



Coping with nesting birds during major civil engineering works – Abberton Reservoir, Essex

↑ View across the south side of Abberton Reservoir during construction work. *Darren Frost*
Inset: Skylark carrying food. *Darren Frost*

How do you carry out a major four-year civil engineering project on a site that also has several international designations for its bird populations? Darren Frost of Cambridge Ecology describes the range of measures that were used successfully to address issues with nesting birds at Abberton Reservoir and makes recommendations for similar situations.

Abberton Reservoir is owned and operated by Essex & Suffolk Water, part of Northumbrian Water Group. It supports the provision of drinking-water supplies to 1.5 million people in Essex, but is also one of the most important freshwater bodies in Britain for wildfowl. It is a Ramsar Site (Wetland of International Importance for birds), a Special Protection Area (SPA) designated under the EU Birds Directive, and a Site of Special Scientific Interest (SSSI) based on the number and assemblage of wildfowl.

As part of The Abberton Scheme, Essex & Suffolk Water planned to increase the storage capacity by raising the water level in the main part of the reservoir. Various habitat creation and management measures also formed part of the scheme, and were designed to increase the value of the reservoir for birds and other wildlife.

In order to comply with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999, Essex & Suffolk Water submitted an Environmental Statement (ES) with The Abberton Scheme

planning application. Numerous ecological surveys were carried out during the preparation of the Environmental Impact Assessment (EIA).

As a result of surveys in 2004 and 2007, 69 species of birds were identified as breeding within the vicinity of Abberton Reservoir. Most breeding species were associated with farmland-type habitats and included 22 species of conservation importance, such as yellow wagtail, skylark and corn bunting. The presence of species such as these was an important element when the construction programme was being developed.

Construction

The primary element of The Abberton Scheme, undertaken by Carillion PLC, involved increasing the storage capacity of Abberton Reservoir by 58%. The construction site around the main reservoir comprised an area in excess of 190ha and contained numerous habitat types, including grassland, arable field margins, semi-natural broadleaved woodland, mixed woodland plantations, hedgerows, ponds, scrub and buildings.

As well as raising the main dam, The Abberton Scheme involved:



← Aerial photograph showing the habitats surrounding Abberton Reservoir. Northumbrian Water Group

- Building a number of small col (earth) dams around the edge of the reservoir;
- Relocating the Essex Wildlife Trust Visitor Centre to a larger site;
- Diverting and modifying a 1.8km section of the B1026;
- Enhancement of public access routes and parking provision;
- Construction and refurbishment of a number of pumping stations;
- Significant amounts of gravel and clay extraction;
- Top-soil stripping, land-forming profiling; and
- Vegetation removal.

The increase in water-storage capacity, along with a variety of habitat-creation and management measures that form part of the scheme, have also been designed to improve the value of the reservoir for birds and other wildlife.

The overall cost of The Abberton Scheme to Essex & Suffolk Water was £150 million and therefore involved a significant investment from the water company.

Construction work carried out by Carillion PLC commenced at the beginning of 2010 and was substantially completed by the end of 2013. This period covered at least four breeding seasons.

As it was recognised that The Abberton Scheme could be delayed by the presence of nesting birds within the construction site, nesting-bird management measures were developed with the aim of: (i) maintaining legal compliance; (ii) maintaining a representative breeding population of birds throughout the construction programme; and (iii) ensuring that the construction programme could proceed efficiently and effectively.

Methods

The methods used to address the presence of nesting birds within the construction site involved three aspects. These were: (i) preventative measures, involving activities that reduced the suitability and attractiveness to nesting birds in certain key construction areas; (ii) active control measures involving physical deterrents and activities that

Legal considerations

The Wildlife & Countryside Act (WCA) is the main piece of legislation that protects all wild birds in England. This legislation makes it illegal intentionally to take, injure or kill any wild bird, or to take, damage or destroy an active nest or its contents. Species listed in Schedule 1 of the WCA are also protected from intentional or reckless disturbance when at, or close to, an active nest, or when with dependent young. Therefore legal protection is related to the bird, not its habitat. When a bird is nesting, the nest site receives legal protection. Consequently, when maintaining legal compliance the presence of nesting birds at a construction site has the potential to lead to delays.

Natural England's stated position in 2010 was that, 'Natural England cannot issue a licence to destroy a nest under the Wildlife and Countryside Act for the purpose of development even for operations that carry imperative reasons of overriding public interest. A licence may only be issued in the case of an "incidental result of an otherwise lawful operation that could not reasonably have been avoided".'

The removal of an actual nest during its creation may be possible only on a case-by-case basis, but would involve applying for a conservation licence, with no guarantee of success. It should also be noted that the process to apply for and obtain a licence would probably take 4-6 weeks, during which time the stage of the breeding cycle for the nest could well have changed, rendering a licence unnecessary and the delay would have happened anyway.

Contravention of the law can lead to costly fines and/or imprisonment. In addition to the legal consequences, the effect of adverse publicity and corporate responsibility on the construction and water company's reputation would likely be significantly greater, especially at a site which incorporates a Wildlife Trust nature reserve, as was the case with the Abberton Scheme.

would deter birds from attempting to nest in a particular area; and (iii) habitat-creation measures, implemented to create areas attractive to nesting birds in order to lure them away from areas where their presence could delay construction works.

The breeding season varies from year to year and species to species, although generally it is considered to occur between March and August inclusive. The deterrent activities continued through the course of the construction programme. To take account of seasonal variations and species ecology, a specialist ornithological Ecological Clerk of Works (ECoW) was appointed by Carillion PLC to oversee all tasks associated with the nesting-bird management process. Close liaison was maintained between the ecologists, the planning teams and the site teams.

The measures employed also took account of the potential presence of other protected species, e.g. bats in trees and buildings and great crested newts and water voles in waterbodies. A member of Essex & Suffolk Water staff was appointed as ECoW to manage these protected species issues and worked alongside the ornithological ECoW.

Preventative measures

A variety of preventative measures were employed to deter birds from nesting in key areas of the construction site. These measures primarily involved using large construction and agricultural machinery to modify and manage habitats in the months (September and February inclusive) prior to the birds' breeding season. These machines were either already on site or local farmers were employed.

Ground vegetation

The ground was ploughed and kept disturbed on a regular weekly basis. As an alternative to ploughing (e.g. in areas where there were known to be subterranean structures such as water and gas pipes), top-soil stripping techniques were used. Where ground disturbance was not possible, the ground vegetation was cut to a low level to

produce a short, dense, uniform sward structure to give a lawn effect. Vegetation was kept mown on a regular weekly basis to keep the sward height as low as possible.

Scrub clearance

Where possible, bushes, shrubs and trees were completely removed from the key areas (areas where it was known or considered work would be taking place between March and September and where birds would be likely to nest) in the construction site. Where this was not possible, all branches were removed, thereby leaving only the trunk standing. Where trunks were left *in situ*, an inspection was made of the trunks and access to any holes and crevices was blocked. All cut plant material was removed from the site (or stockpiled in an area where it could be left undisturbed during the rest of the year) to prevent it being used as nest material, alternative nest sites or ground cover.

Aquatic habitats

Marginal and emergent vegetation next to or in small waterbodies, such as ditches and ponds, were removed from the site. Where this was not possible, vegetation in the water was cut back to just below the water surface. Marginal vegetation was cut as short as possible to ground level. Again, all cut plant material was removed from the site.

Miscellaneous vegetation management

In addition to the management of habitats described above, there were occasions when more manual methods were employed, particularly in areas inaccessible to large machinery. For instance: (i) tree stumps and roots from the old plantations were removed and stockpiled outside key construction areas, firstly to avoid re-growth and secondly to provide alternative nesting sites; (ii) where there was tall vegetation and where vehicle access was not possible, e.g. the area was too small or steep, personnel using grass-trimmers were employed to remove vegetation; and (iii) where vegetation needed to be removed from field boundaries, e.g. amongst fence lines, ditches and hedgerows, the associated vegetation was removed using small-scale equipment.

Man-made structures and features

Where possible, all man-made structures (e.g. rubble piles, buildings) were removed from the key construction areas prior to the start of the birds' breeding season. Where this was not possible, an inspection into the suitability and potential presence of nesting birds and bats was made of the structures. Only in the absence of any signs of nesting birds or suitability for roosting bats was the access to any holes and crevices blocked or filled with expanding foam. Rubble/stock piles that were left *in situ* were covered with securely fitting flexible sheeting, aimed to prevent access by birds.

↓ Grassland habitats at Abberton Reservoir, with clearly demarcated haul roads.
Darren Frost



Bare patches of gravel around the site were covered with plastic sheeting/membrane where the area was small enough for this to be effective and practical.

All vegetation, flotsam and debris was removed from the concrete perimeter of the reservoir, the causeways and the dam. Periodic checks (weekly, at least) were made around the entire reservoir to remove any build-up of potential bird-nesting material, especially for mute swans which had historically used the material on the concrete perimeter to build their nests.

In the borrow pits, from where aggregates such as sand and clay were sourced, vigilance was maintained for the arrival of specialist ground-nesting or burrowing species such as the little ringed plover and sand martin. While the borrow pits were likely to be very active and disturbed, little ringed plovers and sand martins are known to tolerate such disturbance and may still attempt to nest. None of the borrow pits contained steep sides into which sand martins could burrow. All sides of the borrow pits were sloped at a shallow angle of less than 45°.

Owing to the extent of the construction work and earth-moving activities, numerous haul roads and tracks were required. To minimise the extent of the haul routes across potential nesting bird habitat, designated haul roads and tracks were clearly marked for use by heavy machinery.

Active control measures

It was considered that the preventative measures would be unlikely to be completely successful and therefore it would be necessary to use other methods in the event that birds still tried to nest in the construction area. These methods included bird-scaring techniques, which can involve audible, visual and physical deterrents, used either individually or in combination.

Because of the status of Abberton Reservoir as an SPA, Ramsar and SSSI, active control measures were used sensitively (for instance, audible methods were not used at all) in areas and at times of the year when they would not affect the birds for which the reservoir was designated. Where the presence of other protected species, such as water voles, prevented the removal of vegetation, the use of active control measures could be employed to deter nesting birds.

Visual bird deterrents

This included the use of agricultural bird scarers, kites, balloons, scarecrows and raptor decoys. Alternatively, in part of the key construction area where vegetation clearance was not possible, the use of a series of posts and highly coloured, reflective mirrors and/or tape with trailing markers/streamers were used to criss-cross key construction areas. As it was an active construction site, the constant presence of people and vehicles was also considered to provide additional disturbance.



Physical exclusion

This involved the installation of sheeting/netting to exclude birds from key areas. This was used in conjunction with the visual deterrents.

Habitat creation measures

While the deterrent methods were intended to prevent birds nesting in key construction areas, these activities were likely to be more successful if the displaced breeding birds had alternative areas in which to relocate and nest. These areas were chosen to take account of the existing breeding-bird assemblage and the likely presence of species attracted to the construction site. The location of these breeding-bird habitats were within the site but away (over 100m) from any activity likely to cause disturbance.

The nesting habitat creation included:

- Bare/gravelly areas of approximately 50m² for use by ground-nesting species such as oystercatcher. These areas comprised ungraded, uncleaned gravel deposited in a thin layer over the ground.
- On the parts of the concrete perimeter that were outside any key construction areas, nest material was placed for use by waterfowl such as mute swans.
- It was recognised that the digging of borrow pits could attract little ringed plover (a WCA Schedule 1 species), and even birds that currently do not nest at the reservoir, such as sand martins. Therefore in areas where borrow pits were created (and where other earth-moving works had exposed gravel beds and banks), areas were created where species such as little ringed plover could nest undisturbed.
- Stockpiles of cut vegetation, roots and stumps were positioned to allow birds to nest in areas outside key construction areas. In addition, where construction works were not likely to take place, vegetation was left undisturbed to allow birds to nest.
- Two artificial tern-nesting platforms were located adjacent to the Essex Wildlife Trust nature reserve at the reservoir, close to the

↑ The removal of the concrete perimeter road at Abberton Reservoir revealed an aggregate substrate, which was potential nesting habitat for waders such as little ringed plover.
Darren Frost

→ Areas of wetland habitat created during earth-moving and construction provided suitable nesting habitat for species such as lapwing and avocet. *Darren Frost*



↓ Five pairs of little ringed plover were attracted to the habitat created during construction work and successfully bred and fledged their chicks for the first time on the site. *Darren Frost*

construction site. To ensure the nesting terns were not affected, prior to the birds returning the rafts were moved by the Essex Wildlife Trust to an alternative location that was less exposed to noise and visual disturbance.

In addition, a nesting-bird response plan was developed which included setting exclusion zones at an appropriate distance and regular progress monitoring of the stages of birds' breeding cycle.

Nesting-bird activity monitoring

The Abberton Reservoir construction site was monitored weekly, between March and August inclusive, by a suitably qualified and skilled ornithologist (appointed by Carillion PLC) with *experience of finding birds' nests and knowledge of bird behaviour associated with breeding activity.*

Once the observations of an area were completed, the appropriate project team members (programme manager, site manager and construction personnel) were informed of the results of searches. Following discussion with the project team, a suitable plan was implemented to address any nesting-bird activity. Initially, this would be to determine whether the nest would affect the construction programme. For instance, some birds found nesting in parts of the construction site would complete their breeding cycle before the works reached that area, and therefore no action was needed. If, however, the option of waiting for the birds to complete their breeding cycle was not workable then other actions were implemented, depending on the species involved. These included:

- If a WCA Schedule 1 species (e.g. little ringed plover) was found nesting in the construction area, a suitably sized exclusion area was created to prevent vehicles and personnel from destroying the nest and disturbing the birds.
- For any non-Schedule 1 species showing signs of nesting in the construction area, the area of nesting activity was regularly checked to monitor progress. A suitably sized exclusion zone was set up around the nest site to allow the birds to complete their breeding. Once nesting activity had ceased, the nest and vegetation was removed.



Toolbox talks

Construction personnel were given a ‘toolbox’ talk, covering all the issues relating to the wildlife and protected species within the construction site at Abberton Reservoir. This included raising the awareness of the presence of breeding birds, their legal protection and highlighting points of contact and actions to be taken in the event that a bird’s nest was found to be present.

A sheet showing photographs of the most likely species to be found nesting – especially those with the highest legal protection (Schedule 1 species) – was made available during the talks, and was posted on various noticeboards located around the site.

Bird survey

To determine how successful or otherwise the habitat-manipulation measures were at Abberton Reservoir, a breeding-bird survey was carried out. The survey concentrated on a small number of key species chosen for their conservation importance, their presence as part of the breeding-bird assemblage at Abberton Reservoir, and as key examples of species nesting in different habitat types. These were lapwing, yellow wagtail, skylark and corn bunting. In addition, the presence of new species of breeding bird, which had not previously been part of the assemblage, attracted by newly created habitats in the construction site, were also monitored.

The results showed that the number of pairs of corn bunting and yellow wagtail recorded during construction work were comparable with those recorded prior to construction commencing. The number of pairs of skylark present within the construction area was 72 pairs; this represented an increase of 15 pairs. In addition, a number of new species of breeding bird arrived to take advantage of new habitats at Abberton Reservoir.

These included avocet (5 pairs), lapwing (8 pairs) and little ringed plover (5 pairs), which took advantage of shallow flooded scrapes that were created as part of habitat preparation works and construction work to provide clays and aggregates for use in various structures. National trends show that yellow wagtail and lapwing are of increased conservation concern owing to the continued decline of their breeding populations, while corn bunting and skylark breeding populations have not started to recover their former breeding populations despite various agri-environment schemes devised to deliver population recoveries. It is therefore reassuring to know that in this part of the UK these populations are stable at least, and, in the case of the skylark, increasing despite some significant earth-movement and construction works taking place.

The presence of breeding lapwing and little ringed plover was predicted prior to commencing construction work and a plan involving the provision of disturbance-free areas and prepared nesting areas was implemented.

Conclusions

Of all the measures implemented to address the presence of nesting birds within the construction area, the manipulation of habitats prior to the breeding season was considered to be the most effective in allowing construction works to proceed unhindered by nesting birds.

Two key constraints to the habitat-manipulation measures were the time of year they can be carried out and the weather/ground conditions that affected the use of heavy machinery. There was a considerable need to be pro-active to ensure tasks were performed at the correct time and to think laterally and investigate novel solutions to managing habitats when ground conditions prevented large machinery from accessing areas of the site.

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← The yellow wagtail breeding population was maintained at Abberton Reservoir during the construction work.
Darren Frost

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Recommendations

Based on the findings of this study and the experiences gained during the construction works at Abberton Reservoir, a number of recommendations can be made. The main recommendation was that it is best to deter birds from nesting within the key parts of the construction area by early habitat manipulation, and that once birds have started nesting it is generally too late legally to prevent them from completing their breeding cycle.

The recommendations can be broken down into two categories: actions to be taken and actions to be avoided. These measures could be considered best practice guidelines for addressing nesting-bird issues on construction sites.

The following tasks are considered beneficial in addressing the presence of breeding birds on construction sites:

- An Ecological Clerk of Works with a demonstrable knowledge of nesting birds needs to be brought into the project team at an early stage of the construction design and programme preparation work.
- A good collaborative working relationship needs to be created between the Ecological Clerk of Works and key construction personnel. The Ecological Clerk of Works needs to maintain continuous communication with the project team and be pro-active and provide novel solutions to nesting bird issues.
- The Ecological Clerk of Works needs to understand the important commercial and technical issues facing the construction team.
- The key members of the construction team need to be aware of the main issues and timing associated with nesting birds and to appreciate the implications of taking or not taking certain actions.
- Toolbox talks and ecological constraints briefing sessions should be held regularly throughout the whole construction programme.
- Habitat manipulation to prevent birds from nesting in key construction areas prior to works commencing.
- Creation/retention of attractive nesting areas prior to the breeding season in non-key areas of construction sites.
- The Ecological Clerk of Works should prepare and implement a nesting-bird monitoring programme across the key areas of the construction site throughout the breeding season. The frequency of each visit would be dependent on the size of the site, and the phase in the birds' breeding cycle. It is likely that the visits should average out to be weekly across the whole breeding season, but could be more frequent at the start of the season and during peak breeding activity, and less frequent towards the end of the season.

The measures that were considered to be least effective were the active control measures, such as visual deterrents and physical exclusion measures.

The use of visual deterrents prior to and during the breeding season was likely to be insignificant compared to the natural visual deterrents the breeding birds were encountering through their exposure to birds of prey, corvids and mammals. There were numerous daily observations of kestrel, hobby, marsh harrier, common buzzard and peregrine falcon throughout the breeding season. In fact, the breeding avocets were predated by hunting peregrine falcons and marsh harriers. In addition, the presence of large numbers of carrion crows and rooks, as well as foxes, also took their toll on ground-nesting waders. Over the four-year construction programme at Abberton Reservoir, it was considered that no single control measure was wholly effective on its own.

From a project management, civil engineering and construction point of view, the results showed that the presence of nesting birds did not cause any delays to the overall length of The Abberton Scheme. The first three years of the control measures were very successful, in that individual tasks in the construction programme were not delayed significantly by the presence of nesting birds.

In the final year, the nesting-bird control measures were scaled back and not implemented prior to the breeding season. A decision was made that breeding birds should no longer be an issue in the main construction areas in 2013, and therefore the control measures were wound down.

A key factor in successfully addressing the presence of breeding birds within the construction

area was the creation of a good working relationship and regular communication between the ecological team, the key personnel from the construction contractor, Carillion PLC, and the site owner, Essex & Suffolk Water. The periodic change in personnel needed to be managed successfully to ensure a seamless progression of management control measures.

The ecological personnel were required to have a good understanding of the financial and technical issues and pressures that faced the construction contractor and the site owner. In addition, the construction contractor and the site owner also were required to appreciate the legal implications of the presence of nesting birds, the timing of the breeding season and breeding cycle and phases of individual nesting birds.

The ecologists needed to be very proactive and persuasive in advising the construction contractor to spend time and money early in the process in order to save time and money later in the year. Overall, it was considered that the breeding-bird management measures achieved their aims.

In November 2013, The Abberton Scheme was awarded an International Green Apple Award for Environmental Best Practice; the work of Cambridge Ecology, along with the other consultants and contractors involved, was recognised and credited as contributing to that achievement.

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