

Natural Attenuation

Monitored Natural Attenuation
(MNA) for contaminated
groundwater





What is MNA

Natural Attenuation is the reduction of contaminant mass due to naturally occurring processes.

Monitored Natural Attenuation is the process of evaluating the effectiveness of Natural Attenuation.



What is MNA (continued)

- A combination of :
 - Dilution
 - Dispersion
 - Degradation
 - Physical/Chemical
 - Biological
 - Absorption
 - Volatilization



What MNA is Not

- An assumed process
- A constant for all contaminants
- A constant for all environments



MNA of DNT's

- DNT's can:
 - dilute
 - disperse
 - degrade both chemically and biologically
- DNT's do not readily:
 - absorb
 - volatize



MNA of Carbon Tetrachloride (CTET) & Trichloroethylene (TCE)

- CTET & TCE Can:
 - dilute
 - disperse
 - volatize
 - degrade
- CTET & TCE Do not readily:
 - Absorb



Components of MNA

- Plume Boundaries must be stable or receding
- Plume concentrations must be stable or declining
- The goal is to demonstrate that contamination levels will drop below standard (ch. NR 140 Enforcement Standard) on their own



MNA Steps

1. Evaluation of the Plume

- Reasonable effort must be made to define the plume boundaries
- A base line of concentration must be established
- All natural and human influences must be addressed
 - Active systems
 - Groundwater elevation variations
 - Correlations between GWE and concentrations



MNA Steps (Continued)

The concentrations in the wells must be evaluated

- There needs to be a sufficient number of data points
- the data must show that the concentration for each contaminant is declining over time



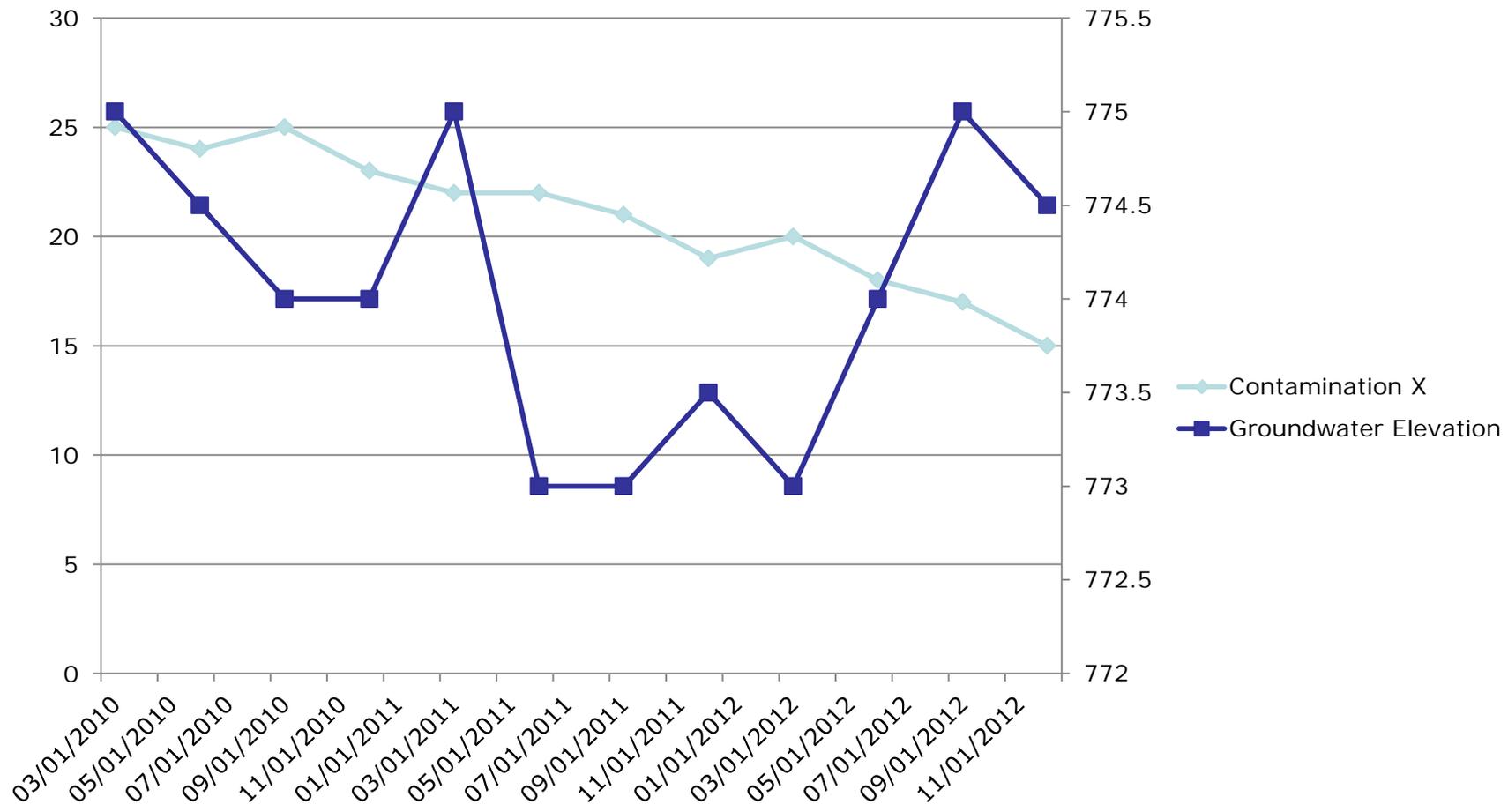
Caveat

Data must be declining over all

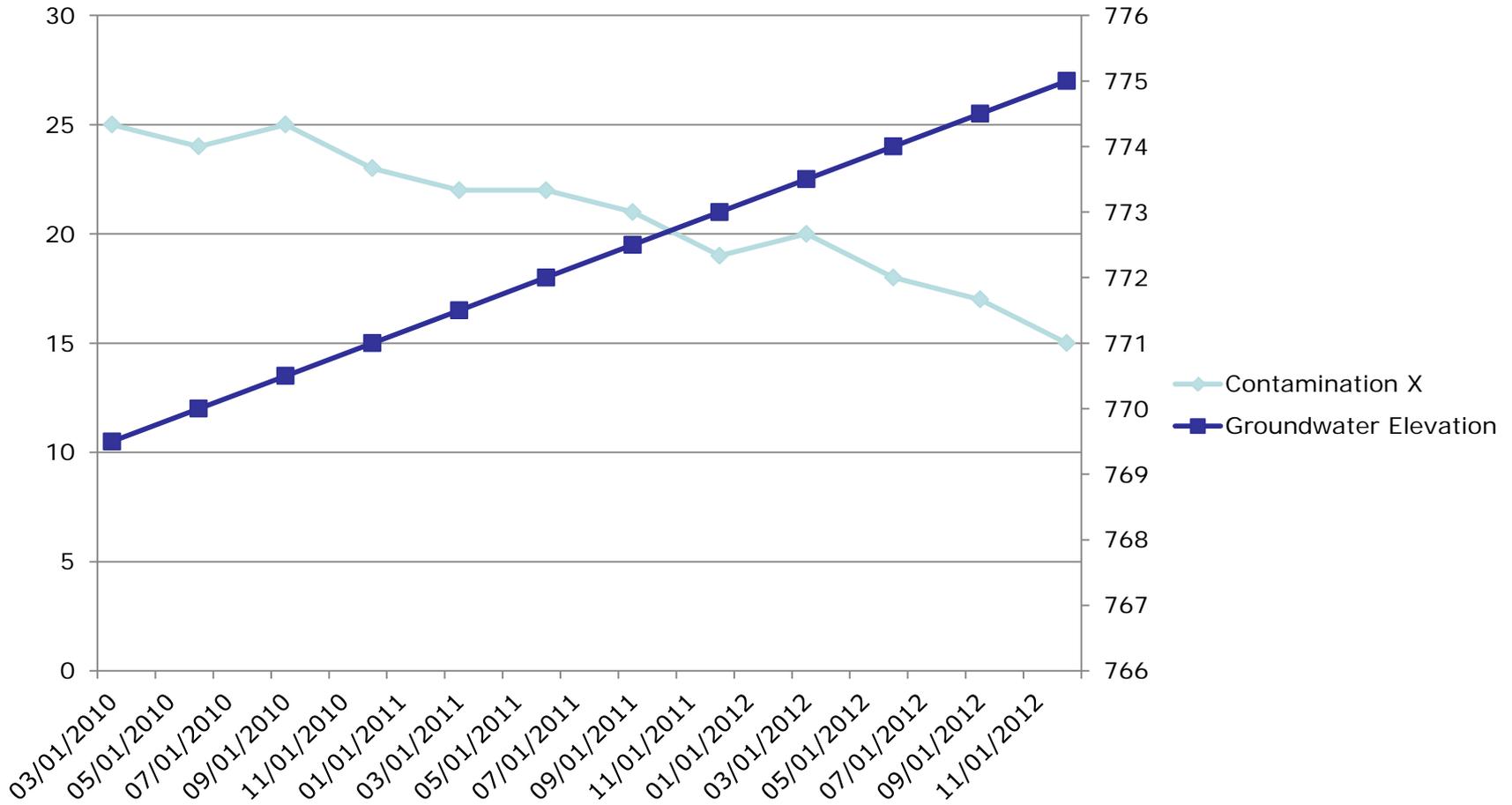
- Short periods must not be taken out of context

There usually is slight variation in concentrations, but a clear trend is what is evaluated for all data.

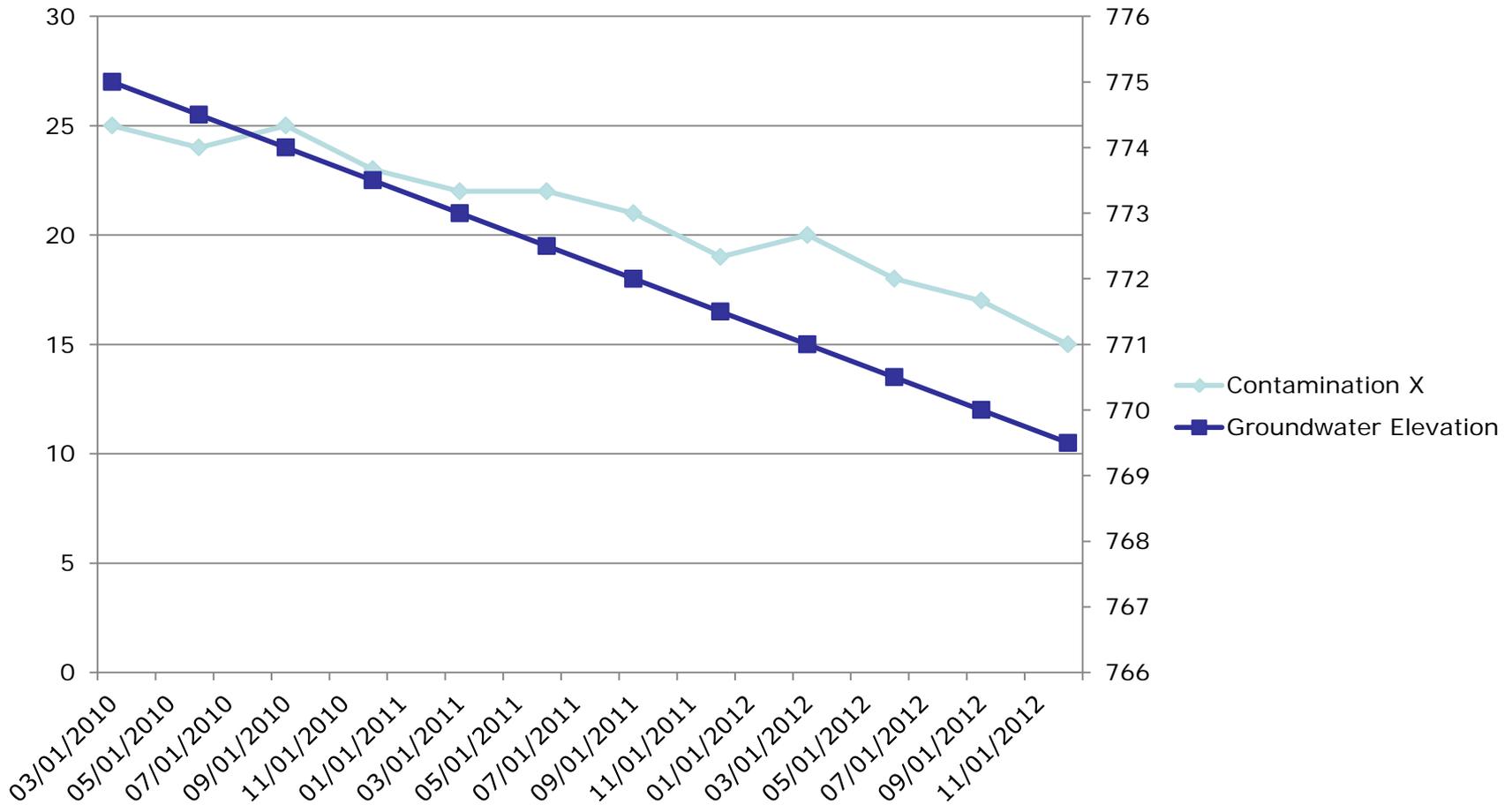
Ideal



Inverse Correlation



Direct Correlation



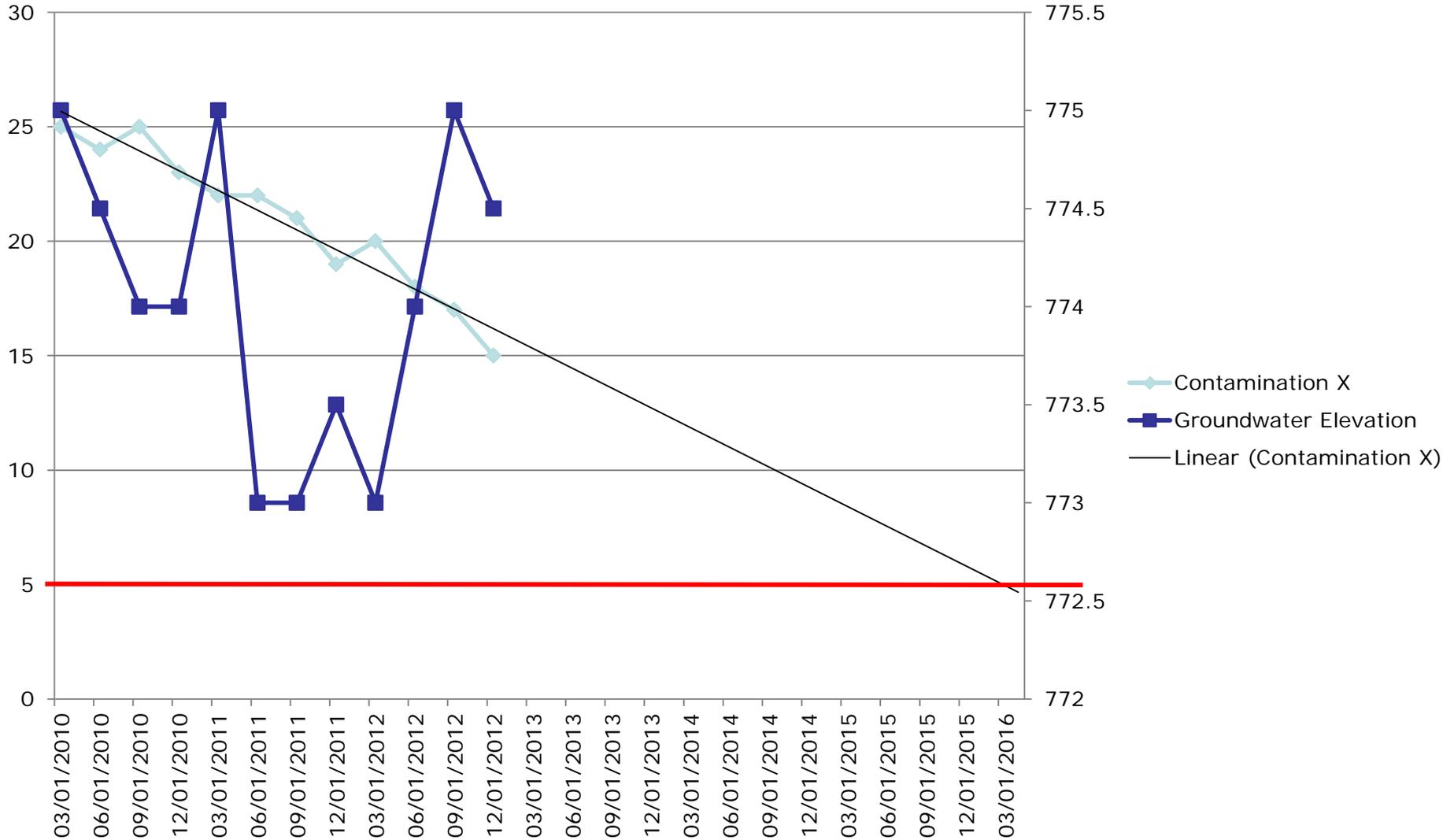


MNA Last Step

Determining time for compliance:

The declining trend line of the contaminant is extended till it intersects the Enforcement Standard line. This is the estimate of when the standard is achieved.

MNA Time to Compliance





Final Note

MNA is only applied to dissolved phase concentrations of contaminants above the ch. NR140 Enforcement Standard

Questions

For this presentation

