We have the transport equation

$$\mathcal{T}\psi - \Sigma\phi = \epsilon Q, \tag{1}$$

where

$$\mathcal{T} = \mu\frac{\partial}{\partial x} + \frac{1}{\epsilon}I, \tag{2a}$$

$$\Sigma = \left[\frac{1}{\epsilon} - \epsilon\right] I. \tag{2b}$$

By Neumann series we know $(I - X)^{-1} = \sum_{n=0}^{\infty} X^n$, and applying this to (2a) we get

$$\begin{aligned}\mathcal{T}^{-1} &= \epsilon\left(I + \epsilon\mu\frac{\partial}{\partial x}\right)^{-1}, \\ &= \epsilon\left(I - \epsilon\mu\frac{\partial}{\partial x} + \epsilon^2\mu^2\frac{\partial^2}{\partial x^2} - \dots\right).\end{aligned} \tag{3}$$

Now from (1) we can see

$$\begin{aligned}\psi - \mathcal{T}^{-1}\Sigma\phi &= \epsilon\mathcal{T}^{-1}Q, \\ \Rightarrow\ \mathcal{P}\psi - \mathcal{P}\mathcal{T}^{-1}\Sigma\phi &= \epsilon\mathcal{P}\mathcal{T}^{-1}Q, \\ \Rightarrow\ \left(I - \mathcal{P}\mathcal{T}^{-1}\Sigma\right)\phi &= \epsilon\mathcal{P}\mathcal{T}^{-1}Q.\end{aligned} \tag{4}$$

Working with the left hand side of (4) and using (3) and (2b) we find

$$\begin{aligned}\left(I - \mathcal{P}\mathcal{T}^{-1}\Sigma\right)\phi &= \left(I - \epsilon\mathcal{P}\left(I - \epsilon\mu\frac{\mathrm{d}}{\mathrm{d}x} + \epsilon^2\mu^2\frac{\mathrm{d}^2}{\mathrm{d}x^2} - \dots\right)\left[\frac{1}{\epsilon} - \epsilon\right]\right)\phi, \\ &= \phi - \left[1 - \epsilon^2\right]\left(\mathcal{P}\phi - \epsilon\frac{\mathrm{d}}{\mathrm{d}x}\phi\mathcal{P}\mu + \epsilon^2\frac{\mathrm{d}^2}{\mathrm{d}x^2}\phi\mathcal{P}\mu^2 - \dots\right).\end{aligned}$$

If we note that $\mathcal{P}\phi = \phi$, and that $\mathcal{P}\mu = 0$ and $\mathcal{P}\mu^2 = \frac{1}{3}$, then we find

$$\left(I - \mathcal{P}\mathcal{T}^{-1}\Sigma\right)\phi = -\frac{\epsilon^2}{3}\frac{\mathrm{d}^2}{\mathrm{d}x^2}\phi + \epsilon^2\phi + \frac{\epsilon^4}{3}\frac{\mathrm{d}^2}{\mathrm{d}x^2}\phi, \tag{5}$$

and so

$$\frac{1}{\epsilon^2}\left(I - \mathcal{P}\mathcal{T}^{-1}\Sigma\right)\phi = -\frac{1}{3}\frac{\mathrm{d}^2}{\mathrm{d}x^2}\phi + \phi + O(\epsilon^2). \tag{6}$$