Consider a square of dimensions $L \times L$, pierced by $2N$ vortices. Assuming there are an approximately equal number of $+1$ and -1 vortices piercing this square, the probability of n $+1$ or -1 vortices piercing some area $A \in L^2$ is

$$P_N(n) = \binom{N}{n} \left(\frac{A}{L^2}\right)^n \left(1 - \frac{A}{L^2}\right)^{N-n} . \tag{1}$$

Therefore, by assuming the different vortex phases are uncorrelated, the expectation value of the Wilson loop can be written as

$$\langle W(\partial A)\rangle = \sum_{n=0}^{N} \left(\exp\left(\frac{2\pi i}{3}\right)\right)^n P_N(n) \sum_{m=0}^{N} \left(\exp\left(\frac{-2\pi i}{3}\right)\right)^m P_N(m) . \tag{2}$$

Taking just the first sum, it evaluates to

$$\left(1 - \frac{A}{L^2}\right)^N \sum_{n=0}^{N} \binom{N}{n} \left(\exp\left(\frac{2\pi i}{3}\right) \frac{A}{L^2} \left(1 - \frac{A}{L^2}\right)^{-1}\right)^n = \left(1 + \left(\exp\left(\frac{2\pi i}{3}\right) - 1\right) \frac{A}{L^2}\right)^N .$$

So the total expectation value is

$$\begin{aligned}
\langle W(\partial A)\rangle &= \left(1 + \left(\exp\left(\frac{2\pi i}{3}\right) - 1\right) \frac{A}{L^2}\right)^N \left(1 + \left(\exp\left(\frac{-2\pi i}{3}\right) - 1\right) \frac{A}{L^2}\right)^N \\
&= \left(1 - 3\frac{A}{L^2} + 3\left(\frac{A}{L^2}\right)^2\right)^N \\
&= \left(\left(\frac{A}{L^2}\right)^3 + \left(1 - \frac{A}{L^2}\right)^3\right)^N .
\end{aligned}$$

Rewriting this in terms of the vortex density $\rho = \frac{N}{L^2}$, we have

$$\langle W(\partial A)\rangle = \left(\left(\frac{A\rho}{N}\right)^3 + \left(1 - \frac{A\rho}{N}\right)^3\right)^N . \tag{3}$$

Taking the limit as $N, L^2 \to \infty$, keeping ρ constant, this becomes

$$\langle W(\partial A)\rangle = \exp(-3\rho A) . \tag{4}$$

Hence we have a simple model for area-law confinement from the vortex model.