United Nations
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Cultural Organization

World Heritage: Struve Geodetic Arc. Managementplan 2016- 22

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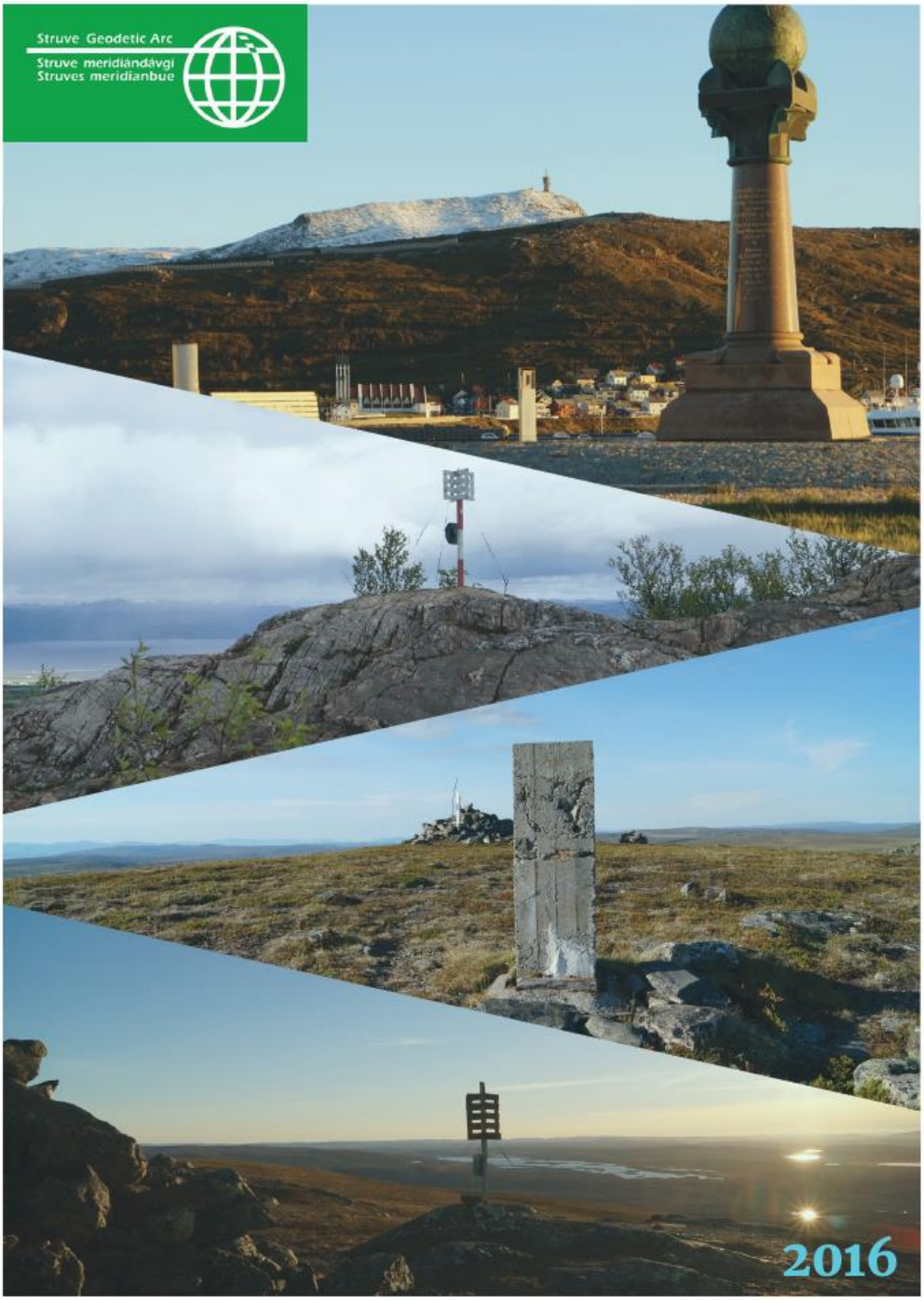

Kartverket

FINNMARK FYLKESKOMMUNE
FINNMÁRKKU FYLKKAGIELDA
HAMMERFEST KOMMUNE
Alta kommune
GUOVDAGEAINNU SUOHKAN
KAUTOKEINO KOMMUNE

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Foreword

The Struve geodetic arc was added to Unesco's list of the world's natural and cultural heritage in 2005 on the grounds of its outstanding universal value (OUV). The purpose of this management plan for the World Heritage: Struve Geodetic Arc is to strengthen and support this OUV.

This is the first plan of its kind to be prepared after 11 years with world heritage status. All sites on the Unesco list must have a management plan for coordinating commitment and collaboration between government authorities and other players in order to achieve common goals.

Finnmark county council has been assigned overarching responsibility for managing the World Heritage: Struve Geodetic Arc, and has welcomed the initiative taken by Hammerfest local authority in producing this management plan. Local entrenchment has been ensured through a steering committee comprising representatives from the Directorate for Cultural Heritage, the Norwegian Mapping Authority, the county council, and the Hammerfest, Alta and Kautokeino local authorities. These participants have also financed work on the plan, with the largest contribution coming from chapter 1429, item 79 of the central government budget, which is allocated to the Directorate for Cultural Heritage.

The plan presents guidelines for managing the four station points and their supporting values in 2016-22. In addition, it outlines how travel to and from the station points should be maintained and improved. Provision should be made for sustainable development and use – including value creation and commercial development. The plan also contains recommendations on the way the three local authorities involved, the county council and the central government partners will collaborate and coordinate the work of preserving and strengthening the world heritage values nationally and in collaboration with the nine other countries concerned. In addition, it gives specific content to joint goals for a formal management system and values base, so that the world heritage values are communicated, preserved and further developed for future generations. The plan will provide guidance up to the next periodic reporting to Unesco (cycle 3).

We would like to take this opportunity to express our thanks for the collaboration and for many good and constructive meetings.

Rune Sjåstad

County council chair

Abbreviations

FFK: Finnmark county council

Fefo: Agency responsible for public lands in Finnmark

Icomos: International Council on Monuments and Sites

KLD: Ministry of Climate and the Environment

KML: Cultural Heritage Act

KU: Cultural purposes

LNFR: agricultural, nature/outdoor recreation and reindeer grazing area

MKG: Museums for the coastal heritage and reconstruction of Finnmark

MPI: Environment, parks and sports department, Alta local authority

NMA: Norwegian Mapping Authority

NNV: Northern Norwegian Science Centre

OF/B: Public purposes/housing

OUV: outstanding universal value

PBL - Planning and Building Act

RA: Directorate for Cultural Heritage

RDM: Kautokeino Rural Museum

SGA: Struve geodetic arc

SGACC: Struve geodetic arc coordinating committee

SOHT: Contemporary and historic time department, Alta Museum

Unesco: United Nations Educational, Scientific and Cultural Organisation

VAK: World heritage coordinator

VAM: Rock art and world heritage department, Alta Museum

WHL: World heritage list

1. World heritage policy

Report no 35 (2012-2013) to the Storting (parliament) on cultural heritage policy clarified and further developed Norway's policy on world heritage. The goals in this White Paper reflect a desire to develop the Norwegian world heritage sites as a beacon of best practice in the management of natural and cultural heritage. Through the White Paper, Norway's world heritage sites will be assured the best possible conditions, management and formal protection. Nevertheless, one of the biggest challenges related to these goals for the World Heritage: Struve Geodetic Arc is considered to be "providing information and presenting the world heritage values to the local population, schools, children and young people".

The following priority tasks are identified in the White Paper:

- safeguard Norway's existing world heritage
- clarify sectoral responsibility and coordinate the government's world heritage policy
- ensure a good information flow between central government and local communities
- ensure continued broad entrenchment of local follow-up for the world heritage through local collaboration fora and coordinator functions
- ensure that all Norwegian world heritage sites have a good management plan
- prioritise monitoring of Norway's world heritage
- make provision for ensuring that information on Norway's world heritage is available

- place greater emphasis on developing and encouraging the presentation of and education on Norway's world heritage
- make provision for enhancing expertise, both general management competence and various forms of leading-edge expertise
- emphasise integrated protection of the tangible and intangible cultural heritage
- maintain collaboration with local authorities and other affected players on developing good centres for presenting Norway's world heritage
- maintain Norway's international commitment to and support for world heritage.

1.1 Responsibilities under the convention

The convention concerning the protection of the world cultural and natural heritage was adopted in 1972 by Unesco's general conference, and is the Unesco convention with the greatest support. It was ratified by Norway in 1977. Its purpose is to provide special protection for sites which, because of their outstanding universal value (OUV) from a historical, artistic, scientific or ethical perspective, must be regarded as part of the world heritage for future generations.

Unesco and its world heritage committee set requirements for state parties when implementing the convention. These apply particularly to management and follow-up of sites inscribed on the list of the world's natural and cultural heritage. The convention establishes basis principles for managing the world heritage.

Pursuant to article 5 of the convention, the state party must ensure that:

- its world heritage is integrated in general planning and given a function in the local community
- services are established with appropriate staff and means to ensure the protection, conservation and presentation of its world heritage
- scientific and technical studies are developed to identify the dangers which threaten its world heritage, and operating methods are worked out to counteract these
- appropriate legal, scientific, technical, administrative and financial measures are taken to identify, protect, conserve, present and rehabilitate its cultural heritage
- the establishment of regional centres for training in the protection, conservation and presentation of its cultural and natural heritage is fostered, and scientific research in this field is promoted.

Unesco's operational guidelines require that every site inscribed in its world heritage list (WHL) has its own statement of OUV, which defines the values which forms the basis for its world heritage status. This OUV statement thereby defines which values are to be protected, and will provide the basis for Unesco's evaluation of whether management of the world heritage site fulfils the intentions of the convention.

Since the Struve geodetic arc (SGA) is a transnational serial nomination, a separate international coordinating committee (SGACC) has been established. Pursuant to a resolution from Belarus of 4 July 2012, its goals are to establish a common management practice in order to protect, conserve, present and promote this world heritage site, although the principal responsibility for the individual station points rests with the respective national governments (see chapter 10).

1.2 Entrenchment of the plan

The management plan is a product of the letter of intent entered into on 3 November 2015 by the Kautokeino, Alta and Hammerfest local authorities, Finnmark county council (FFK), the Norwegian

Mapping Authority (NMA) and the Directorate for Cultural Heritage (RA). Work on the plan is also entrenched in decision 61/15 of the executive board of FFK, which calls for a management plan for the SGA and for future nominations.

Carried out in 2015-16, the management plan project was a collaboration between the above-mentioned players. Responsibility rested with coordinator Gerd Hagen in Hammerfest local authority, Gerd Johanne Valen was the project manager, and the steering group comprised representatives from each of the parties. At least two meetings were held in each phase.

The letter of intent specified the following goals.

- The purpose of the project is to produce a management plan for the World Heritage: Struve Geodetic Arc in Norway. This plan will seek local, regional and national entrenchment and outline a binding collaboration for the future.
- The management plan will clarify the division of roles and responsibilities with regard to future organisation, development plans and value creation.
- The purpose of the declaration of intent is to ensure a binding collaboration between the parties. These undertake to contribute specialist expertise at the various stages in drawing up a management plan.
- The parties can also enter into collaboration with other parties, such as museums and tourist offices, where this is agreed and relevant.
- Common goals and base values for the relevant players will be developed during the project period. It is important the local authorities value the World Heritage: Struve Geodetic Arc.

Verbal and/or written dialogue has taken place with museum departments in the three local authorities and their directors, with two destination companies, with local authority managers and managers for parks/landscaping, with the NMA and with representatives from FFK.

Before establishing advisory and world heritage councils, a new collaboration agreement signed by local and county council chairs and central government parties is advisable. More active efforts must also be devoted to the owners and to increasing their commitment to participate.

1.3 Description of the OUV

This description is based on Unesco's inscription document. Triangulation, the scientific method of measuring large distances, is identified as a universal value. It represents an important scientific and historical advance of great benefit to astronomy, geodesy and cartography, which led to exact knowledge of the Earth's dimensions and shape. Another value is the cross-border collaboration between monarchs, scientists, explorers and instrument-makers which made the knowledge possible. A third value is the way measurement of the geodetic arc relates directly to a three-hundred-year scientific tradition in which theories and ideas about the planet's share and size were developed, and to Sir Isaac Newton's theory that the world is not a true sphere.

Icomos, April 2005: "The Struve geodetic arc's OUV is based on its contribution to developing science and collaboration between scientists, monarchs and nations". Icomos adds that its supporting values are based on technical-scientific values and collaboration between 10 nations.

Thirty-four stations have been selected from among 265 main and 60 auxiliary points to represent the SGA, which extends across 10 countries. The choice of points is based on the existence of original and intact station marks and their significance for the complete chain of triangles, as well as their importance for national mapping. These points preserve positional values which could be of

outstanding significance for future scientists working on plate tectonics or deformation of large sections of the Earth's surface through volcanic eruptions and similar events.

In this context, the term attributes" will also apply to all the station points in the chain. They represent fundamental properties of the whole geodetic arc. Even if all the points do not merit world heritage status, the geodetic arc and its technological method cannot be understood without these attributes.

Norway has 15 of the station points, all of which are intact with the exception of Haldde – one of the summit stations for the triangulation in Alta. A base extension network was also established from the Alta base line, comprising eight stations which carried the scale from the base line to the Luvddiidčohkka–Nuhpealáš side of the triangle in the geodetic arc's main chain. All the points have been investigated by NMA representative Bjørn Geirr Harrson. A and B – Elvebakken and Bukta – in the base line are not intact.

1.3.1 Supporting values

The supporting values for the SGA and national supporting values for the world heritage site are defined as all the station points in the arc measurement chain not incorporated in the site, including Haldde. How the sightlines to all the station points are to be preserved must be evaluated within the buffer/special consideration zones.

The next supporting value for the World Heritage: Struve Geodetic Arc is the base extension network. The final side in this network was intended to coincide with an A' B' side – in other words, Luvddiidčohkka and Nuhpealáš – in the arc measurement sequence. A and B (Elvebakken and Bukta) are not intact, but the remainder are and accordingly represent an important supporting value.

The cultural heritage and landscape associated with the station points, their immediate surroundings and along the prepared paths to the stations must be considered an important part of the history of this world heritage. That is because it provides the basis for creating narratives about the societies and the various cultures encountered by the surveyors, as well as the story of the way they organised transport and survey work through west Finnmark in 1845-50. The evacuation of the Meridian Statue southwards in the autumn of 1944 must also be considered a historical value.

1.3.2 Criteria for inscription

Criterion (ii): The first accurate measuring of a long segment of a meridian, helping in the establishment of the exact size and shape of the world, exhibits an important step in the development of Earth sciences. It is also an extraordinary example for interchange of human values in the form of scientific collaboration among scientists from different countries. It is at the same time an example for collaboration between monarchs of different powers for a scientific cause.

Criterion (iv): The SGA is undoubtedly an outstanding example of a technological ensemble – presenting the triangulation points of the measuring of the meridian, being the non-movable and non-tangible part of the measuring technology.

Criterion (vi): The measuring of the arc and its results are directly associated with man wondering about his world, its shape and size. It is linked with Sir Isaac Newton's theory that the world is not a true sphere.

1.3.3 Declaration of integrity and authenticity

Integrity/intactness

All 34 components are links in a continuous chain of station points. A number of these form part of today's national geodetic reference networks.

The four significant points in Norge thereby provide a representative sample of surveying work in west Finnmark, with the end point, two points from the arc measurement sequence and one from the base extension network. They are all intact and genuine.

Authenticity/genuineness

The registered station points have special qualities and significance at a technological and scientific level. All are preserved in their original position, and changes are limited to some later structures which mark the points. Each of the selected station points has retained its original station mark, but this is concealed beneath the survey marker at Lille Raipas.

1.3.4 Requirements for conservation and management

The station points are adequately protected by the provisions of the Cultural Heritage Act (KML), while provisions for zones of special consideration in the Planning and Building Act (PBL) can be used to conserve the supporting values. All levels of government should cooperate on conserving and strengthening the world heritage value. An advisory council and a world heritage council, with representatives from all levels of government, should coordinate management and contribute to positive development and sustainable utilisation of the world heritage status.

1.4 Challenges

An overarching challenge for the SGA is that it comprises simple and modest tangible values, while its inherent intangible value has a history and a result which affect all humanity.

At the international level, one of the biggest challenges could be to achieve a functioning cross-border collaboration between players from the 10 countries working to manage and present the SGA.

Nationally, the biggest challenge for management and presentation of the SGA could be to achieve the recognition and support required to set priorities, preserve and strengthen the value of this world heritage site, so that it can be perceived as an important player in cooperation with Norway's other world heritage sites.

At a regional level, the biggest challenge for management and presentation of the SGA could be to establish a formal management system which can function from as early as the autumn of 2016. The same applies to establishing a world heritage council and appointing a world heritage coordinator (VAK) as the "driver" in this work from the spring of 2017.

Locally, the biggest challenges could be increasing knowledge about and understanding of the world heritage values and establish a form of ownership of and pride in this world heritage.

2. Status and condition of the values, with preparation and access

The condition of the station points is regarded as good. They need an ordinary level of maintenance, while the Meridian Statue will have a more moderate or greater need for this about every fifth year. On the other hand, the condition of the prepared paths to the world heritage sub-sites varies, with some needing moderate and others rather greater measure to improve accessibility.

2.1 Status for the Meridian Statue

Hammerfest/Fuglenes

Coordinates: 70°40´12´´N, 23°39´48´´E, 14 metres above sea level.

The main area covers 750m², and its buffer zone is 1 500m² (Unesco's nomination documents, table page 2). Development planning approvals were issued by Hammerfest local authority on 25 January 2007 for Stigen-Fuglenes south-east. The closest summits used in the triangulation chain are Håja, Tyven, Seilandstuva/Nordmannsjøkelen and Gosviktind/Gufsvikklumpen. Authenticity is represented by the position of the statue on the original station point. The supporting values in the form of sightlines to Håja and Tyven are intact, while the sightline to Seilandstuva/Nordmannsjøkelen has improvement potential.

Description: The Meridian Statue stands on the Fuglenes peninsula. The station point was marked in 1846, and the final astronomical observation determined it in 1850. Installed in October 1854, the monument was designed by architect von Hanno. Since the SGA measured, the Meridian Statute has functioned as a geodetic station for the NMA. The nomination papers describe it as the historical and northernmost point in the SGA and a constant reminder of what was achieved.

Since 2005, Hammerfest local authority has built an adjacent information kiosk with an information board from the NMA. Features include stone stairs and a stone-edged circle around the monument paved in slate and pink gravel, plus benches and flowerpots. The surrounding paved area now conceals the lowest part of the statue. Access has also been prepared for wheelchair users. The new prepared area/installations are floodlit.

The memorial plaque for registration of the sub-site features Unesco's text and logos. It is installed horizontally alongside the statue. A car park has been installed for visitors and for residents in the county council's accommodation block.

Supporting values: Defined as the nearest station points in the arc measurement chain and the survey work in west Finnmark during 1845-50. In addition, come the astronomical observation point of 1928 and the evacuation and restoration of the statue during World War II. Sightlines to Håja, Tyven and the Seiland summits are preserved, but the one towards Seiland is partly disrupted by a former heliport. The area of the ISP port provides visual disruption to the south.

Daily routines: Performed by the parks department. It empties wastebins, cuts grass and tends the potted flowers during the summer, and clears snow to permit access in the winter. An earmarked budget is needed.

Challenges for the actual monument are: weathering of the gold lettering and wear of the copper globe. The brass capital also shows signs of wear. Lichen is growing on the plinth. More detailed examination and maintenance of the monument are required. Lichen and moss are growing on the cast block with mark from 1928.

Challenges for preparation: Ownership of the adjacent area needs to be coordinated in order to create a unified park. Universal access must be improved through asphalting and removal of loose gravel, and preparation for wheelchair users. Routines for winter access should be developed. Nearby industrial zones could be screened from view or have restrictions imposed within the area. Loose refuse outside the wastebins should also be cleared away.

Road signs to Hammerfest which also convey information on the world heritage sub-site at Fuglenes, as well as on the way out of town to direct motorists to the station points in Alta and Kautokeino, should be assessed.

Presentation measures: The Hammerfest Tourist Board markets the Meridian Statue to cruise and Hurtigruten passengers, hands out brochures and provides daily guided tours. The Museum of Reconstruction (MKG) has brochures in its reception and a simple educational provision – in other words, a guide to all the cultural heritage objects at Fuglenes peninsula. Geocaching is also available. Visitors in guided groups totalled 9 161 in 2015, while the annual total is estimated to be 15-17 000.

2.2 Status for Lille Raipas/Una Ráipásaš

Lille Raipas/Alta

Coordinates: 69° 56´19´´N, 23°39´37´´E, 286 metres above sea level.

The main area covers 100m² and the buffer zone 1 000m², which is not shown on the map (Unesco's nomination documents, table page 2). This is an agricultural, nature/outdoor recreation and reindeer grazing (LNFR) area, and is covered by a conservation order from 2005. The nearest summits used in the triangulation chain are Kåven, Vardfjellet and Haldde. Authenticity is represented by a survey marker. The supporting values in the form of sightlines to points in the base extension network, such as Komsa and Skoddavarre, are intact.

Description: Lille Raipas is point E in a base extension network from Alta's base line – in other words, one of eight supporting points selected for the WHL. The base line comprised two carefully marked end points with the distance between A and B indicated by pillars. This formed one side of the triangle for the base extension network. The latter had eight stations and was intended to extend the scale from the base line to the Luvddiidčohkka/Lodiken-Nuhpealáš/Nubevarre triangle in the main chain. An original iron mark from 1850 for the triangulation observations can be found under today's survey marker. The area is five kilometres south-east of central Alta. Lille Raipas has served since 1850 as a geodetic station for the NMA. The summit offers good views in all directions.

Supporting values: Defined as the closest points in the arc measurement sequence. The Haldde summit occupies a special place here. In addition, the base line and points in the base extension network are intact. These are C: Russeluftholmen, D: Komsafjellet, F: Skoddevarre, G: Store Raipas, H: Peska, I: Vuossogálvárri and K: Rávttašvarri/Helletoppen. Mining was pursued from 1839-58, and spoil tips from the copper mines are passed on the way to Lille Raipas. The actual survey work in 1845-50 is an important historical value. The distinctive local geology also represents a value.

Preparation: Since 2006, the environmental, parks and sports (MPI) department of Alta local authority has prepared a path roughly two kilometres long from the car park, where the NMA's information board is placed. An information sign with a map of the route stands at its start. The path follows an old mine road, and well-anchored round posts were installed in 2013 every 50- 60 metres, with text in cast plexiglas: SGA, Lille Raipas 286 metres above sea level, and with the Unesco/world heritage logos. The posts are about 60-90 centimetres high. Wooden walkways were installed in 2007, 2012 and 2016 over the path's wettest stretches. On the summit, Unesco's memorial plaque for the inscription is mounted vertically on the rock, a miniature cairn has been constructed and a box with a visitor's book is installed in the survey marker for the local authority's summit hikes.

Regular routines: The MPI is responsible for preparation of the sub-site and inspects it regularly in the summer months.

Challenges for the installation: No immediate challenges. A small cairn marks the point. But the area at the summit is clearly affected by vegetation regrowth.

Challenges for preparation: An active gravel pit with heavy traffic close to the access point could be a contributory reason why a road and car park is potholed. This does not provide a good introduction to the world heritage sub-site. A detailed review of the whole park with a more permanent arrangement of wooden walkways, drainage and conservation of marshy areas could improve the trip to the station point. In addition, there are signs of side tracks being formed outside the path and visible traces of bicycles and motor vehicles on the actual path. Monitoring of vegetation regrowth along the path and in the summit area is important.

Presentation measures: Lille Raipas is part of the local authority's commitment to outdoor activities – the environmental week and three- and 10-summit hikes. Brochures on the SGA are handed out at Alta Museum and presented with a separate text on the museum's website. Technical responsibility for the presentation rests with the museum. Lille Raipas has been an offer from North Adventure and tourism company Glød. The vulnerability of the path means large groups have been undesirable. Geocaching is provided at the summit. Figures show 4 500 registered visitors annually.

2.3 Status for Luvddiidčohkka/Lodiken

Luvddiidčohkka/Kautokeino/Guovdageaidnu

Coordinates: 69°39´52´´N, 22°36´08´´E, 639 metres above sea level.

The main area covers 100m² and the buffer zone 1 000m², which is not shown on the map. The station point is protected, the rest is an LNFR area with clear restrictions on intervention as summer grazing for reindeer. The area outside the conserved point is owned by Fefo, the agency responsible for public lands in Finnmark. Clearly visible summits in the triangulation network are Nuhpealáš/the Nuhpi range, Ávjovári and Čaravárri. Authenticity is represented by a cairn, and an astronomical pillar was erected 20 metres south of the station point in 1969. The supporting values in the form of sightlines to the summits in the arc measurement chain are intact.

Description: Luvddiidčohkka has been a station point for the NMA since the measurement of the geodetic arc. The point was remeasured at the same spot in 1867, 1873, 1895, 1902, 1904, 1905, 1909, 1922, 1967 and 1978. A pillar or concrete plinth was built in 1978 about 20 metres away for astronomical observations. The station was well-preserved in 1999.

The car park at Holgajavri is 41.4 kilometres from Alta Museum via Gargia, and 12.5 kilometres from Suolovuopmi. The station point is three kilometres on foot to the south-east. Kautokeino local authority has prepared the area since 2006. An NMA information board has been installed to the left of the lake. The path begins on an old cart track, and a rectangular post every 40-80 metres carries the text: Struve Meridiánadávgi-Luvddiidčohkka and the Unesco and world heritage logos cast in plexiglas. The posts are 100-130 centimetres high and poorly anchored. After 500 metres, the path leaves the cart track and turns south to continue for 2.5 kilometres up a easy slope to the summit. The area is above the tree line and the signs are easy to see.

At the summit are a cairn, a rock pillar, and a concrete plinth/pillar with a mark and an eyebolt set in the rock. Unesco's bronze plaque is installed horizontally on a large flat stone. In clear weather, the view is good in all directions. Haldde, Kåven, Seilandstuva/Nordmannsbredjøkelen, Vardefjellet, Nuhpealáš /Nuhpi, Ádjit and Bealjášvárri as well as the "Gáissás" summits to the east are clearly visible. Sightlines from Luvddiidčohkka are good, and this could be the most educational station point to visit.

Supporting values: Defined as the sightlines to several summits in the arc measurement chain as well as the history of the survey work in 1845-50. The story of two coachmen who died in a snowstorm on 27 July 1895 is a local incident from the area which should form part of the presentation to describe the hard weather experienced in the landscape traversed by the surveyors. Cultural relics from reindeer herding in the area are also an important part of the landscape's history.

Regular routines: No regular maintenance routines. The local authority says it needs increased resources for this.

Challenges for the installation: Weather conditions.

Challenges for preparation: The rectangular signposts are insufficiently anchored for the weather conditions. The Norwegian Public Roads Administration and the NMA have two different information boards 400 metres apart, while a prepared car park with space for four-five vehicles is located only by the road administration's sign. Unfortunately, the information boards just after the Gargia and Suolovuopmi mountain lodges fail to make it clear that the old road leads to the world heritage sub-site, even though these details are incorporated in the road administration's information board at Bæskades/Beaskađas. The national highway at the Suolovuopmi mountain lodge has direction signs when coming from Alta and Kautokeino.

Presentation measures: Various bodies have distributed the brochures about the World Heritage: Struve Geodetic Arc up to 2016, when this became the responsibility of the museum in Kautokeino. Groups should not visit before 1 June because of reindeer calving areas. The Luvddiidčohkka station point also has geocaching. Annual visitor numbers have not been registered.

2.4 Status for Muvravárri/Bealjášvárri

Muvravárri/Kautokeino/Guovdageaidnu

Coordinates: 69°01´43´´N, 23°18´19´´ E, 585 metres above sea level.

The main area covers 100m², and the 1 000m² buffer zone is not shown on the map. The closest summits in the triangulation chain are Ádjit and Spielgavárri. Development planning provisions comprise the LNFR area and conservation regulations from 2005. Restrictions are strict for the area. which is a winter grazing ground for reindeer. Authenticity is represented by a cairn rebuilt in 1896 and entered on the map. Sightlines to Ádjit and Spielgavárri are intact.

Description: The SGA station point is on the Muvravárri summit in the Bealjášvárri range. It lies about 2.5 to three kilometres east of the Ávži rural district, which is in turn roughly 11 kilometres north-east of Kautokeino church. The car is about one kilometre further on. The rock pillar was built in 1896 at the station point, which has functioned since then as a survey point for the NMA. It was measured in 1896, 1917-21, 1969 and 1977. Two metal marks were installed 10 metres from the cairn in 1969.

Access to the prepared path is marked by three signs to the right after the Ávži bridge, leading to a gravel-surfaced car park with space for eight to 10 vehicles. An NMA information sign is installed. The route follows large sections of a motor vehicle track and is marked by rectangular posts bearing the sign: Struve Meridiánadávgi, Muvravárri in cast plexiglas and the same logos described above. The land traversed by the path rises gradually until it descends after 610 metres towards a large marsh where birch twigs and hay have been laid over the wet section, which is about 100-200 metres long. The station point is marked by a cairn, a survey marker with box for a visitor's book, Unesco's memorial plaque attached horizontally to the bedrock, and a small metal bolt.

Supporting values: Defined as the sightlines to Spielgavárri and Ádjit. Historically, Ávži was the largest village in the area until the 19th century, where many of the permanent residents lived. Living conditions for people in Kautokeino were changing in 1845-50 as a result of border closure, religion, Norwegianisation and the uprising of 1852. Visitors are urged to respect all cultural remains in the Muvravárri area. Estimated annual visitor numbers: 50-150.

Regular routines: None.

Challenges for the installation: Weather conditions will probably affect the cairn.

Challenges for preparation: The rectangular posts are more vulnerable to wind and are poorly anchored. The marsh is vulnerable to treading and motor vehicles. Good and permanent measures which do not diminish the natural surroundings should be considered.

Presentation measures: Signs from Kautokeino, which should bear both place names – Muvravárri and Bealjášvárri. Information brochure at the museum.

2.5 Challenges for all preparation

The common denominator for all the local authorities is the lack of coherent information and directional signs. The www.struve.no website is intended to help visitors find their way. Little or no information at the actual station points other than the information boards is also a common feature. A larger number of players should also distribute information brochures. These, or the NMA's information boards, should be renewed. A common challenge for the prepared paths and access to the station points is that all of them have a relatively substantial improvement potential, and some require closer monitoring. These measures are described in the action plan.

2.6 Condition description in the table

Conservation goals and condition variables can be defined as TG1-3 on the basis of Norwegian standard NS 3423. TG1 = ordinary need for action, such as normal care, TG2 = moderate need for action, TG3 = substantial need for action.

Approved action plans and measures taken annually by local authority operational units, and annual checks and documentation of the areas by the VAK in August/September, are proposed as a simple, easy-to-implement method of monitoring, checking and reporting.

3. Factors influencing the station points

This chapter assesses the Meridian Statue in Hammerfest separately, since its status as end point, the monument and the location distinguish it from the selected station points in Alta and Kautokeino.

Unesco published a manual in 2010 on managing disaster risks at world heritage sites. This recommends that both tangible and intangible attributes of the world heritage values are assessed. The White Paper of 2012-13 on cultural heritage policy notes that the areas with world heritage sites must report to Unesco every six years. This report must give details of hazards which are being systematically monitored. This is an extensive process, where governments in each continent are meant to collaborate systematically to quality-assure the reporting. The Ministry of Climate and the Environment (KLD) sees the need for regular reporting of condition and development in order to support the precautionary principle in managing world heritage values, and is therefore strengthening monitoring by introducing a fixed, simplified reporting to central government. A tool in this work is the development of indicators for all world heritage values. The object is to identify undesirable developments and react in time.

The following should be monitored for the World Heritage: Struve Geodetic Arc.

- Threats to and influences on the tangible and supporting values such as the installations and their preparation in the three local authorities and sightlines to station points in the arc measurement chain which must be monitored.
- Threats to and influences on the intangible values. This will deal with inadequate presentation of the triangulation method, the history of the many aspects of the survey and the transnational collaboration.

Some influences will be constant, while others are episodic. The constant factors influencing the tangible values include weather conditions and strong winds, while the episodic ones relate more to vandalism, disasters, natural influences, war and terrorism. The constant factors influencing the intangible values are more a matter of failing to present the world heritage adequately to either visitors or future generations.

3.1 Influences on and threats to the Meridian Statue end point at Fuglenes

The Fuglenes peninsula was designated for industrial development in the 1950s, about a century after the monument was installed there and more than 50 years before it became a world heritage sub-site. In addition, it is rich in historical events. The Meridian Statue has therefore been placed not in an unspoilt natural environment but in an active area which has over time hosted defence facilities, stakes for witch-burning, a bunkering depot, fish processing companies, racks for drying fish, a blubber boiler, slipway for boats, quays, coal cranes, coal transhipment, schools, temporary hospitals and buildings, a bus workshop and more. The immediate area around the statute is important for the experience of the world heritage values, but some players have activities which can be disruptive for this experience. Aided by sponsorship funds from Eni Norge and a small grant from the RA, Hammerfest local authority has implemented substantial measures. Nevertheless, even more action could enhance the positive experience and take care of the OUV.

Activities and development pressures in the immediate vicinity

Factors which could threaten the world heritage value are increased private and industrial activity and public development projects which take no account of the sightlines. A heliport no longer used for this purpose partly mars the sightline to Nordmannsjøkelen/Seilandstuva. In addition, industrial operations in the immediate vicinity could be perceived as dumping sites and be visually disruptive.

One measure would be to establish a larger zone of special consideration around the statue, with provisions on use of the industrial zone and curbs on pollution. Renewal of the development plan of 21 June 2007 for Stigen-Fuglenes with supplements which protect the sightlines to Nordmannsjøkelen, Håja and Tyven could be important for protecting the supporting values.

Pollution and increased greenhouse effect

The Meridian Statue has a plinth of fine cut granite and a column of polished granite. This rock is extremely durable and unaffected by frost, pollution and salts. The plinth has an old injury/notch in its north-western corner.

The vulnerable part of the granite column is the gilded engraved text on it, which is being worn away by the weather conditions and has to be regularly renewed.

The globe is made of copper sheets and is exposed to oxidising acids, oxidation, heavy metals, salts, sulphur and ammonia. Nothing is known about the alloy composition of the globe, and its copper is also becoming coated with verdigris.

Cast in brass, the capital probably has signs of corrosion. Brass is an alloy of copper and zinc (10-40 per cent), hard-wearing but vulnerable to pollution – particularly if exposed to corrosive substances such as acid precipitation. Dezincification can occur, where washing out the zinc makes the metal brittle. A high pH value strengthens this process, but the zinc content must be more than 15 per cent of the alloy. The alloy composition is unknown. Acid precipitation is declining, ammonia emissions in Hammerfest were reduced by the closure of Findus, while carbon dioxide and soot emissions have increased from the gas liquefaction plant at Melkøya. The effect of soot on the copper and brass has not been investigated.

A concrete block measuring about 1.5 x 1.5 x 1 metres with a mark stands about seven metres north of the monument. This was used in 1928 for astronomical observations. Its south-west corner is partly damaged and there are several horizontal cracks. Lichen and moss are present. Relatively high humidity and wet periods provide good conditions for lichen and moss, although growth is slow.

Vandalism

No vandalism has ever been recorded on the end point. Since the iron railings disappeared in World War II, it has been easily accessible. Should this become a problem, a new fence could be considered.

Absence of monitoring and maintenance

The absence of routines for monitoring and maintenance of the monument and the surrounding area could pose a significant risk for deterioration of the value.

War, terrorism and accidental explosions

The risk of war/terrorism could arise, and a safety assessment should be made, particularly given that the statue is located fairly close (about 3.5 kilometres) to the Melkøya plant and that the Port Authority facilities are nearby – which means that societal safety and regulations on major accidents and other factors are the responsibility of other government agencies. The statue has already been subject to disassembly/relocation during World War II, and such emergency response could unfortunately become necessary again.

Natural disasters

Earthquakes, landslides, spring tides, rising sea levels, storms and hurricanes are not regarded as a threat to the statue because of its location.

Hammerfest has had problems with landslides, particularly in association with avalanches, but this is not the case for the Fuglenes peninsula.

Storms gusting to hurricane strength have occurred since the statue was installed in Hammerfest during 1854. The actual structure is robust and can withstand extreme weather, but the gilded lettering is more vulnerable.

The problem of a general rise in sea level does not automatically apply to the Norwegian coast, and would not affect the statute because its base is 14 metres above sea level.

Fire

Buildings close to the statue, such as Hammerfest upper secondary school, could catch fire. The older wooden structures have been removed from the area and the fire risk has declined considerably. Although heat could develop in the area, the owners must assess what impact that could have on the statue. This risk assessment must be made with the fire brigade by the owners of the buildings, FFK, and Hammerfest local authority as the owner of the world heritage sub-site.

3.2 Influences on and threats to the station points in Alta and Kautokeino

Climate and weather

Climate changes, with warmer winter temperatures and more precipitation, will affect vegetation. Increased regrowth on summits and along prepared paths could be one result. The treeline is already being affected and the vegetation belt is constantly changing, which could be the result of pollution and an increased greenhouse effect. In the recent report on Norway's climate in 2100, scientists suggest that greenhouse gas emissions continuing to rise at the rate witnessed so far could mean that the Finnmark plateau would look very different in 85 years time.

Where the Luvddiidčohkka and Muvravárri/ Bealjášvárri station points are concerned, the horizontal cast memorial plaques are the items most vulnerable to deterioration, while the cairns could be vulnerable to weather conditions. Regrowth around the station point in Alta could threaten the sightlines.

Natural disasters

Earthquakes, landslides or floods cannot be regarded as threats to the station points because of their location. Storms/hurricanes may affect the cairns at the points, while avalanches could disrupt access to the installations. However, the latter are not usually visited in the winter.

Human-made disasters

Owing to their remote location, explosions, war and terrorism cannot be regarded as a threat to these three station points. Heather fires caused by incautious use of naked flames could occur, and cases have been recorded outside built-up areas in both Alta and Kautokeino. Banning open fires during the summer is a preventive measure. The civil defence forces and the fire brigade are responsible for emergency preparedness.

Vandalism

Vandalism at the points themselves could also be a threat, although it has only be registered with the marker poles in two places. Authenticity could thereby be threatened.

Absence of monitoring and maintenance

All measures to channel traffic to the world heritage station points involve several influences which could diminish the experience of their value. These include poorly prepared access paths and potholed and/or absent car parks, regrowing of paths and viewing points, increased development of alternative paths, and motorised traffic on unprepared routes. Weather and climate conditions affect prepared paths, and poorly anchored signposts could also suffer badly.

Wear and tear

Lille Raipas and Muvravárri/ Bealjášvárri are both important summits for facilitating outdoor activities in their respective local authorities. The effect of summit tours on world heritage preparation measures should be assessed, so that the paths are made more robust and can handle more visitors.

Development

A new 420kV power line is planned 3 309 metres south of Store Raipas. This will be installed in hilly terrain and partly concealed, but will also be visible in some places. Whether this will disrupt the sightline, however, is open to question. Store Raipas is point G in the base extension network.

Summing up

General speaking, this assessment can be summed up by noting that most station points are placed in a robust area where episodic natural disasters or war/terrorism are unlikely to be a threat in our time. However, the Meridian Statue could be exposed to war/terrorism. Nevertheless, vandalism and climate change are regarded as the biggest threats to the tangible values. Certain measures, such as maintenance routines, upgrading, care and monitoring, could reduce the threats and influences on the tangible values.

3.3 Influences on and threats to the intangible values

The biggest threat to the World Heritage: Struve Geodetic Arc is low prioritisation of presentation and knowledge generation. This would contribute to low familiarity and commitment in the local communities. The consequences could be critical if future generations do not want to conserve and strengthen the selected station points and their supporting and historical values.

4. Vision and ambitions for 2046

The vision for the SGA is as follows.

- The OUV will have been maintained 30 years from now through active use, based on positive development in the three local authorities. At the same time, some of the station points are an arena for communicating knowledge about, management and use of the landscape.

Ambitions for the World Heritage: Struve Geodetic Arc are as follows.

- "Cross-border collaboration" is extended through ties of friendship between the local authorities in west Finnmark and sub-sites in the "Struve countries". At the same time, a transnational collaboration along the SGA will be initiated to increase knowledge across political, cultural and religious divides in order to promote work on peaceful coexistence.
- The triangulation method used, the history of the survey, the places visited in 1845-50 and knowledge about the 10 nations will make important contributions to teaching in schools in subjects such as maths, geography, cultural understanding, history and language.
- The paths in the world heritage areas will provide an example where sustainable use, good planning and maintenance, and an aesthetic approach to the landscape and installations are secured through best practice. Good care will have been taken of the sightlines to the 15 (14) points in the arc measurement chain and the eight points in the base expansion network.

4.1 Goals for the OUV

The selected, original and intact Lille Raipas, Luvddiidčohkka and Muvravárri/ Bealjášvárri station points and the Meridian Statue provide unique evidence of accurate scientific determination of the Earth's shape and size. The authenticity and integrity of the world heritage sub-sites are preserved and strengthened on the basis of scientific principles.

The exchange of human values, such as cooperation at a cultural and technological level, will be activated and strengthened by communicating acquired knowledge about the collaboration, the triangulation method and the arc measurement chain in Norway, and scientific theories about the Earth's shape and size.

Good and long-term knowledge-based projects will have led to a world heritage centre affiliated with an academic institution in Hammerfest with established presentation satellites in Kautokeino and

Alta. This centre will support local government planners, schools, museums, tourist offices and destination companies with knowledge of the SGA's unique world heritage value.

Attaining these goals also calls for a concentration on cooperation, collaboration agreements and recognition of the needs and improvement potential of the world heritage values.

4.2 Goals for conservation and strengthening of conservation objectives

Local government planning provides sufficient legal protection for special consideration zones and guidelines with provisions covering areas close to the world heritage points, and access to these.

Achieving these goals depends on adequate resources for pursuing an active management through local government planning tools and action plans.

4.3 Goals for conserving and strengthening relevant supporting values

Supporting values for the four selected station points are the arc measurement chain, where Norway has 14 intact points, and a base expansion network with eight intact points. These must be conserved by safeguarding sightlines from the four selected points, and strengthened through presentation.

Knowledge of surveying at the locations in west Finnmark, organisation and execution of the work, the societies and cultures encountered by the surveyors, and the Meridian Statue's evacuation history are relevant historical values to be conserved and strengthened through research and presentation.

Achieving the goals depends on resources for establishing a "driver" to work systematically on conserving and strengthening the supporting values and making the sources available.

4.4 Goals for building expertise and presentation

The main aim for education and for knowledge accumulation and development related to the SGA is to create interest in and understanding of the world heritage values and why these must be conserved for future generations.

Achieving this goal depends on access to project funds for educational schemes, digitalisation of archives and opportunities to enter into international collaboration ventures.

4.5. Goals for information and presentation

Presentation must be knowledge-based, interesting and accessible worldwide. Common information platforms with the same design and message are needed, plus collaboration with the tourism sector in the three local authorities on developing good experience programmes and sustainable use.

Residents in Kautokeino, Alta and Hammerfest must be familiar with the World Heritage: Struve Geodetic Arc, the world heritage values, supportive national values and relevant supporting values and their context. That applies to all parts of the history, such as knowledge and collaboration, and to world heritage as a basic concept in work for global peace. To achieve that, the world heritage value must be highlighted through an integrated presentation strategy in order to increase understanding of the value and why it must be conserved.

The SGA will be presented at all Norwegian world heritage sites through a new basic exhibition, and in the three host local authorities.

To meet the focus on children and young people in the presentation strategy, a dedicated education programme must be developed, and account must be taken of several different perspectives for teaching – science, cultural history, language and the basis for world heritage.

A long-term and integrated presentation strategy must be pursued step by step towards establishing a suitable centre. This means that collaborative relations should be developed between scientific arenas, museums, educational institutions and tourist information, so that presentational programmes exist even if it might take time before a dedicate world heritage centre becomes a reality.

Such a strategy should also address how the various geodetic station points can function as separate presentation arenas and how the tourism industry, schools and museums can utilise the paths and areas on the basis of the principle of sustainable use.

Achieving these goals depends on resources for systematic presentation of knowledge.

4.6 Goals for dealing with visitors

Preparation of the SGA in Norway will be clearly signposted, accessible, maintained, attractive and, where appropriate, have a universal form. This will be continuous across local authority boundaries and take account of landscape qualities in the areas. Using the world heritage for tourism and education will be cornerstones in a sustainable and balanced practice, which also takes account of the landscape qualities which the prepared paths pass through.

It is important that all the local authorities, via museums or tourist information/tourism players, can offer a guide which provides constructive and interesting information.

Achieving these goals depend on collaboration over and resources for systematic improvement of preparation and information.

4.7 Goals for value creation and commercial development

Accommodation and visitor facilities in the local authorities should exploit the potential of and proximity to the world heritage sub-sites. The Struve march should be developed locally, nationally and internationally. Marketable experiences and souvenirs should be developed. A strategic marketing plan therefore represents an important step towards value creation and commercial development.

5. Applicable legislation and regulations

A number of square metres per core area and buffer zone are entered for all four station points in the nomination papers. To ensure legal protection of the buffer zones, they must be redefined as zones of special consideration pursuant to the PBL and their area marked on the maps in the local authority area plans. Guidelines and binding restrictions are set for special consideration zones, and provide an instrument which meets Unesco's requirements for buffer zones. This also applies for the LNFR zones.

5.1 Lille Raipas/Unna Ráipásaš

The station point in Alta is protected under a conservation order issued by the RA on 25 July 2005 under the authority of section 22a of Act no 50 of 9 June 1978 on cultural heritage, see section 15 and regulations no 8785 of 9 February 1979 on professional responsibilities, etc, pursuant to section 12 of the KML. The NMA owns the installations at the station point, while Fefo is the landowner.

The Lille Raipas station point in Alta has planning status as an LNFR area. In principle, this means that possible construction of holiday cabins and the like would require an exemption from the local authority's area plan. The bulk of the path up to Lille-Raipas also lies within the coverage of the

special consideration zone for drinking water, where measures also require the consent of the waterworks owner and the supervisory authorities for the waterworks.

The rest of this area, both the prepared path and the summit, is owned by Fefo. Alta local authority is the landowner for the car park at the beginning of the path.

Including both the world heritage sub-site and the special consideration zone, the restricted zone covers 1 252m^2. According to the Askeladden guide from the Directorate of Cultural Heritage and the local authority's own maps, no buffer zone is provided around the 6.86m^2 conservation area for Lille Raipas. When the local authority's area plan comes up for renewal, a special consideration or buffer zone must be circled in around the protected cultural remains, pursuant to the nomination papers, and the zone must be entered on the map with guidelines and legal provisions.

The public safety radio network and Relacom share large parts of the path with Lille Raipas.

Section 4, Act on motorised traffic in open country and waterways (permits directly authorised in the Act)

Without prejudice to section 3, motorised traffic is permitted in connection with a) police, ambulance and rescue services and surveillance and supervision services authorised by law, b) public postal and telecommunication services, c) necessary passenger and freight transport to and from permanent residences and in agriculture, forestry and reindeer herding (hunting, trapping, fishing and berry-picking are not regarded as commercial activities in this context), d) armed forces exercises, movement and transport, e) construction and operation of public roads and installations, f) scheduled transport services conducted by permit pursuant to the Occupational Transport Act.

Section 8 (general provisions for conducting motorised traffic in open country and waterways).

Motorised transport in open country and waterways must be conducted carefully and with consideration in order to avoid damage and inconvenience to the natural environment and people.

5.2 Muvravárri/Bealjašvárri and Luvddiidčohkka

The station points in Kautokeino are protected under a conservation order issued by the RA on 25 July 2005 under the authority of section 22a of Act no 50 of 9 June 1978 on cultural heritage, see section 15 and regulations no 8785 of 9 February 1979 on professional responsibilities, etc, pursuant to section 12 of the KML. The NMA owns the installations at the station points, while Fefo is the landowner. https://lovdata.no/dokument/MV/forskrift/2005-07-25-872?q=struve)

Both points have planning status as LNFR areas. These areas are subject to stringent restrictions as reindeer grazing districts, at Luvddiidčohkka for spring/summer/autumn grazing and at Muvravárri for the winter grazing area. The reindeer grazing facilities are designated special consideration zones on the planning map, and the areas are covered by traffic restrictions.

Reindeer herding is the biggest industry in the local authority and, combined with other outfield activities, is a cornerstone of Sami culture. Most of Kautokeino's land area is used for grazing. Reindeer herding is protected by special legislation, which includes safeguarding migration routes and calving areas. The paths to Muvravárri and Luvddiidčohkka are shared with cart and motor vehicle tracks.

The buffer zones around the world heritage spots are not marked on the map. When renewing the local authority area plan, it is important that these zones are assigned, have their area calculated and have guidelines and legal provisions attached.

Links to local authority plans for Alta and Kautokeino (in Norwegian only):

http://www.alta.kommune.no/index.php?find=Kommuneplanens+arealdel&x=10&y=4

http://www.kautokeino.kommune.no/no/suohkanoasseplanat-almmola-geahadeapmai

Planning measures

Where Alta and Kautokeino are concerned, it is important that the buffer zones are marked on the map and have guidelines and legal provisions attached. It is also important that the paths are sufficiently robust to take into account that one is a motor vehicle track (Muvravárri) and that the other, to Lille Raipas, must provide opportunities for maintaining/repairing the public safety radio network and telecommunication stations. This means that the local authorities, users, owners and the responsible administrators of the station points must collectively ensure robust paths which do not damage the landscape. The owner of the protected station points here is the NMA.

5.3 The Meridian Statue end point

The Meridian Statue in Hammerfest and the surrounding area are protected under a conservation order issued by the RA on 25 July 2005 under the authority of sections 15 and 19 of Act no 50 of 9 June 1978 on cultural heritage, see section 22. The order covers the Meridian Statue – a station point surmounted by a monument. The order pursuant to section 19 covers the area marked on the map. In addition to the station points with the Meridian Statue, section 19 deals with the conservation of an area around a protected cultural heritage site.

Planning status in Hammerfest

The most recent change here is an amendment of 21 June 2007 to the development plan, which includes the Meridian Statue. The development purpose is a “park”, designated cultural purpose (KU) 2. This covers an area of 4 600m^2 and incorporates the buffer zone. The latter is not delineated on the map, and guidelines and legal provisions have not been entered. This must be done at the next renewal of the development plan. The protected station point is owned by Hammerfest local authority.

The area is covered by the following provisions which affect the Meridian Statue:

Section 3. Provisions for conservation of special area/park KU2.

Section 2.2. Provisions for the public purposes/housing (OF/B) area.

b) Area P1 is allocated for car parking.

Hammerfest local authority area plan (in Norwegian only):

http://www.hammerfest.kommune.no/kommuneplanens-samfunnsdel-2015-2027.337304.no.html

Planning measures for the Meridian Statue

The buffer zone for the World Heritage: Struve Geodetic Arc, with its guidelines and legal provisions, must be added to the map at the next renewal of the development plan for Stigen-Fuglenes. The sightlines to Seilandstuva, Håja and Tyven must be conserved. Measures were introduced in 2016 to implement the provisions for the car park. In the longer term, it will be important to beautify the area so that the view of the industrial Rieber site is blocked by a fence, bushes or the like. When the local authority surveys the area, it could be important for it to deal with ownership interests for the

buffer zone and to be attentive to the roof height of the former heliport and buildings on private/local authority land south of the Meridian Statue.

6. Instruments

6.1 Legislation

The PBL protects world heritage sites as well as buffer zones defined as zones of special consideration. A revised Act came into force in 2009. In addition, comes special legislation protecting the world heritage area, such as the KML, while the buffer zones are subject to such statutes as the Nature Diversity Act, the Motor Traffic Act and the Outdoor Recreations Act.

6.2 Plans

Regional and local authority planning are also arenas for developing integrated regional and local social policies which incorporate important national priorities. National goals for cultural heritage management should be addressed by the regional plans in away tailored to the challenges facing the county council. A regional cultural heritage plan is under preparation. Due for completion in 2017, this is being produced through a collaboration between FFK and the Sami Parliament.

The PBL gives local authorities an instrument for protecting cultural heritage and environments by preparing a local plan as well as area and development plans. This can be accomplished by designating special consideration zones and by adopting provisions and guidelines aimed at securing cultural heritage against unfortunate changes and safeguarding cultural history values. Local authority plans are divided into social and area sections. The social section specifies guidelines for goals and strategies and how the local authority will discharge its activities. To strengthen and protect the OUV for the SGA, it should therefore be reflected in the social section of the local authority plan.

6.3 Operational guidelines

Unesco's operational guidelines for implementing the world heritage convention clearly indicate that a buffer zone should be established around all world heritage sites where necessary (section 100/2015). Boundaries should be drawn around properties nominated under criteria (i) to (vi) which include all those areas and attributes which provide a direct tangible expression of its OUV, as well as those areas which offer a potential for enhancing such understanding in the light of future research possibilities.

According to the guidelines, a buffer zone is an area surrounding the nominated world heritage property which has complementary legal and/or customary restrictions placed on its use and development. In addition to the immediate setting of the property, it should include important views and other areas or attributes which are functionally important as a support to the property and its protection (section 104/2015). Important attributes are defined in part in chapter 1.1 as supporting values, and concern preserving sightlines to some of the points in the arc measurement chain.

Any modifications to or creation of buffer zones following the inscription of a property on the WHL should be approved by the world heritage committee (section 107). The White Paper on cultural heritage policy also emphasises the call for buffer zones, and says that their establishing should be considered for all the world heritage sites in Norway. Earlier, in 2007, little attention was given to assessing the creation of specific special consideration zones other than the protected area in Hammerfest. Where establishing such zones pursuant to the PBL is concerned, however, their adequacy in this case for meeting the buffer zone requirement should be assessed.

6.4. Other instruments

6.4.1 Networks and partners

The Norwegian World Heritage Association is a network for these sites in Norway. It raises common issues and meets in connection with the annual world heritage forum, a conference concentrated on relevant issues in managing and presenting the world heritage. The network is also working at the request of the KLD on a new basic exhibition for all Norway's world heritage sites.

The Nordic World Heritage Association was also founded on 23 September 2016 to cover 40 sites. Earlier experience of Nordic collaboration includes annual conferences with experience arenas and professional exchanges. Participants represent the Nordic world heritage sites.

West Finnmark has three museum departments which could become good professional partners for presenting the World Heritage: Struve Geodetic Arc. These are the MKG in Hammerfest, the contemporary and historic time department (SOHT) of the rock art and world heritage department (VAM) at Alta Museum and the Kautokeino Rural Museum (RDM). Two of these departments are able to host a small exhibition (35m^2) on the world heritage sites in Norway, while the VAM can provide 60-70m^2 of exhibition space.

One of the players in northern Norway it is important to establish a collaboration with is the Northern Norwegian Science Centre (NNV) in Tromsø. Its object includes enhancing interest in, understanding of and recruitment to maths, science and technology. It has a branch in Alta with its own "Newton room" for science teaching. The Newton room in Hammerfest is run by Hammerfest Energi, and cooperation with this could also be important.

International networks for common goals for tourism and teaching could be developed by initiating collaboration between players in the Struve countries and via the SGACC.

6.4.2 Archives

Good archives and databases are important in managing cultural heritage. The NMA holds diaries and other records from the survey work in Norway, but this material is not digitalised or accessible. In the longer term, part of the archive must also be made available for people with day-to-day responsibility for managing and presenting the World Heritage: Struve Geodetic Arc. Assembling the broadest possible range of documents covering all aspects of the World Heritage: Struve Geodetic Arc in Norway is important. A goal for a future world heritage centre and the NMA should be to make the content accessible to both the management and the general public. It would be a big advantage if the whole archive from work on the SGA between 1816-55 was accessible to all.

6.5 Financial instruments

A number of grant schemes are available to provide financial support for the various players who want to take action to improve natural and cultural conditions in Norway and to preserve and present the world heritage. The Norwegian Environment Agency receives annual appropriations under chapter 1429 item 79 of the central government budget for world heritage work in Norway. These funds are allocated in the form of project finance.

One purpose of Norwegian cultural policy is to promote the preservation and presentation of the country's cultural heritage. The Ministry of Culture gives grants to museums and other measures for protecting cultural values. The county council has funds for managing, signposting and grading hiking trails in Finnmark. In addition, come various programmes for regional development funds. Funding can be sought from the county council for Sami language and cultural purposes.

The Sami Parliament has a number of different grant schemes which allow funds to be sought for measures relating to Sami language, industry and culture. The Arts Council of Norway manages the Cultural Fund and has support schemes for museum development and protection of culture.

Unesco's grant scheme is intended to contribute to a) strengthening Unesco's work and areas of responsibility, b) making Unesco better known in Norge and c) implementing the Unesco commission's approved priorities. Projects related to cultural heritage can apply for grants from the Research Council of Norway. The Cultural Fund's object is to strengthen work on cultural heritage worthy of preservation which is in private ownership. Private owners of cultural heritage, volunteers or organisations administering cultural heritage worth preserving can apply to the fund for grants.

6.6 International collaboration

A potential source of funds is participation in international projects. These call for resources of their own. Through the European Economic Area (EEA) agreement, Norway can participate in projects related to EU programmes for both research and regional development. Participation in such activities could also enhance the international profile of the world heritage in Finnmark. Another potential financing source could be the Nordic Fund, and a collaboration project between three of the Nordic countries and one of the Baltic States. InteregNorth is part of this financing source, with the object of strengthening and animating the region's culture and cultural heritage. Once work on the world heritage site has a driver of its own, the World Heritage: Struve Geodetic Arc in Norway can assess opportunities for cross-border collaboration.

Go to the link below for details on Nordic support schemes (in Norwegian only).

http://www.nordeninfo.no/nordiske-stoetteordninger.aspx

7. Monitoring and evaluation

Good monitoring and documentation routines for the World Heritage: Struve Geodetic Arc which accord with the planning system and the inscription text are simple to establish. They must be directed at the world heritage site's OUV and should cover the following subjects:

1. condition of the actual installations (have their integrity and authenticity been preserved, document any changes in lichen and vegetation, weathering or vandalism)
2. condition of access – prepared paths and car parks, and the landscape they are placed in
3. condition of sightlines from the four station points to the arc measurement chain/geodetic arc network and the base expansion network
4. condition of information about and knowledge of the intangible values associated with the four station points and the development of suitable indicators for these.

8. Revision and renewal of the plan

Once the management plan has been subjected to political consideration by FFK, the plan will provide guidance for a world heritage council. After the next periodic reporting (cycle 3) to Unesco, the council should assess the plan and, in cooperation with the county council, initiate necessary revision and renewal. The management plan for the world heritage site should be considered politically in order to satisfy Unesco's requirements for local and regional entrenchment.

9. Management system

Ministry of Climate and the Environment (KLD)

The ministry is the political secretariat for the minister of climate and the environment, and the highest authority on matters which also concern protecting the cultural and world heritage. It also presents proposals on protecting important areas for cultural history to the Council of State, and hears administrative appeals from decisions by the RA.

Directorate for Cultural Heritage (RA)

The RA is the advisory and executive agency for the KLD with regard to managing cultural heritage and environments. It also has an advisory function for other public administrative bodies, the general public and industry. In cases where the RA exercises authority pursuant to a special (private) act, its decision must take account of both cultural heritage and social considerations.

The RA is the appropriate authority pursuant to section 8, paragraphs 1, 2 and 4 of the KML, which means in part that it can permit interventions in protected cultural relics. Where facilities – like the station points – are covered by conversation orders, exemptions from the Act can be permitted provided they do not significantly reduce the protected value or contradict the purpose of the protection. Conservation is not intended to prevent sustainable and protective use of the cultural relic and the cultural environment which it forms part of. Pursuant to the PBL, the RA has the authority to object to local authority area and development plans which affect cultural relics. A representative of the RA sits on the advisory council to contribute expertise on conserving and strengthening the world heritage value.

Finnmark county council (FFK)

FFK is responsible for giving advice on cultural relics protected pursuant to the KML, taking decisions on these pursuant to the law and allocating government grants. Its planning and culture department works with this. FFK also gives grants to the museums in the national network and collaborates with these.

Responsibility for cultural heritage in the county rests with FFK, which involves taking account of cultural relics and environments in planning processes – including at local authority level. FFK can prepare matters for the RA, and has the authority to take decisions pursuant to the KML and to grant exemptions for the Meridian Statue and conservation areas, as well as for conservation of state-owned buildings pursuant to section 22a of the Act. FFK is responsible for and leads work on the regional planning strategy, regional plans and planning decisions.

FFK has overall responsibility for management and coordination of work on the World Heritage: Struve Geodetic Arc. It is responsible for protecting the world heritage in the county, and can contribute financial support for this. FFK will contribute to and participate in the steering committee for the SGA. It can delegate and transfer part of its management responsibility to other parties, as is the case with the rock art world heritage in Alta.

Norwegian Mapping Authority (NMA)

The NMA's role so far has been to have principal responsibility for the geodetic part of the management and to hold the archive/documentation. This has also included participation in international cooperation with the other Struve countries through the SGACC. It also contributes to the equity capital of various joint projects for strengthening and protecting the World Heritage: Struve Geodetic Arc. See below about owners.

Local authorities

The local authorities are responsible for planning within their boundaries. They must safeguard conservation interests, provide good guidelines for future management, consider building applications and provide advice for landowners. See below about owners.

Pursuant to the PBL, the local authorities have the primary responsibility for shaping the physical environment through their local plan, social/area plans, development plans and consideration of building applications. In their area and development plans, they must take account of the world heritage and other protected and protection-worthy cultural relics and environments. Local authority measures for preparation and protection of cultural heritage are incorporated in their action programmes as part of the local plan. The local authorities must follow up national environmental and resource goals and guidelines which are introduced to the planning process by central government and county council agencies, and which are intended to ensure that important national and regional considerations are taken into account.

The local authorities should sign administrative and political letters of intent on collaboration over this world heritage before a world heritage council is established. They implement measures in accordance with the action plan, and should make personnel resources available in consultation with the VAK. In future, each local authority should have a representative on the advisory council and political representation on the world heritage council.

Presentation expertise available at the museums in Hammerfest, Alta and Kautokeino is important for activities related to the World Heritage: Struve Geodetic Arc. Their representatives should be observers on the world heritage council.

Hammerfest Turist AS and Visit Alta are collective bodies for marketing these local authorities. They should alternate in providing a representative to the world heritage council every other year.

Newton room Alta /science centre branches

The NNV has entered into an agreement with Newton Alta and has its own branch there to cover the whole of Finnmark. It is important that the SGA project/VAK have a dialogue with the NNV so that an assessment can be made of whether the science aspect can be presented in collaboration with the Newton room in Alta.

Owners and users

Owners and users play a key role in managing Norway's cultural heritage. The owners are responsible for maintaining their property in accordance with the PBL. Fefo has extensive landholdings at three of the station points, the NMA owns the protected points, Alta local authority owns the car park for Lille Raipas and Hammerfest local authority owns the protected station point and its surrounding area. The owners should also desire to have a voice, and not just duties.

The Struve geodetic arc coordinating committee (SGACC)

Comprises representatives from the 10 countries, mostly from the national mapping authorities. It meets every other year and is open to other participants, such as national and international experts.

9.1 Proposal: future management system with a world heritage council

9.1.1 Advisory council/management committee

Establishing an advisory council will provide a natural arena for discussing issues which affect various administrative bodies. Ensuring the implementation of the Unesco convention in managing the World Heritage: Struve Geodetic Arc must be the main goal for this committee. It will comprise

administrative representatives from the local authorities (cultural department or other) and administrative agencies, with the VAK as secretary. The council should meet twice a year and approve action plans drawn up by the VAK in consultation with responsible entities in the local authorities.

One representative from each of the following will have a vote in the council: Alta, Hammerfest and Kautokeino local authorities, FFK, the NMA and the RA. All representatives can be accompanied by an observer – from museum departments in the local authorities, for instance, technical departments or others.

9.1.2 World heritage council

An overarching world heritage council must comprise political representatives from the three local authorities and FFK. Possible representation of the owners must be assessed. Efforts are currently under way to establish two world heritage councils in Finnmark, one for the SGA and the other for the rock art in Alta.

In consultation with FFK, the world heritage council will be responsible for the renewal of the management plan. It should establish clear mandates for a VAK and identify a future form of organisation with the participating players – either a foundation or an intermunicipal company (IKU) – to operate a world heritage centre.

9.1.3 World heritage coordinator (VAK)

A VAK function will be linked to a full-time post requiring expertise in administration, presentation and project management. The VAK must follow up the measures in the management plan, serve as secretary for the advisory and world heritage councils, and initiate collaboration projects of a presentational character both regionally and internationally. The VAK must see to it that applications are submitted for project funds on the basis of recommendations from the advisory council for management and presentational measures, see to it that these are implemented in line with best practice, follow up and report. They will also be in direct contact with the government authorities in the administrative system. They should also participate with the NMA in meetings of the SGACC.

The VAK post will be co-located with a suitable institution in west Finnmark. Expertise on and closeness to the world heritage are the most important qualifications for the appointment. The VAK will work in close contact with the collaborating parties. The goal is to appoint the VAK during the spring of 2017. Qualifications sought must be administrative and presentational expertise, knowledge of the world heritage and project management capabilities. The post must be transferred to a world heritage centre for the SGA once this has been established.

Funds for the VAK position must be directed at a specific post and cover pay, payroll costs, office operation and rental, technical equipment, travel expenses and administrative outlays.

Management responsibility

FFK is responsible for managing the world heritage. It can employ somebody full time in a VAK post or delegate responsibility to one of the host local authorities or to one of the museums in one of the local authorities.

Employer responsibility

The employer can be one of the above-mentioned, which has the VAK job delegated to it, or a competent institution which provides the service over a defined period for a fee.

Approval of the person chosen as the VAK

Should FFK delegate employer responsibility, the person to be appointed as the VAK should be approved by a competent body such as the world heritage council or the advisory council.

Location

The VAK should be physically located in one of the host local authorities, and at the world heritage centre once this has been established.

Financing

FFK (or the organisation it wants to delegate responsibility to) can apply for an annual grant from the RA to finance a VAK in the same way as other world heritage sites. A temporary and limited VAK role was financed by Hammerfest local authority until 2017. Funds for a 50 per cent post over nine months to discharge the VAK function were appropriated in 2017 over chapter 1429, item 79, of the central government budget.

9.1.4 World heritage centre

A world heritage council must assess whether the SGA should have its own centre and/or be linked to existing museums or other players. If visitor numbers are to form the basis for where a centre is to be located, Hammerfest stands out as the relevant candidate. If the world heritage council wishes to establish a centre, an integrated presentation strategy should be studied. Such a study should cover financing, location, design and how activities are to be related to all three local authorities. Design and execution of a future world heritage centre will require a dedicated project manager. Once this facility is established, it would be natural to move the VAK job there. An application for authorisation would have to be considered in advance by the world heritage council, and it would then be advantageous that local and regional financing is in place before applying for full funding. (report 153/2015, Norwegian Institute for Cultural Heritage Research).

10. International collaboration

The SGA has intrinsic intangible value and simple, fairly modest tangible values which require special attention for preserving and strengthening its OUV. The transnational character of this world heritage site calls for the Norwegian component to be a relevant and attractive partner. Experience acquired in Norway with management and presentation should have significance for all 10 nations in the SGA.

International cooperation has been channelled so far through the SGACC, and technical geodetic issues have been at the forefront. So far, only Finland has drawn up a management plan. A great need exists to clarify practice and standards in the various countries for management, organisation and work assigned to coordinators. As a transnational world heritage, the SGA has an intrinsic significance as an OUV – in other words, crossing national boundaries to achieve a shared meaning. It is important that Norway functions as a beacon for best practice and on the basis of national visions in this collaboration, and that assignments related to the SGA receive a high priority.

10.1 Future collaboration

Norway's representatives and observers in the SGACC should initiate closer international cooperation, such as transnational collaboration projects for presentation/education, tourism and continuous information about the SGA. A shared information platform with contact details about coordinators, museums, tourism and educational institutions which will participate in a collaboration to present the SGA could be a first step in this direction. The SGACC should initiate a joint transnational programme financed by EU funds or national grants for a common project between the

Struve countries, with the goal of making this world heritage site better known to the general public, boosting local involvement, increasing experience transfer over national boundaries and developing infrastructure for a number of the selected station points. It will then also be possible to develop common tourist routes to the 34 selected points. The Baltic states have developed a number of these into good presentational arenas, and more are under development. This experience is also important for Norway.

10.2 Sustainable use and value creation

Value creation is often defined in terms of economic, cultural, social or environmental value. If the world heritage is to be a brand or catalyst for economic growth, the world heritage sites must work actively for this by coordinating information and dialogue platforms and joint projects. But it is the world heritage sub-sites in the 10 countries which must generate the activity and value creation at the same time as expertise is built up locally at the sub-sites. As a transnational world heritage site, the SGA will face big challenges related to goals of making world heritage status a tool for local development or identity. But these may perhaps pave the way as a tool for international collaboration in the Struve spirit. Norway's representatives and observers in the SGACC should therefore promote dialogue aimed at establishing a common understanding of the concept of sustainable use and development.

10.2.1 Sustainable tourism

Sustainable tourism involves working for a low impact of this sector on the environment and local culture with the aim of securing a positive effect on and development of the local community, tourism companies and tourists. Work on responsible tourism should be important for sustainable development of the selected station points in the SGA. That will accord with Unesco's goal of sustainable tourism and developed activity programmes (whc.unesco.org/activity-669-7.pdf).

Work on responsible tourism should contribute to a very educational experience for all visitors, as well as giving them an understanding of the OUV and teaching them responsible travel and respect for the world heritage. These efforts must also support the history and environment of the localities. It will therefore be important to develop good and site-specific narratives which can enhance the experience and its attractiveness. To ensure development is sustainable, it should primarily be pursued in line with the relationship of the various communities to the world heritage and the locations where the station points are placed. The biggest benefit for the SGA will arise from a good collaboration between the 10 countries over the interaction between preserving and developing the world heritage.