The dynamical timescale:

$$t_{\rm dyn} = \sqrt{\frac{R^3}{GM}} \tag{1}$$

where R is radius, G is the Gravitational Constant, M is mass.

$$x = \frac{R}{R_s} \tag{2}$$

where R_s is the Schwarzschild radius.

$$\begin{aligned} R &= R_s.x && (3)\\ &= \frac{2GMx}{c^2} && (4) \end{aligned}$$

$\Rightarrow$

$$\begin{aligned} t_{\rm dyn}^2 &= \frac{8x^3G^3M^3}{GMc^6} && (5)\\ &= \frac{8x^3G^2M^2}{c^6} && (6) \end{aligned}$$

$\Rightarrow$

$$t_{\rm dyn} = \frac{\sqrt{8}G}{c^3} x^{3/2} \left(\frac{M}{M_8}\right) \tag{7}$$

where M_8 is the mass of the SMBH is units of $10^8 M_\odot$.

Thus,

$$t_{\rm dyn} = 1400 \left(\frac{R}{R_s}\right)^{\frac{3}{2}} \left(\frac{M}{M_8}\right) \text{ seconds.} \tag{8}$$