

PROTECTION and DEVELOPMENT of the
ALBIAN-NEOCOMIAN
GROUNDWATER
as STRATEGIC RESOURCE for
DRINKING WATER



SUMMARY

- ***STRENGTHS of ALBIAN-NEOCOMIAN AS STRATEGIC RESOURCE FOR DRINKING WATER***
- ***THE WEAKNESSES***
- ***CONTRIBUTIONS OF MODELLING***
- ***TRANSCRIPTION INTO THE WATER MANAGMENT MASTER PLAN***
- ***ENHENCEMENT OF CONTROLS***

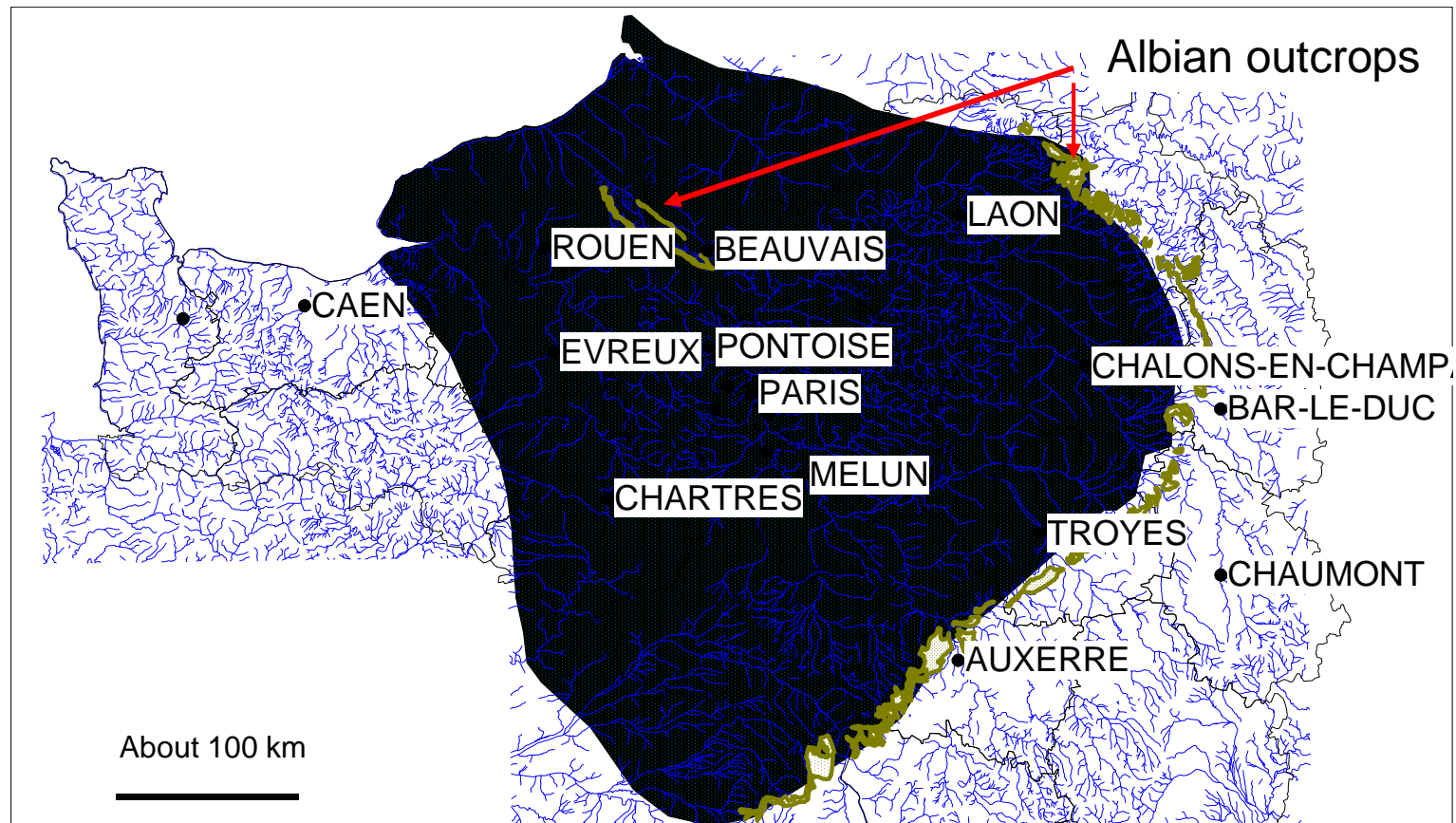


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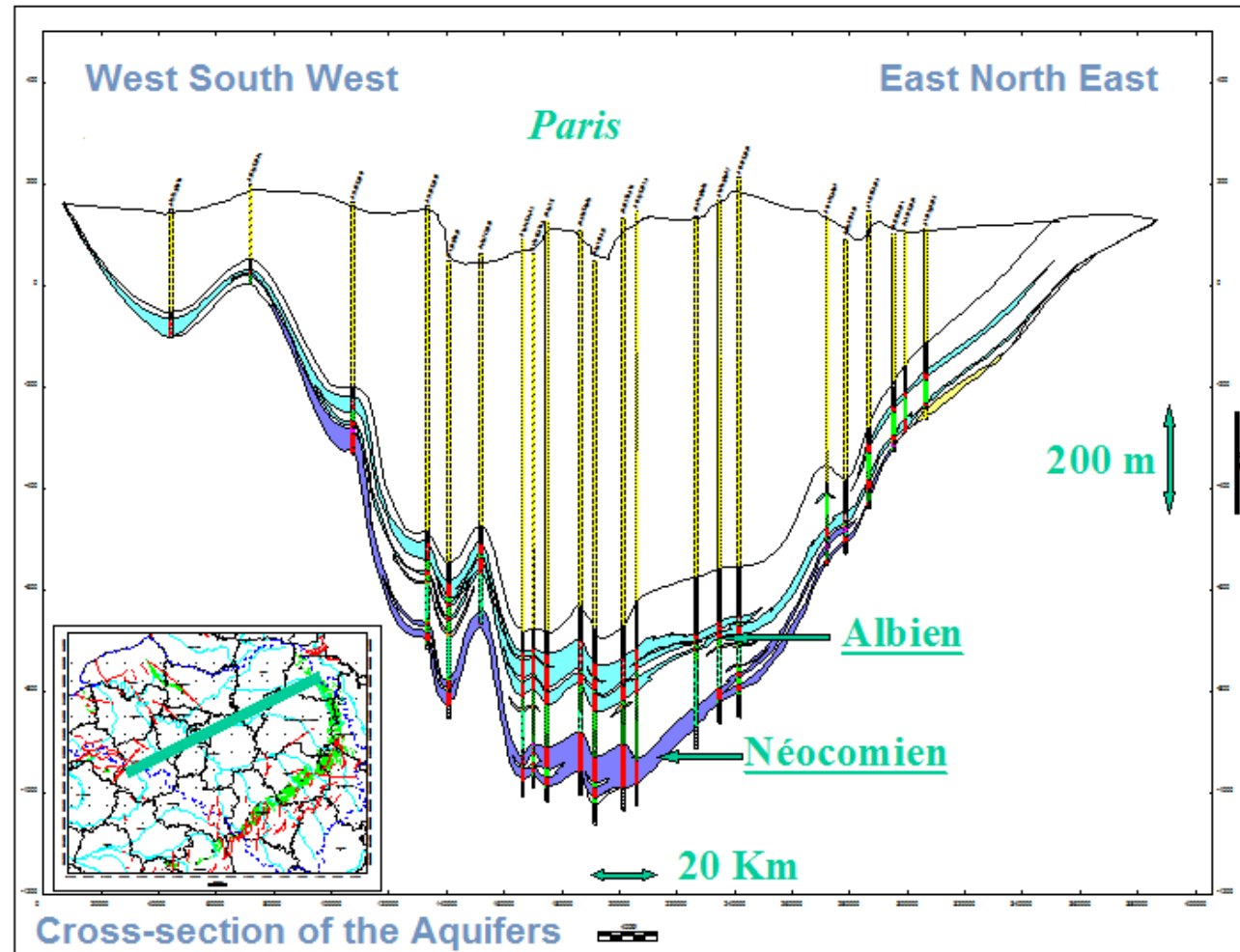


SCOPE AND OUTCROPS of the ALBIAN-NEOCOMIAN



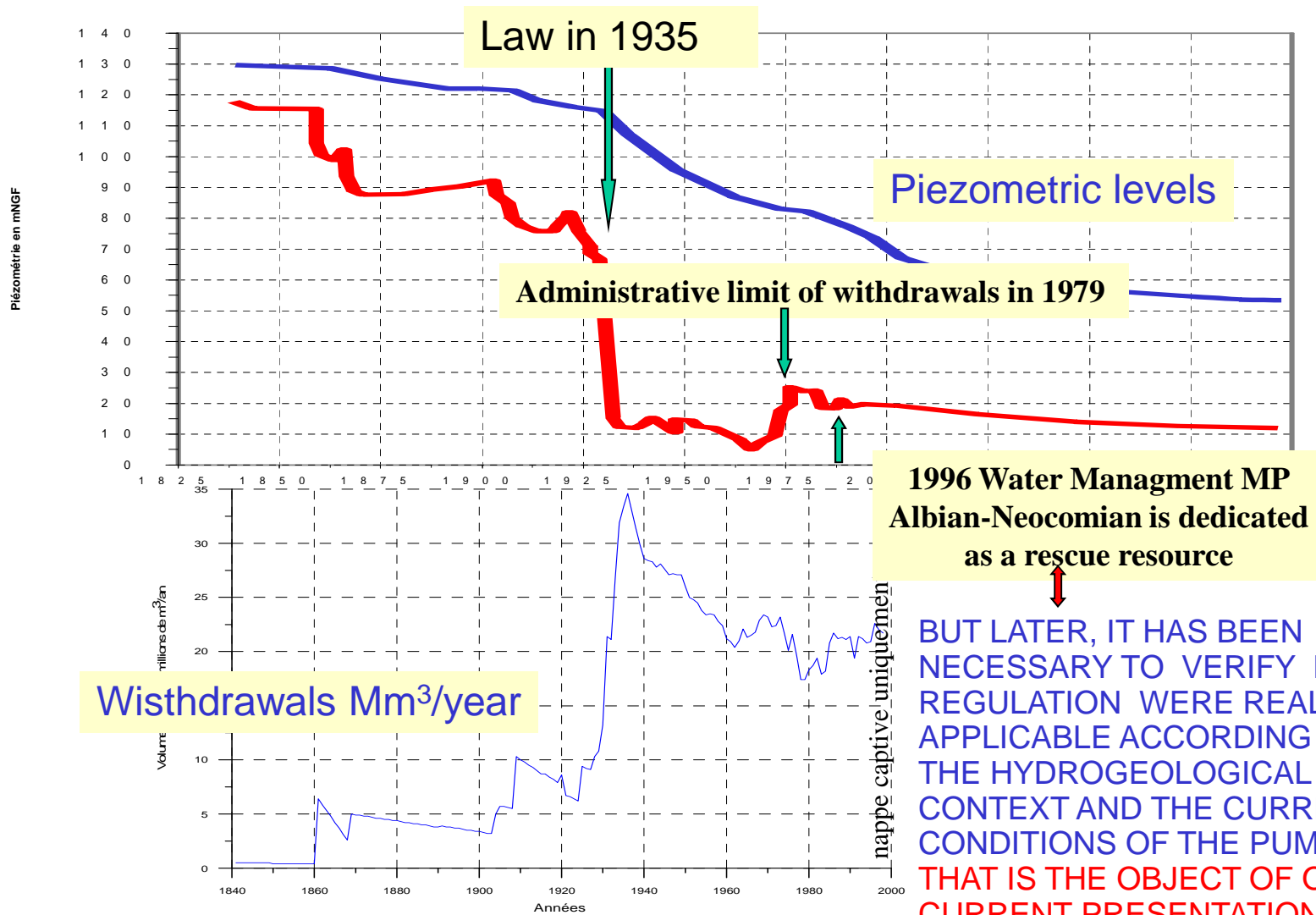
The large area may authorize many people potentially to have an access at the resource

GOOD PROTECTION AGAINST SURFACE POLLUTION



Remark: as we could see later, Albian and Neocomien aquifers are connected by leakage, thus, for more convenience, we often will orally use the Albian term for the 2 aquifers

HISTORICAL ADMINISTRATIVE PROTECTION OF THE ALBIAN GROUNDWATER

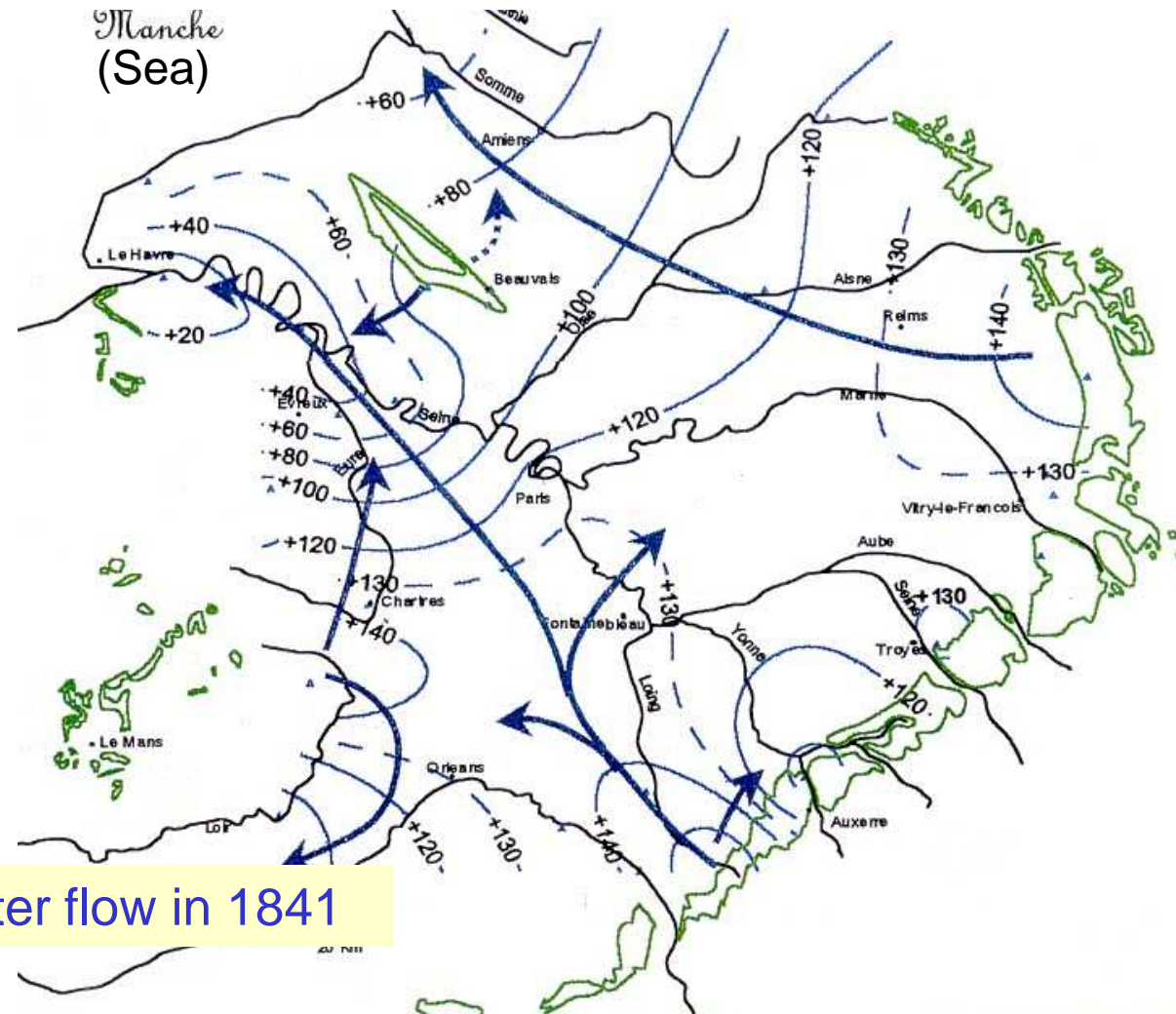


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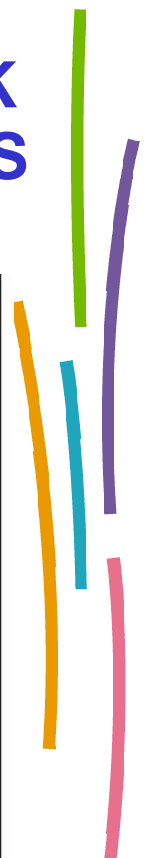
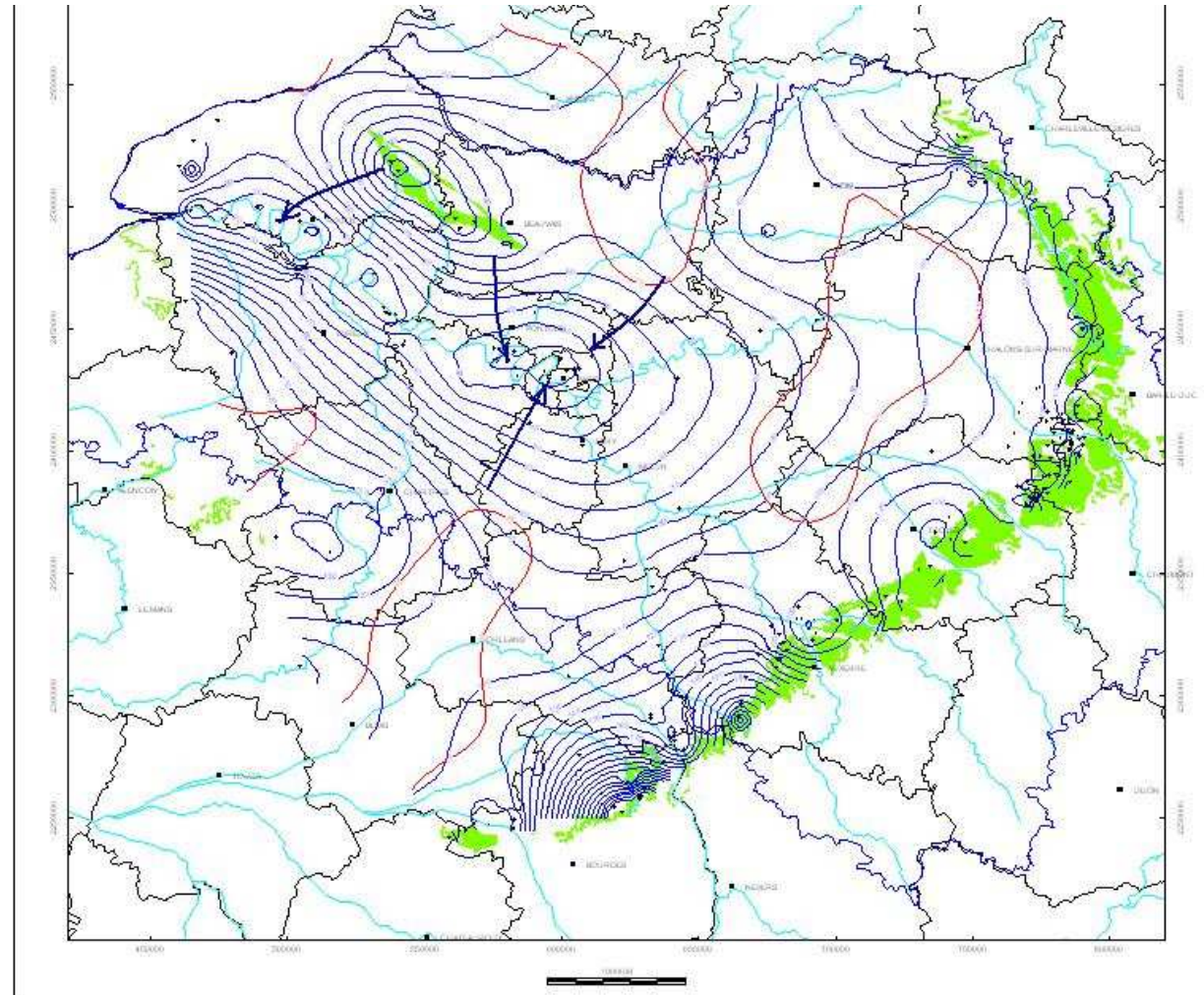
DESPITE OF A IMPORTANT STOCK OF GROUNDWATER, THERE IS A RELATIVELY WEAK FLUX IN COMPARISON OF POTENTIAL PUMPINGS



Groundwater flow in 1841

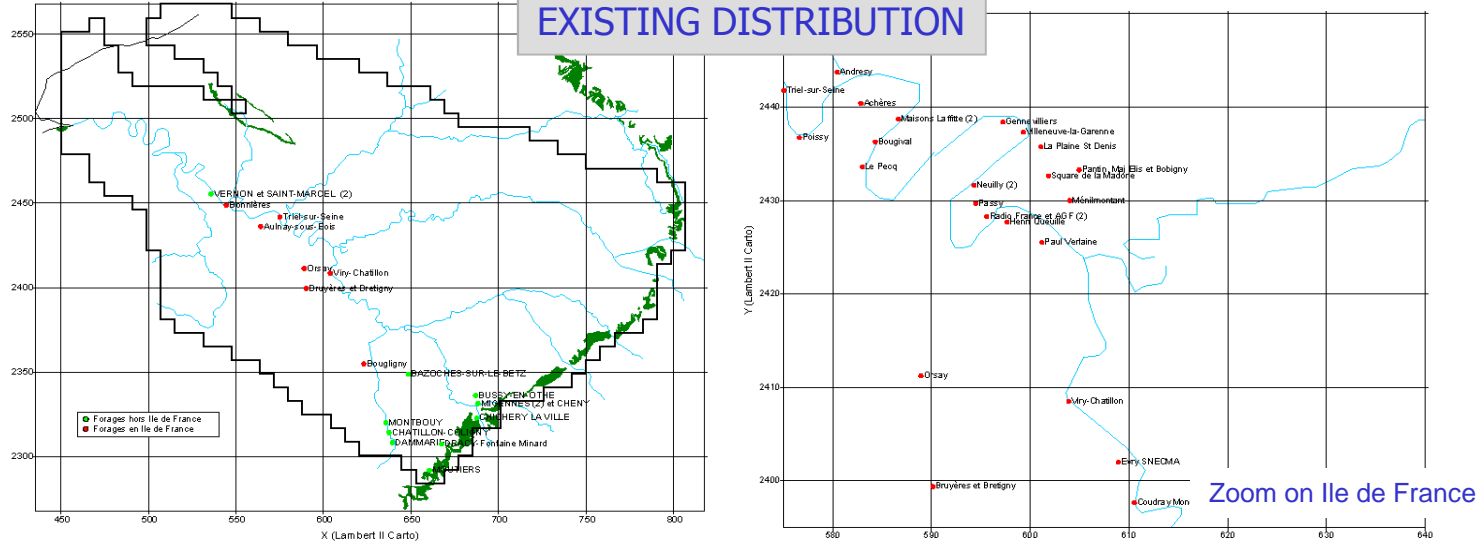
DESPITE OF A IMPORTANT STOCK OF GROUNDWATER , THERE IS A RELATIVELY WEAK FLUX IN COMPARISON OF POTENTIAL PUMPINGS

CURRENTLY, FLOWS CONVERGE TOWARDS PUMPING ZONES (SALTED WATER COULD INVADE THE AQUIFER LIMITS NEAR THE SEA)

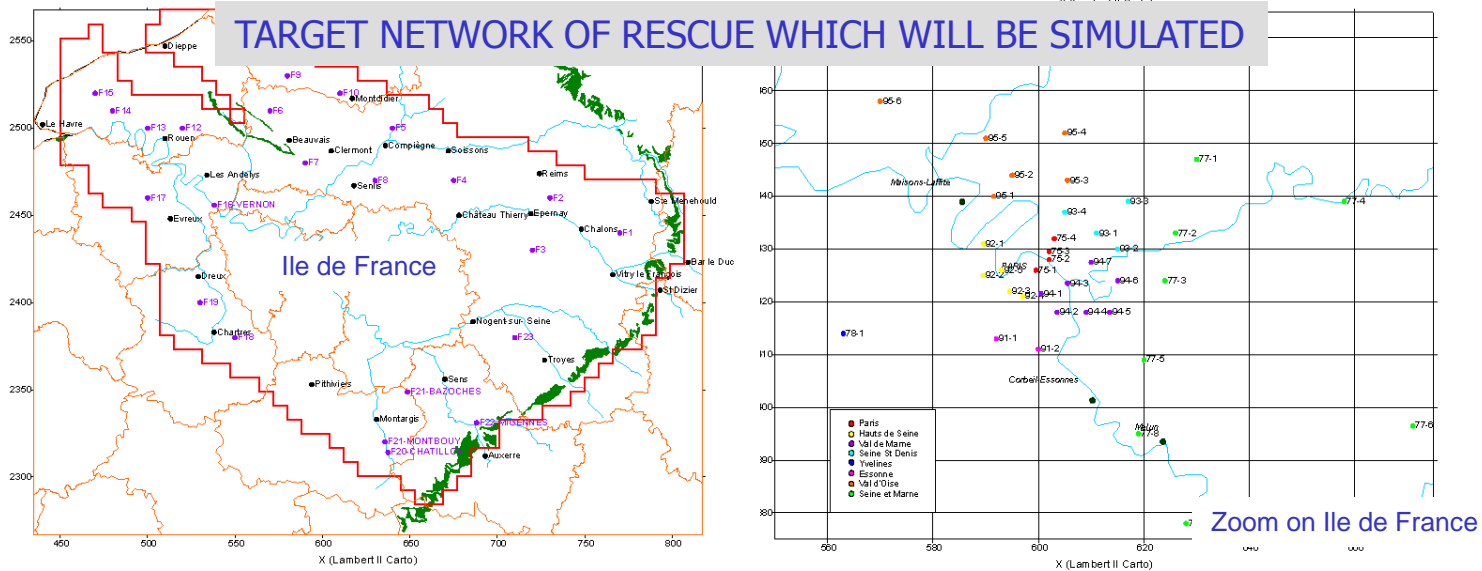


LACK OF AN OPTIMAL DISTRIBUTION OF RESCUE WELLS

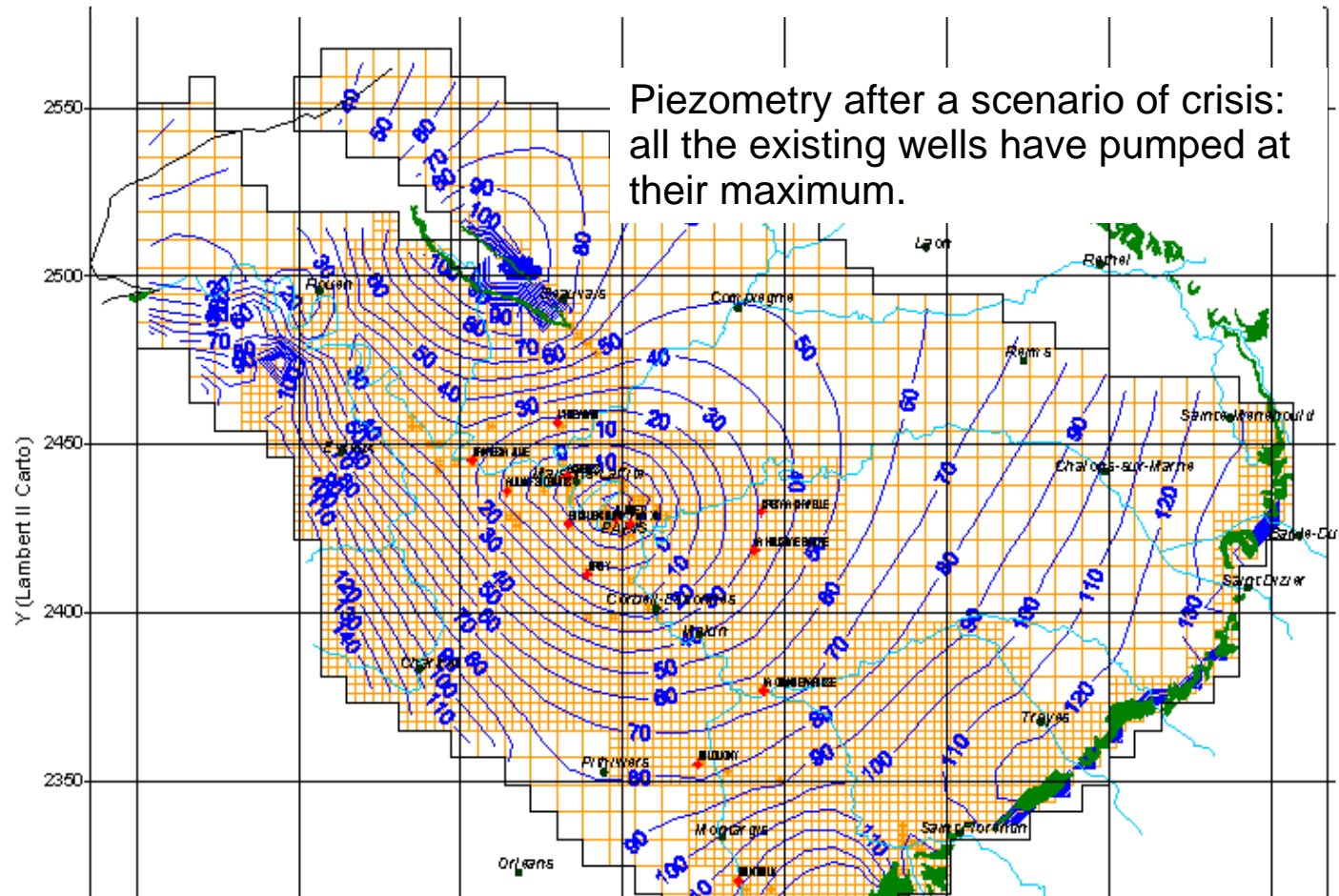
EXISTING DISTRIBUTION



TARGET NETWORK OF RESCUE WHICH WILL BE SIMULATED



INSUFFICIENT DEPTH OF THE EXISTING WELLS



Piezometry after a scenario of crisis: all the existing wells have pumped at their maximum.

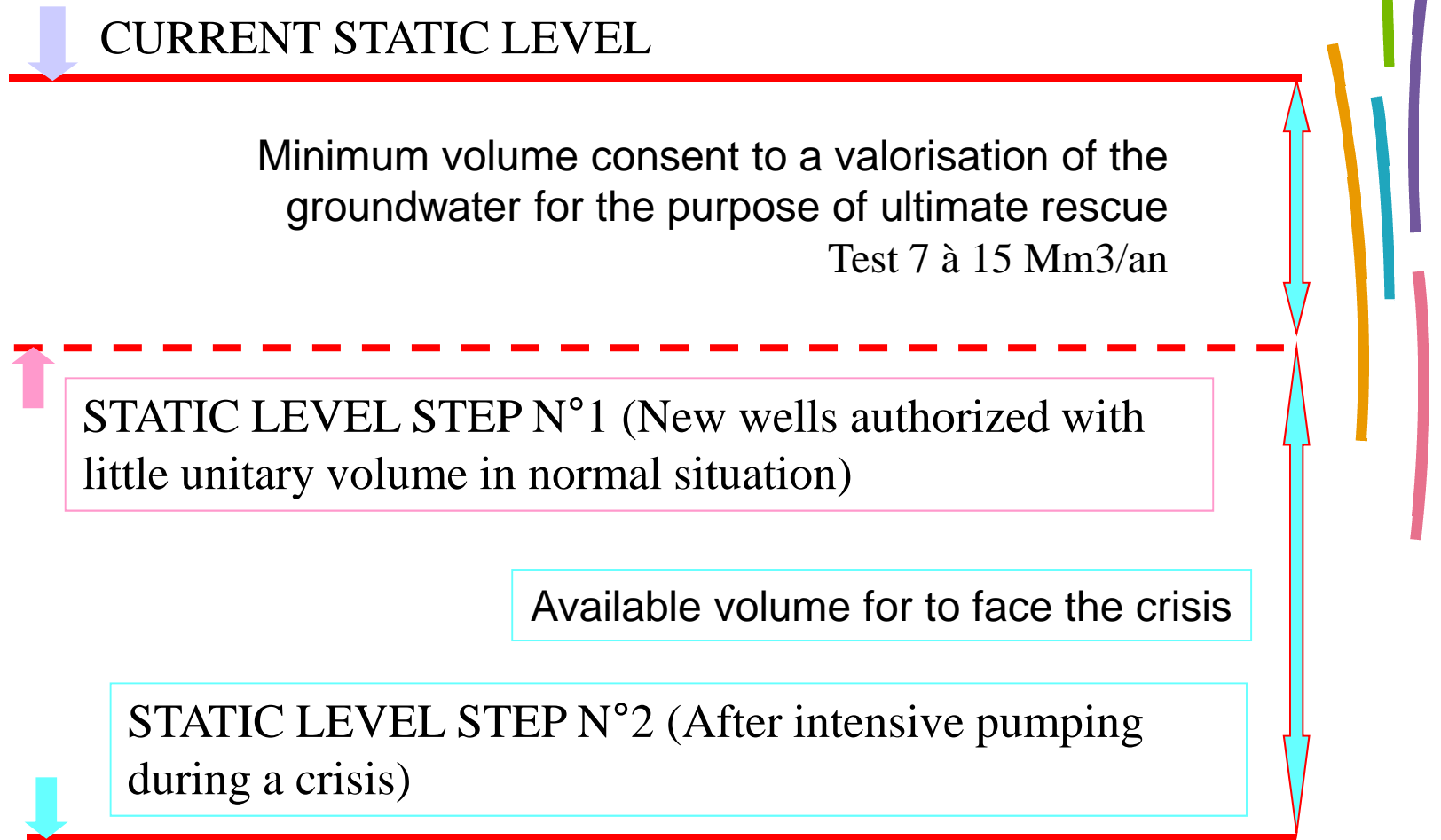
**CURRENTLY , IF A CRISIS WAS HAPPENING, THE MOST OF WELLS WOULD BE DRY AFTER FEW DAYS.
THUS, THE DEPTH OF THE PUMPS WILL HAVE TO BE ADAPTED FOR THE CRISIS SITUATION (WHICH WILL BE DEFINED THANKS TO THE MODELLING)**

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TEST THE OPERATION OF A RESOURCE MOBILIZATION IN TWO STAGES



VARIANTS TO BE STUDIED

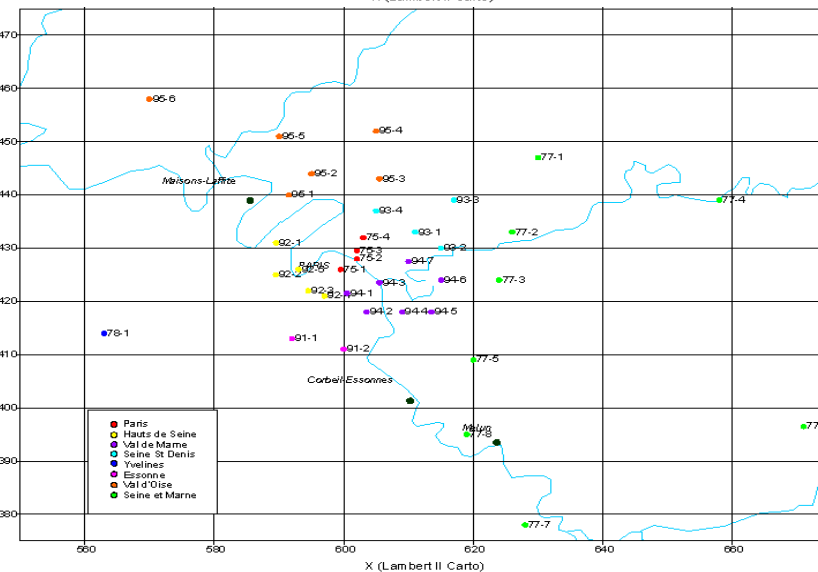
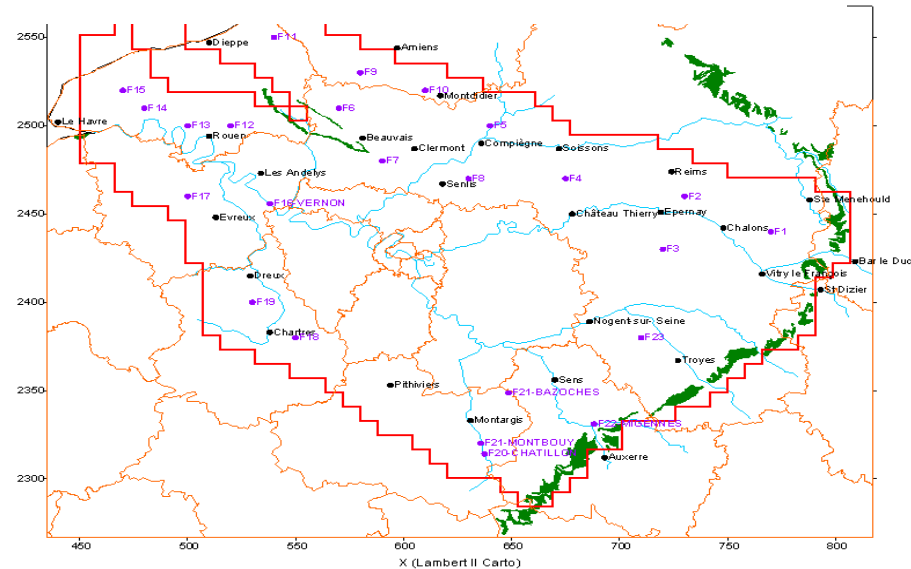
Density of Boreholes

The higher would be the density of boreholes, the easier could be the rescue distribution during a crisis.

Given that a pumping may approximately deliver a maximum of 150 m³/h, we have tested some different densities:

- 120000 habitants (easier)
- 180000 habitants (chosen)
- 240000 habitants (limit)

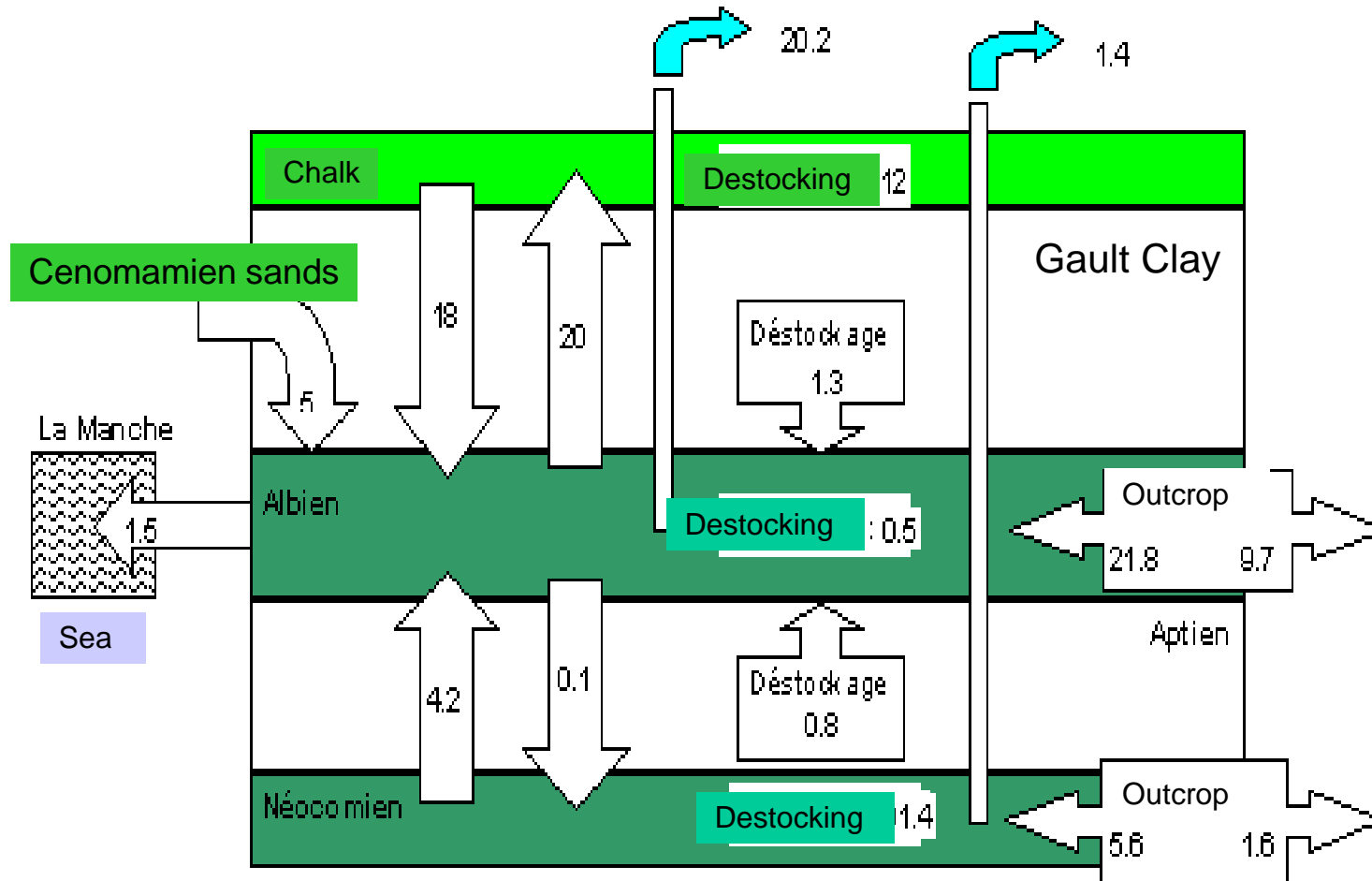
There is no difference on piezometric surface resulting from these 3 variants.



VARIANTS TO BE STUDIED

Which aquifer to be tap?

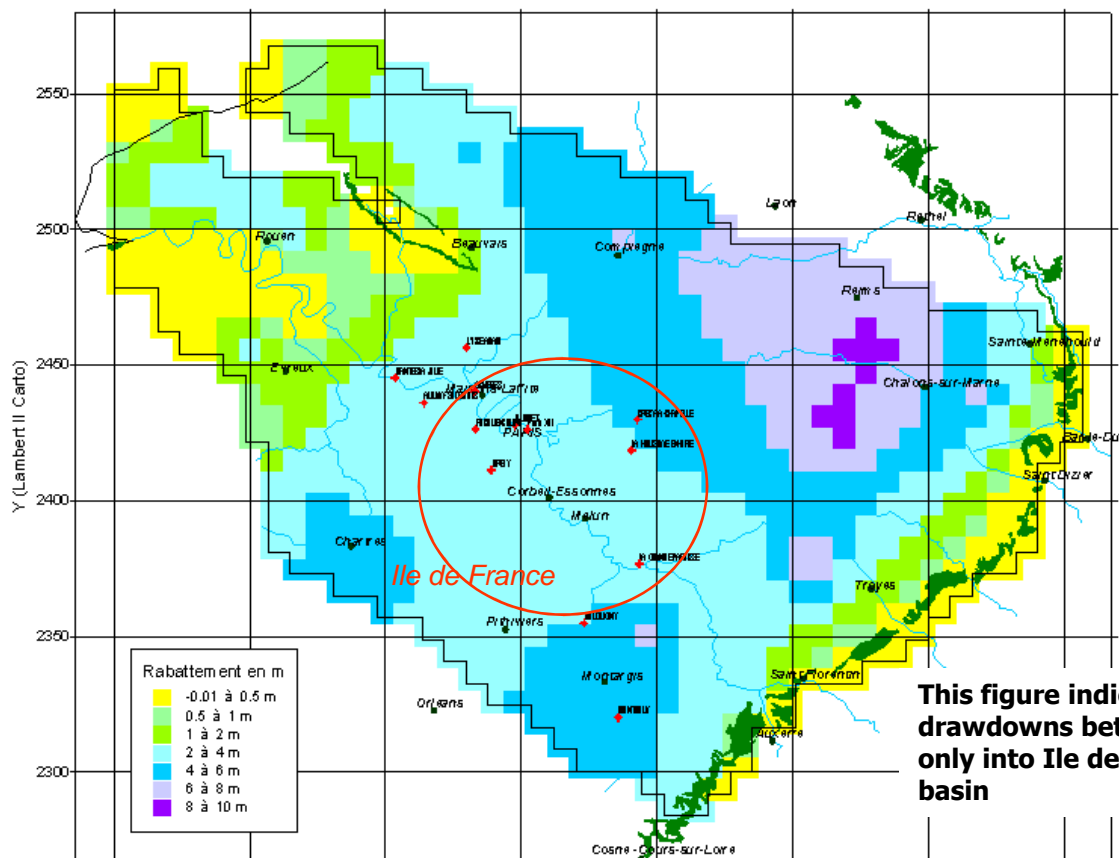
Is it useful to optimize a repartition of boreholes between Albian and Neocomian?



Modeling shows that it is better to tap Albian because of the ascendant leakage from Neocomien when pumping into Albian (Units=Mm³)

VARIANTS TO BE STUDIED

Must we regulate in the only central basin where problems occur (Ile de France) or throughout the entire basin?



This figure indicates little difference in drawdowns between normal pumpings only into Ile de France or throughout the basin

FOR TO BE WELL ACCEPTED BY USERS, A REGULATION THROUGHOUT THE BASIN IS BETTER THAN A LOCAL ONE. PUMPING AUTHORIZATIONS WILL BE ALLOWED PROPORTIONATELY TO THE NUMBER OF INHABITANTS LIVING IN THE DIFFERENT AREAS OF THE BASIN.

EVALUATION OF THE POSSIBILITY TO DEVELOP PUMPINGS IN NEW NORMAL SITUATION

↓ CURRENT STATIC LEVEL

Minimum volume consent to a valorisation of the groundwater for the purpose of ultimate rescue

Test 7 à 15 Mm³/an

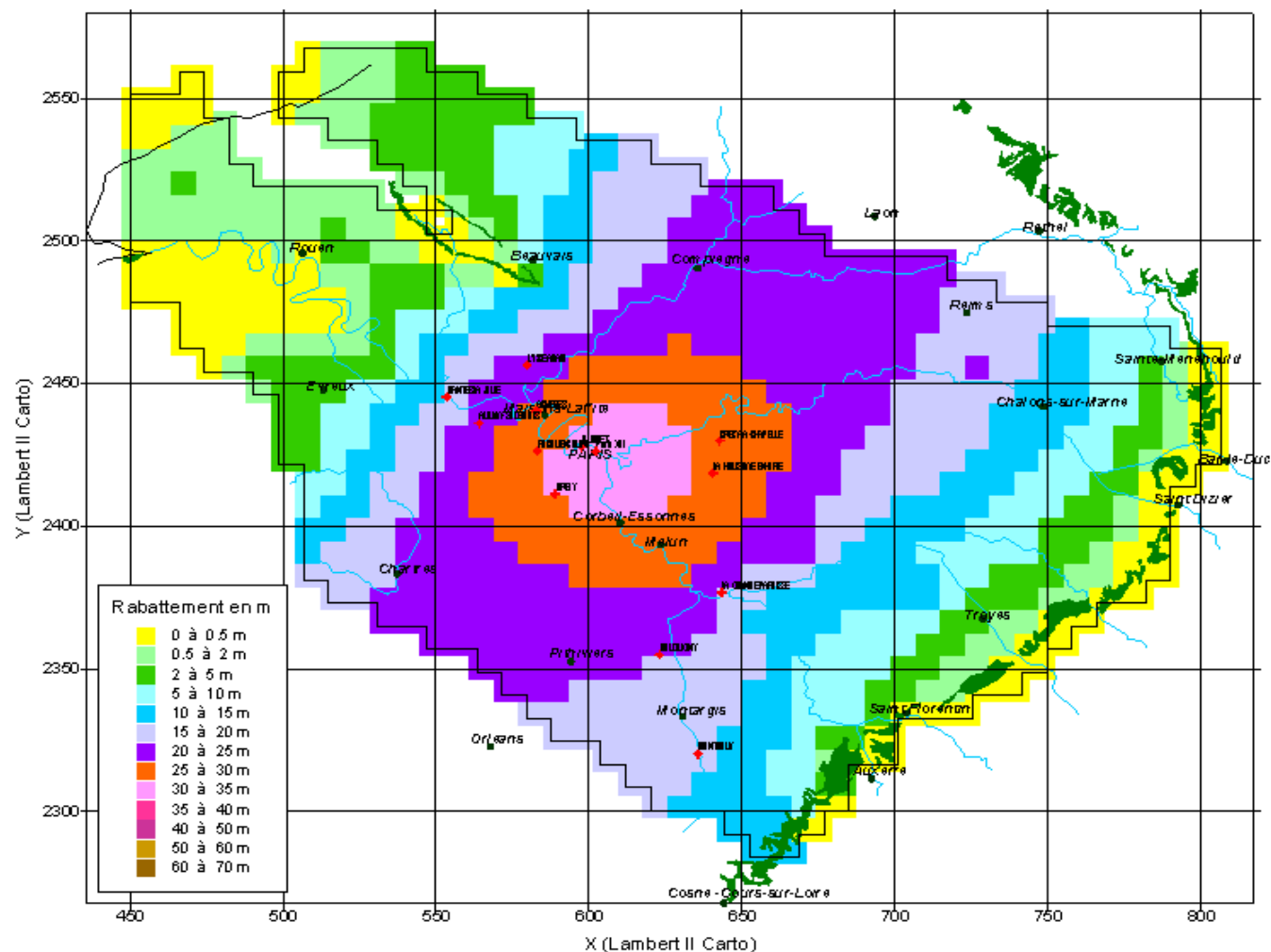
NEW NORMAL SITUATION WHAT PIEZOMETRIC LEVEL ?

↑
STATIC LEVEL STEP N°1 (New wells authorized with little unitary volume in normal situation)

Available volume for to face the crisis

↓
STATIC LEVEL STEP N°2 (After intensive pumping during a crisis)

EVALUATION OF THE POSSIBILITY TO DEVELOP PUMPINGS IN NEW NORMAL SITUATION



This map indicates that THE DIFFERENCE OF PIEZOMETRY BETWEEN THE CURRENT SITUATION AND THE NEW SITUATION WITH NEW BOREHOLES AND MODERATE PUMPINGS (+7,5 Mm³) MAY BE ACCEPTABLE FOR THE EXISTING USERS

EVALUATION OF THE POSSIBILITY TO FACE THE CRISIS

↓ CURRENT STATIC LEVEL

Minimum volume consent to a valorization of the groundwater for the purpose of ultimate rescue
Test 7 à 15
Mm³/an

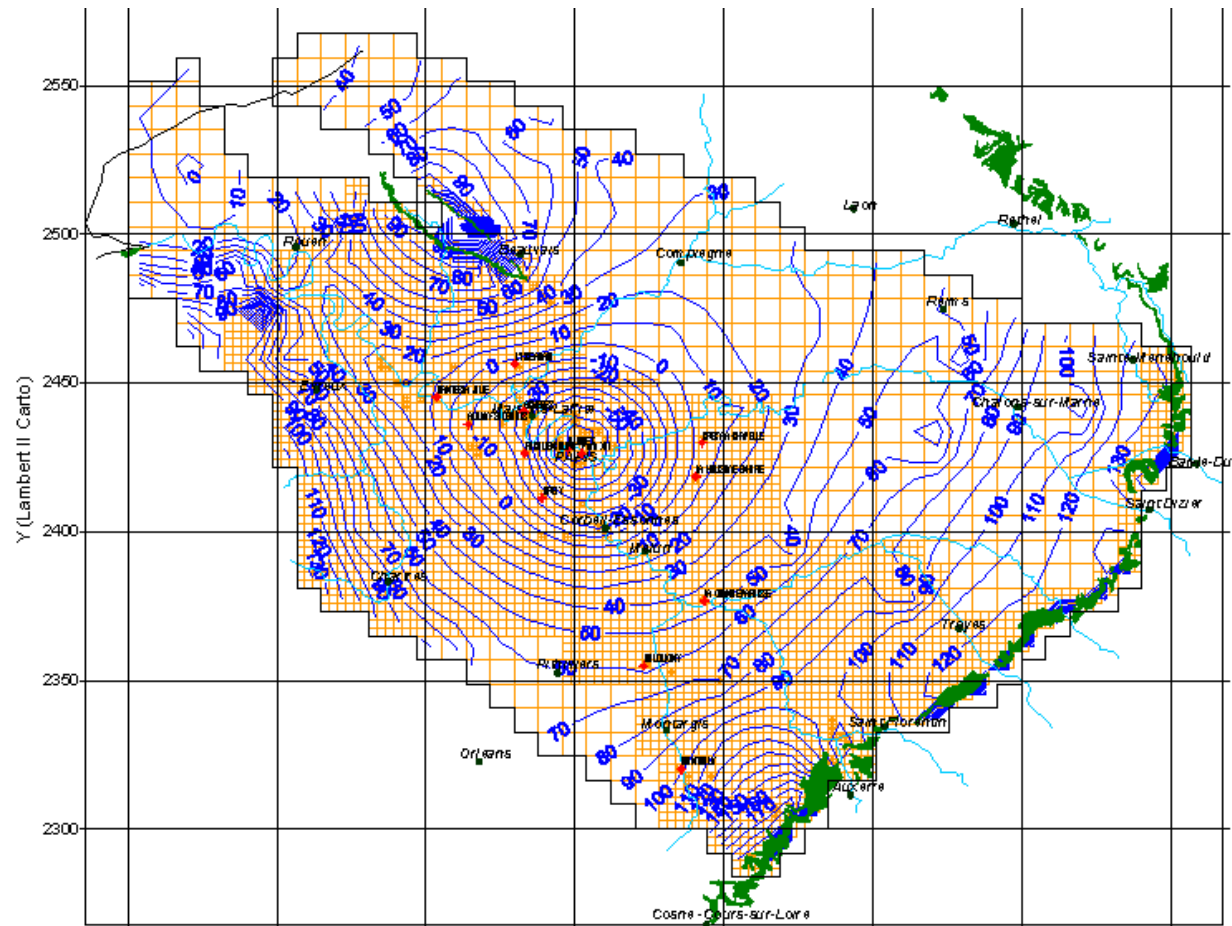
↑ STATIC LEVEL STEP N°1 (New wells authorized with little unitary volume in normal situation)

Available volume for to face the crisis

↓ STATIC LEVEL AFTER INTENSIVE PUMPING DURING A CRISIS STEP N°2

END OF THE CRISIS SITUATION WHAT PIEZOMETRIC LEVEL ?

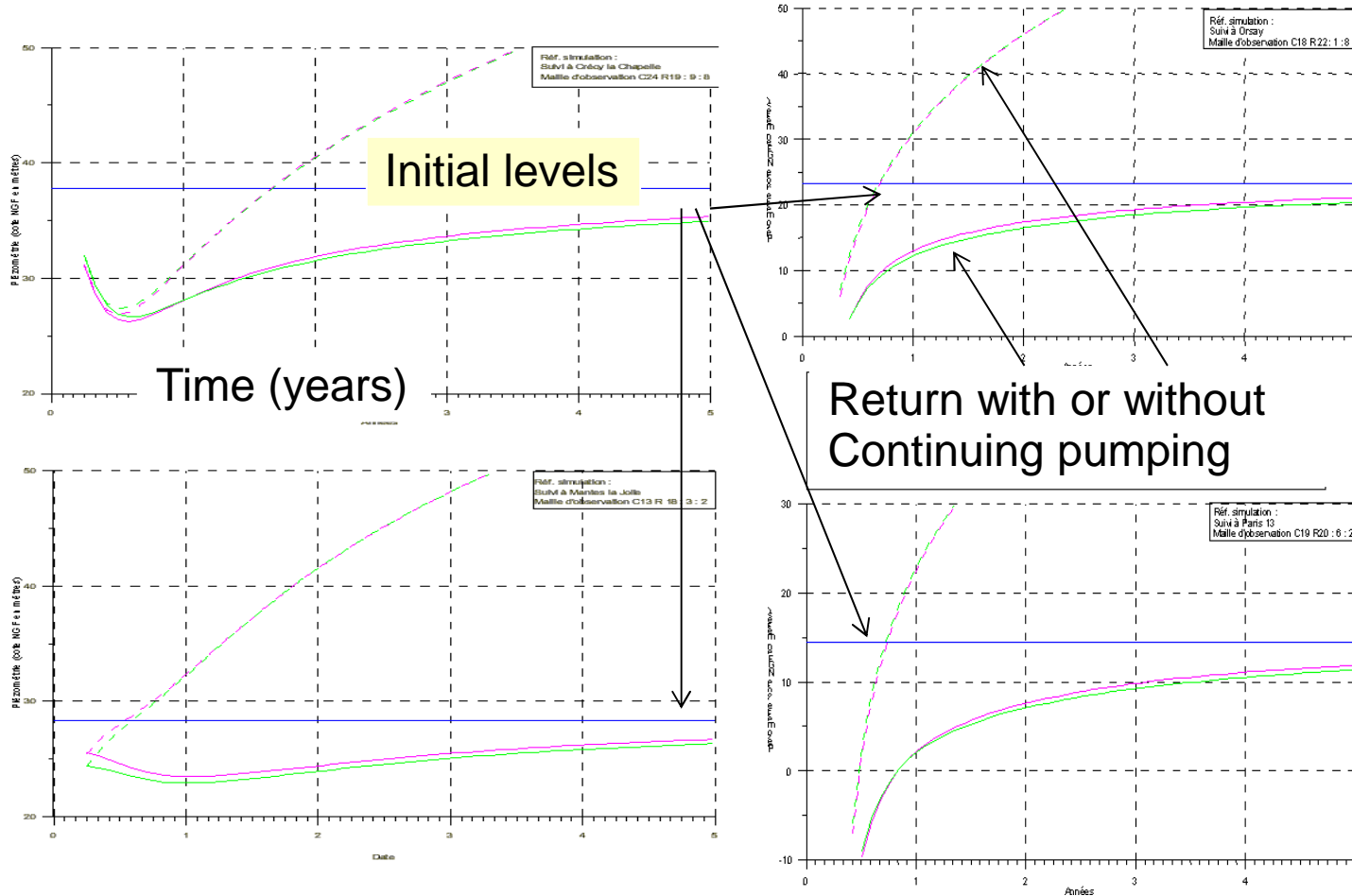
EVALUATION OF THE POSSIBILITY TO FACE THE CRISIS



This PIEZOMETRIC MAP INDICATES THE PIEZOMETRY AT THE END OF A SIMULATED CRISIS (DELIVERY 20L/INHABITANT/DAY FOR ABOUT 15 MILLIONS PERSONS DURING 3 MONTHS)

**THIS SITUATION HAS BEEN JUDGED ACCEPTABLE.
THE DEPTH OF THE PUMPS WILL HAVE TO BE ADAPTED FOR THE CRISIS SITUATION**

EVALUATION OF THE POSSIBILITY FOR THE GROUNDWATER LEVEL TO RETURN AT THE INITIAL STATE AFTER THE CRISIS



THE RETURNING TO THE EQUILIBRIUM AFTER A CRISIS DEPENDS ON:

- THE PLACE CONSIDERED
- THE POLICY HELD: CONTINUING THE PUMPINGS OR NOT

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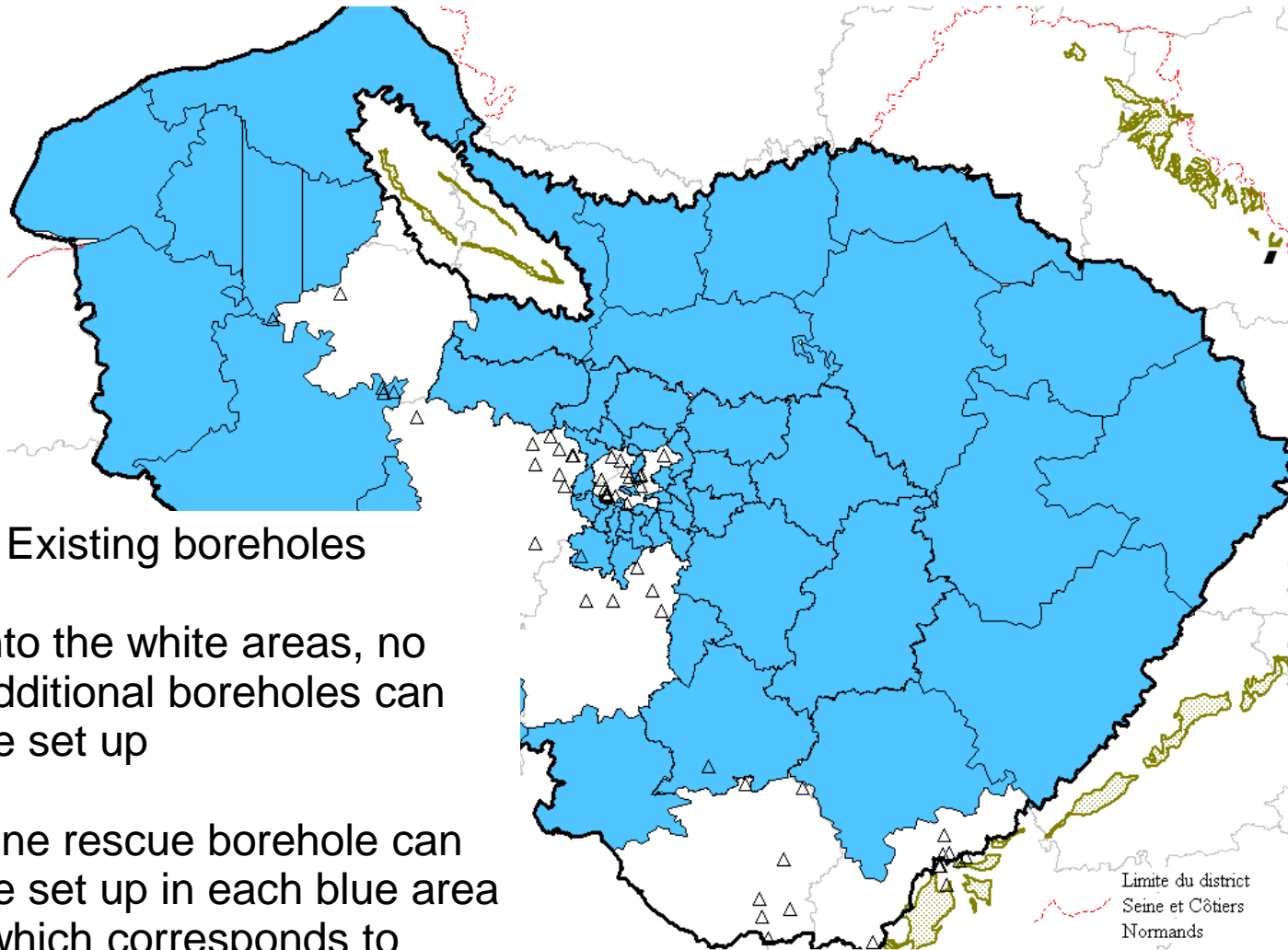


THE RESULTS OF REFLEXIONS AND MODELLINGS HAVE BEEN TRADUCT IN THE WATER MANAGMENT PLAN

THE WMMP:

- Confirms the Albian-Neocomian aquifers as a strategic resource for rescue water supply in the basin
- Limits the maximum withdrawal volume for the two aquifers and for all the basin at 29 millions m³/year
- Organizes the spatial and temporal management of withdrawals during normal and crisis times

WATER MANAGEMENT PLAN OUTLINE AND REGULATION ABOUT ALBIAN-NEOCOMIAN



WATER MANAGEMENT PLAN

REPARTITION OF THE ALLOWABLE VOLUMES IN THE DEPARTMENTS

DEPARTMENT	CURRENT VOLUME	ADDITIONNAL ALLOWABLE VOLUMES	TOTAL VOLUME (m ³ /year)
PARIS (75)	225 000	515 000	740 000
SEINE-ET-MARNE (77)	174 000	853 000	1 027 000
YVELINES (78)	8 010 000	119 000	8 129 000
ESSONNE (91)	3 552 000	257 000	3 809 000
HAUTS-DE-SEINE (92)	3 866 000	892 000	4 758 000
SEINE-SAINT-DENIS (93)	3 453 000	386 000	3 839 000
VAL DE MARNE (94)	0	877 000	877 000
VAL D'OISE (95)	0	790 000	790 000
EURE ET LOIR (28)	0	291 000	291 000
LOIRET (45)	1 110 000	41 000	1 151 000
YONNE (89)	1 249 000	74 000	1 323 000
AUBE (10)	0	187 000	187 000
MARNE (51)	0	404 000	404 000
AISNE (02)	0	121 000	121 000
OISE (60)	0	548 000	548 000
EURE (27)	496 000	259 000	755 000
SEINE MARITIME (76)	76 000	309 000	385 000
Totaux arrondis	22 000 000	7 000 000	29 000 000

PUMPING AUTHORIZATIONS ARE ALLOWED PROPORTIONATELY TO THE NUMBER OF INHABITANTS LIVING IN THE DIFFERENT AREAS OF THE BASIN

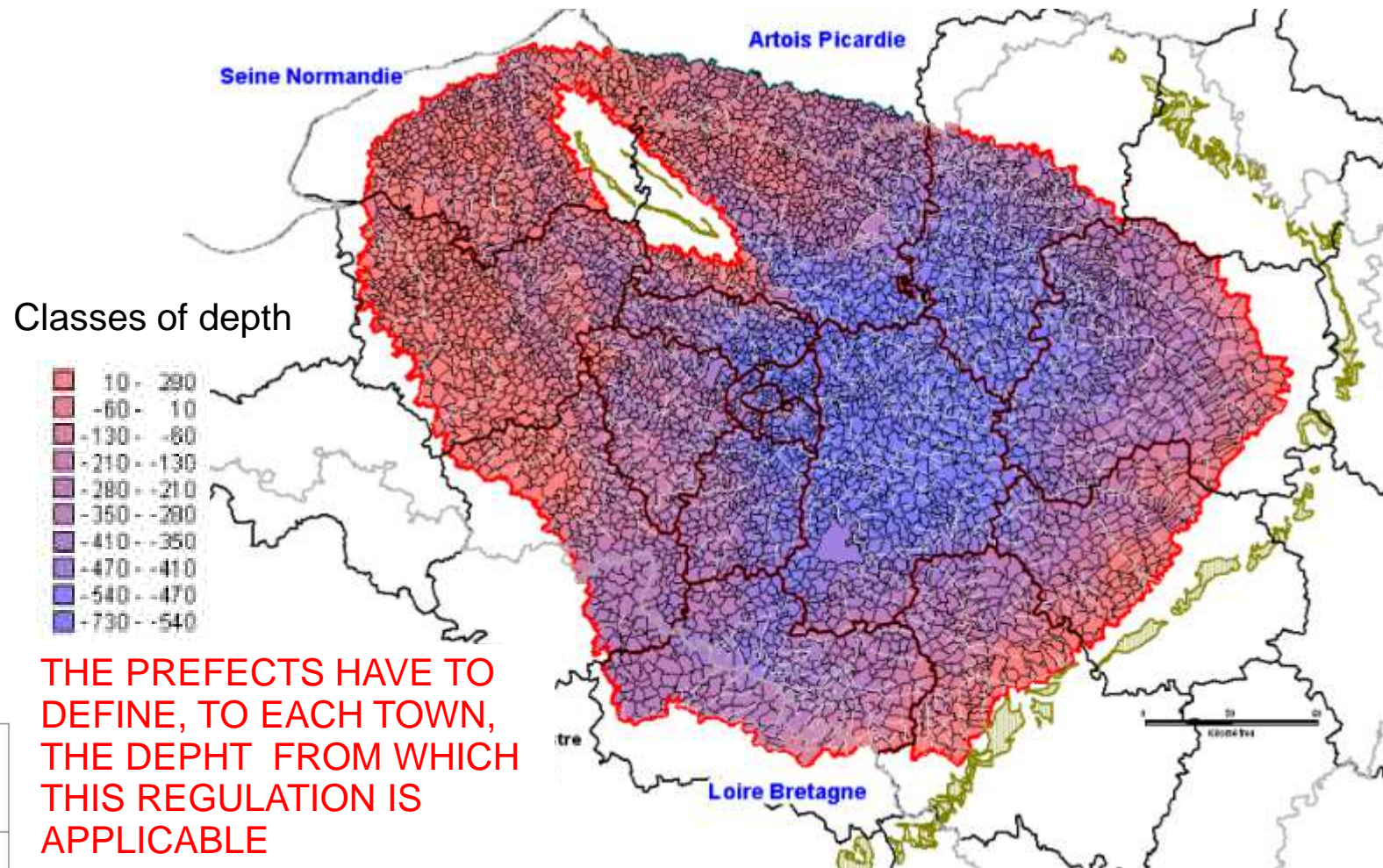
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ENHANCEMENT OF CONTROLS

IN ADDITION OF THE WMP, THE ALBIAN-NEOCOMIAN IS ADDED TO THE FRENCH AREAS INSIDE WHICH AUTHORIZATIONS ARE OBLIGATORY AS SOON AS THE THRESHOLDS OF 8 M³/H IS REACHED



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THANK YOU FOR YOUR ATTENTION