DIAGNÓSTICO GEOAMBIENTAL

TERMINAL BARRA DO RIACHO – PLANGAS

SET/2007

GEORADAR

TERMINAL BARRA DO RIACHO
LOCALIZAÇÃO

LEGENDA

- Companhia Aracruz Celulose
- Portocel
- Barra do Riacho
- Bacias de Resfriamento
- Área de Estudo



FIGURA 01

GEORADAR

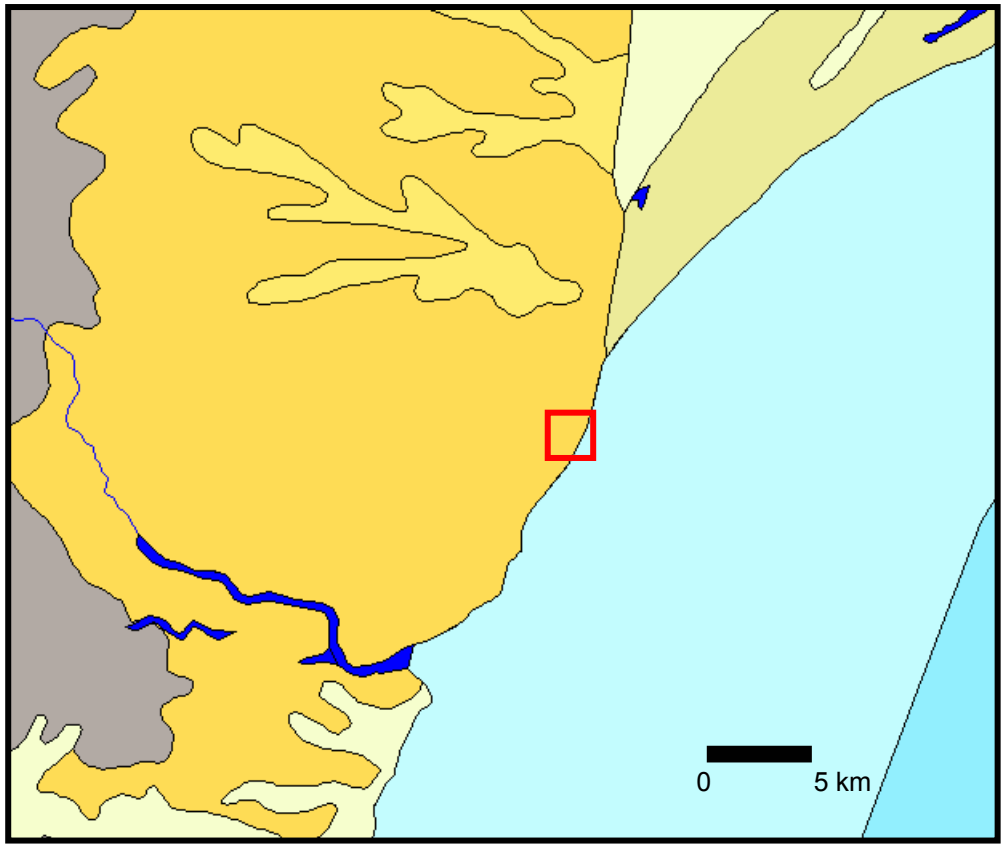
TERMINAL BARRA DO RIACHO
LOCALIZAÇÃO DA ÁREA



FIGURA 02

LEGENDA

- Quaternário
  - Coberturas Detríticas
  - Depósitos Litorâneos
  - Depósitos Colúvio – Aluvionares
- Oligoceno
  - Sedimentos Grupo Barreiras
- Neoproterozóico
  - Complexo Paraíba do Sul
- Área Estudada



Fonte: CPRM 2004

FIGURA 03



Aquisição SEVME



Aquisição SEVME

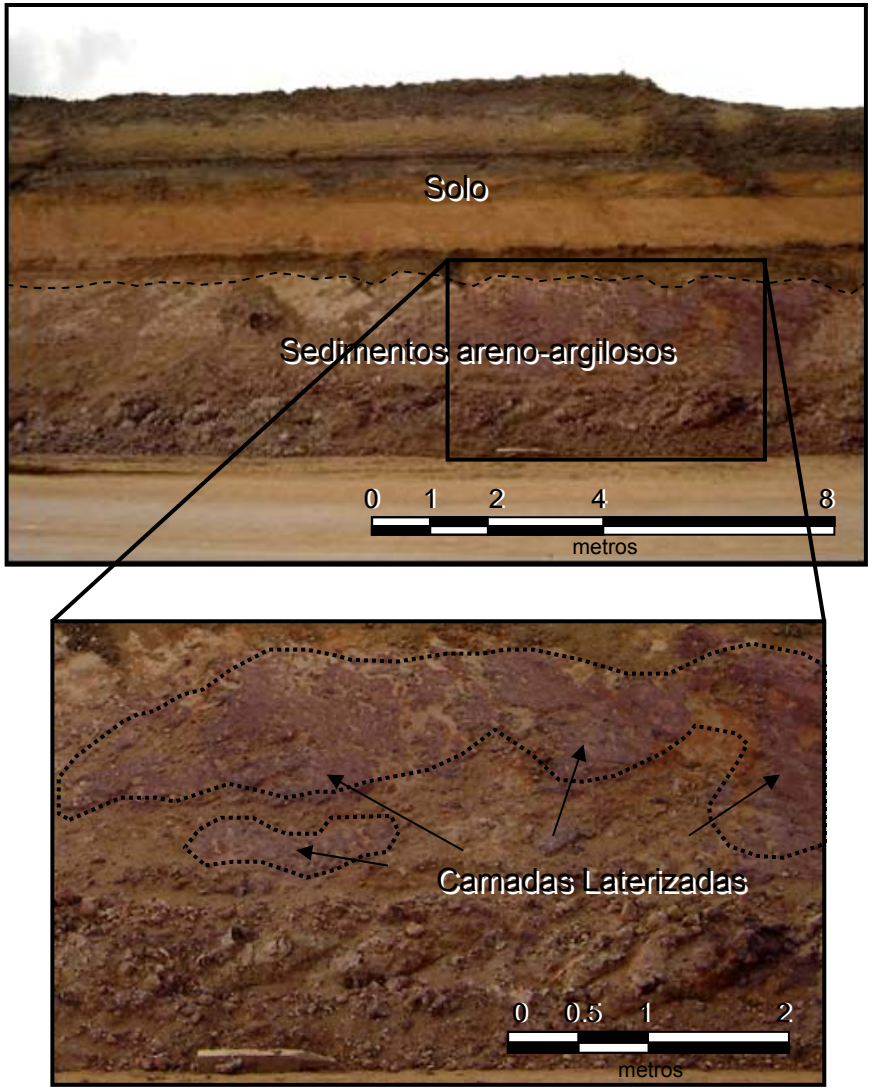


Amostragem


Operação da Perfuratriz

GEORADAR

TERMINAL BARRA DO RIACHO
GEOLOGIA LOCAL
FOTOS DE AFLORAMENTOS



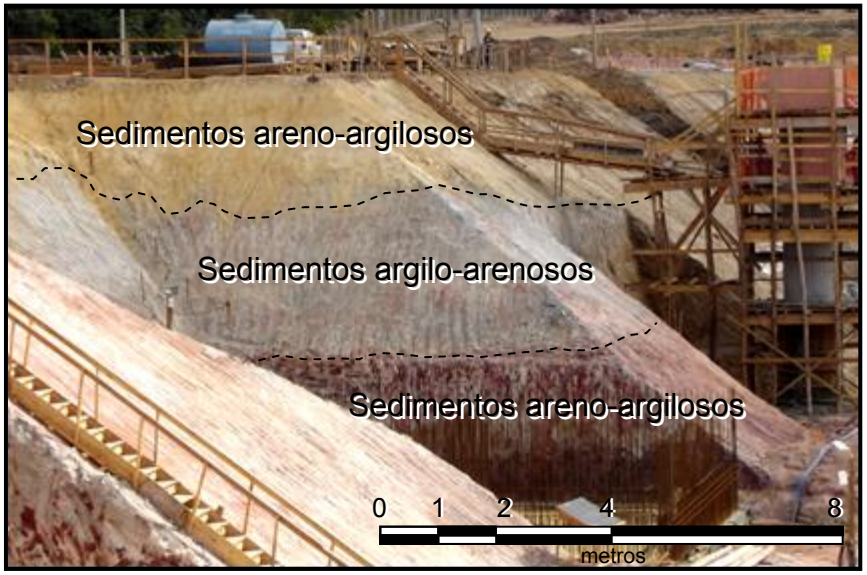


FIGURA 06

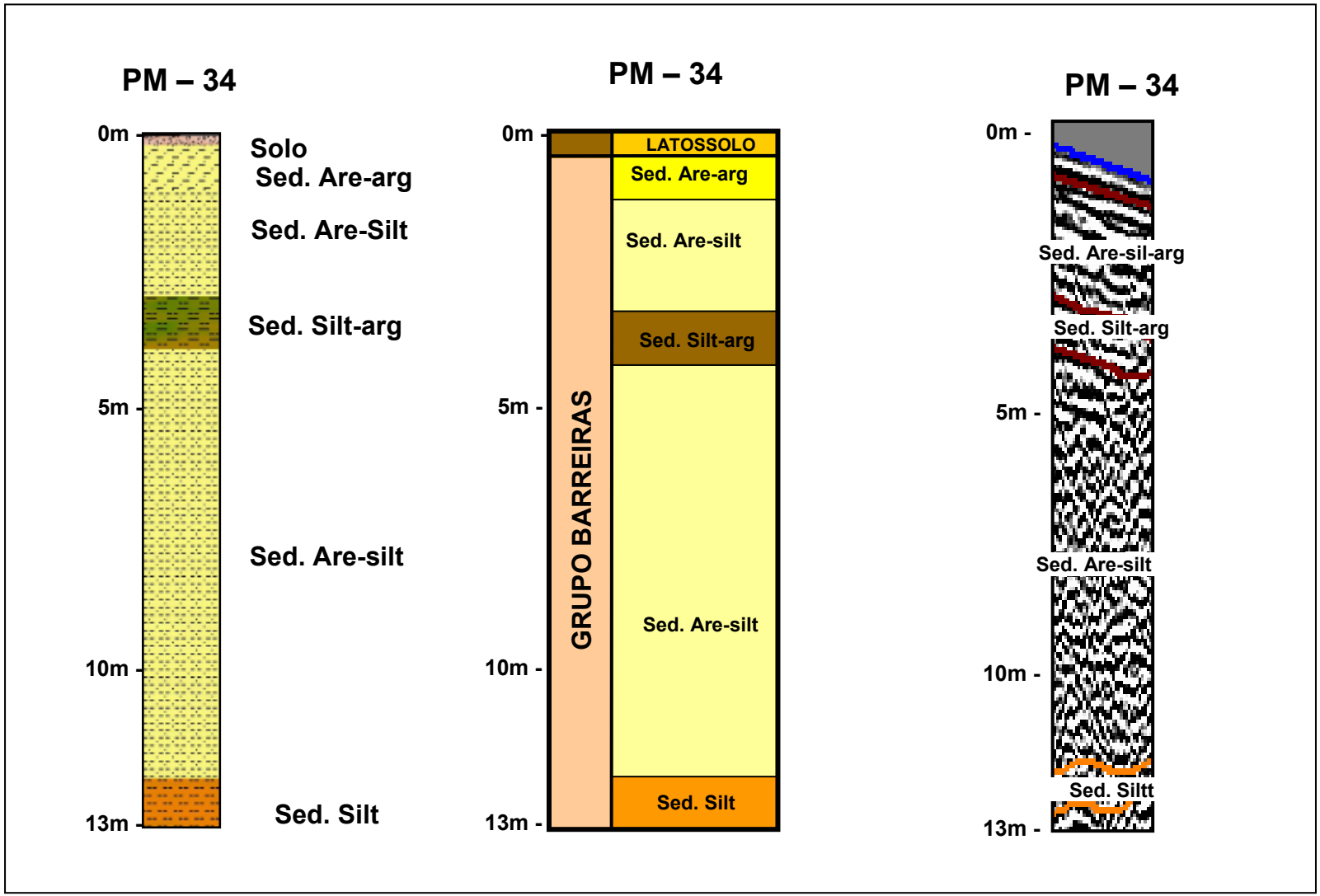
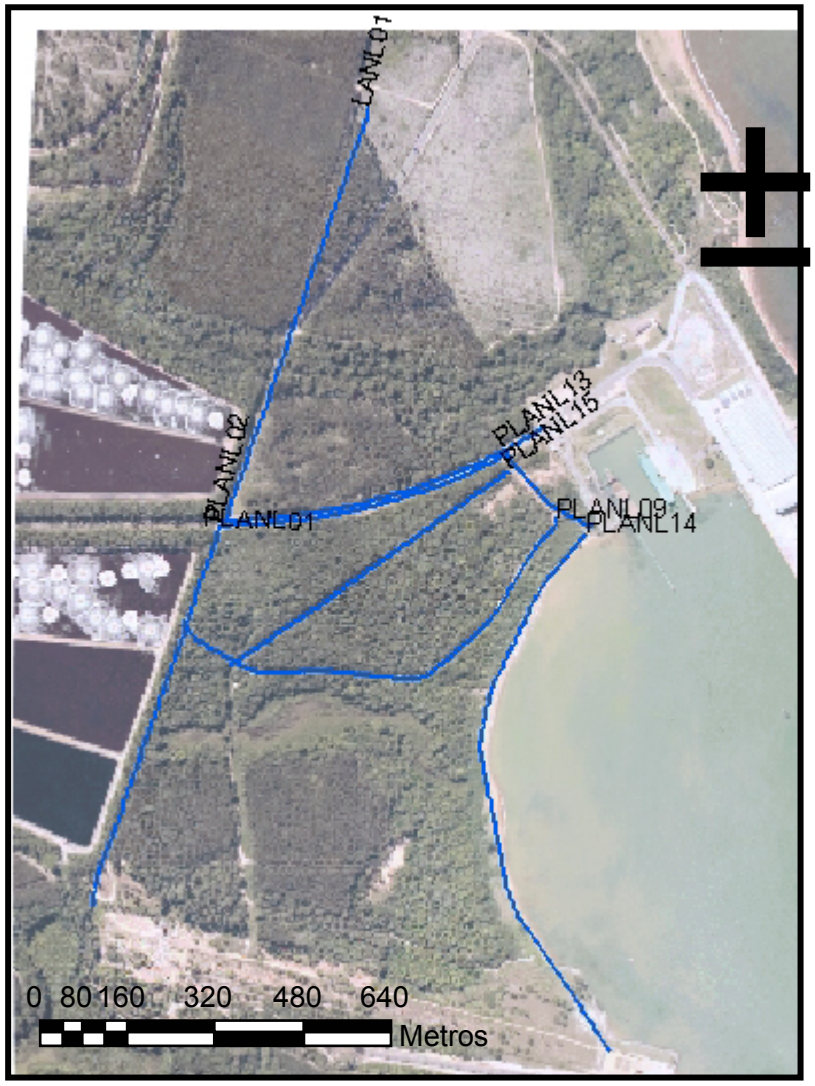

PM – 34
0m
5m
10m
13m
Solo
Sed. Are-arg
Sed. Are-Silt
Sed. Silt-arg
Sed. Are-silt
Sed. Silt
PM – 34
0m
5m
10m
13m
GRUPO BARREIRAS
LATOSSOLO
Sed. Are-arg
Sed. Are-silt
Sed. Silt-arg
Sed. Are-silt
Sed. Silt
PM – 34
0m -
5m -
10m -
13m -
Sed. Are-sil-arg
Sed. Silt-arg
Sed. Are-silt
Sed. Siltt

FIGURA 07



Legenda

LEVANTAMENTO GPR2D

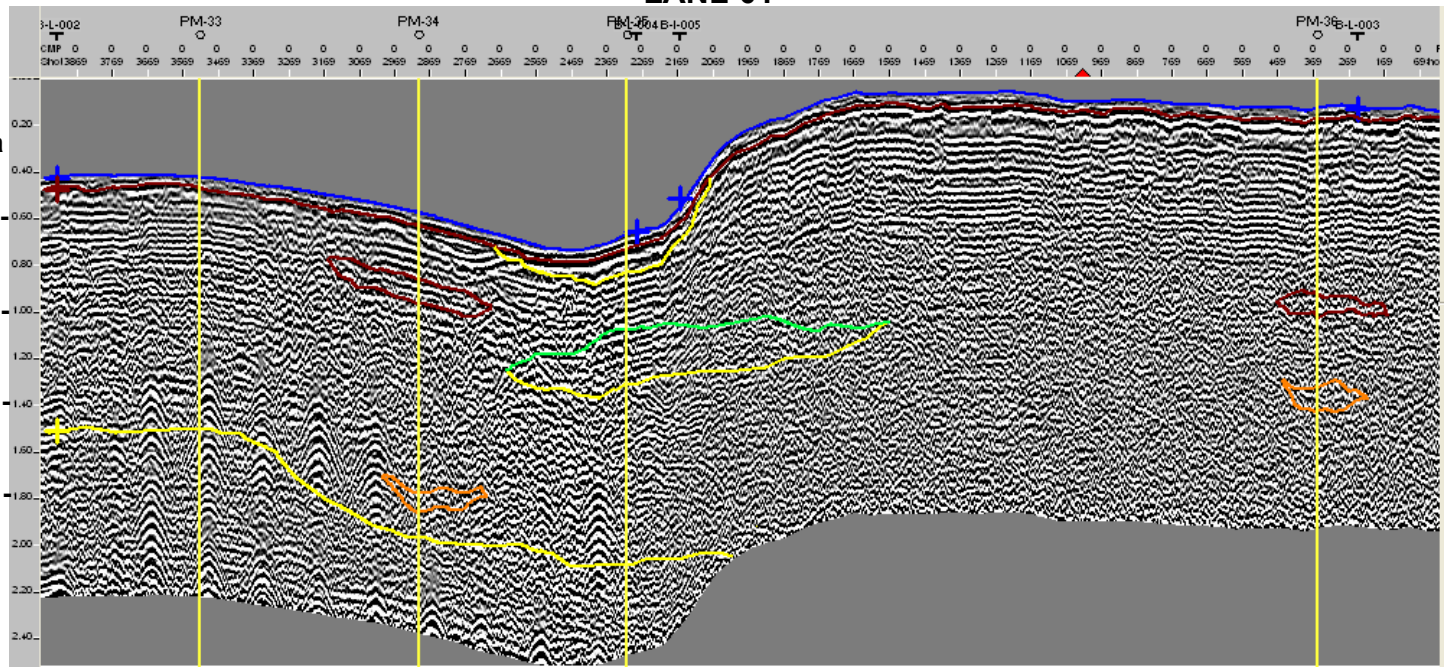
FIGURA 08

TERMINAL BARRA DO RIACHO
GEOLOGIA LOCAL
SEÇÃO GPR

B

LANL-01

B’



- SOLO
- SEDIMENTOS ARENOSOS
- SEDIMENTOS ARGILO ARENOSOS
- SEDIMENTOS ARGILOSOS
- SEDIMENTOS ARENO ARGILOSOS

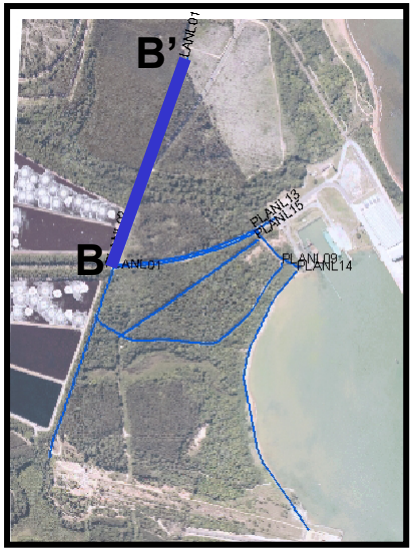
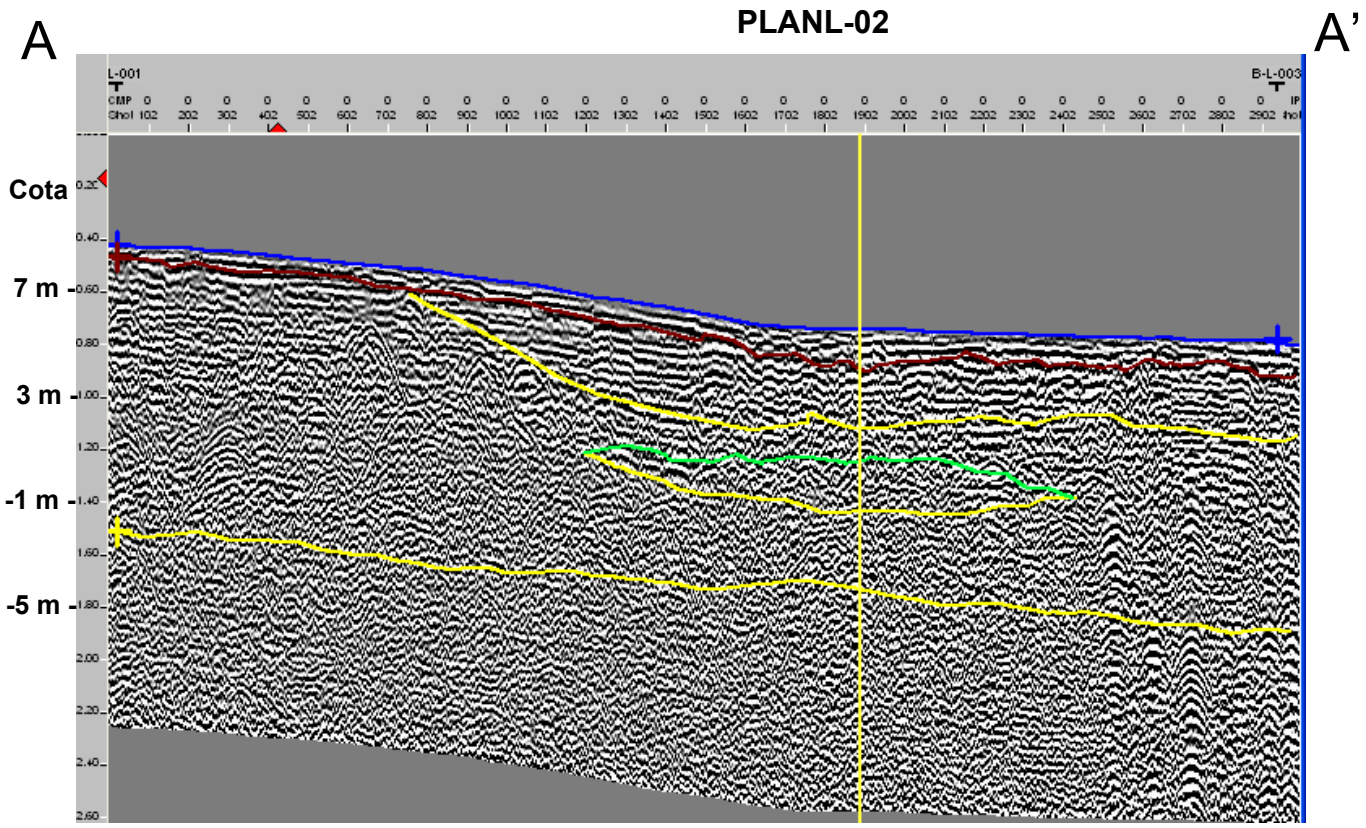


FIGURA 09



SOLO

SEDIMENTOS ARENOSOS

SEDIMENTOS ARGILO ARENOSOS

SEDIMENTOS ARGILOSOS

SEDIMENTOS ARENO ARGILOSOS

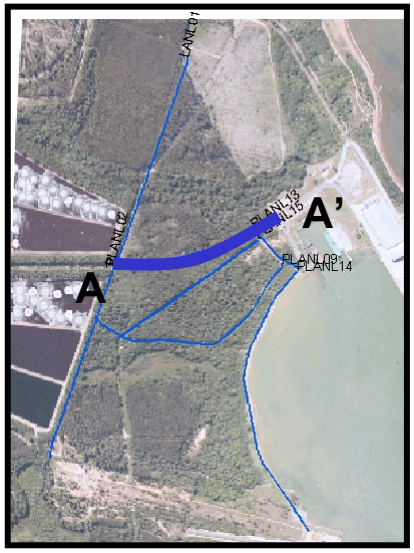
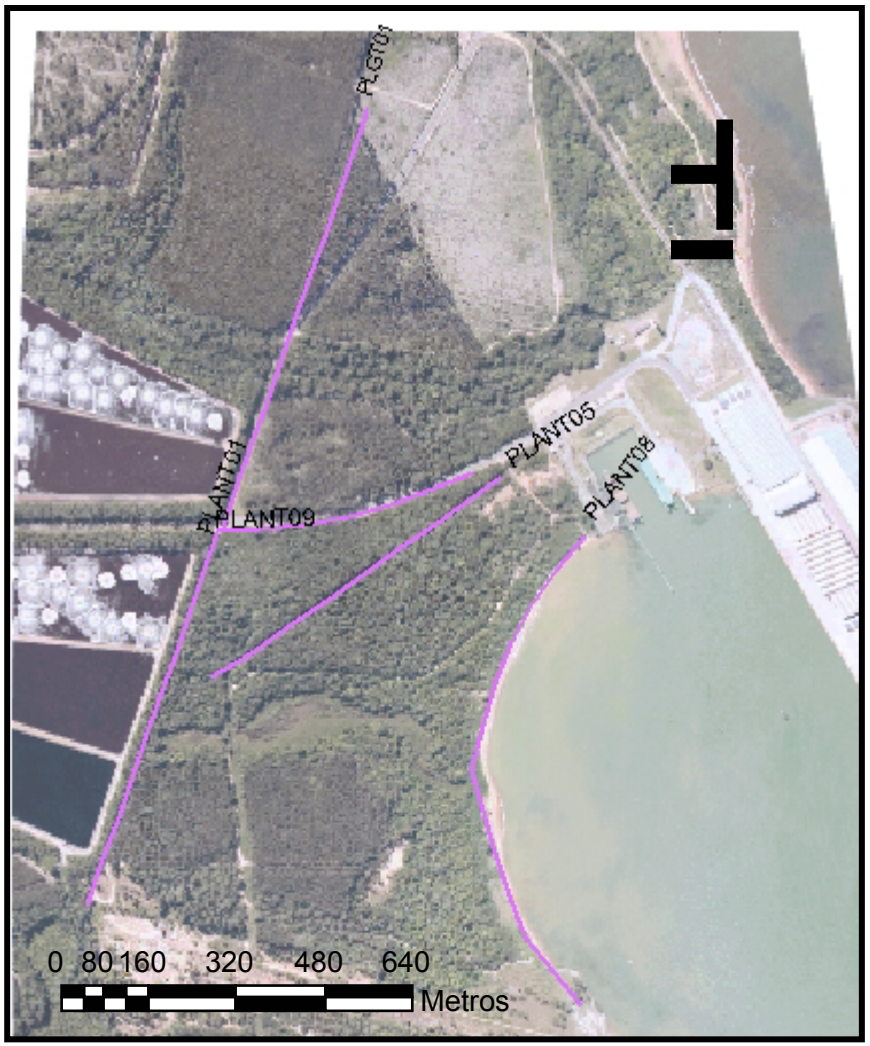


FIGURA 10



Legenda

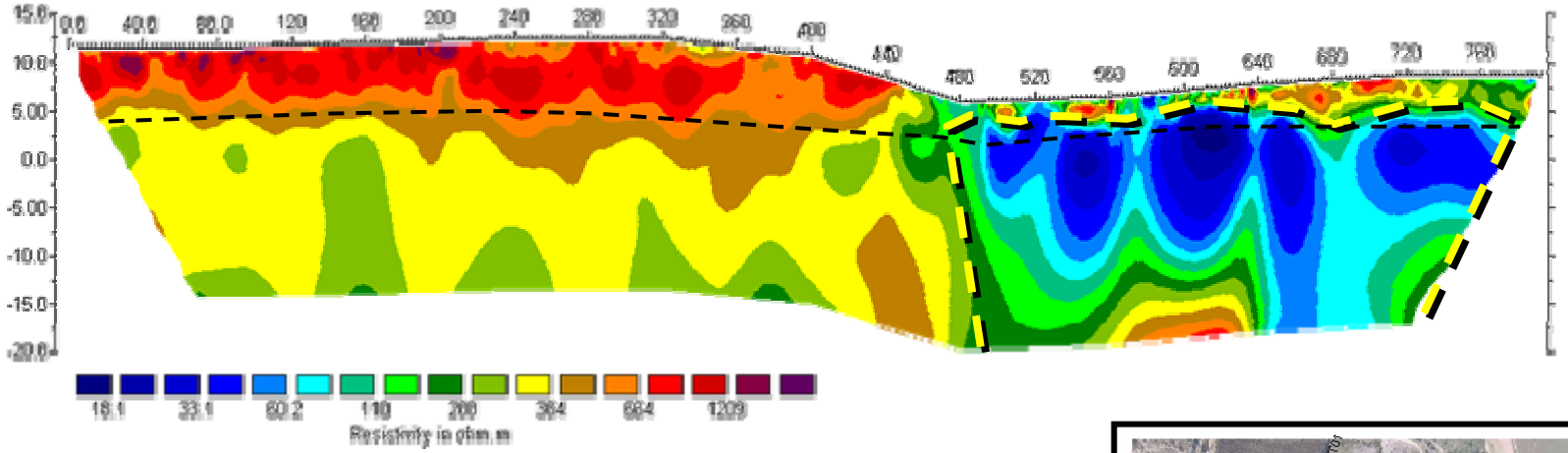
LEVANTAMENTO SEVME

FIGURA 11

C

C’

LRPLGT-01



Legenda

Zona com Baixa Resistividade

Nível freático

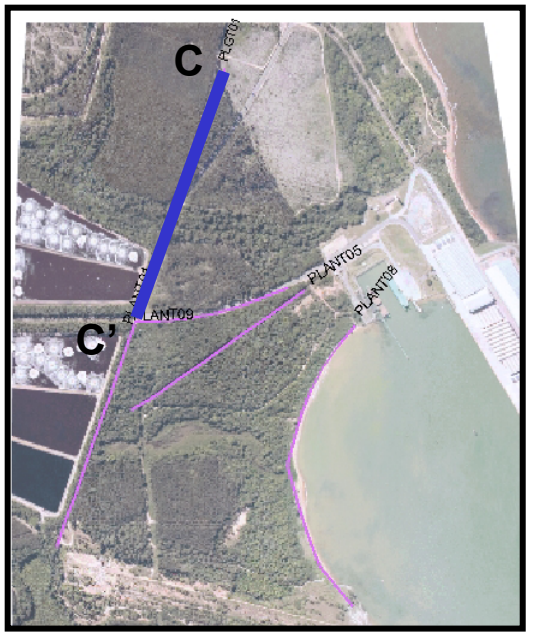
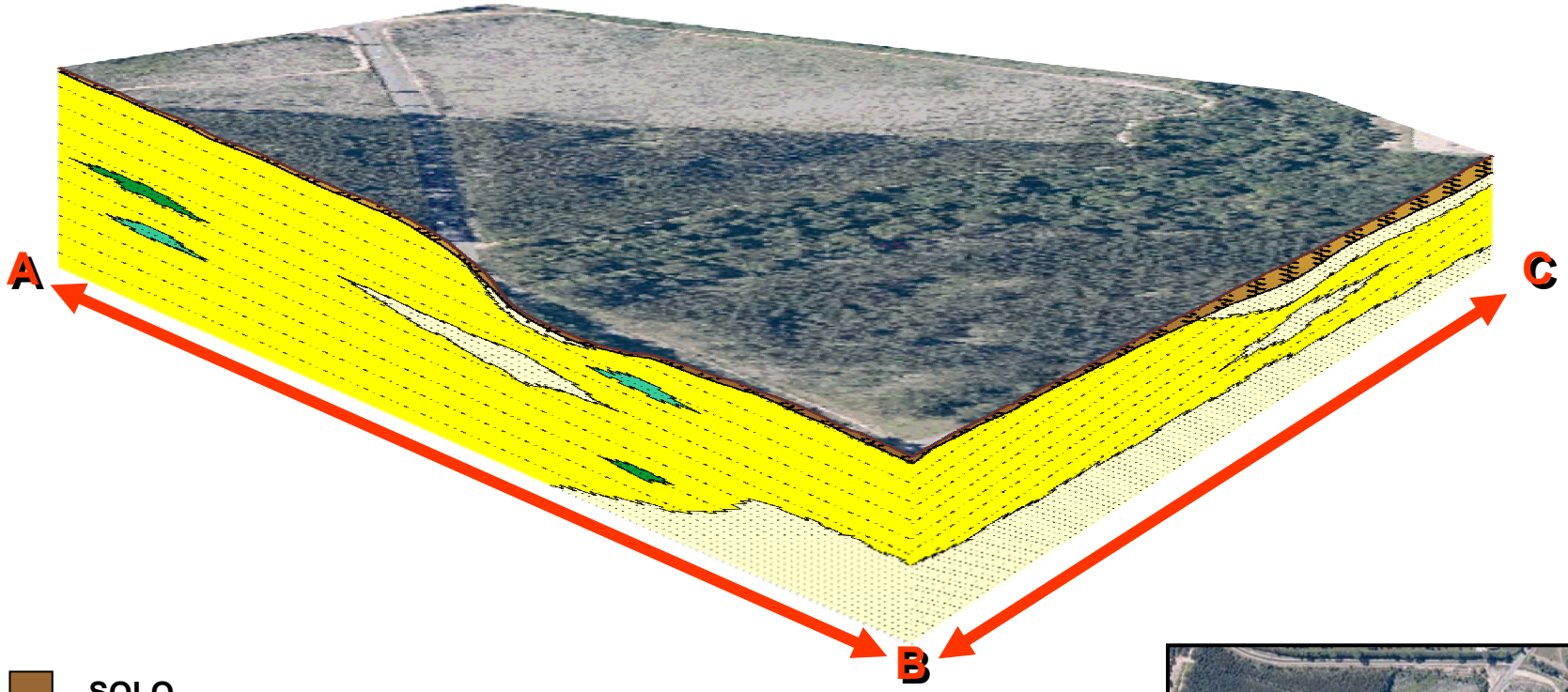


FIGURA 12



- SOLO
- SEDIMENTOS ARENOSOS
- SEDIMENTOS ARGILO ARENOSOS
- SEDIMENTOS ARGILOSOS
- SEDIMENTOS ARENO ARGILOSOS E ARENO SILTOSOS

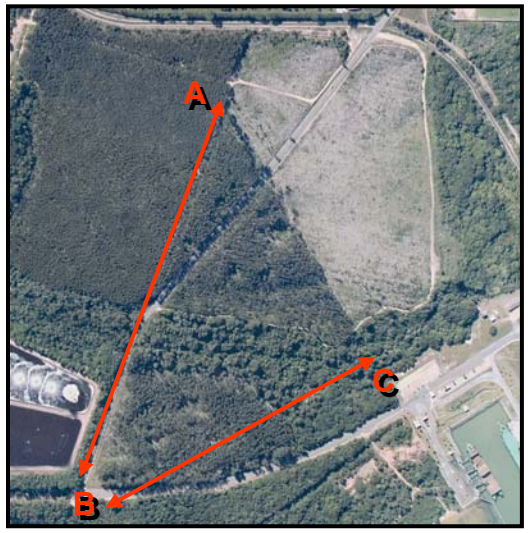


FIGURA 13

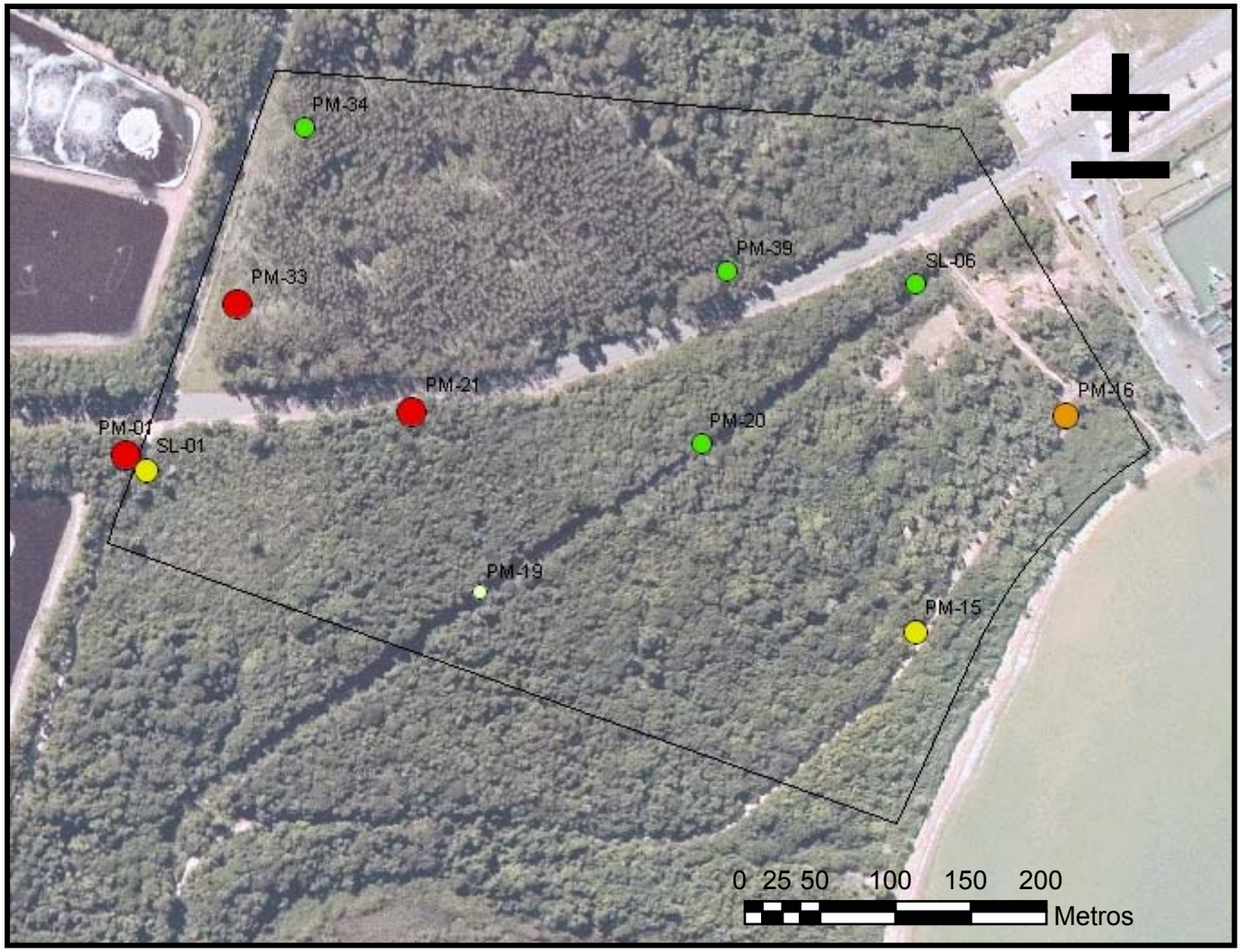


Legenda

A Poços de Monitoramento

Limite da Área

FIGURA 14



Legenda

Limite da Área

87,600

87,601 - 167,500

167,501 - 226,200

226,201 - 396,400

396,401 - 518,100

Valores em ppm

FIGURA 15

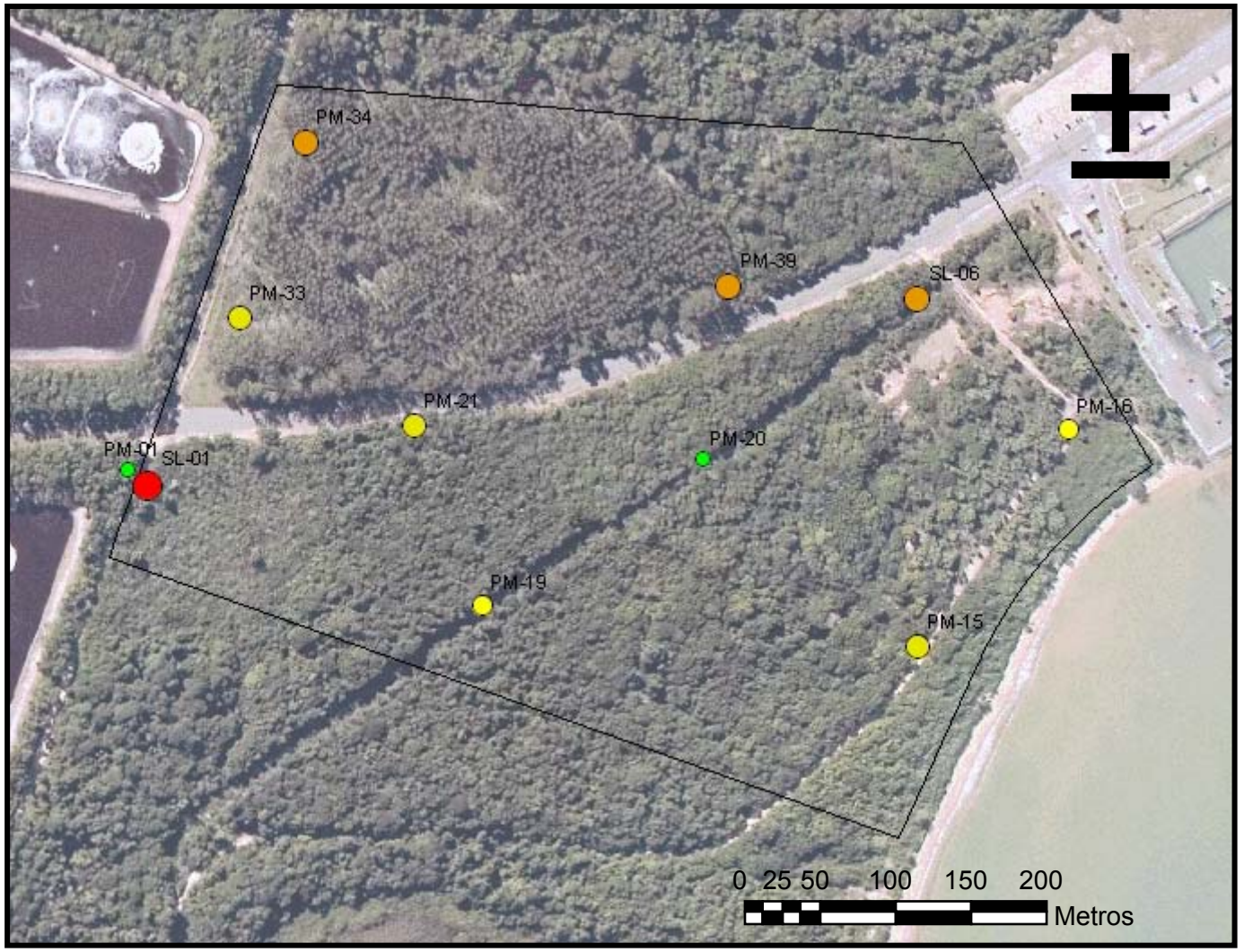

PM-34
PM-33
PM-39
SL-06
PM-21
PM-20
PM-16
PM-01
SL-01
PM-19
PM-15
0 25 50 100 150 200
Metros
Legenda
Limite da Área
111,600 - 114,800
114,801 - 181,700
181,701 - 235,800
235,801 - 283,100
283,101 - 474,300
Valores em ppm

FIGURA 16

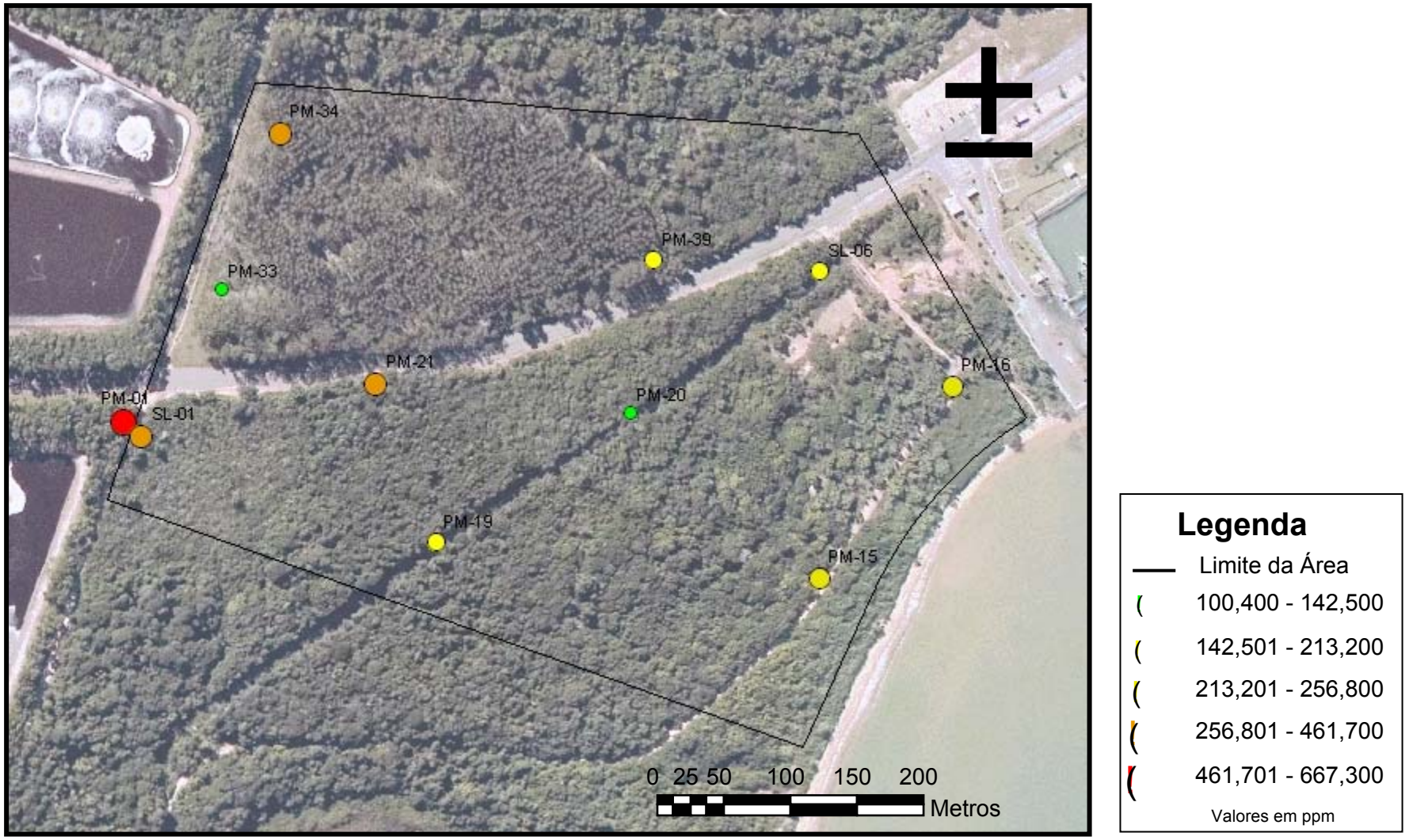
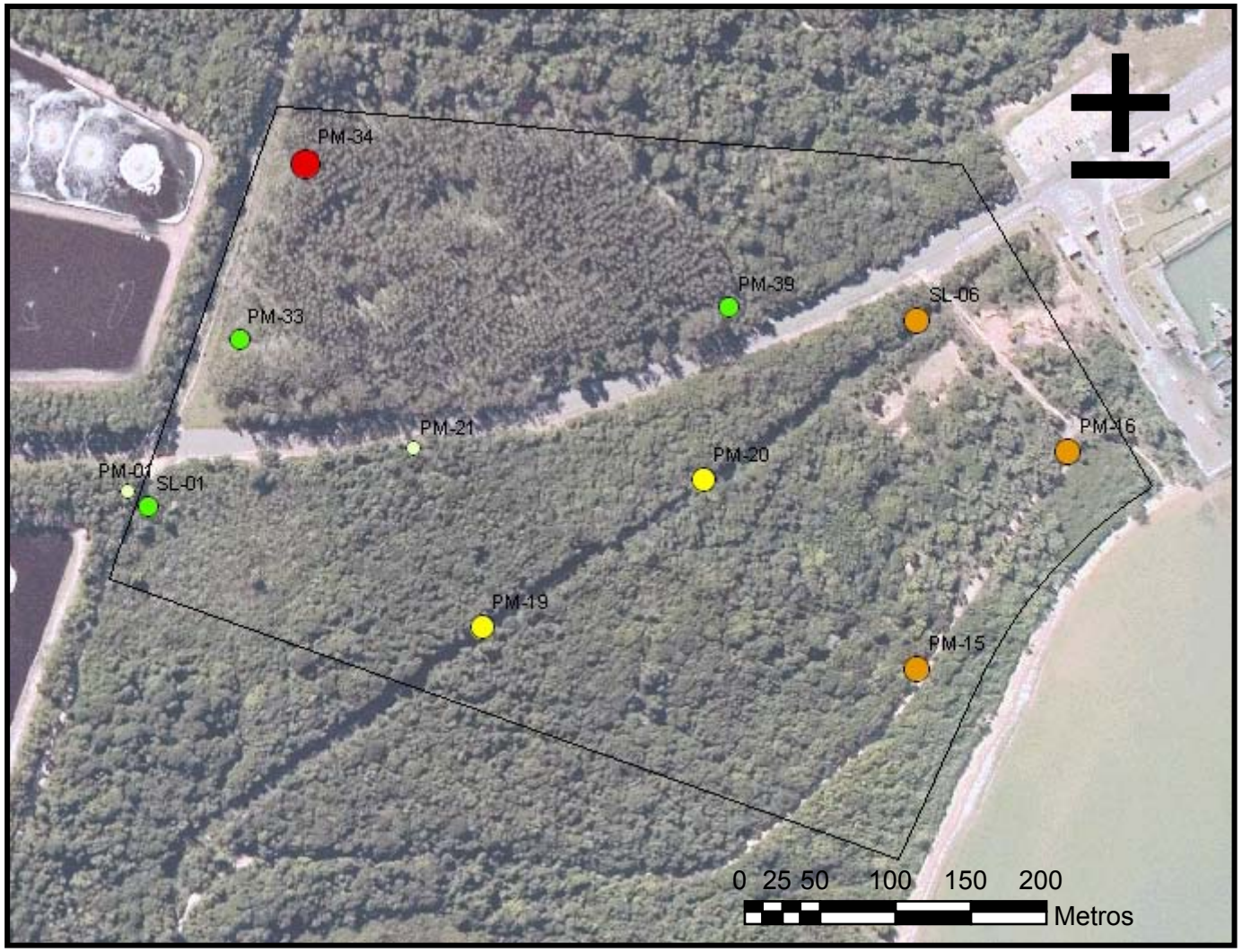

PM-34
PM-39
SL-06
PM-33
PM-21
PM-16
PM-01
SL-01
PM-20
PM-19
PM-15
0 25 50 100 150 200
Metros
Legenda
Limite da Área
100,400 - 142,500
142,501 - 213,200
213,201 - 256,800
256,801 - 461,700
461,701 - 667,300
Valores em ppm

FIGURA 17

GEORADAR

TERMINAL BARRA DO RIACHO
GEOQUÍMICA
FLUORETO – 0,2 prof

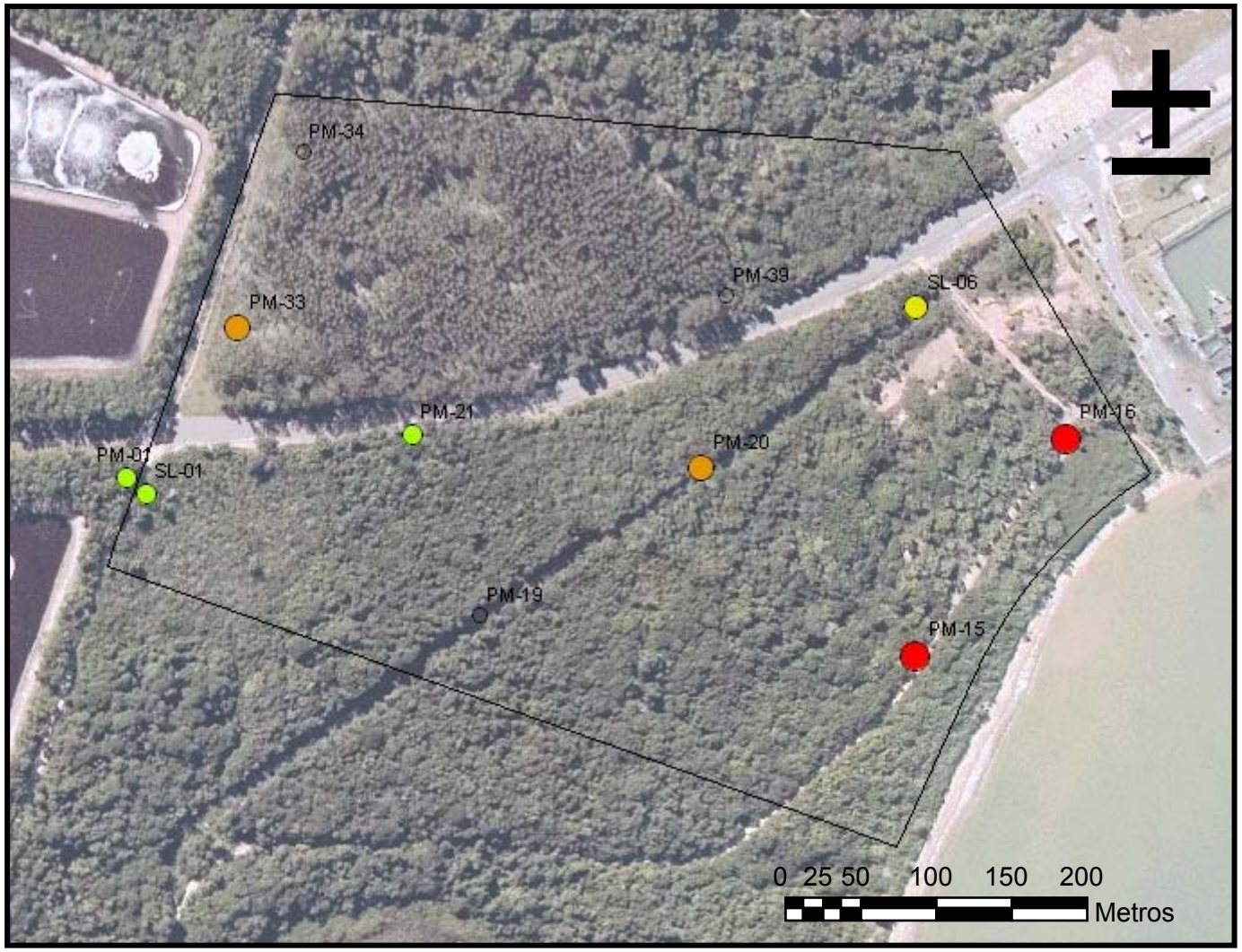


Legenda

- Limite da Área
- 0,040 - 0,060
- 0,061 - 0,120
- 0,121 - 0,240
- 0,241 - 0,510
- 0,511 - 1,060

Valores em ppm

FIGURA 18



Legenda

Limite da Área

0,001 - 0,070

0,071 - 0,130

0,131 - 0,190

0,191 - 1,900

Valores em ppm

FIGURA 19

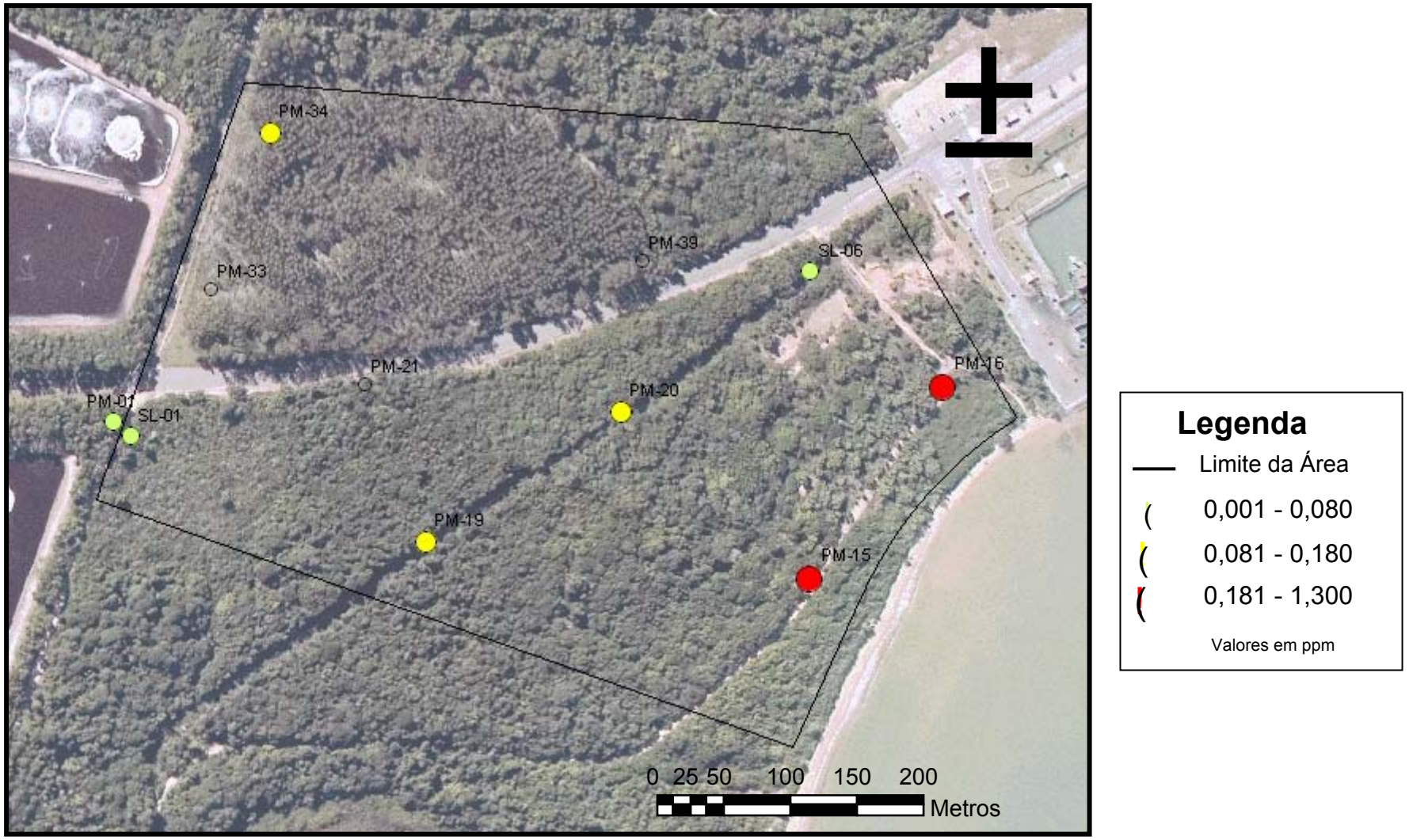
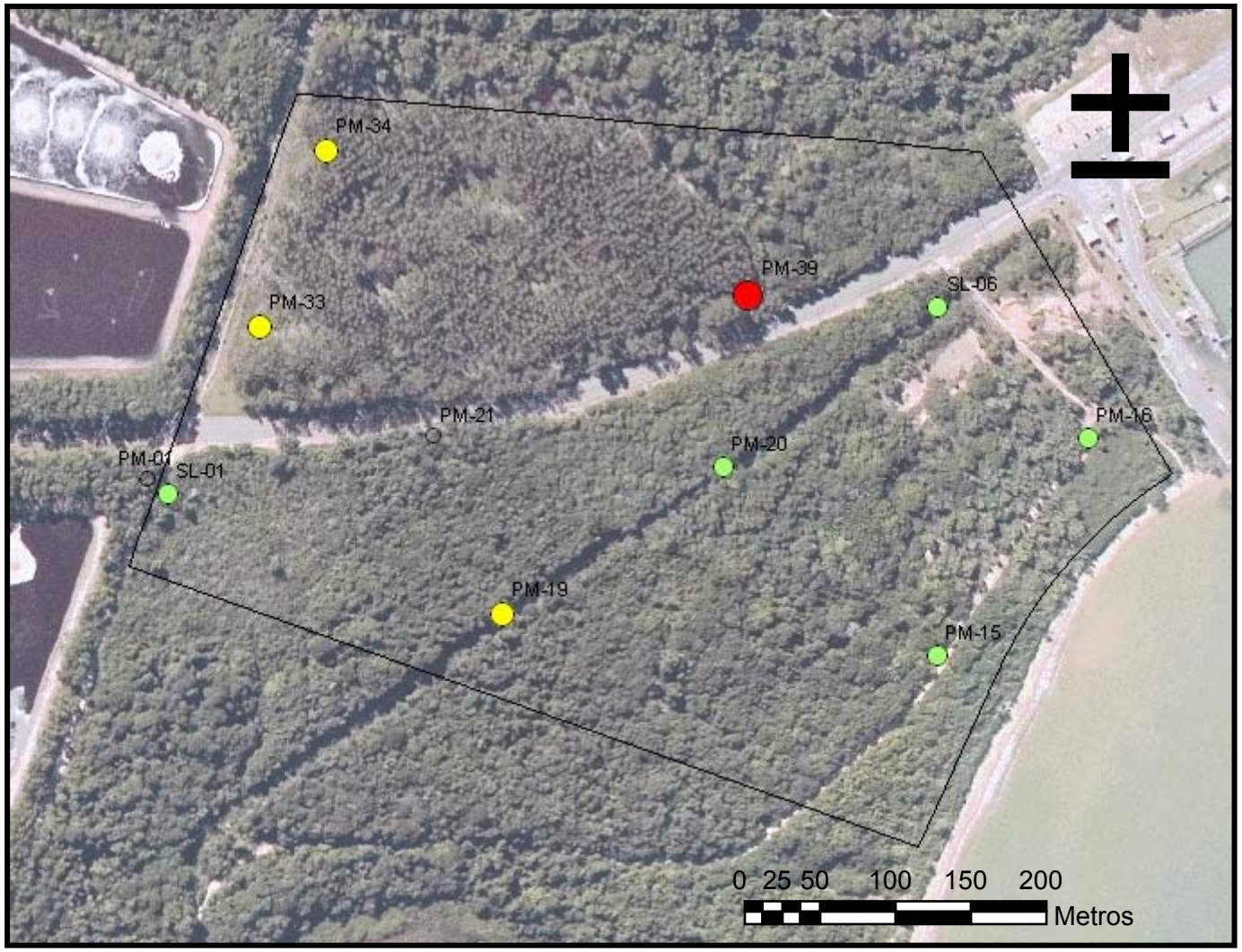

PM-34
PM-33
PM-39
SL-06
PM-21
PM-20
PM-16
PM-01
SL-01
PM-19
PM-15
0 25 50 100 150 200
Metros
Legenda
Limite da Área
0,001 - 0,080
0,081 - 0,180
0,181 - 1,300
Valores em ppm

FIGURA 20



Legenda

Limite da Área

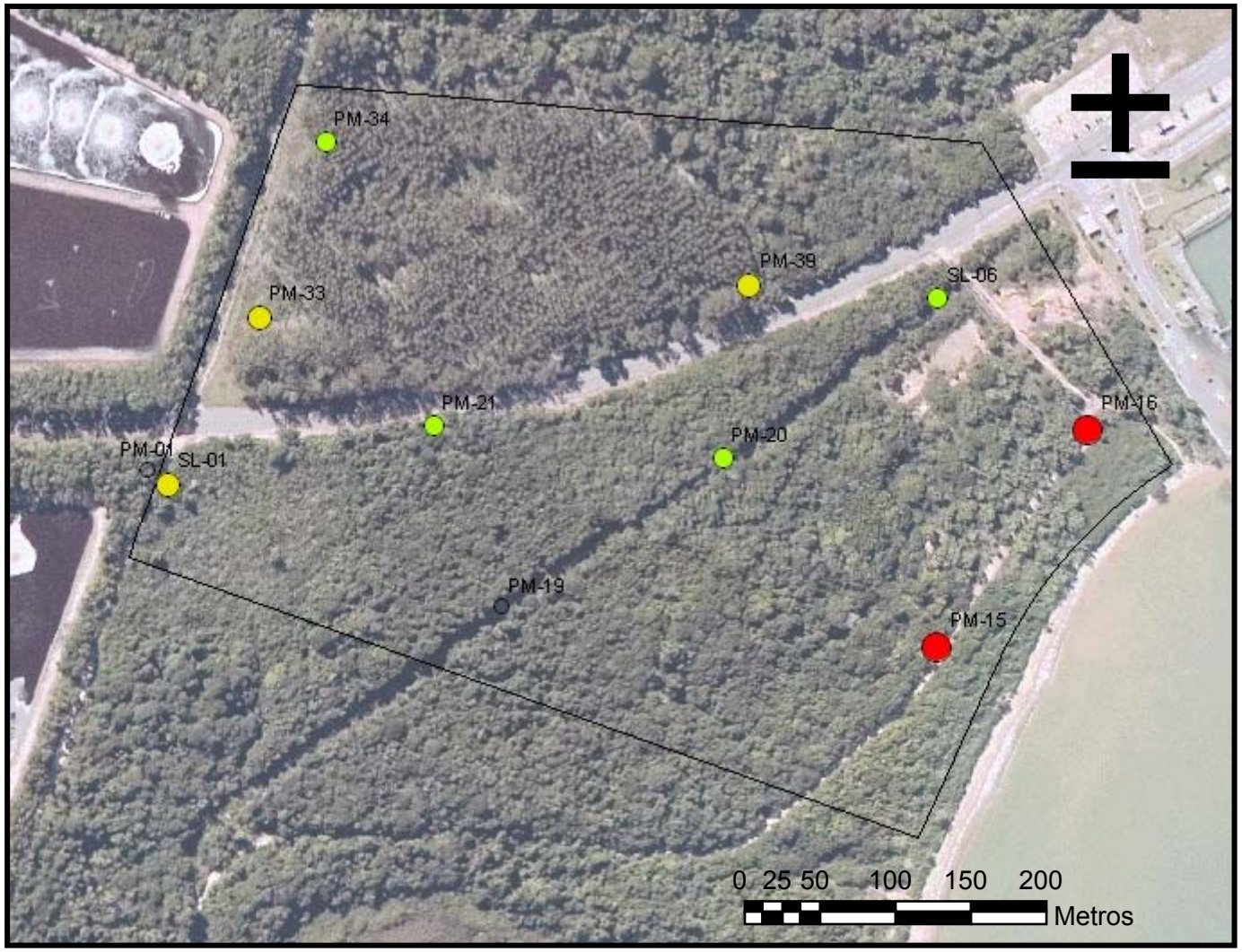
0,001 - 0,160

0,161 - 0,600

0,601 - 1,190

Valores em ppm

FIGURA 21



Legenda

Limite da Área

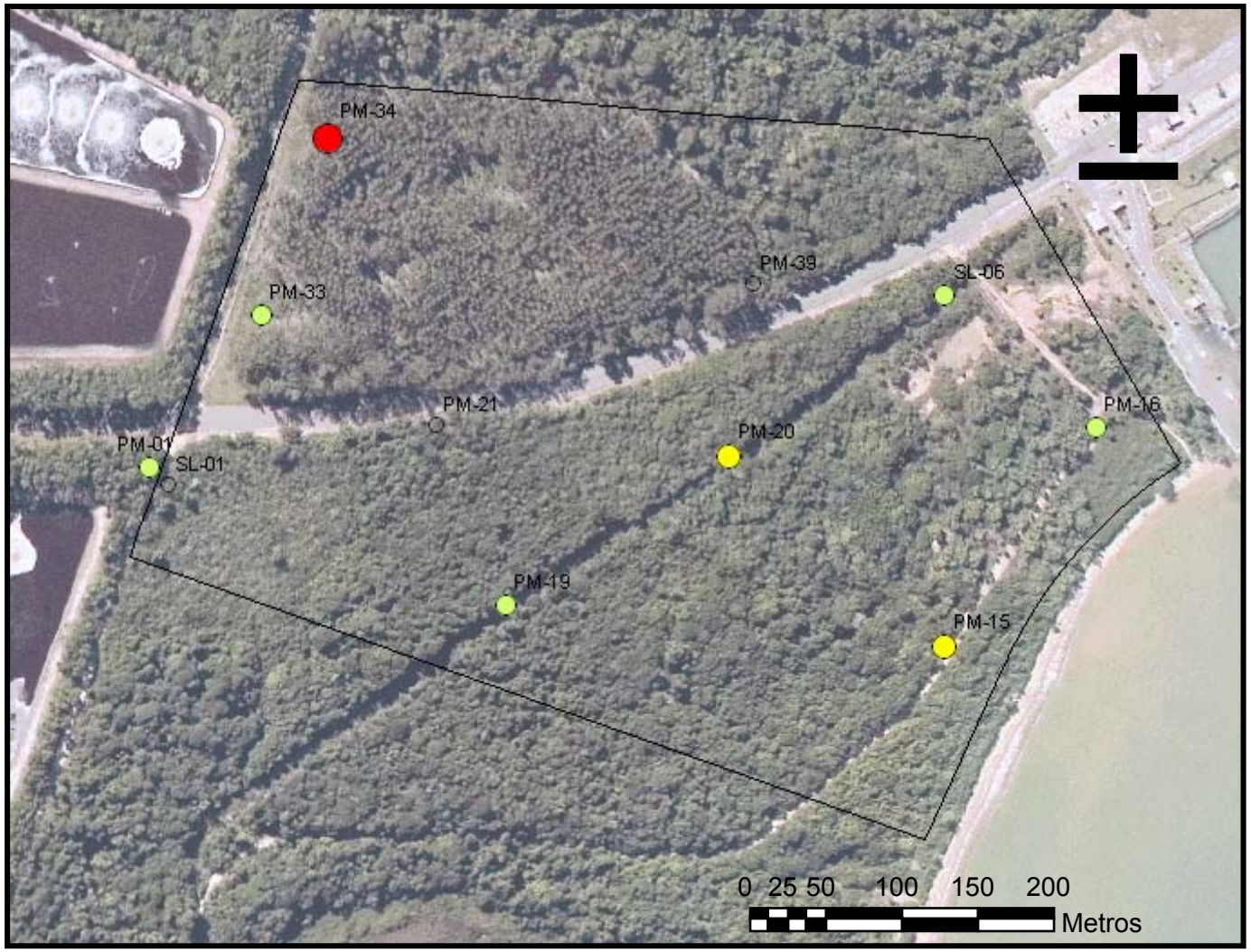
0,001 - 0,080

0,081 - 0,110

0,111 - 0,380

Valores em ppm

FIGURA 22



Legenda

Limite da Área

0,001 - 0,080

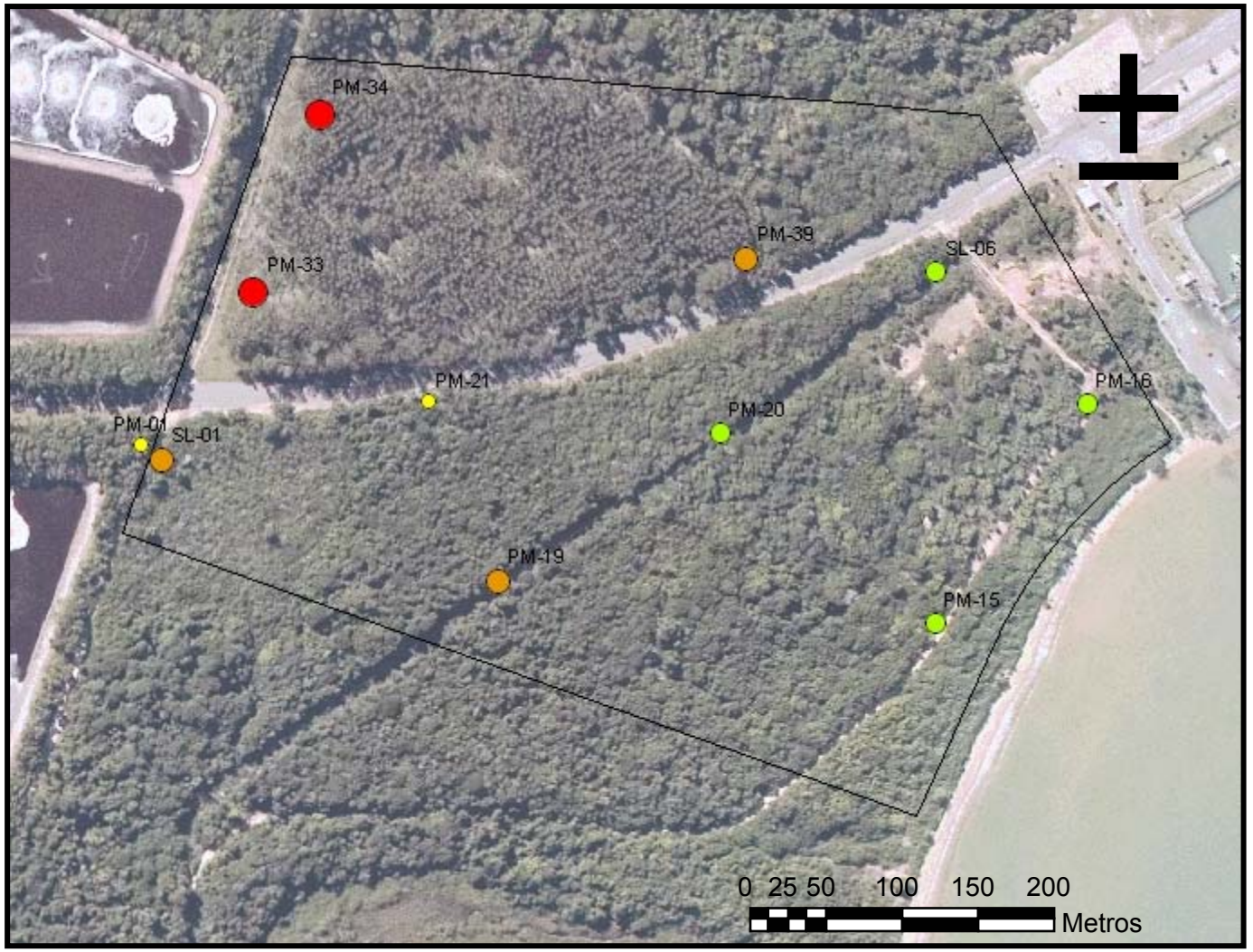
0,081 - 0,150

0,151 - 0,260

Valores em ppm

FIGURA 23

TERMINAL BARRA DO RIACHO
GEOQUÍMICA
CLORETO – 0,2 prof

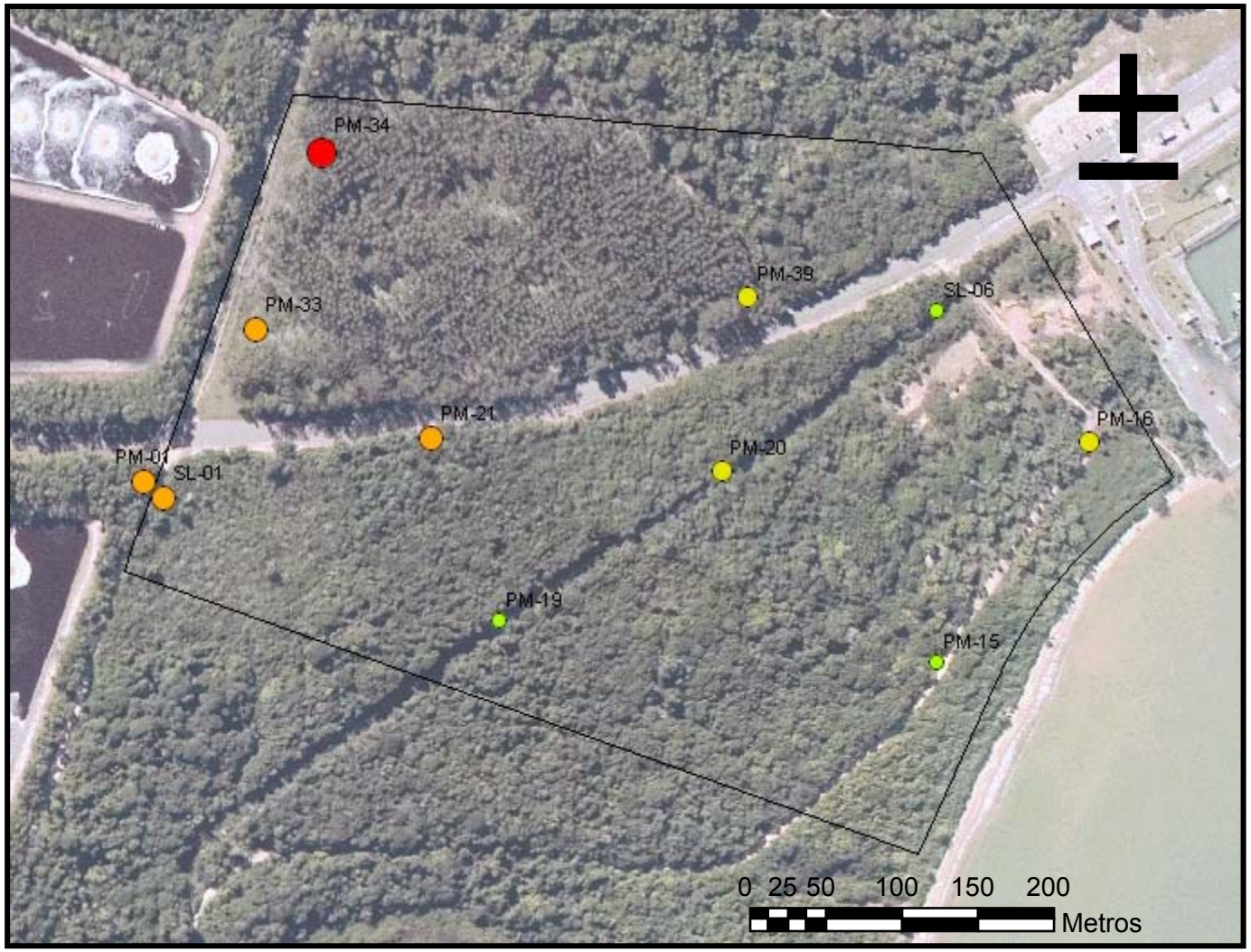


Legenda

- Limite da Área
- 0,000 - 0,380
- 0,381 - 0,770
- 0,771 - 2,290
- 2,291 - 5,880

Valores em ppm

FIGURA 24



Legenda

Limite da Área

0,110 - 0,760

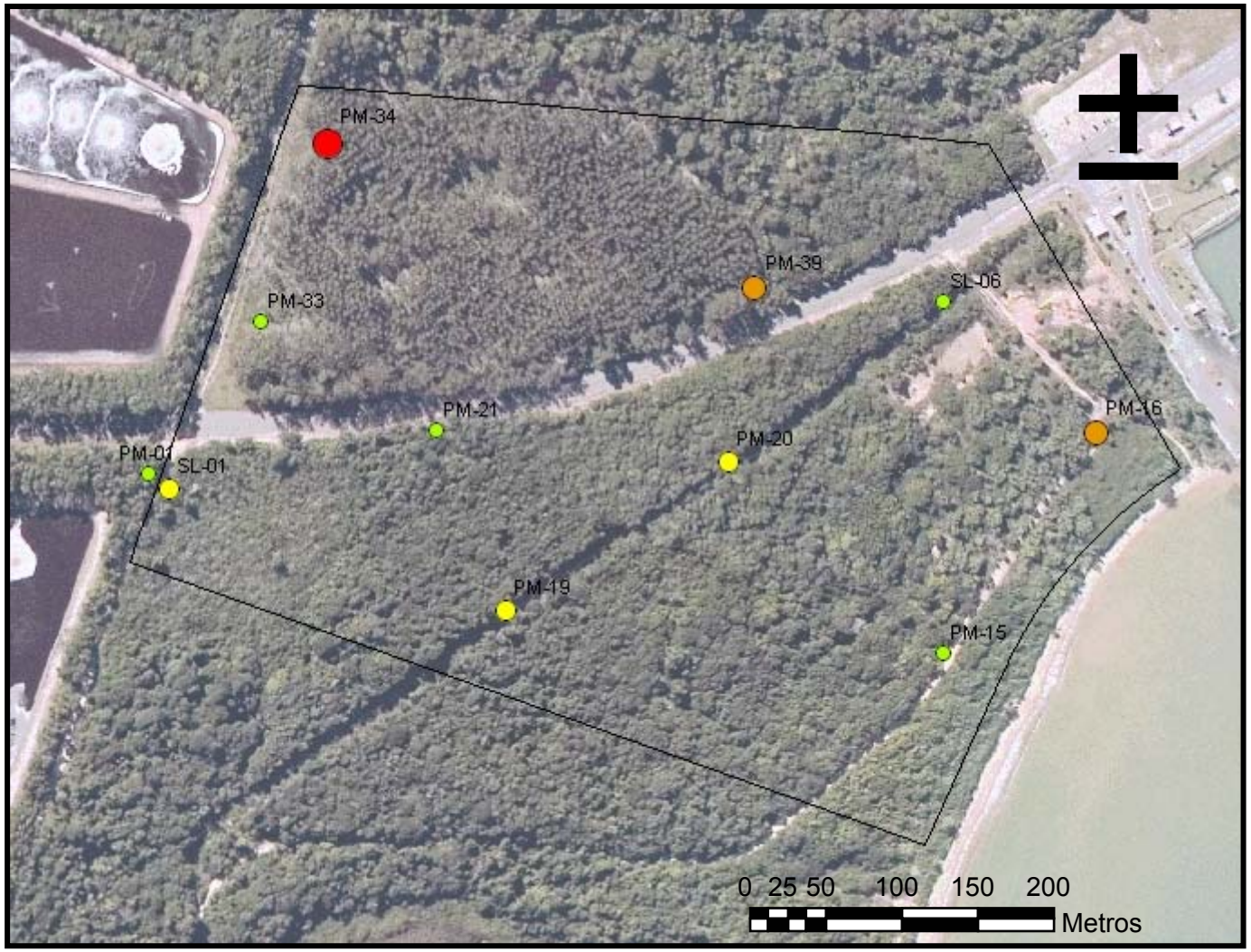
0,761 - 1,470

1,471 - 3,130

3,131 - 7,990

Valores em ppm

FIGURA 25



Legenda

Limite da Área

0,000 - 0,700

0,701 - 2,000

2,001 - 3,940

3,941 - 8,380

Valores em ppm

FIGURA 26

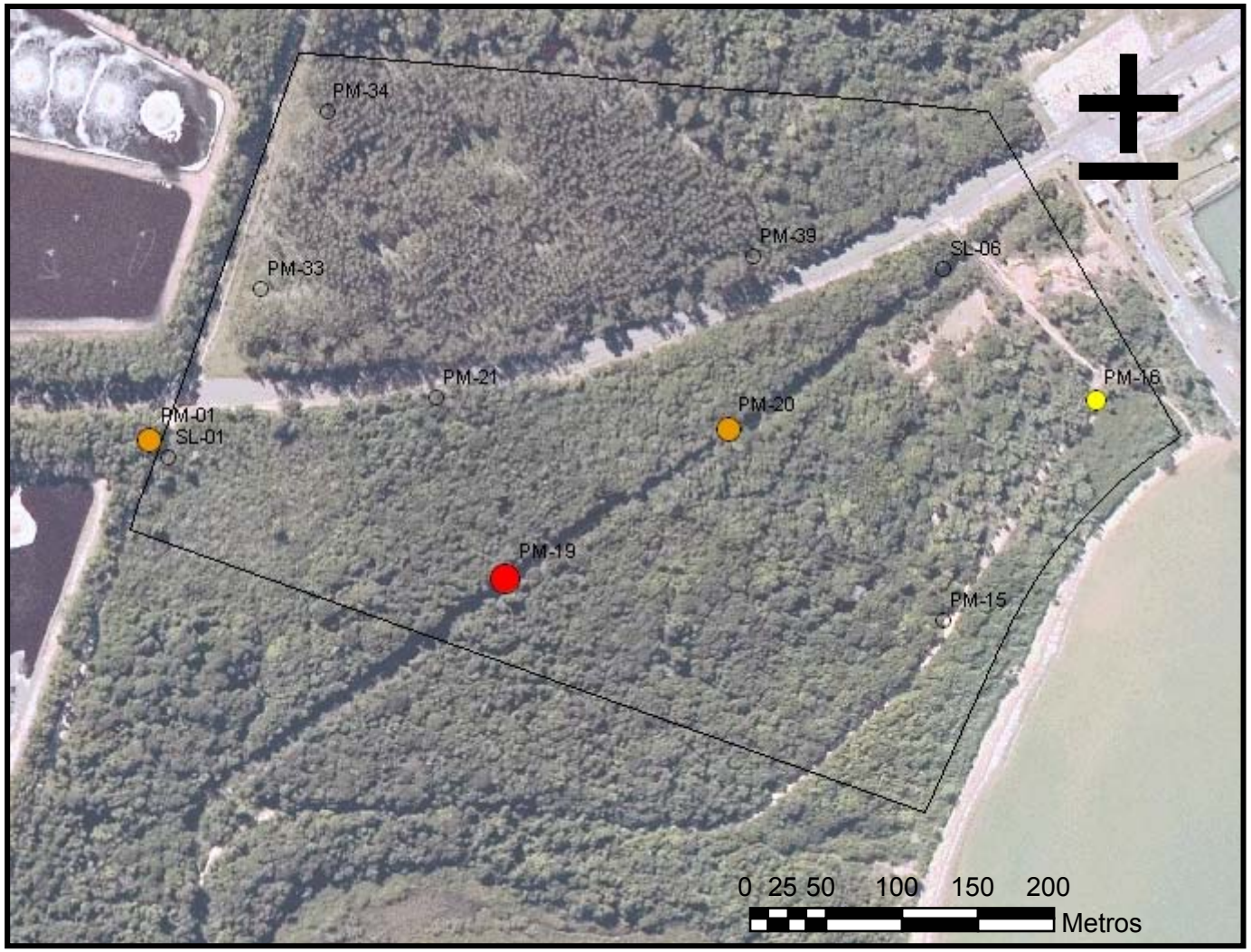
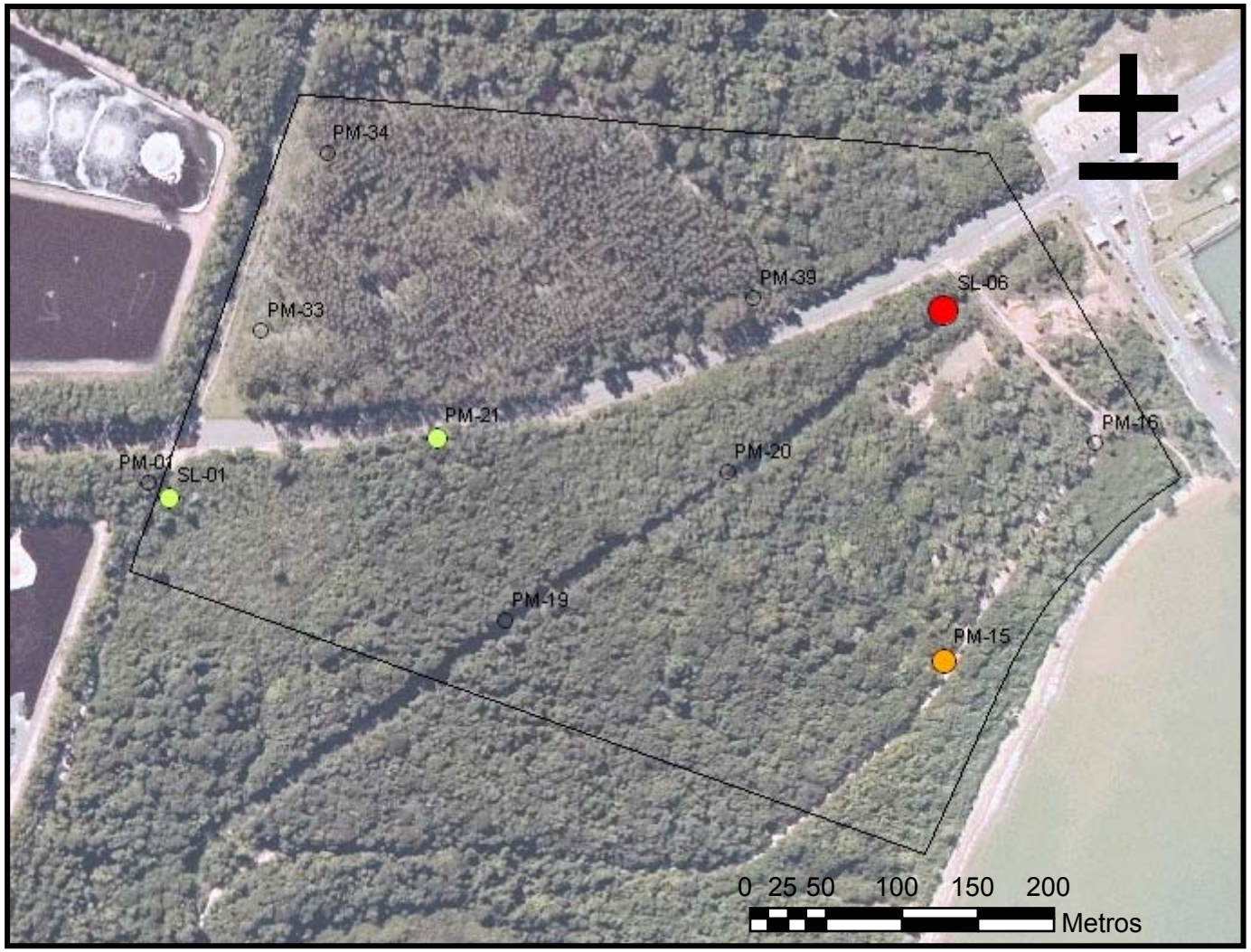

PM-34
PM-33
PM-39
SL-06
PM-21
PM-20
PM-16
PM-01
SL-01
PM-19
PM-15
0 25 50 100 150 200
Metros
Legenda
Limite da Área
0,001 - 3,800
3,801 - 5,500
5,501 - 8,500
Valores em ppm

FIGURA 27



Legenda

Limite da Área

0,001 - 4,800

4,801 - 6,400

6,401 - 12,600

Valores em ppm

FIGURA 28



Legenda

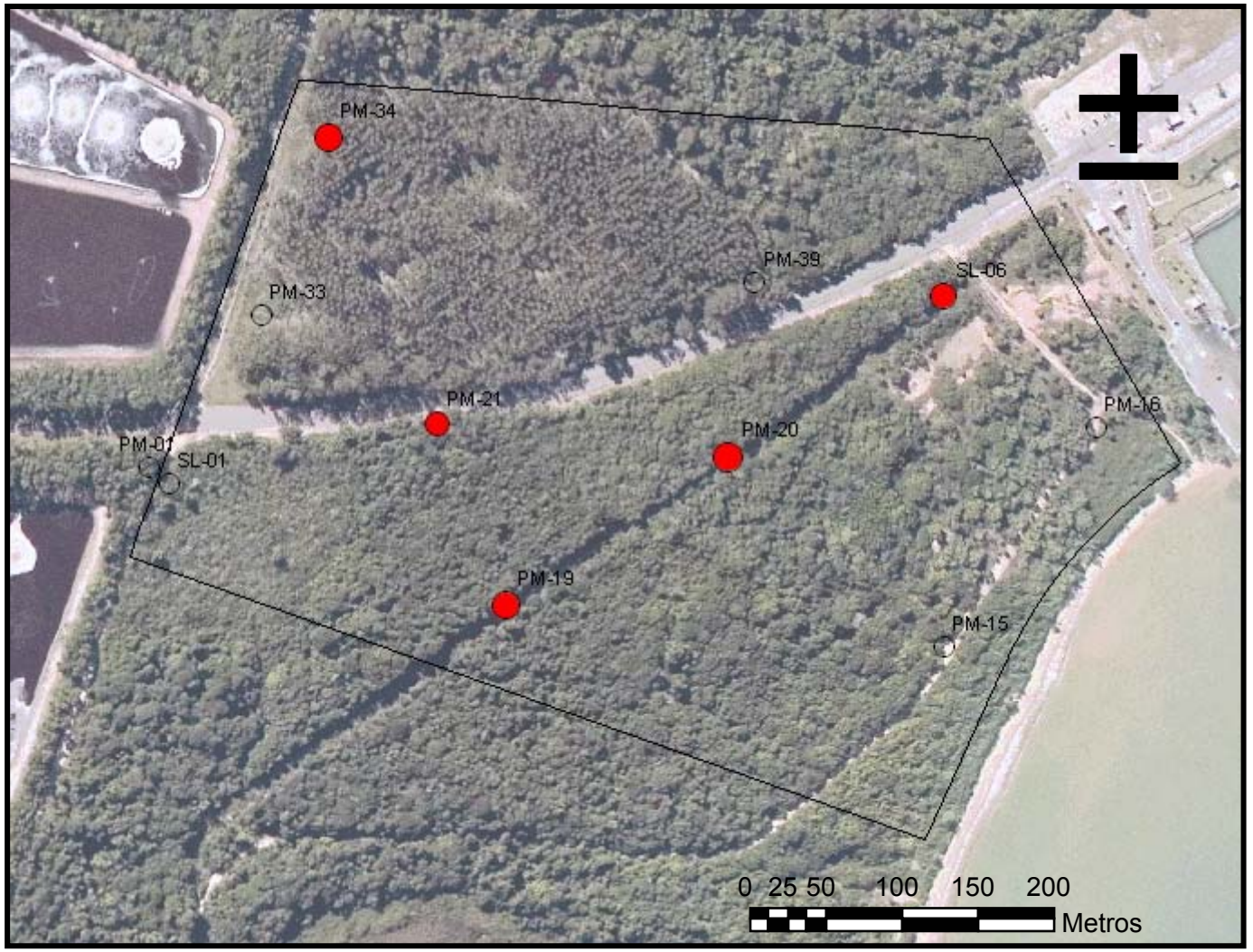
Limite da Área

0,001 - 3,600

3,601 - 4,800

Valores em ppm

FIGURA 29

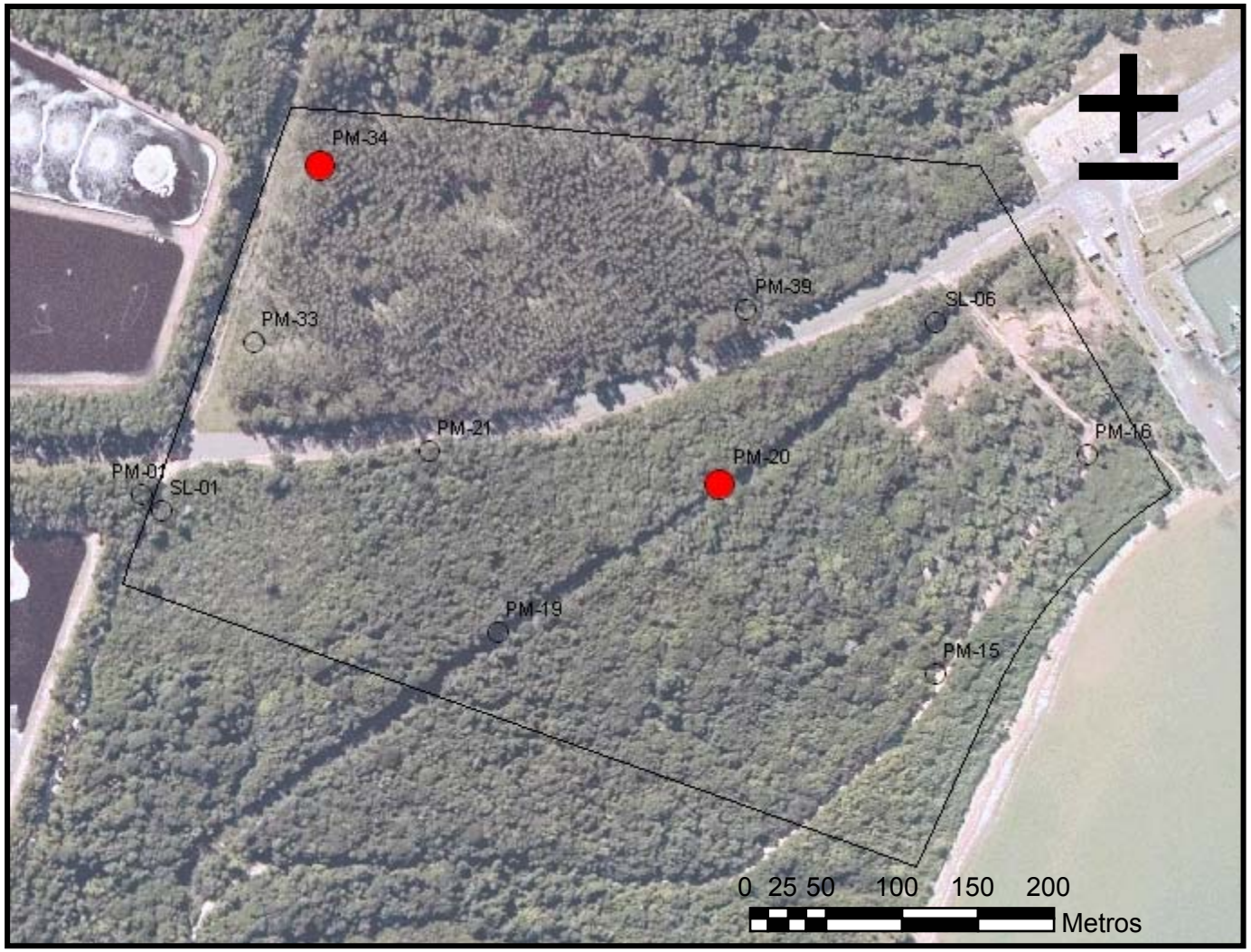


Legenda

- PM 19 - 0,0025
- PM 20 - 0,0855
- PM 21 - 0,0016
- PM 34 - 0,0026
- SL 06 - 0,0022

Valores em ppb

FIGURA 30



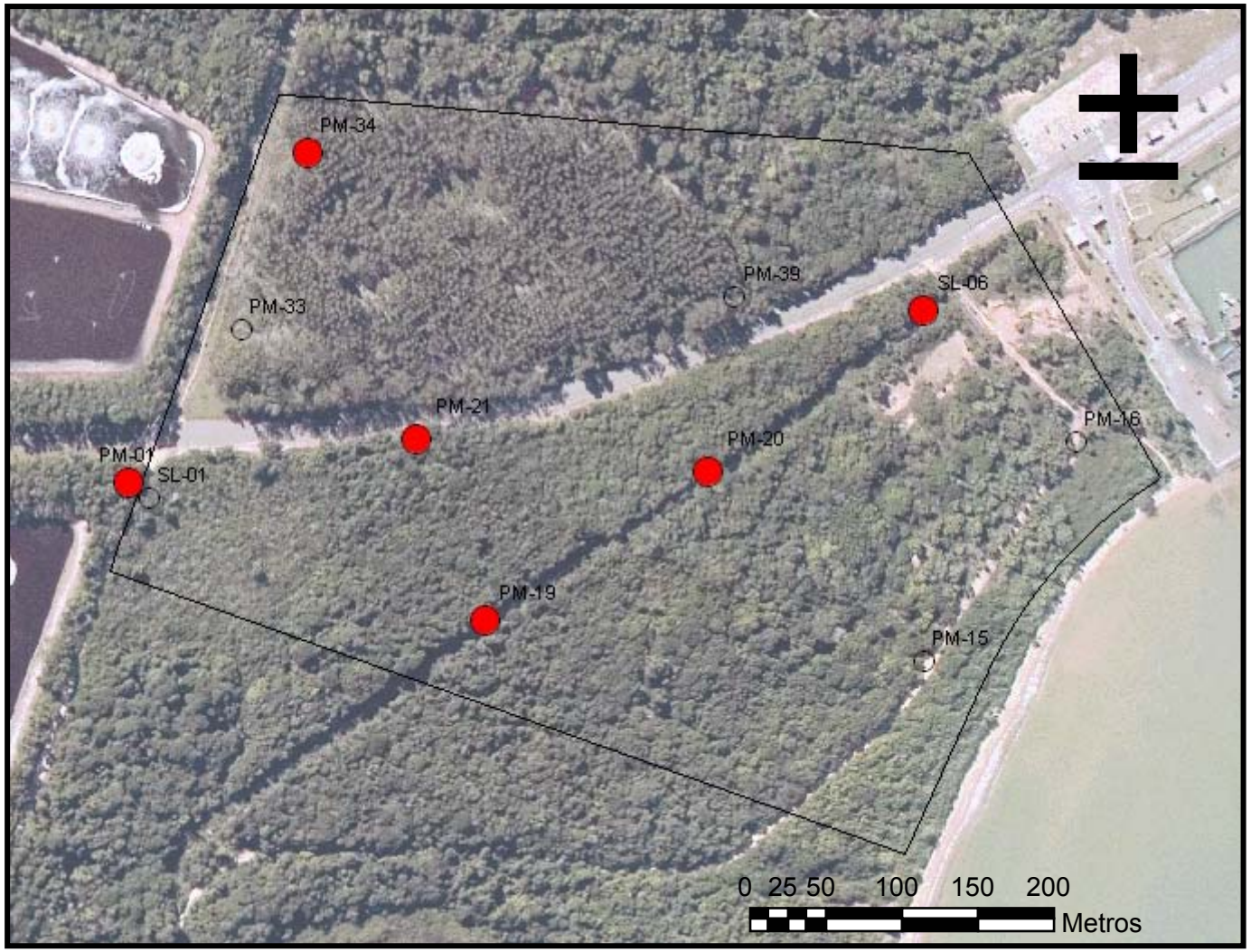
Legenda

PM 20 - 0,0051

PM 34 - 0,0855

Valores em ppb

FIGURA 31

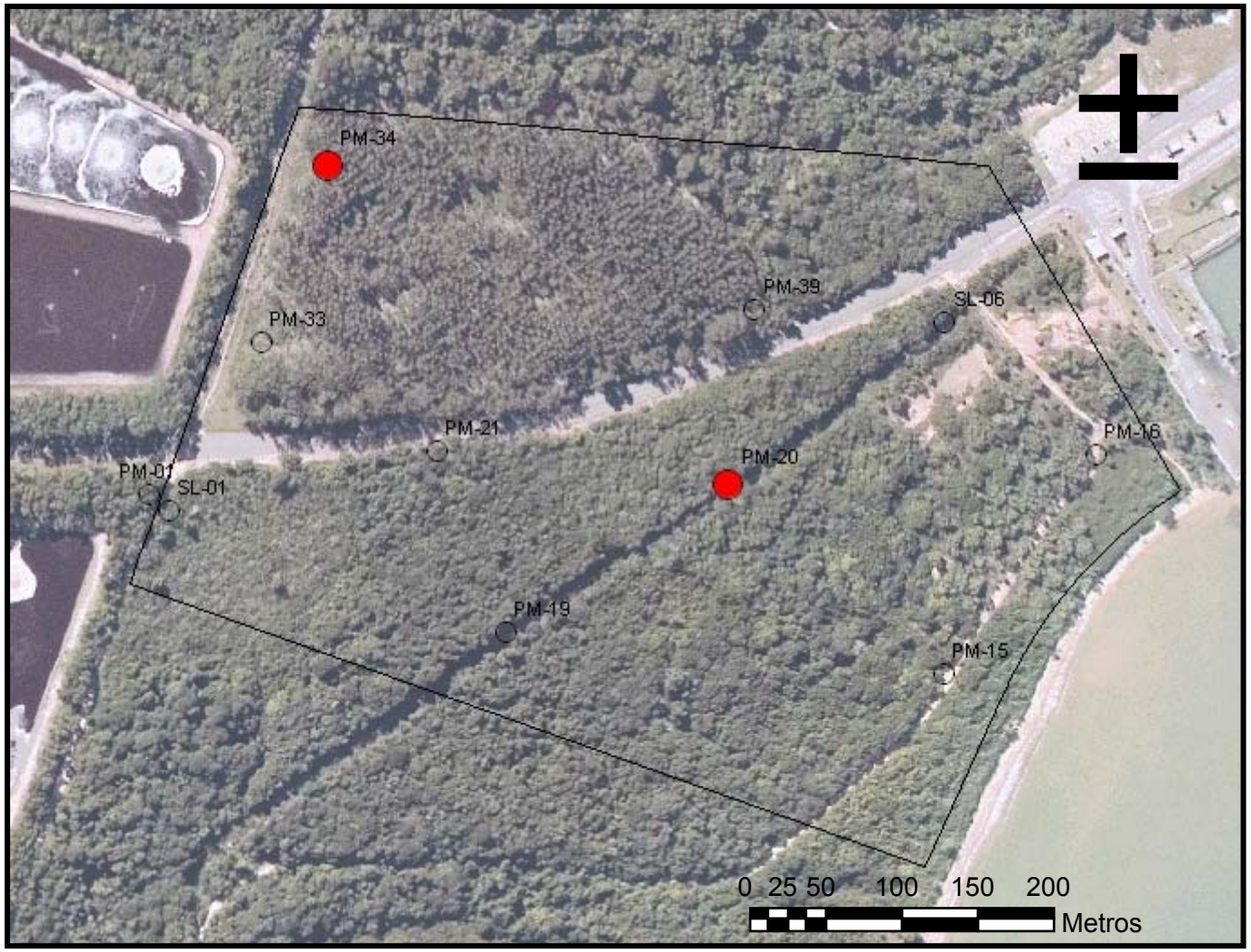


Legenda

- PM 01 - 0,0022
- PM 19 - 0,0107
- PM 20 - 0,2930
- PM 21 - 0,0085
- PM 34 - 0,0058
- SL 06 - 0,0116

Valores em ppb

FIGURA 32



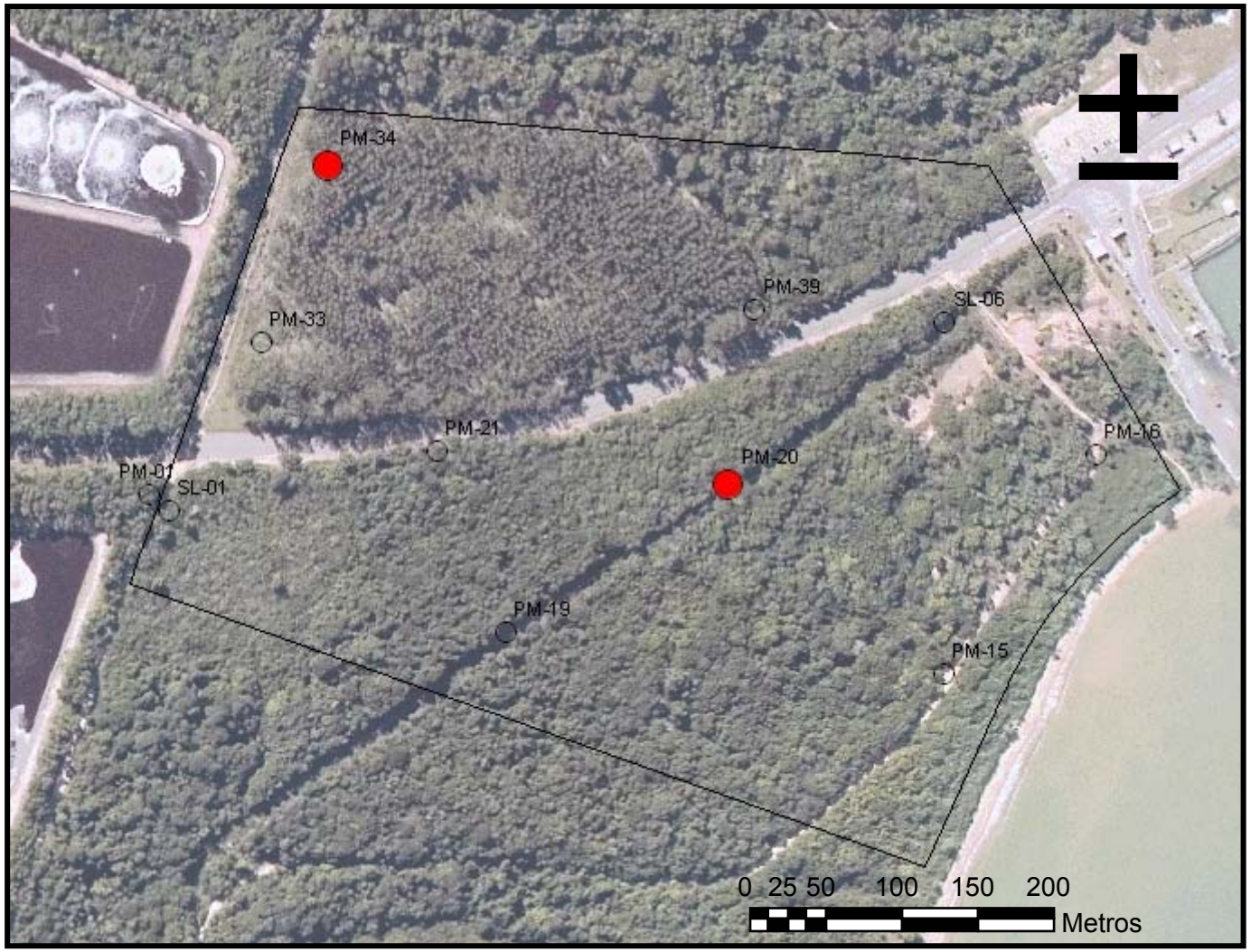
Legenda

PM 20 - 0,0323

PM 34 - 0,0020

Valores em ppb

FIGURA 33



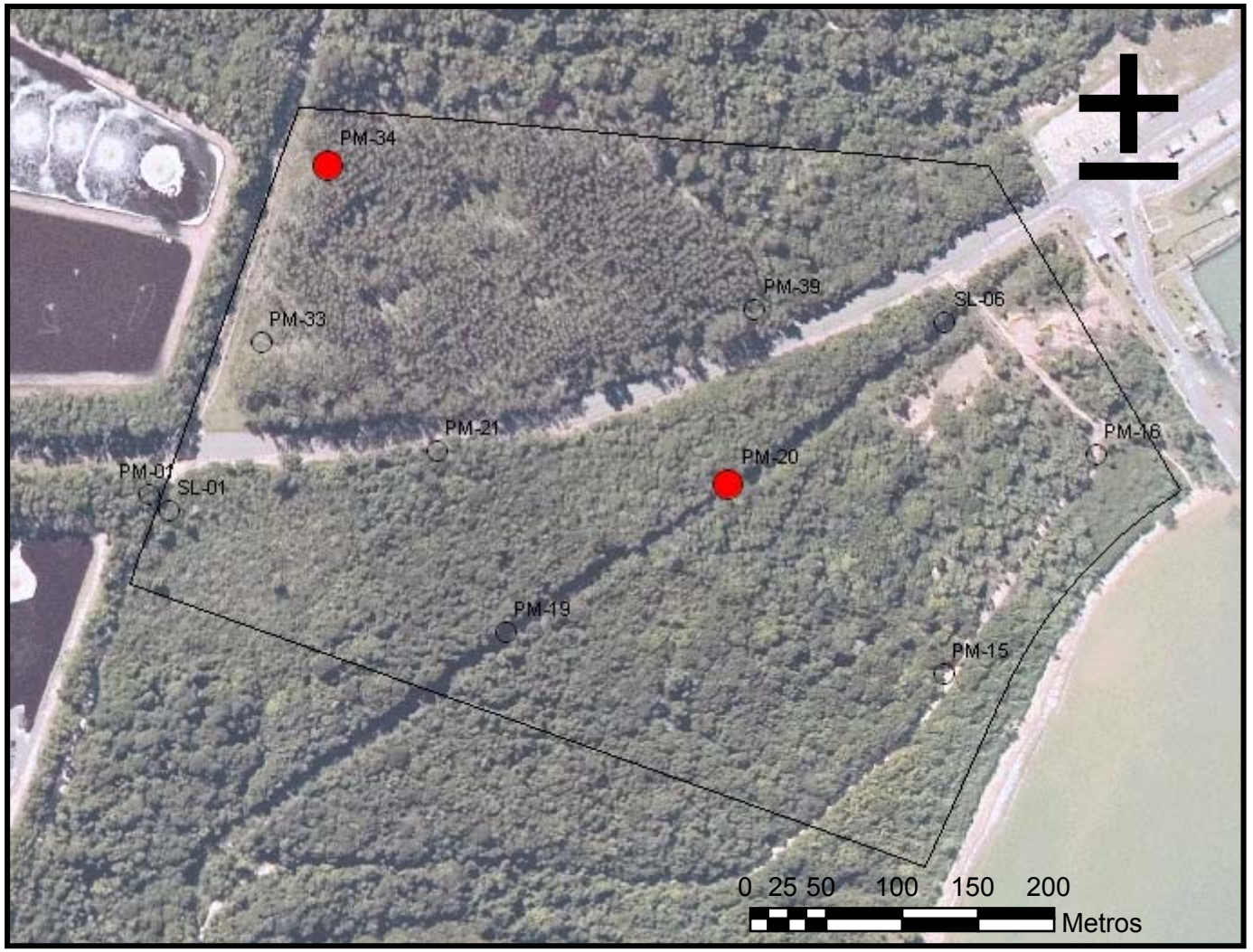
Legenda

PM 20 - 0,0019

PM 34 - 0,0009

Valores em ppb

FIGURA 34



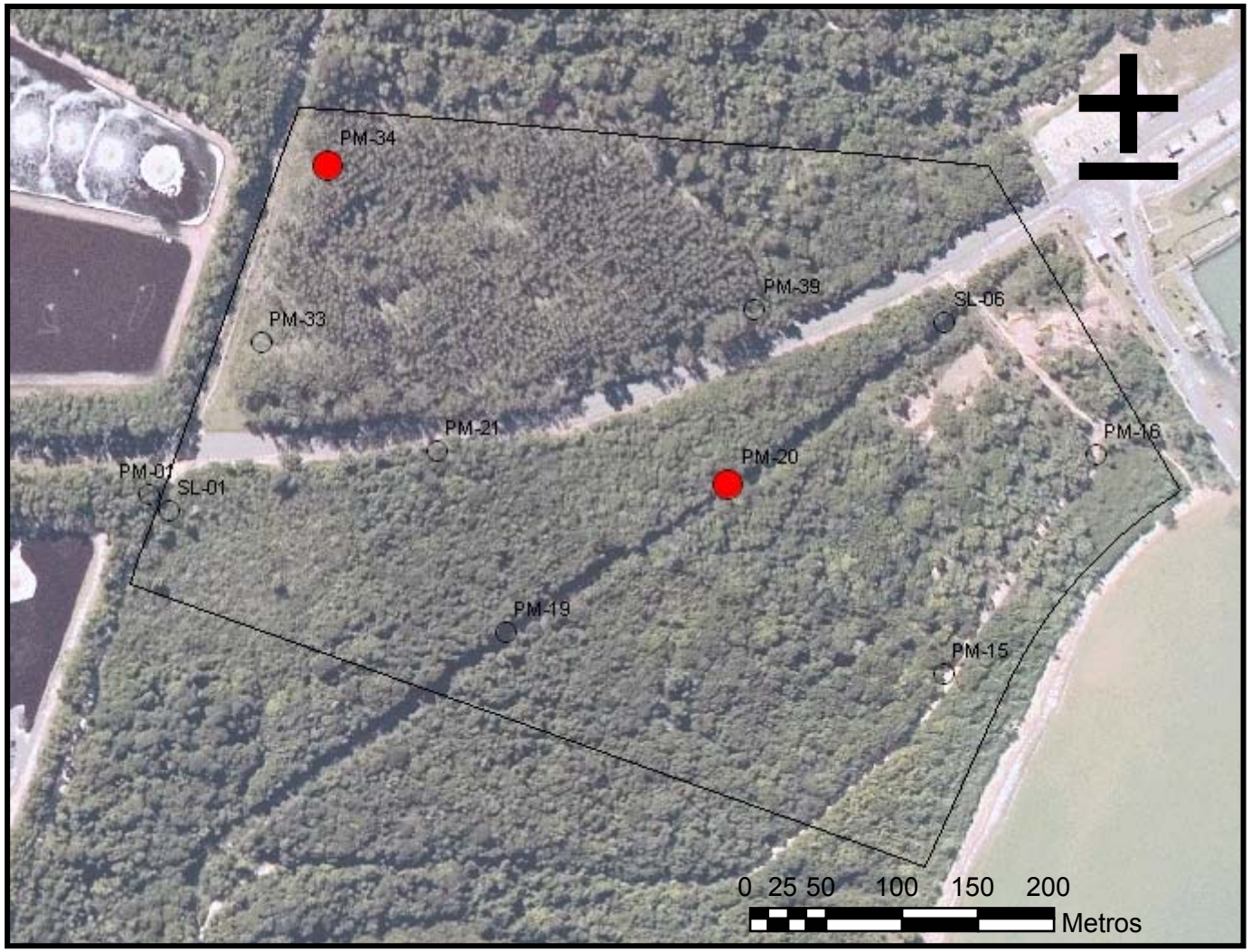
Legenda

PM 20 - 0,0015

PM 34 - 0,0012

Valores em ppb

FIGURA 35



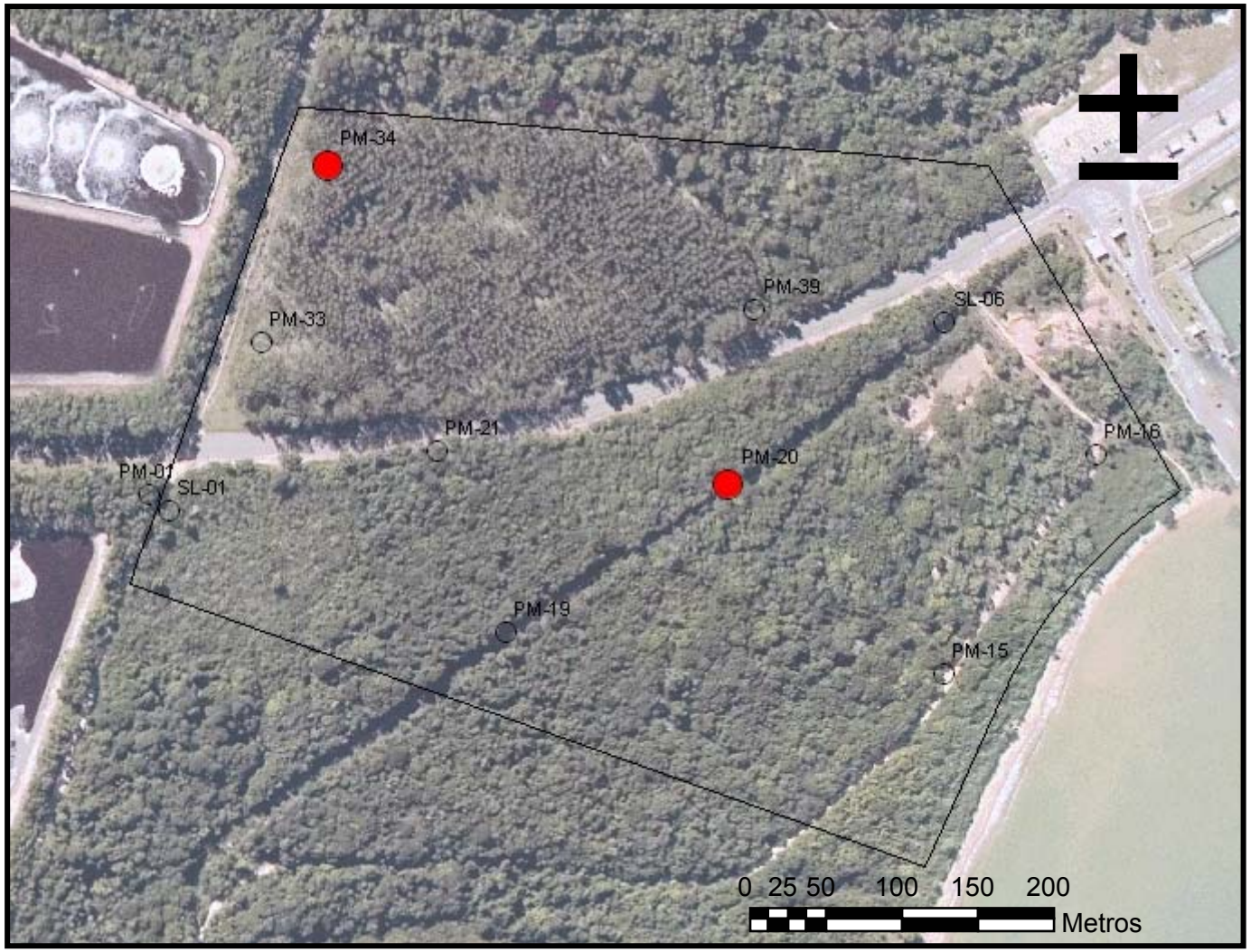
Legenda

PM 20 - 0,0016

PM 34 - 0,0014

Valores em ppb

FIGURA 36



Legenda

PM 20 - 0,0030

PM 34 - 0,0026

Valores em ppb

FIGURA 37

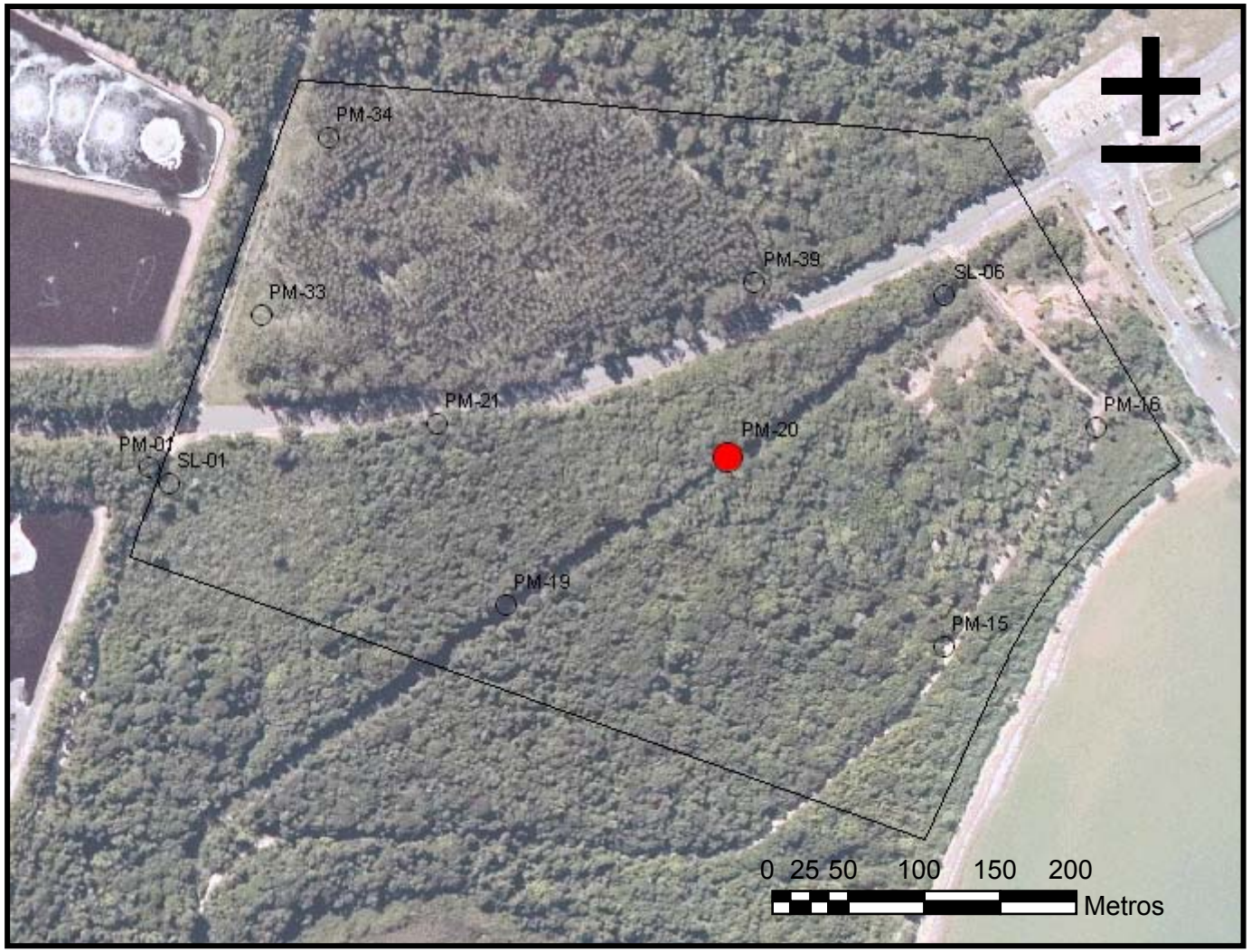


Legenda

PM 34 - 0,0010

Valores em ppb

FIGURA 38

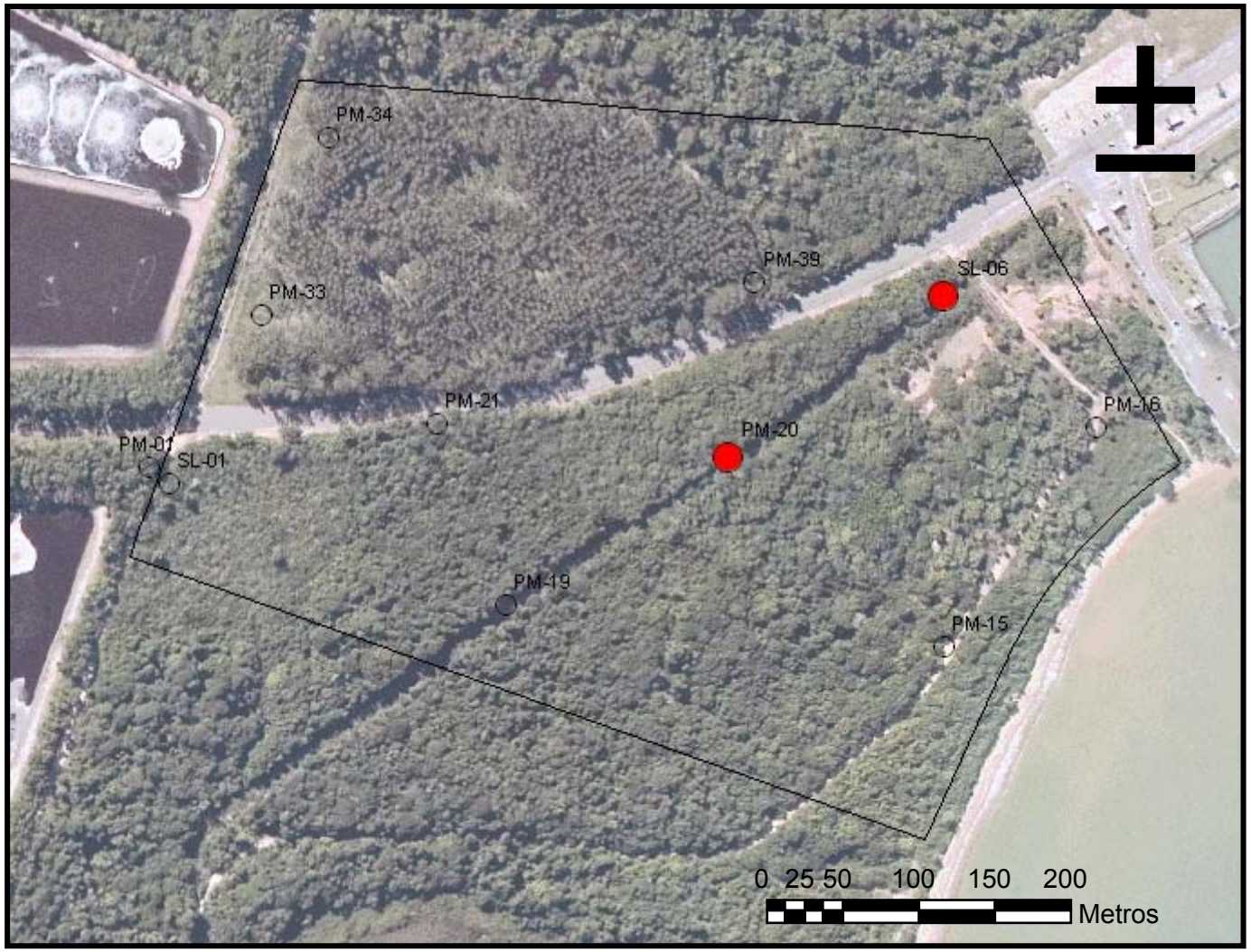


Legenda

PM 20 - 0,0030

Valores em ppb

FIGURA 39



Legenda

(PM 20 - 0,0028

(SL 06 - 0,0021

Valores em ppb

FIGURA 40



Legenda

PM 21 - 0,0006

Valores em ppb

FIGURA 41



Legenda

PM 39 - 0,0026

Valores em ppb

FIGURA 42



Legenda

A Poços de Monitoramento

Limite da Área

FIGURA 43

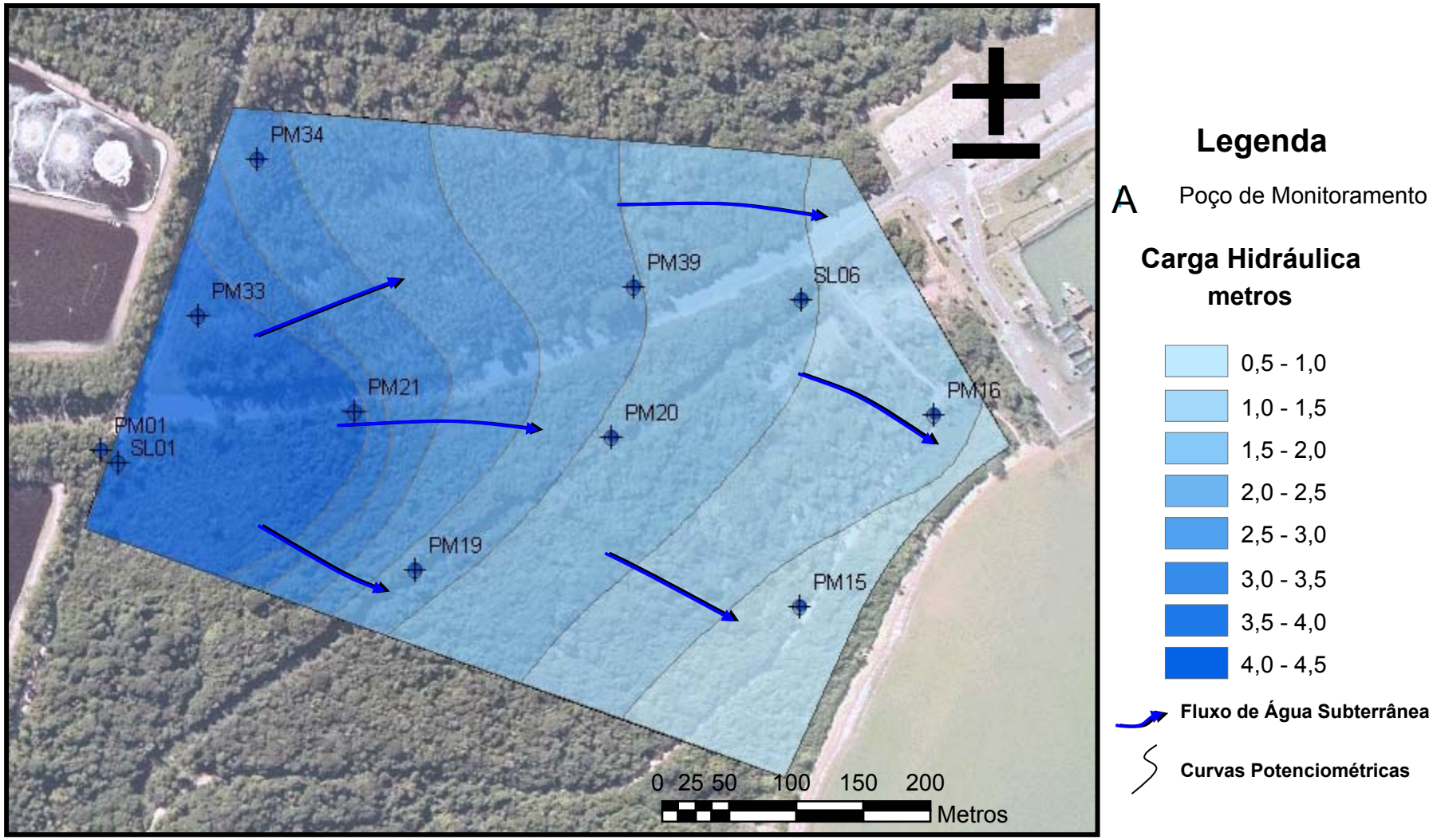

PM34
PM33
PM39
SL06
PM21
PM20
PM16
PM01
SL01
PM19
PM15
0 25 50 100 150 200
Metros
Legenda
A Poço de Monitoramento
Carga Hidráulica
metros
0,5 - 1,0
1,0 - 1,5
1,5 - 2,0
2,0 - 2,5
2,5 - 3,0
3,0 - 3,5
3,5 - 4,0
4,0 - 4,5
Fluxo de Água Subterrânea
Curvas Potenciométricas

FIGURA 44

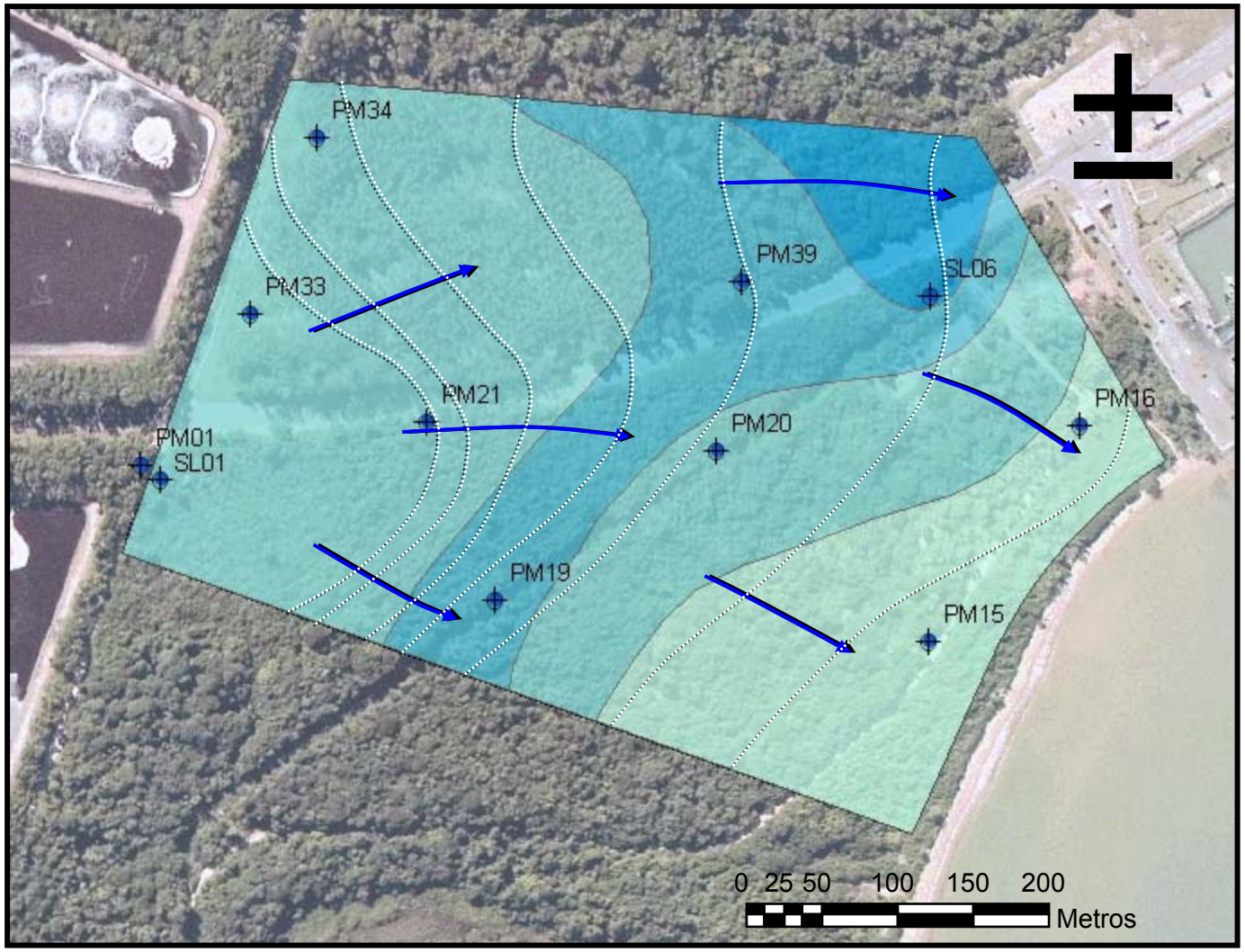
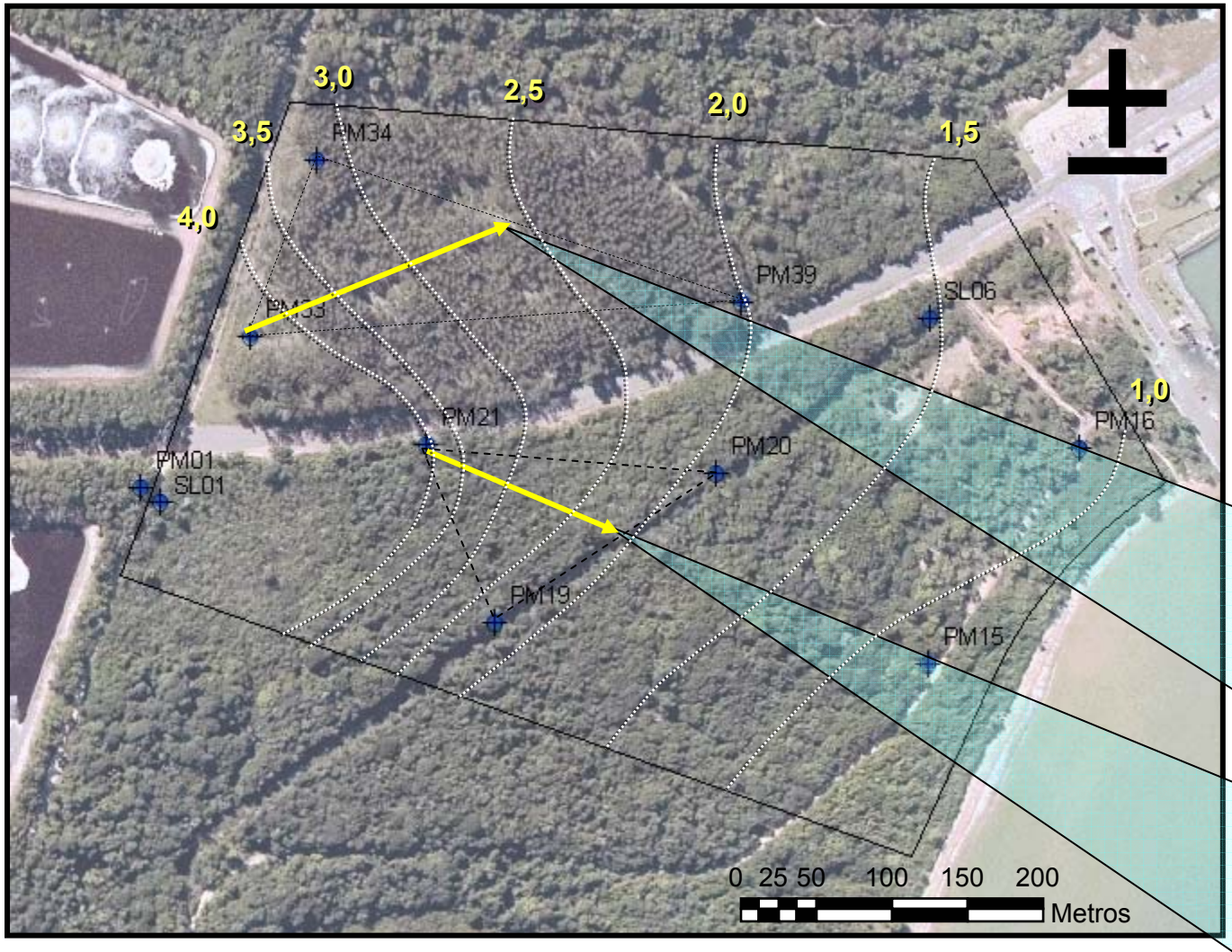

PM34
PM33
PM39
SL06
PM21
PM20
PM16
PM01
SL01
PM19
PM15
0 25 50 100 150 200
Metros
Legenda
A
Poço de Monitoramento
Log K
3,3 - 4,0
4,0 - 5,0
5,0 - 6,0
6,0 - 6,45
Curvas Potenciométricas
Sentido de Fluxo
de Água Subterrânea

FIGURA 45



Legenda

A Poço de Monitoramento

Curvas Potenciométricas

i = Gradiente hidráulico

Q = Vazão

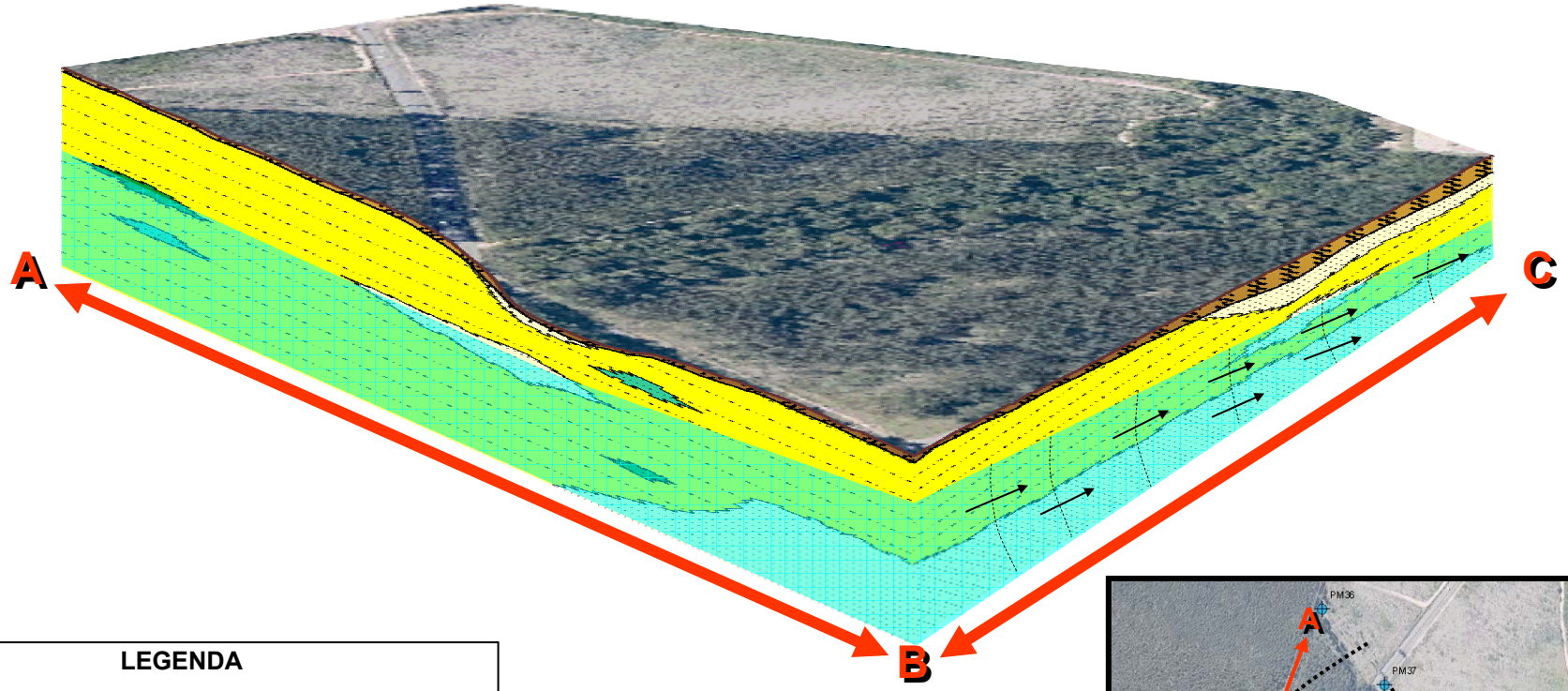
Vr = Velocidade real de fluxo

θ = Azimute

i	**0,0102**
Q	**0, 314m³/mês/m²**
Vr	**3,14 m/mês**
θ	**50 Az**

i	**0,0171**
Q	**0,854m³/mês/m²**
Vr	**8,54 m/mês**
θ	**135 Az**

FIGURA 46



LEGENDA

- SOLO
- SEDIMENTOS ARENOSOS
- SEDIMENTOS ARGILO ARENOSOS
- SEDIMENTOS ARGILOSOS
- SEDIMENTOS ARENO ARGILOSOS E ARGILO SILTOSOS
- Água doce
- Linhas de Fluxo
- Equipotencias

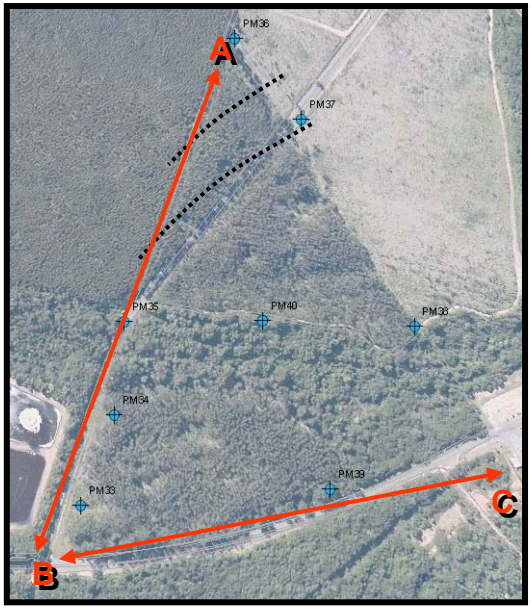


FIGURA 47

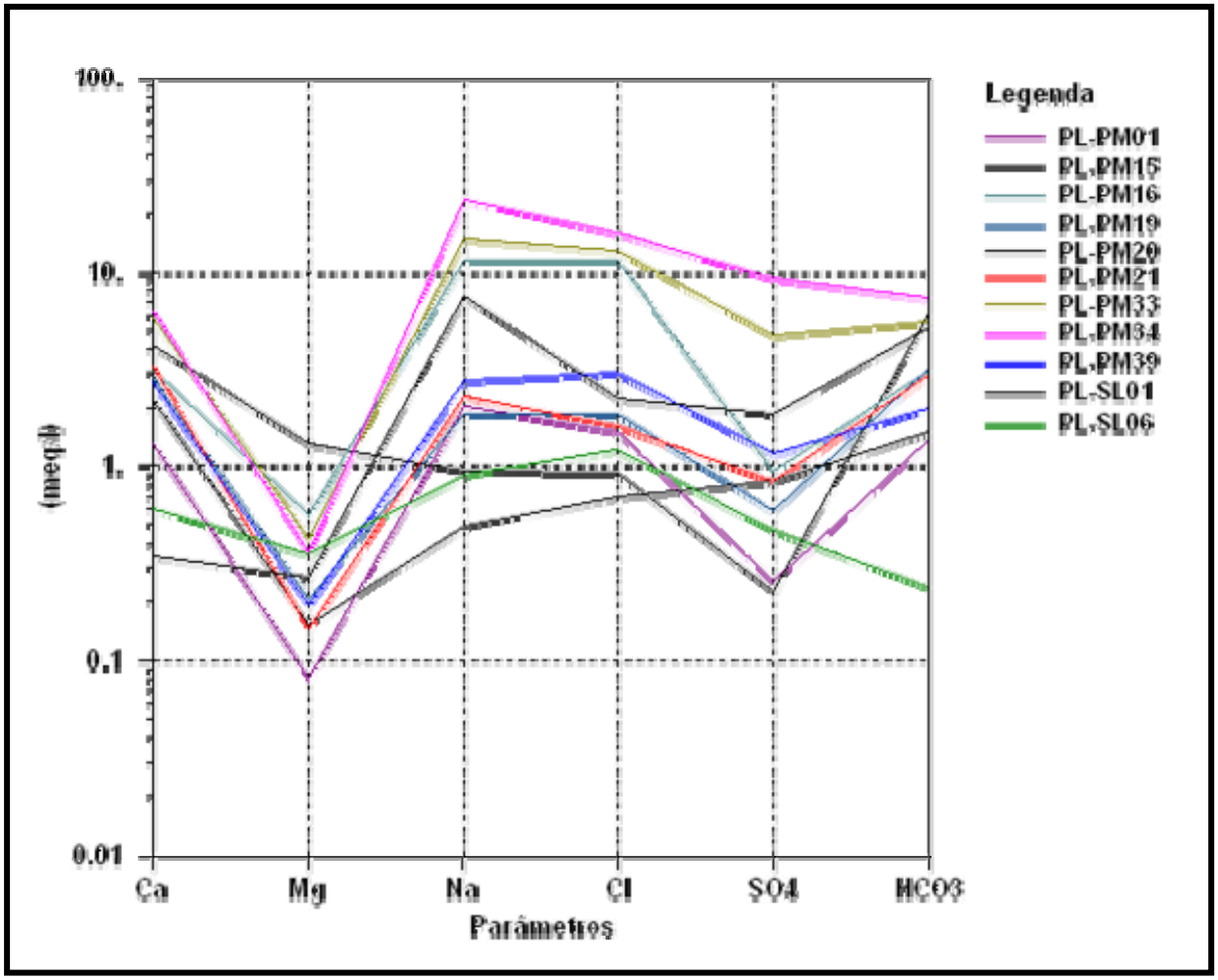

100.
10.
1.
0.1
0.01
(meq/l)
Ca
Mg
Na
Cl
SO4
HCO3
Parâmetros
Legenda
PL-PM01
PL-PM15
PL-PM16
PL-PM19
PL-PM20
PL-PM21
PL-PM33
PL-PM34
PL-PM39
PL-SL01
PL-SL06

FIGURA 48

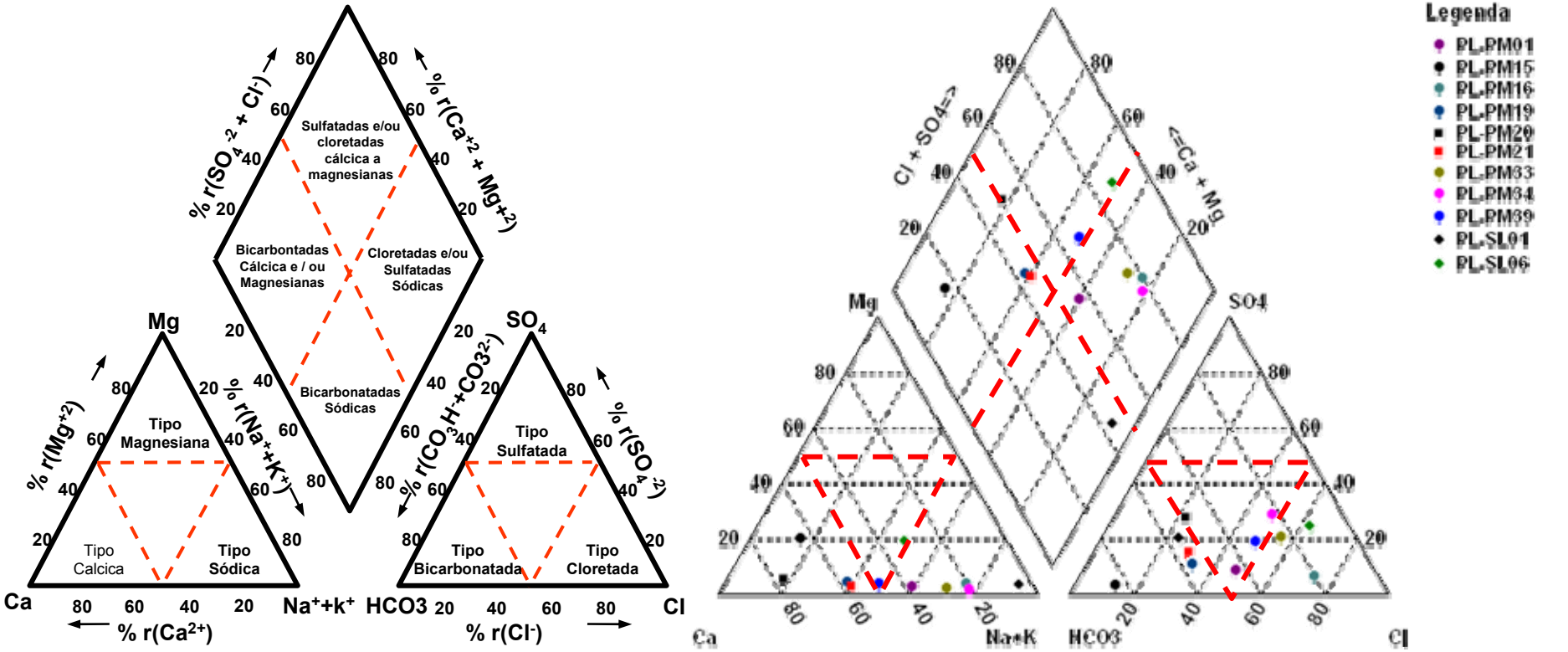
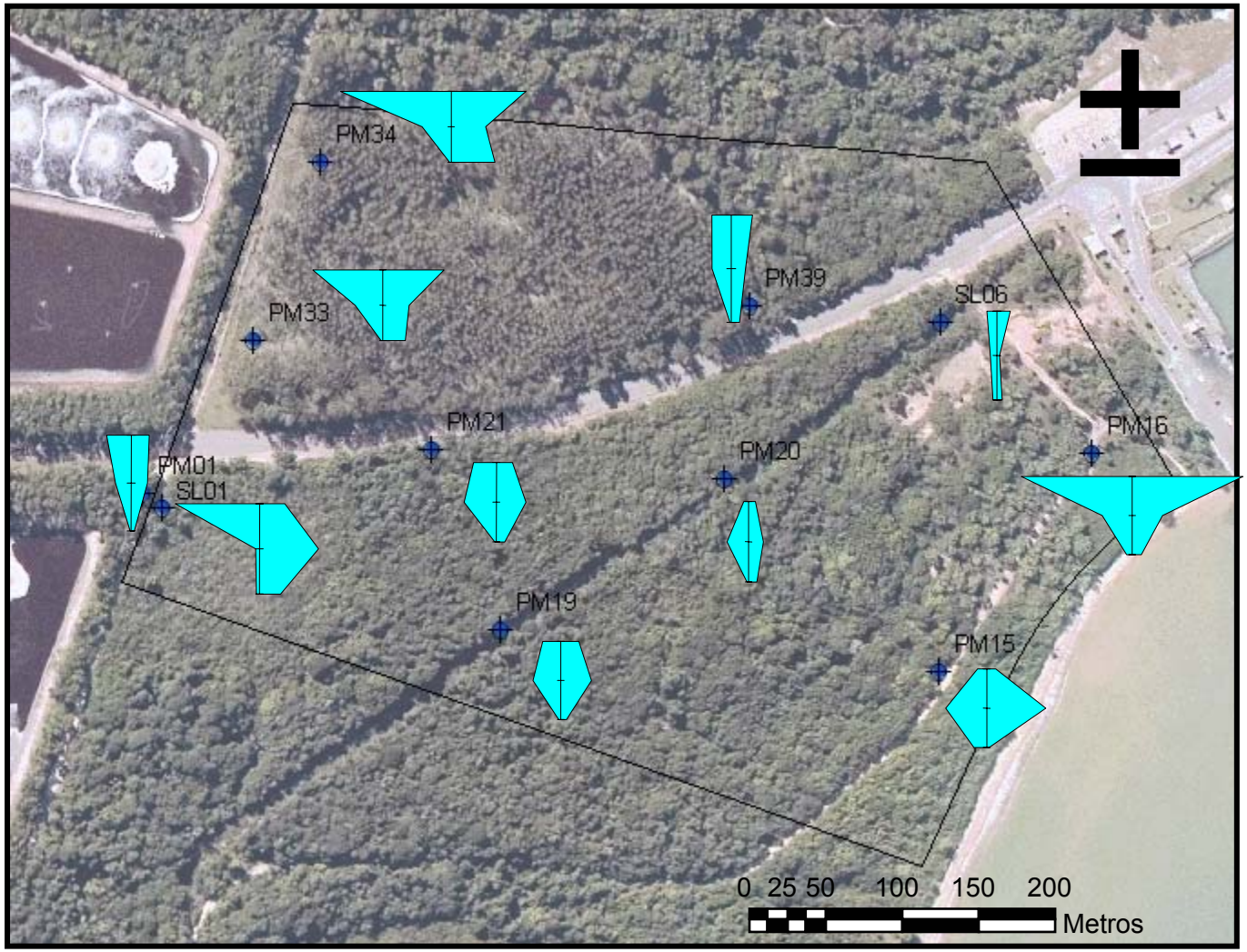


DIAGRAMA PIPER

FIGURA 49



Legenda

A Poço de Monitoramento

Limite da Área

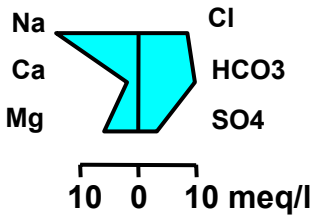
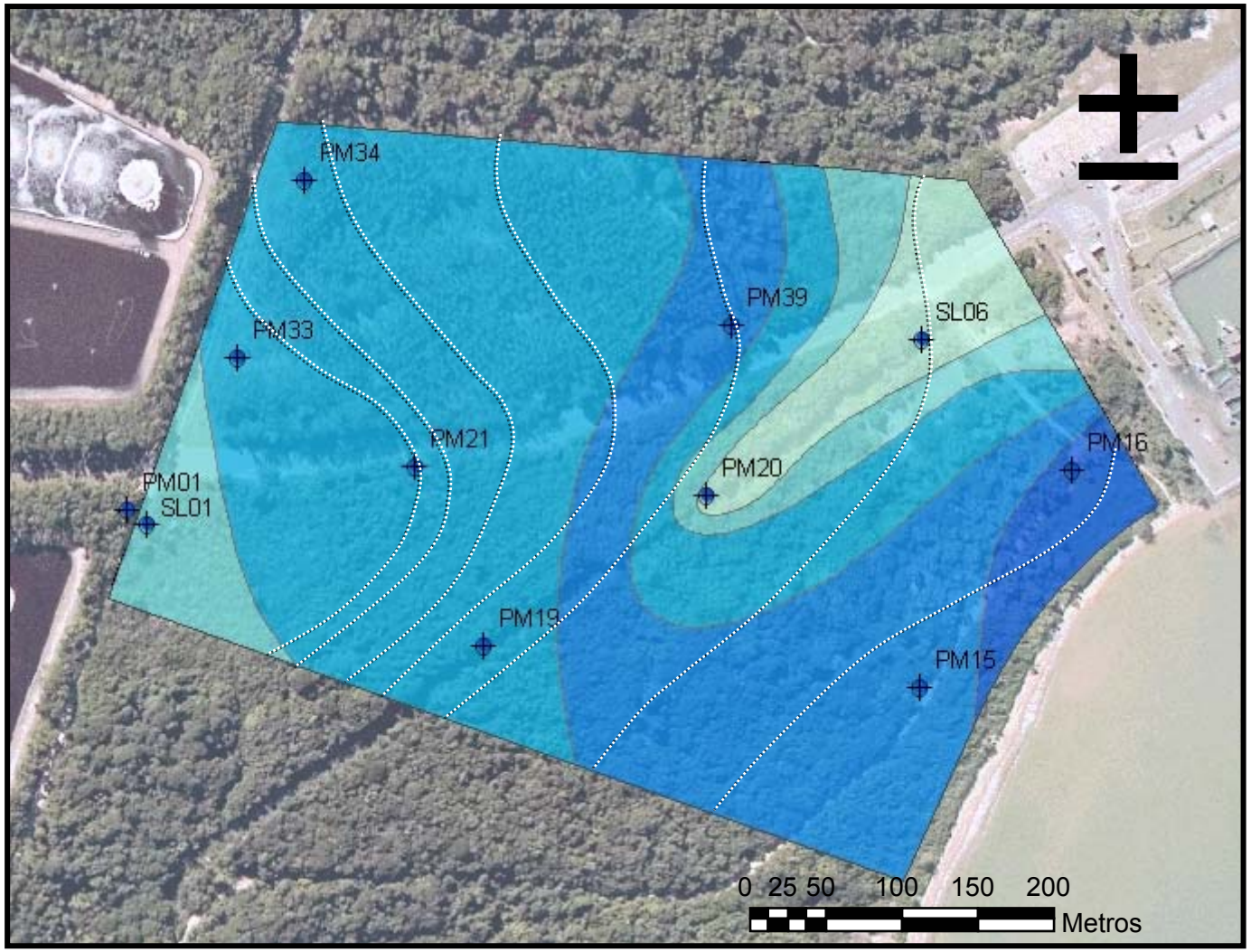


FIGURA 50

GEORADAR

TERMINAL BARRA DO RIACHO
HIDROQUIMICA
POTENCIAL HIDROGENIÔNICO – pH (log [1/H+])



Legenda

A Poço de Monitoramento

Curvas Potenciométricas

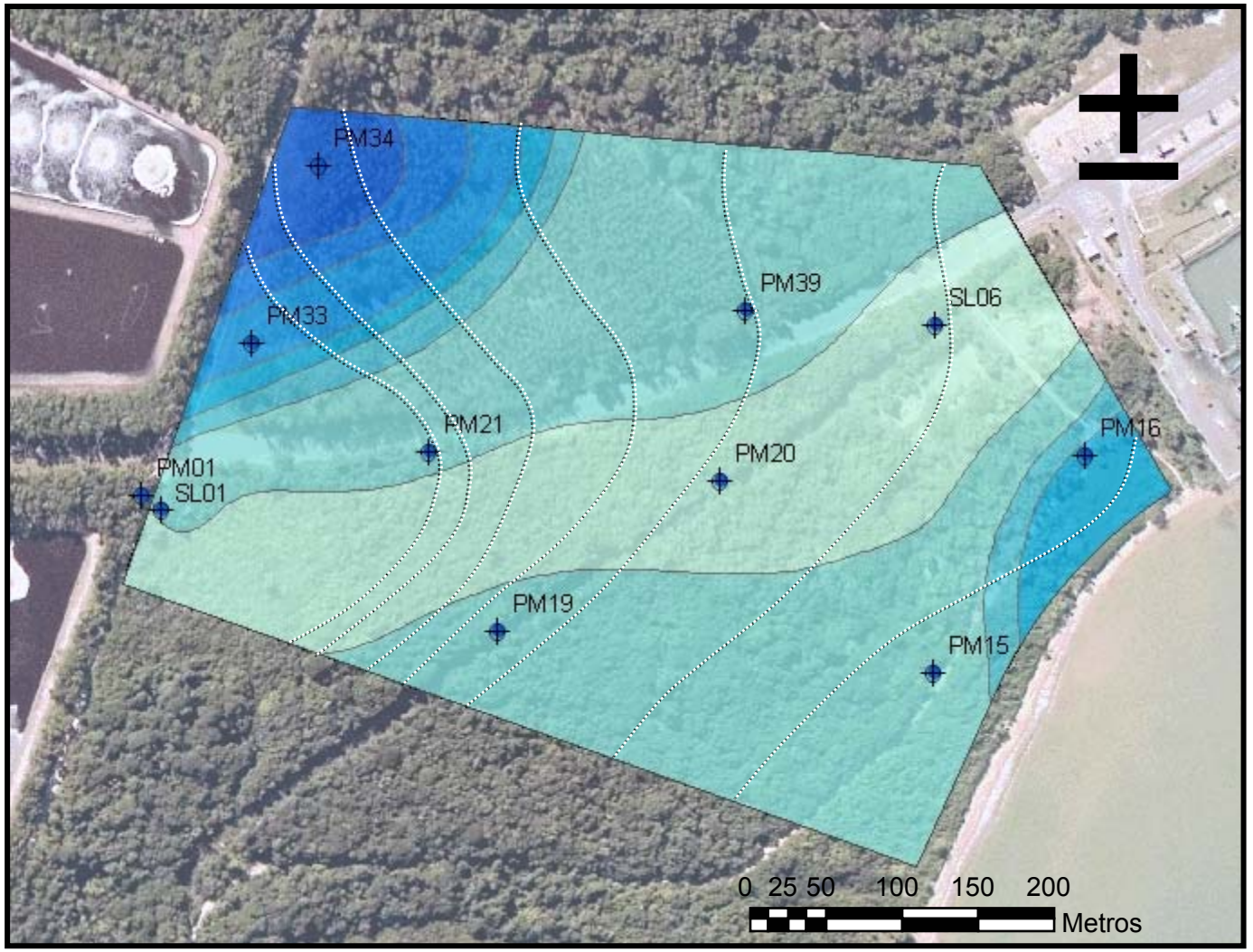
log [1/H+]

- 5,08 - 5,50
- 5,50 - 6,00
- 6,00 - 6,50
- 6,50 - 7,00
- 7,00 - 7,45

FIGURA 51

GEORADAR

TERMINAL BARRA DO RIACHO
HIDROQUIMICA
CONDUTIVIDADE ELÉTRICA – (µS/cm)



Legenda

A Poço de Monitoramento

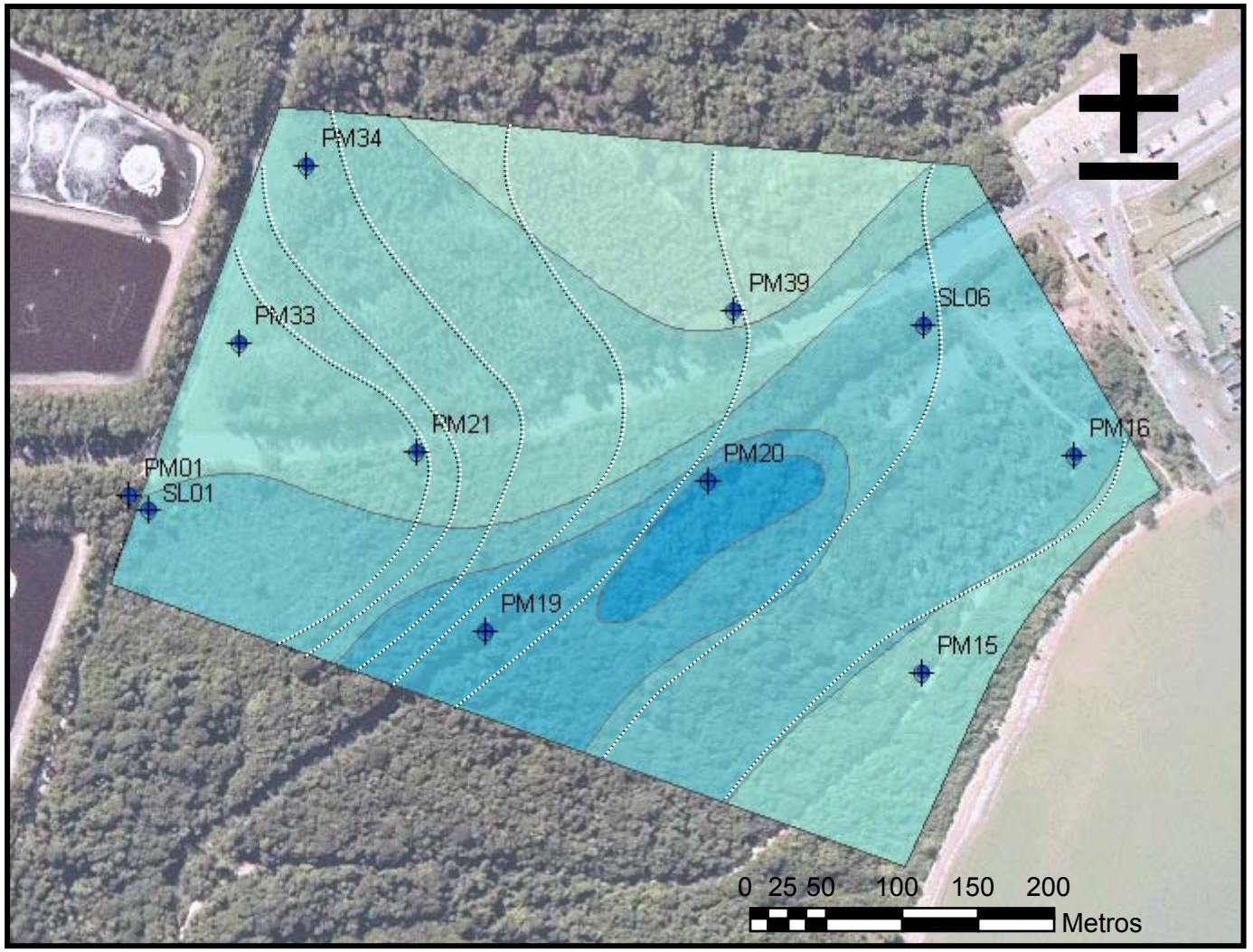
Curvas Potenciométricas

µS/cm

- 307 - 500
- 500 - 1000
- 1000 - 1500
- 1500 - 2000
- 2000 - 2500
- 2500 - 3000
- 3000 - 3500

FIGURA 52

TERMINAL BARRA DO RIACHO
HIDROQUIMICA
POTENCIAL REDOX – Eh (mV)



Legenda

A Poço de Monitoramento

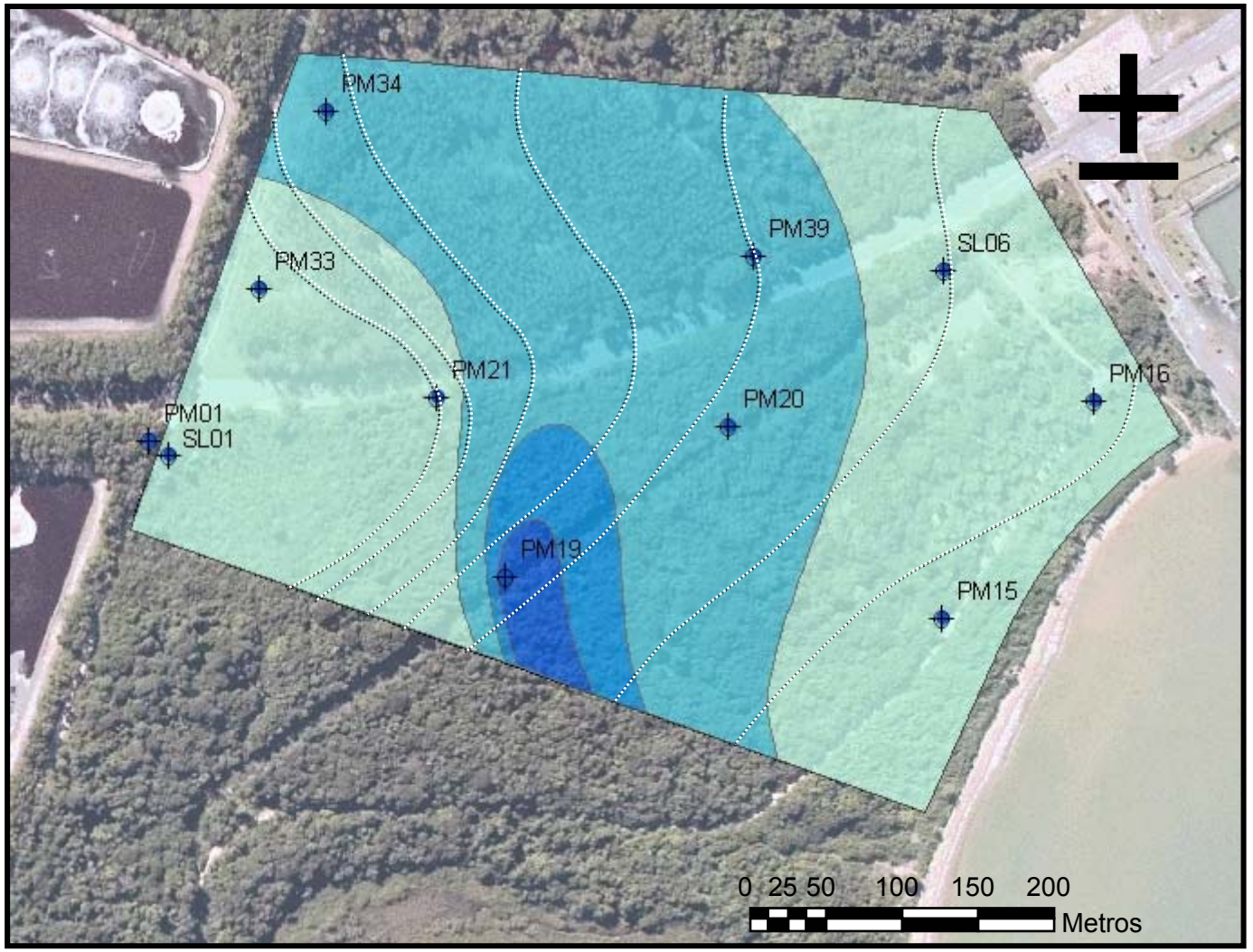
Curvas Potenciométricas

mV

- 121 - 200
- 200 - 300
- 300 - 400
- 400 - 500
- 500 - 535

FIGURA 53

TERMINAL BARRA DO RIACHO
HIDROQUIMICA
OXIGÊNIO DISSOLVIDO – OD – (mg/L)



Legenda

A Poço de Monitoramento

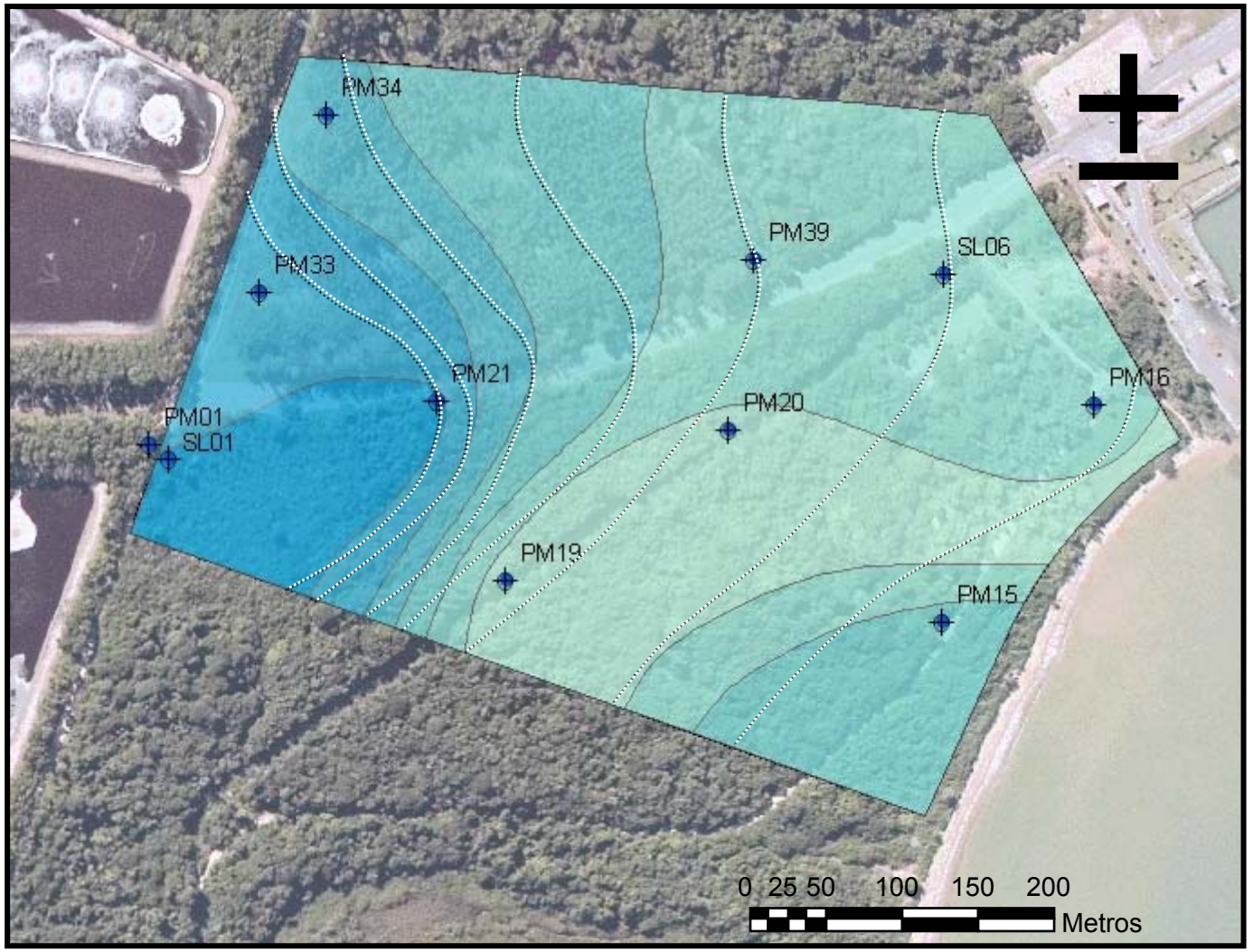
Curvas Potenciométricas

mg/L

- 0,10 - 1,00
- 1,00 - 2,00
- 2,00 - 3,00
- 3,00 - 3,23

FIGURA 54

TERMINAL BARRA DO RIACHO
HIDROQUIMICA
TEMPERATURA (°C)



Legenda

A Poço de Monitoramento

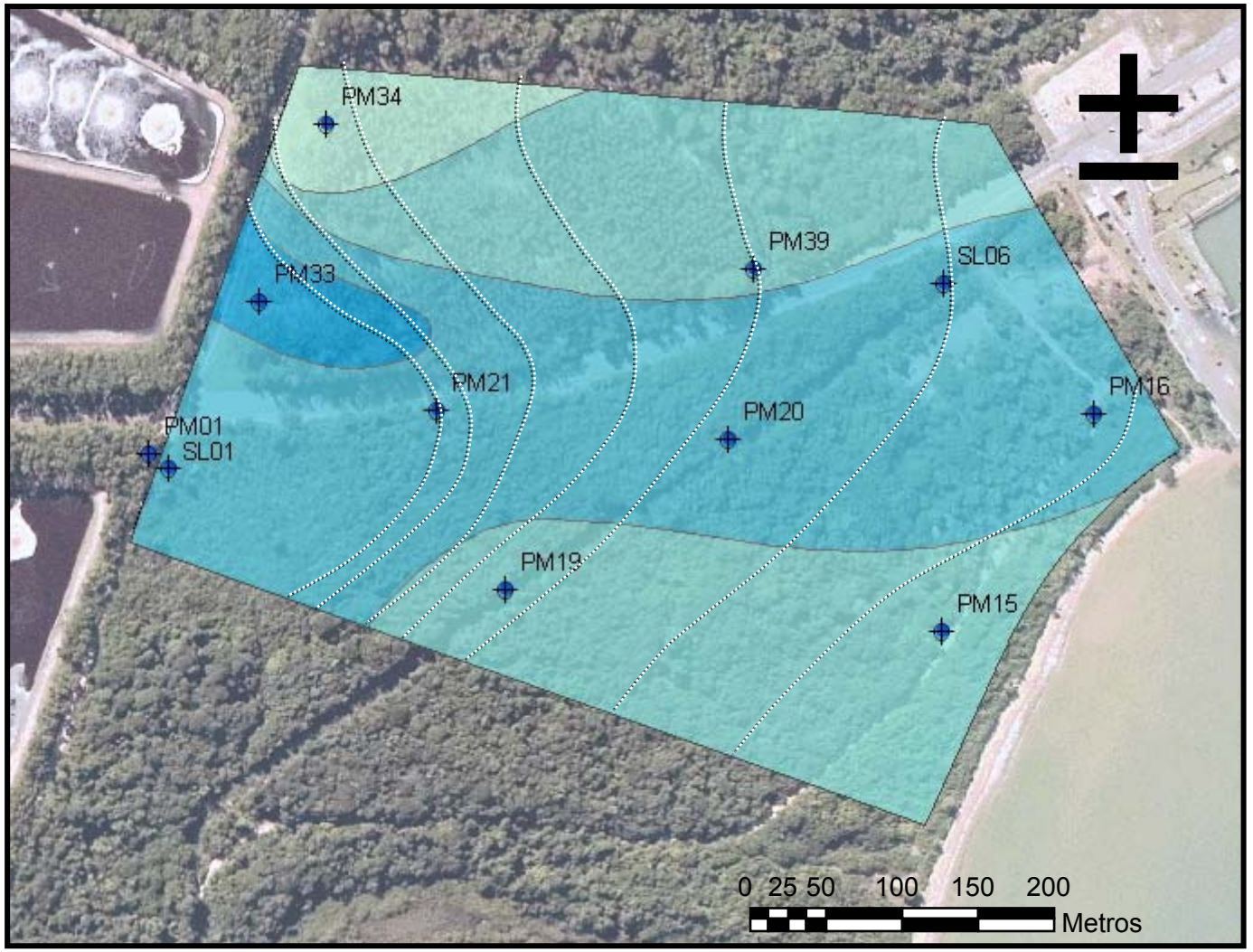
Curvas Potenciométricas

° C

- 24,21 - 24,50
- 24,50 - 25,00
- 25,00 - 25,50
- 25,50 - 26,00
- 26,00 - 26,50
- 26,50 - 26,99

FIGURA 55

TERMINAL BARRA DO RIACHO
HIDROQUIMICA
TURBIDEZ (NTU)



Legenda

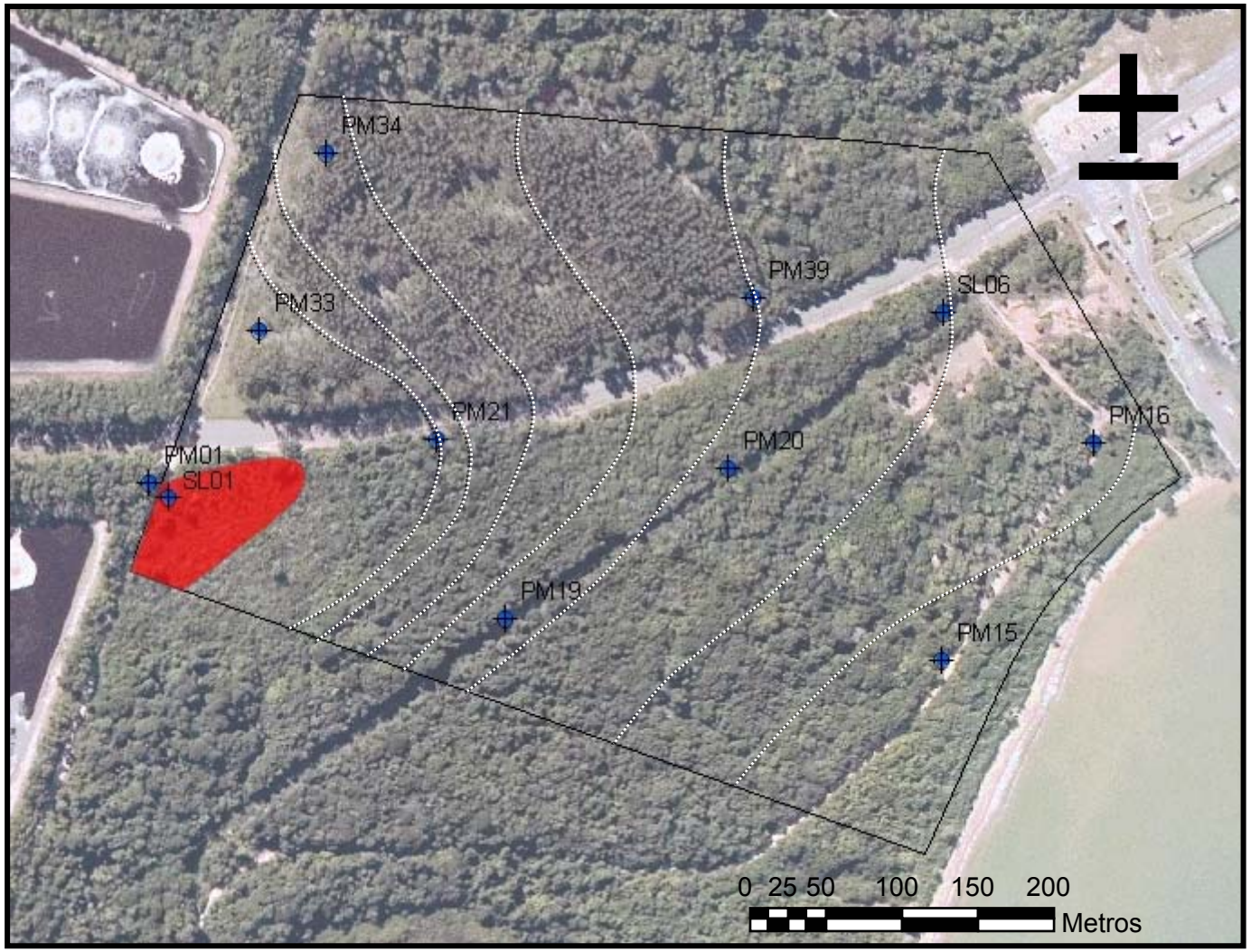
A Poço de Monitoramento

Curvas Potenciométricas

NTU

- 0,6 - 1,0
- 1,0 - 20,0
- 20,0 - 100,0
- 100,0 - 140,0

FIGURA 56



Legenda

A Poço de Monitoramento

Curvas Potenciométricas

Limite da Área

ppm

0,050 - 0,123

•Valor máximo de potabilidade
• (MS) = 0,05 ppm

FIGURA 57



Legenda

A Poço de Monitoramento

Curvas Potenciométricas

Limite da Área

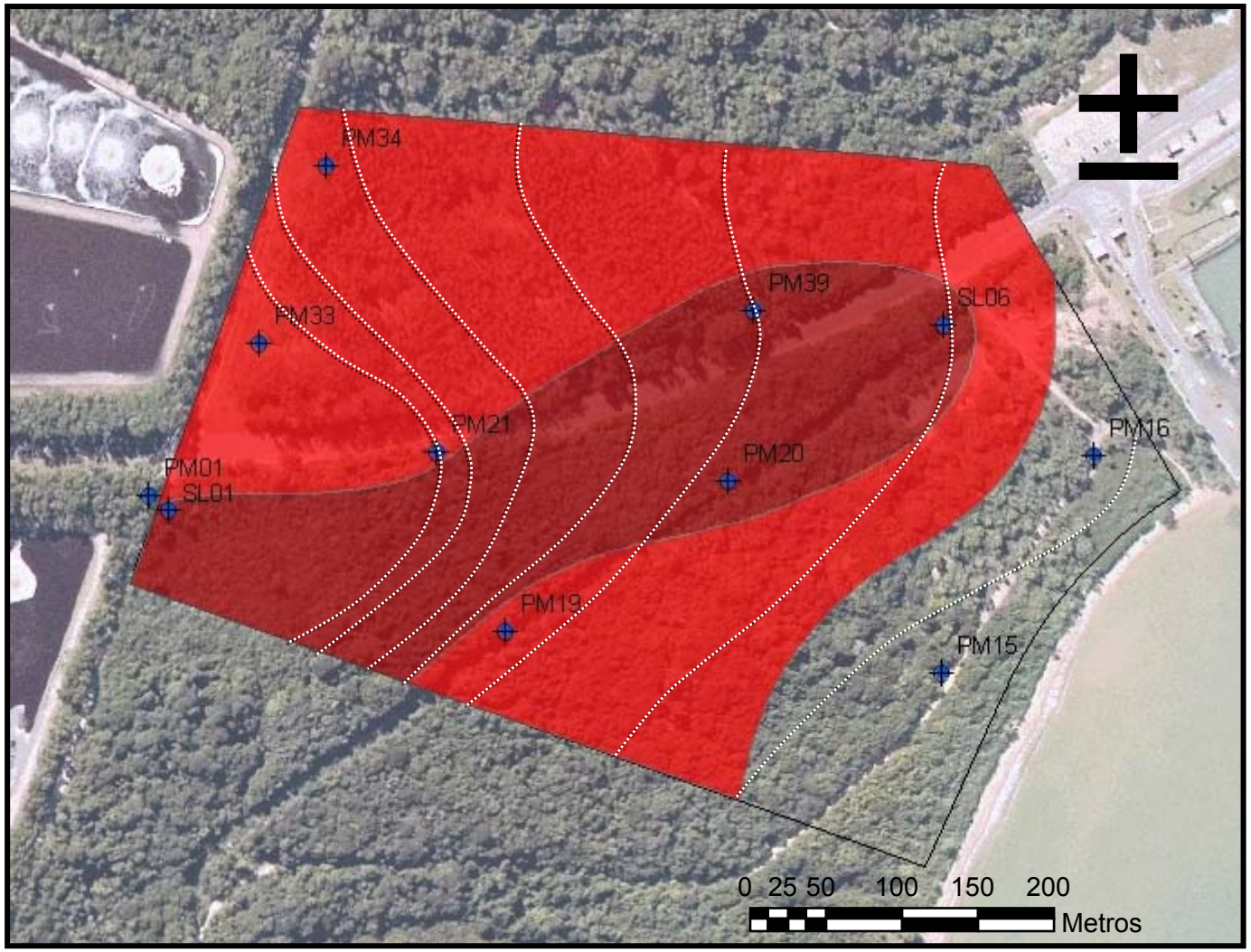
ppm

0,010 - 0,050

0,050 - 0,151

•Limite de Interveção CETESB e Valor máximo de potabilidade (MS) – 0,01 ppm

FIGURA 58



Legenda

A Poço de Monitoramento

Curvas Potenciométricas

Limite da Área

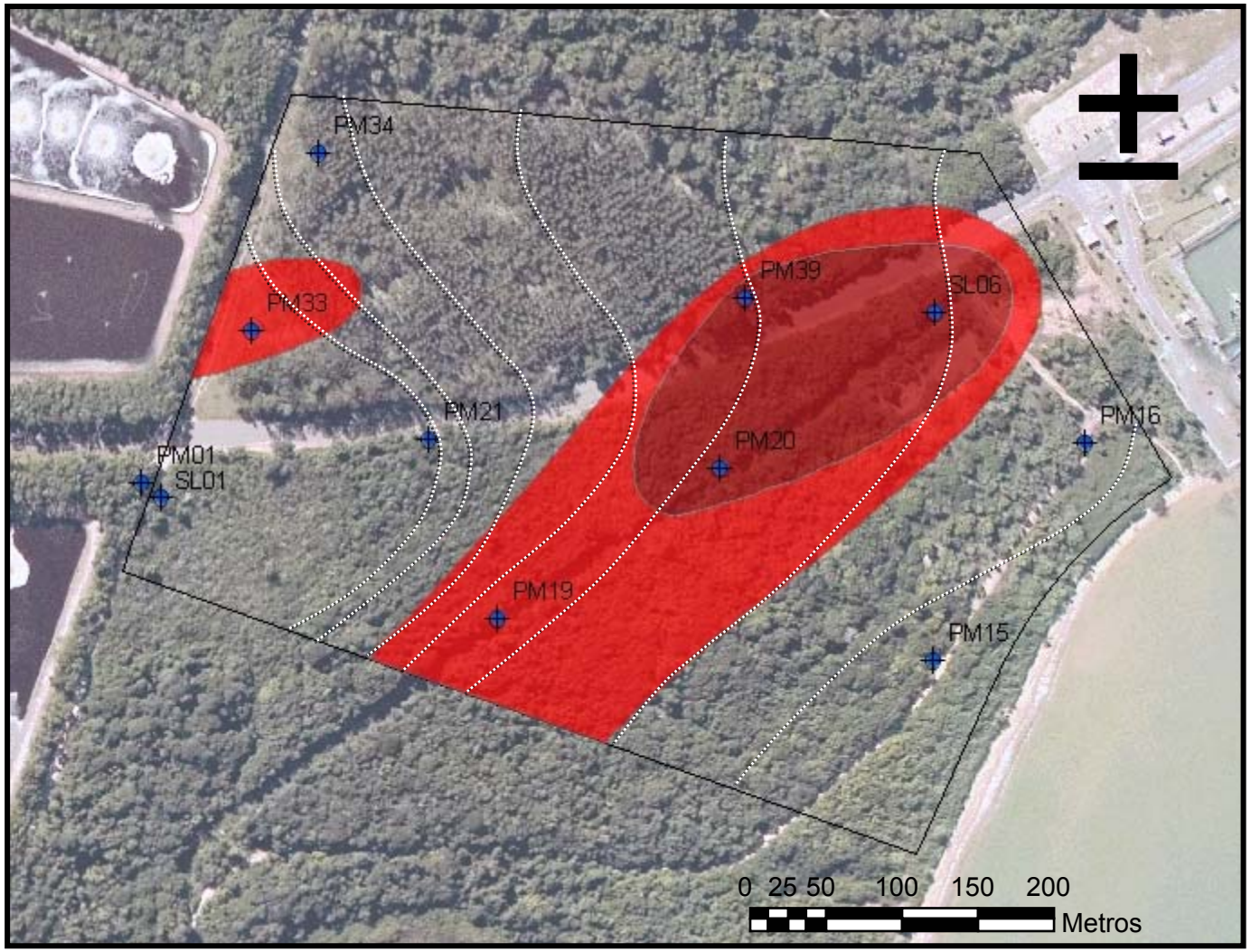
ppm

0,30 - 2,00

2,00 - 10,30

•Valor máximo de potabilidade
•(MS) = 0,30 ppm

FIGURA 59



Legenda

A Poço de Monitoramento

Curvas Potenciométricas

Limite da Área

ppm

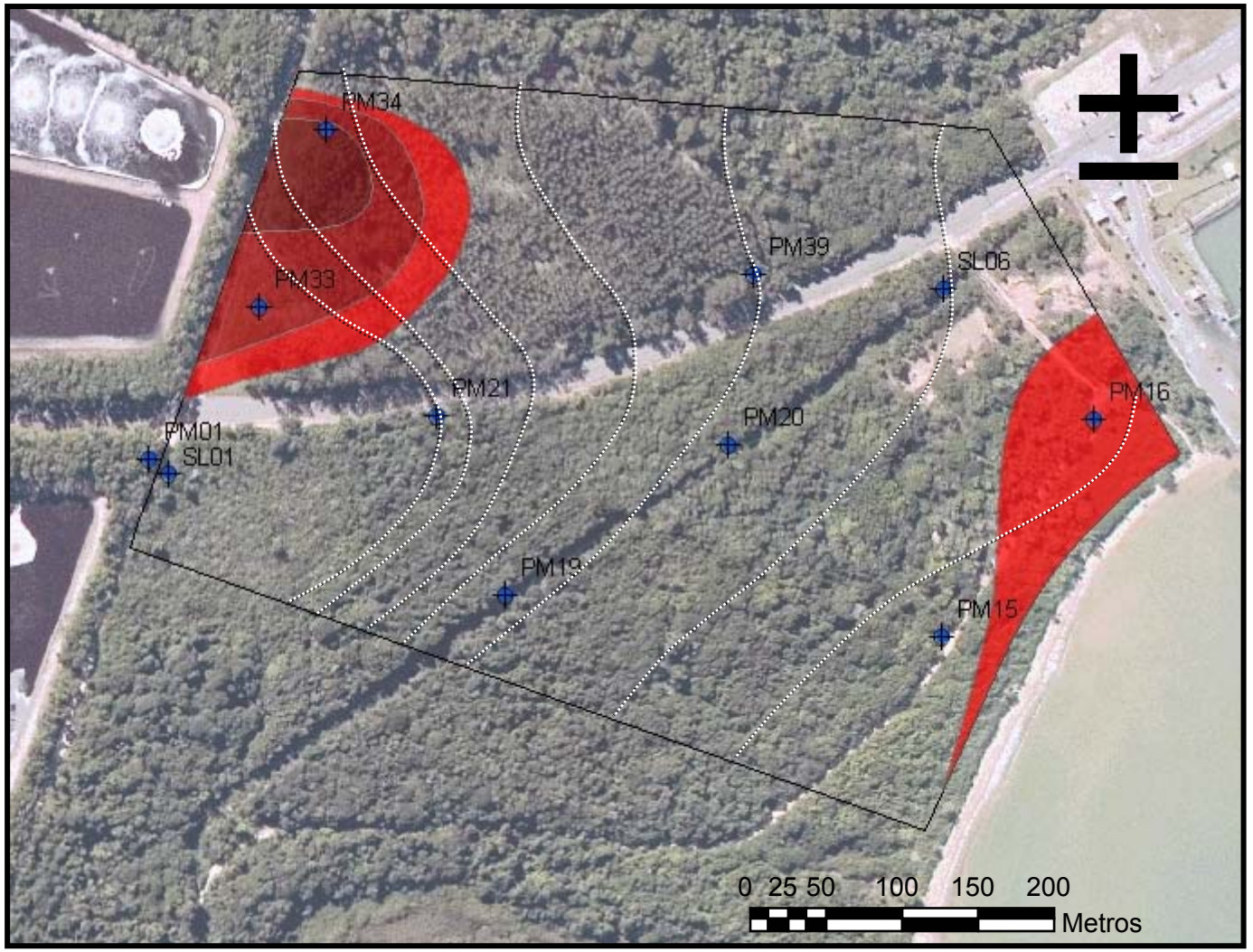
0,10 - 0,30

0,30 - 0,50

•Valor máximo de potabilidade
•(MS) = 0,10 ppm

FIGURA 60

TERMINAL BARRA DO RIACHO
HIDROQUIMICA
SODIO



Legenda

A Poço de Monitoramento

Curvas Potenciométricas

Limite da Área

ppm

200 - 300

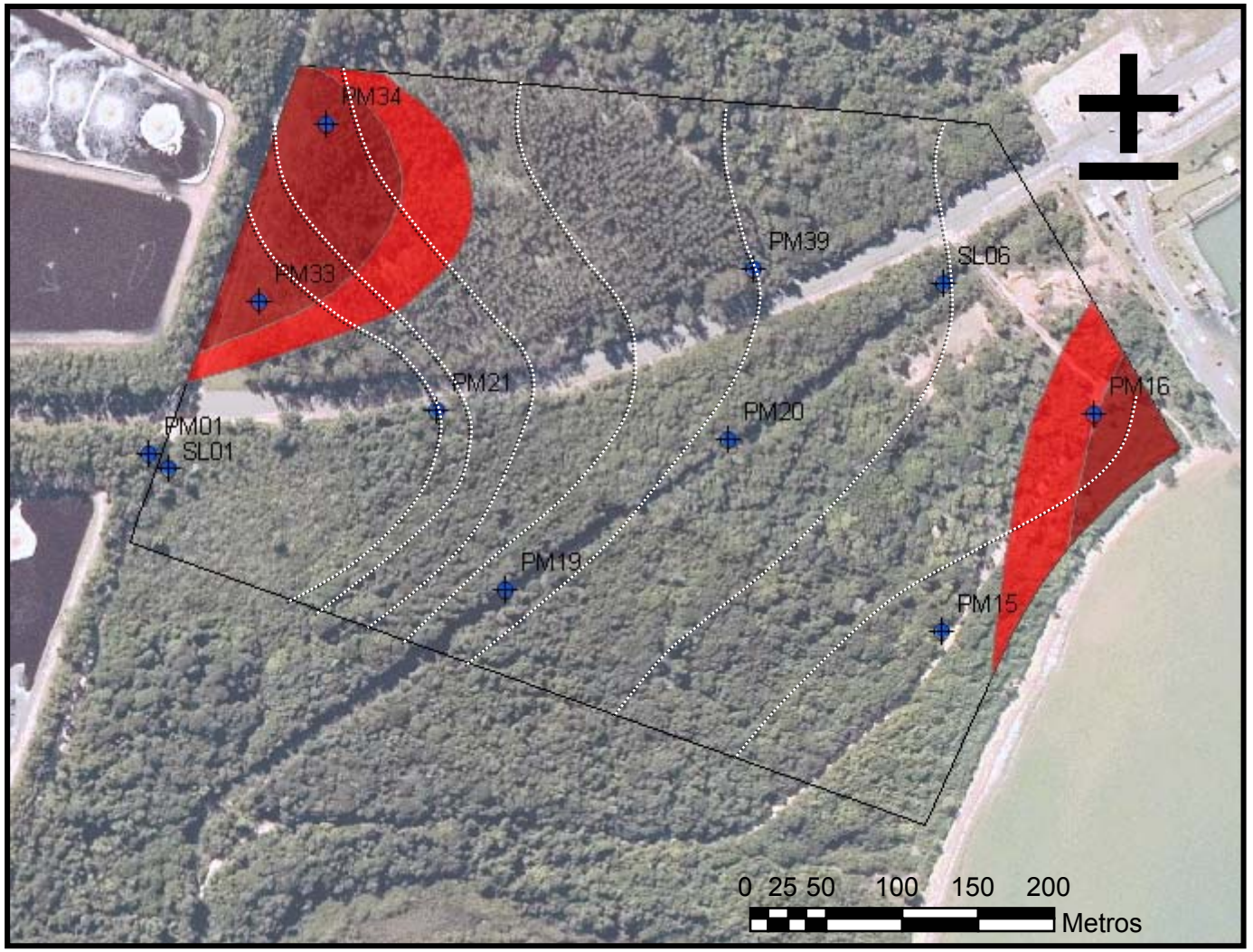
300 - 500

500 - 539

•Valor máximo de potabilidade
•(MS) =200 ppm

FIGURA 61

TERMINAL BARRA DO RIACHO
HIDROQUIMICA
CLORETO



Legenda

A Poço de Monitoramento

Curvas Potenciométricas

Limite da Área

ppm

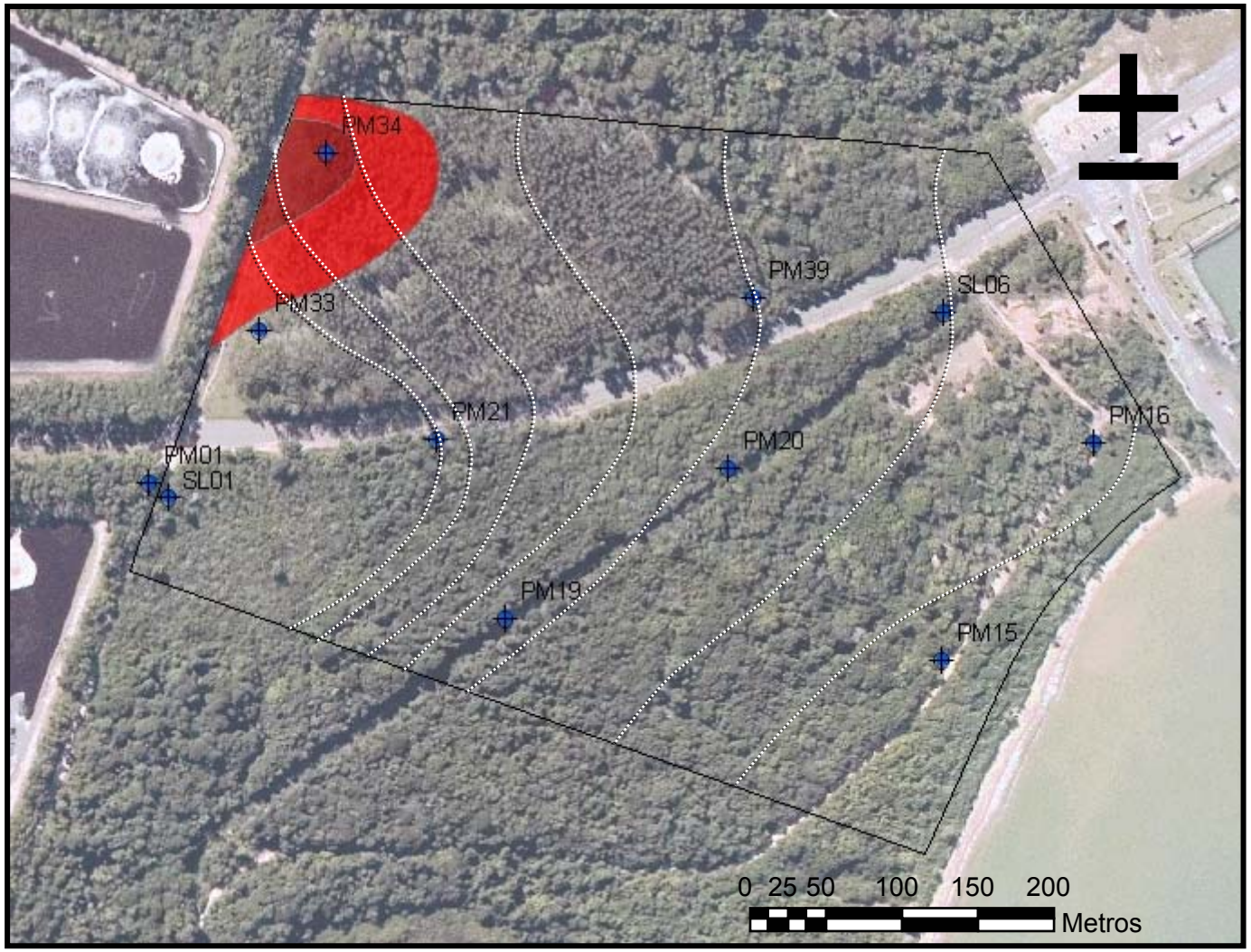
250,00 - 400,00

400,00 - 560,69

•Valor máximo de potabilidade
• (MS) = 250 ppm

FIGURA 62

TERMINAL BARRA DO RIACHO
HIDROQUIMICA
SULFATO



Legenda

A Poço de Monitoramento

Curvas Potenciométricas

Limite da Área

ppm

250,00 - 400,00

400,00 - 443,81

•Valor máximo de potabilidade
•(MS) = 250 ppm

FIGURA 63

TERMINAL BARRA DO RIACHO
HIDROQUIMICA
NITRATO



Legenda

A Poço de Monitoramento

Curvas Potenciométricas

Limite da Área

ppm

10,00 - 20,49

•Valor máximo de potabilidade
• (MS) = 10 ppm

FIGURA 64

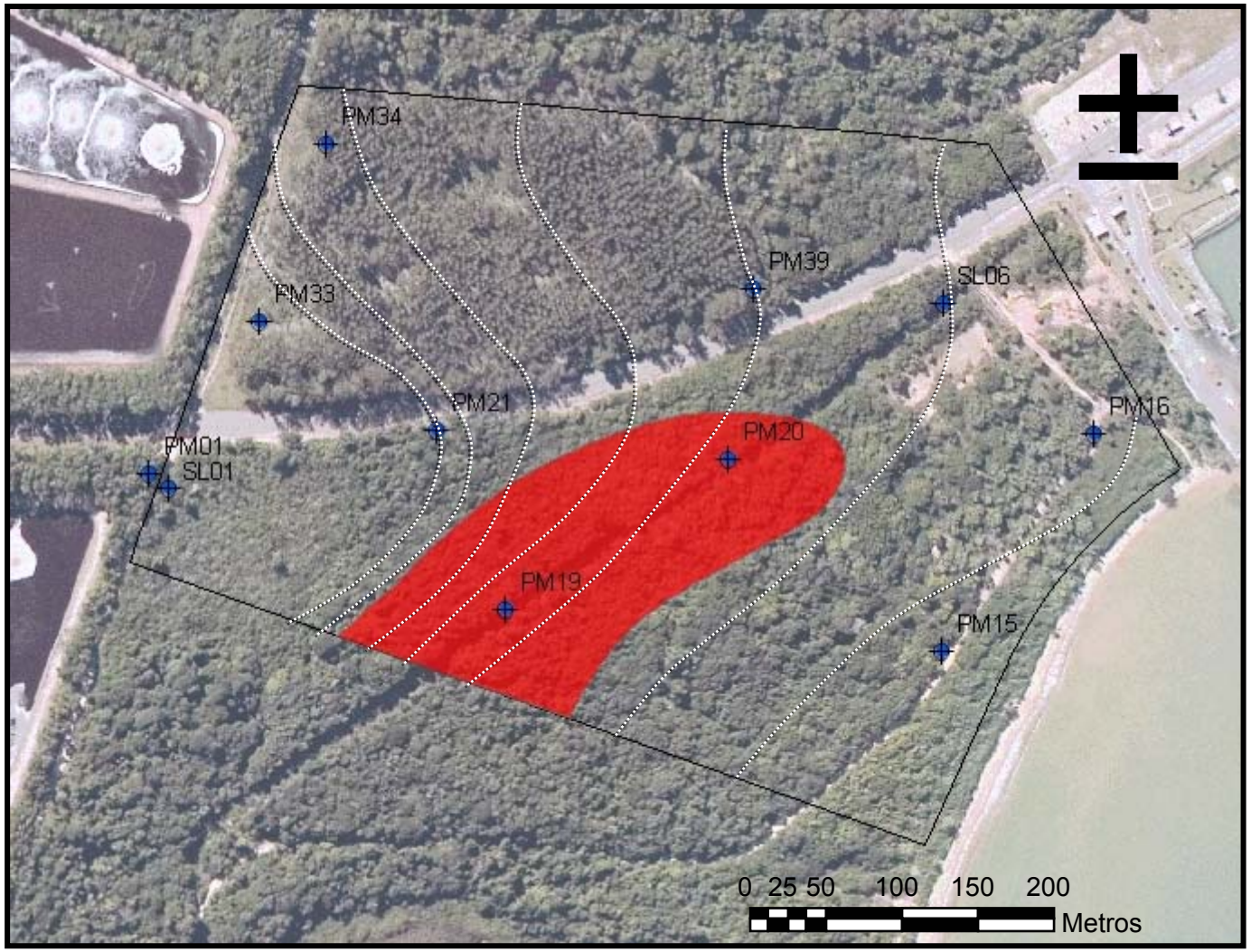

PM34
PM33
PM39
SL06
PM21
PM20
PM16
PM01
SL01
PM19
PM15
0 25 50 100 150 200
Metros
Legenda
A Poço de Monitoramento
Curvas Potenciométricas
Limite da Área
ppq
4,0 - 18,0

FIGURA 65



Legenda

A Poço de Monitoramento

Curvas Potenciométricas

Limite da Área

ppq

20,0 - 40,0

40,0 - 75,6

FIGURA 66

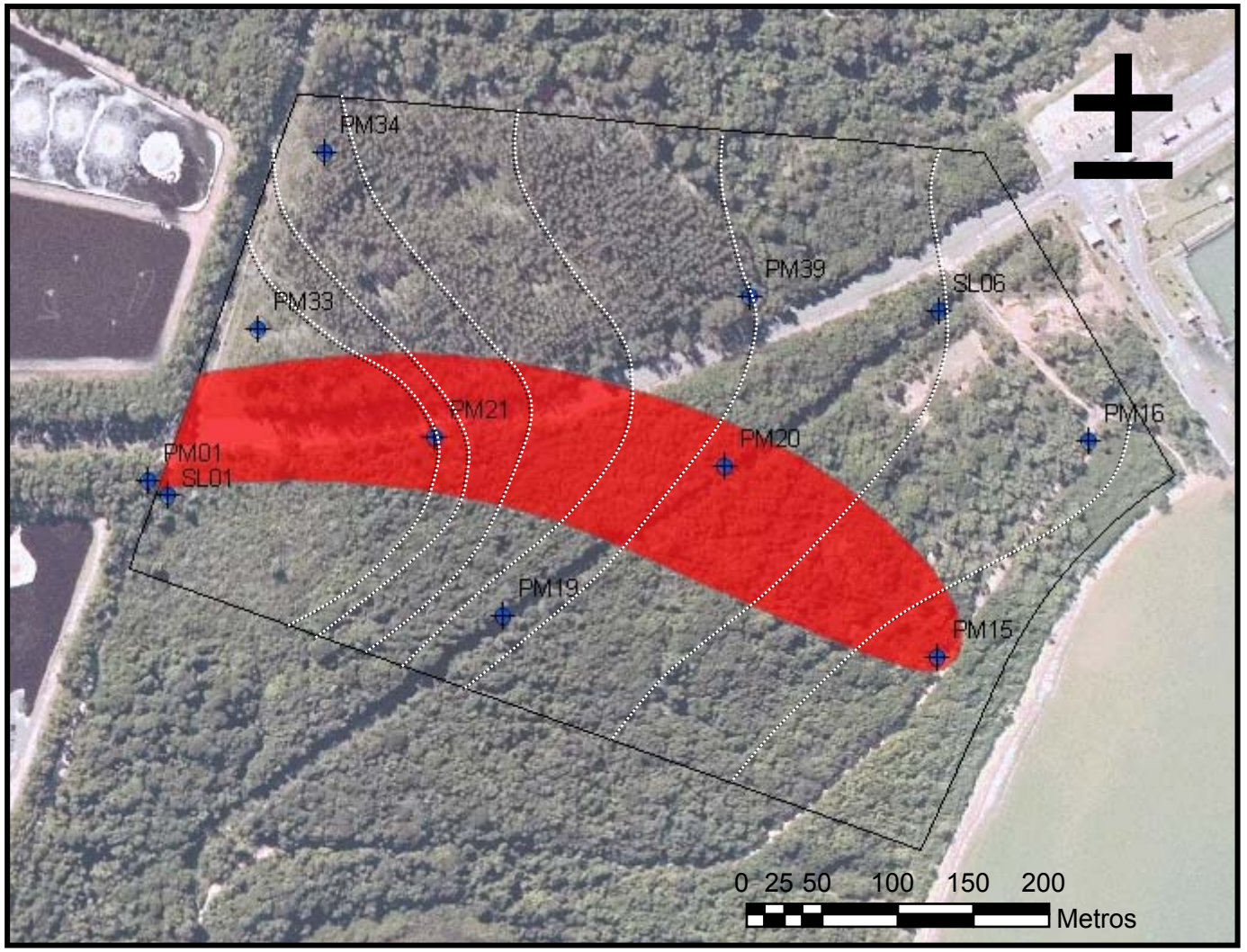
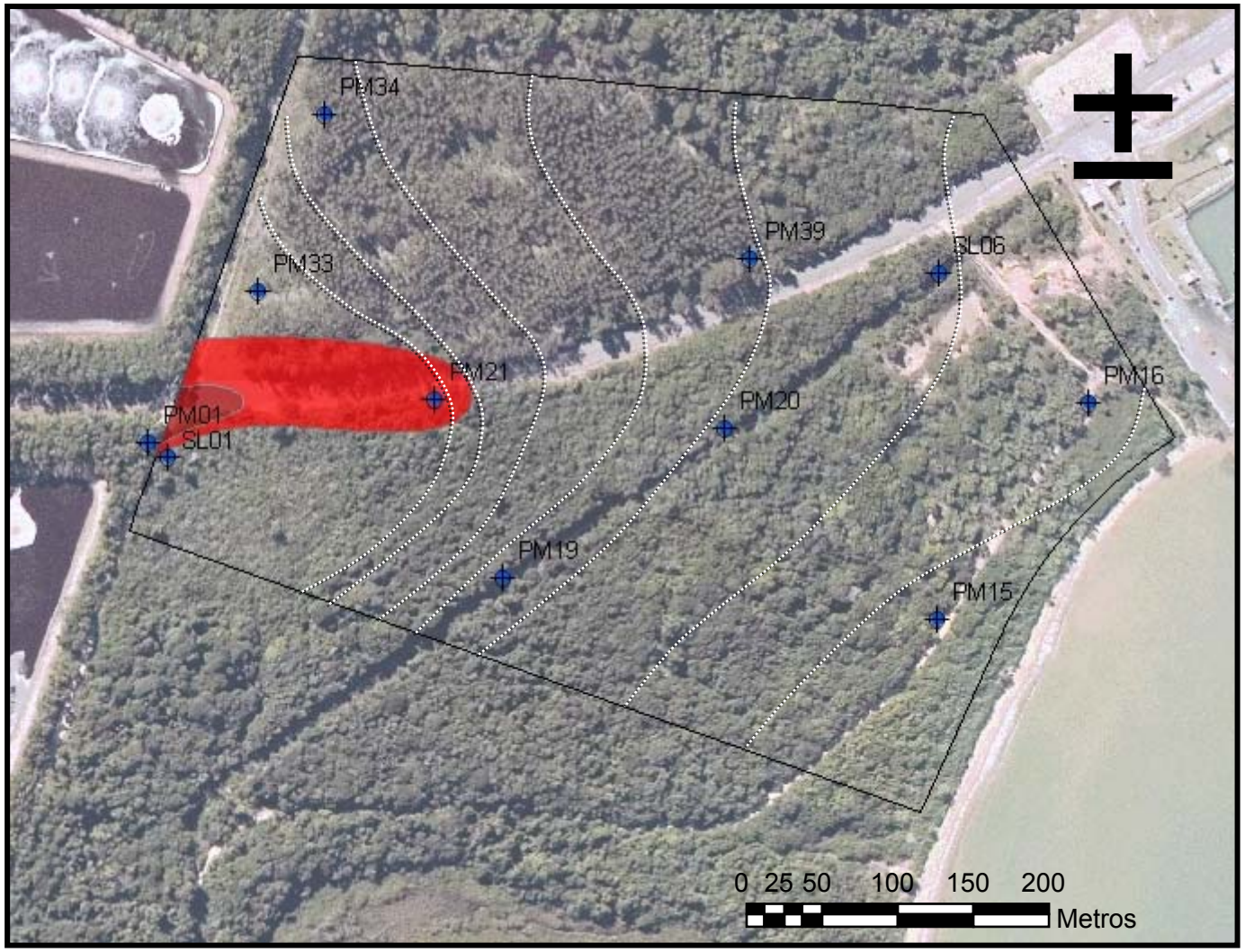

PM34
PM33
PM39
SL06
PM21
PM20
PM16
PM01
SL01
PM19
PM15
0 25 50 100 150 200
Metros
Legenda
A Poço de Monitoramento
Curvas Potenciométricas
Limite da Área
ppq
8,0 - 27,7

FIGURA 67



Legenda

A Poço de Monitoramento

Curvas Potenciométricas

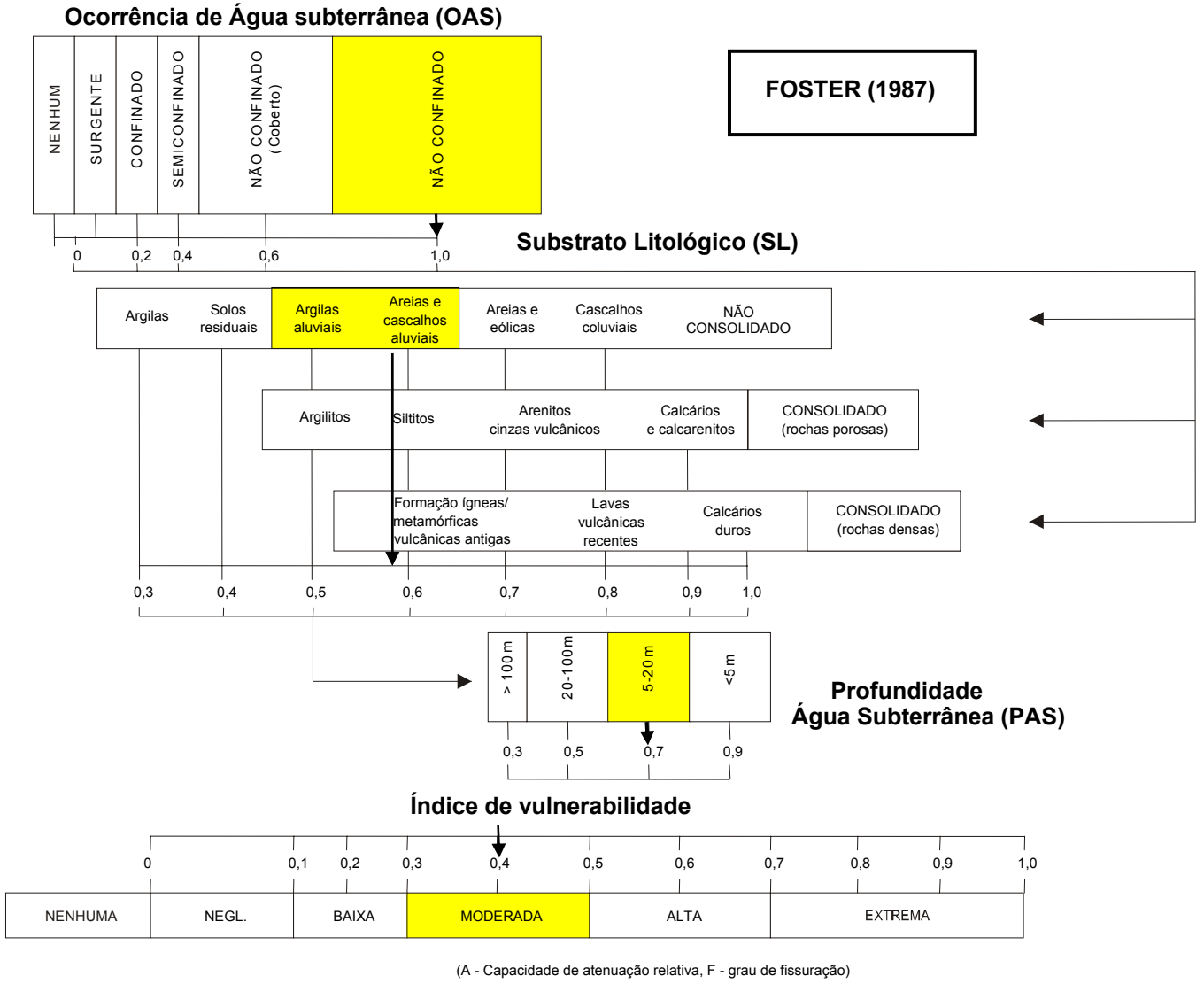
Limite da Área

ppq

20 - 50

50 - 109

FIGURA 68



(A - Capacidade de atenuação relativa, F - grau de fissuração)

Índice de Vulnerabilidade= OAS*SL*PAS=1,0*0,58*0,7=0,406

FIGURA 69