

Summary of PRISMA
Report by PRISMA Project Manager

Summary: This report provides members with an overview of the achievements of the PRISMA project. PRISMA commenced in June 2011 and the delivery stage came to a close on 30 June 2014. The Broads Authority has received approved funding of € 876,360 (over £700,000) from the European Regional Development Fund to carry out projects that support the delivery of the Authority's strategic objectives highlighted in the Broads Plan 2011. Whilst many of these achievements are physical and quantifiable, there is also an invaluable amount of knowledge gained through cross-border cooperation.

Recommendations:

- (i) That the report be noted.
- (ii) That the remaining balance in PRISMA reserve be vired to the vessel equipment reserve.

1 Background

- 1.1 During the last three years the Broads Authority has worked together with three European organisations on the project Promoting Integrated Sediment Management (PRISMA). Partner organisations are from Belgium (Waterways and Seacanal), the Netherlands (Hoogheemraadschap Schieland en de Krimpenerwaard) and France (ARMINES in cooperation with Ecole des Mines de Douai).
- 1.2 On 3 June 2011 the joint application for the Interreg IVA 2 Seas Programme was approved, and the €6.4m project was set in motion. Of this total sum, the Broads Authority was granted € 921,560 of match-funding, based on a 50% rate. This budget was amended in 2014, please see section 4. The projects financial deadline is the 30 June 2014.
- 1.3 For the Broads Authority, the PRISMA project was developed to support the delivery of the Sediment Management Strategy and to tie in with corporate objectives. The project has had an overall focus on navigation related aspects but also conservation, recreation and climate change have played an important role.
- 1.4 The PRISMA project was focussed on actions and investments within three activity packages while other joint studies were carried out linking in to all three activities:

- Sediment management and dredging
- Treatment of dredged sediment
- Reuse of dredged sediment

2 Introduction

- 2.1 In this report an overview is provided of the current (up to May 2014) achievements of the PRISMA project. It also provides an overview of the outstanding actions that require to be achieved before the end of the project (30 June 2014). Considering this report collates three years of collaborative work between many individuals within the Authority and externally, it should be regarded as a concise summary. Detailed reports are available on each individual aspect, pilot and trial on request.

3 Outputs and Achievements

- 3.1 The Broads Authority has carried out six pilot projects to meet the objectives and aims set out:

1. 4,500m³ of sediment was dredged with a suction dredger from Upton Little Broad and subsequently treated in geotextile bags. The project was completed by the Broads Authority in-house team and cost £ 92,365. The suction dredger was successful at limiting the environmental impact of the dredging works, and non-woven geotextile bags limited the space requirements of the dewatering process (conventionally carried out with lagoons). Yet the dewatering of the gelatinous sediment took longer than anticipated. This sediment was spread on agricultural land as a benefit to future cropping. The project carbon equivalent emissions were estimated at 3,668kg.
2. 7,000m³ of sediment was dredged with a bespoke excavator from the 'Old River' Yare at Thorpe River Green. This lightly mercury contaminated sediment was unloaded with the Smith crane and permanently stored at Postwick Tip. The project was completed by the Broads Authority in-house team in combination with a hired 7t excavator on floats and cost £78,800 (excluding tip disposal). The use of the bespoke excavator proved very efficient in removing sediment from the river and working safely close to the two low rail bridges. The project carbon equivalent emissions were estimated at 4,208kg.
3. 19,600m³ of sediment was dredged with a grab crane from the Lower Bure reaches. This sediment was subsequently unloaded by long-reach excavator and reused in setback areas as part of the flood defence works carried out by the Environment Agency (BESL). The setback areas are designed to establish into reedbed habitat, reduce erosion and aid the stability of the floodbanks. The project was completed by the Broads Authority in-house team and cost £ 165,000. The turbidity monitored over a period of two months did not correlate to the dredging operations, proving that the impact of the dredging works is similar to the natural processes in this area. It was also noted that

the recovery of vegetation in the setback areas was slow, potentially caused by the drier conditions. The project carbon equivalent emissions were estimated at 9,466kg.

4. 6,500m³ of sediment was dredged with a long-reach excavator from the River Chet and subsequently reused on the back of the floodbank as future topping-up material and on agricultural land as a benefit to future cropping. During this project a combination of large and small excavators were used to compliment and speed up the dredging process. While for the agricultural spreading transport trailers and spreaders were operated. The sediment was spread in a thin layer to benefit future cropping. The project was completed by the Broads Authority in-house team with a hired 22t excavator and cost £ 70,500. The project carbon equivalent emissions were estimated at 6,550kg.
 5. 12,000m³ of sediment was dredged from the middle Bure by grab crane and reused in the spit restoration project at Salhouse Broad. The barges were unloaded by long-reach excavator into a concrete pump that filled a geotextile bag retaining structure. Approximately 7,000m² of reedbed was created with a diverse range of plant species. During the project a retaining structure of Alder piling was also trialled. The project was completed by the Broads Authority in-house team with a hired concrete pump and screener and cost £ 250,000. The project carbon equivalent emissions were estimated at 15,869kg.
 6. 15,000m³ of sediment was dredged from Heigham Sound by cutter suction dredger. This sediment was reused in the spit restoration project with a gabion basket retaining structure at Duck Broad, where approximately 12,000m² of reedbed is currently being established. The project was carried out in the sensitive environment of the Upper Thurne and continuous monitoring of water quality, flora and fauna was carried out. This monitoring record led to the better understanding of the system and complex issues like for example Prynnesium algae. The project was completed by the Broads Authority in-house team with support of a contractor that dredged the sediment. The project cost £355,000. The project carbon equivalent emissions were estimated at 38,763kg.
- 3.2 The technical details of these trials are summarised at Appendix 1. It can be seen that traditional methods for dredging and reuse remain the most cost effective and also lowest carbon emissions. However, as these opportunities dwindle, work at Upton Broad and Salhouse also shows that working with geotextiles can be done more efficiently than with gabion baskets, although site specific assessments are required of possible options at each location given the high variability of the sediments and substrates in the Broads.

3.3 The Broads Authority has also carried out several trials as follows:

- (a) 3,000m³ of sediment was dredged from Hardley Dyke. The trial involved a submersible pump and bespoke reusable geotextile bag. The reusable geotextile bags did not function as anticipated and therefore the project was finalised with a long-reach excavator. A small proportion of sediment was spread on agricultural land and the remaining sediment was reused on the back of the floodbank as future topping-up material. The project was completed by a contractor and hire equipment with support of the Broads Authority Staff and cost £ 83,000. The project carbon equivalent emissions were estimated at 4,922kg. The submersible pump functioned well on the loose silts but did not perform well on the heavy clay. The reusable geotextile bag is a concept product and requires further research and development.
- (b) 100m³ of sediment dredged from the River Chet was treated with stabilisers, for example cement, to improve the geotechnical quality of the sediment. The trial was carried out with close links to the Environment Agency as the treated material is aimed to be suitable for the construction of floodbanks. Although the research is ongoing, the sediment has proven geotechnically suitable for floodbanks, and we continue in collaboration with the Environment Agency.
- (c) Desk top investigations into trialling a decanter centrifuge to dewater liquid sludges produced by suction dredging. The use of decanter centrifuges was regarded as not economically feasible for the dewatering of non-contaminated maintenance dredgings. For this reason no onsite trialling was carried out.
- (d) Submersible pumps were trialled to empty barges filled with dredged sediment. These submersible pumps were proven during the trial to be unsuccessful to remove sediment from barges due to the high dry solids content of approximately 45%. The pumps were successful in transferring material with high water content.
- (e) A standard concrete pump was trialled for the transport of undiluted dredged sediment. The successful trial allowed the Authority to assess the use of the pump but also the use of the pipeline on land and on water. The successful trial led to the use of the concrete pump during the project at Salhouse Broad.

3.4 The Broads Authority also carried out the following investments with part funding from PRISMA:

- The dockyard workshop
- The barge Iona
- A long-reach JCB excavator
- The tug Cannonbrook
- The Smith crane
- The Pennine crane

- Equipment for the Fitters and Technicians, including welders, grinders, drills and a lifting bar.
- Equipment for the Environment Officers, including monitoring sondes and probes
- Equipment for the Rivers Engineer including hand shear vane, levelling stave, slump cone and laser distometer.

3.5 The Broads Authority furthermore achieved the following:

- Presentations of projects during workshops in Rotterdam (x2) and Antwerp
- Cross-border knowledge sharing with organisations in the Netherlands, Belgium, France and Germany
- The project at Salhouse Broad was awarded the following:
 - Commendation from the Canal and River Trust 'Waterways Renaissance Awards 2013'
 - Certificate for 'Working with Nature' from PIANC
 - Candidate for the 'Working with Nature' Award, announced during the World Congress of PIANC (1st week of June 2014)
- Presentations of the achievements at the following opportunities:
 - Institute of Civil Engineers, Norwich
 - Community engagement at Salhouse, Ludham, Reedham, Chedgrave and Loddon
 - Dredgelines congress, Rostock, Germany
 - PIANC world congress, San Francisco, USA
 - Site visits at Salhouse Broad, Duck Broad and Hardley Dyke

4 Major Modification

- 4.1 On 22 January 2014 the Major Modification for the PRISMA project was approved by the Steering Committee of Interreg IVA. This modification is a revision of the bid submitted and approved three years ago. It allowed the project partners to modify individual budgets, in order to meet the project requirements at this more developed stage.
- 4.2 Budgets for the purchase of land were redistributed, because the unavailability of land in the vicinity of the river and priority dredge locations.
- 4.3 Budgets were transferred to the lead partner in order for them to pay the project consultants directly, instead of having to go through a reimbursement procedure.
- 4.4 Other budgets, for example staff cost, were changed to match the project requirements without changing the overall project budget.

5 Costs

- 5.1 The table below is split up into eight claims. These claims represent the half yearly calendar periods. The first claim takes into account the preparation period and the eighth claim takes into account the project closure.

	Total expenditure	Total match funding received	Percentage accumulated expenditure
Claim 1	€ 196,275	€ 98,138	10.6%
Claim 2	€ 150,514	€ 75,257	18.8%
Claim 3	€ 304,381	€ 152,191	35.3%
Claim 4	€ 421,430	€ 210,715	58.2%
Claim 5	€ 166,504	€ 83,252	67.2%
Claim 6#	€ 257,006	€ 128,503	85.4%
Claim 7#	€ 203,750*	€ 0	97.0%
Claim 7#	Remaining foreseen expenditure € 52,100*		100.0%
Claim 8#	Management cost eligible until September 2014		< 0.5%
Total	€ 1,843,120	€ 921,560	100%
Total#	€ 1,752,720	€ 876,360	100%

* current expenditure up to 12 May, including estimated staff cost € 72,000, eligible until June 2014.

figures take into account major modification.

5.2 The remaining budget for claim 7 and 8 is € 256,610, this represents 14,6% of the total budget.

5.3 Currently (up to the 14 May) in excess of 97% of the PRISMA budget has been spent. This figure for claim 7 includes € 131,750 project expenditure and an estimate for staff costs of € 72,000.

5.4 The remaining foreseen expenditure for claim period 7 is € 52,100.

5.5 The foreseen and eligible expenditure for claim period 8 is management cost in relation to the project closure, this is expected to be less than 0.5% of the budget.

5.6 The project is aimed to spend the entire PRISMA budget in order to obtain the full amount of match funding.

6 Conclusions

6.1 The match funding granted by Interreg (Regional Development Fund) has allowed the PRISMA project to support the Authority's programme of planned work and dredge and beneficially reuse a total volume of 67,600m³ of sediment.

6.2 Through PRISMA a total amount of € 876,360 (equivalent to around £718,815 at today's exchange rate) of external funding has supported the Broads Authority's strategic objectives.

6.3 Investments were carried out that allow the Authority to make use of equipment, machinery and facilities for a period beyond the duration of the PRISMA project.

- 6.4 By carrying out the pilots, trials and through cross-border cooperation a significant amount of knowledge has been gained on methods of dredging, sediment treatment and beneficial reuse. This also includes bank restoration techniques with different retaining structures.
- 6.5 Three different retaining structures were trialled; gabion baskets, geotextile tubes and alder pole piling.
- 6.6 Different dredging equipment was trialled including; three different suction dredgers, three different submersible pumps, wire cranes with grabs were trialled and different size excavators ranging from 7 to 22ton.
- 6.7 Transport of dredged sediment was assessed by pipeline (liquid state) and concrete pump (in-situ state). A new barge (wherry) design was purchased and trialed. Sediment was transported by road (trailer) and spread on agricultural land using rear-end muck spreaders.
- 6.8 Dredged sediment was beneficially reused in different ways, for example for habitat creation, floodbank strengthening and topping up, agricultural reuse, filling of borrow pits and bank restoration.
- 6.9 Although the physical achievements and investments have been commendable, the knowledge and experience gained through PRISMA is invaluable.

7 Next Steps

- 7.1 On 30 June 2014 the PRISMA project officially comes to a close, and on the 18 June the final conference was held. Project management actions will continue until September 2014 in order to draw this project to a close.
- 7.2 The final conference took place in Antwerp, Belgium and was hosted by the Lead Partner 'Waterwegen en Zeekanaal'. The conference included presentations on the three activity packages and the achievements of the project overall.
- 7.3 It is estimated that the balance in the PRISMA reserve account will be approximately £110,000 upon completion of the PRISMA project and taking into account receipt of the final claim amounts.
- 7.4 This projected remaining balance has arisen due to the Authority making additional contributions from the Vessels & Equipment Reserve into the PRISMA reserve during the first two years of the project to ensure cash balances were available. The cash availability was required because Interreg funds were usually received six months after the actual claim submission, potentially causing a cash flow issue.
- 7.5 Upon receipt of the match funding from Interreg early 2015, it is estimated that a sum equivalent to the initial contributions will be held in the PRISMA reserve.

7.6 The projected balance in the PRISMA reserve represents a one-off sum of money in 2014/15. Three potential expenditure options were identified as set out below and the Navigation committee's views were sought on these options in order to inform future plans.

7.6.1 Option 1

Initial ideas have been shared between the PRISMA partner organisations on how to continue the successful working relationship. These ideas involve another Interreg project that aims to support corporate strategic objectives from the Broads Plan 2011, while providing the opportunity to improve current practices of sediment management. The remaining funds will aid as part match-funding for this new project, in order to obtain 50% external funding.

7.6.2 Option 2

The remaining funds could directly be used for further project work that aids the Broads Plan 2011 and the Sediment Management Strategy, for example recreation of further islands to provide reuse of sediment opportunity and restore habitat and landscape features.

7.6.3 Option 3

The remaining funds could be used to renew some of the Authority's aging equipment. This would support the steps being taken to deliver the Authority's Asset Management Plan as previously endorsed by the Committee; however as a one-off amount in 2014/15, this sum will not remove the need to make ongoing revenue provision for the maintenance and replacement of equipment and assets. Four examples are provided below with an indicative cost:

A replacement for Grab 7, for example a 22t excavator, £110,000

A new set of 9 Linkflotes with spudlegs, £90,000

A third Wherry, £115,000

A replacement smaller fen excavator, £100,000

7.7 Following discussion with the Navigation Committee, the view was that as the initial seed funding for the project had been provided by the Vessels and Equipment reserve, it would be appropriate to return the balance back to this reserve. As identified in 7.6.3 above, this would then be used to support the vessel and equipment replacement strategy.

Background papers: Nil

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Broads Plan Objectives: NA1, CC1, CC3, CC4, BD4,

Appendices: APPENDIX 1 – Summary of Key Projects

APPENDIX 1, PRISMA Summary of Key Projects

	Upton Little Broad	Thorpe Saint Andrew	Duck Broad	Lower Bure	Salhouse Broad	Hardley Dyke	Loddon
Year of Execution	2011	2011	2010 – 2014	2011 – 2012	2012 – 2013	2013	2014
Site character	Isolated Broad	Urban river front	Large broad and river	Tidal river	Large broad and river	Isolated Dyke	Urban river
Sediment type	Organic	Sandy silt	Organic clayey silt	Silty clay	Organic clayey silt and peat	Silty clay	Organic clayey silt
Environmental Constraints	SSSI	Mercury contamination	SSSI/Ramsar	nil	nil	nil	nil
Type of reuse	Land spreading	Licenced landfill site	Gabion retaining structure	Floodbank setback	Geotextile retaining structure	Land spreading & back of floodbank	Back of floodbank & land spreading
Treatment process	Geotextile bags	lagooning	lagooning	setback	Geotubes and lagooning	Geotunnel	nil
Dredging method	Suction Dredging	Backhoe dredging	Suction Dredging	Grab Dredging	Grab Dredging	Suction dredging Backhoe Dredging	Backhoe Dredging
Transport distance	550m	2750m	800m	4000m	3750m	700m	1400m
Mode of transport	Pipeline	Barge	Pipeline	Barge	Barge & pipeline	Pipeline & none	none
Turbidity impact	Minimal	Moderate	Minimal	Moderate	Moderate	Minimal Moderate	Moderate
Total volume	4,500m ³	7,000m ³	15,000m ³	19,600m ³	12,000m ³	3,000m ³	6,500m ³
Av. Dredging rate per week	190m ³	875m ³	860m ³	750 – 1200m ³	750 – 1200m ³	100m ³ 1000m ³	850 -1000m ³
Cost per m³	£20.53	£11.26*	£23.66	£8.40	£20.83	£27.67	£10.85
Carbon per m³	0.82kg	0.60kg	2.58kg	0.48kg	1.32kg	1.64kg	1.0kg

* not including the cost for tip disposal.