Economic studies have projected a traffic of 19M tonnes by the year 2020 on the north-south axis, which the future canal will have to accommodate. This article presents the studies of practical capacity of the canal and transit times following three different approaches: a formula giving the capacity of a lock, time-distance diagrams (which also reveals where waiting times occur), and finally numerical simulation which enables heterogeneous fleet characteristics to be taken into account. These studies first analysed the practical capacity of the existing waterways (Canal du Nord and Saint-Quentin canal), then the practical capacity of the future Seine-Nord Europe canal and an alternative scheme under which two locks would be replaced by 6 tunnels, as envisaged during the preliminary design phase.