1) The key here is that we know M, and $1 \ll M \ll N$.

So, rather than applying the operations

$$|0\rangle \rightarrow \frac{1}{\sqrt{N}} \sum_{i=1}^{N} |i\rangle = |s\rangle,$$

followed by $\underbrace{\mathbb{1} - 2|w\rangle\langle w|}_{= U_w}$ $\left(\begin{array}{l} |w\rangle \rightarrow -|w\rangle \\ |i \neq w\rangle \rightarrow |i\rangle \end{array} \right)$

followed by $\mathbb{1} - 2|s\rangle\langle s| = U_s$,

then repeating $U_s U_w$ $O(\sqrt{N})$ times,

apply
$|0\rangle \rightarrow |s\rangle$ followed by

$$\mathbb{1} - 2\sum_{j=1}^{M} |w_j\rangle\langle w_j| \equiv U_{\tilde{w}}$$

followed by U_s, and repeat

$U_s U_{\tilde{w}}$ $O\left(\sqrt{\frac{N}{M}}\right)$ times