Warfield groups are direct summands of simply presented abelian groups or, alternatively, are abelian groups possessing a nice decomposition basis with simply presented cokernel. They have been classified up to isomorphism by their Ulm-Kaplansky and Warfield invariants. Let $L_\delta$ denote the class of formulas in $L_{\infty\omega}$ with quantifier rank $\leq \delta$. In this paper, we classify up to $L_\delta$-equivalence a large class of $p$-local abelian groups having a nice decomposition basis. This generalizes results by Barwise and Eklof. (Received September 10, 2009)