Kenilworth Castle was founded in the early 1120s by Geoffrey de Clinton, Lord Chamberlain and treasurer to Henry I. Clinton was a local rival to Roger de Beaumont, the Earl of Warwick and owner of the neighbouring Warwick Castle, and the king made Clinton the sheriff in Warwickshire to act as a counterbalance to Beaumont's power. Henry I’s son had died and so he needed to show that he was powerful even though he did not have an heir.

The castle's original form is uncertain. It has been suggested that it consisted of a motte, an earthen mound surmounted by wooden buildings; however, the stone great tower may have been part of the original design.

Henry II (Henry I’s grandson) succeeded to the throne at the end of a Civil war that lasted from 1135 to 1154 but during the revolt of 1173-74 he faced a significant uprising led by his son, Henry, backed by the French crown. The conflict spread across England and Kenilworth was garrisoned by Henry II's forces;

By this point Kenilworth Castle consisted of the great keep, the inner bailey wall, a basic causeway across the smaller lake that preceded the creation of the Great Mere, and the local chase for hunting.

De Clinton’s Keep. Windows were added much later, these would have been arrow slits and fishtail arrow slits in the original keep.
Henry's successor, Richard I, paid relatively little attention to Kenilworth, but under King John significant building resumed at the castle. When John was excommunicated in 1208, he embarked on a programme of rebuilding and enhancing several major royal castles. This is because this meant that he would be seen as a weak king as he did not have god on his side.

John spent £1,115 on Kenilworth Castle between 1210 and 1216, building the outer bailey wall in stone and improving the other defences, including creating Mortimer's and Lunn's Towers. He also significantly improved the castle's water defences by damming the Finham and Inchford Brooks, creating the Great Mere. The result was to turn Kenilworth into one of the largest English castles of the time, with one of the largest artificial lake defences in England. John was forced to give the castle to the barons who opposed him as part of the Magna Carta, before it reverted to royal control early in the reign of his son, Henry III.
Henry III granted Kenilworth in 1244 to Simon de Montfort, Earl of Leicester, who later became a leader in the Second Barons’ War (1263-67) against the king, using Kenilworth as the centre of his operations. Initially the conflict went badly for King Henry, and after the Battle of Lewes in 1264 he was forced to give his son, Prince Edward, to the rebels as a hostage. Edward was taken back to Kenilworth, where chroniclers considered he was held in unduly harsh conditions. After he was released in early 1265, Edward defeated Montfort at the Battle of Evesham; the rebels under the leadership of Henry de Hastings, Montfort’s constable at Kenilworth, regrouped at the castle the following spring. Edward’s forces proceeded to lay siege to the rebels.

The Siege of Kenilworth Castle in 1266 was "probably the longest in English history" according to historian Norman Pounds, and at the time was also the largest siege to have occurred in England in terms of the number of soldiers involved. Simon de Montfort’s son, Simon VI de Montfort, promised in January 1266 to hand over the castle to the king. Five months later this had not happened, and Henry III laid siege to Kenilworth Castle on 21 June. Protected by the extensive water defences, the castle withstood the attack, despite Edward employing huge siege towers and even attempting a night attack using barges brought from Chester. The distance between the royal trebuchets and the walls severely reduced their effectiveness, and heavier trebuchets had to be sent for from London.
Edmund Crouchback passed on the castle to his eldest son, Thomas, Earl of Lancaster, in 1298. He was the richest nobleman in England. Kenilworth became the primary castle of the Lancaster estates. Kenilworth became the centre of support for Edward II.

In 1326, however, Edward was deposed and he was captured; custody of the king was assigned to Henry, Earl of Lancaster, and constable of Kenilworth. Edward was transported there in late 1326. Edward formally resigned as king in the great hall of the castle on 21 January 1326.

Henry of Grosmont, the Duke of Lancaster, inherited the castle from his father in 1345 and remodelled the great hall with a grander interior and roof. On his death Blanche of Lancaster inherited the castle. Blanche married John of Gaunt, the third son of Edward III; their union, and combined resources, made John the second richest man in England next to the king himself. After Blanche's death, John married Constance, who had a claim to the kingdom of Castile, and John styled himself the king of Castile and León. Kenilworth was one of the most important of his thirty or more castles in England. John began building at Kenilworth between 1373 and 1380 in a style designed to reinforce his royal claims in Spain. John constructed a grander great hall, the Strong Tower, Saintlowe Tower, the state apartments and the new kitchen complex. When not campaigning abroad, John spent much of his time at Kenilworth and used it even more after 1395 when his health began to decline. In his final years, John made extensive repairs to the whole of the castle complex.
Many castles, especially royal castles, were left to decay in the 15th century; Kenilworth, however, continued to be used as a centre of choice, forming a late medieval "palace fortress". Henry IV, John of Gaunt's son, returned Kenilworth to royal ownership when he took the throne in 1399 and made extensive use of the castle. Henry V also used Kenilworth extensively, but preferred to stay in the Pleasance, the mock castle he had built on the other side of the Great Mere.

English castles, including Kenilworth, did not play a decisive role during the Wars of the Roses (1455-85), which were fought primarily in the form of pitched battles between the rival factions of the Lancastrians and the Yorkists. Kenilworth remained an important Lancastrian stronghold for the rest of the war, often acting as a military balance to the nearby castle of Warwick. With the victory of Henry VII at Bosworth, Kenilworth again received royal attention; Henry visited frequently and had a tennis court constructed at the castle for his use. His son, Henry VIII, decided that Kenilworth should be maintained as a royal castle. He abandoned the Pleasance and had part of the timber construction moved into the base court of the castle.
The castle remained in royal hands until it was given to John Dudley in 1553. Dudley came to prominence under Henry VIII and became the leading political figure under Edward VI. Dudley was a patron of John Shute, an early exponent of classical architecture in England, and began the process of modernising Kenilworth. Before his execution in 1553 by Queen Mary for attempting to place Lady Jane Grey on the throne, Dudley had built the new stable block and widened the tiltyard to its current form.

Kenilworth was restored to Dudley's son, Robert, Earl of Leicester, in 1563, four years after the succession of Elizabeth I to the throne. Leicester's lands in Warwickshire were worth between £500-£700 but Leicester's power and wealth, including monopolies and grants of new lands, depended ultimately on his remaining a favourite of the queen.
Leicester continued his father's modernisation of Kenilworth, attempting to ensure that Kenilworth would attract the interest of Elizabeth during her regular tours around the country. Elizabeth visited in 1566 and 1568, Leicester employed William Spicer to rebuild and extend the castle so as to provide modern accommodation for the royal court and symbolically boost his own claims to noble heritage.

Elizabeth viewed the partially finished results at Kenilworth in 1572, but the complete effect of Leicester's work was only apparent during the queen's last visit in 1575. Leicester was keen to impress Elizabeth in a final attempt to convince her to marry him, and no expense was spared. Elizabeth brought an entourage of thirty-one barons and four hundred staff for the royal visit that lasted an exceptional nineteen days; twenty horsemen a day arrived at the castle to communicate royal messages. Leicester entertained the Queen and much of the neighbouring region with pageants, fireworks, bear baiting, mystery plays, hunting and lavish banquets. The cost was reputed to have amounted to many thousand pounds, almost bankrupting Leicester, though it probably did not exceed £1,700 in reality. The event was considered a huge success and formed the longest stay at such a property during any of Elizabeth's tours, yet the queen did not decide to marry Leicester.
In 1605 Sir Thomas Chaloner, governor (and from 1610 chamberlain) to James I's eldest son Prince Henry, was commissioned to oversee repairs to the castle and its grounds, including the planting of gardens, the restoration of fishponds and improvement to the game park. During 1611–12 Dudley arranged to sell Kenilworth Castle to Henry, by then Prince of Wales. Henry died before completing the full purchase, which was finalised by his brother, Charles. When Charles became king, he gave the castle to his wife, Henrietta Maria; he bestowed the stewardship on Robert Carey, Earl of Monmouth, and after his death gave it to Carey's sons Henry and Thomas. Kenilworth remained a popular location for both King James I and his son Charles, and accordingly was well maintained.

The First English Civil War broke out in 1642. During its early campaigns, Kenilworth formed a useful counterbalance to the Parliamentary stronghold of Warwick. Kenilworth was used by Charles on his advance to Edgehill in October 1642 as a base for raids on Parliamentary strongholds in the Midlands. After the battle, however, the royalist garrison was withdrawn on the approach of Lord Brooke, and the castle was then garrisoned by parliamentary forces, in 1649 Parliament ordered the slighting of Kenilworth. One wall of the great tower, various parts of the outer bailey and the battlements were destroyed.

Colonel Joseph Hawkesworth, responsible for the implementation of the slighting, acquired the estate for himself and converted Leicester's gatehouse into a house; part of the base court was turned into a farm, and many of the remaining buildings were stripped for their materials. In 1660 Charles II was restored to the throne, and Hawkesworth was promptly evicted from Kenilworth. The Queen Mother, Henrietta Maria, briefly regained the castle, with the Earls of Monmouth acting as stewards once again, but after her death King Charles II granted the castle to Sir Edward Hyde, whom he later created Baron Hyde of Hindon and Earl of Clarendon. The ruined castle continued to be used as a farm, with the gatehouse as the principal dwelling; the King's Gate was added to the outer bailey wall during this period for the use of farm workers.