VILLUM Fonden og VELUX fonden
Conni Elisabeth Cederholm
cec@veluxfondene.dk

VARDE KOMMUNE
Bytoften 2
6800 Varde

Tlf. 7994 6800

www.vardekommune.dk
vardekommune@varde.dk

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Poul Sig Vadsholt
Direkte tlf. 7994 7401
Mobil 25381288
posv@varde.dk

Dok. nr.
Sagsnr. 786824

Application for funding of a preliminary project - Restoration of Holme River

Varde Municipality has initiated planning of a large-scale natural and aquatic restoration project of nearly 12 km of Holme River and hereby submits an application to the Velux Foundation and Villum Foundation.

Varde Municipality and partners ask the foundations to support a preliminary project – Restoration of Holme River which will conclude how a restoration can be made in a sustainable way with respect to the many interest and what will be the realistic costs of the project.

The project has been searching for one or two private sponsors to subsidize the restoration of Holme River, and has contacted the Velux foundation and the Villum foundation to ask for an expression of Interest.

Varde Municipality has on at meeting the 18. January 2013 presented Helene Bjerre Jordans, Lars Arnskov Olsen and Steffen Brøgger-Jensen for the project in Varde and together we visited important locations at the Holmes River valley.

Varde Municipality has further developed the project which can be taken to the final level by making a preliminary project. Therefor Varde Municipality and partners hope to be successful with this application.

Verde Municipality is at your disposal if there are questions or there is a need for additional material about the project. Contact may be directed to Bent Peter Larsen on 7994 6529 or 3036 7036 or Poul Sig Vadsholt at 7994 7401or 2538 1288.

Venlig hilsen

Preben Olesen	Bent Peter Larsen
Udvalgsformand	Direktør

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Annex 8:CV for Project managers

Copy send to
Velux Fondene, cec@veluxfondene.dk; hbj@veluxfondene.dk
SydEnergi, Att.: Steen Thomsen, Ravnevej 12, 6705 Esbjerg Ø. steen@se.dk
Naturstyrelsen, Att.: Ulrik Lorenzen, Ålholtvej 1, 6840 Oksbøl BLH@nst.dk; ulo@nst.dk; brasm@nst.dk
Frit Løb grupppen henning.haahr@skanderborg.dk; cbp@pol.dk; AR@cowi.dk; kvist@hotmail.com
Jysk Landbrugsrådgivning, John Tranums Vej 25, 6705 Esbjerg Ø pvi@jlbr.dk

Preliminary Project - Restoration of Holme River

1. Summary

Varde Municipality wants to make a preliminary project on how to make a restoration of Holme River which lost 95 % of its water volume in 1925 when it was relocated from the river and transported in an artificial channel to Karlsgårde hydropower plant to generate power for households.

The aim of the project is to investigate different methods to make the restoration of the river with respect both to the interest of the local landowners, NGOs, outdoor interests etc. and the interest attached to aquatic environment and nature with a special focus on protecting the existing qualities and in general to create better conditions for endangered species. The project will eventually help to build the foundations for the creation of a greater diversity of species in the river and the river valley.

Due to the different methods to make a restoration the project shall from a set of assumptions identify the most optimal way to restore Holme River and provide a realistic estimate on the budget to realize the project.

The consequence of the hydropower production was a loss of passage to the 40 km of Holme River for migratory fish as the endangered houting, 3 species of lampreys and salmon, sea trout etc. and Holme River left back with a pour quality at a stretch of nearly 12 km.

The project shall achieve an overview on how the part of Holme River can be resorted in a sustainable way to secure a future wider diversity of species in the water and at the land. The aim is to create 12 km of river with the best possible quality by giving the water back to the river while improving the physical conditions in the river and preventing the river from being polluted by outlet from drainage etc. This aims to bring back ecological diversity on land and in the water.

The project will improve conditions for salmon and trout by creating good spawning and nursery areas on the project route, and generally creating accessibility for migrating fish to the higher stretches and small streams as well as to allow for the endangered houting to get a larger area to propagate to. Houting is today threatened with extinction worldwide, and Denmark, for example through the EU Habitats is committed to ensuring houting a favorable conservation status. The project will also have a positive effect on sea, river and stream lampreys that are designated species.

In the nature survey it will be investigated how the project can make excellent solutions for endangered species as birch mouse, otter, special insects etc. There will be made a focused initiative to describe how the project can reintroduce the river pearl mussel that can live up to 150 years. River pearl mussel is endangered species that is protected and may no longer reproduce in the Varde River system, but perhaps still exists in Holme River or can be reintroduced. An opening of salmon migration in Holme River provides a good starting point to reintroduce the specie.

The project will document if there is a potential in making a climate adaption by using the remaining volumes in the channel and Karlsgårde Lake to protect Holme River, Varde River and Varde City form heavy rain incidents.

The project will investigate if it in parts of Holme River is possible to make a more sustainable stream restoration by changing traditional digging and removal of soil from the river by excavators and other machinery and instead to use the power in the water or to make power in the water by lowering the river on specific parts where material shall be removed. It is expected that a helping manual hand is needed to improve the process.

The project will investigate the potential to change the land or parts of the land in the river valley to wetland to create an ecosystem that supports a more diverse life. It'll be estimated how the wetland can reduce the content of nutrients and reduce the drainage of ochre. This will be made with respect to the land owner interests and the interest of the aquatic environment and nature.

A holistic approach will link all the different interest related to the river restoration and the use of the river, the river valley and its surrounding after a restoration is fulfilled. The aim is to cuts across sectors and break traditional patterns of cooperation to ensure the involvement of all relevant organizations, associations, councils etc. in an effort to provide the best possible solutions. It will be analyzed what instruments there can be used to compensate the land owners.

The project will unite the several local trails to the "Coast to Coast trail" which connects Vejle in east with Blaavand in the west of Jutland and it will be evaluated how roads/trails along the channels can be use as connection points for both walking and biking. It will be discussed how to make permanent public information and how to improve availability by trail, road or water. Karlsgårde Lake is included as one of the areas involved in the project "Stories in the Park North Sea". The project is an IT-communication project which in a new and innovative way to disseminate knowledge about the natural and cultural content in the area.

It's estimated that the preliminary project costs will amount up to 600.000 kr. depending on all parts are being included. The project partners are open to discuss and to adjust the different points in the project.

2. Introduction to the applying organizations

The project partners are SydEnergi, the national Nature Agency and Varde Municipality, which corresponds to the partners in the original agreement to shut down the Karlsgårde hydropower plant and to give back the water to Varde and Holme Rivers. The plant will retain as a protected.

SydEnergi (SE) is the owner of the Karlsgårde hydropower plant, the lake and the 2 channels' for transportation of the water to the plant. SE seaced to produce electric power at the plant in 2012 and wants to donate the channels and surrounding areas to Varde municipality or the landowners. SE will still be the owner of the plant, the Karlsgårde Lake and the nearby surrounding areas. The Buildings are protected cultural monument and will be used to present the public to history of the hydropower plant.

The Nature Agency is the national body to take care of nature and waters. The Agency has completed the restoration of Varde River to create the necessary ideal conditions for houting and have got a special knowledge about the project, how to protect nature/water and what special topics will be valuable for further long term studies.

Varde Municipality is the authority of environment, waters and nature. The municipality sees a unique opportunity to make a large-scale restoration project that unites all forces locally to improve conditions for a variety of endangered species and to recreate valuable nature which can be of interest of the landowners, the citizens in general and the many tourists visiting the area.

3. Context and problem presentation

Holme River is an approximately 40 km long clear water river which has its point of outlet to Varde River, annex 2. The river is not re-oriented as many other rivers in Denmark and is passing through a variety of terrain in a river valley with meadows, higher situated valuable arable land and locally plantations.

The river valley has status as "Low area which is potential suitable as a wetland", corresponding to areas, where the original water surface level can be restored. Holme River has at set quality of water as "spawning and nursery area for salmonides - B1".

Holme River is strongly characterized by Karlsgårde hydropower plant which was established in the 1925. The plant was from the start and up to 1945 provided with 95% of the water from Holme River at Hostrup, where the water was dammed up and transported by the artificial made Holme Channel to

Karlsgårde Lake. From 1945, the water from Varde River was also transferred to Karlsgårde Lake by the artificial made Ansager Channel to increase electricity generation at power plant.

Varde River system and its streams have been among the best rivers for salmon in Denmark with its own breed of the West Jutland salmon. This was virtually wiped out due to ocher, regulations and because it could not get past Karlsgårde hydropower plant. The result has been a loss of passage to some of the best spawning grounds in the Varde River system. A National salmon management plan was adopted 2004 in order to maintain the stock

As part of the national action plan to save the endangered salmonids houting the Danish state has completed a restoration project to relocate the water from Ansager Channel and Karslgårde hydropower plant back to Varde River. This is the first part of the project to restore the Varde River system, and "Restoration of Holme River" is the second part.

The project's main objective is to restore an original and coherent Varde River system as it was before Karlsgårde hydropower plant was established, by returning water from Holme Channel to Holme River. The project generally aims to increase biodiversity in the area and create favorable conditions for priority species.

The project will improve conditions for salmon and trout by creating good spawning and nursery areas on the project route, and generally creating accessibility for migrating fish to the higher stretches and small streams as well as to allow the endangered houting to get a larger area to propagate to. Houting is today threatened with extinction worldwide, and Denmark, for example through the EU Habitats is committed to ensuring houting a favorable conservation status. The project will also have a positive effect on sea, river and stream lampreys that are designated species.

There shall be a full reversal of the water to Holme River, creating availability for salmonids, trout and other migratory fish along a 40 km stretch of Denmark's best fish water. It is expected that the State Water plans ensure that in the period 2012-2015 there will be created passage at 2 farms, located higher up the river. Puglund fish farm is acquired by Nature Agency, and passage is already created, see Appendix 2.

The Holme River restoration shall be conducted on an approximately 12 km stretch with its natural meanders, its original flow and with large parts of spawning gravel in order to achieve a significantly better self-cleaning effect and the spawning grounds will provide the foundation for self-reproducing populations of salmon and trout in Holme River.

For Holme River the result with most of its water in the channel and the lake has been a non-existing or a poor passage for migratory fish and dangerous conditions for fish fry to be eaten as it moves into the sea because it has to cross the lake and other stagnant waters. Because of the bad passage salmon, sea trout, houting, 3 species of lampreys have lost some of their best spawning grounds in the Varde River system.

There is a natural link to the project “Restoration of Varde River” which was the first part of the project to bring the hydropower production of the Karlsgårde Plant to an end and to give the water back to its rivers. The project is an important part of the national Danish action plan to save the endangered salmonids houting.

Along Holme Channel today there is a path which is a part of the "Coast to Coast Trail". The hiking trail connects the Blaavand in the west with Vejle in the east of Jutland, and the trip across Jutland given along the path opportunities for primitive accommodations. The trail is managed in cooperation be-

tween the municipalities of Billund, Vejle and Varde. Dissemination of the path is through the path website (www.kyst-kyststien.dk) and folders in 3 languages.

In order to provide users of the path the opportunity to experience the region in a fruitful way, the path is located along rivers and in natural areas on the lines where it has been possible to make agreements with the landowners. Upstream the project area is a path along Holme River at a longer distance. As part of the project it will be evaluated how the Coast to Coast Trail in the future can be relocated to the restored Holme River. It is presupposed in the project to have a coherent path link from coast to coast.

The Coast to Coast Trail is today used both by people walking in all or large parts of the trail, but also by local people who use the trail for shorter walks. To accommodate the last group the path is in several places supplemented by shorter trail loops. Typically, the local trail connections are established by local action groups and local councils. An active involvement of local interests during the project could be based on similar initiatives within the project area.

Along the paths there is established permanent public communication in the form of boards etc. There will be cooperation with sport fishing association to create parking spaces at the 2 bridges and possible other relevant places.

4. Objective, output/main activities and outcome

Objective of the project

The main objective of the project is to investigate how you can make a restoration of Holme River and what the total cost will be. The overall aim of the restoration is that it shall create the potential for a large biodiversity in Holme River valley both on land and in the aquatic environment.

Main activities	**Outcome**
Make a total budget for the restoration of Holme River	A preliminary project that can be used to initiate the restoration of Holme River
To minimize the costs to excavate and transport the soil	The majority of surplus soil from the expansion of Holme River will be used to fill up the Holme Channel. Alternatively it can be deposited outside the river valley. It will be evaluated how expenses to transport can be reduced for example by temporary storage of up to ½ -1 year to reduce the content of organic matter.
To dismantle the Hostrup weir and create a passage for the most vulnerable species	Design a 200 m passage of stone so it will fully passable for all species, including houting. It will be analyzed where to establish resting parts etc.
The possibility to make local sand traps	To preserve the sand trap in the upper part of Holme River to reduce the transportation of sediment to the restored Holme River with the benefit to keep the spawning banks clean of sand.
Excavation of the river to future width	This can be done in different ways. The way to design the physics of the future river. How will the coming climate

	changes influence the different solutions
Evaluation of how the future ditch in the Holme Channel shall be designed	The project has to ensure the current options for drainage of agricultural land to the channel is maintained where landowners do not want to make wetlands. A mapping of the drains with a proposal of the future outlet to Holme ditch or Holme River. At the area Øselund the public wants a maximum of water in the Holme ditch. It'll be evaluated if it partly can be generate by surface water from areas outside the project area.
Where there are vulnerable nature and species which need a particular protection	Where are driving plates need to protect humid § 3 protected areas? If a major sand trap as it exists today is to be maintained to protect the down stream areas of the river. If parts of the channel can be used as wet areas for amphibians and birds that live in the meadows.
Evaluate the potential to make spawning grounds	To make better physical conditions and thereby improve water quality. To secure the reproduction of salmon and sea trout
Potential to make wetlands	How big areas can be changed to wetlands? What will be the benefit for the land owners? What will be the benefit for the nature? What reduction rates can the project expect to gained with respect to N, P and Ochre? The project will show how the landscape in the river valley can be improved.
Climate change adaptation	To evaluate if it's possible to use channel and lake. Where do Varde Forsyning A/S have problems with rainwater?
Change of bridges	Road bridges shall be replaced by new and wider bridges which are able to transport the future water at Holme River.
How shall the work be offered to contractors	Shall work be offered in at total contract or might it be split up in minor parts which can be carried out by local contractors. Shall the 2 bridges be a part of the total contract shall they have a separate contract.
In general to make the project available for the public	Existing options for crossing the river and channel by bridge (wanders/bikes) will be secured and linked to the "Coast to Coast trail" The river valley will be made available to the public by walking, biking or canoeing. Establish parking to get access the river.

	To make primitive camping areas. The areas shall be available for locals to make bonfire, eat packed lunches etc.
Potential to improve the diversity of species in the project area	The nature survey will investigate the potential.
To evaluate if it is cost-effective to make a restoration at a longer part of Holme River	The costs to extend the project to Haltrup fish farm above the restored Holme River, creating availability of additional approximately 12 km of Holme River.
Evaluate if parts of the project can be developed for a further study	Electric fishing to follow how the different fish species develop. Project to secure the river pearl mussel in Varde River System. Others will be appointed through this project.

5. Strategy

Communication and knowledge sharing

Varde Municipality will make press releases about the different elements in the project like; nature survey, the preliminary archeological investigations, the ability to make wetland, the possibility to make a climate initiative etc. This will mostly be at regional and local level. There will be a national public communication in connection with a commitment to support the project and when the project has been realized.

Preliminary investigations will be presented to the landowners and the farm organizations to discuss the possible outcome for the different initiatives. A subject of special interest will be to change some areas to wetlands. The farm organization is attached to the process because it will be the best professional consultant to advice the farmers.

Preliminary investigations about the options to remove the channel, to reuse the whole channel or to reuse parts of the channel will be discusses first with the landowners and later with the big group representing all interests. Knowledge from the project will be combined with knowledge from the Climate Change Adaptation Plan which Varde Municipality is developing in 2013-2014 to evaluate if there is a foundation for synergy.

"Frit løb gruppen", the local Angling organization and others will be invited to discuss the proposal to make the best physical conditions for salmon and trout in the river in general and especially where spawning grounds can be made. DTU Aqua will be asked to evaluate the final proposal with respect to the different fish species to make sure.

There will be held innovative big meetings for municipal and public interest to give an outcome of ideas to connect the project to the potential of developing outdoor life and tourism. NaturKulur Varde and others will be invited to assist Varde Municipality in the process.

An overall description of possible partnership models and cooperation modalities

The local angling organization "Varde Sportsfiskerforening" and the "Varde River association" have made a working group to support the project. Varde Sportsfiskerforening has initiated a local collection with the purpose to make good conditions for spawning salmon and sea trout. It will be communicated how the public, local business and other support the project. There will be set up milestones for the collection and the public will be informed when the next milestone of the collection is reached.

The organizations will be asked to evaluate if it is possible to make fishing grounds for handicapped along the river as they have done in other parts of Varde River System. The initiative will be financially supported by DTU Aqua and others.

In the project there will be made a test to document if there is a river in Varde where there can be made an artificial sand trap to collect sand and what the gradient of the river bottom shall be to make the sand move down the river to the sand trap. Local angling organizations will participate where a manual hand is needed to secure a sustainable river restoration.

The outdoor organizations will be asked to come up with innovative ideas on how to develop the use of the open space with respect to walking, running, bicycling, canoeing etc. and where to make primitive camping areas and a fire place for the local area.

Describe the project's approach and overall strategy, including overall working modalities (including use of volunteers), communication and knowledge sharing. Include an overall description of possible partnership models and cooperation modalities.

The will be a special follow up with DTU Aqua to discuss the important parts of the project that might be an issue for further study.

Varde Municipality has a volunteer policy and has got a good experience how to implicate the public in many projects. In this project NaturKultur Varde and local action groups will contribute by addressing the different projects. All objectives will be set up in a volunteer matrix connected to the part that has got the initiative. Varde Municipality has got a special department for development of project which can support with knowledge about financial support to the projects.

6. Target groups

The project will cut across sectors and aim to break traditional patterns of cooperation to ensure the involvement of all relevant organizations, associations, councils, etc. in an effort to provide the best possible holistic solutions.

The project partners are working together to finish the project to give the water back to the Holme River. The aim is to involve all possible interest and organizations to make a restoration with a holistic approach to make all the improvements for the recreational use in one loop.

The primary target group is the landowners, the citizens in the municipality/ the region and the tourists visiting the area.

The secondary target group is all the interests which can be divided in 3 groups which are used under section 8.

7. Budget

It is estimated that the total cost of the project will amount to a size of 600.000 kr. The work to be done by Varde Municipality is estimated to 135.000 kr. And 15.000 kr. for an external auditor.

Varde Municipality has asked the engineering company Johansson & Kalstrup to evaluate parts of the estimated budget. Varde Municipality will propose the company to make the major part of the engineering investigations, calculations and reporting.

Johansson & Kalstrup has also been asked to evaluate the budget of a restoration of Holme River which Varde Municipality on for hand has estimated to be in the range of 20 mio. kr. Johansson & Kalstrup has estimated the total costs might amount to 22-24 mio. kr., being in mind that one of the greatest uncertainties is handling and disposal of surplus soil.

The salary expense for employees in Varde Municipality is set at an average of 400 kr. for one hour of work. For consultants the salary expense is set at 750 kr. being the average price for an hour.

The budget is not presented as an output-based budget because of its nature. The detailed and commented budget is enclosed in annex 4.

8. Implementation and management

The project management consists of a management group and 3 or more working groups.

1. Management group

A management group will consist of up to 10 persons representing the farmers, the farm organization, SydEnergi, Nature Agency, Varde Municipality, "Frit løb gruppen" and relevant NGOs' which are closely connected to the project. The group will be headed by Director Bent Peter Larsen and managed by the Poul Sig Vadsholt . Klaus Bertram Fries will be the managing part in all matters related to the nature.

(Attached CV for Poul and Klaus in Annex 8)

2. Working groups

Green Council unites nearly all interest in Varde Municipality and will initially be used as a platform to discuss the project to give it an innovative boost.

Further discussions and development will be made in 3 groups with organizations being invited if they have got a certain interest in the subjects being on the agenda.

Working Group 1) Landowner interests

Landowners, Farm organizations, Varde Municipality, Nature Agency etc.

Working Group 2) Nature and Water interests

"Frit løb gruppen", Varde Sportsfiskerforening, Varde Ådals gruppe, Danmarks Naturfredningsforening, Dansk Aquakultur, Dansk Ornitologisk forening, Dansk Jægerforbund

Working Group 3) Recreational use – outdoor life

NaturKultur Varde, local action groups, local councils, Friluftsrådet, Dansk Jægerforbund, Varde Museum, Naturvejlederforeningen i Danmark, Dansk Aquakultur, Canoeing rental Companies

A coordinator for each working group will be identified and be a part of the managing group. They are responsible to attach new members to the group and for reporting the progress to the project manager.

9. Reporting and monitoring

The project period is 1 year in the period 2013-2014.

Varde Municipality proposes a short half-yearly progress report being twice in the period. The final report will be the second progress report to conclude the project. The report will be in a form where it can be used as a decision tool for the restoration of Holme River.

The output report will be verified by specialists in Varde Municipality and Nature Agency.

10. Financial management and control

Varde Municipality will make a special account for the project and all expenditures will be registered on this account. Original invoices will bee saved as documentation for a period of 5 years as for our EU-projects.

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The internal auditing will be made by the economic department in Varde Municipality which in general is audited by an external auditor. If there is a request for an external auditor Varde Municipality will use the one it has got a business agreement with. It is estimated than the price of an external auditor will amount 15.000 kr.

11. Implementation plan

The project's implementation plan is enclosed in Annex 6..

12. Assumptions, preconditions and risks

The project has been discussed with all the landowners and potential partners. A restoration project is fully supported by all whatever interest they might have. There are minor differences' in the opinion about the future of the channel and if or not to make wetlands in the river valley. The attitude is though changing towards a positive attitude to make wetlands.

The working groups shall work with the different proposals in the project so it can be discussed in a plenum for all interests which might be the Green Council plus others.

The risk might be that the restoration of Holme River is not being fulfilled but that is evaluated to be a hypothetical risk because all interest are working in the municipality .

Annex 2 Supplementary description to the project.

A feasibility study, together with a climate change adaptation report and the assessment of environmental impact provides (EIA) the basis to make a choice between;

1. to remove Holme Channel and direct all the water back to Holme River
2. to maintain Holme Channel wholly or partly by directing a part of the water to Holme River - and use of the channel and Karlsgårde Sø to relieve Holme Å, Varde and Varde City for more or less extreme runoff
3. to maintain the current ratio

The latter point is addressed in the EIA report, 0-alternative and are not included in the estimate of the feasibility study.

An important part in the feasibility study is to clarify the physics underlying the future project. Holme Channel must be measured to find the exactly volume of the channel below a certain level. All the outlets to the channel shall be measured too. It shall be calculated how the physics of the channel is affecting the land calculations. Information about the terrain around Holme River is also necessary to calculate the areas that will be affected due to a higher groundwater levels and at different flood events.

Moreover likely purchased a laser scanned terrain survey of the river valley and adjoining areas in order to make a realistic estimate of construction costs. This applies regardless of whether Holme Channel must be completely removed or retained with reduced dimensions

Information about the terrain around Holme River is also necessary to calculate the areas that will be affected by a higher groundwater levels and at different flood events. Moreover likely purchased a laser scanned terrain survey of the river valley and adjoining areas.

Holme River is about. 12 km long and it will have a major impact on the soil quantities to be disposed to what extend the river will be excavated. It have to be investigated to what extend the river valley can bear the construction machinery, since it is expected that there will be many stretches of poor carrying capacity.

It is worth considering whether it would be possible to supply water to Holme River without digging. Material from the erosion that might occur could possibly be collected in a sand trap immediately upstream of the former fish farm, where there is plenty of capacity on the terrain. As the stream of most of the line has a drop of just under 1 ‰, it is not certain that there will be erosion. The extra water volume may instead lead to a permanent flooding of the river riparian areas where water in a large cross-sectional area will move slowly towards the outlet without erosion creates a wider stream profile. In time there will be a risk of reed spreading in the permanent flood and completely masks the open water in Holmes River. Under such conditions Reeds can not be grassed down by cattle or sheep. It is therefore expected that the expansion of Holmes River will be necessary in a yet unknown extent.

Prospects beyond the project period

Establish a nature trail along the restored Holmes River, and tie it together with the rest of the trail system in Verde Municipality, including the Coast to Coast trail. Prepare permanent information signs, and the project becomes a permanent part of dissemination through NaturKultur Varde.

Holme River becomes available for canoeing and arranged one or more primitive overnight stay places.

There must be electric fishing of the restored Holme River to document how the project has significantly helped to ensure self-reproducing populations of salmon and trout.

Nature

Varde Municipality has in 2012 made a general revision of the Natural Quality Plan for the municipality which is being a part of the Municipal Plan. Within the frame of the plan Holme River valley has been evaluated at a superior level and therefore some data are available.

It is recommended that the river riparian areas and banks are examined, preferably in the spring period, so rare electric clay endangered plants can be registered if necessary with GPS, so as to take them into account in the planning of the construction work.

There is a need to have a survey of the terrain to ensure that surplus of soil not is being deposited but transported away from the river valley. This is in order to ensure that the current natural state is maintained.

It is estimated that it that the work-load will be 2 weeks.

The river pearl mussel

A project to restore populations of river pearl mussels will be unique in Denmark. There can be expected a lot of attention to a project and follow-up both in terms of dissemination but perhaps also in relation to the research interest.

There will be made a special effort to document how a restoration project can make optimal conditions for the river pearl mussel which is an endangered species that are protected and may no longer reproduce in the Varde River system, but perhaps still exists in Holme River. The river pearl mussel can live up to 150 years.

An opening for salmon migration to Holme River provides a good basis for making an effort to reintroduce the river pearl mussel

http://www.naturriget.dk/index-filer/Flodperlemusling.htm.

In Sweden and Germany scientists have made field tests to let river pearl mussels spawn on restocking fish before they were put out, which has yielded positive results in reintroducing the specie. It is also estimated possible at Holme River, where every year exposed thousands of salmon.

The otter

The project will also be important to create good conditions and passage for otters. Danmarks Naturfredningsforening has appointed Varde Municipality to make a special effort to create good conditions for the otter. The 2 road bridges will be constructed to be passable for otters.

The birch mice

There have been found of observations of the endangered birch mouse, both below and above the line in which the restoration is to be made. The Birch mouse has summer residence in damp areas and in winter it stays in the slopes of the grasslands.

Birds and amphibians

The nature survey will conclude if special actions should be made for the species. Wetlands and the biotopes at Holme River valley will make excellent areas for birds and amphibians. In the line of Holme Channel the landowners will be asked to give a proposal to local solutions.

There is a need to have a survey of the terrain to ensure that surplus land is not deposited in the valley but transported away from the river valley. This is in order to ensure that the current natural state is maintained in the meadows.

To turn parts of the river valley to wetland

Wetlands are semi-aquatic lands, flooded or saturated by water for varying periods of time during the growing season. Because of the presence of water, wetlands are characterized by water-loving plants, called hydrophytes, and periodically saturated or flooded soil known as hydric soil.

Wetlands have got the ability of using naturally occurring bacteria to convert nitrate to gaseous nitrogen, which is harmless. At the same time, the projects can help to improve the conditions of nature.

The project will use an engineering consultant to map the areas in the river valley being potential for wetlands and reduction of ochre.

Jysk Farm Consulting will investigate in which of the appointed areas the landowners will be interested in making wetlands. It shall be illustrated how the landowners can benefit in income by changing parts of their land to wetlands. The Nature Agency will assist Jysk Farm Consulting in the effort to obtain financial support for this project.

Reduction of ochre

In general the Danish rivers in the southwestern part of Jutland have a negative quality because of the drainage which has resulted in oxidation of pyrite which is deposited as ochre in the river with a negative effect on the spawning and rearing of salmon and sea trout fry.

In Denmark in general the knowledge about ochre is poor but often the solution selected is to raise the water level

The project shall determine if the ochre is a problem in this area and how a restoration can contribute to

Where the river valley can be changed to wetlands the drainpipes can be cut of at the edge of the valley securing the ochre to be filtered in the plants before the water flow into the river.

Climate change adaptation

Knowledge about future water level in Varde River is very important for risk assessments and cost effective adaptation to climate change.

The increased precipitation caused by global warming, will in Jutland lead to increased groundwater recharge, but not so great increase in the groundwater level, as in the more clayey soils. Periphery to Holme River is not fortified to any great extent, which means that the extreme of-currents are not as big as you see in streams receiving much more surface water from major cities.

It is possible that the increase in runoff in Holme River, as a result of climate change is not as large as in the rest of the country, but by disconnecting Holme Channel and Karlsgårde Lake to a greater or lesser extent, the delay of water will be less than previously. This may in itself have a significant impact in Varde, where the transfer of water from Ansager Channel and Karlsgårde Lake to Varde already has reduced the delay of the water.

It is not expected to be possible to establish the same delay of the water in an extended Holme River and meadows in the river valley, which today is in Holme Channel and Karlsgårde Lake. The importance of a larger runoff must be investigated with respect to both coming separate sewer in up stream urban communities, groundwater recharge and modified delay in Holme River and Karlsgårde Lake.

Preliminary archaeological studies

The project has to make preliminary archaeological studies because it is known that archaeological excavations can be rather expensive to a project.

On forehand it is evaluated that the need will be limited because Holme River is still situated in its original place as it has been for more than the last 100 years which is seen at the "Høje Målebordsblade 1842-1899". The river will be restored by removing material deposited in the river since 1920 when the Holme Channel was constructed to remove the water from Holme River. Therefor there is not expected to be sits of archaeological interest in this area.

At the 2 points where there are roads crossing the river the physically conditions will change due to the extra water volume. New road bridges and the roads have to be constructed possible without taking in new land. It is proposed that a small amount is set aside to make preliminary archaeological studies.

Studies

As a part of the project it will be evaluated if there are special parts which can be of certain interest for study projects. Several are mentioned in this application.

<u>How to restore parts of the river in a sustainable way</u>

It is worth considering whether it would be possible to make a restoration of parts of Holme River without digging in the river. As the button line in the most of the river has a slope at approximately 1 ‰, it is not certain that there will be naturel erosion.

Therefor it will be theoretical investigated if a project can make an artificial stronger stream by digging a lower part in the river to start erosion to transport deposited material. The material from the erosion can possibly be collected in a sand trap immediately downstream the particular sensitive area.

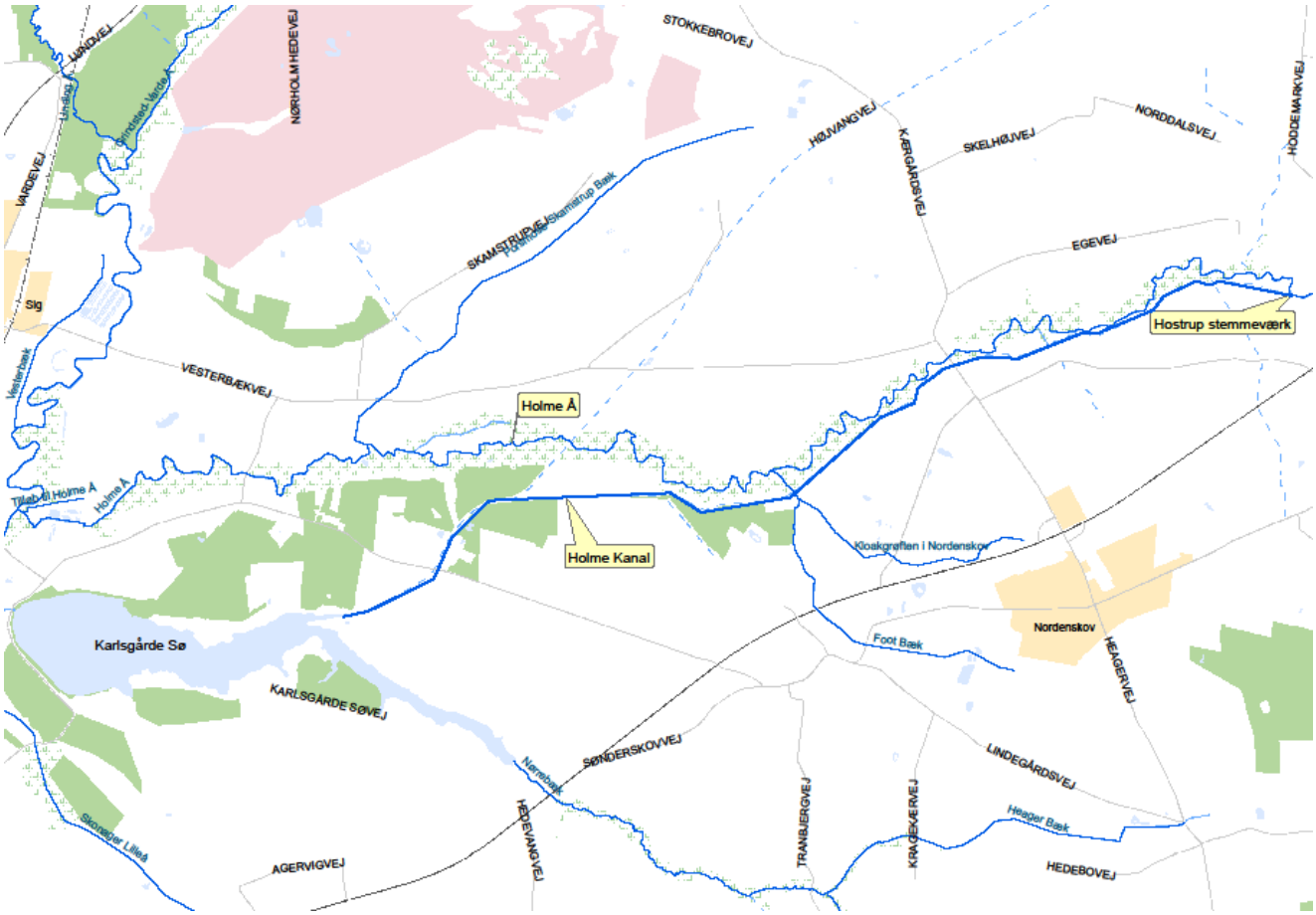
If an extension of the river is made by natural or manual release of the deposited materials and vegetation, it is likely that nutrients and ocher will be released. The project has to describe if such a risk is potential and it will have a negative effect on the water quality.

If the river is too narrow there is a risk that the extra water volume may lead to a permanent flooding of the river riparian areas where water in a large cross-sectional area will move slowly towards the outlet without erosion creates a wider stream profile. In time there will be a risk of reed spreading in the permanent flood and completely masks the open water in Holme River. Reeds will not, under the circumstances could be kept down by cattle or sheep. It is therefore expected that the expansion of Holme River will be necessary in a yet unknown extent.

Annex 3: Maps and pictures of project

Map of Holme River, Holme Channel and Hostrup Weir.

By Hostrup Weir, the water from the Holme River is diverted to Holme Channel and further on to Karlsgårde Lake. Holme River runs west to Varde River at a point north of Karlsgårde Lake. Holme River is in its original meandering course.



At Hostrup weir where 95 % of the water is removed from Holme River.

Holme River at Kærgårdsvej down the stream

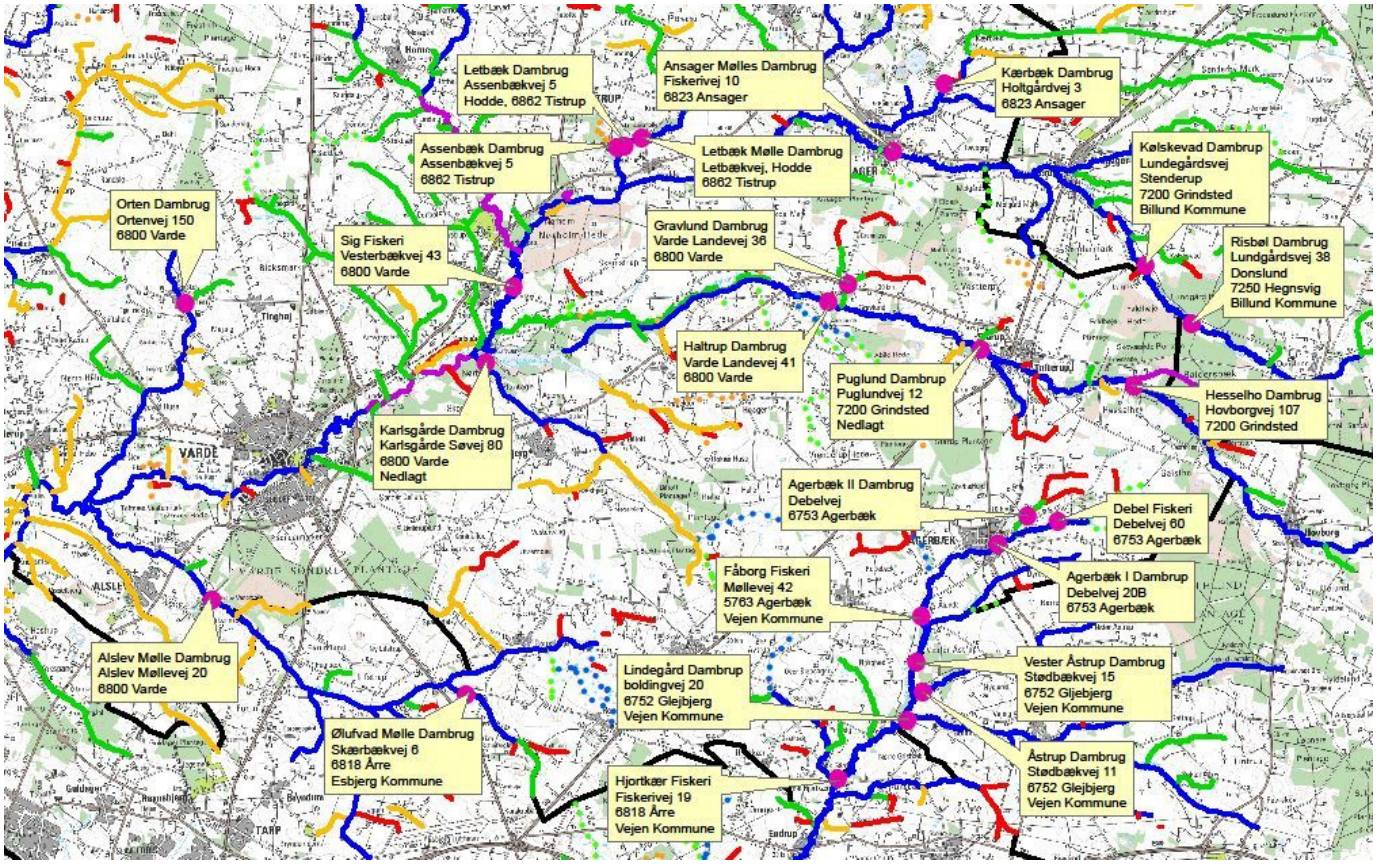
Holme Channel at Kærgårdsvej up the stream

Holme River at Liljebro road where the profile of the cross-section is changed because the river over time has been filled up by deposited material and vegetation.

Map of fish farms in Holme River

Above the project area in Holme River there are 2 fish farms at Haltrup and Hesselho. The fish farm in Puglund is purchased by the Nature Agency to make passage in Holme River.

If the fish farm in Puglund is purchased in order to make a passage at the weir the output will be an additional available part of 12 km of Holme River.



At the map Haltrup fish farm is seen to be the first fish farm up the stream of the project area. Further up the stream Puglund fish farm is no longer a problem for the passage because the water is no longer dammed up at the wier.

Annex 4: . Budget for the project "Preliminary project - Restoration of Holme River"

-+	Work to be done by	Danish kr.
Project managing	Varde Municipality	50.000
Survey of the water profiles in the 6,6 km long Holme Channel with 5 profiles per km (by boat)	Consultant Engineer	40.000
Preparation of 2 alternatives (full or partly removal of the Holme Channel)	Consultant Engineer	120.000
Acquisition of a laser scanned survey of the conditions of the ground	Consultant Engineer	20.000
Set up a model of the conditions of the ground and to calculate the amount of soil which shall be removed	Consultant Engineer	20.000
Set up a hydraulic model (Mike 11) inclusive water surface calculations	Consultant Engineer	50.000
Internal meetings (Varde Municipality – Consultant)	Consultant Engineer	15.000
Meetings with land owners and the NGOs (3 meetings of 3 hours with 2 consultants)	Consultant Engineer	15.000
The potential to make wetlands Evaluation of potential to make areas to wetland to reduce the content of nutrients and to reduce the drainage of ochre	Consultant Engineer	30.000
To contact land owners to discuss the interest and the willingness to establish wetlands	Jysk Landbrugs-rådgivning	40.000
The potential to make Climate change efforts Calculate the ability of the system to store water, the result of separating the sewage system in higher placed minor urban communities, change in the level of ground water, study of the change in water surface level in Varde City.	Consultant Engineer	100.000
Nature survey of the river banks	Varde Municipality	35.000
Preliminary Archeological investigations at the area of the 2 bridges	Museet for Varde by og omegn (*Museum of Varde City and environs)*	50.000
External audit		15.000
Total costs		600.000

Annex 5: Estimated costs - Restoration of Holme River

	Estimation March 2013 ***(Earlier Estimation July 2012)***
Planning, supervision and construction costs	
EIA report, project planning etc.	800.000 kr. ***Earlier estimated to be 1.000.000 kr.***
Project management	1.000.000 kr.
Removal of Hostrup Weir and establishing of passage	0 kr. The passage at Hostrup shall be restored. It is an action in the national water planning which shall be fulfilled in the period 2013-2015. It is expected that the action can be coordinated with EPA so there will be no costs for the project. ***Though with the project the expenses to establishing passage at Hostrup will rise significant.***
Extension of Holme River	An Engineering Consultant has been asked to give a preliminary evaluation of the expenses of the project. It has been estimated that the construction work of Holme River can rise to 10-12 mio. kr. – not at least because of the poor carrying capacity of the banks along the river. ***Earlier it was estimated to 7.000.000 kr.***
Establishment of spawning grounds	1.200.000
The extension of the road bridges at Liljebrovej and Kjaergaardsvej.	4.000.000 Esteemed by the Department of Roads in Varde Municipality assisted by a Consultant.
Bridges to cross Holme Å for walking/biking (2 units)	1.200.000 ***Earlier it was estimated to be the price for 3 bridges.***
Planning, projecting, supervision and expenses to contractor in to-	**18.200.00-20.200.000**

tal:	*A crucial parameter will be the ability to reuse the extra soil in the Channel, spread it on nearby farmland outside the project etc.*
Survey and preliminary investigations	350.000
Compensation for permanent los of land	850.000
Compensation for the los of the ability to use the land while restoring the river etc.	650.000
Correction of the registrations on the land	250.000
Connection of paths – The Coast to Coast path	550.000
Information of the public etc.	100.000
Unforeseen Costs	1.300.000
Total costs excl. VAT	**22.250.000-24.250.000**

Earlier it was estimated that the project could be realized for approximately 20 mio. kr.

Annex 6: Project implementation plan

Time	Activity
November 2013	***Presentation of project, discussion of content, innovative suggestions etc.*** Meeting managing group A meeting for 49 farmers and farm organization
December 2013	Make a contract with engineering consultant
December 2013	Make a workshop for all partners, organization; NGOs etc.
December-March 2014	Survey of water profiles, laser scanned survey, analysis of 2 alternatives, calculation, hydraulic model and meetings with landowners and NGO's A meeting with interests related to water and nature Evaluation of making wetlands
April 2014	Meeting managing group
April 2014	Preliminary Archeological investigations Nature survey
April-May 2014	Theoretical investigation on sustainable restoration
May 2014	Meeting managing group.
May-June 2014	Progress report to foundations
	Summer holiday
August-October 2014	Evaluation to make climate change effort
October-November 2014	Meeting managing group.
December 2014	The final reporting to foundations Final accounting of the project
January-February 2015	External auditing

Annex 7: Independent external experts.

1. External expert

Lars Bo Christensen, Chief of section, restoration of Nature
Orbicon, Jens Juuls Vej 16, 8260 Viby J.

4019 5635
lbch@orbicon.dk

Lars participated in the project "Restoring of Varde River" as a Consultant for Ribe County and later the Nature Agency.

(Alternative – Anne-Vibe Ryttergaard Jensen, Biologist

2. External expert

Ole Juul Pedersen, Biologist, restoration of streams and the Watercourse Act in general

Johansson & Kalstrup A/S, Østervang 2, 6800 Varde

Ole has been a Consultant for Varde Municipality for years.

7522 4088 - 4095 8507

ojp@j-k-as.dk

(Alternative – Flemming Davidsen, Consulting Engineer)

3. External expert

Finn Sivebæk, Advisor on freshwater fisheries management

DTU Aqua**,** National Institute of Aquatic Ressource, Advisor on freshwater fisheries management

Section for Freshwater Fisheries Ecology, Technical University of Denmark, Vejlsøvej 39, 8600 Silkeborg

Phone +45 3588 3117

Cellphone +45 2179 2195

Email fs@aqua.dtu.dk

Annex 8: CV for project managers

CV for Poul Sig Vadsholt, [redacted]

Education

M. Sc. in Environment, Aalborg University 1985-1990

Degree in leadership (1994-1998)

Job

Engineer in Industrial Environment, Ribe County 1991-1992

Chief of the Environmental Office, Varde Municipality 1992-2000

Chief of Environmental Centre West I/S from 2000-2006

Head of Environment Department Varde Municipality 2007-2013

Other Assignments

Coordinator of KIMO Denmark and head of the Danish secretariat since 2002

The Technical representative for KIMO Denmark in the International board

1. September 2012 appointed to the national body "Stormrådet" by the Danish Association of Municipalities.

EU projects

Participated (KIMO Denmark) in the project "Save the North Sea" from 2002-2004 with special focus on the Fishing for Litter Project and the Marine Awareness Course.

Participated (Environmental Centre West I/S) in EU funded projects and latest been leading part of Varde Municipality in a 3 year project (2005-2008) "Ecological use of pig waste in peri-urban towns" building up the first full scale plant to fully reuse the pig waste in China. It was an EU project in the EU- ASIA PRO ECO II Programme.

Participating (KIMO Denmark) in the MARLISCO project 2012-2015.

Participating (Varde Municipality) in the 5 year DNMARK Project - Danish Nitrogen Mitigation Assesment, Research and know-how for a sustainable, low-Nitrogen food production (Strategic Research Alliance 2013-2017)

Restoration of streams and nature

Restoration of Varde River east of Varde City by recreation of 4 meander at the river. The first big scale project in Ribe County.

Project leader of restoration projects at Marie bæk, Skærbæk, Snorup bæk and others.

Project leader of establishing a major amount of spawning grounds in Varde River system.

Participating as the municipal part in the restoration projects at Frisvad Møllebæk and Varde River.

CV – Klaus Bertram Fries

Education

M. Sc. in Biology, Aarhus University 2000-2006

Diploma in Management, Professionshøjskolen Metropol 2010-2012

Job

Head of Natur and Park Department, Varde Municipality 2009–2013

Biologist in Nature and Water systems, Haderslev Municipality 2007-2009

Private part time company, assignments in nature and river monitoring 2008-2010

Teacher at Aarhus University (definition of insects and watercourse invertebrates) 2007

Field Assistant, Ribe County 2006

Consultants

Ole Juul Pedersen, Consultant Johansson & Kalstrup

Flemming Davidsen, Consultant Johansson & Kalstrup

Per Vinther Jensen, Specialist in water and law

Anne Robenhagen Ravnshøj, Co-ordinator af Team Jysk Natur, Jysk Landbrugsrådgivning

Lene B. Fransen, Museum inspector, Museet for Varde By og Omegn

Nature: Niels Eg Poulsen, biologist, Varde Municipality

Contact "Frit Løb gruppen"

Jørgen Kvist Jensen, representing the people behind "Frit løb gruppen".