



Speleological Hellenic Athletic Club - SELAS

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Recent exploration undertaken by S.EL.A.S. club
in the "Dersios" sinkhole at Palaiochora, Arcadia,
N. Mitsakis and S. Zacharias
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Introduction

Location and name

The Dersios Sinkhole is located on the Palaiochora plateau at an altitude of 755m within the administrative boundaries of the Municipality of Tyros or Tyrosapounakeika of the Arcadia prefecture. It is about 45 minutes drive from Tyros on unpaved road. The entrance is located at N 37° 15'32.1" , E022°46'49.2" (WGS 84). The name of the sinkhole is derived from the word Dersie or Dersio, meaning sinkhole in the local Tsakonian dialect.

Previous exploration

During August 1974, the sinkhole was explored and surveyed until the first sump by a team of French speleologists supported by the Hellenic Speleological Society (HSS) which gave it the identification number ASM 6412. The depth was surveyed at -110m and the length of the cave at 300m. The report printed in the XIII Fascicule of the Bulletin of the HSS, volume 6-8 (1976) mentions that local reports state that the sinkhole is linked to coastal and undersea resurgences.

Exploration during the 2003 season

During the summer months of 2003 four weekends were spent by teams of cavers from S.EL.A.S caving club on the plateau of Palaiochora, together with some members of other clubs. In total over 30 cavers were involved in the exploration, caver-diver support and survey.

During the year 2001, members of SELAS visited the cave for the first time and confirmed that at a depth of -80m and about 260m from the entrance to the sinkhole the route is blocked by a sump. A follow-up visit was planned for the next winter, but the heavy rainfall forced the group to postpone the expedition as any rainfall makes exploration of the sinkhole dangerous. It has been known to flood as water from the whole plateau eventually finds its way into the sinkhole's entrance. In 1907 the sinkhole had flooded spectacularly with water levels rising to above the level of nearby houses. Two local residents perished in the flood. The multitude of debris stuck to the walls and ceiling of the sinkhole bear testament to the frequent flooding.

First dive of the sump

In the end, it was on 18 May 2003, that a team from SELAS under the leadership of Nikos Mitsakis, an experienced Cave Diver arrived to examine the condition of the sump. It was clear that the sump was wide and large enough for an attempt to be made to dive it. The temperature of the cave at this point is 13.6°C and the sump itself 13°C. The relative humidity at this point is 95%. It was noticed that the level of the water was stable since the last visit. It was clear that we were faced with a sump and not a lake. We were therefore very hopeful that the cave would continue dry on the other side of the sump and that a way would be found through the sump to lead us to it. Following the discovery of the dry cave, the sump would be emptied mechanically to allow the non-diving cavers to have access to the continuation.

Diving equipment was taken to the sump by 3-4 helpers who assisted Nikos prepare for the dive. The dive itself had a maximum depth of 4.5m. The 20m sump was passed in only 5 minutes but some sections were narrow and disturbed silt made seeing impossible in places. On the other side, the diver followed a route of about 100m before having to turn back at a pitch which needed rigging. Away for one hour in total, Nikos returned to inform the team that not only did the cave continue, but it would be possible to empty the sump into the sinkhole and allow non-diving cavers to continue the exploration.

Emptying of the sump and new discoveries

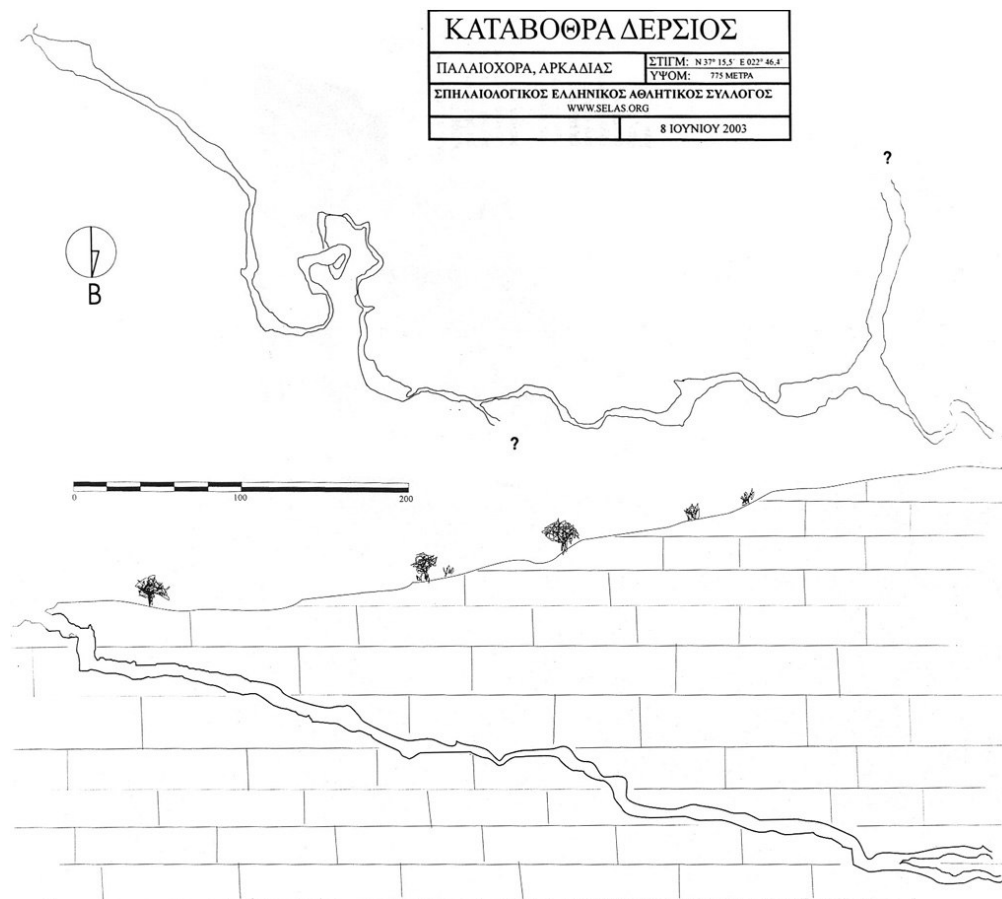
Very soon (31 May - 1 June) an expedition was undertaken to empty the sump and allow cavers to rig the pitch after the sump and continue the exploration. The sump was the first to have been emptied by members of SELAS and posed a number of challenges to the team. The method chosen was to create a simple siphon using a length of hose to empty the sump. We needed 40-50m of hose, and having been supplied with 100m by interested locals, this was laid double. The whole process was easier than expected in the end and required another dive to take the lower ends of the hoses to the other side of the sump. On the afternoon of Saturday the hoses began to empty the sump

On Sunday the level of the water had not dropped sufficiently to allow new exploration to take place, despite having dropped 2.5m. A new expedition was planned for the next weekend (5-6 June). The news of the potential for virgin cave ensured a large turnout. More than 20 people converged on the cave in one of the club's largest mobilizations. It was decided to work in three teams, on eight hour shifts. The fact that the level of water in the sump had risen slightly reminded the teams that we had a limited time before the small inflow into the sump would close the route again.

The teams proceeded about 400m beyond the sump reaching a depth of -161m. At this point they found a second sump with a steady inflow coming into it from a junction at about -140m. The cave becomes all the more active the deeper one gets, with inflows being more common as the depth increases. On Sunday another trip was made to the junction and the left branch was investigated up until another sump.

Both these sumps were the subject of the final expedition in September. The sump at -161m is deeper than the first and after about 30m comes out again into dry passage for about 100m when a third sump is encountered. Safety concerns did not allow for this sump to be explored. The sump to the left of the junction has a length of about 70m. Dry passage follows and the cave diver found himself at the bottom of a pit which halted any further exploration.

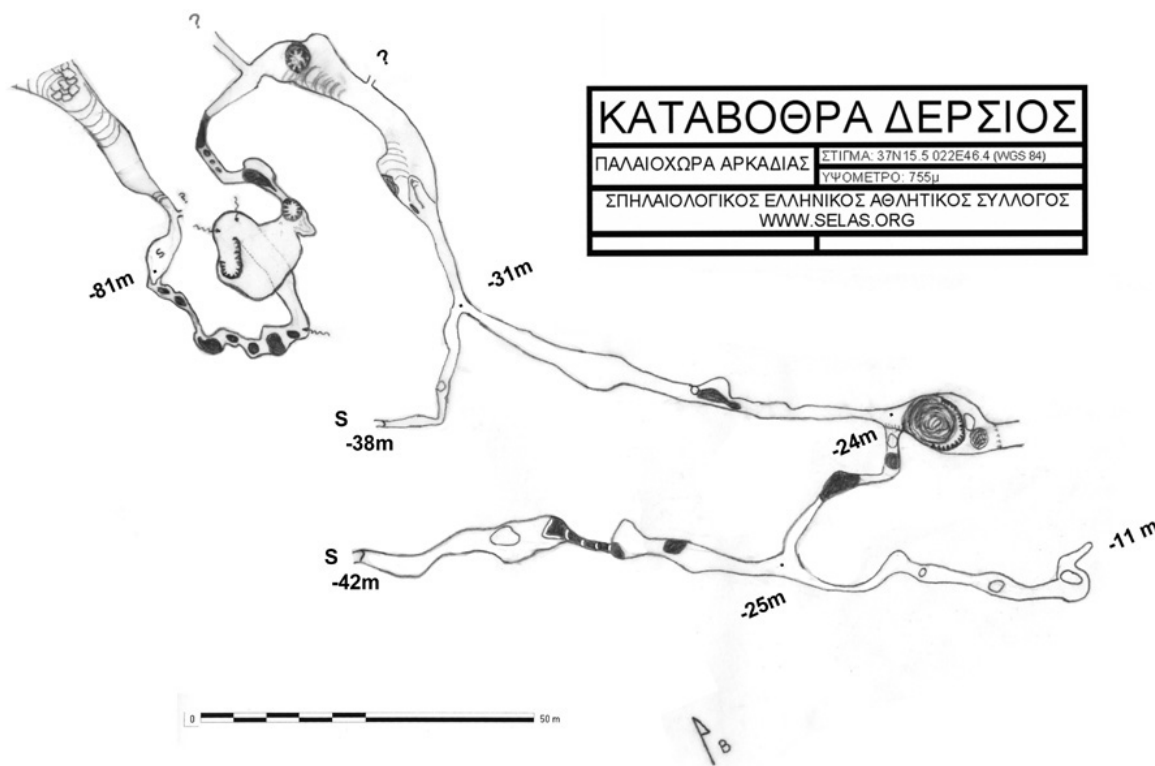
The total length of the cave was at 633m at the end of the season and the depth was -161m. Our exploration had doubled the cave's size in both dimensions.



Exploration during the 2004 season

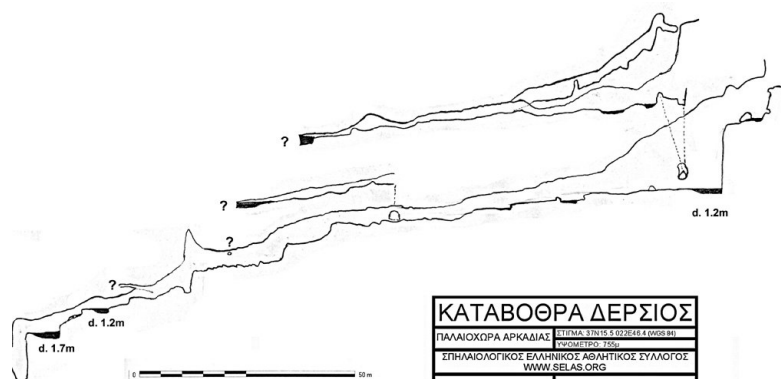
The summer of 2004 saw the return of SELAS to the sinkhole. Apart from training carried out as part of the club's annual caving seminars, the sinkhole saw two more expeditions, during which four dives were conducted (three of which at the first sump). The survey was also broadened to take into account the two side branches coming off the main passage. Thicker hoses (of 1.25 inches) were taken into the sinkhole for the faster emptying of the sump and these were capped with taps to allow the flow to be regulated in such a way as not to break the siphon in between visits. All that was required was for the tap to be turned and the flow resumed. In all, more than 20 people participated in the year's three expeditions.

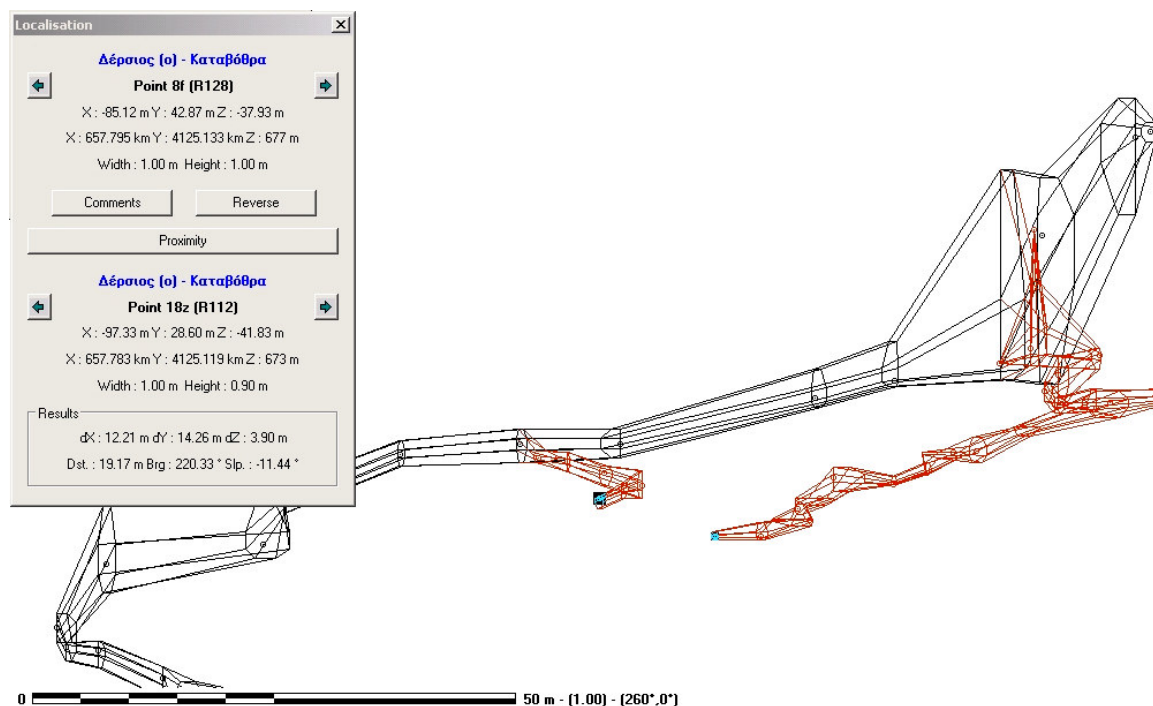
Both side passages were surveyed until the sumps which block further progress. About a km of wire and military style field telephones were installed between the entrance and at the first sump to allow communication between the diver and the surface in the event of inclement weather. A dive was conducted in the sump of the first side branch which resulted in about 70m of penetration with no dry cave visible. During October, a sample of water was taken from the spring which feeds the second sump, and presented to the mayor for analysis as per his wishes.



While in the cave, it was on our mind that it may be the case that the two sumps in the first and second side branches were one and the same. It was after returning to Athens with the survey data that the survey team was able to make the calculations and come to the conclusion that the two bodies of water were 4m apart on the vertical plane.

Nevertheless, it was decided that the expeditions of 2005 should re-confirm the survey data for this upper part of the cave.





Using the Visual Topo software commonly used in Greece for centerline calculations, it was clear that this 4m difference in depth of the two sumps, when they are separated by only 20m was probably an artefact of inaccurate survey measurements in the first side branch. The measurements had been taken by trainee cavers and may not have been as accurate as desired. One of the goals of the 2005 season was set as the improvement of the survey in this part of the cave.

Visual Topo also allowed us to calculate that from the second side branch, it would be possible to empty the sump deeper into the cave with only 70m of hosepipe, using a simple siphon again. Following this revelation, the emphasis of the season moved from the bottom of the cave to the sumps coming off the side branches. Already experienced following the emptying of the first sump many times over two years, hoses were purchased and plans were drawn up for the 2005 season.

Exploration during the 2005 season

The summer of 2005 saw the return of SELAS to the sinkhole with the defined goals and the purpose mentioned above. In all, more than six expeditions have been made already this year.

The first weekend resulted in the successful diving of the first sump and rigging of the whole cave until the second sump, together with the commencement of the emptying of the sump in the second side passage using the 70m hose we had brought for this purpose.

During June and early July, the emptying of the sump in the first side branch progressed slowly as the height difference between the surface of the sump and the highest point to which the water had to rise was large and close to the 10m limit for a simple siphon to work using water at normal atmospheric pressure. The work was also slow because in the absence of our diver, we did not have access to the deepest point of the sump until the water level had begun to drop enough to let us enter the sump little by little on foot.

On 23 and 24 July, the level had dropped enough in the sump to allow us to confirm what we had only suspected previously, that the two sumps were indeed connected! A round trip was now possible joining the first and second side branches.

The now emptied sumps revealed a small section of "dry" cave and yet another sump at a point -39m below the entrance. With an extra 50m of hose, the 70m was extended and set to empty the new sump in the combined first/second side branch. This was set in motion on 24 July.

The next weekend, although we had plans to dive the second sump at -161m, we found the hose still emptying water out of the sump at -39m. Following the hose, we came to the sump itself: where one week earlier there had been only rock and water, we now saw the water level had dropped by about a meter and new passage had opened up and was beckoning us into the unknown.

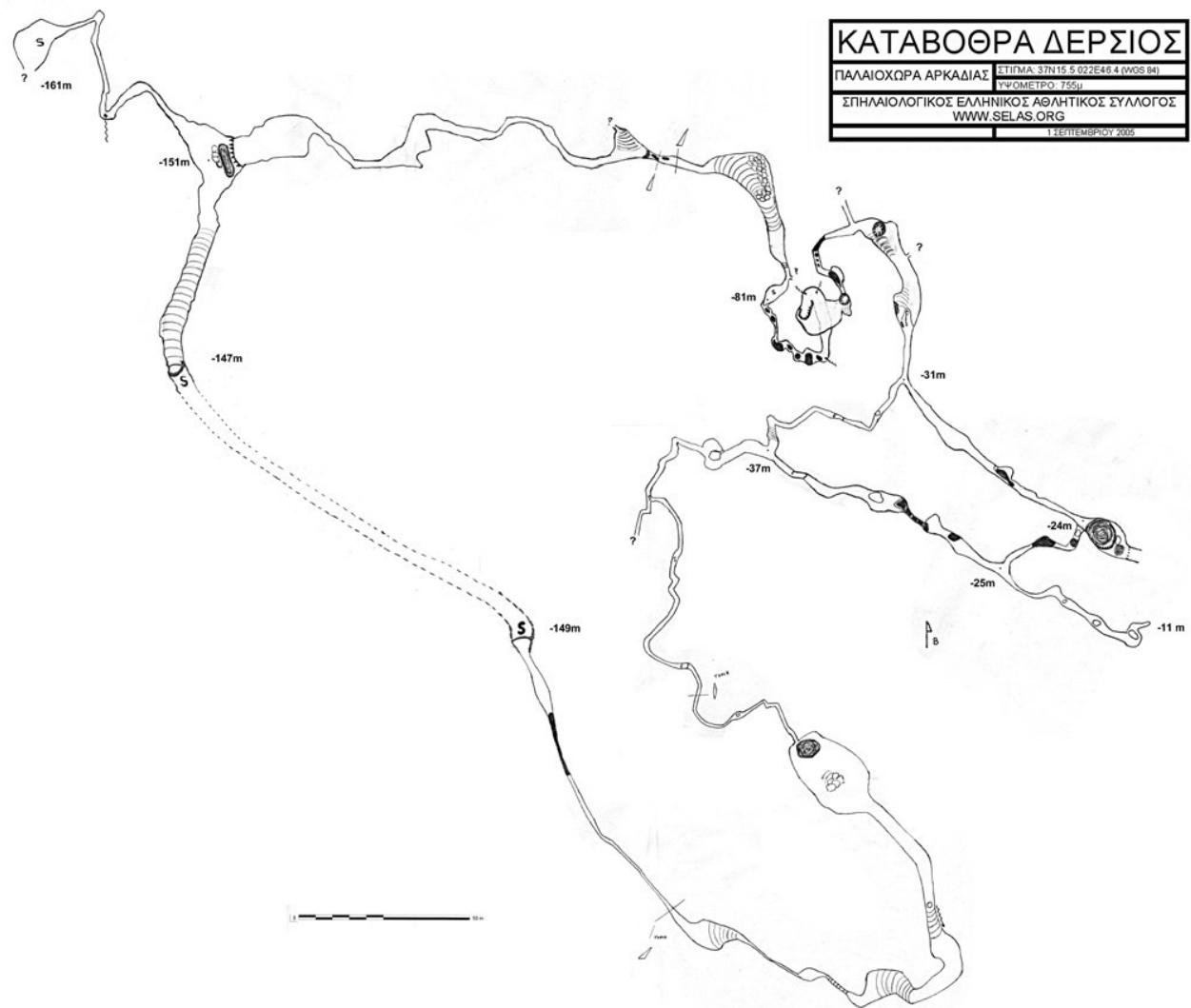
This new passage that used to be a sump had a meandering route through chest-high and neck-high water interspersed with completely dry parts. We walked through sections reminiscent of canyons, totally sculpted out of the rock by the waters' passage. We finally reached a large break-down chamber where the sump would empty out as a waterfall in the winter. From there, a few meters further on we got to the first descent. After the first descent, the cave takes a small turn to the right, turning from a course of almost directly south back to the usual westward course we were used to in Dersios.



We went through some meters chimneying between two different rock types - one was stratified horizontally, the other had stratification at an angle of about 55-60 degrees. In between the two, in a gap of about 50cm to 1m the water would flow in the winter. In between the two, either walking or chimneying, we continued to push into the unknown until lack of tackle forced us back.

The next day was dedicated to surveying the new section and completing the exploration itself. The first 120m of the survey were tough, with about 6m between each station and every other station requiring someone to be motionless in the water while azimuth and inclination were taken.

There are four pitches requiring rope. After the fourth, to the right, the cave continues, walking, at a depth of about -140m. The walking section ends up at a sump. In the sump we could see a diver's guideline. We had closed a circular route of over one kilometre ending up at the sump first explored by Nikos in 2003.



The results of 2005 season were that the cave now has a total length of surveyed sections of **1,525m**. The final survey (plan) for 2005 is presented above.

Conclusions

As far as we are aware, the method of emptying sumps through use of the simple siphon as employed in 2003 had not been employed previously in Greece. Until this time, it was and remains common practice if a sump is to be emptied, to draw the water mechanically from above. In 2004 the addition of taps allowed the flow to be controlled and, significantly, permitted the flow to be cut before the sump emptied and broke the siphon in the hose by allowing air to enter. Through the use of computer surveying software at the end of the 2004 season, opportunities were identified for sump emptying without the need for cave diving, which were exploited with good result in 2005. The main benefits of all these techniques are the ability for non-diving cavers to provide support for continued exploration once the sumps are emptied.

The perspectives for future expeditions are good. The cave is wide and does not show any signs of closing on us yet. Using the dive-and-empty technique it should be possible to continue the exploration to the limit of the divers' or hose carriers' ability. The methods used in the first -161m depth of Dersios are easily repeatable in other caves and our experiences will guarantee that each time the process will be easier.

This presentation incorporates translated text from the presentation of Nikos Mitsakis to the Sixth Panhellenic Speleological Meeting in 2003.

Survey data was collected by:

2003 - Kostas Adamopoulos, Yiota Kafetzi, Nikos Mitsakis, Tolis Sioutis, Peter Stavropoulos and Rania Telioudi

2004 - Nikos Mitsakis, Stelios Zacharias, Erato Tagaridi, Nontas Emmanouil

2005 - Nikos Mitsakis, Stelios Zacharias, Komninos Boutaras

Survey drawing by: Kostas Adamopoulos, Peter Stavropoulos, Erato Tagaridi and Stelios Zacharias

Photographs



The Palaiochora Plateau and the position of the cave



Nikos Mitsakis after the first successful crossing of the first sump (2003)



Kostas Adamopoulos commences survey in the newly empty first sump (2003)



Movement of the 1.25 inch hose (2004)



Work being carried out on the emptying of the sumps in the first side branch (2005)



Survey work (2004)



The first sump (2004)