

Bedford – Milton Keynes Waterway Project

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1. Bedford – Milton Keynes Waterway

Proposals for the construction of the Bedford and Milton Keynes Waterway (B&MK Waterway), a new 26km link between the Great Ouse at Kempston in Bedford and the Grand Union Canal at Newlands in Milton Keynes, was first proposed in 1811 (Bedford & Milton Keynes Consortium, 2013). The B&MK Waterway plans to 'Close the Gap' between the main national canal network and the Fens Waterways Link (FWL) project. The FWL and the B&MK Waterway projects have emerged as a major 21st century infrastructure project, central to reshaping the locality that will be a powerful agent for economic growth with huge environmental and commercial potential.

The Waterway will be located within a green corridor in three sections; Bedford Waterway Park, Marston Vale Waterway Park and Milton Keynes Waterway Park. The project is promoted by the Bedford & Milton Keynes Waterway Consortium, an informal partnership of local authorities, navigation authorities, long term green infrastructure maintenance trusts and the Bedford & Milton Keynes Waterway Trust. Members are:

- Bedford Borough Council;
- Bedford & Milton Keynes Waterway Trust;
- Canal & River Trust (formerly British Waterways);
- Central Bedfordshire Council;
- Environment Agency;
- Marston Vale Trust;
- Milton Keynes Council; and
- The Parks Trust.

2. The Brief

CH2M Hill has been commissioned by Bedford Borough Council (BBC) to provide ground engineering plans (including a lock location), ground work requirements and cut plans together with costings to deliver these for sections and components of the waterway between Homeless Wood, east of Wootton and Green Lane, Stewartby.

As part of this commission, CH2M HILL has been instructed to assess the ecological implications for a future fully linked waterway if we adopt either of the following 3 intermediate scenarios:

1. **Do Nothing** – leave the footprint as is at existing ground level;

2. **Excavate Dry Sections** – This scenario would leave the existing drainage system intact and the cut sections of canal left dry. The excavated material will be stockpiled along the alignment (for fill sections) where the material will be used for future waterway embankments; or
3. **Excavate Wet Sections** – This scenario would comprise excavating sections of canal and allowing them to fill with local drainage. Local sections where possible can be interconnected via pipes and connected to the existing drainage.

3. Desk Study

3.1 Data sources

The following data sources were consulted prior to visiting site to assess the potential for it to support protected species; the presence of Biodiversity Action Plan (BAP) habitats; and for the presence of designated sites:

- Aerial photos: Bing Maps was used to assess habitat type and suitability for particular species/groups along the route of the proposed Bedford and Milton Keynes Waterway (B&MK Waterway);
- Historical records: The NBN gateway was searched for the presence of protected species and notable wildlife within 1km of the proposed B&MK Waterway. The Multi-Agency Geographic Information for the Countryside (Magic) website (www.magic.gov.uk) was accessed to determine if any designated sites are located within or adjacent to the proposed route; and
- Previous studies: Bedford Borough Council have provided a number of ecological reports detailing the results of recent surveys (land within or adjacent to the proposed BMK Waterway) undertaken to support planning applications for development or highways improvements. A full list of documents reviewed is provided in the reference list.

4. Field Survey Methodology

The route of the proposed BMK Waterway was walked on the 29th April 2014.

4.1 Habitats and plants

Existing habitats were mapped and notes made on dominant species and structure in order to assess their potential to meet criteria as BAP habitats, support protected or notable plant species.

4.2 Protected and notable species

The survey area was walked systematically and habitats present assessed with regards to their suitability for supporting protected and/or notable animal species.

4.3 Amphibians

4.3.1 Great crested newt (*Triturus cristatus*)

Nineteen ponds exist within 1km either side of the proposed canal route (Figure 1, Table 1). A number of these have already been surveyed in order to support planning applications for development or highways improvements to the A421. Any ponds that have not been previously surveyed (Table 1) were assessed with regards to their suitability using the Great Crested Newt (GCN) Habitat Suitability Index (HSI) as developed by Oldham *et al.* (2000) and modified by Dr Lee Brady (Kent Amphibian and Reptile Group).

Table 1 Great crested records for ponds located within 1km of site

Pond Ref	NGR	Previously surveyed	GCNs present
P1	TL0031843289	Yes	Yes
P2	TL0057543826	Yes	Yes
P3	TL0072544100	Yes	Yes
P4	TL0089044120	Yes	Yes
P5	TL0136844154	No	Unknown
P6	TL0101244782	Yes	No
P7	TL0103444825	Yes	No
P8	TL0069344845	Yes	Yes
P9	TL0044544665	No	Unknown
P10	TL0036144570	No	Unknown
P11	TL0060144423	No	Unknown
P12	TL0110645257	Yes	Yes
P13	TL0169244886	Yes	Yes
P14	TL0082943124	No	Unknown
P15	TL0113242741	No	Unknown
P16	TL0109542732	No	Unknown
AP1	TL0206045863	No*	Unknown
AP2	TL0201245555	No*	Unknown
AP3	TL0219645638	No*	Unknown

*These ponds may be monitored as part of the road improvement scheme

A large linear pond P14 (Photo 1, Appendix A1) exists along the north-western edge of the Stewartby landfill site between Green Lane and the C94 (the former A421 alignment). In addition, several small ponds P15 and P16 (Photos 2 and 3, Appendix A1) are located close to the Stewartby Landfill Site weighbridge.

The habitat suitability for GCNs of three attenuation ponds AP1 to AP3 (Photos 4 and 5, Appendix A1) created as part of the A421 - Improvements M1 J13 to Bedford Improvement Scheme road scheme was also assessed.

4.3.2 Other species

Ponds were also assessed with regards to their suitability for common frog, common toad and smooth newts.

4.4 Badger

The site and adjacent habitats were surveyed for evidence of badgers (Scottish Natural Heritage, 2003) such as:

- Faeces (dung pits): Concentrations of which (latrine sites) are typically found at home range boundaries;
- Setts: Comprising either single isolated holes or a series of holes, likely to be interconnected underground;
- Paths: Between setts or leading to feeding areas;

- Scratching posts: On the base of trees or fallen trees;
- Snuffle holes: Where badgers have searched for insects, earthworms and plant tubers;
- Day nests: Where badgers may sleep above ground;
- Guard hairs: Within spoil/discarded bedding outside the sett entrance, attached to barbed wire; and
- Footprints.

If setts were found, activity levels were scored using the following criteria:

- Number of well used holes with one or more of the features: well worn entrance; freshly excavated soil; bedding material;
- Number of partially used holes, e.g. leaves or twigs in entrance and/or mosses and other plants growing in or around entrance;
- Number of disused holes, e.g. partially or completely blocked, with considerable amount of excavation required for reoccupation; and
- Setts (if present) were classified using the conventions in Table 2.

Table 2 Sett classification definition

SETT TYPE	DEFINITION
Main	Several holes with large spoil heaps and obvious paths emanating from and between sett entrances.
Annexe	Normally less than 150m from main sett, comprising several holes. May not be in use all the time, even if main sett is very active.
Subsidiary	Usually at least 50m from main sett with no obvious paths connecting to other setts. May only be used intermittently.
Outlier	Little spoil outside holes. No obvious paths connecting to other setts and only used sporadically. May be used by foxes and rabbits.

4.5 Bats

Trees were assessed from the ground for their potential to support roosting bats (using binoculars as required) to look for cavities, cracks, peeling bark, rot holes, urine or faecal staining etc. Any trees or boughs that require felling that support a medium or high potential to support bats would require further survey via dusk emergence and/or dawn re-entry surveys to assess their use by roosting bats.

4.6 Common reptiles

Habitats were assessed with regard to their suitability for common reptiles such as grass snake (*Natrix natrix*), common lizard (*Zootoca vivipara*) and slow-worm (*Anguis fragilis*) based on their known habitat requirements.

4.7 Nesting birds

Existing trees located within or close to potential working corridors and/or site compounds were inspected for the potential to support nesting or roosting barn owl, whilst banks and fallen trees (if present) were inspected for the presence of kingfisher burrows. Ruderal and scrub habitat adjacent to ponds or watercourses was assessed for its suitability for nesting waterfowl such as mallard (*Anas platyrhynchos*) and moorhen (*Gallinula chloropus*), and resident and migrant small passerines such as reed bunting (*Emberiza schoeniclus*) (Amber Status), common whitethroat (*Sylvia communis*) (Amber Status) and grey wagtail (*Motacilla cinerea*) (Amber status). Areas of dense scrub were also assessed for nesting nightingale (*Luscinia megarhynchos*) (Amber Status) and migrant birds such as fieldfares

(*Turdus pilaris*) (Red Status) and redwings (*Turdus iliacus*) (Red Status) that visit the UK during the winter.

4.8 Otter (*Lutra lutra*)

The structures and river banks immediately up and downstream on both banks were inspected for the presence of holts, couches, resting sites, slides, footprints, spraints and feeding remains.

4.9 Water vole (*Arvicola amphibius*)

The linear watercourse adjacent to the Stewartby Landfill Site and any wet ditches were visually assessed with respect to their suitability for water voles based on the surveyor's 11 years' experience of surveying for water vole. Areas of suitable habitat were inspected for the presence/absence of positive field signs such as burrows, feeding remains and latrines.

4.10 Non-native invasive plant species

The presence of non-native invasive plant species were noted and mapped where present.

4.11 Survey constraints

Access was possible to the majority of the canal route except for a section of overgrown scrub woodland at the eastern end by a sewage works. It was not possible to enter the scrub in places to inspect for badger setts and positive field signs.

4.12 Surveyor

Christian Whiting who has over 16 years' experience as a field ecologist. He holds Natural England WML CL18 Bat Survey Level 2 licence (Registration No. CLS0657) and WML CL08 Great Crested Newt Class 1 survey licence (Registration No. CLS00657).

5. Ecological Risk

5.1 Desk Study

5.1.1 Designated sites

There are no Sites for Special Scientific Interest (SSSI) or Local Nature Reserves located within or immediately adjacent to the proposed route of the canal¹.

5.1.2 Species records

5.1.2.1 Amphibians

The desk study identified a number of GCN records for ponds within 500m of the proposed waterway (Figure 1, Table 1). The majority of ponds have been surveyed using approved methods to determine presence – likely absence have found GCNs. A number of ponds have not been surveyed within 500m either side of the proposed route including some within the Stewartby Landfill Site.

A GCN mitigation (under licence) scheme was completed in 2013 for the Marston Vale Innovation Park (Landscape Partnership, 2013), whilst a mitigation strategy for a Persimmon Homes development site to the north of Fields Road is currently being implemented. Ecological risk as a result of the proposed canal will relate to loss of terrestrial habitat and fragmentation of habitat; the A421 improvements have further fragmented populations. The ponds and terrestrial habitat bordering arable fields and within areas of permanent grassland or woodland is suitable for common frog (*Rana temporaria*), common toad (*Bufo bufo*) and smooth newt (*Lissotriton vulgaris*).

5.1.2.2 Badger

No badger records* are shown on the NBN Gateway. The Environmental Statement for the A421 road improvement scheme identified a number of setts, but the exact locations are currently unknown as

¹ No information currently available regarding proximity of County Wildlife Sites or District Wildlife Sites within or close to the waterway

this detailed information was not available. This needs to be obtained and reviewed in order to confirm location relative to the proposed waterway.

5.1.2.3 Bats

There are no bat records* for within 2km either side of the proposed route.

5.1.2.4 Common reptiles

There are common lizard records from areas of gravel/sand extraction at Stewartby and Kempston Hardwick, whilst grass snake have also been recorded near to Kempston Hardwick. There are no adder or slow-worm records* for within 2km of the proposed waterway route.

5.1.2.5 Schedule 1 birds

No kingfisher (*Alcedo atthis*) records exist* within 2km of the proposed waterway route, but this species is likely to be present foraging and potentially nesting close to any river or large waterbodies such as the gravel pits to the east of the proposed route.

5.1.2.6 Water vole

There are no records* for any ponds or watercourses within 2km of the proposed waterway route. The long linear pond adjacent to the Stewartby landfill site has potential to support this species.

*The lack of records for some species may simply reflect lack of surveys along the route or submission of records to the county recorders or records office.

5.2 Field Survey

5.2.1 Amphibians

Additional ponds (not knowingly previously surveyed) such as those within the Stewartby landfill site and the 2 attenuation ponds were assessed (Table 3) with regards to their suitability for supporting GCNs using the GCN HSI methodology. Two of the ponds (P15 and AP2) support excellent habitat suitability, whilst P14, P16 and AP3 support good habitat suitability. AP1 supports average habitat suitability due to the poor terrestrial habitat, lack of aquatic plants and potential to dry up.

Table 3 GCN HSI assessments for selected ponds

Pond Ref	NGR	HSI	Suitability
P14	TL0082943124	0.72	Good
P15	TL0113242741	0.80	Excellent
P16	TL0109542732	0.74	Good
AP1	TL0206045863	0.65	Average
AP2	TL0201245555	0.82	Excellent
AP3	TL0219645638	0.79	Good

5.2.2 Badger (*Meles meles*)

Aerial photos (Bing Maps) show that areas of potential foraging and refuge habitat (e.g. permanent grassland and plantation woodland) exist within or adjacent to the proposed waterway. Disturbance of existing setts (noise, vibration or physical damage) would be an offence under the Protection of Badgers Act 1992. No badger setts were discovered along Chainage 0m to 2800m, but access into the scrub woodland by the sewage works (Chainage 2830m to 3120m) was not possible. Such habitat provides ideal cover for a badger sett especially as it is located immediately adjacent to areas of permanent grassland, which is a favoured foraging habitat for animals hunting earthworms. No obvious well worn paths were noted around the edge of the woodland.

5.2.3 Bats

A number of bat species such as common pipistrelle (*Pipistrellus pipistrellus*), Daubenton's (*Myotis daubentonii*) and soprano pipistrelle (*P. pygmaeus*) readily forage within riparian habitats including over rivers. Bats and their roosts receive full protection under The Wildlife and Countryside Act 1981 (as amended) and The Conservation of Habitats and Species Regulations 2010 (as amended).

Where the canal route is located through arable farmland or permanent grassland, no roosting niches will be directly affected. Where the route is located immediately adjacent to or through areas of woodland or scrub that will require removal, there is the potential for loss of roosting niches and/or foraging habitat (creation of open water will benefit species such as Daubenton's that will predominantly forage over water).

Chainage 0m – 350m: This section of the canal along the north-west boundary of the landfill site coincides with an existing linear pond that is c. 10 to 12m wide (see Photo 1). The banks are very steep and supports dense scrub, dominated largely by hawthorn (*Crataegus monogyna*) with frequent bramble (*Rubus fruticosus* agg.) and dog rose (*Rosa canina*). At the eastern end of the linear pond, there is a rookery with an area of hybrid black poplars (*Populus x canadensis*) and some semi-mature sycamore (*Acer pseudoplatanus*), hawthorn and field maple (*Acer campestre*). The majority of the trees support no suitable roosting niches but the hybrid black poplars contained some cavities and have the potential to support bats. The scrub habitat provides optimal foraging habitat, especially where it is growing along the banks of the linear pond.

Chainage 650m – 1650m

This section of the canal passes adjacent to or through area of Berry Wood that was planted between 1991 and 1994. Due to the young age of the trees, very few roosting niches are likely to be present. However, the woodland and grassland rides provide excellent commuting and foraging habitat.

Chainage 2820m – 3200m

This section of the canal as proposed would require the removal of trees and scrub within an area of plantation woodland and adjacent to the sewage works. In addition, an area of woodland and grassland (including some remnant ridge and furrow) that is part of the Bedfords Green Gateway² will be directly affected by the existing proposed route. The community woodland was planted between 2001 and 2007 and as such, the trees are immature and support no suitable roosting niches. The trees do however provide suitable commuting and foraging habitat.

5.2.4 Otter

Otter and their places of shelter receive full protection under relevant wildlife legislation. No otter holts or resting sites were observed along the proposed route of the canal where access was possible. Due to the steepness of the banks along the long linear pond by the Stewartby landfill site, it was not possible to inspect the banks to confirm absence of field signs and holts. Some pioneer clearance may be required to allow an accurate survey. Given that Stewartby Lake supports a good stock of fish it is likely that otter may periodically visit the lake to feed, whilst animals may visit other fishing lakes, ponds or drains that support fish or amphibians in the locality.

5.2.5 Water vole (*Arvicola amphibius*)

Water vole and their places of shelter receive full protection. Any temporary disturbance of bank side habitat (e.g. temporary crossings for access etc.) could impact water vole. Conservation licences granted by Natural England are required to use traps to relocate water voles to facilitate development.

A number of ditches were inspected along the route and none of them supported suitable habitat. The long linear pond P14 supports suitable habitat and is close to Stewartby lake which supports suitable

² A linear 2.5km long swathe of new community woodlands (currently Buttons Ramsey, the Kill, Ridgeway Wood, Wiles Wood and Van Diemen's Land) between Wootton and Kempston which forms part of the wider Forest of Marston Vale and.

habitat. It was not possible to survey it safely from the bank due to the steep banks and extensive scrub growth. Any future works to widen or reprofile the banks would need to consider the potential for water voles and a boat based survey combined with use of floating platforms would seem the most sensible approach. The new attenuation pond AP2 will provide suitable habitat in time should there be any colonies locally which could colonise them.

5.2.6 *Birds*

No suitable trees were identified that could support nesting or roosting barn owl, whilst no fallen trees or vertical banks were noted that currently support nesting kingfisher. A large rookery is present with some mature hybrid black poplars at the eastern end of pond P14 (NGR TL0095043282). Given the current proposed alignment of the waterway, these trees would require felling. Should the current waterway alignment remain any future tree felling would need to be undertaken outside of the main bird breeding season (March to August inclusive) if the rookery remains active.

5.2.7 *Habitats*

An area of ridge and furrow exists within a field from Chainage 3330m which is outside the scope of the existing works for which CH2M Hill have been commissioned to provide design services etc. Ridge and furrow is an important feature both archaeologically and ecologically (can support diverse plant communities) which has been lost from large areas of the country and amending the route by moving it into the area of permanent grassland to the west should be given due consideration.

In addition to the ridge and furrow, the section of the proposed waterway from Chainage 2830m to 3120m will require the removal of woodland and scrub habitat. The adjacent area of grassland to the north looks like it may have been arable farmland in the not too distant past and consideration should be given to moving the route north and retaining the woodland scrub. This would have some added benefits through reduced risk of trees falling into the canal.

5.2.8 *Non-native invasive plant species*

No Schedule 9 plant species were recorded along the proposed canal route. A further inspection of the working area is recommended prior to works commencing should works not occur for an extended period of time.

6 Option appraisal

As the construction phase and completion of the section of waterway between Homeless Wood, east of Wootton and Green Lane, Stewartby is dependent on funding streams and is linked to the redevelopment of land along the waterway corridor, the piecemeal construction of the waterway could have cost and environmental implications.

This options appraisal assesses the ecological implications for a future fully linked waterway if either of the following 3 intermediate scenarios is adopted:

1. **Scenario 1 Do Nothing** – Under this scenario the proposed waterway corridor (c. 60m wide) will be left unaffected until the entire scheme is constructed in one phase;
2. **Scenario 2 Excavate Dry Sections** – This scenario would leave the existing drainage system intact and the cut sections of canal left dry. The excavated material will be stockpiled along the alignment (for fill sections) where the material will be used for future waterway embankments;
or
3. **Scenario 3 Excavate Wet Sections** – This scenario would comprise excavating sections of canal and allowing them to fill with local drainage. Local sections where possible can be interconnected via pipes and connected to the existing drainage.

6.1 Ecological risk

The construction of a canal with a channel 21m wide and 2m deep along with associated towpath and verges will result in a corridor up to 60m wide being disturbed. Any physical disturbance could impact upon the existing biodiversity resource including protected and notable species.

Great crested newts

The desk study has identified a number of ponds to the north of the dualled A421 that support great crested newts with additional ponds within the Stewartby Landfill Site that could support the species (See Figure 1). As areas of suitable terrestrial habitat exist for this species along the proposed waterway alignment, there is a high likelihood that works could impact upon this species during the construction phase. Dispersing GCNs and common amphibians could get trapped within a dry channel if the banks were excavated with steep sides.

Badgers

No active badger setts were recorded along the sections of the route that were easily accessible. A detailed survey is recommended for 1) Ch 0m to 250m where the banks of P14 were very steep and slippery during the site walkover, and 2) Ch 3000m to 3100m adjacent to an area of dense scrub. Impacts on this species could occur as a result of physical disturbance and damage to badger setts if badgers subsequently excavate setts close to the proposed route (a licence is required to close down an active sett), whilst animals could potentially get trapped in the channel if the banks were excavated with steep sides or soft muds developed in the base due to limited seepage.

Bats

In the short to medium term (1 to 20 years) no impacts on existing roosts are predicted given that the majority of trees that would require removal do not support potential roosting niches. In the longer term (20 years+) roosting niches may develop such that potential roost sites could be adversely affected.

Breeding birds

Breeding bird surveys are recommended for Chainage 0 – 350m and 3000m – 3100m where suitable habitat for species such as nightingale exist. Should any hedgerows require removal then breeding bird surveys should be undertaken to determine use by farmland specialist and other bird species.

Whichever scenario is chosen, any tree felling should preferably be undertaken outside of the main bird breeding season (March to August inclusive), whilst areas of scrub should be created in advance of removal to offset any lost which support species such as nightingale or turtle dove (*Streptopelia turtur*) (Red Status).

Reptiles

No detailed reptile survey of the proposed waterway route has been undertaken. Based on the habitat structure present and historical records, species most likely to be present are grass snake within the route to the north of the A421, whilst common lizard and slow-worm could also be present along the route adjacent to the Stewartby landfill site (Chainage 0m to 350m).

6.2 Scenario 1 Do Nothing

This option is likely to have no direct ecological impacts (e.g. physical harm) on protected species such as GCNs as there would be no construction works. If the proposed route was left unmanaged, there is the potential for protected species such as GCNs (and common amphibians), badgers and common reptiles (especially grass snake) to colonise. The greatest risk are in areas of arable farmland which are currently of limited value for wildlife due to regular cultivation. Colonisation by GCNs in particular could have significant cost implications should European Protected Species Mitigation (EPSM) licences be required to remove animals from along the route via the use of exclusion fencing and pitfall traps. In addition, badgers could potentially excavate setts.

A negative aspect of not undertaking the piecemeal development of the route in advance of linking the various sections (as opposed to constructing it all in one go) relates to the potential biodiversity benefits that would be lost. A water filled section of channel would have significant biodiversity benefits for amphibians, birds, bats, aquatic invertebrates and plants, otter, grass snake, water voles etc. In addition to loss of biodiversity benefits, there would be recreational benefits should sections close to the Grand Union Canal or Great Ouse

6.3 Scenario 2 Excavate Dry Sections

Construction Phase 1

The construction phase of excavating sections could directly impact upon wildlife inhabiting the areas affected including haul routes and compound areas. Species of greatest risk would be GCNs as there are several ponds where they have been recorded that are located within 1km of the proposed route. Other species as identified within baseline surveys undertaken prior to securing planning permission may also be affected. The arable fields supported several nesting skylark during the site walkover.

Post Construction (prior to linking sections)

The excavation of the channel could result in the loss of habitat used by wildlife for refuge (including hibernation) and for breeding (e.g. nesting birds or potentially breeding GCNs). Excavating dry sections of canal (if practically feasible given the channel will be 2m deep) could also affect the movement of wildlife if the sides of the channel were excavated with steep sides. As long as the channels are excavated with gently sloping sides (e.g. 1:3 slope) then trapping of wildlife would probably be low risk such that fencing would not be required. However, issues can arise if the base of excavations become waterlogged such that deer and small mammals can become trapped (C. Whiting *pers obs.*).

Dry excavations that are allowed to become vegetated with scrub would be attractive to badgers (e.g. excavation of setts). Stockpiled material could also be used by badgers for excavating setts if it becomes well vegetated and is not subject to regular disturbance.

Depending on timescales for sections being connected and the entire waterway being connected to the Great Ouse and the Grand Union Canal, habitats could develop that are attractive to wildlife, e.g. rough grassland with scrub would support amphibians, reptiles, breeding birds etc.

Newt and reptile fencing could be used to prevent GCNs and common amphibians and reptiles from entering sections of the proposed route, but the effectiveness of this in Milton Keynes for example has been poor (Chris Damant, *pers comm.*) for the following reasons:

- Maintenance of the fencing is important and expensive and is seldom done effectively. Sites are often left undeveloped for several years after clearing them of GCNs under licence and without management fencing will deteriorate or be deliberately vandalised so that GCNs recolonise sites;
- EPSM licence are secured by staff that then leave companies and the licence is not taken up by someone else; and
- Fencing can also provide suitable conditions for overwintering GCNs and other newts such that EPSM licences may need to be amended to allow the safe removal of GCNs when the fencing is removed.

Depending on timescales for works commencing, to minimise biodiversity value and hence the cost of mitigation, the proposed route including material stockpiles should be kept bare by repeated herbiciding or cultivation (e.g. ploughing, harrowing etc). However, this method would have associated cost and potential environmental risks. Spraying if undertaken close to watercourses or ponds could affect aquatic flora and fauna whilst soil runoff could cause turbidity and potentially eutrophication which would impact upon water quality.

A negative aspect of not undertaking piecemeal development of the route relates to the potential biodiversity benefits that would be lost. A dry section of channel would have some biodiversity benefits for invertebrates (e.g. bees, potter wasps etc) depending on the underlying soils, whilst plant communities would tend to be fairly weedy unless sown with a wildflower seed mix and managed specifically to develop a diverse sward. Areas of rough grassland would provide suitable habitat for common reptiles.

6.4 Scenario 3 Excavate Wet Sections

Construction Phase 1

As for Scenario 2 the construction phase of excavating sections could directly impact upon wildlife inhabiting the areas affected including haul routes and compound areas. Species of greatest risk would be GCNs as there are several ponds where they have been recorded that are located within 1km of the proposed route. For sections where GCNs already exist, an EPSM licence would be needed to cover the initial construction period.

Post Construction (prior to linking sections)

The completed sections of waterway could have significant positive impacts for biodiversity which in turn could have negative impacts for project costs and programme.

A major positive impact would be the biodiversity benefits for species associated with the creation of waterbodies, e.g. amphibians, birds, bats, aquatic invertebrates and plants, otter, grass snake, water voles etc. As there are numerous ponds that support GCNs, it is possible that some of the excavated sections could become colonised by GCNs which would be considered a major positive impact or the species. However, colonisation by GCNs would have cost implications associated with the need to remove animals under an EPSM licence with significant exclusion fencing costs etc.

The risk of colonisation is time and distance (to existing GCN ponds) dependent. The section of the waterway adjacent to Berry Wood (Chainage 650m – 1650m) is located relatively close to existing GCN ponds and the risk is greater here given the woodland and grassland habitats that have been created.

Should GCNs colonise the completed sections, there would be a legal requirement to secure a further or amend an existing EPSM licence from Natural England to allow the removal of any animals within the proposed working corridor prior to linking completed sections. Should significant GCN breeding populations establish within completed sections there is the potential that Natural England may request the creation of compensatory breeding ponds as the completed waterway will result in the introduction of fish that can predate the various life stages of GCNs. Consultation with Natural England will be required to discuss issues regarding licensing should Scenario 3 be the preferred option.

Newt and reptile fencing could be used to prevent GCNs and common amphibians and reptiles from entering sections of the proposed route, but the effectiveness of this in Milton Keynes for example has been poor (Chris Damant, *pers comm.*) for the following reasons:

- Maintenance of the fencing is important and expensive and is seldom done effectively. Sites are often left undeveloped for several years after clearing them of GCNs under licence and without management fencing will deteriorate or be deliberately vandalised so that GCNs recolonise sites;
- EPSM licence are secured by staff that then leave companies and the licence is not taken up by someone else; and
- Fencing can also provide suitable conditions for overwintering GCNs and other newts such that EPSM licences may need to be amended to allow the safe removal of GCNs when the fencing is removed.

A negative impact of excavating sections of the waterway and then connecting them all at a later date (as opposed to constructing it in one go) is that disturbance impacts are greater. A piecemeal approach to the delivery of the waterway has the potential to fragment populations. With different parties potentially delivering sections of the waterway, the risk of fragmentation of populations is increased. A strategic masterplan covering ecological mitigation for the entire route is required to maximise biodiversity benefits from the project.

7 Conclusions

7.1 Preferred option

Scenario 1 Do Nothing

This is the cheapest and lowest risk option with respect to protected species but would not show any intent or deliver progress with the project, whilst limited biodiversity benefits would be delivered.

Scenario 2 Excavate Dry Sections

Underlying geology and topography would determine whether the excavations could remain dry without the need for pumping. If the waterway was excavated within sands and gravels there could potentially be issues regarding the waterway holding sufficient water unless clay was used to create a seal. Water filled channels will be more attractive to GCNs than a dry ditch. Mitigation costs for protected species could be high and biodiversity benefits relatively low.

Scenario 3 Excavate Wet Sections

This scenario could deliver high biodiversity benefits whatever the timescale but potentially high/unknown future mitigation costs.

7.2 Need for further survey

7.2.1 Desk survey prior to implementation

A number of reports were consulted in order to determine ecological risk associated with the proposed waterway including the Environmental Statement for the A421 road improvement scheme. However, the Figures which would have shown the location of protected species recorded during baseline surveys have not been received. If any GCNs been moved from along the section of the A421 adjacent to the proposed section of the waterway covered by this study, where have the newts been moved? If an EPSM licence for GCNs was required, there is also likely to have been a requirement for monitoring populations.

Other historical records for adjacent land should be sought by making a data request to the Bedfordshire and Luton Biodiversity Recording and Monitoring Centre to ensure the most up to date information regarding protected/notable species and designated sites is available. FCC Environment as operators of the Stewartby landfill site may undertake their own surveys of the site including existing ponds. They should be consulted regarding any protected or notable species records they may hold.

The desk study should be used to produce ecological constraints plans (ECP) which show where protected species have been recorded and areas of suitable habitat that may support certain species. The ECPs would identify areas which require surveying.

7.2.2 Field survey

A strategic masterplan for delivering the project is required to ensure the most efficient and cost effective delivery. Areas that have not yet been surveyed should ideally be surveyed as soon as possible as the results would help refine the ECPs for the waterway. Ponds P14 to P16 should be surveyed. Some pioneer scrub clearance would required to allow safe access to P14. Further scrub/tree clearance may be required to allow access to undertake a badger survey of woodland (Chainage 2830m to 3120m).

The area of ridge and furrow (Chainage 3330m) is outside of the scope of current commission but it should be surveyed to determine if it is species rich or not and if it is, consideration to given to amending the route.

8 References

Highways Authority (2007) A421 Improvements M1 Junction 13 to Bedford, Environmental Statement Volume 1 – Scheme Information and Summary of Assessment

Magic Website (www.magic.gov.uk) – accessed on 28th May 2014 to assess whether any designated sites are located within or close to the proposed route of the B&MK Waterway

Pegasus Planning Group (2011) Fields Road North Wootton, Bedfordshire Non-Technical Summary, Prepared on Behalf of Persimmon Homes Midlands and Charles Church Midlands

Pegasus Planning Group (2011) Fields Road North Wootton, Bedfordshire Environmental Statement Volume 1, Prepared on Behalf of Persimmon Homes Midlands and Charles Church Midlands

Scott Wilson (2008) A421 Improvements M1 J13 to Bedford – Borrow Pits Ecological Impact Assessment, Prepared for Highways Authority

The Landscape Partnership (2010) Protected species survey report (Great Crested Newt and reptiles) for Marston Vale Innovation Park, Prepared on behalf of Bedford Borough Council

The Landscape Partnership (2010) Ecological Management Plan for Marston Vale Innovation Park – Enabling Works, Prepared on behalf of Bedford Borough Council

The Landscape Partnership (2013) Letter (04/11/13) to Bedford Borough Council outlining the result of a great crested newt mitigation scheme on land identified for future development as the Marston Vale Innovation Park

Waterman Energy, Environment & Design Limited (2010) Ecological Appraisal Land to the South of Fields Road, Wootton, Prepared on behalf of Bedford Borough Council

Appendix A1 Habitat photos



Photo 1 Linear channel (P14) along the north-west boundary of the Stewartby Landfill Site



Photo 2 Pond P15 on the Stewartby Landfill Site



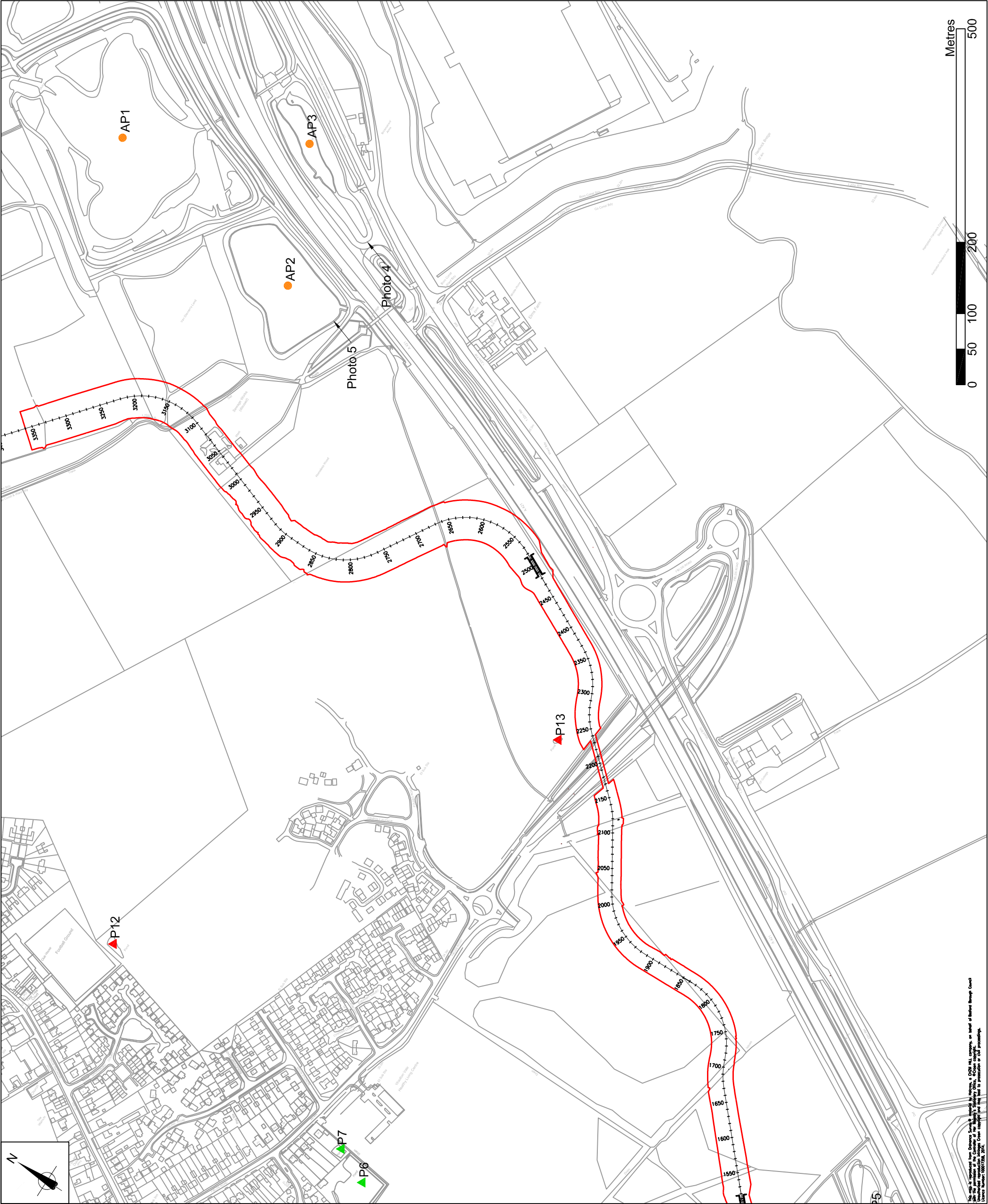
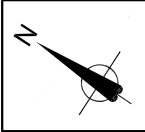
Photo 3 Pond P16 on the Stewartby Landfill Site



Photo 4 Attenuation pond AP1 for the A421 improvement scheme



Photo 5 Large attenuation pond AP2 for the A421 improvement scheme



Key:

GCN SURVEY:

- △ PRESENCE / ABSENCE
- HSI ONLY
- ◇ NOT SURVEYED

GCN PRESENCE/ABSENCE:

- YES
- NO
- UNKNOWN

- PHOTO LOCATION & DIRECTION

Notes:

- DO NOT SCALE FROM THIS DRAWING.

Rev	By	Chkd	Apprd	Date	Description

Client



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Project
BEDFORD MILTON KEYNES WATERWAY
GREEN LANE TO HOMELESS WOOD
(BMK SECTION M TO Q)

Drawing

G.C.N. PONDS
AND PHOTO LOCATIONS
SHEET 3 OF 3

Drawn by: L MERSEY	Date: . .
Checked by: . .	Date: . .
Approved by: . .	Date: . .
Drawing No.	Revision

FIGURE 1

0

Drawing Scale: 1:2,500 AT A1