The problem is in $\mathcal{NP}$ since we can exhibit a set of k nodes and check that the distance between all pairs is at least 3.

We now show *Independent Set* $\leq_P$ *Strongly Independent Set*. Given a graph G and a number k, we construct a new graph G' in which we replace each edge $e = (u, v)$ by a path of length two: we add a new node w_e, and we add edges $(u, w_e), (w_e, v)$. We also include edges between every pair of new nodes.

Now suppose that G has an independent set of size k. Then in this new graph G', all these k nodes are distance at least three from each other, so this is a strongly independent set of size k. Conversely, suppose G' has a strongly independent set of size k. Now, this set can't contain any of the new nodes, since all such nodes are within distance two of every node in the graph. Thus, it consists of nodes present in G. Moreover, no two of these nodes can be neighbors in G, since then they'd be at distance two in G'. Thus this set of nodes forms an independent set of size k in G.

[1] ex900.39.43