No, L is not context-free. Assume for a contradiction that it is. By the pumping lemma for context-free languages, L has a pumping length p. Let $w \in L$ be $a^p b^{2p} a^p$. Clearly, $|w| \geq p$. By the pumping lemma, w can be split into $uvxyz$ such that $|vy| > 0$, $|vxy| \leq p$ and $uv^i xy^i z \in L$ for any non-negative integer i. Use case distinction to show that this is impossible.
Case $\#_a(vy) = \#_b(vy)$:
Since there are $2p$ b's in the middle of w and $|vxy| \leq p$, vy can't span a's on both sides of the b's. So taking $i = 0$ will result in the string uxz, which will either start with less than p a's or end with less than p a's and thus can't start with the same amount of a's as it ends with, and thereby can't be in L, which is a contradiction.
Case $\#_a(vy) \neq \#_b(vy)$:
Taking $i = 0$ will result in the string uxz, which can't have the same number of a's and b's since w had the same number of a's and b's and vy did not. So uxz is not in L, which is a contradiction.
Clearly, these were all cases and both lead to a contradiction, so the assumption that L is context-free must have been false. Thus L is not a context-free language.