64,225,000    | 1,883                                           | 65,905,000  |                           |                          |            |
|                                     | 3             | RG3    | ※Fermeture                    | 0               | 0           | 1,983                        | 0             | 2,033                                           | 0           |                           |                          |            |
|                                     | 4             | E01    | ※Fermeture                    | 0               | 0           | 2,951                        | 0             | 2,909                                           | 0           |                           |                          |            |
|                                     | 5             | E02    | ※Renouvellemen                | 30              | 30,000      | 1,605                        | 48,150,000    | 1,629                                           | 48,870,000  |                           |                          |            |
|                                     | 6             | E03    | ※Fermeture                    |                 | 0           | 2,536                        | 0             | 2,578                                           | 0           |                           |                          |            |
|                                     | 7             | E05    | ※Renouvellemen                | 30              | 30,000      | 1,199                        | 35,970,000    | 1,252                                           | 37,560,000  |                           |                          |            |
|                                     | 8             | E06    | ※Renouvellemen                | 30              | 30,000      | 1,728                        | 51,840,000    | 1,765                                           | 52,950,000  |                           |                          |            |
|                                     | 9             | E07    | ※Renouvellemen                | 30              | 30,000      | 1,383                        | 41,490,000    | 1,420                                           | 42,600,000  |                           |                          |            |
|                                     | 10            | E08    | En continu                    | 40              | 40,000      | 1,009                        | 40,360,000    | 1,042                                           | 41,680,000  |                           |                          |            |
|                                     | 11            | E09b   | En continu                    | 40              | 40,000      | 1,316                        | 52,640,000    | 1,348                                           | 53,920,000  |                           |                          |            |
|                                     | 12            | E11    | ※Renouvellemen                | 30              | 30,000      | 1,809                        | 54,270,000    | 1,842                                           | 55,260,000  |                           |                          |            |
|                                     | 13            | E12    | ※Fermeture                    | 0               | 0           | 2,026                        | 0             | 2,066                                           | 0           |                           |                          |            |
|                                     | 14            | E13    | En continu                    | 81              | 81,000      | 1,725                        | 139,725,000   | 1,759                                           | 142,479,000 |                           |                          |            |
|                                     | 15            | E15    | Réhabilitation                | 30              | 30,000      | 1,848                        | 55,440,000    | 1,889                                           | 56,670,000  |                           |                          |            |
|                                     | 16            | E16    | Réhabilitation                | 30              | 30,000      | 2,153                        | 64,590,000    | 2,183                                           | 65,490,000  |                           |                          |            |
|                                     | 17            | E17    | En continu                    | 21              | 21,000      | 1,887                        | 39,627,000    | 1,889                                           | 39,669,000  |                           |                          |            |
|                                     | 18            | E18    | En continu                    | 86              | 86,000      | 2,229                        | 191,694,000   | 2,269                                           | 195,134,000 |                           |                          |            |
|                                     | 19            | E19    | En continu                    | 80              | 80,000      | 2,041                        | 163,280,000   | 2,062                                           | 164,960,000 |                           |                          |            |
|                                     | 20            | E21    | Réhabilitation                | 37              | 37,000      | 1,594                        | 58,978,000    | 1,638                                           | 60,606,000  |                           |                          |            |
|                                     | 21            | E22    | En continu                    | 70              | 70,000      | 1,512                        | 105,840,000   | 1,543                                           | 108,010,000 |                           |                          |            |
|                                     | 22            | E24    | ※En continu (ajustement)      | 40              | 40,000      | 2,573                        | 102,920,000   | 2,592                                           | 103,680,000 |                           |                          |            |
|                                     | 23            | E25    | ※En continu (ajustement)      | 40              | 40,000      | 2,218                        | 88,720,000    | 2,242                                           | 89,680,000  |                           |                          |            |
|                                     | 24            | E26    | ※En continu (ajustement)      | 40              | 40,000      | 2,108                        | 84,320,000    | 2,128                                           | 85,120,000  |                           |                          |            |
|                                     | 25            | E27    | ※En continu (ajustement)      | 40              | 40,000      | 2,043                        | 81,720,000    | 2,065                                           | 82,600,000  |                           |                          |            |
|                                     | 26            | E29b   | En continu                    | 76              | 76,000      | 1,251                        | 95,076,000    | 1,276                                           | 96,976,000  |                           |                          |            |
|                                     | 27            | E30    | En continu                    | 91              | 91,000      | 1,157                        | 105,287,000   | 1,186                                           | 107,926,000 |                           |                          |            |
|                                     | 28            | E31    | En continu                    | 61              | 61,000      | 1,377                        | 83,997,000    | 1,419                                           | 86,559,000  |                           |                          |            |
|                                     | 29            | E33    | Réhabilitation                | 46              | 46,000      | 1,756                        | 80,776,000    | 1,788                                           | 82,248,000  |                           |                          |            |
|                                     | 30            | F3     | -                             | 0               | 0           | 1,500                        | 0             | 800                                             | 0           |                           |                          |            |
|                                     | 31            | F4     | -                             | 0               | 0           | 1,500                        | 0             | 800                                             | 0           |                           |                          |            |
|                                     | 32            | F5     | -                             | 0               | 0           | 1,500                        | 0             | 800                                             | 0           |                           |                          |            |
|                                     | 33            | E35    | En continu                    | 44              | 44,000      | 863                          | 37,972,000    | 900                                             | 39,600,000  |                           |                          |            |
|                                     | 34            | E36    | En continu                    | 50              | 50,000      | 713                          | 35,650,000    | 728                                             | 36,400,000  |                           |                          |            |
|                                     | 35            | Z2     | Nouveau                       | 45              | 45,000      | 650                          | 29,250,000    | 700                                             | 31,500,000  |                           |                          |            |
|                                     | 36            | Z3     | Nouveau                       | 45              | 45,000      | 650                          | 29,250,000    | 700                                             | 31,500,000  |                           |                          |            |
|                                     | 37            | Z25    | Nouveau                       | 45              | 45,000      | 650                          | 29,250,000    | 700                                             | 31,500,000  |                           |                          |            |
| sous-total 1                        |               |        | 1,363                         | 2,092,307,000   |             |                              | 2,137,052,000 |                                                 | 1,363       | 0                         | 1,363                    | 11,939,880 |
| Teneur totale en sel dissous et TDS |               |        |                               |                 |             | 1,568                        |               | 1,535                                           | 1,535       | 1,535                     |                          |            |
| Groupe de forages de PK20           | 42            | F3bis  | Nouveau                       | 45              | 45,000      | 750                          | 33,750,000    | 780                                             | 35,100,000  |                           |                          |            |
|                                     | 43            | F9bis  | Nouveau                       | 45              | 45,000      | 750                          | 33,750,000    | 780                                             | 35,100,000  |                           |                          |            |
|                                     | 44            | F10bis | Nouveau                       | 45              | 45,000      | 750                          | 33,750,000    | 780                                             | 35,100,000  |                           |                          |            |
|                                     | 38            | PK20-1 | En continu                    | 56              | 56,000      | 733                          | 41,048,000    | 780                                             | 43,680,000  |                           |                          |            |
|                                     | 39            | PK20-2 | ※Renouvellemen                | 40              | 40,000      | 751                          | 30,040,000    | 780                                             | 31,200,000  |                           |                          |            |
|                                     | 40            | PK20-3 | En continu                    | 23              | 23,000      | 895                          | 20,585,000    | 945                                             | 21,735,000  |                           |                          |            |
|                                     | 41            | PK20-4 | En continu                    | 66              | 66,000      | 908                          | 59,928,000    | 977                                             | 64,482,000  |                           |                          |            |
|                                     | sous-total 2  |        |                               | 320             | 252,851,000 |                              |               | 266,397,000                                     |             |                           | 320                      | 320        |
| Teneur totale en sel dissous et TDS |               |        |                               |                 |             | 832                          |               | 790                                             | 790         | 790                       |                          |            |
| ※:※:production ajustement           |               |        |                               |                 |             |                              |               |                                                 |             |                           | production annuel        | 14,743,080 |

Calcul du taux de dilution des ions de chlore dans le cas 3 (Gegada + Nagad + PK20 + ajustement de la production)

|                               | Nom du Forage                 |        | Projet de fonctionnement      | Débit du projet |        | Valeur d'ions de chlore |            | Envoi d'eau vers Djibouti | Envoi d'eau vers Balbala | Total  |
|-------------------------------|-------------------------------|--------|-------------------------------|-----------------|--------|-------------------------|------------|---------------------------|--------------------------|--------|
|                               |                               |        |                               | (m³/h)          | ①(l/h) | ② (mg/l)                | ①×② (mg/h) |                           |                          |        |
| Groupe de forages de Djibouti | 1                             | RG1    | ※Fermeture                    | 0               | 0      | 986                     | 0          |                           |                          |        |
|                               | 2                             | RG2    | Renouvellement (ajustement) ※ | 35              | 35,000 | 827                     | 28,945,000 |                           |                          |        |
|                               | 3                             | RG3    | ※Fermeture                    | 0               | 0      | 909                     | 0          |                           |                          |        |
|                               | 4                             | E01    | ※Fermeture                    | 0               | 0      | 1,523                   | 0          |                           |                          |        |
|                               | 5                             | E02    | ※Renouvellement               | 30              | 30,000 | 732                     | 21,960,000 |                           |                          |        |
|                               | 6                             | E03    | ※Fermeture                    |                 | 0      | 1,241                   | 0          |                           |                          |        |
|                               | 7                             | E05    | ※Renouvellement               | 30              | 30,000 | 455                     | 13,650,000 |                           |                          |        |
|                               | 8                             | E06    | ※Renouvellement               | 30              | 30,000 | 754                     | 22,620,000 |                           |                          |        |
|                               | 9                             | E07    | ※Renouvellement               | 30              | 30,000 | 573                     | 17,190,000 |                           |                          |        |
|                               | 10                            | E08    | En continu                    | 40              | 40,000 | 400                     | 16,000,000 |                           |                          |        |
|                               | 11                            | E09b   | En continu                    | 40              | 40,000 | 639                     | 25,560,000 |                           |                          |        |
|                               | 12                            | E11    | ※Renouvellement               | 30              | 30,000 | 816                     | 24,480,000 |                           |                          |        |
|                               | 13                            | E12    | ※Fermeture                    | 0               | 0      | 1,000                   | 0          |                           |                          |        |
|                               | 14                            | E13    | En continu                    | 81              | 81,000 | 804                     | 65,124,000 |                           |                          |        |
|                               | 15                            | E15    | Réhabilitation                | 30              | 30,000 | 900                     | 27,000,000 |                           |                          |        |
|                               | 16                            | E16    | Réhabilitation                | 30              | 30,000 | 900                     | 27,000,000 |                           |                          |        |
|                               | 17                            | E17    | En continu                    | 21              | 21,000 | 945                     | 19,845,000 |                           |                          |        |
|                               | 18                            | E18    | En continu                    | 86              | 86,000 | 1,063                   | 91,418,000 |                           |                          |        |
|                               | 19                            | E19    | En continu                    | 80              | 80,000 | 972                     | 77,760,000 |                           |                          |        |
|                               | 20                            | E21    | Réhabilitation                | 37              | 37,000 | 682                     | 25,234,000 |                           |                          |        |
|                               | 21                            | E22    | En continu                    | 70              | 70,000 | 672                     | 47,040,000 |                           |                          |        |
|                               | 22                            | E24    | ※En continu (ajustement)      | 40              | 40,000 | 1,259                   | 50,360,000 |                           |                          |        |
|                               | 23                            | E25    | ※En continu (ajustement)      | 40              | 40,000 | 995                     | 39,800,000 |                           |                          |        |
|                               | 24                            | E26    | ※En continu (ajustement)      | 40              | 40,000 | 982                     | 39,280,000 |                           |                          |        |
|                               | 25                            | E27    | ※En continu (ajustement)      | 40              | 40,000 | 977                     | 39,080,000 |                           |                          |        |
|                               | 26                            | E29b   | En continu                    | 76              | 76,000 | 531                     | 40,356,000 |                           |                          |        |
|                               | 27                            | E30    | En continu                    | 91              | 91,000 | 468                     | 42,588,000 |                           |                          |        |
|                               | 28                            | E31    | En continu                    | 61              | 61,000 | 618                     | 37,698,000 |                           |                          |        |
|                               | 29                            | E33    | Réhabilitation                | 46              | 46,000 | 835                     | 38,410,000 |                           |                          |        |
|                               | 30                            | F3     | -                             | 0               | 0      | 700                     | 0          |                           |                          |        |
|                               | 31                            | F4     | -                             | 0               | 0      | 700                     | 0          |                           |                          |        |
|                               | 32                            | F5     | -                             | 0               | 0      | 700                     | 0          |                           |                          |        |
|                               | 33                            | E35    | En continu                    | 44              | 44,000 | 250                     | 11,000,000 |                           |                          |        |
|                               | 34                            | E36    | En continu                    | 50              | 50,000 | 187                     | 9,350,000  |                           |                          |        |
|                               | 35                            | Z2     | Nouveau                       | 45              | 45,000 | 250                     | 11,250,000 |                           |                          |        |
|                               | 36                            | Z3     | Nouveau                       | 45              | 45,000 | 250                     | 11,250,000 |                           |                          |        |
|                               | 37                            | Z25    | Nouveau                       | 45              | 45,000 | 250                     | 11,250,000 |                           |                          |        |
|                               | sous-total 1                  |        |                               | 1,363           |        | 932,498,000             |            | 1,363                     | 0                        | 1,363  |
|                               |                               |        |                               |                 |        |                         |            | 100.0%                    | 0.0%                     | 100.0% |
|                               | Valeur d'ions de chlore préue |        |                               |                 |        | 684                     |            | 684                       | 684                      | 684    |
| Groupe de forages de PK20     | 42                            | F3bis  | Nouveau                       | 45              | 45,000 | 250                     | 11,250,000 |                           |                          |        |
|                               | 43                            | F9bis  | Nouveau                       | 45              | 45,000 | 250                     | 11,250,000 |                           |                          |        |
|                               | 44                            | F10bis | Nouveau                       | 45              | 45,000 | 250                     | 11,250,000 |                           |                          |        |
|                               | 38                            | PK20-1 | En continu                    | 56              | 56,000 | 213                     | 11,928,000 |                           |                          |        |
|                               | 39                            | PK20-2 | ※Renouvellement               | 40              | 40,000 | 205                     | 8,200,000  |                           |                          |        |
|                               | 40                            | PK20-3 | En continu                    | 23              | 23,000 | 250                     | 5,750,000  |                           |                          |        |
|                               | 41                            | PK20-4 | En continu                    | 66              | 66,000 | 275                     | 18,150,000 |                           |                          |        |
|                               | sous-total 2                  |        |                               | 320             |        | 77,778,000              |            |                           | 320                      | 320    |
|                               |                               |        |                               |                 |        |                         |            | 0.0%                      | 100.0%                   | 100.0% |
|                               | Valeur d'ions de chlore préue |        |                               |                 |        | 243                     |            | 243                       | 243                      | 243    |

11,939,880

2,803,200

※:※:production ajustement

A-99

production annuel

14,743,080



11. Calcul de la puissance des moteurs des pompes immergées

| Forage No.           | Débit<br>$Q \text{ m}^3/\text{h}$ | Élévation<br>$m$ | Niveau<br>d'eau<br>statique<br>GL-m (1) | Hauteur de<br>pompage<br>GL-m (1) | Niveau d'eau<br>de la<br>canalisation<br>de transport<br>d'eau<br>GL+m (2) | Hauteur de<br>pompage<br>réelle (m)<br>(3)=(1)+(2) | Tube de<br>pompage $\varnothing$ | Vitesse<br>du flux<br>$m/s$ | Longueur<br>du tube de<br>pompage | Perte de la<br>canalisation<br>$H1(m)$ (4) | Hauteur de<br>pompage<br>totale du<br>projet<br>$\sum H(m)$<br>(5)=(3)+(4) | Hauteur de<br>pompage<br>totale<br>$H(m)$ | Efficacité de<br>transmission<br>$\eta_t$ | Efficacité<br>de la<br>pompe<br>$\eta_p$ | Moteur<br>électrique<br>Puissance<br>kW | Moteur<br>électrique<br>Puissance<br>kW |
|----------------------|-----------------------------------|------------------|-----------------------------------------|-----------------------------------|----------------------------------------------------------------------------|----------------------------------------------------|----------------------------------|-----------------------------|-----------------------------------|--------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|
| RG2                  | 35.0                              | 21.24            | 20.26                                   | 27.00                             | 23.7                                                                       | 50.7                                               | 80                               | 1.93                        | 37.00                             | 3.28                                       | 53.98                                                                      | 55.00                                     | 1                                         | 0.65                                     |                                         | 11                                      |
| E 2                  | 30.0                              | 23.56            | 22.77                                   | 25.00                             | 26.5                                                                       | 51.5                                               | 80                               | 1.66                        | 35.00                             | 2.33                                       | 53.83                                                                      | 55.00                                     | 1                                         | 0.65                                     |                                         | 11                                      |
| E 5                  | 30.0                              | 24.61            | 23.81                                   | 26.00                             | 26.0                                                                       | 52.0                                               | 80                               | 1.66                        | 36.00                             | 2.40                                       | 54.40                                                                      | 55.00                                     | 1                                         | 0.65                                     |                                         | 11                                      |
| E 6                  | 30.0                              | 23.50            | 22.73                                   | 29.00                             | 27.3                                                                       | 56.3                                               | 80                               | 1.66                        | 39.00                             | 2.60                                       | 58.90                                                                      | 60.00                                     | 1                                         | 0.65                                     |                                         | 11                                      |
| E 7                  | 30.0                              | 29.06            | 27.92                                   | 31.00                             | 24.3                                                                       | 55.3                                               | 80                               | 1.66                        | 41.00                             | 2.73                                       | 58.03                                                                      | 60.00                                     | 1                                         | 0.65                                     |                                         | 11                                      |
| E 11                 | 30.0                              | 32.04            | 30.78                                   | 33.00                             | 21.3                                                                       | 54.3                                               | 80                               | 1.66                        | 43.00                             | 2.86                                       | 57.16                                                                      | 60.00                                     | 1                                         | 0.65                                     |                                         | 11                                      |
| PK20-2               | 40.0                              | 171.64           | 113.90                                  | 129.00                            | 38.4                                                                       | 167.4                                              | 100                              | 1.41                        | 139.00                            | 5.32                                       | 172.72                                                                     | 175.00                                    | 1                                         | 0.66                                     | 35                                      | 37                                      |
| F3b                  | 45.0                              | 168.87           | 106.94                                  | 124.00                            | 14.0                                                                       | 138.0                                              | 100                              | 1.59                        | 134.00                            | 6.37                                       | 144.37                                                                     | 145.00                                    | 1                                         | 0.68                                     | 31                                      | 37                                      |
| F9b                  | 45.0                              | 148.74           | 87.05                                   | 105.00                            | 30.3                                                                       | 135.3                                              | 100                              | 1.59                        | 115.00                            | 5.47                                       | 140.77                                                                     | 145.00                                    | 1                                         | 0.68                                     | 31                                      | 37                                      |
| F10b                 | 45.0                              | 161.00           | 100.91                                  | 118.00                            | 13.1                                                                       | 131.1                                              | 100                              | 1.59                        | 128.00                            | 6.09                                       | 137.19                                                                     | 140.00                                    | 1                                         | 0.68                                     | 30                                      | 37                                      |
| Z2                   | 45.0                              | 190.35           | 179.00                                  | 186.00                            | 28.2                                                                       | 214.2                                              | 100                              | 1.59                        | 196.00                            | 9.32                                       | 223.52                                                                     | 225.00                                    | 1                                         | 0.68                                     | 49                                      | 55                                      |
| Z3                   | 45.0                              | 226.64           | 223.00                                  | 216.00                            | 10.0                                                                       | 226.0                                              | 100                              | 1.59                        | 226.00                            | 10.75                                      | 236.75                                                                     | 240.00                                    | 1                                         | 0.68                                     | 52                                      | 55                                      |
| Z25                  | 45.0                              | 170.49           | 170.00                                  | 168.00                            | 43.3                                                                       | 211.3                                              | 100                              | 1.59                        | 178.00                            | 8.47                                       | 219.77                                                                     | 220.00                                    | 1                                         | 0.68                                     | 47                                      | 55                                      |
| Nouveau forage prévu |                                   |                  |                                         |                                   |                                                                            |                                                    |                                  |                             |                                   |                                            |                                                                            |                                           |                                           |                                          |                                         |                                         |
| Forage renouvelé     |                                   |                  |                                         |                                   |                                                                            |                                                    |                                  |                             |                                   |                                            |                                                                            |                                           |                                           |                                          |                                         |                                         |

## 12. Documents d'étude pour le réservoir de dépressurisation

12-1 PK20

(1) Calcul hydrologique de la canalisation principale PK20 (pour le débit du projet, sans réservoir de dépressurisation)

C= 110.0

| Sta.     | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                          | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|----------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|-------------------------------|------------|------------|-----------|
| 0.0      | 183.2   | 0.0        |             |           |         |           | 202.9   | 19.7   |          | CS PK20-1, 2                  | 96.0       | 257.2      | 74.0      |
| 500.0    | 171.4   | 500.0      | 300         | 96.0      | 0.00077 | 0.384     | 202.5   | 31.1   | 0.38     |                               |            | 257.2      | 85.8      |
| 997.4    | 164.6   | 497.4      | 300         | 96.0      | 0.00077 | 0.382     | 202.2   | 37.6   | 0.38     | CS PK20-3                     | 23.0       | 257.2      | 92.6      |
| 1,100.0  | 162.8   | 102.6      | 300         | 119.0     | 0.00114 | 0.117     | 202.0   | 39.2   | 0.47     |                               |            | 257.2      | 94.4      |
| 1,200.0  | 161.4   | 100.0      | 300         | 119.0     | 0.00114 | 0.114     | 201.9   | 40.5   | 0.47     |                               |            | 257.2      | 95.8      |
| 1,300.0  | 159.9   | 100.0      | 300         | 119.0     | 0.00114 | 0.114     | 201.8   | 41.9   | 0.47     |                               |            | 257.2      | 97.3      |
| 1,600.0  | 161.2   | 300.0      | 300         | 119.0     | 0.00114 | 0.343     | 201.5   | 40.3   | 0.47     | CS PK20-4                     | 201.0      | 257.2      | 96.0      |
| 2,000.0  | 151.2   | 400.0      | 300         | 320.0     | 0.00713 | 2.853     | 198.6   | 47.4   | 1.26     |                               |            | 257.2      | 106.0     |
| 2,500.0  | 147.2   | 500.0      | 300         | 320.0     | 0.00713 | 3.566     | 195.0   | 47.8   | 1.26     |                               |            | 257.2      | 110.0     |
| 3,004.0  | 141.1   | 504.0      | 300         | 320.0     | 0.00713 | 3.595     | 191.5   | 50.4   | 1.26     |                               |            | 257.2      | 116.1     |
| 3,515.0  | 134.4   | 511.0      | 300         | 320.0     | 0.00713 | 3.644     | 187.8   | 53.4   | 1.26     |                               |            | 257.2      | 122.8     |
| 4,015.0  | 132.0   | 500.0      | 300         | 320.0     | 0.00713 | 3.566     | 184.2   | 52.2   | 1.26     |                               |            | 257.2      | 125.2     |
| 4,515.0  | 127.9   | 500.0      | 300         | 320.0     | 0.00713 | 3.566     | 180.7   | 52.8   | 1.26     |                               |            | 257.2      | 129.3     |
| 5,187.0  | 119.5   | 672.0      | 300         | 320.0     | 0.00713 | 4.793     | 175.9   | 56.4   | 1.26     | Modification<br>du diamètre   |            | 257.2      | 137.7 *   |
| 5,587.0  | 114.6   | 400.0      | 350         | 320.0     | 0.00337 | 1.347     | 174.5   | 59.9   | 0.92     |                               |            | 257.2      | 142.6 *   |
| 6,081.0  | 106.6   | 494.0      | 350         | 320.0     | 0.00337 | 1.663     | 172.9   | 66.3   | 0.92     |                               |            | 257.2      | 150.6 *   |
| 6,591.0  | 98.4    | 510.0      | 350         | 320.0     | 0.00337 | 1.717     | 171.2   | 72.8   | 0.92     |                               |            | 257.2      | 158.8 *   |
| 7,091.0  | 90.8    | 500.0      | 350         | 320.0     | 0.00337 | 1.683     | 169.5   | 78.7   | 0.92     |                               |            | 257.2      | 166.4 *   |
| 7,606.0  | 88.6    | 515.0      | 350         | 320.0     | 0.00337 | 1.734     | 167.7   | 79.1   | 0.92     |                               |            | 257.2      | 168.6 *   |
| 8,109.0  | 89.6    | 503.0      | 350         | 320.0     | 0.00337 | 1.693     | 166.0   | 76.4   | 0.92     |                               |            | 257.2      | 167.6 *   |
| 8,609.0  | 92.1    | 500.0      | 350         | 320.0     | 0.00337 | 1.683     | 164.4   | 72.3   | 0.92     |                               |            | 257.2      | 165.1 *   |
| 9,109.0  | 93.2    | 500.0      | 350         | 320.0     | 0.00337 | 1.683     | 162.7   | 69.5   | 0.92     |                               |            | 257.2      | 164.0 *   |
| 9,366.0  | 94.2    | 257.0      | 350         | 320.0     | 0.00337 | 0.865     | 161.8   | 67.6   | 0.92     |                               |            | 257.2      | 163.0 *   |
| 9,865.9  | 92.3    | 499.9      | 350         | 320.0     | 0.00337 | 1.683     | 160.1   | 67.8   | 0.92     |                               |            | 257.2      | 164.9 *   |
| 10,277.8 | 112.8   | 411.9      | 350         | 320.0     | 0.00337 | 1.387     | 158.7   | 45.9   | 0.92     |                               |            | 257.2      | 144.4 *   |
| 10,631.1 | 110.7   | 353.3      | 350         | 320.0     | 0.00337 | 1.189     | 157.6   | 46.9   | 0.92     |                               |            | 257.2      | 146.5 *   |
| 11,007.5 | 111.7   | 376.4      | 350         | 320.0     | 0.00337 | 1.267     | 156.3   | 44.6   | 0.92     | Vanne de dé<br>pressurisation |            | 257.2      | 145.4 *   |
| Total    |         | 11,007.5   |             |           |         | 46.634    |         |        |          | Réservoir<br>PK12             | WL120      |            |           |

Canalisations secondaire PK20-2(existante)

| Sta.    | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                           | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|---------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------------------------------|------------|------------|-----------|
| 0.0     | 171.64  | 0.0        |             |           |         |           | 210.0   | 38.4   |          | PK20-2                                         | 40.0       | 257.2      | 85.6      |
| 503.0   | 173.60  | 503.0      | 150         | 40.0      | 0.00445 | 2.239     | 207.8   | 34.2   | 0.63     |                                                |            | 257.2      | 83.6      |
| 1,003.0 | 189.30  | 500.0      | 150         | 40.0      | 0.00445 | 2.226     | 205.5   | 16.2   | 0.63     |                                                |            | 257.2      | 67.9      |
| 1,053.8 | 190.90  | 50.8       | 150         | 40.0      | 0.00445 | 0.226     | 205.3   | 14.4   | 0.63     |                                                |            | 257.2      | 66.3      |
| 1,233.8 | 190.70  | 180.0      | 150         | 40.0      | 0.00445 | 0.801     | 204.5   | 13.8   | 0.63     |                                                |            | 257.2      | 66.5      |
| 1,467.5 | 186.20  | 233.7      | 150         | 40.0      | 0.00445 | 1.040     | 203.5   | 17.3   | 0.63     |                                                |            | 257.2      | 71.0      |
| 1,589.7 | 183.20  | 122.2      | 150         | 40.0      | 0.00445 | 0.544     | 202.9   | 19.7   | 0.63     | Jonction avec<br>la canalisation<br>principale |            | 257.2      | 74.0      |
| Total   |         | 1,589.7    |             |           |         | 7.077     |         |        |          |                                                |            |            |           |

Canalisations secondaire PK20-1(existante)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                           | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------------------------------|------------|------------|-----------|
| 0.0   | 186.20  | 0.0        |             |           |         |           | 204.0   | 17.8   |          | PK20-1                                         | 56.0       | 257.2      | 71.0      |
| 130.0 | 183.20  | 130.0      | 150         | 56.0      | 0.00830 | 1.078     | 202.9   | 19.7   | 0.88     | Jonction avec<br>la canalisation<br>principale |            | 257.2      | 74.0      |
| Total |         | 130.0      |             |           |         | 1.078     |         |        |          |                                                |            |            |           |

Canalisations secondaire PK20-3(existante)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                           | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------------------------------|------------|------------|-----------|
| 0.0   | 171.30  | 0.0        |             |           |         |           | 203.5   | 32.2   |          | PK20-3                                         | 23.0       | 257.2      | 85.9      |
| 240.0 | 171.20  | 240.0      | 150         | 23.0      | 0.00160 | 0.384     | 203.1   | 31.9   | 0.36     |                                                |            | 257.2      | 86.0      |
| 498.4 | 166.70  | 258.4      | 150         | 23.0      | 0.00160 | 0.413     | 202.7   | 36.0   | 0.36     |                                                |            | 257.2      | 90.5      |
| 826.0 | 173.60  | 327.6      | 150         | 23.0      | 0.00160 | 0.524     | 202.2   | 28.6   | 0.36     | Jonction avec<br>la canalisation<br>principale |            | 257.2      | 83.6      |
| Total |         | 826.0      |             |           |         | 1.321     |         |        |          |                                                |            |            |           |

Canalisations secondaires PL20-3b, 9b, 10b (projet), pose de nouvelles canalisations spéciales (F3, F9, F10), élargissement de la canalisation principale existante pour la traversée de la route

| Sta.    | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                            | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|---------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|-------------------------------------------------|------------|------------|-----------|
| 0.0     | 168.87  | 0.0        |             |           |         |           | 212.3   | 43.4   |          | F3b                                             | 45.0       | 257.2      | 88.3      |
| 652.0   | 155.47  | 652.0      | 150.0       | 45.0      | 0.00554 | 3.609     | 208.7   | 53.2   | 0.71     |                                                 |            | 257.2      | 101.7     |
| 1,077.0 | 155.99  | 425.0      | 150.0       | 45.0      | 0.00554 | 2.353     | 206.3   | 50.3   | 0.71     | CS F9b                                          | 45.0       | 257.2      | 101.2     |
| 1,702.0 | 162.00  | 625.0      | 200.0       | 90.0      | 0.00492 | 3.072     | 203.2   | 41.2   | 0.80     | CS F10b                                         | 45.0       | 257.2      | 95.2      |
| 2,125.0 | 161.20  | 423.0      | 250.0       | 135.0     | 0.00351 | 1.485     | 201.8   | 40.6   | 0.76     | CS F4                                           | 66.0       | 257.2      | 96.0      |
| 2,221.0 | 0.00    | 96.0       | 300.0       | 201.0     | 0.00302 | 0.290     | 201.5   | 201.5  | 0.79     | Raccordement à<br>la canalisation<br>principale |            | 257.2      | 257.2     |
| Total   |         | 2,221.0    |             |           |         | 10.519    |         |        |          |                                                 |            |            |           |

Canalisations secondaire PK20-4(existante)

| Sta.    | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                   | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|---------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------|------------|------------|-----------|
| 0.0     | 157.95  | 0.0        |             |           |         |           | 211.6   | 53.7   |          | F4                     | 66.0       | 257.2      | 99.3      |
| 620.0   | 158.92  | 620.0      | 150.0       | 66.0      | 0.01124 | 6.970     | 204.6   | 45.7   | 1.04     |                        |            | 257.2      | 98.3      |
| 1,663.0 | 161.20  | 1,043.0    | 200.0       | 66.0      | 0.00277 | 2.889     | 201.8   | 40.6   | 0.58     | Jonction avec<br>la CS |            | 257.2      | 96.0      |
| Total   |         | 1,663.0    |             |           |         | 9.859     |         |        |          |                        |            |            |           |

Canalisations secondaire F9b(projet)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                   | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------|------------|------------|-----------|
| 0.0   | 148.74  | 0.0        |             |           |         |           | 208.5   | 59.7   |          | F9b                    | 45.0       | 257.2      | 108.5     |
| 387.0 | 155.99  | 387.0      | 150.0       | 45.0      | 0.00554 | 2.142     | 206.3   | 50.3   | 0.71     | Jonction avec<br>la CS |            | 257.2      | 101.2     |
| Total |         | 387.0      |             |           |         | 2.142     |         |        |          |                        |            |            |           |

Canalisations secondaire F10b(projet)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                   | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------|------------|------------|-----------|
| 0.0   | 161.00  | 0.0        |             |           |         |           | 203.5   | 42.5   |          | F10b                   | 45.0       | 257.2      | 96.2      |
| 38.0  | 162.00  | 38.0       | 150.0       | 45.0      | 0.00554 | 0.210     | 203.2   | 41.2   | 0.71     | Jonction avec<br>la CS |            | 257.2      | 95.2      |
| Total |         | 38.0       |             |           |         | 0.210     |         |        |          |                        |            |            |           |

CS:Canalisations secondaire

(2) Calcul hydrologique de la canalisation principale PK20 (pour le débit du projet, avec réservoir de dépressurisation à la Sta. 700)

C= 110.0

| Sta.     | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                          | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|----------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|-------------------------------|------------|------------|-----------|
| 0.0      | 183.2   | 0.0        |             |           |         |           | 210.0   | 26.8   |          | CS PK20-1, 2                  | 96.0       | 225.2      | 42.0      |
| 500.0    | 171.4   | 500.0      | 300         | 96.0      | 0.00077 | 0.384     | 209.6   | 38.2   | 0.38     |                               |            | 225.2      | 53.8      |
| 700.0    | 171.9   | 200.0      | 300         | 96.0      | 0.00077 | 0.154     | 209.5   | 37.5   | 0.38     |                               |            | 225.2      | 53.3      |
| 700.0    |         |            |             |           |         |           | 173.0   |        |          | Vanne de dé<br>pressurisation |            |            |           |
| 997.4    | 164.6   | 297.4      | 300         | 96.0      | 0.00077 | 0.229     | 172.8   | 8.2    | 0.38     | CS PK20-3                     | 23.0       | 211.4      | 46.8      |
| 1,100.0  | 162.8   | 102.6      | 300         | 119.0     | 0.00114 | 0.117     | 172.7   | 9.9    | 0.47     |                               |            | 211.4      | 48.6      |
| 1,200.0  | 161.4   | 100.0      | 300         | 119.0     | 0.00114 | 0.114     | 172.5   | 11.1   | 0.47     |                               |            | 211.4      | 50.0      |
| 1,300.0  | 159.9   | 100.0      | 300         | 119.0     | 0.00114 | 0.114     | 172.4   | 12.5   | 0.47     |                               |            | 211.4      | 51.5      |
| 1,600.0  | 161.2   | 300.0      | 300         | 119.0     | 0.00114 | 0.343     | 172.1   | 10.9   | 0.47     | CS PK20-4                     | 201.0      | 211.4      | 50.2      |
| 2,000.0  | 151.2   | 400.0      | 300         | 320.0     | 0.00713 | 2.853     | 169.2   | 18.0   | 1.26     |                               |            | 211.4      | 60.2      |
| 2,500.0  | 147.2   | 500.0      | 300         | 320.0     | 0.00713 | 3.566     | 165.7   | 18.5   | 1.26     |                               |            | 211.4      | 64.2      |
| 3,004.0  | 141.1   | 504.0      | 300         | 320.0     | 0.00713 | 3.595     | 162.1   | 21.0   | 1.26     |                               |            | 211.4      | 70.3      |
| 3,515.0  | 134.4   | 511.0      | 300         | 320.0     | 0.00713 | 3.644     | 158.4   | 24.0   | 1.26     |                               |            | 211.4      | 77.0      |
| 4,015.0  | 132.0   | 500.0      | 300         | 320.0     | 0.00713 | 3.566     | 154.9   | 22.9   | 1.26     |                               |            | 211.4      | 79.4      |
| 4,515.0  | 127.9   | 500.0      | 300         | 320.0     | 0.00713 | 3.566     | 151.3   | 23.4   | 1.26     |                               |            | 211.4      | 83.5      |
| 5,187.0  | 119.5   | 672.0      | 300         | 320.0     | 0.00713 | 4.793     | 146.5   | 27.0   | 1.26     |                               |            | 211.4      | 91.9      |
| 5,587.0  | 114.6   | 400.0      | 350         | 320.0     | 0.00337 | 1.347     | 145.2   | 30.6   | 0.92     |                               |            | 211.4      | 96.8      |
| 6,081.0  | 106.6   | 494.0      | 350         | 320.0     | 0.00337 | 1.663     | 143.5   | 36.9   | 0.92     |                               |            | 211.4      | 104.8     |
| 6,591.0  | 98.4    | 510.0      | 350         | 320.0     | 0.00337 | 1.717     | 141.8   | 43.4   | 0.92     |                               |            | 211.4      | 113.0     |
| 7,091.0  | 90.8    | 500.0      | 350         | 320.0     | 0.00337 | 1.683     | 140.1   | 49.3   | 0.92     |                               |            | 211.4      | 120.6     |
| 7,606.0  | 88.6    | 515.0      | 350         | 320.0     | 0.00337 | 1.734     | 138.4   | 49.8   | 0.92     |                               |            | 211.4      | 122.8     |
| 8,109.0  | 89.6    | 503.0      | 350         | 320.0     | 0.00337 | 1.693     | 136.7   | 47.1   | 0.92     |                               |            | 211.4      | 121.8     |
| 8,609.0  | 92.1    | 500.0      | 350         | 320.0     | 0.00337 | 1.683     | 135.0   | 42.9   | 0.92     |                               |            | 211.4      | 119.3     |
| 9,109.0  | 93.2    | 500.0      | 350         | 320.0     | 0.00337 | 1.683     | 133.3   | 40.1   | 0.92     |                               |            | 211.4      | 118.2     |
| 9,366.0  | 94.2    | 257.0      | 350         | 320.0     | 0.00337 | 0.865     | 132.4   | 38.2   | 0.92     |                               |            | 211.4      | 117.2     |
| 9,865.9  | 92.3    | 499.9      | 350         | 320.0     | 0.00337 | 1.683     | 130.7   | 38.4   | 0.92     |                               |            | 211.4      | 119.1     |
| 10,277.8 | 112.8   | 411.9      | 350         | 320.0     | 0.00337 | 1.387     | 129.4   | 16.6   | 0.92     |                               |            | 211.4      | 98.6      |
| 10,631.1 | 110.7   | 353.3      | 350         | 320.0     | 0.00337 | 1.189     | 128.2   | 17.5   | 0.92     |                               |            | 211.4      | 100.7     |
| 11,007.5 | 111.7   | 376.4      | 350         | 320.0     | 0.00337 | 1.267     | 126.9   | 15.2   | 0.92     | Vanne de dé<br>pressurisation |            | 211.4      | 99.7      |
| Total    |         | 11,007.5   |             |           |         | 46.634    |         |        |          | Réservoir PK12                | WL120      |            |           |

Canalisations secondaire PK20-2(existante)

| Sta.    | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                           | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|---------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------------------------------|------------|------------|-----------|
| 0.0     | 171.64  | 0.0        |             |           |         |           | 210.0   | 38.4   |          | PK20-2                                         | 40.0       | 225.2      | 53.6      |
| 503.0   | 173.60  | 503.0      | 150         | 40.0      | 0.00445 | 2.239     | 207.8   | 34.2   | 0.63     |                                                |            | 225.2      | 51.6      |
| 1,003.0 | 189.30  | 500.0      | 150         | 40.0      | 0.00445 | 2.226     | 205.5   | 16.2   | 0.63     |                                                |            | 225.2      | 35.9      |
| 1,053.8 | 190.90  | 50.8       | 150         | 40.0      | 0.00445 | 0.226     | 205.3   | 14.4   | 0.63     |                                                |            | 225.2      | 34.3      |
| 1,233.8 | 190.70  | 180.0      | 150         | 40.0      | 0.00445 | 0.801     | 204.5   | 13.8   | 0.63     |                                                |            | 225.2      | 34.5      |
| 1,467.5 | 186.20  | 233.7      | 150         | 40.0      | 0.00445 | 1.040     | 203.5   | 17.3   | 0.63     |                                                |            | 225.2      | 39.0      |
| 1,589.7 | 183.20  | 122.2      | 150         | 40.0      | 0.00445 | 0.544     | 202.9   | 19.7   | 0.63     | Jonction avec la<br>canalisation<br>principale |            | 225.2      | 42.0      |
| Total   |         | 1,589.7    |             |           |         | 7.077     |         |        |          |                                                |            |            |           |

Canalisations secondaire PK20-1(existante)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                           | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------------------------------|------------|------------|-----------|
| 0.0   | 186.20  | 0.0        |             |           |         |           | 204.0   | 17.8   |          | PK20-1                                         | 56.0       | 225.2      | 39.0      |
| 130.0 | 183.20  | 130.0      | 150         | 56.0      | 0.00830 | 1.078     | 202.9   | 19.7   | 0.88     | Jonction avec la<br>canalisation<br>principale |            | 225.2      | 42.0      |
| Total |         | 130.0      |             |           |         | 1.078     |         |        |          |                                                |            |            |           |

Canalisations secondaire PK20-3(existante)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                           | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------------------------------|------------|------------|-----------|
| 0.0   | 171.30  | 0.0        |             |           |         |           | 206.6   | 35.3   |          | PK20-3                                         | 23.0       | 211.4      | 40.1      |
| 240.0 | 171.20  | 240.0      | 150         | 23.0      | 0.00160 | 0.384     | 206.2   | 35.0   | 0.36     |                                                |            | 211.4      | 40.2      |
| 498.4 | 166.70  | 258.4      | 150         | 23.0      | 0.00160 | 0.413     | 205.8   | 39.1   | 0.36     |                                                |            | 211.4      | 44.7      |
| 826.0 | 190.90  | 327.6      | 150         | 23.0      | 0.00160 | 0.524     | 205.3   | 14.4   | 0.36     | Jonction avec la<br>canalisation<br>principale |            | 211.4      | 20.5      |
| Total |         | 826.0      |             |           |         | 1.321     |         |        |          |                                                |            |            |           |

Canalisations secondaires PL20-3b, 9b, 10b (projet), pose de nouvelles canalisations spéciales (F3, F9, F10), élargissement de la canalisation principale existante pour la traversée de la route

| Sta.    | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                            | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|---------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|-------------------------------------------------|------------|------------|-----------|
| 0.0     | 168.87  | 0.0        |             |           |         |           | 182.9   | 14.0   |          | F3b                                             | 45.0       | 211.4      | 42.5      |
| 652.0   | 155.47  | 652.0      | 150.0       | 45.0      | 0.00554 | 3.609     | 179.3   | 23.8   | 0.71     |                                                 |            | 211.4      | 55.9      |
| 1,077.0 | 155.99  | 425.0      | 150.0       | 45.0      | 0.00554 | 2.353     | 176.9   | 20.9   | 0.71     | CS F9b                                          | 45.0       | 211.4      | 55.4      |
| 1,702.0 | 162.00  | 625.0      | 200.0       | 90.0      | 0.00492 | 3.072     | 173.9   | 11.9   | 0.80     | CS F10b                                         | 45.0       | 211.4      | 49.4      |
| 2,125.0 | 161.20  | 423.0      | 250.0       | 135.0     | 0.00351 | 1.485     | 172.4   | 11.2   | 0.76     | CS F4                                           | 66.0       | 211.4      | 50.2      |
| 2,221.0 | 161.20  | 96.0       | 300.0       | 201.0     | 0.00302 | 0.290     | 172.1   | 10.9   | 0.79     | Raccordement à<br>la canalisation<br>principale |            | 211.4      | 50.2      |
| Total   |         | 2,221.0    |             |           |         | 10.519    |         |        |          |                                                 |            |            |           |

Canalisations secondaire PK20-4(existante)

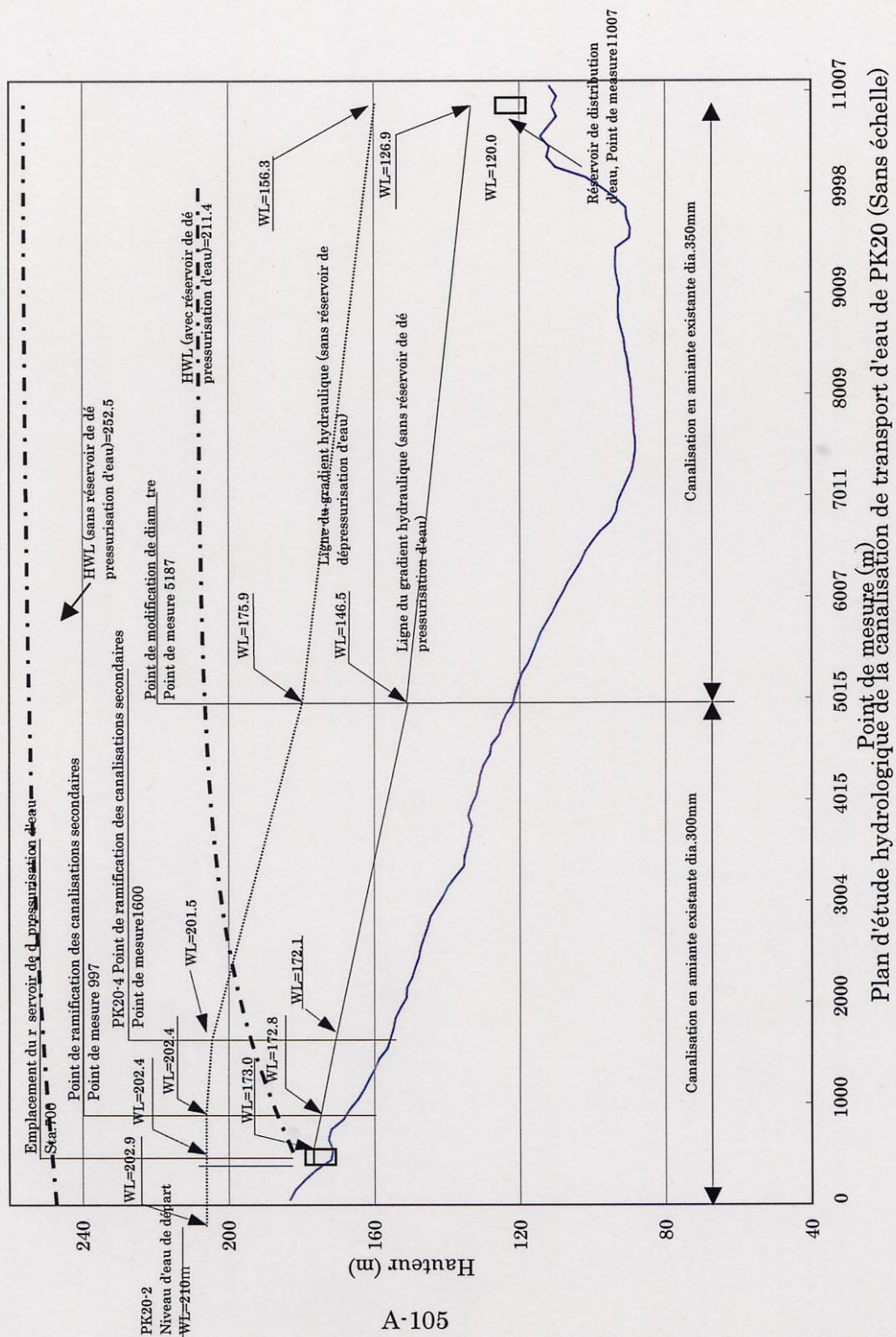
| Sta.    | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                   | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|---------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------|------------|------------|-----------|
| 0.0     | 157.95  | 0.0        |             |           |         |           | 182.2   | 24.3   |          | F4                     | 66.0       | 211.4      | 53.5      |
| 620.0   | 158.92  | 620.0      | 150.0       | 66.0      | 0.01124 | 6.970     | 175.3   | 16.3   | 1.04     |                        |            | 211.4      | 52.5      |
| 1,663.0 | 161.20  | 1,043.0    | 200.0       | 66.0      | 0.00277 | 2.889     | 172.4   | 11.2   | 0.58     | Jonction avec la<br>CS |            | 211.4      | 50.2      |
| Total   |         | 1,663.0    |             |           |         | 9.859     |         |        |          |                        |            |            |           |

Canalisations secondaire F9b(projet)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                   | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------|------------|------------|-----------|
| 0.0   | 148.74  | 0.0        |             |           |         |           | 179.1   | 30.3   |          | F9b                    | 45.0       | 211.4      | 62.7      |
| 387.0 | 155.99  | 387.0      | 150.0       | 45.0      | 0.00554 | 2.142     | 176.9   | 20.9   | 0.71     | Jonction avec la<br>CS |            | 211.4      | 55.4      |
| Total |         | 387.0      |             |           |         | 2.142     |         |        |          |                        |            |            |           |

Canalisations secondaire F10b(projet)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                   | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------|------------|------------|-----------|
| 0.0   | 161.00  | 0.0        |             |           |         |           | 174.1   | 13.1   |          | F10b                   | 45.0       | 211.4      | 50.4      |
| 38.0  | 162.00  | 38.0       | 150.0       | 45.0      | 0.00554 | 0.210     | 173.9   | 11.9   | 0.71     | Jonction avec la<br>CS |            | 211.4      | 49.4      |
| Total |         | 38.0       |             |           |         | 0.210     |         |        |          |                        |            |            |           |



## 12-2 Zone de Gegada

(1) Calcul hydrologique de la canalisation principale de Gegada (pour le débit du projet, sans réservoir de dépressurisation)

Canalisation secondaire Z3 (projet)

Si des nouvelles canalisations sont installées seulement pour les nouveaux forages.

CS Z3(projet)

C= 110.00

| Sta.     | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                      | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|----------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|-------------------------------------------|------------|------------|-----------|
| 0.0      | 226.64  | 0.0        |             |           |         |           | 234.4   | 7.8    |          | Z3                                        | 45.0       | 317.1      | 90.5      |
| 3,309.0  | 189.80  | 3,309.0    | 150.0       | 45.0      | 0.00554 | 18.316    | 216.1   | 26.3   | 0.71     | CS Z2                                     | 45.0       | 317.1      | 127.3     |
| 4,497.0  | 176.84  | 1,188.0    | 200.0       | 90.0      | 0.00492 | 5.840     | 210.3   | 33.4   | 0.80     | CS Z25                                    | 45.0       | 317.1      | 140.3     |
| 6,981.0  | 149.00  | 2,484.0    | 200.0       | 135.0     | 0.01041 | 25.853    | 184.4   | 35.4   | 1.19     | (E35)                                     | 0.0        | 317.1      | 168.1     |
| 7,929.6  | 144.74  | 948.6      | 200.0       | 135.0     | 0.01041 | 9.873     | 174.5   | 29.8   | 1.19     | (CS E36)                                  | 0.0        | 317.1      | 172.4     |
| 10,047.0 | 130.38  | 2,117.4    | 200.0       | 135.0     | 0.01041 | 22.038    | 152.5   | 22.1   | 1.19     | Raccordement à la canalisation principale |            | 317.1      | 186.7     |
|          |         |            |             |           |         |           | 152.5   |        |          |                                           |            |            |           |
| Total    |         | 10,047.0   |             |           |         | 81.921    |         |        |          |                                           | 135.0      |            |           |

Canalisations secondaire Z2 (projet)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                   | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------|------------|------------|-----------|
| 0.0   | 190.35  | 0.0        |             |           |         |           | 216.3   | 26.0   |          | Z2                     | 45.0       | 317.1      | 126.8     |
| 38.0  | 189.80  | 38.0       | 150.0       | 45.0      | 0.00554 | 0.210     | 216.1   | 26.3   | 0.71     | Jonction avec la CS Z3 |            | 317.1      | 127.3     |
| Total |         | 38.0       |             |           |         | 0.210     |         |        |          |                        | 45.0       |            |           |

Canalisations secondaire Z25 (projet)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                   | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------|------------|------------|-----------|
| 0.0   | 170.49  | 0.0        |             |           |         |           | 211.5   | 41.0   |          | Z25                    | 45.0       | 317.1      | 146.6     |
| 230.0 | 176.84  | 230.0      | 150.0       | 45.0      | 0.00554 | 1.273     | 210.3   | 33.4   | 0.71     | Jonction avec la CS Z3 |            | 317.1      | 140.3     |
| Total |         | 230.0      |             |           |         | 1.273     |         |        |          |                        | 45.0       |            |           |

Canalisations secondaire E36(existante)

| Sta.    | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                     | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|---------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------------------------|------------|------------|-----------|
| 0.0     | 132.50  | 0.0        |             |           |         |           | 172.4   | 39.9   |          | E36                                      | 50.0       | 317.1      | 184.6     |
| 560.0   | 144.31  | 560.0      | 150.0       | 50.0      | 0.00673 | 3.767     | 168.6   | 24.3   | 0.79     |                                          |            | 317.1      | 172.8     |
| 1,286.0 | 144.74  | 726.0      | 150.0       | 50.0      | 0.00673 | 4.884     | 163.8   | 19.0   | 0.79     | Jonction avec la canalisation principale |            | 317.1      | 172.4     |
| Total   |         | 1,286.0    |             |           |         | 8.650     |         |        |          |                                          | 50.0       |            |           |

Canalisation principale GEGADA (existante)

| Sta.     | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                 | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|----------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|--------------------------------------|------------|------------|-----------|
| 6,981.0  | 149.00  | 0.0        |             |           |         |           | 165.0   | 16.0   |          | E35                                  | 44.0       | 317.1      | 168.1     |
| 7,929.6  | 144.74  | 948.6      | 200.0       | 44.0      | 0.00131 | 1.241     | 163.8   | 19.0   | 0.39     | CS E36                               | 50.0       | 317.1      | 172.4     |
| 8,697.0  | 137.13  | 767.4      | 200.0       | 94.0      | 0.00533 | 4.088     | 159.7   | 22.5   | 0.83     |                                      |            | 317.1      | 180.0     |
| 9,347.0  | 133.35  | 650.0      | 200.0       | 94.0      | 0.00533 | 3.463     | 156.2   | 22.9   | 0.83     |                                      |            | 317.1      | 183.8     |
| 10,047.0 | 130.38  | 700.0      | 200.0       | 94.0      | 0.00533 | 3.729     | 152.5   | 22.1   | 0.83     | CS Z 3                               | 135.0      | 317.1      | 186.7     |
| 10,372.0 | 128.74  | 325.0      | 300.0       | 229.0     | 0.00384 | 1.248     | 151.2   | 22.5   | 0.90     |                                      |            | 317.1      | 188.4     |
| 11,115.0 | 123.85  | 743.0      | 300.0       | 229.0     | 0.00384 | 2.853     | 148.4   | 24.5   | 0.90     |                                      |            | 317.1      | 193.3     |
| 11,765.0 | 117.94  | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 145.9   | 27.9   | 0.90     |                                      |            | 317.1      | 199.2     |
| 12,140.0 | 119.11  | 375.0      | 300.0       | 229.0     | 0.00384 | 1.440     | 144.4   | 25.3   | 0.90     |                                      |            | 317.1      | 198.0     |
| 12,790.0 | 108.86  | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 141.9   | 33.1   | 0.90     |                                      |            | 317.1      | 208.2     |
| 13,440.0 | 102.81  | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 139.4   | 36.6   | 0.90     |                                      |            | 317.1      | 214.3     |
| 14,190.0 | 97.28   | 750.0      | 300.0       | 229.0     | 0.00384 | 2.880     | 136.6   | 39.3   | 0.90     |                                      |            | 317.1      | 219.8     |
| 14,465.0 | 96.83   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 135.5   | 38.7   | 0.90     |                                      |            | 317.1      | 220.3     |
| 15,215.0 | 88.65   | 750.0      | 300.0       | 229.0     | 0.00384 | 2.880     | 132.6   | 44.0   | 0.90     |                                      |            | 317.1      | 228.5     |
| 15,490.0 | 80.85   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 131.6   | 50.7   | 0.90     |                                      |            | 317.1      | 236.3     |
| 15,865.0 | 71.78   | 375.0      | 300.0       | 229.0     | 0.00384 | 1.440     | 130.1   | 58.4   | 0.90     |                                      |            | 317.1      | 245.3     |
| 16,290.0 | 64.01   | 425.0      | 300.0       | 229.0     | 0.00384 | 1.632     | 128.5   | 64.5   | 0.90     |                                      |            | 317.1      | 253.1     |
| 16,641.0 | 70.34   | 351.0      | 300.0       | 229.0     | 0.00384 | 1.348     | 127.2   | 56.8   | 0.90     |                                      |            | 317.1      | 246.8     |
| 16,936.0 | 67.88   | 295.0      | 300.0       | 229.0     | 0.00384 | 1.133     | 126.0   | 58.1   | 0.90     |                                      |            | 317.1      | 249.2     |
| 17,211.0 | 72.02   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 125.0   | 52.9   | 0.90     |                                      |            | 317.1      | 245.1     |
| 17,361.0 | 71.72   | 150.0      | 300.0       | 229.0     | 0.00384 | 0.576     | 124.4   | 52.7   | 0.90     |                                      |            | 317.1      | 245.4     |
| 17,486.0 | 66.31   | 125.0      | 300.0       | 229.0     | 0.00384 | 0.480     | 123.9   | 57.6   | 0.90     |                                      |            | 317.1      | 250.8     |
| 17,536.0 | 68.51   | 50.0       | 300.0       | 229.0     | 0.00384 | 0.192     | 123.7   | 55.2   | 0.90     |                                      |            | 317.1      | 248.6     |
| 17,700.0 | 64.80   | 164.0      | 300.0       | 229.0     | 0.00384 | 0.630     | 123.1   | 58.3   | 0.90     |                                      |            | 317.1      | 252.3     |
| 17,825.0 | 67.70   | 125.0      | 300.0       | 229.0     | 0.00384 | 0.480     | 122.6   | 54.9   | 0.90     |                                      |            | 317.1      | 249.4     |
| 18,275.0 | 37.02   | 450.0      | 300.0       | 229.0     | 0.00384 | 1.728     | 120.9   | 83.9   | 0.90     |                                      |            | 317.1      | 280.1     |
| 18,550.0 | 27.73   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 119.8   | 92.1   | 0.90     | E28                                  |            | 317.1      | 289.4     |
|          |         |            |             |           |         |           | 85.0    |        |          | Vanne de de pressurisation existante |            |            |           |
| Total    |         | 11,569.0   |             |           |         | 45.177    |         |        |          |                                      |            |            |           |

CS:canalisation seconJaonction avec la canalisation principale

(2) Calcul hydrologique de la canalisation principale de Gegada (pour le débit du projet, avec réservoir de dépressurisation à 2 emplacements) Cas 1

Emplacement des réservoirs de dépressurisation : Sta. 4797 canalisation secondaire Z3, et Sta. 13540 canalisation principale de Gegada

Canalisation secondaire Z3 (projet)

Si des nouvelles canalisations sont installées seulement pour les nouveaux forages.

CS Z3 (projet)

C= 110.00

| Sta.     | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                      | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|----------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|-------------------------------------------|------------|------------|-----------|
| 0.0      | 226.64  | 0.0        |             |           |         |           | 236.6   | 10.0   |          | Z3                                        | 45.0       | 261.6      | 35.0      |
| 3,309.0  | 189.80  | 3,309.0    | 150.0       | 45.0      | 0.00554 | 18.316    | 218.3   | 28.5   | 0.71     | CS Z2                                     | 45.0       | 261.6      | 71.8      |
| 4,497.0  | 176.84  | 1,188.0    | 200.0       | 90.0      | 0.00492 | 5.840     | 212.5   | 35.6   | 0.80     | CS Z25                                    | 45.0       | 261.6      | 84.8      |
| 4,797.0  | 174.20  | 300.0      | 200.0       | 135.0     | 0.01041 | 3.122     | 209.4   | 35.2   | 1.19     |                                           | 45.0       | 261.6      | 87.4      |
| 4,797.0  |         |            |             |           |         |           | 176.2   |        |          | Vanne de dépressurisation                 |            |            |           |
| 5,297.0  | 169.07  | 500.0      | 250.0       | 135.0     | 0.00351 | 1.755     | 174.4   | 5.4    | 0.76     |                                           | 0.0        | 207.2      | 38.1      |
| 6,981.0  | 149.00  | 1,684.0    | 250.0       | 135.0     | 0.00351 | 5.912     | 168.5   | 19.5   | 0.76     | (E35)                                     | 0.0        | 207.2      | 58.2      |
| 7,481.0  | 148.00  | 500.0      | 250.0       | 135.0     | 0.00351 | 1.755     | 166.8   | 18.8   | 0.76     |                                           | 0.0        | 207.2      | 59.2      |
| 7,929.6  | 144.74  | 448.6      | 250.0       | 135.0     | 0.00351 | 1.575     | 165.2   | 20.5   | 0.76     | (CS E36)                                  | 0.0        | 207.2      | 62.5      |
| 10,047.0 | 130.38  | 2,117.4    | 250.0       | 135.0     | 0.00351 | 7.434     | 157.8   | 27.4   | 0.76     | Raccordement à la canalisation principale | 0.0        | 207.2      | 76.8      |
| Total    |         | 10,047.0   |             |           |         | 45.711    |         |        |          |                                           | 180.0      |            |           |

Canalisations secondaire Z2 (projet)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                   | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------|------------|------------|-----------|
| 0.0   | 190.35  | 0.0        |             |           |         |           | 218.5   | 28.2   |          | Z2                     | 45.0       | 261.6      | 71.3      |
| 38.0  | 189.80  | 38.0       | 150.0       | 45.0      | 0.00554 | 0.210     | 218.3   | 28.5   | 0.71     | Jonction avec la CS Z3 |            | 261.6      | 71.8      |
| Total |         | 38.0       |             |           |         | 0.210     |         |        |          |                        | 45.0       |            |           |

Canalisations secondaire Z25 (projet)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                   | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------|------------|------------|-----------|
| 0.0   | 170.49  | 0.0        |             |           |         |           | 213.8   | 43.3   |          | Z25                    | 45.0       | 261.6      | 91.1      |
| 230.0 | 176.84  | 230.0      | 150.0       | 45.0      | 0.00554 | 1.273     | 212.5   | 35.6   | 0.71     | Jonction avec la CS Z3 |            | 261.6      | 84.8      |
| Total |         | 230.0      |             |           |         | 1.273     |         |        |          |                        | 45.0       |            |           |

Canalisations secondaire E36(existante)

| Sta.    | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                     | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|---------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------------------------|------------|------------|-----------|
| 0.0     | 132.50  | 0.0        |             |           |         |           | 177.7   | 45.2   |          | E36                                      | 50.0       | 207.4      | 74.9      |
| 560.0   | 144.31  | 560.0      | 150.0       | 50.0      | 0.00673 | 3.767     | 173.9   | 29.6   | 0.79     |                                          |            | 207.4      | 63.1      |
| 1,286.0 | 144.74  | 726.0      | 150.0       | 50.0      | 0.00673 | 4.884     | 169.0   | 24.3   | 0.79     | Jonction avec la canalisation principale |            | 207.4      | 62.7      |
| Total   |         | 1,286.0    |             |           |         | 8.650     |         |        |          |                                          | 50.0       |            |           |

Canalisation principale GEGADA (existante)

| Sta.     | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|----------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|-------------------------------------|------------|------------|-----------|
| 6,981.0  | 149.00  | 0.0        |             |           |         |           | 170.3   | 21.3   |          | E35                                 | 44.0       | 207.4      | 58.4      |
| 7,929.6  | 144.74  | 948.6      | 200.0       | 44.0      | 0.00131 | 1.241     | 169.0   | 24.3   | 0.39     | CS E36                              | 50.0       | 207.4      | 62.7      |
| 8,697.0  | 137.13  | 767.4      | 200.0       | 94.0      | 0.00533 | 4.088     | 165.0   | 27.8   | 0.83     |                                     |            | 207.4      | 70.3      |
| 9,347.0  | 133.35  | 650.0      | 200.0       | 94.0      | 0.00533 | 3.463     | 161.5   | 28.1   | 0.83     |                                     |            | 207.4      | 74.1      |
| 10,047.0 | 130.38  | 700.0      | 200.0       | 94.0      | 0.00533 | 3.729     | 157.8   | 27.4   | 0.83     | CS Z 3                              | 135.0      | 207.4      | 77.0      |
| 10,372.0 | 128.74  | 325.0      | 300.0       | 229.0     | 0.00384 | 1.248     | 156.5   | 27.8   | 0.90     |                                     |            | 207.4      | 78.7      |
| 11,115.0 | 123.85  | 743.0      | 300.0       | 229.0     | 0.00384 | 2.853     | 153.7   | 29.8   | 0.90     |                                     |            | 207.4      | 83.6      |
| 11,765.0 | 117.94  | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 151.2   | 33.2   | 0.90     |                                     |            | 207.4      | 89.5      |
| 12,140.0 | 119.11  | 375.0      | 300.0       | 229.0     | 0.00384 | 1.440     | 149.7   | 30.6   | 0.90     |                                     |            | 207.4      | 88.3      |
| 12,790.0 | 108.86  | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 147.2   | 38.4   | 0.90     |                                     |            | 207.4      | 98.5      |
| 13,440.0 | 102.81  | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 144.7   | 41.9   | 0.90     |                                     |            | 207.4      | 104.6     |
| 13,540.0 | 103.34  | 100.0      | 300.0       | 229.0     | 0.00384 | 0.384     | 144.4   | 41.0   | 0.90     |                                     |            | 207.4      | 104.1     |
| 13,540.0 |         |            |             |           |         |           | 106.8   |        |          | Vanne de dépressurisation           |            |            |           |
| 14,190.0 | 97.28   | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 104.3   | 7.0    | 0.90     |                                     |            | 138.4      | 41.1      |
| 14,465.0 | 96.83   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 103.2   | 6.4    | 0.90     |                                     |            | 138.4      | 41.6      |
| 15,215.0 | 88.65   | 750.0      | 300.0       | 229.0     | 0.00384 | 2.880     | 100.4   | 11.7   | 0.90     |                                     |            | 138.4      | 49.8      |
| 15,490.0 | 80.85   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 99.3    | 18.5   | 0.90     |                                     |            | 138.4      | 57.6      |
| 15,865.0 | 71.78   | 375.0      | 300.0       | 229.0     | 0.00384 | 1.440     | 97.9    | 26.1   | 0.90     |                                     |            | 138.4      | 66.6      |
| 16,290.0 | 64.01   | 425.0      | 300.0       | 229.0     | 0.00384 | 1.632     | 96.2    | 32.2   | 0.90     |                                     |            | 138.4      | 74.4      |
| 16,641.0 | 70.34   | 351.0      | 300.0       | 229.0     | 0.00384 | 1.348     | 94.9    | 24.6   | 0.90     |                                     |            | 138.4      | 68.1      |
| 16,936.0 | 67.88   | 295.0      | 300.0       | 229.0     | 0.00384 | 1.133     | 93.8    | 25.9   | 0.90     |                                     |            | 138.4      | 70.5      |
| 17,211.0 | 72.02   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 92.7    | 20.7   | 0.90     |                                     |            | 138.4      | 66.4      |
| 17,361.0 | 71.72   | 150.0      | 300.0       | 229.0     | 0.00384 | 0.576     | 92.1    | 20.4   | 0.90     |                                     |            | 138.4      | 66.7      |
| 17,486.0 | 66.31   | 125.0      | 300.0       | 229.0     | 0.00384 | 0.480     | 91.6    | 25.3   | 0.90     |                                     |            | 138.4      | 72.1      |
| 17,536.0 | 68.51   | 50.0       | 300.0       | 229.0     | 0.00384 | 0.192     | 91.5    | 22.9   | 0.90     |                                     |            | 138.4      | 69.9      |
| 17,700.0 | 64.80   | 164.0      | 300.0       | 229.0     | 0.00384 | 0.630     | 90.8    | 26.0   | 0.90     |                                     |            | 138.4      | 73.6      |
| 17,825.0 | 67.70   | 125.0      | 300.0       | 229.0     | 0.00384 | 0.480     | 90.3    | 22.6   | 0.90     |                                     |            | 138.4      | 70.7      |
| 18,275.0 | 37.02   | 450.0      | 300.0       | 229.0     | 0.00384 | 1.728     | 88.6    | 51.6   | 0.90     |                                     |            | 138.4      | 101.4     |
| 18,550.0 | 27.73   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 87.6    | 59.8   | 0.90     | E28                                 |            | 138.4      | 110.7     |
|          |         |            |             |           |         |           | 85.0    |        |          | Vanne de dépressurisation existante |            |            |           |
| Total    |         | 11,569.0   |             |           |         | 45.177    |         |        |          |                                     |            |            |           |

CS: Canalisation secondaire



(3) Calcul hydrologique de la canalisation principale de Gegada (pour le débit du projet, avec réservoir de dépressurisation à 2 emplacements) Cas 2

Emplacement des réservoirs de dépressurisation : Sta. 7920 canalisation secondaire Z3, et Sta. 13540 canalisation principale de Gegada

Si des nouvelles canalisations sont installées seulement pour les nouveaux forages

CS Z3 (projet)

C= 110.00

| Sta.     | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                      | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|----------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|-------------------------------------------|------------|------------|-----------|
| 0.0      | 226.64  | 0.0        |             |           |         |           | 236.6   | 10.0   |          | Z3                                        | 45.0       | 273.3      | 46.6      |
| 3,309.0  | 189.80  | 3,309.0    | 150.0       | 45.0      | 0.00554 | 18.316    | 218.3   | 28.5   | 0.71     | CS Z2                                     | 45.0       | 273.3      | 83.5      |
| 4,497.0  | 176.84  | 1,188.0    | 200.0       | 90.0      | 0.00492 | 5.840     | 212.5   | 35.6   | 0.80     | CS Z25                                    | 45.0       | 273.3      | 96.4      |
| 4,797.0  | 174.20  | 300.0      | 200.0       | 135.0     | 0.01041 | 3.122     | 209.4   | 35.2   | 1.19     |                                           | 45.0       | 273.3      | 99.1      |
| 5,297.0  | 169.07  | 500.0      | 200.0       | 135.0     | 0.01041 | 5.204     | 204.2   | 35.1   | 1.19     |                                           | 0.0        | 273.3      | 104.2     |
| 6,981.0  | 149.00  | 1,684.0    | 200.0       | 135.0     | 0.01041 | 17.527    | 186.6   | 37.6   | 1.19     | (E35)                                     | 0.0        | 273.3      | 124.3     |
| 7,481.0  | 148.00  | 500.0      | 200.0       | 135.0     | 0.01041 | 5.204     | 181.4   | 33.4   | 1.19     |                                           | 0.0        | 273.3      | 125.3     |
| 7,920.0  | 144.94  | 439.0      | 200.0       | 135.0     | 0.01041 | 4.569     | 176.9   | 31.9   | 1.19     |                                           | 0.0        | 273.3      | 128.3     |
| 7,920.0  |         |            |             |           |         |           | 147.0   |        |          | Vanne de dépressurisation                 |            |            |           |
| 7,929.6  | 144.74  | 9.6        | 250.0       | 135.0     | 0.00351 | 0.034     | 147.0   | 2.2    | 0.76     | CS E36                                    | 0.0        | 182.0      | 37.2      |
| 8,697.0  | 137.13  | 767.4      | 250.0       | 135.0     | 0.00351 | 2.694     | 144.3   | 7.1    | 0.76     |                                           | 0.0        | 182.0      | 44.8      |
| 9,347.0  | 133.35  | 650.0      | 250.0       | 135.0     | 0.00351 | 2.282     | 142.0   | 8.6    | 0.76     |                                           | 0.0        | 182.0      | 48.6      |
| 10,047.0 | 130.38  | 700.0      | 250.0       | 135.0     | 0.00351 | 2.458     | 139.5   | 9.2    | 0.76     | Raccordement à la canalisation principale | 0.0        | 182.0      | 51.6      |
| Total    |         | 10,047.0   |             |           |         | 67.251    |         |        |          |                                           | 180.0      |            |           |

Canalisations secondaire Z2 (projet)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                   | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------|------------|------------|-----------|
| 0.0   | 190.35  | 0.0        |             |           |         |           | 218.5   | 28.2   |          | Z2                     | 45.0       | 273.3      | 83.0      |
| 38.0  | 189.80  | 38.0       | 150.0       | 45.0      | 0.00554 | 0.210     | 218.3   | 28.5   | 0.71     | Jonction avec la CS Z3 |            | 273.3      | 83.5      |
| Total |         | 38.0       |             |           |         | 0.210     |         |        |          |                        | 45.0       |            |           |

Canalisations secondaire Z25 (projet)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                   | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------|------------|------------|-----------|
| 0.0   | 170.49  | 0.0        |             |           |         |           | 213.8   | 43.3   |          | Z25                    | 45.0       | 273.3      | 102.8     |
| 230.0 | 176.84  | 230.0      | 150.0       | 45.0      | 0.00554 | 1.273     | 212.5   | 35.6   | 0.71     | Jonction avec la CS Z3 |            | 273.3      | 96.5      |
| Total |         | 230.0      |             |           |         | 1.273     |         |        |          |                        | 45.0       |            |           |

Canalisations secondaire E36(existante)

| Sta.    | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                     | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|---------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------------------------|------------|------------|-----------|
| 0.0     | 132.50  | 0.0        |             |           |         |           | 159.5   | 27.0   |          | E36                                      | 50.0       | 182.0      | 49.5      |
| 560.0   | 144.31  | 560.0      | 150.0       | 50.0      | 0.00673 | 3.767     | 155.7   | 11.4   | 0.79     |                                          |            | 182.0      | 37.7      |
| 1,286.0 | 144.74  | 726.0      | 150.0       | 50.0      | 0.00673 | 4.884     | 150.8   | 6.1    | 0.79     | Jonction avec la canalisation principale |            | 182.0      | 37.2      |
| Total   |         | 1,286.0    |             |           |         | 8.650     |         |        |          |                                          | 50.0       |            |           |

Canalisation principale GEGADA (existante)

| Sta.     | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|----------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|-------------------------------------|------------|------------|-----------|
| 6,981.0  | 149.00  | 0.0        |             |           |         |           | 152.1   | 3.1    |          | E35                                 | 44.0       | 182.0      | 33.0      |
| 7,929.6  | 144.74  | 948.6      | 200.0       | 44.0      | 0.00131 | 1.241     | 150.8   | 6.1    | 0.39     | CS E36                              | 50.0       | 182.0      | 37.2      |
| 8,697.0  | 137.13  | 767.4      | 200.0       | 94.0      | 0.00533 | 4.088     | 146.7   | 9.6    | 0.83     |                                     |            | 182.0      | 44.8      |
| 9,347.0  | 133.35  | 650.0      | 200.0       | 94.0      | 0.00533 | 3.463     | 143.3   | 9.9    | 0.83     |                                     |            | 182.0      | 48.6      |
| 10,047.0 | 130.38  | 700.0      | 200.0       | 94.0      | 0.00533 | 3.729     | 139.5   | 9.2    | 0.83     | CS Z 3                              | 135.0      | 182.0      | 51.6      |
| 10,372.0 | 128.74  | 325.0      | 300.0       | 229.0     | 0.00384 | 1.248     | 138.3   | 9.5    | 0.90     |                                     |            | 182.0      | 53.2      |
| 11,115.0 | 123.85  | 743.0      | 300.0       | 229.0     | 0.00384 | 2.853     | 135.4   | 11.6   | 0.90     |                                     |            | 182.0      | 58.1      |
| 11,765.0 | 117.94  | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 132.9   | 15.0   | 0.90     |                                     |            | 182.0      | 64.0      |
| 12,140.0 | 119.11  | 375.0      | 300.0       | 229.0     | 0.00384 | 1.440     | 131.5   | 12.4   | 0.90     |                                     |            | 182.0      | 62.9      |
| 12,790.0 | 108.86  | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 129.0   | 20.1   | 0.90     |                                     |            | 182.0      | 73.1      |
| 13,440.0 | 102.81  | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 126.5   | 23.7   | 0.90     |                                     |            | 182.0      | 79.2      |
| 13,540.0 | 103.34  | 100.0      | 300.0       | 229.0     | 0.00384 | 0.384     | 126.1   | 22.8   | 0.90     |                                     |            | 182.0      | 78.6      |
| 13,540.0 |         |            |             |           |         |           | 105.5   |        |          | Vanne de dépressurisation           |            |            |           |
| 14,190.0 | 97.28   | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 103.0   | 5.7    | 0.90     |                                     |            | 136.6      | 39.3      |
| 14,465.0 | 96.83   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 101.9   | 5.1    | 0.90     |                                     |            | 136.6      | 39.8      |
| 15,215.0 | 88.65   | 750.0      | 300.0       | 229.0     | 0.00384 | 2.880     | 99.1    | 10.4   | 0.90     |                                     |            | 136.6      | 48.0      |
| 15,490.0 | 80.85   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 98.0    | 17.2   | 0.90     |                                     |            | 136.6      | 55.8      |
| 15,865.0 | 71.78   | 375.0      | 300.0       | 229.0     | 0.00384 | 1.440     | 96.6    | 24.8   | 0.90     |                                     |            | 136.6      | 64.8      |
| 16,290.0 | 64.01   | 425.0      | 300.0       | 229.0     | 0.00384 | 1.632     | 94.9    | 30.9   | 0.90     |                                     |            | 136.6      | 72.6      |
| 16,641.0 | 70.34   | 351.0      | 300.0       | 229.0     | 0.00384 | 1.348     | 93.6    | 23.3   | 0.90     |                                     |            | 136.6      | 66.3      |
| 16,936.0 | 67.88   | 295.0      | 300.0       | 229.0     | 0.00384 | 1.133     | 92.5    | 24.6   | 0.90     |                                     |            | 136.6      | 68.7      |
| 17,211.0 | 72.02   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 91.4    | 19.4   | 0.90     |                                     |            | 136.6      | 64.6      |
| 17,361.0 | 71.72   | 150.0      | 300.0       | 229.0     | 0.00384 | 0.576     | 90.8    | 19.1   | 0.90     |                                     |            | 136.6      | 64.9      |
| 17,486.0 | 66.31   | 125.0      | 300.0       | 229.0     | 0.00384 | 0.480     | 90.3    | 24.0   | 0.90     |                                     |            | 136.6      | 70.3      |
| 17,536.0 | 68.51   | 50.0       | 300.0       | 229.0     | 0.00384 | 0.192     | 90.2    | 21.6   | 0.90     |                                     |            | 136.6      | 68.1      |
| 17,700.0 | 64.80   | 164.0      | 300.0       | 229.0     | 0.00384 | 0.630     | 89.5    | 24.7   | 0.90     |                                     |            | 136.6      | 71.8      |
| 17,825.0 | 67.70   | 125.0      | 300.0       | 229.0     | 0.00384 | 0.480     | 89.0    | 21.3   | 0.90     |                                     |            | 136.6      | 68.9      |
| 18,275.0 | 37.02   | 450.0      | 300.0       | 229.0     | 0.00384 | 1.728     | 87.3    | 50.3   | 0.90     |                                     |            | 136.6      | 99.6      |
| 18,550.0 | 27.73   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 86.3    | 58.5   | 0.90     | E28                                 |            | 136.6      | 108.9     |
|          |         |            |             |           |         |           | 85.0    |        |          | Vanne de dépressurisation existante |            |            |           |
| Total    |         | 11,569.0   |             |           |         | 45.177    |         |        |          |                                     |            |            |           |

CS: Canalisation secondaire

(4) Calcul hydrologique de la canalisation principale de Gegada

(pour le débit du projet, avec réservoir de dépressurisation à 2 emplacements) Cas 3

Emplacement des réservoirs de dépressurisation : Sta. 10047 de la partie jonction de canalisation secondaire Z3 de la canalisation principale de Gegada, et Sta. 13540, partie aval de la canalisation principale de Gegada

Canalisation secondaire Z3

Si des nouvelles canalisations sont installées seulement pour les nouveaux forages.

Canalisation secondaire Z3 C= 110.00

| Sta.     | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                         | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|----------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------------|------------|------------|-----------|
| 0.0      | 226.64  | 0.0        |             |           |         |           | 236.6   | 10.0   |          | Z3                           | 45.0       | 279.1      | 52.5      |
| 3,309.0  | 189.80  | 3,309.0    | 150.0       | 45.0      | 0.00554 | 18.316    | 218.3   | 28.5   | 0.71     | CS Z2                        | 45.0       | 279.1      | 89.3      |
| 4,497.0  | 176.84  | 1,188.0    | 200.0       | 90.0      | 0.00492 | 5.840     | 212.4   | 35.6   | 0.80     | CS Z25                       | 45.0       | 279.1      | 102.3     |
| 6,981.0  | 149.00  | 2,484.0    | 200.0       | 135.0     | 0.01041 | 25.853    | 186.6   | 37.6   | 1.19     | (E35)                        | 0.0        | 279.1      | 130.1     |
| 7,929.6  | 144.74  | 948.6      | 200.0       | 135.0     | 0.01041 | 9.873     | 176.7   | 32.0   | 1.19     | (CS E36)                     | 0.0        | 279.1      | 134.4     |
| 10,047.0 | 130.38  | 2,117.4    | 200.0       | 135.0     | 0.01041 | 22.038    | 154.7   | 24.3   | 1.19     | Jonction avec la<br>CS Z3    | 0.0        | 279.1      | 148.7     |
|          |         |            |             |           |         |           | 133.0   |        |          | Vanne de<br>dépressurisation |            |            |           |
| Total    |         | 10,047.0   |             |           |         | 81.921    |         |        |          |                              | 135.0      |            |           |

Canalisations secondaire Z2 (projet)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                      | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|---------------------------|------------|------------|-----------|
| 0.0   | 190.35  | 0.0        |             |           |         |           | 218.5   | 28.1   |          | Z2                        | 45.0       | 279.1      | 88.7      |
| 38.0  | 189.80  | 38.0       | 150.0       | 45.0      | 0.00554 | 0.210     | 218.3   | 28.5   | 0.71     | Jonction avec la<br>CS Z3 |            | 279.1      | 89.3      |
| Total |         | 38.0       |             |           |         | 0.210     |         |        |          |                           | 45.0       |            |           |

Canalisations secondaire Z25 (projet)

| Sta.  | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                      | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|-------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|---------------------------|------------|------------|-----------|
| 0.0   | 170.49  | 0.0        |             |           |         |           | 213.7   | 43.2   |          | Z25                       | 45.0       | 279.1      | 108.6     |
| 230.0 | 176.84  | 230.0      | 150.0       | 45.0      | 0.00554 | 1.273     | 212.4   | 35.6   | 0.71     | Jonction avec la<br>CS Z3 |            | 279.1      | 102.3     |
| Total |         | 230.0      |             |           |         | 1.273     |         |        |          |                           | 45.0       |            |           |

Canalisations secondaire E36(existante)

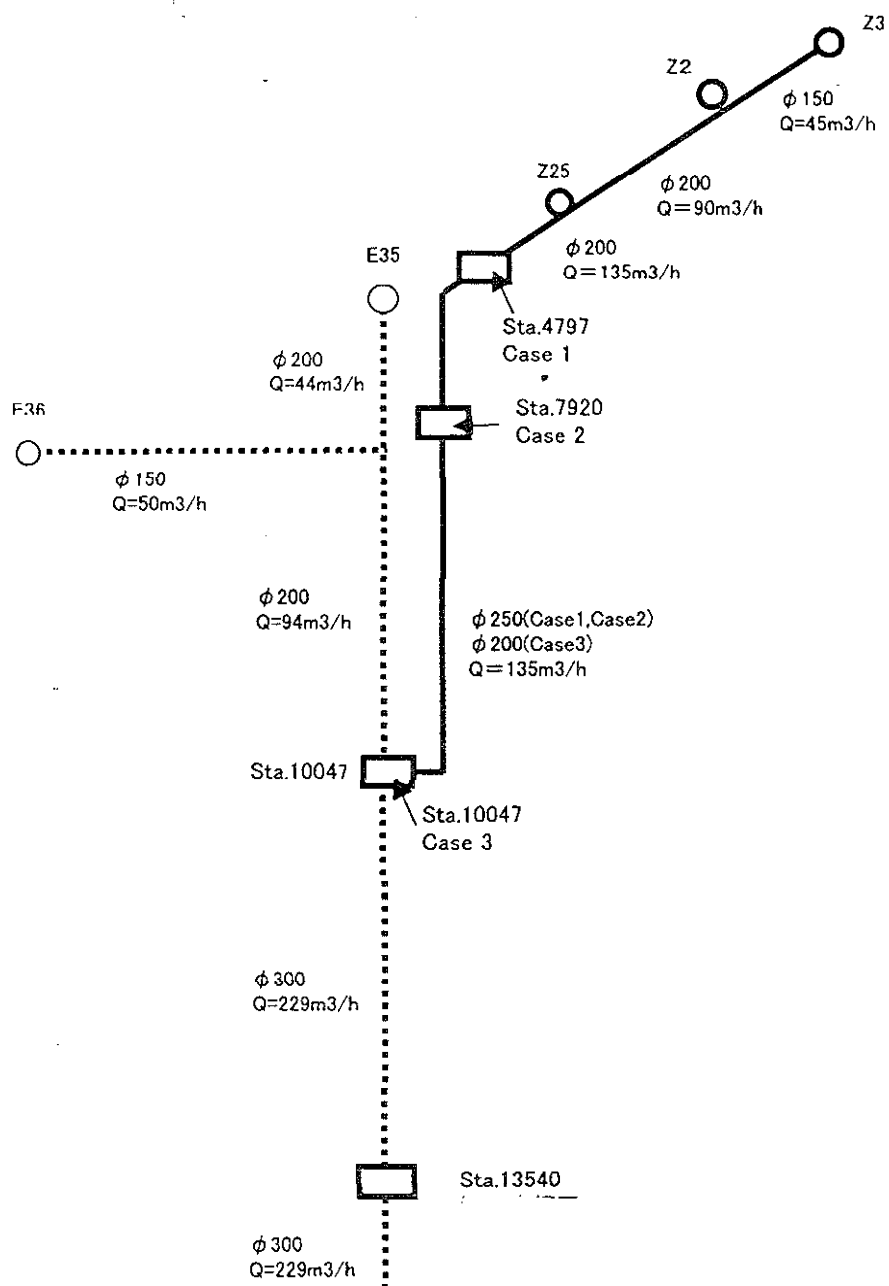
| Sta.    | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                           | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|---------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|------------------------------------------------|------------|------------|-----------|
| 0.0     | 132.50  | 0.0        |             |           |         |           | 159.5   | 27.0   |          | E36                                            | 50.0       | 189.2      | 56.7      |
| 560.0   | 144.31  | 560.0      | 150.0       | 50.0      | 0.00673 | 3.767     | 155.7   | 11.4   | 0.79     |                                                |            | 189.2      | 44.9      |
| 1,286.0 | 144.74  | 726.0      | 150.0       | 50.0      | 0.00673 | 4.884     | 150.9   | 6.1    | 0.79     | Jonction avec la<br>canalisation<br>principale |            | 189.2      | 44.5      |
| Total   |         | 1,286.0    |             |           |         | 8.650     |         |        |          |                                                | 50.0       |            |           |

Canalisation principale GEGADA (existante)

| Sta.     | GL<br>m | Dist.<br>m | Diam.<br>mm | Q<br>m³/h | I       | Loss<br>m | WL<br>m | H<br>m | V<br>m/s | Well                                       | Qw<br>m³/h | Wlmax<br>m | Hmax<br>m |
|----------|---------|------------|-------------|-----------|---------|-----------|---------|--------|----------|--------------------------------------------|------------|------------|-----------|
| 6,981.0  | 149.00  | 0.0        |             |           |         |           | 152.1   | 3.1    |          | E35                                        | 44.0       | 189.2      | 40.2      |
| 7,929.6  | 144.74  | 948.6      | 200.0       | 44.0      | 0.00131 | 1.241     | 150.9   | 6.1    | 0.39     | CS E36                                     | 50.0       | 189.2      | 44.5      |
| 8,697.0  | 137.13  | 767.4      | 200.0       | 94.0      | 0.00533 | 4.088     | 146.8   | 9.6    | 0.83     |                                            |            | 189.2      | 52.1      |
| 9,347.0  | 133.35  | 650.0      | 200.0       | 94.0      | 0.00533 | 3.463     | 143.3   | 10.0   | 0.83     |                                            |            | 189.2      | 55.9      |
| 10,047.0 | 130.38  | 700.0      | 200.0       | 94.0      | 0.00533 | 3.729     | 139.6   | 9.2    | 0.83     | CS Z 3                                     |            | 189.2      | 58.8      |
| 10,047.0 |         |            |             |           |         |           | 133.0   |        |          | Vanne de<br>dépressurisation               | 135.0      |            |           |
| 10,147.0 | 130.03  | 100.0      | 300.0       | 229.0     | 0.00384 | 0.384     | 132.6   | 2.6    | 0.90     |                                            |            | 144.9      | 14.9      |
| 10,247.0 | 129.42  | 100.0      | 300.0       | 229.0     | 0.00384 | 0.384     | 132.2   | 2.8    | 0.90     |                                            |            | 144.9      | 15.5      |
| 10,347.0 | 128.85  | 100.0      | 300.0       | 229.0     | 0.00384 | 0.384     | 131.8   | 3.0    | 0.90     |                                            |            | 144.9      | 16.1      |
| 10,447.0 | 128.20  | 100.0      | 300.0       | 229.0     | 0.00384 | 0.384     | 131.5   | 3.3    | 0.90     |                                            |            | 144.9      | 16.7      |
| 10,547.0 | 128.85  | 100.0      | 300.0       | 229.0     | 0.00384 | 0.384     | 131.1   | 2.2    | 0.90     |                                            |            | 144.9      | 16.1      |
| 10,647.0 | 128.30  | 100.0      | 300.0       | 229.0     | 0.00384 | 0.384     | 130.7   | 2.4    | 0.90     |                                            |            | 144.9      | 16.6      |
| 10,747.0 | 127.43  | 100.0      | 300.0       | 229.0     | 0.00384 | 0.384     | 130.3   | 2.9    | 0.90     |                                            |            | 144.9      | 17.5      |
| 10,847.0 | 126.72  | 100.0      | 300.0       | 229.0     | 0.00384 | 0.384     | 129.9   | 3.2    | 0.90     |                                            |            | 144.9      | 18.2      |
| 10,865.0 | 126.59  | 18.0       | 300.0       | 229.0     | 0.00384 | 0.069     | 129.9   | 3.3    | 0.90     |                                            |            | 144.9      | 18.3      |
| 11,265.0 | 122.12  | 400.0      | 300.0       | 229.0     | 0.00384 | 1.536     | 128.3   | 6.2    | 0.90     |                                            |            | 144.9      | 22.8      |
| 11,565.0 | 119.65  | 300.0      | 300.0       | 229.0     | 0.00384 | 1.152     | 127.2   | 7.5    | 0.90     |                                            |            | 144.9      | 25.3      |
| 11,765.0 | 117.94  | 200.0      | 300.0       | 229.0     | 0.00384 | 0.768     | 126.4   | 8.5    | 0.90     |                                            |            | 144.9      | 27.0      |
| 12,140.0 | 119.11  | 375.0      | 300.0       | 229.0     | 0.00384 | 1.440     | 125.0   | 5.9    | 0.90     |                                            |            | 144.9      | 25.8      |
| 12,790.0 | 108.86  | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 122.5   | 13.6   | 0.90     |                                            |            | 144.9      | 36.0      |
| 13,440.0 | 102.81  | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 120.0   | 17.2   | 0.90     |                                            |            | 144.9      | 42.1      |
| 13,540.0 | 103.34  | 100.0      | 300.0       | 229.0     | 0.00384 | 0.384     | 119.6   | 16.2   | 0.90     |                                            |            | 144.9      | 41.6      |
| 13,540.0 |         |            |             |           |         |           | 105.5   |        |          | Vanne de<br>dépressurisation               |            |            |           |
| 14,190.0 | 97.28   | 650.0      | 300.0       | 229.0     | 0.00384 | 2.496     | 103.0   | 5.7    | 0.90     |                                            |            | 136.6      | 39.3      |
| 14,465.0 | 96.83   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 101.9   | 5.1    | 0.90     |                                            |            | 136.6      | 39.8      |
| 15,215.0 | 88.65   | 750.0      | 300.0       | 229.0     | 0.00384 | 2.880     | 99.1    | 10.4   | 0.90     |                                            |            | 136.6      | 48.0      |
| 15,490.0 | 80.85   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 98.0    | 17.2   | 0.90     |                                            |            | 136.6      | 55.8      |
| 15,865.0 | 71.78   | 375.0      | 300.0       | 229.0     | 0.00384 | 1.440     | 96.6    | 24.8   | 0.90     |                                            |            | 136.6      | 64.8      |
| 16,290.0 | 64.01   | 425.0      | 300.0       | 229.0     | 0.00384 | 1.632     | 94.9    | 30.9   | 0.90     |                                            |            | 136.6      | 72.6      |
| 16,641.0 | 70.34   | 351.0      | 300.0       | 229.0     | 0.00384 | 1.348     | 93.6    | 23.3   | 0.90     |                                            |            | 136.6      | 66.3      |
| 16,936.0 | 67.88   | 295.0      | 300.0       | 229.0     | 0.00384 | 1.133     | 92.5    | 24.6   | 0.90     |                                            |            | 136.6      | 68.7      |
| 17,211.0 | 72.02   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 91.4    | 19.4   | 0.90     |                                            |            | 136.6      | 64.6      |
| 17,361.0 | 71.72   | 150.0      | 300.0       | 229.0     | 0.00384 | 0.576     | 90.8    | 19.1   | 0.90     |                                            |            | 136.6      | 64.9      |
| 17,486.0 | 66.31   | 125.0      | 300.0       | 229.0     | 0.00384 | 0.480     | 90.3    | 24.0   | 0.90     |                                            |            | 136.6      | 70.3      |
| 17,536.0 | 68.51   | 50.0       | 300.0       | 229.0     | 0.00384 | 0.192     | 90.2    | 21.6   | 0.90     |                                            |            | 136.6      | 68.1      |
| 17,700.0 | 64.80   | 164.0      | 300.0       | 229.0     | 0.00384 | 0.630     | 89.5    | 24.7   | 0.90     |                                            |            | 136.6      | 71.8      |
| 17,825.0 | 67.70   | 125.0      | 300.0       | 229.0     | 0.00384 | 0.480     | 89.0    | 21.3   | 0.90     |                                            |            | 136.6      | 68.9      |
| 18,275.0 | 37.02   | 450.0      | 300.0       | 229.0     | 0.00384 | 1.728     | 87.3    | 50.3   | 0.90     |                                            |            | 136.6      | 99.6      |
| 18,550.0 | 27.73   | 275.0      | 300.0       | 229.0     | 0.00384 | 1.056     | 86.3    | 58.5   | 0.90     | E28                                        |            | 136.6      | 108.9     |
|          |         |            |             |           |         |           | 85.0    |        |          | Vanne de dé<br>pressurisation<br>existante |            |            |           |
| Total    |         | 11,569.0   |             |           |         | 45.177    |         |        |          |                                            |            |            |           |

CS: Canalisation secondaire

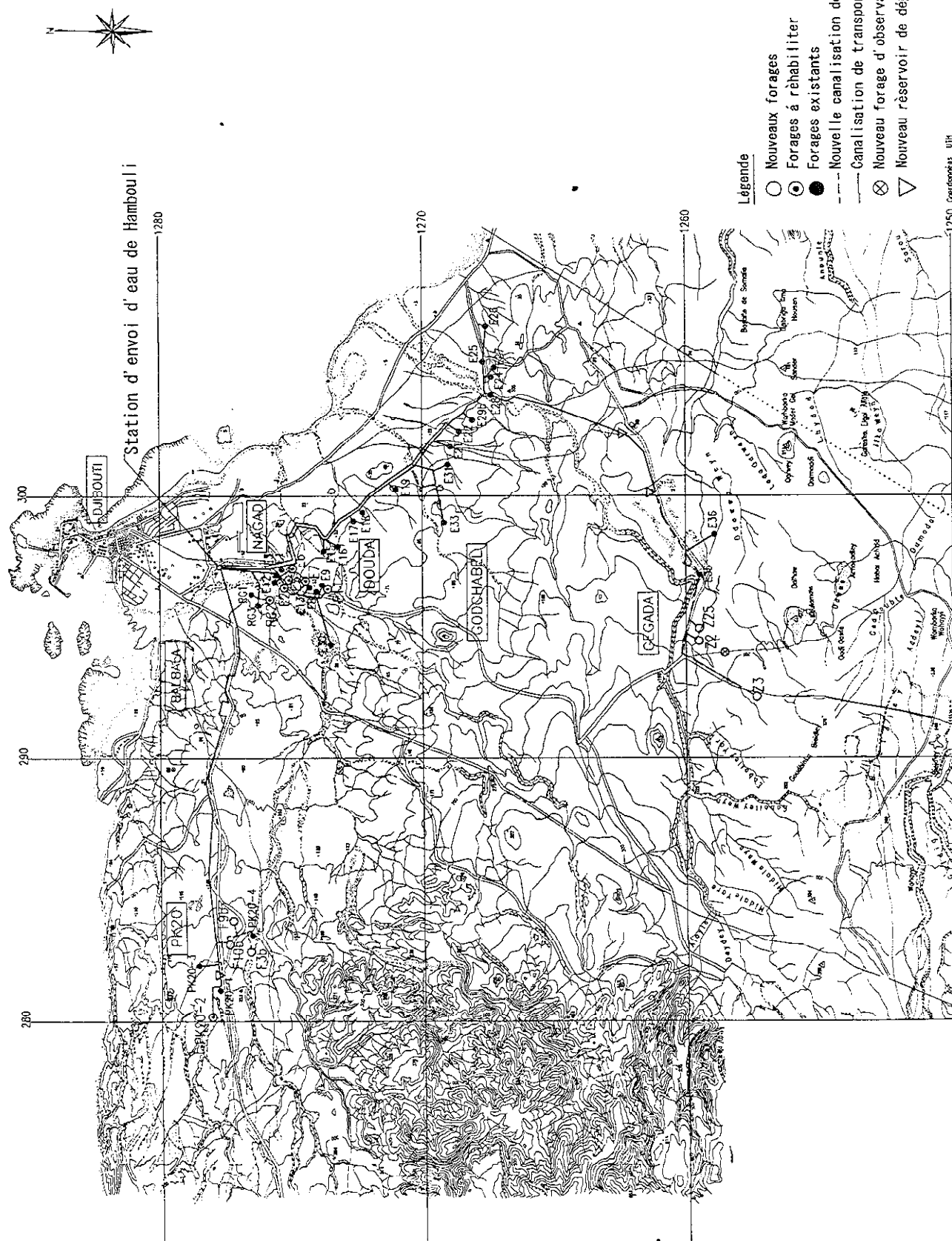
(5) Plan de comparaison d'installation des réservoirs de dépressurisation pour les Cas 1, 2 et 3



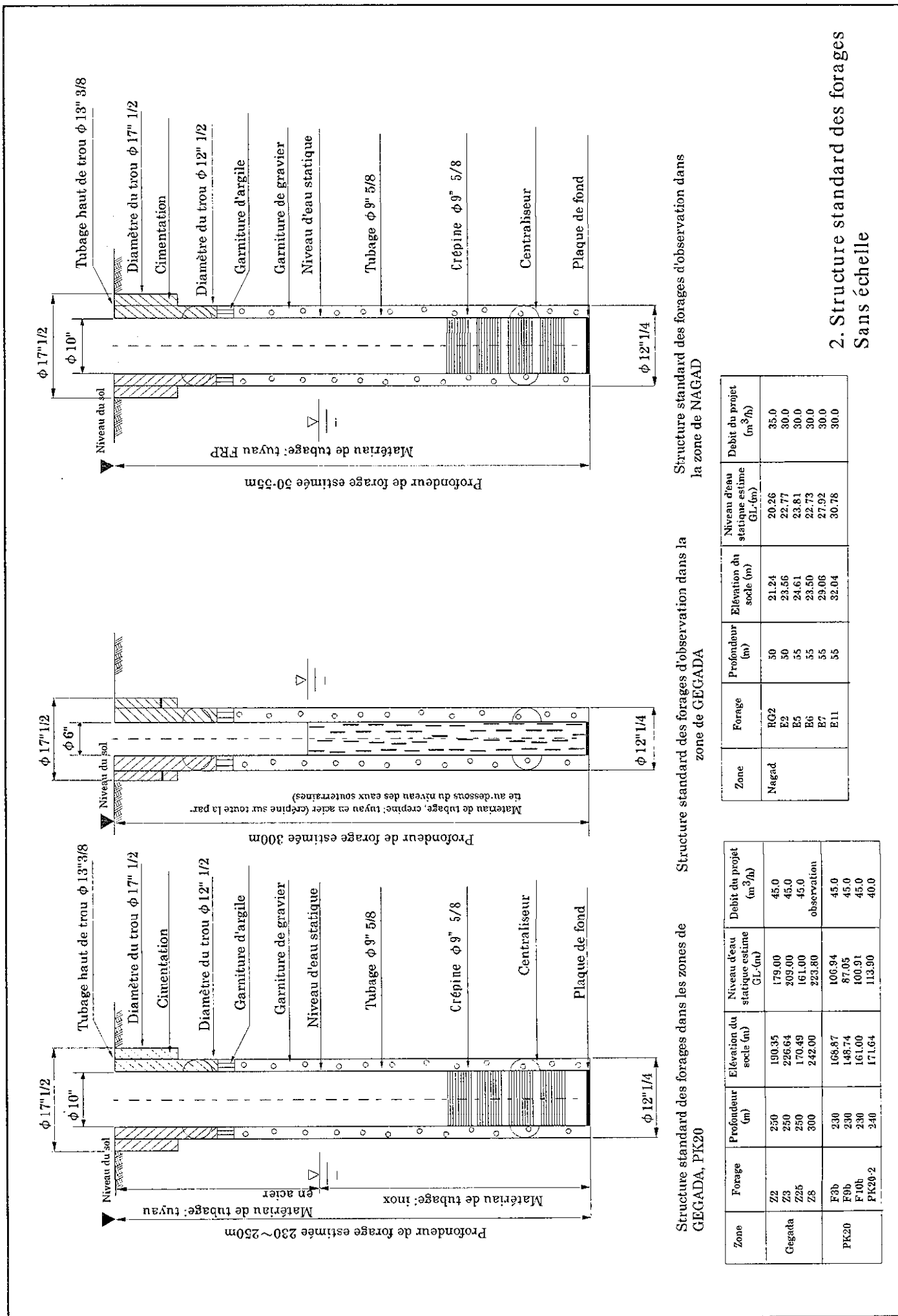


### **13. Plans du plan de base**

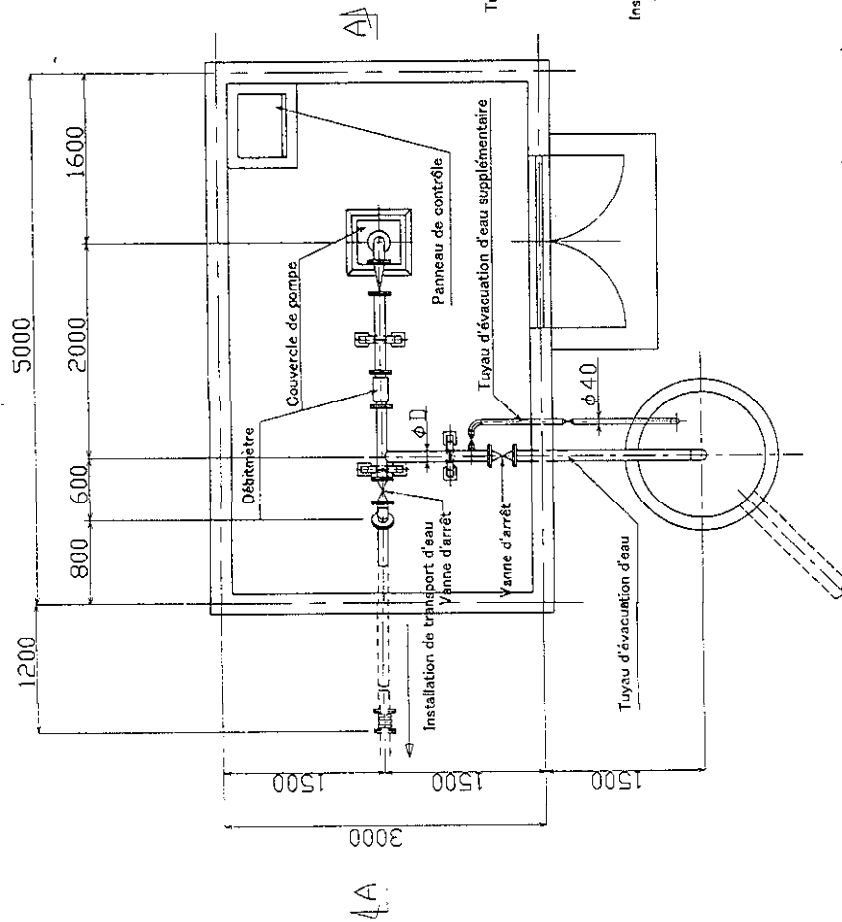
1. Carte de localisation des sites du projet
2. Plan structurel standard par type de forage
3. Plan des installations de forage
4. Plan structurel de la salle de la pompe de forage
5. Plan standard de pose des canalisations d'amenée
6. Plan structurel de la salle de ramification des canalisations
7. Plan standard des ouvrages de traversée des oueds
8. Plan standard de l'ouvrage du bloc de poussée
9. Plan standard du réservoir de dépressurisation d'eau
10. Plan de disposition des installations électriques
11. Equipements à fournir (véhicule pour l'entretien des forages)



# I. Emplacements des sites du projet Echelle 1:150000



## 2. Structure standard des forages Sans échelle



Plan de masse d'installation de forage (échelle 1:50)

| No de forage | Débit (m <sup>3</sup> /H) | Altitude Niveau du sol (m) | Niveau d'eau statique Niveau du sol (m) | Niveau d'eau dynamique Niveau de sol (m) | Diamètre φ D (mm) | Hauteur de relevage totale (m) | Puissance du moteur (kW) |
|--------------|---------------------------|----------------------------|-----------------------------------------|------------------------------------------|-------------------|--------------------------------|--------------------------|
| RG2          | 35.0                      | 21.24                      | 20.26                                   | 27                                       | 80                | 55                             | 11                       |
| E2           | 30.0                      | 23.56                      | 22.77                                   | 25                                       | 80                | 55                             | 11                       |
| E5           | 30.0                      | 24.61                      | 23.81                                   | 26                                       | 80                | 55                             | 11                       |
| E6           | 30.0                      | 23.50                      | 22.73                                   | 29                                       | 80                | 60                             | 11                       |
| E7           | 30.0                      | 29.06                      | 27.92                                   | 31                                       | 80                | 60                             | 11                       |
| E11          | 30.0                      | 32.04                      | 30.78                                   | 33                                       | 80                | 60                             | 11                       |
| PK20-2       | 40.0                      | 171.64                     | 113.90                                  | 129                                      | 100               | 175                            | 37                       |
| F3b          | 45.0                      | 168.87                     | 106.94                                  | 124                                      | 100               | 145                            | 37                       |
| F9b          | 45.0                      | 148.74                     | 87.05                                   | 105                                      | 100               | 145                            | 37                       |
| F10b         | 45.0                      | 161.00                     | 100.91                                  | 118                                      | 100               | 140                            | 37                       |
| Z2           | 45.0                      | 190.35                     | 179.00                                  | 186                                      | 100               | 225                            | 55                       |
| Z3           | 45.0                      | 226.64                     | 209.00                                  | 216                                      | 100               | 240                            | 55                       |
| Z25          | 45.0                      | 170.49                     | 161.00                                  | 168                                      | 100               | 220                            | 55                       |

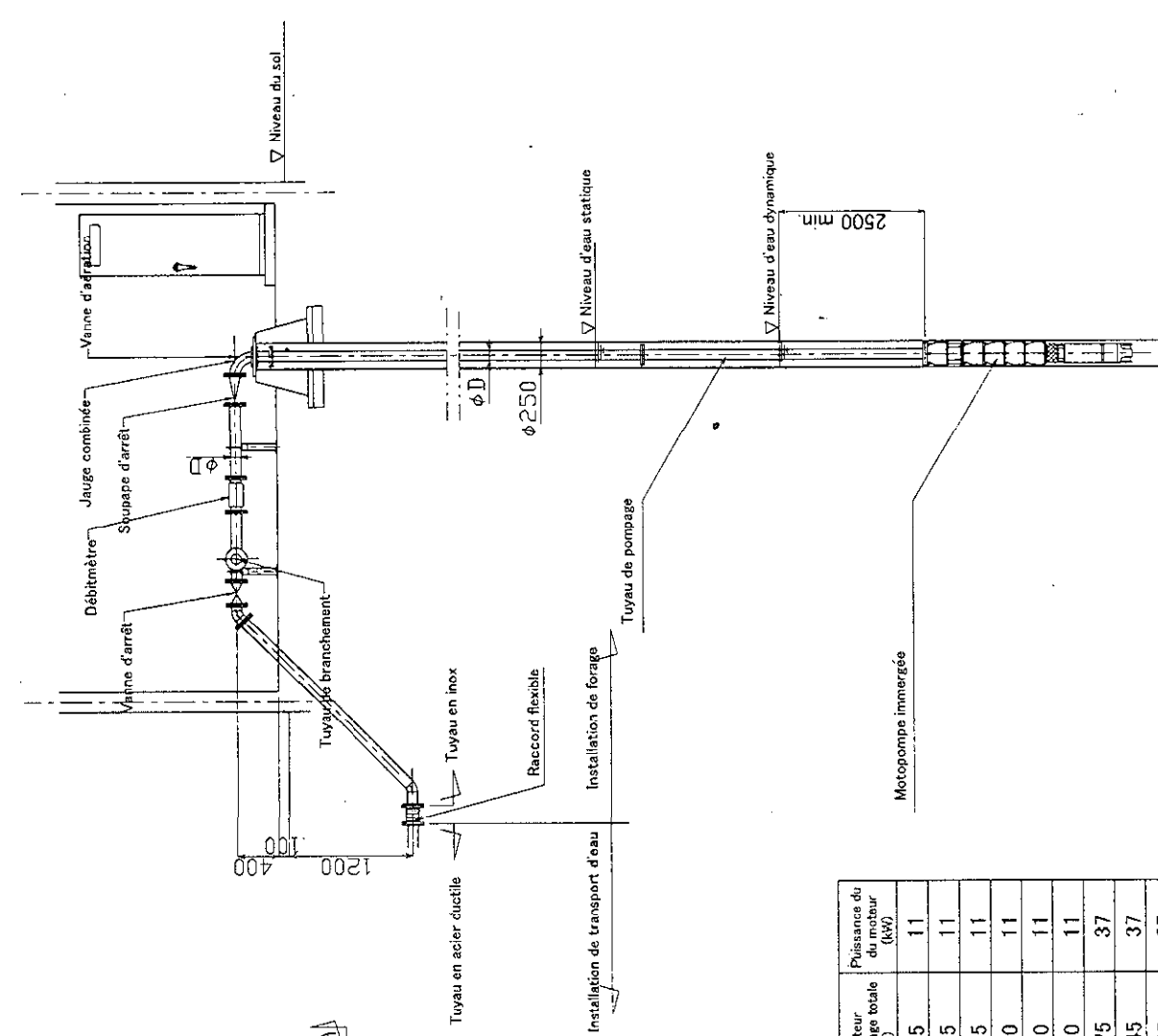
Forages à réhabiliter

Nouveaux forages

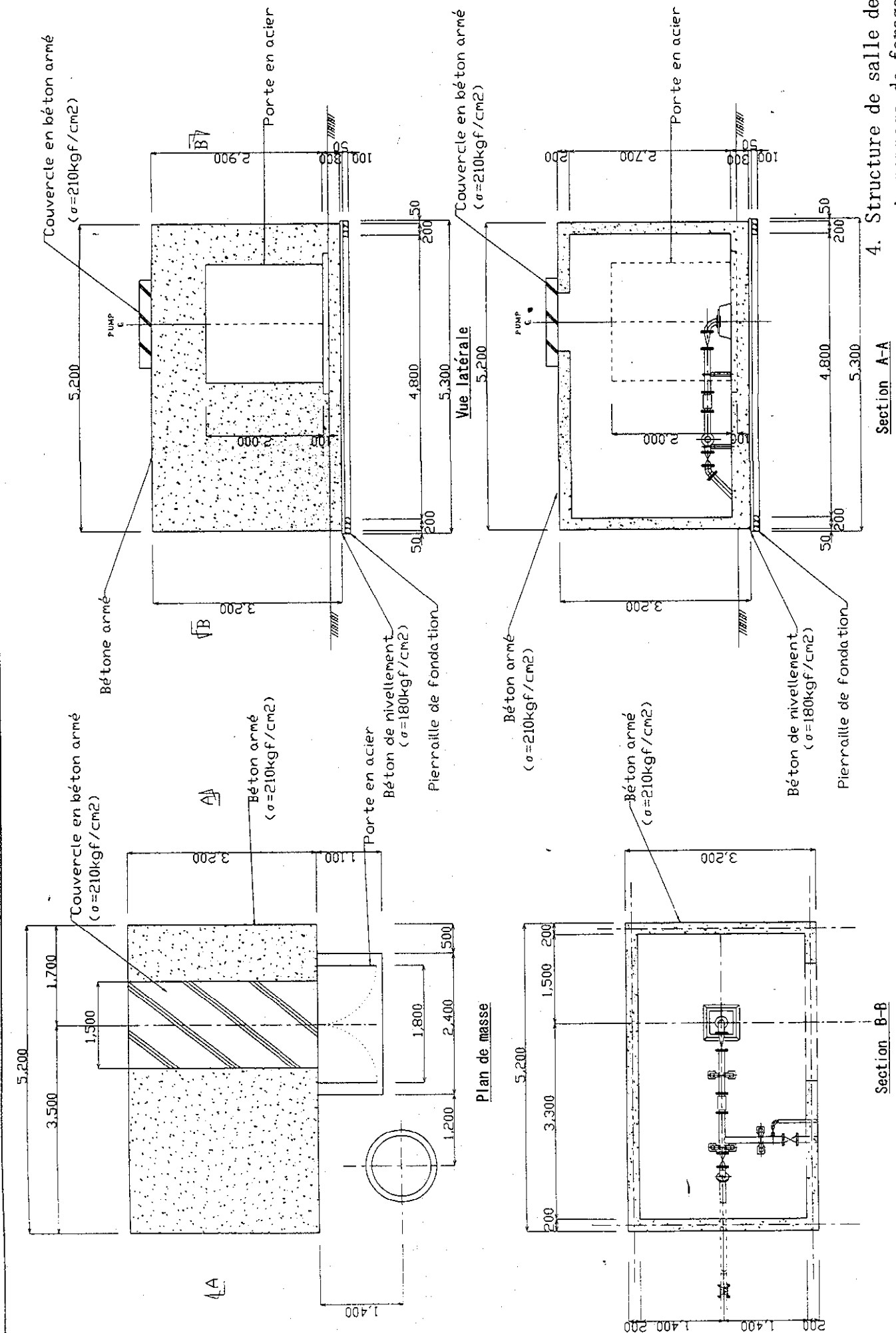
Section d'installation de forage (échelle 1:50)

### 3. Plan d'installation de forage

Echelle 1:50



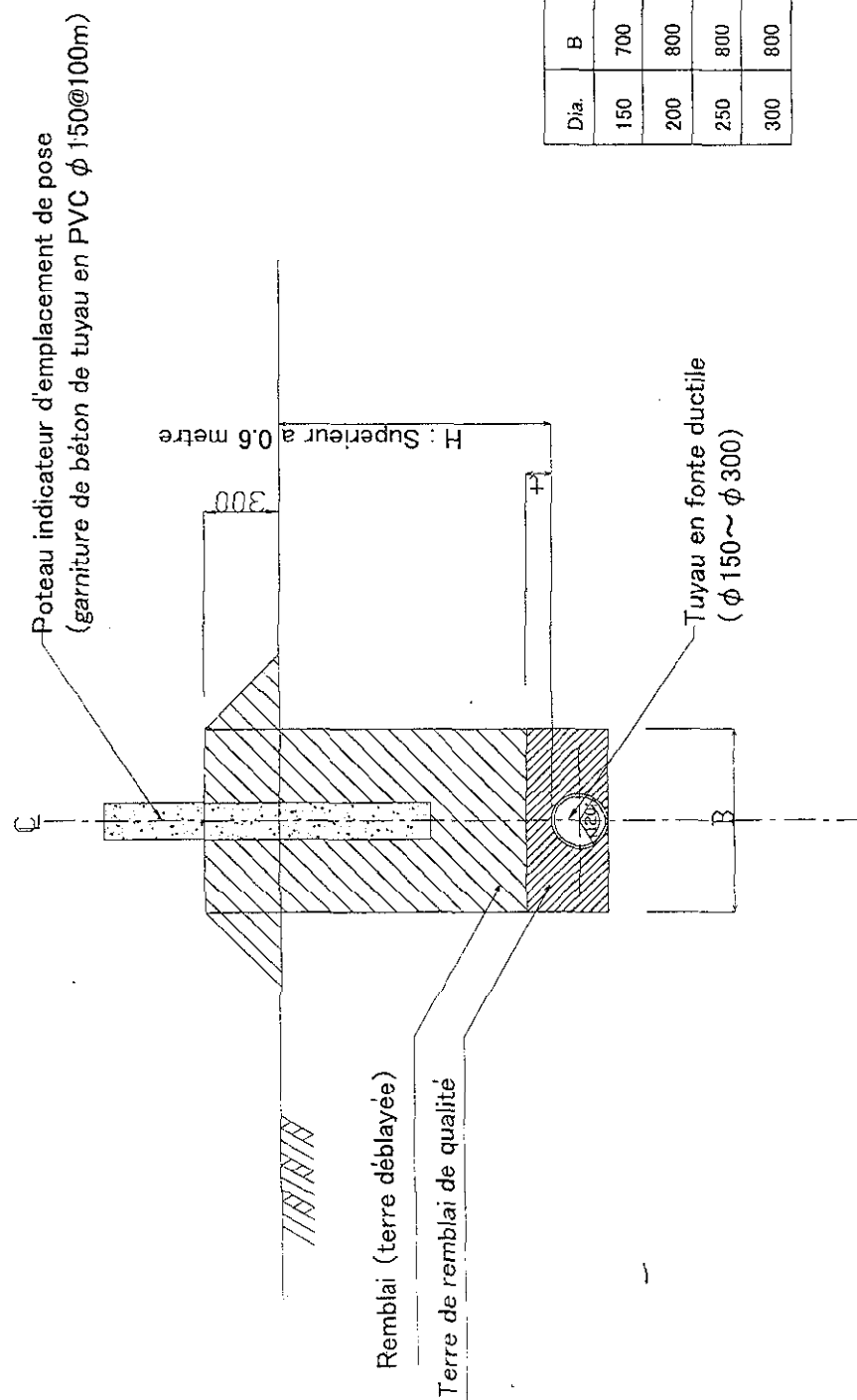




4. Structure de salle de  
pompage de forage  
Echelle 1:60

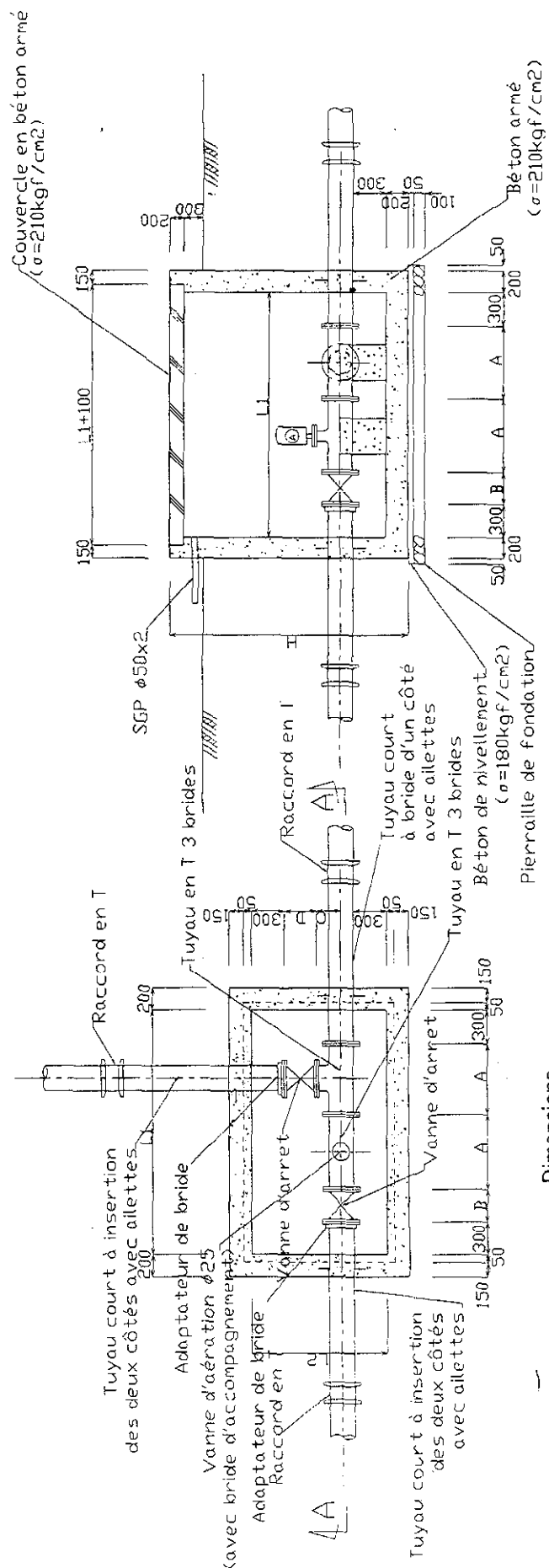
Section A-A

Section B-B



5. Plan standard d'enterrementdes canalisations de transport d'eau

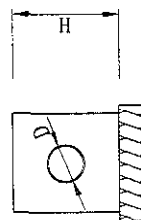
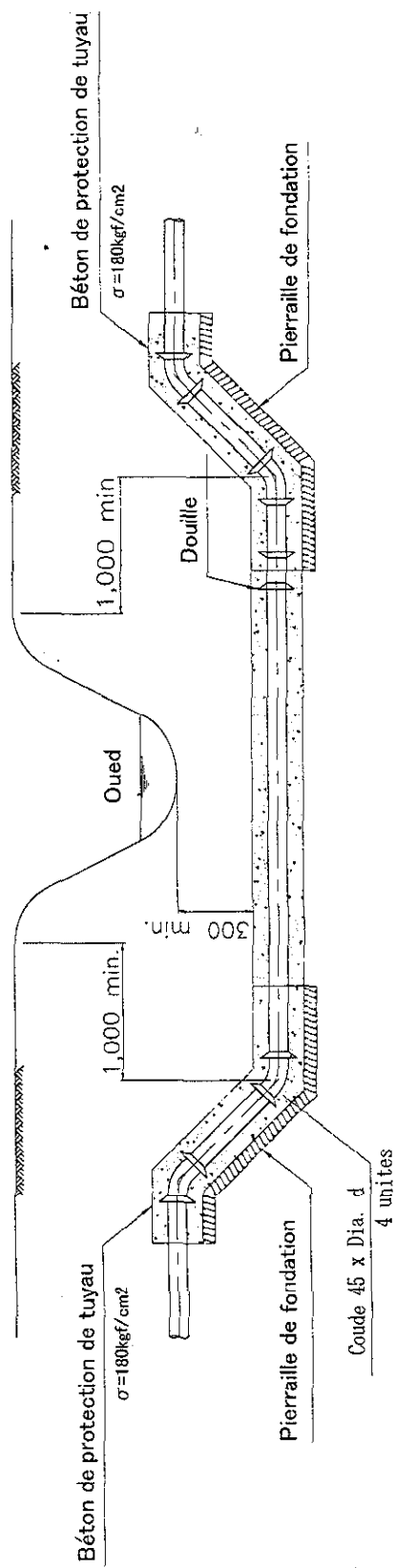
## Plan de masee



## Dimensions

| Diámetro  | A   | B   | C   | D   | L1   | L2   | H    | Type |
|-----------|-----|-----|-----|-----|------|------|------|------|
| φ 200x150 | 520 | 292 | 250 | 267 | 2000 | 1300 | 1800 | T-1  |
| φ 200x200 | 520 | 292 | 350 | 292 | 2050 | 1600 | 1900 | T-2  |
| φ 300x300 | 800 | 356 | 400 | 356 | 2600 | 1600 | 2000 | T-2  |

6. Structure de salle de ramification  
(avec vanne d'arrêt, vanne d'aération)

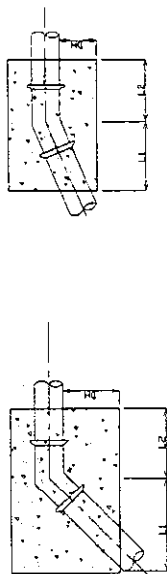


Dimensions

| D    | A    | H    | Type |
|------|------|------|------|
| φ150 | 0.55 | 0.65 | J    |
| φ150 | 0.55 | 0.65 | I    |
| φ200 | 0.70 | 0.85 | J    |
| φ200 | 0.60 | 0.75 | I    |
| φ250 | 0.85 | 1.00 | J    |
| φ250 | 0.65 | 0.80 | I    |
| φ300 | 1.00 | 1.15 | J    |
| φ300 | 0.70 | 0.85 | I    |

## 7. Structure d'ouvrage de traversée d'oued

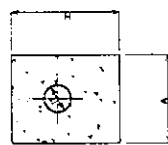
Béton de protection vertical orienté vers le haut (S-UB)



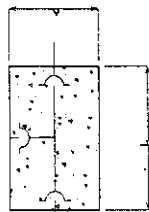
TYPE J

TYPE I

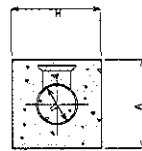
| D<br>(cm) | Angle   | Dépassement des parapets (cm) |      |      |      |      | Type |
|-----------|---------|-------------------------------|------|------|------|------|------|
|           |         | A                             | B    | C    | D    | E    |      |
| 150       | 11/14°  | 0,55                          | 0,55 | 0,50 | 0,55 | 0,18 | I    |
|           | 22/1/2° | 0,55                          | 0,55 | 0,50 | 0,45 | 0,18 |      |
|           | 45°     | 0,55                          | 0,55 | 0,50 | 0,50 | 0,28 |      |
|           | 90°     | 0,70                          | 0,70 | 0,70 | 0,65 | 0,19 |      |
| 200       | 11/14°  | 0,60                          | 0,65 | 0,55 | 0,50 | 0,24 | J    |
|           | 22/1/2° | 0,60                          | 0,65 | 0,55 | 0,50 | 0,24 |      |
|           | 45°     | 0,70                          | 0,85 | 0,65 | 0,60 | 0,44 |      |
|           | 90°     | 0,80                          | 1,10 | 0,40 | 0,80 | 0,60 |      |
| 250       | 11/14°  | 0,65                          | 0,70 | 0,60 | 0,55 | 0,24 | J    |
|           | 22/1/2° | 0,65                          | 0,70 | 0,60 | 0,55 | 0,24 |      |
|           | 45°     | 0,85                          | 1,00 | 0,70 | 0,55 | 0,54 |      |
|           | 90°     | 1,00                          | 1,80 | 0,55 | 0,90 | 0,74 |      |
| 300       | 11/14°  | 0,70                          | 0,70 | 0,75 | 0,75 | 0,19 | J    |
|           | 22/1/2° | 0,70                          | 0,70 | 0,75 | 0,75 | 0,19 |      |
|           | 45°     | 0,80                          | 0,80 | 0,85 | 0,85 | 0,34 |      |
|           | 90°     | 1,00                          | 1,15 | 0,80 | 0,75 | 0,64 |      |



Béton de protection de tuyau en T (S-1)



| D<br>(cm) | d<br>(cm) | Dépassement des parapets (cm) |      |      |      |      |
|-----------|-----------|-------------------------------|------|------|------|------|
|           |           | A                             | B    | C    | D    | E    |
| 150       | 73        | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 100       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 150       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 200       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
| 200       | 150       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 200       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 250       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 300       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
| 250       | 150       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 200       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 250       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 300       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
| 300       | 150       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 200       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 250       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 300       | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |



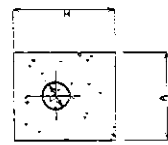
Béton de protection vertical orienté vers le bas (S-DB)



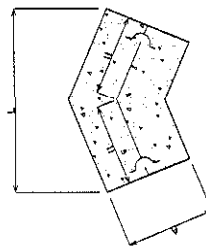
TYPE J

TYPE I

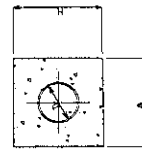
| D<br>(cm) | Angle   | Dépassement des parapets (cm) |      |      |      |      | Type |
|-----------|---------|-------------------------------|------|------|------|------|------|
|           |         | A                             | B    | C    | D    | E    |      |
| 150       | 11/14°  | 0,55                          | 0,55 | 0,50 | 0,55 | 0,18 | I    |
|           | 22/1/2° | 0,55                          | 0,55 | 0,50 | 0,55 | 0,18 |      |
|           | 45°     | 0,55                          | 0,55 | 0,50 | 0,50 | 0,28 |      |
|           | 90°     | 0,70                          | 0,70 | 0,70 | 0,65 | 0,19 |      |
| 200       | 11/14°  | 0,60                          | 0,65 | 0,55 | 0,50 | 0,24 | J    |
|           | 22/1/2° | 0,60                          | 0,65 | 0,55 | 0,50 | 0,24 |      |
|           | 45°     | 0,70                          | 0,85 | 0,65 | 0,60 | 0,44 |      |
|           | 90°     | 0,80                          | 1,10 | 0,40 | 0,80 | 0,60 |      |
| 250       | 11/14°  | 0,65                          | 0,70 | 0,60 | 0,55 | 0,24 | J    |
|           | 22/1/2° | 0,65                          | 0,70 | 0,60 | 0,55 | 0,24 |      |
|           | 45°     | 0,85                          | 1,00 | 0,70 | 0,55 | 0,54 |      |
|           | 90°     | 1,00                          | 1,80 | 0,55 | 0,90 | 0,74 |      |
| 300       | 11/14°  | 0,70                          | 0,70 | 0,75 | 0,75 | 0,19 | J    |
|           | 22/1/2° | 0,70                          | 0,70 | 0,75 | 0,75 | 0,19 |      |
|           | 45°     | 0,80                          | 0,80 | 0,85 | 0,85 | 0,34 |      |
|           | 90°     | 1,00                          | 1,15 | 0,80 | 0,75 | 0,64 |      |



Béton de protection de tuyau horizontal (S-HB)

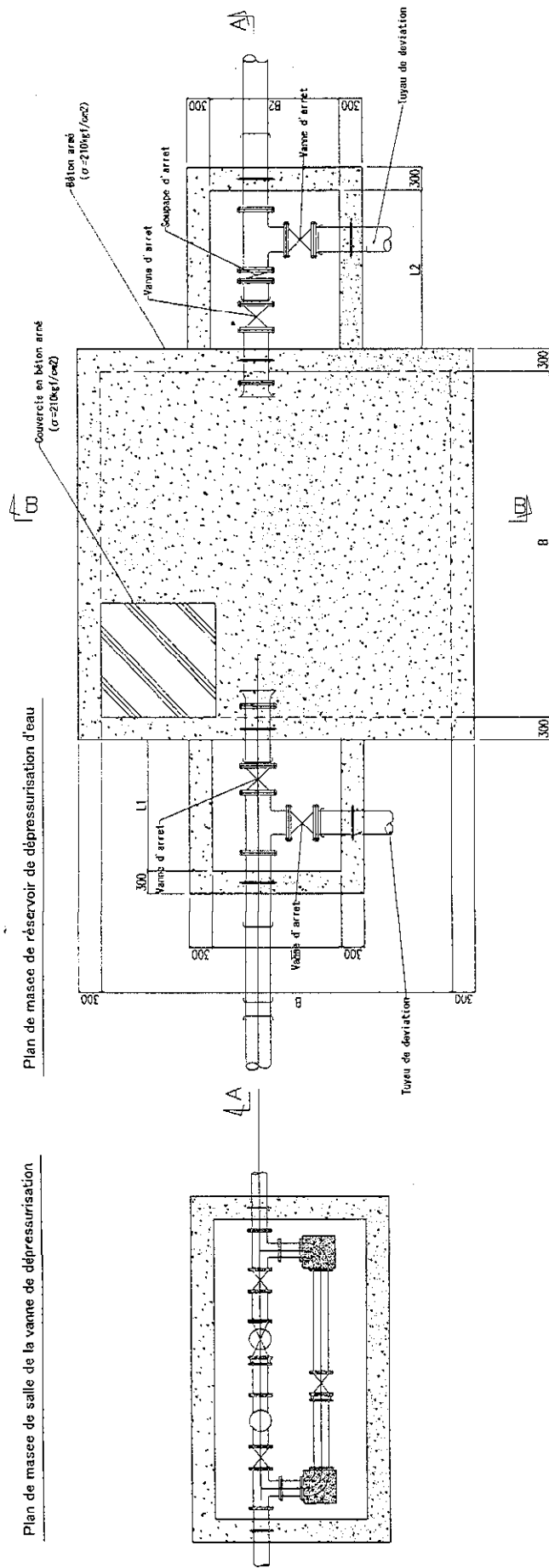


| D<br>(cm) | Angle   | Dépassement des parapets (cm) |      |      |      |      |
|-----------|---------|-------------------------------|------|------|------|------|
|           |         | A                             | B    | C    | D    | E    |
| 150       | 11/14°  | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 22/1/2° | 0,50                          | 0,50 | 0,50 | 0,45 | 0,18 |
|           | 45°     | 0,50                          | 0,50 | 0,50 | 0,45 | 0,28 |
|           | 90°     | 0,60                          | 0,60 | 0,60 | 0,55 | 0,19 |
| 200       | 11/14°  | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 22/1/2° | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 45°     | 0,50                          | 0,50 | 0,50 | 0,55 | 0,28 |
|           | 90°     | 0,70                          | 0,70 | 0,70 | 0,65 | 0,19 |
| 250       | 11/14°  | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 22/1/2° | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 45°     | 0,50                          | 0,50 | 0,50 | 0,55 | 0,28 |
|           | 90°     | 0,80                          | 0,80 | 0,80 | 0,75 | 0,19 |
| 300       | 11/14°  | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 22/1/2° | 0,50                          | 0,50 | 0,50 | 0,50 | 0,18 |
|           | 45°     | 0,50                          | 0,50 | 0,50 | 0,55 | 0,28 |
|           | 90°     | 0,90                          | 0,90 | 0,90 | 0,85 | 0,19 |



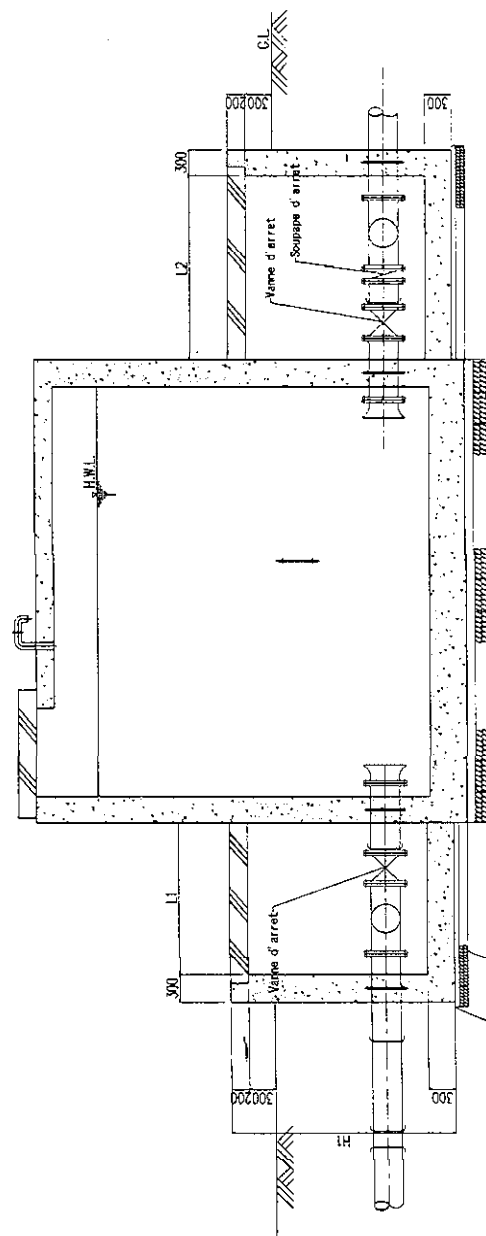
Plan de masse de salle de la vane de dépressurisation

Plan de masse de réservoir de dépressurisation d'eau



Section A-A

Section B-B



Dimensions

| Designation  | B (mm) | B1 (mm) | B2 (mm) | L1 (mm) | L2 (mm) | H (mm) | H.W.L (m) | Tuyau d'entrée (mm) | Tuyau découlement (mm) | Tuyau de dérivation (mm) | STA   |
|--------------|--------|---------|---------|---------|---------|--------|-----------|---------------------|------------------------|--------------------------|-------|
| GEGADA Amont | 4200   | 1500    | 1500    | 1300    | 3200    | 4700   | 133.0     | 200x2               | 300                    | 200                      | 7920  |
| GEGADA Aval  | 4600   | 1700    | 1700    | 1750    | 2100    | 4200   | 105.5     | 300                 | 300                    | 300                      | 13540 |
| PK20         | 3400   | 1700    | 1700    | 1750    | 2100    | 3500   | 173.0     | 300                 | 300                    | 300                      | 700   |

9. Structure du réservoir de dépressurisation d'eau

GEGADA(7500m)

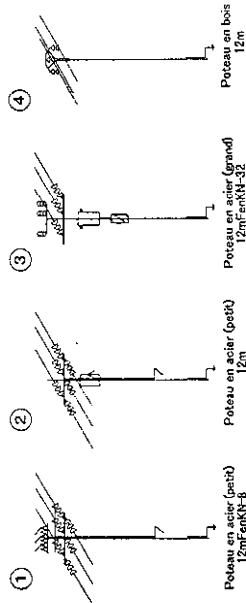
- Poteau en acier (grand)
- Poteau en acier
- Poteau en bois
- ⊗ Commutateur manuel (nouveau)
- ⊗ "
- ⊗ Transformateur
- ⊗ Paratonnerre

Plan de masse

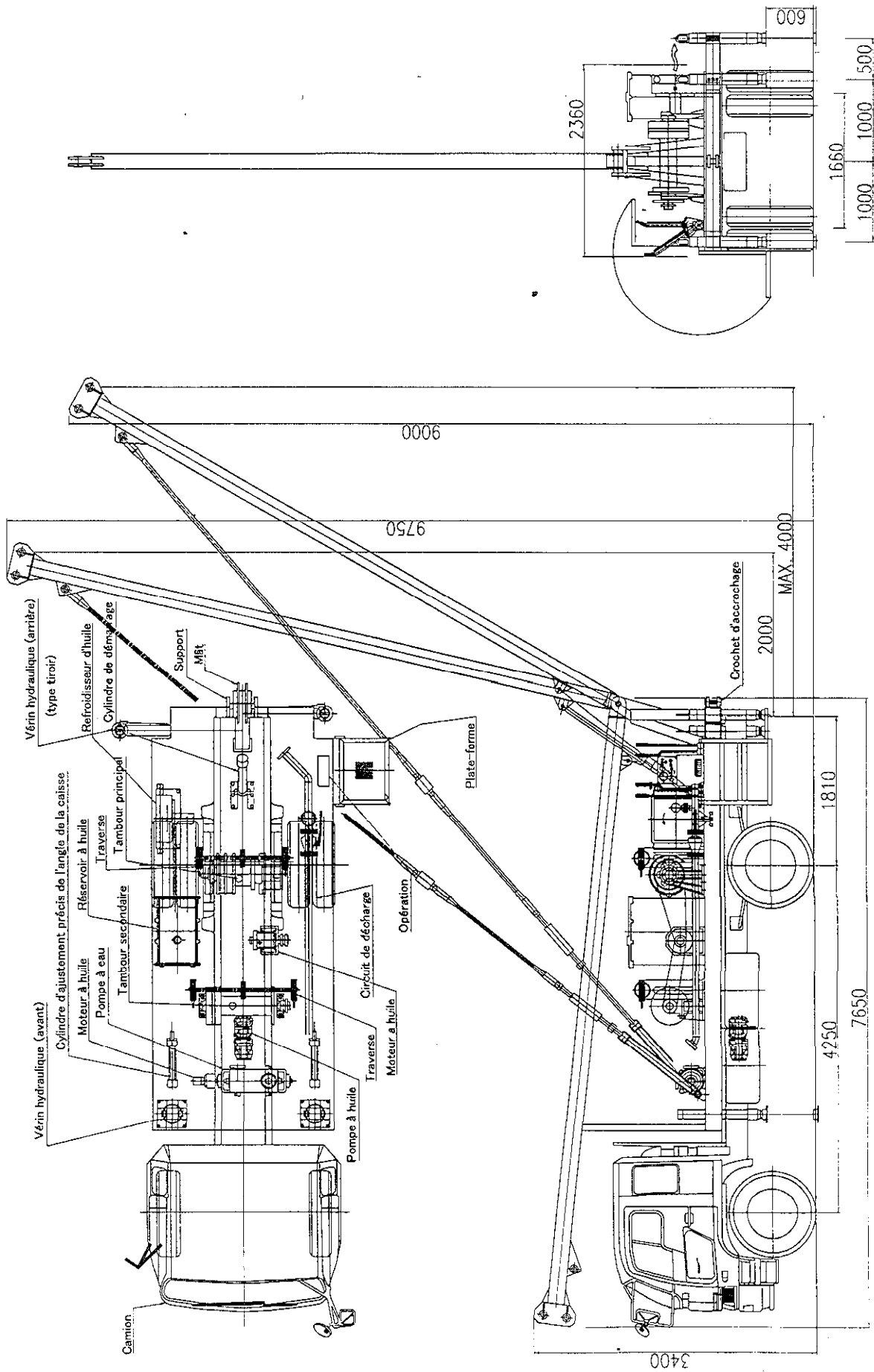


4720m

- Designation des assemblages et matériaux
1. Commutateur manuel
  2. Commutateur manuel (nouveau)
  3. Transformateur
  4. Transformateur secondaire
  5. Paratonnerre
  6. Bras de passage
  7. Isolant
  8. Mât à la terre



10. Disposition des installations de câblage électrique  
(zone de GEGADA)  
Echelle 1:10000



11. Equipement et matériaux à fournir  
(véhicule de gestion des forages)  
Echelle 1:50