

ADDRESS

REMAINS OF THE CLIFTON BATHS AT CLIFTONVILLE LIDO,
ETHELBERT TERRACE, THANET

Parish THANET
District THANET
County KENT

Case UID: 163598

Date First Listed:

Formerly Listed As:

RECOMMENDATION

Adviser: Mrs C Ryan

Outcome: Yes, list

Recommended Grade: II

25-JAN-2008

Advice Text: After examining all the papers on this file and other relevant information and having carefully considered the architectural and historic interest of this case, the criteria for listing are fulfilled.

CONTEXT

We have been asked to assess The Lido and Clifton Baths, Cliftonville for statutory listing. The buildings have recently changed ownership and the existing Lido buildings and the remains of the earlier Clifton Baths underneath may be affected by a proposal to build a hotel on the site although a planning application has not yet been submitted. The owners commissioned a report from Canterbury Archaeological Trust which has informed this assessment.

The building does not group with any listed buildings but is situated within a designated conservation area. Its assessment sits alongside a batch of cases within Margate which has figured prominently in English Heritage's major research project on the history and architecture of seaside resorts, culminating in the publications 'English Seaside Towns' and Margate's Seaside Heritage'.

HISTORY

The complex of buildings on the site are of two distinct phases: an early-C19 sea bathing establishment, dating from 1824, called the Clifton Baths; and a C20 lido, dating from 1926, called the Cliftonville Lido from 1938. The structures are on four levels, the lower levels excavated from the chalk cliffs and only the upper level, on the landward side, above ground level.

Margate was in the forefront of sea bathing in the C18 with bathers taken into the sea in simple carts before a fully developed bathing machine appeared there by 1753. This was ascribed to a Quaker, Benjamin Beale, who added a modesty hood to the rear of a bathing machine, enabling the bather to enter the sea unobserved and offering some protection from wind and waves. By 1793 a guide to Margate speaks of 30 to 40 bathing machines in use at a time. Bathing Rooms had been established at Margate in the 1750s to the south-west of the harbour from which the bather descended an external staircase on the seaward side into a waiting bathing machine to enter the sea. In 1791 the Quaker physician John Coakley Lettsom established "The Margate Infirmary, for the relief of the Poor whose Diseases require Sea-Bathing" which had its own bathing machine and later sea water baths.

The Clifton Baths were constructed between 1824-8 by John Boys at a cost of £15,000 and excavated from the chalk cliff north-east of the harbour. An engraving of c1829 shows a Gothick

style fort-like structure with a massive arch at sea level, buildings above with lancet windows, crenellated parapet and an obelisk-shaped chimney. A detailed description was published in 1830 by George Alexander Cooke, probably based on a visit three or four years earlier. A large domed circular chamber provided storage for 20 to 30 bathing machines which were brought down a curving tunnel to sea level when required. A tunnel also led to the lower reservoir used as a plunge bath for women and children. A horse pump forced sea water from the lower reservoir to the upper reservoir where it supplied the water for hot baths, the power supplied by a horse gin in the open air. An obelisk-shaped chimney served the boiler but was removed in the later C19. A Bathing Room divided into two wings, the north for gentlemen and the south for ladies, had seven hot baths, shower baths and hip baths but was later demolished. There was a Waiting Room which was also a reading and subscription room and a newsroom which also had an organ and billiard table. The upper terrace had round-headed alcoves, seats and benches for enjoying the sea views. A bathers' terrace was erected by 1831 and a second chimney was erected between 1833-45.

In 1849 ownership of the Clifton Baths passed to John Boys' son, John Harvey Boys. A map of the Margate Sanitation survey of 1852 shows the subterranean plan of the Clifton Baths with the circular dome, a passage leading off to the north-east, a reading room, bathing room, reservoir, tank and horse pump and further subterranean passages. An engraving of circa 1860 shows a further obelisk-shaped chimney had been built by this date.

In 1869 the site was sold to Thomas Dalby Reeve who built a drill hall for the local Artillery Volunteers and a boiler house with tall chimney. These are shown on Bacon's map of Margate of 1875. In 1876 electricity was used to generate ozone, believed to be beneficial to bathers. In the 1880s an indoor salt water swimming pool was provided at the north-east corner of the site. This appears on the 1907 Ordnance Survey map and survived until the mid-C20. By 1903 a cinema had been installed into the former Drill Hall, operational until 1929. In 1924 a theatre or concert hall was built east of the indoor swimming pool but was later demolished.

From 1926 onwards the Clifton Baths were re-modelled under John Henry Iles, a leading figure in the amusement park industry between the wars, who also owned the Dreamland Amusement Park. It was turned into a large modern seaside complex with bars, cafes and restaurants on several storeys and a large open air swimming pool built out into the sea. These buildings were built on to and over the existing Clifton Baths in a Neo-Classical style with Mediterranean influences, laid out over a series of terraces. The Clifton Baths boiler house chimney was adapted with the addition of a large sphere (probably intended to be a lamp), to be an advertising feature for the new complex. The lido was a semi-circular shaped pool constructed of concrete which held 1000 bathers and could be emptied and filled every day with the ebb and flow of the tide. At the landward end it had an amphitheatre for 3000 people and adjoining promenades and cafes. It had slides, diving boards and moored floats. The changing rooms, comprising lockers and timber changing cubicles, were located under the promenade and tiered seating of the open air swimming pool. The Cliff Bar was erected beside the sun terrace and the interior scheme was often re-decorated. The Cliff Cafe, which could seat 1000 people with entertainment provided by orchestras on a circular stage, was erected underneath the the Cliff Bar and much of the Sun Terrace. The Cafe Normandie was a large cafe where dances were held, destroyed by a great storm in 1953 and replaced by the Echoes Nightclub. The French Bar, in existence by 1933, was damaged by fire in 1953 and is now a small bar at the east end of Echoes Nightclub. In it is a painted timber doorway blocking the lower end of the earlier Clifton Baths bathing machine tunnel and next to this part of the flint retaining wall of the Clifton Baths Bathers Terrace. The Jolly Tar Tavern, to the south of the Cafe Normandie used the blocked up mouth of the Clifton Baths lower reservoir as an arched alcove behind the bar. Under

the Cafe Normandie was constructed the Cafe Basque by 1929 which had plaster scenery. Currently this is inundated at high tide. On the upper terrace, the south range, west of the boiler house had 50 private bathrooms providing ozonised sea or fresh water treatments. By 1929 hair dressing salons had been erected at the west end of the range, currently in use as a snooker club. In 1938 the Clifton Baths were renamed the Cliftonville Lido.

After the Second World War, circa 1948, the private bathrooms in the south range of the lido were closed and replaced by an aquarium and mini-zoo, a billiard hall and by 1949 a puppet theatre. During the storm of 1953 the open air swimming pool was damaged and the Cafe Normandie wrecked and replaced by the Golden Garter saloon, used for a Wild West type show. By 1962 a nightclub called the Cavern Disco had been established in the dome. By circa 1965 the Cliff Bar was re-decorated with a Caribbean theme and renamed the Jamaica Bar. Circa 1971 the Cavern Disco was renamed the Hades discotheque. In the late 1970s the Echoes Nitespot replaced the Golden Garter Saloon. A turf accountants was built by 1974 above the bar at the west end of the south range. The open air pool closed in 1977-8 and was filled in with sand.

DESCRIPTION

Most of the structures above ground level are buildings constructed for the lido, with the exception of the eastern building of the south range, which is the remains of a circa 1870 drill hall with attached boiler house and chimney. This is a stuccoed single-storey building with blocked round-headed arch with a taller boiler house, both with C20 replaced felted roofs. At the western end is a tall, tapering, square brick chimney with moulded top and base to which was added, in the early C20, a multi-faceted sphere and additional raised panels to provide a striking advertising sign for the lido. The original lettering was replaced some time between the 1960s and 1980 and the beacon was repainted and reglazed in 2003. The remainder of the south range and the west side comprises an L-shaped range of buildings mainly erected in the 1920s for the new lido in a Neo-Classical style, stuccoed with hipped pantiled roofs. At the eastern end is a rusticated archway with flat arch and hipped pantiled roof. Adjoining is a low single-storey range with an off-centre projecting and taller entrance, again with a hipped pantile roof. The range has projecting piers defining the bays, one of which is decorated with a mosaic picture from circa 2000, and at the western end a taller flat-roofed entrance to a snooker club. The junction of the L-shaped range is split by a wide flight of steps up to street level and the two ranges are connected by two pantile-roofed angled pavillions, joined by a pantiled roof across the steps supported on a Tuscan column. Attached to the north-western pavilion is the Cliff Bar, a single-storey stuccoed building with projecting central canted entrance bay with cornice and brackets, rusticated piers and two mosaic panels, also from circa 2000. On the north side, overlooking the sea, is a detached 1920s shelter comprising four Tuscan corner columns supporting a hipped pantiled roof.

The western wall of the Cliff Bar drops sharply to sea level and is of three storeys, the bar forming the top level with the former Cliff Cafe below and former Cafe Basque below this. There are 6 bays divided by piers to the two lower levels, rusticated to the base and plain above, and later C20 windows to the top floor. The penultimate bay to the south has a projecting cambered arch, approached up a flight of steps, and projecting pilasters with blank panels. The northern bay is similar. The north (seaward) side of the complex is of two to three storeys high. The west bay is three storeys high and defined by rusticated or plain pilasters with rusticated centre with a round-headed arch to the first floor and a flat arch to the ground floor. The remainder is plainer with rusticated piers defining the bays. The lower level comprised changing rooms for the lido. The tiered concrete terraces of the lido are attached to the north as are the large horseshoe-shaped concrete lido walls. The centre of the seaward side has a large concrete panel with curved top and circa 2000 mosaic. This panel is not shown in a photograph of 1928 but the concrete plinth may be

a remaining part of the original diving tower.

Few original internal features remain to the lido buildings as they were frequently refurbished. The Cliff Cafe retains the remains of the stage with four fluted columns and shield but the columns and piers in the remainder of the room have been stripped down, for example losing the Ionic capitals. The Echoes nightclub has a 1970s refurbishment replacing at least two earlier decorative schemes. The changing rooms retain a tiled entrance, wooden changing cubicles and tiled freshwater plunge bath, foot bath and showers.

However, internal features also remain from the 1820s Clifton Baths, such as the circular chamber for storing bathing machines. This is a brick lined chamber, 42 feet (12.8m) in diameter, with eight round-headed arches with a thin brick stringcourse at impost level and alcoves, some lined with chalk blocks, in which the bathing machines were stored. The floor was constructed about ten feet (3m) above high water level. The circular shape made it easier for turning horses. Originally there was a domed roof 33 feet (10m) high which protruded above ground level. This was truncated in the 1920s when the above ground lido buildings were built, and a concrete curved staircase and gallery were added after 1962 when the space was used as a nightclub. From the eastern alcove a wide chalk block lined tunnel with vaulted roof about 100 feet (30.5m) in length, 13 feet (3.96m) high and 10 feet (3m) wide, leads to the beach and was used for bringing bathing machines to and from the beach pulled by horses. The mouth of the bathing machine tunnel is now blocked by a doorway in the French Bar where, looking west, can be seen the flint revetment wall of the bathers' terrace. Halfway along the bathing machine tunnel a straight tunnel, the entrance tunnel, leads west. This was used by both staff and patrons and was wide enough for small vehicles. Only the curving lower portion is currently accessible, the rest cut off by C20 alterations. From the west alcove a curved staircase tunnel constructed of chalk-block walls with segmental brick vaulted roof and thirty four steps provided access to ground level for foot passengers and survives in a mutilated condition. At the north-west end a straight horse pump tunnel, 120 feet (36.5m) long lined in brick with some knapped flints, communicated with the horse pump supplying sea water from the lower reservoir to the upper reservoir. Almost immediately leading off the northern wall of the horsepump tunnel is a further narrower curved brick-lined tunnel, called the reservoir tunnel, leading to the lower reservoir. The lower reservoir is a rectangular vaulted chamber about 80 feet (24.4m) long by 18 feet (5.5m) wide, slightly wider at the outward north western end and with a rounded eastern end. It was open to the air at the far end through a huge archway. The reservoir was cut directly into the chalk with a high semi-circular vault of large chalk blocks but the south-west wall has been extensively revetted in brick. It is thought that the reservoir walls were originally lined to a certain height with cement. A wide blocked cambered arch to the exterior is now visible in the former Jolly Tar Tavern. It is possible John Boys' self-acting valves or other features may survive within the brick-lined apron at the north-west end.

ASSESSMENT

Surviving culture and recreation buildings of pre-1914 date are likely to have rarity value and warrant serious consideration for listing. Much greater selectivity is applied to the period between the First and Second World Wars. Criteria include architectural quality, the quality of internal and external decoration, including sculpture and murals, historical associations, novelty and rarity in surviving examples of popular culture and intactness.

The surviving parts of Clifton Baths, constructed between 1824-8, are an early and rare example of a seabathing establishment. Quebec House in Portsmouth of 1754 (listed Grade II) is the earliest surviving example but it was built on a domestic scale and is now a house. Nos. 2 and 4 High Street, Swanage, Dorset (Grade II) was built in 1825 as baths, billiard and coffee rooms but is now

in domestic use. Pelham Place in Hastings, built 1824-8 (Grade II) originally included seawater baths but these have not survived. An example in Cromer of circa 1828 is also now in domestic use. Two examples from the 1830s, Allonby House in Allonby, Cumbria of 1835 and The Bath House at Ilfracombe, Devon of 1836 (both Grade II) have impressive Neo-Classical fronts but have been converted into residential use. The earliest surviving seawater bath appears to be the small marble hot brine bath of c1845 at Shanklin, Isle of Wight (listed Grade II) originally situated in the c1817 fisherman's cottage nearby.

The Clifton Baths retains an early and rare survival of a seawater plunge bath, (the lower reservoir) and the only known structure in the country purpose-built to store bathing machines and convey them to the beach (the dome and bathing machine tunnel). The Clifton Baths is unique also as the only known example of a seabathing establishment to be dug out of the cliffs which altered the existing topography. While little survives in stylistic terms, given the overbuilding of the lido, the original choice of a Gothick style was very much of interest, and contributed to the picturesque, scintillating enjoyment of the bathing experience; this does remain in the way the baths exploit the cliffside, maintaining an element of mystery and pleasure as well as the interaction with nature.

The 1920s and later Cliftonville Lido buildings would, had they survived intact with lido, terraces, restaurants and bars, cinema, concert hall and theatre, zoo and aquarium have comprised a remarkably comprehensive range of inter war seaside entertainment buildings in stylish Neo-classical buildings. Sadly the existing buildings have suffered from degradation of architectural details and been the subject of constant internal re-fitting and the lido itself was damaged in the storm of January 1978 and subsequently filled with sand. The adapted circa 1870 Clifton Baths boiler chimney became a striking iconic advertising sign to the later lido but unfortunately it has been altered since the 1920s, the original lettering to the chimney replaced between the 1960s and 1980 and the beacon repainted and reglazed in the summer of 2003.

Conclusion: The remaining structures of the early-C19 Clifton Baths, all currently below ground, are recommended for statutory listing. The later-C19 drill hall, boiler house and chimney and the structures of the C20 Cliftonville Lido, including the earlier boiler house chimney adapted to provide advertising signage are not recommended for statutory listing because of the degree of alteration although they have local historical interest.

Reasons For Designation Decision:

The surviving parts of the Clifton Baths are recommended for designation at Grade II for the following principal reasons:

- * Constructed between 1824-8 this is one of the earliest surviving seawater bathing establishments in the country, only two listed examples being earlier in date, both of which were later converted to residential accommodation.
- * The lower reservoir is probably the earliest surviving seawater plunge bath in the country;
- * The circular chamber and bathing machine tunnel of the Clifton Baths are the only known examples of purpose-built structures built to store bathing machines and convey them to the beach;
- * The Clifton Baths is the only known example of a sea bathing establishment which was dug out of the cliffs, altering the existing topography.

VISITS

30-OCT-2007 Internal

COUNTERSIGNING

First Countersigning Adviser: Dr P Stamper

Comments: Agreed. List surviving early C19 parts of Clifton Baths. The structures at Margate are a rare survival from the early days of sea-bathing, their complexity reflecting the investment made by its promoters at Margate. By contrast, the lido structures are much later, and elsewhere survive in a much more complete condition. The Margate lido structures should not be listed.

09-APR-2008

Second Countersigning Adviser: Ms E Gee

Comments: Agreed. This is a special survival indeed. Extensive research by Canterbury Archaeological Trust, together with fulsome English Heritage research into the architecture of the seaside, and ongoing work into the specific history of bathing huts by an outside historian provides a very clear context in which to make our assessment. This early-C19 architectural infrastructure to enable a health and pleasure filled experience of sea bathing is a very interesting survival and that it remains in Margate, with its own claims to earliness in seaside terms provides additional interest. Even with the losses set out in our advice, the internal survival certainly renders it listable at Grade II. While characterful, particularly the trademark chimney, we are not recommending the inter-war lido buildings above, given the degree of alteration and the much more rigorous context in which such buildings must be assessed.

30-APR-2008

HP Director:

Comments:

Proposed List Entry

ETHELBERT TERRACE
MARGATE
REMAINS OF THE CLIFTON BATHS AT
CLIFTONVILLE LIDO

II

Case UID: 163598

Proposed LBS UID: 503234

Seabathing baths. The Clifton Baths were constructed between 1824-8 by John Boys at a cost of £15000, excavated from the chalk cliff north-east of Margate harbour. The Gothick style exterior of flint and stone was mainly overbuilt by buildings of the Cliftonville Lido, constructed from 1926 onwards, which are not of special interest. The remaining features of the Clifton Baths are below ground level, excavated out of the chalk cliffs, lined in brick or chalk blocks with some knapped flint visible.

PLAN: Comprises a circular chamber for the storage of bathing machines with eight alcoves from which passages lead off to the east, west and north-west and a further passage, leading off the north side of the north-west passage, leads down to the large rectangular Lower Reservoir designed as a plunge bath for females and children.

DESCRIPTION: The circular chamber is brick lined in Flemish bond and is 42 feet (12.8m) in diameter with eight round-headed arches with a thin brick string course at impost level and alcoves, some lined with chalk blocks, in which bathing machines were stored. The floor was constructed about ten feet (3m) above high water level. The circular shape made it easier for turning horses. Originally there was a domed roof 33 feet (10m) high which protruded above ground level. This was truncated in the 1920s when the above ground lido buildings were built, and a concrete curved staircase and gallery were added after 1962 when the space was used as a nightclub. From the eastern alcove a wide chalk block lined tunnel with vaulted roof about 100 feet (30.5m) in length, 13 feet (3.96m) high and 10 feet (3m) wide, lead to the beach and was used for bringing bathing machines to and from the beach pulled by horses. The mouth of the Bathing Machine Tunnel is now blocked and the original opening can be seen in the French Bar of the later Cliftonville Lido, which also preserves the flint revetment wall of the Bather's Terrace of the Clifton Baths. Halfway along the Bathing Machine Tunnel a straight tunnel, the entrance tunnel, leads west. This was used by both staff and patrons and was wide enough for small vehicles. Only the curving lower portion is currently accessible, the rest cut off by C20 alterations. From the west alcove a curved Staircase Tunnel constructed of chalk-block walls with segmental brick vaulted roof with 34 steps provided access to ground level for foot passengers and survives in a mutilated condition. At the north-west end a straight Horse Pump Tunnel 120 feet (36.5m), long lined in brick with some knapped flints, communicated with the horse pump supplying sea water from the lower reservoir to the upper reservoir. Almost immediately in the northern wall of the Horse Pump Tunnel is a further narrower curved brick lined tunnel, called the Reservoir Tunnel, leading to the Lower Reservoir.

The Lower Reservoir is a rectangular vaulted chamber about 80 feet (24.4m) long by about eighteen feet (5.5m) wide, slightly wider at the outward north-western end and with a rounded eastern end and originally open to the air at the far end through a huge archway. The reservoir was cut directly into the chalk with a high semi-circular vault of large chalk blocks but the south-west wall has been extensively revetted in brick. It is thought that the reservoir walls were originally lined to a certain height with cement. A wide blocked cambered arch to the exterior is now visible in the Jolly Tar Tavern of the Cliftonville Lido. It is possible that John Boys' "self-acting valves" or other features may survive within the brick-lined apron at the north west end. Other features of the Clifton Baths may survive beneath 1920s and later structures of the Cliftonville Lido which were superimposed on the earlier fabric.

HISTORY: Margate was in the forefront of sea bathing in the C18 with bathers taken into the sea in simple carts before a fully developed bathing machine appeared there by 1753. This was ascribed to a Quaker, Benjamin Beale, who added a "modesty" hood to the rear of a bathing machine, enabling the bather to enter the sea unobserved and offering some protection from wind and waves. By 1793 a guide to Margate speaks of 30 to 40 bathing machines in use at a time. Bathing rooms had been

established at Margate in the 1750s to the south-west of the harbour, from which the bather descended an external staircase on the seaward side into a waiting bathing machine to enter the sea. In 1791 the Quaker physician John Coakley Lettsom established "The Margate Infirmary for the relief of the Poor whose Diseases require Sea-Bathing" which had its own bathing machines and later sea water baths.

The Clifton Baths were constructed between 1824-8 by John Boys at a cost of £15,000, excavated from the chalk cliff north-east of the harbour. It is estimated that the total quantity of the chalk excavated and removed was 40,000 cubic yards (30,584m³). An engraving of circa 1829 shows a Gothick style fort-like structure with massive arch at sea level, buildings above with lancet windows, crenellated parapet and an obelisk-shaped chimney. A detailed description was published in 1830 by George Alexander Cooke, probably based on a visit three or four years earlier. A large dome provided storage for 20 to 30 bathing machines which were brought down a curving tunnel to sea level when required. A tunnel also led to the Lower Reservoir used as a plunge bath for women and children. A horse pump forced sea water from the Lower Reservoir to the Upper Reservoir where it supplied the water for the hot baths, the power supplied by a horse gin in the open air. An obelisk-shaped chimney served the boiler but was removed in the later C19. A Bathing Room divided into two wings, the north for gentlemen and the south for ladies, had seven hot baths, shower baths and hip baths but was later demolished. There was a waiting room which was also a reading and subscription room and a newsroom which had an organ and billiard table. The Upper Terrace had round-headed alcoves, seats and benches for enjoying the sea views. A bathers' terrace was erected by 1831. A second chimney was erected between 1833-45.

In 1849 ownership of the Clifton Baths passed to John Boys' son, John Harvey Boys. A map from the Margate Sanitation survey of 1852 shows the subterranean plan of the Clifton Baths with the circular dome, a passage leading off to the north-east, a reading room, bathing room, reservoir, tank and horse pump and further subterranean passages. An engraving of circa 1860 shows a further obelisk-shaped chimney had been built by this date.

In 1869 the site was sold to Thomas Dalby Reeve who built a drill hall for the local Artillery Volunteers and a boiler house with tall chimney. These are shown on Bacon's map of Margate of 1875. In 1876 ozone baths were produced by an electrical process and in the 1880s an indoor salt water swimming pool was provided at the north-east corner of the site. This appears on the 1907 Ordnance Survey map and survived until the mid-C20. By 1903 a cinema had been installed into the former Drill Hall which was operational until 1924. In 1924 a theatre or concert hall was built east of the indoor swimming pool but was later demolished.

From 1926 onwards the Clifton Baths were re-modelled under John Henry Iles, a leading figure in the amusement park industry between the wars, who also owned the Dreamland Amusement Park in Margate. The site was turned into a large modern seaside complex with bars, cafes and restaurants on several levels and a large open air swimming pool projecting into the sea. These buildings were built onto and over the remaining parts of the Clifton Baths in a Neo-Classical style with Mediterranean influences, laid out over a series of terraces. From 1938 the name was changed from the Clifton Baths to the Cliftonville Lido.

SOURCES:

Peter Seary, "The Cliftonville Lido, formerly the Clifton Baths, Margate". A Canterbury Archaeological Trust Report of October 2007.

Allan Brodie and Gary Winter, "England's Seaside Resorts". English Heritage (2007) ps 104-5.

English Heritage, "Margate's Seaside Heritage" (2007)

Janet Smith, "Liquid Assets" English Heritage (2007) ps 70-71.

Nick Evans, "Dreamland Remembered" 2005 Edition. P 85-111.

REASONS FOR DESIGNATION:

The surviving parts of the Clifton Baths are recommended for designation at Grade II for the following principal reasons:

- * Constructed between 1824-8 this is one of the earliest surviving seawater bathing establishments in the country. The two earlier listed examples were both later converted to residential accommodation.
- * The Lower Reservoir is probably the earliest seawater plunge bath in the country to survive.
- * The circular chamber and bathing machine tunnel of the Clifton Baths are the only known examples of purpose-built structures built to store bathing machines and convey them to the beach.
- * The Clifton Baths is the only known example of a sea bathing establishment which was dug out of the cliffs and, as a result, altered the local topography.