SUMMARY

of cultural values at the Lule river power plant

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VekuVaku

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1. Porjus power plant

Porjus hydropower plant was the first power plant to be built on the Lule River. The decision to build the power station was primarily based on the industrial development of the 19th century. There was a major increase in demand for iron ore, which led to increased interest in the ore mines in Gällivare and the construction of the Malmbanan railway line and the ore ports in Luleå and Narvik. In order to make transportation of the ore more efficient, it was important to be able to replace steam locomotives with electric locomotives. The primary reason for wanting to build the Porjus power station was therefore to enable electrification of the Malmbanan railway line, and a final decision to proceed with the project was made in 1910.

When the Royal Vattenfall Board came to Porjus, the area was considered to be wasteland. There was only one permanent residence in the area, which was the home of Erik Olsson, also known as the "Old Man of Porjus", and his family, although the Sami people also spent time in the area. Porjusselet and the surrounding areas were frequently used as pasture land and migration routes by the Sirka and Sörkaitum Sami villages.

The construction of the Porjus hydropower plant entailed major difficulties, due to both the placement of the plant and the surrounding environment. The construction work was therefore divided into three different projects. The first project was to build the world's first major power station with an underground machine room, long underground canals and the Nordic region's largest dam facility. The second project was to build up a completely new village in an area without roads, and to achieve this a third sub-project was required, namely solving the issue of transportation in the wasteland and building a road along the 50 km stretch of land between Gällivare and the construction site.

These three projects were carried out in parallel, which meant that the workers initially had to carry all materials to the construction site, from Gällivare to Porjus. In this way almost 5 tonnes of materials, tools and food were brought to Porjus. There was an alternative route of 80 km, which took three days instead of one. Boats could be employed along parts of this transport route, and horses could be used on certain other parts of the route, and in this way an additional 16 tonnes of materials were transported to the work site before the railway was finally completed in 1911.

For the workers at the site it was not only the work itself that was tough, but also the living conditions in general. Porjus was intended to be a temporary construction village. The first residences built by the Vattenfall Board were extremely primitive shacks. 12 men were expected to share a total living area of 16 square metres. It was not deemed necessary to build family homes in this village, as the plan was to dismantle the village within four years, but it proved difficult to limit the construction of accommodation to the state-owned land. The aforementioned "Old Man of Porjus" started leasing plots on nearby land, which led to the development of an unplanned shanty town.

Construction of the more permanent buildings commenced in the late 1910s. The engineers' mess and head office became available for use in April 1911, and a medical centre, storage premises and department offices soon followed suit. In February of the same year, the temporary steam power station was put into operation and supplied the village with electric lighting and power for the operation of machinery. After a while it became apparent that Porjus would become a more permanent settlement.

The first stages of the power station were completed in 1915. The facility was the largest underground power station in Sweden at the time, with the machine room located at a depth of 50 metres below ground level. A weir was built for the power station. The design is one of the simplest types of dam, with the discharge occurring through the water flowing over the crest of the dam, so that the dam is self-regulating. The intake tunnel was built underground to prevent the water from freezing before it reached the turbines. The water was diverted through the intake tunnel to a distribution chamber with five intake sections, one for each power generation unit. When it was opened in 1915, the power plant had a capacity of 38 MW. A switchgear building was also built for the power plant. This was a monumental building and was commonly referred to as "The Temple in the Wilderness".

In 1916 a smeltery was built in Porjus, and the production requirements and electricity consumption at the smeltery led to an expansion of the Porjus power plant, with two new power generation units put into operation between 1917-1920. In connection with this expansion, the Suorva dam was built to enable more efficient regulation of the water supply to Porjus. A new three-phase power generation unit was installed between 1922-1923 to enable electrification of the Malmbanan railway line that ran to the port in Luleå. In the late 1920s, outdoor switchgear was installed to replace the grandiose switchgear building.

One factor that contributed to the village in Porjus becoming a more permanent settlement was that Porjus was to be the initial base for two upcoming projects: the construction of the Suorva dam between 1919-1923, and the construction of the Harsprånget power plant between 1919-1922. As the electricity distribution network had not yet been widely developed, Porjus was considered to be a strategic location for energy-intensive processing industries due to its proximity to both the power plant and the ore mines. This led to the establishment in the area of a smeltery (AB Porjus Smältverk) in 1916 and a superphosphate factory (Stockholms Superfosfatfabrik AB) in 1918.

The post-war period and the associated economic crisis took a hard toll on the processing industry. The newly established factories stopped operations in 1921, leading to an exodus of residents from the village. But the 1930s saw the return of more positive times, and the smeltery operations gained new momentum in connection with the expansion of the power station.

After World War I and the subsequent economic crisis, there was a surplus of electricity in northern Sweden. However, there was still a need for electricity in southern parts of the country, and this led to a decision in 1935 to build a 1,000 km long, 130 kV power line between Porjus and Västerås. During the 1930s, Porjus power station was expanded with an intake and outlet tunnel as well as an eighth power generation unit, and between 1944-1949 the station was further expanded with an underground intake tunnel. The existing earthen dam was raised in height, and a ninth power generation unit was installed.

Construction of the Harsprånget hydropower station recommenced between 1945-1952, which increased the employment opportunities in the area. The smeltery in Porjus was closed six years after the completion of the Harsprånget power plant. At the same time, the power plants in Messaure and Porsi were established, which meant that workers could be offered employment at these sites, and later in Vietas and Ritsem. This meant that Porjus primarily functioned as a commuter town in the 1960s and 1970s.

During the 1970s, a completely new power station was built in Porjus, as well as a completely new dam, a few hundred metres upstream of the original station and dam. The new station utilises the original waterways, which were supplemented with two new intake and outlet tunnels. Excavation works were carried out to enable the establishment of a new underground machine room for the two new power generation units, along with an assembly room and a control room. The new station was completed and put into operation in 1980, thus making Porjus the site of the first and the penultimate development projects on the Lule River. At this time, the facility had two new power generation units that were used together with the two units from the 1940s. The latest development of the power station had increased its capacity to 540 MW, which was fourteen times the capacity of the original facility when it was first put into operation.

Porjus is a unique settlement that paved the way for Sweden's hydropower development in the 1910s. To this day, the site is still characterised by the national romantic style of the age. That said, the settlement has also kept pace with contemporary developments, and the comprehensive environment has grown and developed in line with the growth rings that go hand-in-hand with the modern hydropower expansion.

The actual power plant area is characterised by contrasts, with elements of both the old and the new; the rugged natural environment and its lushly landscaped counterpart; the combination of intentional order and unencumbered freedom; the aesthetic and the functional. The power plant area has two major landmarks: the old switchgear building in the southern part of the area, and the new power station with the intake buildings in the north. Both buildings tower over the surrounding landscape, with the dry riverbed in between. The switchgear building – "The Temple in the Wilderness" – was declared a listed building in 1986.

2. Harsprånget power plant

The Harsprånget power plant is located on the Greater Lule River, 9 km downstream of Porjus. Harsprånget was once one of Sweden's most magnificent waterfalls. The Sami name for the waterfall is Njommelsaskam, which literally means "Hare's Leap". This name is said to originate from the fact that the river makes a sudden change in direction, much like a hare can do when leaping. The Harsprånget waterfall has now been silenced, and its force is instead utilised by Sweden's largest power station in terms of capacity.

Construction of the power plant commenced in 1918, with the aim of helping Porjus produce electricity for future industrial operations in the local area. When the workers first started coming to the site, they lived in tents and basic huts. When the time came for the actual village to be constructed, a plan was developed with designated residential areas and areas for trade. The workers who were to stay at the site for a lengthy period of time were given the opportunity to lease plots of land on which they could build their own homes.

The village was to have all necessary conveniences; wells were dug, and pipes were laid for water and sewage. The village was also electrified, which was a novelty at the time. All buildings were supplied with electric heating, and some of the apartments even had an electric stove. The small trading district that was established comprised three stores, a cinema, a couple of cafés and premises for arts and craft.

Excavation blasting commenced in 1921, in order to reach the depth at which the machine room was to be built. But although the intention was to excavate down to a depth of 100 metres, the workers only managed to reach a depth of 16 metres before the work was halted a year later. The reason for this was the economic situation in Sweden at the time. The Swedish government halved the amount of funding granted to Vattenfall's Board, and the industry to which Harsprånget was intended to supply electricity did not develop.

When the construction work was halted, focus switched to conserving the structure that had already been built, in case a decision was made to recommence the work in the future. But no one remained living in the village. The workers' homes were redeemed, and machinery and materials were dismantled. By the early part of 1923, both the work site and the village stood empty and desolate.

However, in the late 1930s, the question of building the Harsprånget power plant was once again raised in the Swedish parliament. The electrification of Sweden was a prioritised issue at this time. But Vattenfall's Board rejected the idea and instead proposed development projects along the Indalsälven River and the Ångerman River. Discussions regarding the fate of Harsprånget continued over the years. At the same time, technological developments, including the advent of more efficient equipment and a new technique for dam construction, made Vattenfall's Board more positive to the idea of recommencing the construction of the Harsprånget plant. Furthermore, technology was developed for transferring electricity over long distances without significant power losses.

In 1945, the Swedish parliament decided to grant funding to Vattenfall's Board for the continued development of Harsprånget. The power plant was to have three power generation units with a combined capacity of 260 MW, with room for a fourth unit if required. A new proposal had been developed regarding both the design and placement of the power plant. The construction site was moved two kilometres downstream of the original site, as it was no longer necessary to focus on building the dam at the narrowest part of the river. Instead, the dam could be built at a wider section of the riverbed.

The rock-fill dam was built at an angle, with a total crest length of 1,320 metres. An almost 800 metre long dam was built across the river in order to halt the progress of the river. On the eastern bank, where the dam wall turns to the north, the intake was constructed to lead the water down to the turbines and the machine room, which were located 65 metres below ground level.

The village was erected on a plateau above the work site, on the eastern bank of the river. The work commenced in 1945, and two years later there were 1,000 men working in Harsprånget, a number of whom brought their families with them. At the height of the project, the village had around 2,300 inhabitants.

The standard of the new village was better than that of earlier construction villages. All homes were

supplied with water and sewage, the heating was completely electric, and more or less all of the apartments had an electric stove. Workers with families had the opportunity to build their own homes or to rent a single-family detached home or a terraced house. A town square was built in the centre of the village, with stores, restaurants, a post office, telephone and telegraph facilities, and a community centre. There was also a school in the centre of the village, as well as a medical centre, a laundry and a small church in the nearby area.

In March 1951, Harsprånget began producing power when the first power generation unit was put into operation. The second unit started producing power in the autumn of the same year, and all three power generation units were in operation by the spring of 1952. At the same time as the construction of the power plant, a nationwide expansion of power lines was carried out between Harsprånget and Hallsberg.

25 years later it was once again time for work to be performed on the power plant. The three existing power generation units were to be supplemented with the addition of the previously planned fourth unit, as well as a fifth unit with a capacity of 450 MW. At the time, this was the largest power generation unit in Western Europe, and there were only a few larger units in other parts of the world.

Workers once again arrived in Harsprånget in 1974. The installation of the fifth power generation unit required excavation works for the construction of a completely new machine room alongside the original machine room. The fourth power generation unit was put into operation in 1978, and the fifth unit followed suit in 1980. Harsprånget is now Sweden's largest hydropower plant, with a maximum capacity that is almost equivalent to that of a nuclear power plant.

Harsprånget's cultural environment is typical of hydropower's cultural heritage, primarily in terms of parts of the original components having been supplemented with new additions and expansions over time. However, the environment lacks a preserved construction village of the type that can be found in Porjus. That said, the site still provides indications of the standard of the buildings erected during construction of the power plant, both at the time of the original attempt and during the subsequent development projects.

The area is characterised by the canyon-like valley that the Greater Lule River once thundered through. The road from Jokkmokk crosses the river at Ligga and takes motorists along the eastern side of the river towards Harsprånget. The Inlandsbanan railway line meets the river valley on the western side, passing over the river three kilometres above the power plant facility before continuing towards Porjus.

The environment south of the power plant area is characterised by the dry bed that has been created by the construction of the dam. This area provides dramatic views, with high boulders that create high walls around the exposed riverbed.

At the site of the once mighty waterfall, which was long visited and admired, there is now a rocky dry bed, and it is still possible to make out the sharp turn that, according to legend, gave rise to the name of the waterfall. A visitor site has been arranged here in memory of the once mighty waterfall.

At the location of the first construction village and work site, there are still traces of what once existed here. The streets still largely remain, although they are now long overgrown. It is possible to see remnants of the old buildings among the thickets and vegetation. The site of the second village is now also overgrown with forest, although this effect is somewhat broken up by the streets that were once used here. The original town square, located in the centre of the site, has an information sign with details of the village that once thrived here.

3. The Suorva dam

In 1918, the Swedish parliament decided that the Suorva dam was to be built in the middle of Stora Sjöfallet National Park, which had been established just a few years earlier, in 1909. The area was considered to be one of the most naturally beautiful areas of Sweden, with five waterfalls, each of them more magnificent than the other. In the investigation that formed the basis for the establishment of the national park, it was stated that the location was of major value for tourists but of little economic significance. The Royal Vattenfall Board was founded in the same year, and within five years a conflict arose regarding the national park. The reason for this was the completion, in 1915, of the Porjus power plant, which was the first power plant to be built on the Lule River. By regulating the chain of lakes that existed in the valley, it would be possible to create a more even water supply and year-round production.

When the time came to build the Suorva dam, it became apparent that major natural and cultural historical values would be lost. Around the Suorva lakes there were a number of Sami settlements and goahti sites where the Sami people had lived for many centuries. The valley between the mountains contained a number of small lakes that were used by the Sami as transport routes for the movement of reindeer between their winter and summer grazing lands. The Suorva lakes were also frequently visited by tourists and explorers.

The work commenced in 1919 at Lilla Sjöfallet, 110 km from Porjus, in an area without roads. No roads were built to facilitate the work; instead, the river was used to transport materials to the dam construction site. In the wintertime, a hundred or so horses were employed to pull the loads across the ice, and a whole armada of boats was used in the summertime. The desolate location and the harsh climate, in combination with the heavy nature of the work, which had to be performed without any major assistance in the form of machinery or equipment, made the work and life in general both physically and mentally testing for the workers.

The work environment in the rugged landscape was tiring and strenuous, and the accommodation was extremely primitive to begin with. The first workers arrived at Lilla Sjöfallet in the summer of 1919 and had to live in tents, later switching to dirt huts during the first winter. When the construction work began, 26 barracks were erected to house 400 workers. Other amenities were also constructed, including a canteen, a medical centre, an office, a command mess, a community hall, a laundry, storage premises, a stable and a workshop.

The Suorva dam project involved the construction of two multiple-arch dams by the eastern and western outlets of Lake Suorvajaure. These two dams were completed in 1923, at which time they had a height of 8 metres. After the initial regulation, the Suorva dam was regulated a further three times. The second regulation occurred between 1937-1941 following the development of technology that enabled the export of electric power. A 130 kV trunk line was in the process of being established between Porjus and Västerås. This meant that Porjus could increase its production, and consequently it was necessary to expand the dam facilities at Suorva. The existing dams were extended and raised in height by seven metres.

The third regulation took place between 1942-1944, at which time the height of the dams was increased still further. It was also necessary to build a third dam, the Sågvik dam. The fourth and final regulation was carried out between 1966-1972. Instead of continuing to develop the original dams, three new rock-fill dams were built just downstream. The major expansion of the dam facilities has resulted in Suorva now being a multi-year reservoir with the function of regulating the water supply to all power plants located downstream. The regulation of the dam facilities has entailed a drastic transformation of life in the area and the natural landscape, both upstream and downstream of the dams.

Today, the Suorva dam is a monumental construction in the midst of a desolate natural landscape, and it is the dam that now characterises the surrounding area. The dam spreads out over an area of almost two kilometres from Suorva and the site of the old construction village. It is a massive barrier that runs straight across the riverbed. Two Sami villages were directly impacted by the regulation of the dam facilities: Unna

Tjerusj (formerly Sörkaitum), and Sirges (Sirka). The regulation of Suorva and the expansion of the Akkajaure reservoir has successively taken over a larger area of land, and the Sami villages have constantly been forced to move and alter their reindeer migration routes.

Distinctive characteristics

- A monumental dam facility.
- Three rock-fill dams that utilise Järtasuolo as a partial barrier.
- Possible to glimpse the multiple-arch dam beneath the surface of the water.
- Creative spillway section.
- Traces of the old construction village.
- Well preserved workers' barracks.

4. Ligga hydropower plant

Ligga power station is located on a part of the Greater Lule River that has several power plants in close proximity. There are namely four hydropower plants on a stretch of the river less than 80 km in length. Ligga was the third power plant to be built on the river and was constructed downstream of its predecessors, Porjus and Harsprånget. The combined head that is utilised by these three power stations is 205 metres, more than half of the total head of 370 metres between the Great Lule Lake and the Bay of Bothnia. The gross head in Ligga alone was 40 metres, making it an ideal location for the construction of a power plant.

Construction of the Ligga power plant commenced in 1951, and it would turn out to be one of the most quickly built power plants along the Lule River. The reason for this was that the construction of the Bergeforsen power plant on the Indalsälven River had been delayed, and Vattenfall was finding it difficult to meet the demand for electricity. In order to solve this predicament, the work at Ligga was initiated with the help of workers from the Harsprånget site, as construction of the Harsprånget plant was already in its final phase.

Unlike earlier power plant construction projects along the Lule River, it was not necessary to build a new village adjacent to the work site at Ligga. Many of the workers at Ligga had been transferred from the Harsprånget site and were therefore able to continue to live in their existing accommodation at Harsprånget. Only 30 or so men needed accommodation at the new site, and three bachelors' barracks were therefore erected. Three dining rooms were also built at the work site, and this was the first time that white-collar and blue-collar workers ate their meals together.

In order to facilitate the workers' daily travel and the transfer of machinery from Harsprånget to Ligga, a new road was built along the northern bank of the river. This new road enabled most of the workers at Ligga to remain living in the Harsprånget village. The machinery that had been used at Harsprånget was transported to Ligga, and additional machinery was added as necessary. The intense pressure of needing to complete construction of the power plant as quickly as possible meant that the use of machinery was highly prioritised in the project.

Ligga's outlet tunnel had an area of 260 m2, compared to Harsprånget's 190 m2. The reason for the larger size was that the Ligga tunnel was designed to enable timber floating through the tunnel, something which did not need to be taken into consideration when building the facilities at Porjus and Harsprånget, as the floating of timber started downstream of both these power stations.

The dam was built as a combined earthen and rock-fill dam. The dam has a crest length of 350 metres, with a highest point 35 metres above the bedrock. The power station is an underground facility, with both the machine room and the control room located 35 metres below ground level. The two Kaplan turbines had a runner diameter of 5.8 metres, which at the time made them the largest known Kaplan turbines, installed to cope with Ligga's high head.

Ligga was the first hydropower station in the world to use industrial television (ITV). This innovation had recently achieved a breakthrough when it came to monitoring of workplaces and industrial processes. Ligga was initially remotely operated from the control room in Harsprånget.

In the late 1970s, Vattenfall decided to expand the power station as part of the ongoing expansion of the capacity of the stations along the river. A new building was constructed to house a third power generation unit and a new machine room. At the same time, additions were made to the intake and the dam at the existing facility. The capacity of the power station was doubled to 343 MW. The new Kaplan turbine had a runner that was 7.5 metres in diameter and weighed 205 tonnes, making it one of the largest turbine runners in Sweden at the time.

At the same time, plans were developed for a new bridge over the river that would be integrated with the power plant. The new bridge was opened in 1984. When driving from Jokkmokk towards Gällivare, you pass Ligga power station when you cross the bridge on the crest of the dam. The area is characterised by the wooded landscape that slopes down towards the banks of the riverbed and the dam that cuts off the river, with the reservoir on one side of the bridge and the dry bed on the other.

5. Messaure power plant

Messaure power plant is located on the Greater Lule River, 30 km upstream of Vuollerim, and its reservoir stretches to the outlet for the Ligga power plant. Prior to the construction of this power plant, the stretch of water between Messaure and Ligga had three large falls with a total head of 88 metres. Part of this stretch of river was located within Muddus National Park. Vattenfall sent an application to the King in Council for permission to build a dam over part of the national park, and received the reply that there was nothing to prevent the Swedish Water Court from granting a permit for such a project.

The area that would be affected by the project was used by several Sami villages for reindeer husbandry. The Slakka Sami village used the dam area as pasture land throughout the year. A total of 54 properties were affected, although only one was permanently inhabited. The property in question was called Njuoravuolle, where there were two crown crofts dating from 1868. Prior to the construction of the dam, the Swedish National Heritage Board carried out cultural-historical surveys and discovered three Stone Age settlements with associated trapping pit systems for hunting moose and wild reindeer. These finds would later end up under water.

Construction of the Messaure dam and power station commenced in 1957. The dam construction came to be the largest of Vattenfall's construction projects. At the height of the project, the machinery fleet consisted of 170 machines. The dam and power station were completed in 1962. At the time, the dam was one of the largest in Europe, and this 2 kilometre long and 101 metre high earthen and rock-fill dam is still the largest dam in Sweden to this day.

The actual power plant is an underground facility, with the machine room floor located 100 metres below ground level. The power plant was originally equipped with two power generation units with a combined production capacity of 1,700 MkWh. These two power generation units were put into operation in 1963. Vattenfall later decided to install a third power generation unit, which was put into operation in 1984. In terms of capacity, this expansion made Messaure the third largest hydropower station in Sweden, just behind Porjus and Harsprånget.

Construction of the Messaure village began in 1957 and was completed three years later. The village comprised 178 family apartments for rent, 80 homes, 20 bungalows and 32 bachelors' buildings. There was also a mess building for white-collar workers and four mess annexes for office staff. A town square was built in the middle of the village, which had every type of convenience required by a modern community: food stores, schools, a post office, a kiosk, a medical centre, a dental clinic, a hairdresser, a shoemaker, a telephone station, a haberdashery, a hardware store, a library, a police station, a filling station, a community centre and a building for religious services.

At the height of the project, no less than 1,350 people worked on the construction site in Messaure. The village was at its largest during the years 1959-61, when it had 3,000 inhabitants. When construction of the power plant and the dam had been completed, the village began to be dismantled, and it has been uninhabited since 1980. These days there are only three homes remaining as a reminder of what was once Vattenfall's largest temporary construction village.

The Messaure power plant area is characterised by the enormous rock-fill dam that dominates the landscape both upstream and downstream. The reservoir stretches for more than 20 km up to the outlet from the Ligga power plant. As the actual power station is located underground, the identifiable functions in the cultural environmental are of extra importance when it comes to understanding the site. The spillway is located at the north-east end of the crest of the dam. The spillway at Messaure is characterised by the concrete sections that are framed by shaped natural stone retrieved from the remnants of the excavation blasting.

The only remaining traces of the village that once thrived here are the streets that are gradually being reclaimed by nature. Signs indicate what once existed on this site and what the streets were once called, but otherwise there are only a couple of buildings remaining. The area that was once the heart of the village, in other words the town square, still has a central role to play at this location. It is namely here that an information sign has been erected to show what once existed on this site, along with some historical facts and a model of the original village.

6. Porsi power plant

Porsi power plant was the fifth plant to be built on the Lule River, but the first to be built downstream of the point where the Lesser Lule River and Greater Lule River meet. The power plant is located just to the east of Vuollerim. Upstream, the water has passed through the Messaure power plant on the Greater Lule River and the Letsi power station on the Lesser Lule River. Due to its close proximity to Vuollerim, the site village came to be a central hub for Vattenfall's organisation of the projects along the Lule River.

The area around the Porsi power plant and Vuollerim was originally a farming district where the land has been harvested since the middle of the 18th century. There is, however, evidence to suggest that the area has actually been populated for almost 6,000 years! The power plant is named after the rapids that once swirled in the river past Vuollerim. The rapids, in turn, got their name from the village of Porsi, which is one of the oldest villages in the parish of Jokkmokk.

In 1956, the Vattenfall Board applied for permission to undertake development of Porsiforsen. The damming area covered a 29 kilometre long stretch of river, with two major falls: Kuoukaforsen and Porsiforsen, including Vuollerimforsen. The Swedish National Heritage Board carried out cultural historical surveys and found four Stone Age buildings that were deemed to be of such significance that an archaeological dig was performed at these sites.

In December 1957, the Swedish Water Court decided to reject Vattenfall's application, on the grounds that the work would have too great an impact on coastal and sea fishing. The Lule River had been Sweden's foremost river for salmon fishing since the 1920s. Vattenfall appealed the Court's decision, and after several twists and turns the Water Court left the final decision to the King in Council, which gave the "green light" to the construction project. However, the decision by the King in Council was conditional, with one of the conditions being that Vattenfall would need to implement measures to compensate for the loss and damage that would be caused to fishing, and to promote reindeer husbandry in the Porsi region.

The work commenced in earnest in the summer of 1958. Unlike the other power plants that had been built along the river at this time, Porsi was constructed as an aboveground station. The construction work involved two earthen dams with connecting walls, a relief building, a machine room with intake, an outlet canal, a timber floating chute, a spillway section, a transformer building and switchgear. In order to enable the work to proceed more quickly, the slipform technique was used for the first time when casting the pillars for the spillway section.

The power station was equipped with two Kaplan turbines with a total capacity of 175 MW, which was a new record capacity at the time. The first power generation unit was put into commercial operation in October 1961, and the second unit followed suit in February the following year. An expansion of the station's capacity was carried out in the 1980s, with the addition of a further power generation unit with a capacity of 95 MW. As the timber floating activities had ceased, the timber floating intake was cast tight, and the chute was dismantled.

During the most active phase of the project, Porsi provided employment for a thousand people. A temporary village was erected close to the construction site, and an area with permanent housing was established nearer the existing settlement. This site also had a church, a school, a doctor's clinic, a dental clinic and an old age home. In conjunction with the construction of Porsi, Vuollerim became the base for the future power plant projects along the Lule River. A main office was established, including an operations centre and a plant office.

A reorganisation of Vattenfall in the 1970s came to change the conditions for the office and the settlement, as the construction projects were to be managed from Stockholm in the future. However, the Vuollerim office still served a number of functions in relation to the power plants on the Lule River, including as an operations centre. The local municipality took over responsibility for the temporary settlement in the 1980s, whereupon the buildings were refurbished and sold to private owners.

Vuollerim's strategic location has transformed the old farming village into a hub for the expansion of hydropower in Norrbotten. The area now boasts a cultural environment comprising the remnants of a construction village that was intended, in part, to only be temporary, and a power plant area with a dam that hides, to some extent, the large aboveground station.

7. Letsi power plant

Letsi was the first power plant to be built on the Lesser Lule River. When all three power generation units were put into operation in the early 1970s, Letsi was the most powerful hydropower station in Sweden at the time, although it was also the station responsible for the greatest destruction of nature. The damming area covers more than 40 km from Valjeteselet, just downstream of Jokkmokk, to Vuollerim, a stretch of water that had a number of rapids and falls prior to the construction of the power plant. By also diverting the water from the Lesser Lule River to the Porsi power plant on the Greater Lule River, a 17 kilometre dry bed was created.

Before Vattenfall commenced development of the Lesser Lule River, a meeting was arranged in the local community centre to inform relevant parties about the planned construction work. The plan for the Lesser Lule River involved six power stations and nine artificial water level adjustments. Letsi power station was the largest of these projects and involved a 70 metre high dam and a 6.5 kilometre waterway, possibly a tunnel, that would flow into the Greater Lule River approximately 10 km upstream of the mouth of the Lesser Lule River. This would entail the creation of a dry bed downstream of the power plant.

Work on the power station commenced in 1960, but before this could happen it was necessary to empty the riverbed of water. A 300 metre long water diversion tunnel was completed in the early summer of 1962, and work commenced in the summer of 1963 on the construction of the rock-fill dam that would control the water in the regulation reservoir. The dam, which is 85 metres high and 530 metres long, creates a 30 km long regulation reservoir that stretches all the way to the town of Jokkmokk.

The reservoir has the capacity to hold 2.5 million m3 of water. The intakes are located on the northern bank of the dam, and the spillway section is located on the southern bank, by the slopes of Mount Pokevare. The plans for the power station involved three power generation units, each with their own penstock that would lead the water down to the turbines through a joint tunnel. The machine room was built 136 metres below ground to enable utilisation of the equivalent head. The first and second power generation units were put into operation in the spring of 1967.

The outlet tunnel for Letsi power station is unique. In order to enable the water to also be utilised by the power plant in Porsi, a 6 km tunnel was built from Letsi to the Greater Lule River above the Porsi power plant. By diverting the water to the Greater Lule River, the Lesser Lule River was completely turned into a dry bed downstream of Letsi. To counteract this effect, mirror ponds were created at Padjerim and Vuollerim through two weirs.

At the height of the project, 500 people worked on the construction of the Letsi power plant. The increased use of cars at the time reduced the need for a construction village. No family homes were built in Letsi close to the work site, as most of the workers lived in Vuollerim and could commute from there. After completion of the work at Letsi, large parts of the workforce were transferred to work on the projects at the Bodenforsarna rapids.

Expansion of the Letsi plant, involving installation of the third power generation unit, commenced in 1969. This gave the power plant a total capacity of 415 MW, which meant that Letsi had the greatest production capacity of all hydropower plants in Sweden at the time. At the same time as the expansion of the power plant, a 230 km long power line was erected from Letsi, over the Torne River, to Petäjäskoski, south of Rovaniemi in Finland. The primary function of this power line was to export electricity from Sweden, although it also served the dual purpose of being able to import electricity from Finland in the event of a crisis.

A major renovation of Letsi power station commenced at the end of 1989, leading to a stoppage of electricity production until 1995. In 2008, Vattenfall carried out an upgrade of the three power generation units, which increased the station's total capacity to 456 MW.

Letsi power plant is located in an area with an extensive cultural environment, and the construction of the plant has impacted the local area both upstream and downstream of the station. Letsi power plant is an underground station and has altered the characteristics of the local landscape through the dam facility, which creates a lake-like reservoir upstream of the station and a 17 kilometre dry bed downstream.

8. Laxede power plant

Laxede hydropower plant is located in the municipality of Boden and is the northernmost of the three power plants that are situated within the municipality's borders, and which comprise the final units in the Lule River production chain. Laxede was opened in 1963, the same year as the power plants in Messaure and Porsi. Laxede's regulation reservoir stretches for 20 km up to Porsi's outlet canal.

Edefors, the location of the Laxede power plant, is rich in cultural history. Salmon fishing has been a dominant activity in the area since the Middle Ages. In the 17th century it was decided that the Crown's fishing rights were to be donated to the establishment of the city of Luleå, which then became the sole owner of the salmon fishing rights in Edefors. In the 1960s the city of Luleå sold its fishing rights and associated property to the Vattenfall Board, which then proceeded to construct the Laxede power plant, whereupon the fishing in the area ceased.

In the early 18th century, the river was used to transport silver from the silver mines in Sarek to the port in Luleå. A large number of mills were established in Norrbotten in the 19th century due to the ore deposits that had been discovered in Gällivare. In order to facilitate transportation of the ore on the river, an English company commenced construction of a canal at Edefors. The construction work was subsequently halted, but it is still possible to see parts of the "English Channel", as it was known. An administration building was erected in conjunction with the construction of the canal, and this building was later converted into the Edefors Hotel to provide accommodation for tourists who travelled along the river by steamboat. When the mills were closed, they were replaced by sawmills. Increased demand for timber meant that the river once again became a popular means of transport. The floating of timber on the Lule River continued until the 1960s.

The power station in Laxede was primarily built to meet a growing national need for electricity in Sweden, as well as to satisfy the need for employment in the area. Construction of Laxede commenced in 1959, and unlike other power plant projects along the Lule River, the Laxede project proceeded in an uncontroversial manner, without any major tensions or raised voices.

Laxede was built as an aboveground facility with two power generation units, with a combined capacity of 116 MW, and the possibility of increasing the capacity still further by adding a third unit. The dam was constructed as an earthen dam stretching approximately 500 metres on each side of the spillway and intake sections. The dam was built downstream of the old road bridge, which would eventually end up under water. A new bridge was built 500 metres upstream of the old bridge.

The third power generation unit was put into operation in 1986 and provided an increase in capacity of 70 MW. But Laxede was only intended to produce electricity during periods of high demand, as a complement to the other power plants in the Lule River production chain. When the third power generation unit became operational, the first two units were renovated. Further renovations of the three power generation units were carried out later, at which time the power plant's output was increased through the use of a more efficient turbine and generator.

In conjunction with commencement of the construction work at Laxede, a small village was erected to provide accommodation for the workers. Barracks were built, and the tourist hotel was closed so that the building could be used as a mess and main office for Vattenfall. 28 houses were built to be used as family homes, along with ten bachelors' barracks and one worker's own home, and there were also buildings for social services, including a community hall, a store and a mess for white-collar workers. The village was completely dismantled when the work had been completed. Two houses were built as permanent accommodation, but when the construction work was finished it was decided that the power plant was to be operated remotely, and consequently there was no need to station any machine operators in Laxede.

Laxede and the surrounding area changed drastically when the dam and power station were built. Prior to the construction work, the area was rich in settlements and facilities with links to the activities that had been practised in the area over the years. In the dry bed it is still possible to find traces of the salmon fishing and timber floating activities that were once so prevalent in the area. At Laxholmen, to the west of the power plant, there is a settlement with links to fishing in the river. The eight buildings at Laxholmen date from the middle of the 18th century and have been declared listed buildings.

9. Seitevare power plant

In 1957, the Vattenfall Board presented a regional plan prior to the regulation of the Lesser Lule River. This plan included the Seitevare power station and its associated reservoir, Tjaktjajaure (Tjaktjajávrre). The regulation was given the name Blackälven, after the river that was to be blocked off and thus create the dam upstream. The plan was to build an underground power station and carry out excavation blasting for the construction of an outlet tunnel that would lead into the Lesser Lule River.

The area at Seitevare is named after a historical site with strong links to Sami culture. The Sami word "seite" can be translated as "worshipped rock" and gives an indication of the importance of this site in the Sami faith. Seitevare has been an important local visitor location through the ages, primarily due to the "sacred" waterfall that the construction of the power plant would utilise.

The damming of Lake Tjaktjajaure would entail damming effects equivalent to those created by the Akkajaure reservoir and the Suorva dam. Seitevare was to be the Lule River's next largest regulation reservoir after Suorva and Akkajaure. The regulation would involve the damming of 6,000 hectares of land, including the Rittakdalen pine forest in Sarek National Park. The damming would also affect settlements in the area and the Sami mountain village of Jåhkågasska.

The work commenced in the summer of 1963. Excavation blasting was carried out to enable construction of the power station 175 metres below ground level, utilising a head of 182 metres. The water was led from the turbine, which with its capacity of 225 MW was the largest turbine in existence at the time, through a five kilometre long outlet tunnel, to a canal leading out into Lake Jäkaure (Jiekkávrre). Together with the turbine, a new type of generator with water-cooled stator and rotor windings was used, which reduced the weight, volume, losses and costs.

Up to 700 people worked in Seitevare during the winter period, a number that increased to around 1,000 during the summer. A small construction village was erected in Snavva for those working on the dam, and a larger village was built in Seitevare, with a mess and residences. There was also a post office, a convenience store and premises for meetings and hobby activities. It was not deemed suitable for families to live this far up in the mountain region, and family homes were therefore built in the Nyborg area of Jokkmokk. The Nyborg settlement provided housing for workers from Seitevare, Vietas and Ritsem, who commuted to their respective work sites on a weekly basis, as well as workers from Akkats, Ligga and Harsprånget, who commuted to work on a daily basis.

The workers referred to the work site at Seitevare as an icy hole due to the harsh local climate. The work commenced in 1962, and during the month of December it was not unusual for the workers to have to work in temperatures of 40 degrees below zero. The work clothes included a face mask and countless layers of clothing. Seitevare was the first power plant construction site at which a five-day work week was introduced after local negotiations.

The power plant was opened in September 1968, together with the Letsi power plant. The generator that was originally installed utilised water-cooling, which was a new innovation at the time. However, it turned out that this cooling method led to repeated operational stoppages, causing Vattenfall to make a decision to rebuild the generator. Between 1982-1984 the cooling method was changed from water-cooling to air-cooling.

Located in a naturally beautiful environment on the border to Sarek National Park, the power station and reservoir are a scar on the face of the landscape as a reminder of what has been lost at their expense. The power plant and dam facility are located in the midst of the Blackälven River valley, by the slopes of the Seitevare mountains. The enormous dam creates an artificial wall across the deep valley that the Blackälven River once vigorously flowed through. Traces of the construction village that existed here remain to this day. On the ground it is still possible to see indications of areas where pathways were once created and where buildings once stood.

10. Parki power station

Parki, on the Lesser Lule River, is one of several stations and dams that interact in a long production chain. Prior to the construction of the power station, the Royal Vattenfall Board developed a regional plan for the whole of the river. The plan involved six power stations that would regulate nine lakes. At the outlet of Lake Parkijaure (now renamed Bárgávrre), a dam was to be constructed to regulate the water levels in the lakes upstream.

A power plant was to be built at ground level adjacent to the regulation dam between Parkijaure and Randijaure (Ráddnávrre). The working name given to the proposed project was Parkiforsen. Through wintertime regulation of the Skalka reservoir via the power station, it would be possible to lower the natural low water level in Skalka by around 3 metres and the natural low water level in Parkijaure by around 2 metres.

The regional plan would impact the local reindeer husbandry and Sami culture. The Sami village of Jåhkågasska spent time at Parkijaure, and to this day the village has migration routes and collection areas around the lake. The plan created a lot of discussions but was eventually approved. However, not all parts of the planned construction project were carried out. The development of the Lesser Lule River began with Letsi, followed by Seitevare, and Parki was the third step in the process.

Parki power station is one of the smallest stations along the river and utilises a head of only 14 metres, which gives the station a total capacity of 20 MW. However, production of electricity was not actually Parki's primary function. Its most important role was to regulate the water supply for the power stations downstream, such as Randi and Akkats.

Following completion of Seitevare power station, the workers were transferred to Parkijaure. The work commenced in October 1967, and unlike the project in Seitevare, the construction of Parki proved to be relatively unproblematic. The weather was dry and mild, and months passed without accidents. At the height of the project, 125 people worked at the Parki construction site. Given the site's close proximity to Jokkmokk, it was not necessary to erect a construction village at the work site. Instead, only a few bachelors' barracks, an administration building and two saunas were erected at the site. No permanent homes were ever built, as the facility was to be operated remotely.

The pace of the work on the Parki power station and the power development of the Lesser Lule River quickened during the 1970s, as there was a growing demand for electric power. The reason for this was a dry year, cold weather and an economic boom within industry. The year after the station was opened, Tjåmotisjaure, Katnesjaure, Skalka and Parki were also regulated. In the 1990s, the machine room was expanded to nearly three times its original size.

Parki power station is located in a naturally beautiful environment characterised by lush woodlands dotted with small and large lakes. The station is an aboveground facility located downstream on the eastern side of the dam wall, and is largely subordinate to the surrounding environment. Through the portage and the height difference created through the dam, the power station is located in souterrain. The power station is characterised by the long but narrow volume that sticks out from the dam wall.

11. Boden hydropower plant

The power plant in Boden is the last unit in the Lule River's production line and thus the final location where energy is produced from the water flow that begins at the Akkajaure reservoir and flows into the Bay of Bothnia. The power station utilises the head from three former rapids in the river – Trångforsen, Bodforsen and Näsforsen – with a combined head of 13 metres.

The idea of developing the Bodenforsarna rapids was seriously raised for the first time prior to the production of a preliminary programme in the late 1950s in which Vattenfall presented power stations which they felt should be completed between 1964-1968 in order to utilise the river in the best manner after other power plants had been completed.

Construction of the Boden power station began in the spring of 1967. The conditions for the construction of this power plant were considerably different than the conditions for earlier power plant projects along the Lule River. Thanks to the power plant's proximity to the railway line and the town of Boden, the construction work developed into a more industrial project than was the case with other projects in the late 1960s. When it came to laying the foundations for the power station, the workers encountered difficult conditions. The bedrock on which the station was to be built was at such a depth that it was not viable to work all the way down to the solid rock. Instead, the foundations were laid on subsoil, with special sealing measures.

The power station in Boden is an above-ground facility built directly adjacent to the intake. The machine room was equipped with two power generation units with Kaplan turbines. Two earthen dams were built for the power station. One is 400 metres long and runs along the eastern bank of the reservoir, diverting the water towards the station. This dam also blocks the Bodån river, whose water is led past the station via a canal and a tunnel. The other dam, the actual main dam, runs across the riverbed and towards the western bank by the spillway, and has a crest length of 140 metres. This western dam connects with the spillway and intake, together creating a dam structure that is 200 metres long and regulates the reservoir. The spillway sections form three openings and have upward-facing segment gates.

As the power station in Boden was built in a densely populated area, it did not require the same type of construction village as had been necessary at many other work sites along the river. Only two family homes and two buildings providing accommodation for a total of 70 single men were built on behalf of Vattenfall. The first power generation unit was put into operation in 1971, although the official opening of the station did not take place until the spring of 1972. After completion of the power plant in Boden, the workers were gradually transferred to work on the construction of the power plant in Vittjärv. In the early part of the 21st century, the dam was reinforced to enable it to cope with extreme water flows. Among other things, the crest of the dam was raised by 1.8 metres.

With the construction of the power station in Boden, the last spawning sites for salmon and sea trout in the Lule River disappeared. Vattenfall was therefore ordered to release 600,000 migration-ready salmon and trout annually. To this end, a fish farm was built downstream of the power station, where migratory salmon and trout are captured for breeding. Roe is extracted from the breeding fish, and the young fish are allowed to grow for two years before being released into the river. These fish operations came to be a popular tourist attraction. Boden was built as an exhibition station, and inside the power station a gigantic aquarium was created with around a hundred salmon, and guided tours/exhibitions were arranged during the summer period. However, these tourist activities have been phased out as the safety procedures at the facility have been tightened.

12. Akkats power plant

The Akkats hydropower plant is located at the outlet of Lake Vajkijaure on the Lesser Lule River, four kilometres to the north of the town of Jokkmokk. The facility utilises the head between Vajkijaure and the reservoir for Letsi power station downstream, with a net head of 42 metres. Akkats is a much talked about power plant with a distinctive expression due to the artwork, created by the artists Bengt Lindström, Lars Pirak and Lars J:son Nutti, that adorns the facility. The artwork is intended to be a symbol of the Sami lifestyle and culture that has characterised the region, but it has received criticism on the basis that the construction of power plants has deprived the Sami people of their traditional lifestyle and culture.

Prior to the development of the Lesser Lule River, the Vattenfall Board developed a regional plan involving the Seitevare, Randi, Parki, Letsi and Akkats hydropower plants. The plan was to commence work on the Akkats plant in the mid-1960s. However, Jokkmokk Municipality initially rejected the planned project due to the fact that the placement of the power plant was far too close to Jokkmokk's church town. Vattenfall's plan included an assessment of the anticipated impact of the regulation of Vajkijaure. The impact identified in the plan included total damage to local fishing, as well as potential impact on the migration routes for reindeer. Despite this, the plan was approved, and the work commenced in 1969.

The regulation of Vajkijaure (Vájgajávrre) creates a reservoir with a capacity of 43 million m3, with a regulation height of 1.5 metres. The reservoir is regulated by several dams. The main dam has a crest length of 1,450 metres. A smaller barrier dam upstream prevents the water from passing through a depression in the terrain. The power station is located on the eastern side of the river and is an underground facility with a two kilometre long outlet tunnel. The power generation unit consists of a Kaplan turbine with a runner diameter of 6.8 metres. The turbine is connected to a generator that is designed for power output of 170 MVA.

At the height of the project, 235 people worked at the Akkats construction site. No major local community measures were required, as the power plant was built at a time when most workers had their own cars. However, bachelors' barracks were erected with room for 100 men. Separate homes for operating staff were never built at the site, as the station was to be remotely operated from the control centre in Vuollerim.

The Akkats power station was put into operation in August 1973 and has since been beset with problems. Repeated faults have led to periods of downtime at the power plant. A major overhaul of the generator and turbine was performed in 1992, but in 2002 a major breakdown occurred when an electrical fault caused the power plant's turbine to stop quickly. Large amounts of water inside the station were sucked out and then swept back into the power plant, causing major damage. In 2008, in order to increase the power plant's capacity, Vattenfall decided to replace the original power generation unit with two smaller but more efficient units. The redevelopment work required blasting operations to enable the construction of a new machine room adjacent to the original one.

Akkats is one of the most expressive power plants along the Lule River, thanks to the artwork that adorns its facades and spillway sections. The local environment has undergone major changes on account of the power plant, and the loss of the thundering waterfalls has created a new landscape characterised by tranquillity and mirrored water. The site is surrounded by a typical North Bothnian rolling forest landscape dotted with lakes. The intake building and spillway sections are the elements of the facility that characterise the Akkats hydropower plant, in particular due to the paintings created by Bengt Lindström in strong primary colours typical of the artist. This artwork makes the power plant a unique facility, not only in comparison to the other plants along the Lule River, but also in the whole of Sweden. The buttresses and southern facade are adorned by Lars Pirak's more restrained paintings featuring classic Sami motifs.

13. Vittjärv hydropower plant

Vittjärvs kraftstation är det näst sista i Luleälvens produktionslinje. Nedströms når vattnet Vittjärv power station is the penultimate station in the Lule River production chain. Downstream the water reaches Boden power station, and Laxede is located upstream. Vittjärv's regulation reservoir stretches for almost sixty kilometres up to the outlet at Laxede.

Vittjärv is located in an area that is rich in cultural history, where the river has constantly been used for both fishing and timber floating, as well as for hydropower – even before the power plant was built. In 1849, the villagers of Vittjärv were granted permission to build a sawmill and a mill driven by hydropower. The first proposal to build a hydropower plant in the Boden area was presented in 1900, with Vittjärv named as a potential site.

However, the Vittjärv power plant actually ended up being one of the last to be planned on the Lule River. The background to this decision was that the Vindel River was to be spared from further development, and Vattenfall had therefore been assigned the task of investigating alternative projects. Vittjärv was one of the proposed alternatives, and timing-wise it was also a suitable site, as the nearby Boden power station was in the final stage of the construction process. Consequently, workers would be able to be transferred from the Boden construction site to Vittjärv without needing to move from their existing accommodation.

Another reason for proposing Vittjärv was that it would make it possible to offer employment to those working on the development of the Lule River as Vattenfall gradually wound up the operations. Vittjärv was, in reality, too expensive to build, but the project was made financially viable thanks to government funding provided for employment purposes.

In 1971, the Swedish Water Court granted permission for construction of the power plant. The design of the Vittjärv power plant is relatively unusual in comparison to other such facilities in Sweden, as the machine room and spillways are built directly on the ground. The more natural approach would have been to carry out excavation works to enable construction of these facilities underground, but the bedrock was so deep at this location that it was cheaper to build the station on a cast concrete foundation.

At only 6 metres, Vittjärv has the lowest head of all the power plants on the Lule River, and the station's production capacity is only 33 MW. In order to enable production of sufficient power from such a low head, three Kaplan tube turbines were installed. On the other hand, with a height of 45 metres and no less than seven spillways, the actual station building is certainly not small in size, and of all the power stations along the Lule River, Vittjärv is the one with the most spillways. The size of the station is due to the fact that it needs to be able to receive 2,000 m3 of water per second.

The first power generation unit was put into operation in November 1974, the second in December of the same year, and the third in February 1975. Due to the low head, an expansion of the power plant's capacity was never an option.

At the height of the project, 250 people worked on the construction of the Vittjärv power plant between 1971-74. Three bachelors' barracks were erected adjacent to the work site, with room for around 90 men. A small area for workers' own homes was established in Vittjärv in conjunction with the construction of Boden power plant. All 13 buildings were moved there from Messaure and Vuollerim.

The workforce in Vittjärv gradually left the construction project. Many of them stayed within Vattenfall, with approximately half of the workforce being transferred to work on the construction of Randi power station. Many of the white-collar workers were transferred to Forsmark to help with the construction of the nuclear power plant at that site. The bachelors' barracks were moved to other projects, but the workers' own homes remain where they were originally placed in the late 1960s.

In 2005-2006, the dam facility was redeveloped in order to reduce the risks associated with discharge in the event that the damming levels became critically high. During the 2010s, the power plant has undergone renovations in order to ensure the operational reliability of the plant, including renovation of the segment

gates and power generation units.

Unlike the majority of the power plants on the Lule River, Vittjärv power station is an aboveground facility. The low head means that the power station's placement and characteristics distinguish it from other power plants. The power plant area is surrounded by single-family homes located closely together along the banks of the river.

14. Vietas power station

Almost 50 years after the completion of the Suorva dam, Vattenfall decided to once again undertake a construction project in Stora Sjöfallet National Park. In 1960, the Vattenfall Board presented a regional plan for the final regulation of the northernmost parts of the Greater Lule River and proposed three projects: Vuojat power plant, with Lake Vastenjaure (Vásstenjávrre) as its reservoir, and the Ritsem and Vietas power plants, with Lake Sitasjaure (Siiddasjávri) and Lake Satisjaure (Satihaure/Sádijávrre) as their respective reservoirs. The first project never came to fruition, but the other two projects came to be the last power plant establishments in the national park.

The area, which was denoted as wasteland in the early 20th century, has been utilised by the Sami people since the Stone Age. A large number of ancient monuments have been discovered in the nearby area, bearing witness to the Sami people's use of the natural environment in this area through the ages. In the 19th century, interest in "untouched" nature grew among the bourgeoisie, and early forms of tourism were started in the area. The Stora Sjöfallet waterfall was a popular tourist destination in the Swedish mountain region.

The Vietas power station was to be built to the north of the Stora Sjöfallet waterfall, utilising the water from both the Suorva reservoir and the planned Satisjaure reservoir. In order to be able to carry out the work, the first step was to build a 90 km long road from Luspebryggan, outside Porjus, to Vietas, a road known by the name "The Road to the West". The road had not yet been completed when construction of the power plant in Vietas commenced in 1962. Excavators and tractors had therefore been transported up to Stora Sjöfallet during the spring on ice roads. Ferries were also used for the first transports during the summer, in the same manner as in the early 20th century.

The actual power plant project began with the construction of the 1.5 km long Satisjaure dam and a 5 km long tunnel to the new power station. The Suorva dam would also supply the Vietas power station with water through a 7 km long tunnel. At the same time as the construction work at Vietas, the Suorva dam underwent its fourth regulation and expansion. The work on the power station commenced in the winter of 1964. The machine room was built completely underground, with room for two power generation units. One of the power generation units is driven by water from both reservoirs, while the other unit only utilises water from the Suorva reservoir.

At the height of the Vietas project, the work was carried out by 590 men. Similar to other power plant projects along the Lule River, a small construction village was erected for the Vietas project. As the work site stretched over a large area, there were three different housing areas, at Suorva and Satisjaure as well as the main village close to the power station. After completion of the construction work, the village was dismantled, and the buildings were moved to the site of other power plant projects. However, the mess remained to form the core of the tourist activities in the area. The property that was once the engineers' mess in the construction village is now the Stora Sjöfallet Mountain Lodge.

On 3 July 1971, the first power generation unit in Vietas began feeding power to the network, and the second unit followed suit six months later. At the opening ceremony, the Sörkaitum (now Unna Tjersj) Sami village made a final attempt to draw the outside world's attention to the problems created by the construction of the power plant. When the invited guests arrived at the entrance to the machine room, they were met by a group of 15 men and women with placards proclaiming the degradation of the Sami cultural

landscape that the construction of the power plant entailed.

In the early 1980s, planning began to expand the capacity of the power station. The Vietas construction project provided employment for 175 men during five years and was the last such project to be undertaken along the Lule River.

Vietas power plant is located in the midst of the natural beauty of Stora Sjöfallet National Park, adjacent to the site of the once mighty waterfall. The power station is an underground facility, which makes it difficult to identify in the landscape. However, west of the outlet canal it is possible to see one of the entrances to the machine room. The nature in the area is characterised by the forested slopes of the surrounding mountains. The Stora Sjöfallet waterfall, one of the attractions in the national park, can be seen cascading over the rocks on the portage between Lake Langas and Lake Kårtjejaure.

The original construction village has been transformed into a tourist facility, and the original engineers' mess now houses the reception area and restaurant at the Stora Sjöfallet Mountain Lodge. The bachelors' barracks were typical of those erected by Vattenfall at the site of power plant projects, characterised by their simple design with symmetrical window placement, a flat gable roof and wooden panelling.

15. Ritsem power station

The hydropower plant in Ritsem is the northernmost plant on the Lule River, located on the northern bank of Akkajaure, on the outskirts of Stora Sjöfallet National Park. Akkajaure is the large reservoir that has been created through the Suorva dam. In December 1969, Vattenfall asked the Swedish government for permission to once again undertake a construction project in Stora Sjöfallet National Park, but the request was met with overwhelming resistance from the political opposition and various advocacy groups. Vattenfall therefore reworked the project plan.

In the original version of the plan, Lake Autajaure was to be regulated in order to significantly reduce the flow of water through Teusajaure, which was of importance both to the national park and to the Unna Tjersj Sami village. The new plan meant that Autajaure would not be regulated, and that the water would instead be led through a tunnel from Sitasjaure to Ritsem. Despite this change, the planned project would still have a major impact on the surrounding environment. Having already been significantly affected by the regulations that had been carried out along the Lule River, a protest was lodged by the three Sami villages that would be most affected by the construction of the power plant: Mellanbyn (now Baste), Norrkaitum (Girjas) and Sörkaitum (Unna Tjerusj).

Following the amendment of the plan, the work was able to commence in 1971, with an extension of the "Road to the West" from Vietas to Ritsem. The power plant project involved excavation blasting to enable construction of a 16 kilometre long tunnel from Sitasjaure to the power station at Ritsem. A three metre high concrete weir was built at Lake Sitasjaure. The long intake canal is used to tap Sitasjaure of water during the winter half of the year, with a maximum level drop of 10 metres. The reservoir is then refilled to its natural levels during the summer half of the year.

Ritsem power plant was built as an underground facility, and it is only possible to see the gates that lead into the machine room, which have been excavated into the rock. The machine room was built 160 metres below ground level, and the power station would be equipped with Sweden's largest hydro power generation unit. Pneumatic drills were used during the extensive drilling works, which contributed to a better work environment as they were quieter and had a higher capacity that the hydraulic drills that had been used in the past. Other measures aimed at improving the work environment included the use of machinery to a greater extent instead of hand-held drilling and manual scrapping operations.

The number of employees at the construction site varied, with up to 500 men working there at the height of the project. The work site stretched over an area that was 20 km wide, which led to the establishment

of two housing areas, one at Ritsem and one at Autajaure. Apart from housing and a mess, there was also a store, a post office, a laundry and a large tent where workers could play table tennis and badminton or do weight training. No permanent homes were built for operating staff, as the station was to be remotely operated from Vuollerim. However, several buildings from the construction period were left in place to serve the needs of maintenance staff. The mess, annex and a number of other buildings were taken over by the Swedish Tourist Association, the police, the municipal government and the Swedish Armed Forces.

Ritsem is a strategic location for reindeer husbandry, with migration routes, collection areas, grazing land and work paddocks. At Sitasjaure, the Baste (Mellanbyn) Sami village has established a settlement with reindeer herders' cabins and work paddocks. The reindeer herders' cabins have partly been built from the old workers' huts used during the construction of the Sitasjaure dam.

Ritsem was created as a surplus capacity station that could help out during periods of heavy electricity consumption when other power stations were unable to cope with spikes in demand. The power generation unit at Ritsem became operational on 1 February 1978. The environment surrounding the power station is characterised by that which is not actually visible, namely traces in the landscape of the work involving the construction of the 16 kilometre long tunnel and a weir with the function of continuing to create a water flow. It is only at Ritsem Harbour that it is possible to find the first real sign of the existence of a hydropower station in the area, where the water that has been transported all the way from Sitasjaure flows from the tunnel, through an outlet canal, into Akkajaure.

16. Randi power station

Randi is a unique power station along the Lule River, with a facility that spreads out over several lakes, and with visible waterways in long canals. Randi was the last, completely new power station to be built on the Lesser Lule River, and it also signalled the end of the development of the entire Lule River. After completing the construction of Randi, the only work subsequently carried out by Vattenfall along the river involved the redevelopment of existing power stations.

Prior to the development of the Lesser Lule River, the Vattenfall Board produced a regional plan in which the power station was given the working name Rava. The plan described construction works at two locations: a regulation dam at Lake Randijaure's outlet to Lake Purkijaure, and a power station located between two woodland lakes, Unna and Stuor Seunnak (now renamed Sievnak), to the east of Lake Randijaure.

The banks of Lake Randijaure were utilised by settlers from an early stage, and the lake has a long history of settlements. The village of Randijaur is located at the northern part of the lake, while the villages of Lulleketje and Östra Randijaur are located between the current power station and the regulation dam. The investigation that was conducted prior to the construction of the power station showed that the damming of Lake Randijaure would entail the complete loss of two settlements with links with farming, and around 30 hectares of productive woodland. The Sami village that would be impacted by the project was Jåkkåkaska (now called Jåhkågasska), primarily in relation to the migration route that ran along the chain of lakes that comprised the most north-western part of the Lesser Lule River.

The construction work commenced in the summer of 1973 and proceeded at a rapid pace due to the prevailing oil crisis and an anticipated economic recession in Europe. The work site stretched over an area of 10 km in which excavation and blasting works were carried out. Lake Randijaure was dammed up with an earthen dam, from where the water was led through a 500 metre long tunnel to Lake Unna Sievnak. A two kilometre long tunnel was then built from there to the machine room at Randi power station, and a 95 metre long tunnel was built from the power station in order to allow the water to flow into Lake Stuor Sievnak, from where it was led through a two kilometre long canal to Klubbuddsjön, an inlet of Lake Vaikijaure.

A rock-fill regulation dam was built at Lake Randijaure's outlet to Lake Purkijaure, in Lulleketjeforsen. The plan for the dam was to only tap the water during periods when the water flow was greater than normal. This would lead to the creation of a dry bed between Randijaure and Purkijaure during large parts of the year, and it also meant that Parkijaure would mainly be flowed through by water from the Pärlälven River.

The plan was based on the assumption that Vattenfall would be able to employ workers from the Jokkmokk region, who would be able to commute to the work site from their own homes. The project therefore made use of family homes in Jokkmokk, Vuollerim and Messaure. Three bachelors' buildings were erected at the work site, as well as two annexes with room for 90 people. Various temporary buildings were also erected at the site, including an office building, a dining room, a workshop, a storehouse, and premises with areas for table tennis and a sauna. The construction of Randi power station took three years, during which time around 850 full-time workers were employed throughout the year.

The power generation unit at Randi power station was started for the first time on 3 September 1976. The construction of the station had cost SEK 225 million. Randi power station is unique in that it is a combination of an underground station and an aboveground station. The machine room has been excavated into the ground, with only the roof visible above ground level, while the intake building has been built completely above ground.

Randi is located in a rich lake landscape where the Lesser Lule River is shaped by small and large lakes that link together like pearls on a necklace. A verdant forest landscape undulates around the lakes. The power station and the regulation dam have a unique design, with characteristics that distinguish them from other facilities along the Lule River, in particular the visible waterways that lead the water from Lake Randijaure to Klubbuddssjön.