f Lipschitz
$K > 0$
$$|f(x)-f(y)| \le K|x-y|. \tag{1}$$

f
$K > 0$
$$|f(x)| \le K(1+|x|). \tag{2}$$

$p \ge 1$
$E[Y_T^{(p)}] < \infty$
$Y_t^{(p)} := 1 + \sup_{0 \le r \le t} |X_r|^p$
$S_\ell := \inf\{t \ge 0 : Y_t^{(p)} > \ell\}$
$\ell \in N$
X
$t \ge 0$ $Y_t^{(p)} < \infty$
$\ell \to \infty$ $S_\ell \uparrow \infty$
P_D
$t \mapsto E_B[Y_{t \wedge S_\ell}^{(p)}]$
ℓ
$t = T$
$\ell \to \infty$
$E_B[Y_T^{(p)}]$
S_ℓ
$$\int_0^t E_B[Y_{r \wedge S_\ell}^{(p)}]\, dE_r \le \ell E_t < \infty,$$

$p \ge 2$
$1 \le p < 2$
$p \ge 2$
$X_s^p = x_0^p + J_s + K_s$

$$J_s := \int_0^s \sigma p X_r^{p-1}\, dB_{E_r};$$

$$K_s := \int_0^s \left\{ p X_r^{p-1} f(X_r) + \frac{\sigma^2}{2} p(p-1) X_r^{p-2} \right\} dE_r.$$

$t \in [0, T]$
$\ell \in N$
$(x+y+z)^p \le c_p(x^p + y^p + z^p)$
$x, y, z \ge 0$
$c_p = 3^{p-1}$

$$E_B\left[\sup_{0 \le s \le t \wedge S_\ell} |K_s|\right] \le \left(p c_p K + \frac{1}{2} p(p-1) c_p K^2\right) \int_0^{t \wedge S_\ell} E_B[Y_r^{(p)}]\, dE_r.$$

$(J_s)_{s \ge 0}$
$$E_B\left[\sup_{0 \le s \le t \wedge S_\ell} |J_s|\right] \le b_1 E_B\left[\left(\int_0^{t \wedge S_\ell} \sigma^2 p^2 X_r^{2p-2}\, dE_r\right)^{1/2}\right],$$