

**MINUTES OF 1st STEERING GROUP MEETING HELD ON
WEDNESDAY 8TH FEBRUARY 2006**

**MIRO/MIST PROJECT:
Water-based quarry restoration: Methodologies, Technologies & Approaches**

Produced by P Ellis, Hafren Water

Attendees: Paul Ellis, Hafren Water (HW)
Chris Leake, Hafren Water
Emilie Galley, Hafren Water
Rob Smith, North Yorkshire County Council (NYCC)
Malcolm Barnett, NYCC
Simon Warwick, Swale & Ure Washlands Trust (SUWT)
David Park, Lafarge
Gary Staddon, Lafarge
Martin Fuller, Environment Agency (EA)
Jeff Pacey, Environment Agency

Apologies: Craig Arditto, Tarmac
R Wilson, English Nature

1. Introduction

- Partners
- Objectives of meeting

P Ellis of Hafren Water introduced the various partners on the project and outlined the meetings objectives. These were to present progress to date and to obtain partner input into the work programme to be undertaken over the next six months.

The overall project objectives were summarised as follows:

- *Review methods of water-based restoration*
 - Determine physical/practical constraints for each restoration scheme
 - Develop assessment criteria
 - Consider hydrological/hydrogeological implications & engineering requirements
 - Link with the landscape and ecological aspects of restoration
- *Inform planning*

Water-based restoration is considered to relate to the following:

- i) Open waterbodies below the watertable
- ii) Perched waterbodies above the regional watertable
- iii) Areas of habitat dependent on wet conditions, such as fens, mires, reedbeds and wet grassland
- iv) Areas subject to frequent inundation
- v) The use of groundwater and surface water within a potential restoration

2. Progress summary

The project has been underway for some 6 months (since August 2005) and has a further year to run until the end of January 2007.

To date meetings had been held with individual partners to obtain their ideas for the project. The quarry operators Tarmac and Lafarge have proved very co-operative in supplying data and suggesting suitable locations for case studies (Tarmac: Scorton, Nosterfield and Wensley; Lafarge: Kiplin Hall, Marfield and Dry Rigg). NYCC has provided a strategic overview of the current revision of mineral planning policy. A major part of this has been provided in the form of the Swale and Ure Washlands Mineral Site afteruse strategy which sets out the many issues to be considered and provides the regional context for the current research project. The RSPB and EN are also understood to be taking a strategic look at habitat creation across the UK and it is hoped to link with these projects.

After an initial screening exercise a total of 7 sites have been selected for detailed analysis as indicated in Table 2.1.

Name	Map N ^o	Grid Ref
Kiplin Hall Quarry	99	SE 272 973
Marfield Pit	99	SE 215 827
Nosterfield	99	SE 284 807
Dry Rigg Quarry	98	SD 800 695
Scorton	93	NZ 235 007
Wensley	99	SE 065 920
Staveley	99	SE 360 630

Table 2.1: Site details

SUWT, Staveley Nature Reserve and North Yorkshire Wildlife Trust have also been very helpful in supplying information on the restored quarries, now nature reserves at Nosterfield and Staveley. The Environment Agency has agreed to supply regional groundwater and surface water data and consider the ecological and flood risk management potential of the various sites.

Case studies have been chosen to reflect a range of hydrogeological settings and operational/restored states ranging from initial extraction to partly restored areas to fully restored areas, such as Staveley which has been restored for several decades.

A review of the literature has revealed numerous case studies and research projects which provide useful insights into hydrogeological factors which may influence quarry restoration. This information is in the process of being summarised and used to inform the current research project.

A group of several consultants have been engaged to undertake different aspects of the work over the forthcoming 6-month period. The Landscape Agency will be assessing the landscape issues associated with water-based quarry restoration. Martin Hammond will be assessing the ecological potential for water-based quarry

restoration in the regional context and for each of the case studies. A range of habitat creation schemes has been undertaken at the various sites and the hydrological constraints on these are to be investigated.

The project website is now up and running (www.quarry-restoration.com) and partners were encouraged to use, contribute and link to it.

3. Hafren Water Powerpoint presentation

Hafren Water gave a PowerPoint presentation summarising the current status of the project and the proposed work programme.

Case study areas

A map (Figure 1) was presented showing the location of current and historical quarry sites and the location of the case study sites.

Aerial photographs were shown along with a summary of each of the case study areas.

Marfield

Lies close to the River Ure and a SSSI. Sand and gravel extraction is on-going by Lafarge in the northern area. Restoration has been completed for several years in the southern area, comprising open waterbodies, fen, willow and wet grazing land.

Kiplin Hall

Lies near the River Swale, one of several sand and gravel units (including Scorton). Restoration has been partially completed by Lafarge including open waterbodies. As part of this a fishing lake has been created to complement the landscape setting according to the wishes of the owners of Kiplin Hall.

Dry Rigg

The site lies in the far west of the study area near Horton in Ribblesdale. Lafarge currently extracts and crushes gritstone to produce a high specification aggregate. A deep pit has been created which will be allowed to flood as part of restoration to form a ~60 m deep lake. The process of flooding may take in the order of 20 years to complete. A SSSI lies adjacent to the site and includes fen and raised bog environments. Restoration is currently underway of an old stocking area where it is proposed to create a fen habitat including seepage features fed by discharge from the quarry.

Nosterfield

This site comprises a partly restored area and an active area of sand and gravel extraction operated by Tarmac. Nosterfield Nature Reserve lies adjacent to the quarry managed by SUWT primarily for birds. A principal feature of the nature reserve is the frequent inundation of the site during the spring as water levels in the underlying limestone rise. A partially completed restoration of the existing quarry site includes areas of open water, reedbeds, limestone grassland and an experiment currently underway to create a fen using peat stripped from a future excavation area.

Scorton

This site lies near the River Swale and Tarmac is still in the initial phase of sand and gravel extraction. Restoration proposals to open waterbodies will include provision to discourage large bird flocks due to the proximity of a major airfield. Potential may exist for the creation of a series of linked waterbodies with an outfall to the Swale. This is dependent on a number of factors including the accurate prediction of final water levels.

Wensley

Tarmac operates a limestone quarry on the valley side. Previously worked areas have been restored to produce limestone cliffs and rough pasture. The limestone is generally sub-horizontally bedded, and shallow waterbodies and intermittent streams have formed on a relatively low permeability bedding plane at the base of the former workings.

Staveley

Located in a low-lying area to the south of the study region. The site comprises a mixture of open waterbodies, fen and reedbed habitats. Former sand, gravel and clay workings were allowed to naturally regenerate and, after several decades, a complex ecology has developed similar to historical conditions prior to the wide scale drainage of the area. Plans are currently in place to re-wet adjacent fields underlain by peat.

Site restoration criteria

Hafren Water proposes to create a pro-forma data sheet for each site to include hydrological, ecological and landscape information. This will assist comparison between sites and potentially allow development of a set of criteria for different approaches to water-based quarry restoration.

Virtual quarry

Hafren Water proposes to examine various restoration scenarios based upon an idealised 'virtual' quarry. This will provide a comparison of results achieved for different schemes including the cost and tonnage of fill material required.

Water resources and flood risk management

Issues related to these topics fall primarily under the remit of the Environment Agency and are associated with the available water storage capacity. A number of the case study areas have the potential to be incorporated into flood risk management schemes, however these are likely only to be important on a local scale. However, where multiple, adjacent units cover a large area there is potential to provide significant benefits downstream. Such may be the case with the group of units including Scorton and Kiplin Hall which encompass several kilometres of the Swale Valley. The case is similar in terms of water resources where quarries generally have only a local effect. A relatively high level of risk to the landowner/quarry operator is perceived in relation to the creation of flood alleviation schemes in terms of liabilities and future maintenance requirements.

Habitat creation

Open water:

A fundamental control on the options for wet quarry restoration is the volume of void below the watertable and the material available to fill the space. Should enough infill

be unavailable in the form of indigenous overburden/interburden, mineral processing by-product or imported waste material then areas of open water will inevitably be created. Landowners are often seeking a return to some form of agricultural land with an associated income which places a demand on the available material. Potential does exist to derive income from land set aside for nature conservation but obtaining appropriate funding can be complex and future funding is uncertain. The creation of open waterbodies is being actively opposed in the vicinity of airfields where there may be an increased risk of 'bird strike' and damage to aircraft. Where open water is unavoidable measures to discourage flocking birds are employed including the use of steep shorelines, tall overhanging trees up to the shoreline and fences along the lake shore.

Reedbeds:

The reedbeds created at Nosterfield are the most extensive in North Yorkshire and provide valuable habitat for important bird species. Although reedbeds are not as rich in biodiversity as fens they have several advantages in terms of habitat creation:

- a) The creation and management of reedbeds is fairly well understood;
- b) they don't need to be spring-fed as is the case with many fens and,
- c) they produce peat which potentially forms a substrata for future fen development. Reedbeds can grow in deeper water than fens, requiring less imported fill material.

Fens and mires:

Several of the case studies include areas of fen which are ecologically important and a feature in the national biodiversity action plan (BAP). There are many different types of fen which depend on complex hydrological factors. It is hoped to identify how restoration may be used to create the conditions for growth of a range of these fen types. Attempts are being made to create fen at Dry Rigg and Nosterfield Quarries where peat material, from the original overburden, is available and in suitable condition (ie not dehydrated). A review is to be made of the potential to promote the formation of floating bogs to reduce the surface area of open waterbodies.

Strategic overview

In order to facilitate the creation of large areas of specific habitat and undertake major flood alleviation or water resource schemes a strategic approach to planning is required, informed by relevant data, of which the hydrogeology forms a key component. At present a reactive and ad hoc approach pertains with each planning application often assessed in isolation. NYCC is developing a more strategic approach, with targets set for restoration objectives. These targets would relate directly to areas selected for inclusion within the mineral plan and maximise the benefits of a co-ordinated approach to quarry restoration.

NYCC indicated that strategic planning could be applied at the scale of an individual planning application. The tools are in place to do this through the development of regional and area action plans focussed on a particular area or issue. Area action plans are due to commence at the end of 2008.

National biodiversity targets and local biodiversity targets will feed into the process. However simply because a particular habitat is on the BAP list does not mean that it is necessarily useful or likely to be successful in a particular hydrological setting.

A GIS approach to planning is a potentially valuable tool as investigated as part of the Swale and Ure Washlands project. Important factors to be incorporated into this may include depth to watertable and available fill material, although this data is often relatively site-specific. Extraction could then be limited in areas with a high saturated mineral to fill ratio where the creation of open waterbodies was considered inappropriate.

GS indicated a GIS pilot study had been successfully undertaken on the Llyn Peninsular to restrict areas of mineral search.

This project will provide guidance to the planners on what data is required for a site.

A scoring system may be developed for different quarry end uses.

4. Proposed work programme

Deliverables

A report will be produced containing a literature review with details of other research projects, case studies and options for water-based quarry restoration.

It is intended that the report will provide a best practice guide. Useful texts already exist for the minerals industry, such as the RSPB habitat creation handbook, however the current project will provide more detailed insights into the hydrological constraints of such schemes.

The detailed case studies pro-forma data from the project will be used to examine trends and develop criteria for specific restoration objectives and guidance for planning targets.

Lafarge indicated that operators need generic guidance rather than prescriptive rules as a procedural document in public hands could give cause for complaint if restoration varied from the 'best option'. The report will steer away from presenting 'best option' as it is subjective and there are potentially conflicting interests. All partners will be provided with a draft report for detailed comment prior to final publication and external circulation.

The final report will be publicly available through both the MIRO website and the project website. The latter will potentially be maintained for several years after the project ends.

The project seeks to provide a platform for all partners including operators, planners, regulators, consultants and conservationists to develop a holistic approach to water-based restoration incorporating aspects of landscape, ecology, engineering and hydrology.

Discussion

Different parties want different things from a restoration, ie:

Industry generally wants to maximise mineral recovery and needs to maintain flexibility within the design whilst maintaining profitability.

Landowners have significant control over the restoration and often require some form of income generation. This may be in the form of:

- Water sports
- Residential (ie lakeside houses)
- Fishing and fish farming
- Subsidies for nature conservation. It is possible to earn a significant income under a high level stewardship scheme but not if the nature conservation target is not delivered.

Income generation might be relatively small but is an important consideration for the landowner.

End use

A multi-function end use is considered a desirable objective and may incorporate:

- Amenity value
- Water resources
- Flood risk management
- Landscape setting (including archaeology)
- Biodiversity

Availability of fill material

Discussions were held as to the appropriateness of importing fill material to achieve a desired habitat restoration as opposed to leaving an open waterbody. In some cases mineral is being sterilised to provide restoration material for habitat creation consequently leading to a greater requirement for land elsewhere. Maximum extraction would utilise all the available mineral resource but limit the potential for habitat creation.

Importing inert waste

In many cases quarry operators do not want to instigate landfill operations as this may make obtaining planning permission more difficult due to:

- Local objection and negative perception of even inert waste
- Environment Agency policy does not encourage landfill below the watertable. Historically exemptions were allowed for inert waste at <20,000 m³/ha if there was ecological benefit. However, now the depth of inert waste is limited to 2 m which is not of benefit in the case of deep waterbodies

There is frequently not much locally available inert material, especially in rural areas, and as recycling becomes more widespread. Restoration options become much more limited if material cannot be imported. Importation of material is declining but does still occur, especially close to urban centres where it may be possible to backhaul material, ie bring in waste and return with aggregate.

Overburden

Overburden may, in the future, become increasingly desirable due to its use to provide material for backfilling: it could even be thought of as a resource. Future searches may focus on areas with higher overburden ratios or alternatively planning permission may include additional areas outside the extraction envelope to obtain sufficient fill material. This has significant cost implications in terms of land

purchase and engineering costs. A benefit may be to improve the landscape context, eg 'fades' in better.

5. Date of next meeting

The next meeting is to be held at 10.00 am on Wednesday 6th September 2006 in the pink room at Northallerton County Hall.