

Appendix 7.3

Great Crested Newt Habitat Suitability Assessment 2014 of the Proposed Douglas West & Dalquhandy DP Renewable Energy Project, South Lanarkshire



Dunnock Environmental Services

Final Report

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1. Introduction

A planning application is being drawn up by 3R Energy for a 15-turbine wind farm and associated wood drying facility at Douglas West and Dalquhandy DP, located to the north-west of the village of Douglas in South Lanarkshire (central OS grid reference: NS 820 325).

In addition to the turbines and wood drying facility the proposed development would contain associated infrastructure, such as substation/control building, hardstandings, crane pads, access tracks, etc. It is anticipated that the grid connection would be laid largely underground along the former Dalquhandy access road which leaves the north-eastern corner of the site and runs northwards past the Dewars bonded warehouses towards the M74 motorway.

The turbines would be sited largely on land disturbed by the former Dalquhandy Opencast Coal Site and to the north-east of the operational Hagshaw Hill Wind Farm.

As part of this planning application, a suite of ecological and ornithological surveys is being carried out to feed into the Environmental Impact Assessment process. This report presents the results of a habitat suitability assessment of the waterbodies on and in the vicinity of the proposed wind farm site for Great Crested Newts (*Triturus cristatus*).

2. Legislation

The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the 'Habitats Regulations') provide protection to European Protected Species (EPS) of animals listed in Annex II of the Council Directive 92/43/EEC on the Conservation of Natural Habitats of Wild Fauna and Flora (the 'Habitats Directive').

Great Crested Newts are listed in Schedule 2 of the Habitats Regulations. The following provides a summary of relevant offences included in the Habitats Regulations in relation to Great Crested Newts¹.

It is an offence, amongst others, to deliberately or recklessly:

- capture, injure or kill a wild animal of this species
- disturb such an animal whilst using any structure or place it uses for shelter or protection (e.g. a breeding pond, a hibernation site)
- obstruct access to a breeding site or resting place of such an animal or otherwise deny the animal use of that site
- disturb such an animal in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species
- disturb such an animal in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young.

¹ The summary is not comprehensive and is included here for illustrative purposes only. Further details are provided at <http://www.snh.gov.uk/protecting-scotlands-nature/protected-species/which-and-how/amphibians-reptiles/>. For a definite list of offences, the reader is referred to the original legislative text.

It is also an offence to:

- damage or destroy a breeding site or resting place of such an animal even when this is not occupied. This does not need to be deliberate or reckless to constitute an offence.

3. Site Description

The site (excluding the access road) is 318 ha and consists of two distinctive sections: a northern section and a southern section, which are separated by the former coal haul road, now a tarmac road that crosses the site in an east-west direction.

The northern half of the site consists of previously worked opencast coal land which was restored in the mid-1990s and which has reverted predominantly to a rough grassland consisting of a mixture of Soft-rush (*Juncus effusus*) and Tufted Hair-grass (*Deschampsia cespitosa*) with patches of more open and improved grassland scattered in between. A number of small waterbodies, including former settlement lagoons, and running streams are scattered across the site. The concrete hardstanding of the former dispatch point (DP) in the north-east corner of the site and the tarmac road are remnants of the previous opencast coal infrastructure.

The southern section of the site consists of unworked land that is more semi-natural in character, although has been gripped in the past, and consists of a mixture of Purple Moor-grass (*Molinia caerulea*) dominated wet heath, marshy and acidic grassland. There is also a band of young mixed woodland plantation along the south-western site boundary.

The Poniel Water corridor, deeply incised in the west, runs along the northern boundary of the site (in a diverted channel), while dense Sitka Spruce plantation borders the western boundary and a mixture of broadleaved woodland, coniferous woodland and a disused railway flanked by broadleaved trees border the eastern boundary. The access track to the Hagshaw Hill Wind Farm forms the southern boundary of the site beyond which the rough grassland of the southern section continues south-westwards for some distance.

The entire site is grazed by sheep and there is a low level of informal recreational use of the site, primarily along the former coal haul road in the centre of the site.

4. Survey Limitations

The following survey limitations are noted:

- Access to two ponds - Pond 25 at Craigend (NS 82803 33580, ca. 400 m north of the north-eastern site boundary) and Pond 26 at Westerhouse (NS 82772 33480, ca. 250 m north of the north-eastern site boundary) (see Figure 1) - had not been granted at the time of survey and these ponds were therefore excluded from the field survey. However, an assessment of their suitability to support Great Crested Newts based on their location and distance to the construction-disturbed areas is presented in section 6.2.1.
- The assessment was carried out in mid-October and, hence, outside the recommended survey period of March to September, after which most Great Crested Newts are likely to have left their breeding ponds in search of terrestrial hibernation sites, usually within 500 m of the pond. However, October 2014 was unusually mild and temperaturewise similar to the month of

September in more typical years. The slight delay of the survey into October is therefore not thought to have significantly compromised the survey results.

5. Methodology

The approach adopted consisted of a desk exercise and a field survey, as described in sections 5.1 and 5.2 below.

5.1 Desk Study

As part of the desk study the SNHi web site (<http://www.snh.gov.uk/publications-data-and-research/snhi-information-service/map/>) and the NBN Gateway (<https://data.nbn.org.uk/>) were consulted for records of Great Crested Newts.

5.2 Field Survey

The methodology for the habitat suitability assessment followed the guidance of the Amphibian and Reptile Groups of the United Kingdom (ARG UK, 2010). This method provides a guide for scoping ponds in or out of further assessment for the presence of Great Crested Newts.

The habitat suitability assessment method assesses habitat quality and quantity by means of a Habitat Suitability Index (HSI). In general ponds with high HSI scores are more likely to support Great Crested Newts than those with low scores but the method is not sufficiently precise to conclude that any particular pond with a high score will support newts and any pond with a low score will not.

The HSI incorporates ten suitability indices (SI), all of which are known to affect the species. The suitability indices are derived from field scores, some of which are categorical and some numerical. The field scores are converted into SI scores by comparison against tables. Further details are provided in ARG UK (2010).

The HSI is a geometric mean of the ten suitability indices and is calculated as follows:

$$HSI = (SI1 \times SI2 \times SI3 \times SI4 \times SI5 \times SI6 \times SI7 \times SI8 \times SI9 \times SI10)^{1/10}$$

where:

- SI1 = **geographic location** in Great Britain (optimal, marginal, unsuitable)
- SI2 = **pond area** (in m²)
- SI3 = **permanence** (never dries, dries no more than two years in ten or only in drought, dries between three years in ten to most years, dries annually)
- SI4 = **water quality** (polluted, low invertebrate diversity, moderate invertebrate diversity, abundant and diverse invertebrate diversity)
- SI5 = **shade** covering pond perimeter (in %)
- SI6 = **waterfowl** (no evidence of impacts from waterfowl, little indication of waterfowl impact, severe impact of waterfowl presence)
- SI7 = **fish** (no records or evidence of fish, no evidence of fish but conditions suggest may be present, small numbers present, dense population of fish present)
- SI8 = **pond count** within 1 km (excluding pond under assessment)
- SI9 = **terrestrial habitat** (good opportunities for foraging and shelter, opportunities present but not extensive, limited opportunities, no

suitable habitat)
SI10 = **macrophyte cover** of pond surface (in %)

HSI scores are categorized as follows:

HSI	Pond suitability
>= 0.80	excellent
0.70 – 0.79	good
0.60 – 0.69	average
0.50 – 0.59	below average
< 0.50	poor

A total of 55% of ponds assessed as of 'average' suitability supported Great Crested Newts. For the 'below average' category that proportion dropped to 20% of ponds (ARG UK, 2010). For the purposes of this assessment, any pond that is scored as of average or above average suitability for Great Crested Newts is considered to be suitable Great Crested Newt breeding habitat and it is recommended that it be assessed further for the presence of Great Crested Newts. However, this is moderated by professional judgement, where appropriate, since the HSI method only provides a rough assessment of likely habitat suitability and, hence, Great Crested Newt presence.

Great Crested Newts occupy core territories of about 250 m around their breeding ponds but they can move up to 500 m in areas of suitable terrestrial habitat and, in some cases, even further but the scale of potential development impacts decreases with increasing distance from the breeding ponds. It is generally accepted that 500 m is a sufficient limit of survey, unless there are significant barriers to movements (e.g. major roads, fast-flowing rivers), in which case this distance can be decreased, or particularly good surrounding terrestrial habitat, in which case this distance can be increased (English Nature, 2001 & Langton *et al.*, 2001; Natural England, undated).

All extant standing waterbodies and those shown on OS and/or aerial photos within the site boundary and a surrounding buffer zone of approximately 500 m were included in the assessment, which took place on 12th and 19th October 2014. Weather conditions on the survey dates were generally good, with overcast conditions, light winds and mild conditions on 12th October and overcast conditions, strong winds, intermittent heavy showers and mild conditions on 19th October.

However, it should be remembered that the northern part of the site was previously worked as part of the Dalquhandy opencast coal mine and that there have subsequently been significant changes to the land use and habitats following restoration. Several ponds marked on the OS map no longer exist. Conversely, new ponds have been created as part of the restoration of the site. Where this is the case, this is noted in section 6.2.1 below.

6. Results

This section presents the results of the desk study and the field survey elements.

6.1 Desk Study

The desk study returned a number of newt records from 10 km squares NS83 (in which the Douglas West site is located), NS82 (to the south) and NS72 (to the south-west), as detailed in the table below. There

were no returns from 10 km square NS 73 (to the west), while the M74 constitutes a major obstacle to areas located to the north and east.

Species	Site name	Grid reference	Date	Distance to Douglas West
Newt sp. (<i>Triturus</i>)	Denovan	NS 824 316	26/04/1991	on site
Newt sp. (<i>Triturus</i>)	Loch Walton	NS 824 316	29/07/1991	on site
Smooth Newt	-	NS83	01/01/1833-31/12/1959	in same 10 km square
Newt sp. (<i>Triturus</i>)	Pineapple (Mid Rig)	NS 868 275	16/07/1991	ca. 6 km SE
Smooth Newt	-	NS72	01/01/1960-31/12/1985	10 km square to SW
Palmate Newt	-	NS72	01/01/1960-31/12/1985	10 km square to SW

There were two records of newts from the south-eastern section of the site (at Denovan and Loch Walton, respectively) from 1991. Both locations appear to be identical and are located to the north-east of a former bing and west of the adjacent coniferous plantation. These waterbodies do not appear on OS and aerial maps and were not located in the field and are thought to no longer exist.

These records were not identified to species level and can thus refer to either *Triturus helveticus* (former scientific name of Palmate Newt), *Triturus vulgaris* (former scientific name of Smooth Newt) or *Triturus cristatus* (Great Crested Newt).

Another unspecified newt record, also from 1991, stems from a location known as Pineapple or Mid Rig at ca. 6 km to the south-east of the Douglas West site.

There was furthermore a very old record dating from prior to 1959 of a Smooth Newt from 10 km square NS83 in which the Douglas West is located as well as records of both a Smooth and a Palmate Newt from 10 km square NS72 to the south-west of the square in which Douglas West is located. Both date from the period 1960-1985.

The desk study thus returned no positive records of Great Crested Newts from the site and the wider surrounding area.

6.2 Field Survey

A total of 26 ponds within an approximately 500 m surrounding buffer zone (see Figure 1), were located in the field and considered for their suitability to support Great Crested Newts. Due to access restrictions, two ponds, Pond 25 and Pond 26, were excluded from the field survey.

6.2.1 Pond assessment

The sections below provide a short description of each pond, its HSI score and habitat suitability for breeding Great Crested Newts. All HSI scores are summarized at the end of this section. In addition, the detailed HSI calculations are presented in Appendix 1.

Pond 1 - NS 82800 33056

Located in the north-eastern section of the site, this pond was created artificially and sat in a rectangular depression. The pond has been drained but is still squelchy underfoot and is now totally dominated by Soft-rush (*Juncus effusus*) which sets it apart from the surrounding vegetation. This pond is **unsuitable** as breeding habitat for Great Crested Newts.



Pond 2 - NS 82816 33033

Pond 2 is a shallow flood located in the north-eastern section of the site, ca. 15 m south-east of former Pond 1. Cracked mud at the bottom showed that this pond is clearly ephemeral and more than likely dries out regularly in warm temperatures. The pond supported few plants, amongst which were Jointed Rush (*Juncus articulatus*) and Horsetail (*Equisetum* sp.). The HSI score for Pond 2 is 0.50 and its suitability for Great Crested Newts is **below average**.



Pond 3 - NS 82822 33069

Pond 3 is a very small waterbody that is located some 20 m north of Pond 2. It is similar to the latter, being very shallow and with a bottom substrate of cracked mud. There were Roe Deer tracks in the substrate. The pond did not support any aquatic vegetation. The HSI score for Pond 3 is 0.43 and its suitability for Great Crested Newts is **poor**.



Pond 4 - NS 82843 32796

These were eight treatment lagoons located at the dispatch point which have since been drained and removed. The area now consists largely of dense Soft-rush with some Tufted Hair-grass (*Deschampsia cespitosa*). This habitat is **unsuitable** as breeding habitat for Great Crested Newts.



Pond 5 - NS 83144 32679

A small pond is shown adjacent to the north-eastern boundary of the site on a small-scale OS map of the area but was not relocated. From previous knowledge of the site, a small pond was located in this area. At the time works on an electricity line were going on in its vicinity and part of the pond had been damaged. The pond was either completely destroyed as a result of the works or has since dried out and vegetated over. It is **unsuitable** as breeding habitat for Great Crested Newts.



Pond 6 (Alder Burn Pond) - NS 82656 32388

Large pond located in the eastern section of the site and on-line with the Alder Burn which runs north to join the Poniel Water. A fringing band of sedges lines its shoreline; the pond supports few emergent plants. The HSI score for Pond 6 is 0.72 and its suitability for Great Crested Newts is **good**.



Pond 7 - NS 82446 32419

The OS map shows two small ponds in the eastern section of the site just north of the meteorological mast. However, only a small area of Yellow Iris (*Iris pseudacorus*) and dense Soft-rush remains around a tiny area of very shallow standing water, likely ponded from a small stream that links Ponds 6 and 8. This area is **unsuitable** breeding habitat for newts.



Pond 8 - NS 82414 32415

A medium-sized pond in the east-central section of the site, similar in character to but slightly smaller than Pond 6. It supported very little fringing vegetation, which included Floating Sweet-grass (*Glyceria fluitans*) and small strips of sedges as well as a tree in the centre of the pond. The HSI score for Pond 8 is 0.70 and its suitability for Great Crested Newts is **good**.



Pond 9 - NS 81977 32609

Large pond in the centre in the centre. Regularly supports good numbers of waterfowl. Narrow fringing band of Water Horsetail (*Equisetum fluviatile*), Bulrush (*Typha latifolia*) and sedges, mostly on the western shore where some planted Alder (*Alnus glutinosa*) also occur. There is less vegetation on the northern shore which is adjacent to a sheep pen and there may thus be some run-off into the pond. The HSI score for Pond 9 is 0.61 and its suitability for Great Crested Newts is considered to be **average**.



Pond 10 - NS 81703 32795

Pond 10 is located adjacent to and partly within the large Sitka Spruce plantation that abuts the western boundary of the site. It was very dark looking and rather deep (knee height) right from the bank. There was a band of fringing vegetation consisting of sedges, Soft-rush (*Juncus effusus*), Tufted Hair-grass (*Deschampsia cespitosa*), young Willows (*Salix* sp.) and young dead Sitka Spruce conifers. It is likely to be rather acidic. A Palmate/Smooth Newt larva was recorded in this pond during netting. The HSI score for Pond 10 is 0.63 and its suitability for Great Crested Newts is considered to be **average**.



Pond 11 - NS 81376 33012

Small pond which is similar to and within ca. 60 m of Pond 12. Looks very natural but there are restored areas in between both ponds. It is surrounded by a 3-8 m wide sedge bed with some Soft-rush (*Juncus effusus*) and Bulrush (*Typha latifolia*) and a single Willow (*Salix* sp.) on the steep bank of the adjacent tarmac track to the north-east, while a floating mat of Bog-mosses (*Sphagna*), Haircap (*Polytrichum*

commune) and Red-stemmed Feather-moss (*Pleurozium schreberi*) occurs in the north-western corner, making access to the open water difficult. Like Pond 12 it sits within an area of wet heath and is within 40 m of the Sitka Spruce plantation to the south. The HSI score for Pond 11 is 0.68 and its suitability for Great Crested Newts is considered to be in the upper range of the **average** category.



Pond 12 - NS 81288 33057

Small pond set amongst wet heath with a narrow fringe of Tufted Hair-grass (*Deschampsia cespitosa*), Bulrush (*Typha latifolia*) and sedge stands, four Willows (*Salix* sp.) and a Birch (*Betula* sp.) tree. It is adjoined by the steep bank of the adjacent tarmac track. The HSI score for Pond 12 is 0.72 and its suitability for Great Crested Newts is considered to be in the lower range of the **good** category.



Pond 13 - NS 81097 33205

A medium-sized pond located in a depression in the north-western section of the site just west of the track. A bed of Common Sedge (*Carex nigra*) encircles an inflow from the west, while a second inflow enters the pond in its south-eastern corner. Sheep have access to the northern shore where a section is

denuded of vegetation. The HSI score for Pond 13 is 0.68 and its suitability for Great Crested Newts is considered to be in the upper range of the **average** category.



Pond 14 - NS 81308 33447

The OS map shows two former lagoons in approximately this location. However, these ponds no longer exist and have been taken over by rushes. This habitat is unsuitable for breeding Great Crested Newts.

Pond 15 - NS 81773 33467

Small, artificially created pond just outside the central-northern boundary of the site. The pond is shaped in a dogleg and built into a slope between a Scots Pine copse to the north-west and the Poniel Water to the south. It is surrounded by a narrow, steep bank covered by a neutral grassland with Red Clover (*Trifolium pratense*), Ribwort Plantain (*Plantago lanceolata*), Dandelion (*Taraxacum Sect. Ruderalia*), Buttercup (*Ranunculus* sp.) and Crested Dog's-tail (*Cynosurus cristatus*). Sedges fringe some sections of shoreline, while some pondweeds were evident away from the bank. Scattered, planted trees occur around the pond. The HSI score for Pond 15 is 0.58 and its suitability for Great Crested Newts is considered to be **below average**. However, an adult and a juvenile Palmate Newt were recorded in this pond and it is therefore possible that it could also support Great Crested Newts.

Although Pond 15 is only some 25 m north of the Douglas West & Dalquhandy DP site boundary, it is separated from the latter by the Poniel Water but there is a section to the east of the pond where the Poniel Water runs underground. Using this pathway, the distance from Pond 15 to the nearest currently proposed construction-disturbed area - Turbine 5 - is ca. 450 m. Pond 15 is therefore recommended for further survey.



Pond 16 - NS 80227 33231

Pond located within the Poniel Water corridor and west of the latter. It is heavily polluted, as evidenced by an orange discharge on the banks. The scant vegetation consisted of some Soft-rush (*Juncus effusus*) around the banks and a small patch of Pondweed (*Potamogeton* sp.) in the water. A line of orange discharge from this pond down to the Poniel Water was also evident, probably the result of the pond overflowing. This seems to kill all vegetation with the possible exception of thistles. The orange substrate was very soft and unstable and the pond consequently unsafe to access. Given the high degree of pollution, invertebrate diversity is thought to be low and the pond unsuitable for newts.



Pond 17 - NS 80710 34071

Artificial pond in bowl-shaped depression surrounded by banks covered in a mixture of Raspberry (*Rubus idaeus*), Bracken (*Pteridium aquilinum*), Heather (*Calluna vulgaris*) and Tufted Hair-grass (*Deschampsia cespitosa*) and sitting on a shaley substrate. The pond was heavily drawn down on the day of survey and there was virtually no aquatic vegetation.

The HSI score for Pond 17 is 0.62 and its suitability for Great Crested Newts is considered to be **average**. However, Pond 17 is separated from the site by the Poniel Water, except for the tarmac road that crosses the Douglas West & Dalquhandy DP site and which provides a connection route into the site. However, newts travelling along this route would have to move in excess of ca. 700 m, which is outside the main dispersal distance of 500 m. It is therefore considered unlikely that any newts present in this pond would be significantly affected by the proposed development.



Pond 18 - NS 80312 33865

Long (ca. 175 m), irregular pond of variable width (ca. 10-60 m) located on the former Dalquhandy opencast site ca. 450 m due north of the north-westernmost corner of the Douglas West site. This waterbody is known to have supported a breeding gull colony in the past and on the day of survey supported 15 Wigeon, 3 Teal, 2 Mute Swans, 1 Canada Goose and 100 Golden Plover. Sitting in a shallow bowl, it was drawn down with very shallow and wide edges that supported a fringing vegetation of Water Horsetail (*Equisetum fluviatile*), amongst others, while other areas consisted of exposed mud or rock. The pond was just barely cut into two separated units, which are, however, hydrologically linked. Some disturbance from motor cycles was evident around the edge.



The HSI score for Pond 18 is 0.66 and its suitability for Great Crested Newts is considered to be **average**. As for ponds 19 to 21, this pond is located within 500 m of the north-western section of the Douglas West site. However, it is separated from the latter by the Poniel Water, which presents a barrier to migration. While a pathway to the site exists along the tarmac track, this is about 800 m away from the site and thus well outside the core dispersal distance of Great Crested Newts. Although it is not impossible that newts could cross the Poniel Water in conditions of low flow or across objects lying across the Poniel Water, this is unlikely and would still be over 500 m from the currently considered position of the nearest turbine. It is therefore considered unlikely that any newts present in this pond would be affected by the development.

Pond 19 - NS 79786 33333

Artificially created, more or less rectangular, pond associated with the former opencast works located ca. 375 m outside the western site boundary. It has very shallow edges but is deeper further in. Except for its southern section it is bordered on its western boundary by a ca. 8 m wide sedge bed, while Bulrush (*Typha latifolia*) is sparse and occurs as a small stand in the north-eastern corner. The rest of the shoreline is bare.



The HSI score for Pond 19 is 0.73 and its suitability for Great Crested Newts is considered to be **good**. While this pond is located within 500 m of the north-western section of the Douglas West site, as for pond 18 it is separated from the latter by the Poniel Water, which presents a barrier to migration. While a pathway to the site exists along the track, this is in excess of 1.3 km from the site and thus well outside the core dispersal distance of newts. Although it is not impossible that newts could cross the Poniel Water in conditions of low flow or across objects lying across the Poniel Water, this is unlikely and would still be some 750 m from the currently considered position of the nearest turbine. It is therefore considered unlikely that any newts present in this pond would be affected by the development.

Pond 20 - NS 79780 33145

Easternmost of two former, hydrologically linked, opencast lagoons located approximately 325 m outside the north-westernmost corner of the site. At the time of survey the two lagoons were separate, though linked by a small flow of water from the westernmost to the easternmost lagoon. The draw-down zone indicated that both are fully connected during at least some times. This lagoon was very shallow throughout, the depth rarely dropping below ca. 40 cm. The substrate consisted of a mixture of shale-type stones and thick mud.



The HSI score for Pond 20 is 0.66 and its suitability for Great Crested Newts is considered to be **average**. While this pond is located within ca. 325 m of the north-western section of the Douglas West & Dalquhandy DP site, as for ponds 17 to 19 it is separated from the latter by the Poniel Water, which presents a barrier to migration. While a pathway to the site exists along the track, this is in excess of 1.3 km from the site and thus well outside the core dispersal distance of newts. Although it is not impossible that newts could cross the Poniel Water in conditions of low flow or across objects lying across the Poniel Water, this is unlikely and would still be some 750 m from the currently considered position of the nearest turbine. It is therefore believed unlikely that any newts present in this pond would be affected by the development.

Pond 21 - NS 79734 33135

Westernmost of two former, hydrologically linked, opencast lagoons located approximately 450 m outside the north-westernmost corner of the site. Though separated from the easternmost lagoon at the time of survey, both were hydrologically linked by a small flow of water and the drawdown zone suggests that both form one large waterbody during at least some times of year. Pond 21 is similar to Pond 20 in its absence of fringing vegetation, the presence of very shallow edges and the shale-like substrate on the edges. However, it is deeper than Pond 20 with thick mud replacing the shale-like substrate away from the edges.



The HSI score for Pond 21 is 0.50 and its suitability for Great Crested Newts is considered to be at the bottom end of the **below average** category. Furthermore, while this pond is located within ca. 450 m of the north-western section of the Douglas West site, as for ponds 17 to 20 it is separated from the latter by the Poniel Water, which presents a barrier to migration. While a pathway to the site exists along the track, this is in excess of 1.5 km from the site and thus well outside the core dispersal distance of newts. Although it is not impossible that newts could cross the Poniel Water in conditions of low flow or across objects lying across the Poniel Water, this is unlikely and would still be over 750 m from the currently considered position of the nearest turbine. It is considered highly unlikely that this pond would be adversely affected by the development.

Pond 22 - NS 81810 30469

Tiny, rectangular pond, which was rather deep (40+ cm) and looked like it had been dug into the surrounding acid grassland by a digger bucket. It was completely covered in pondweeds.



The HSI score for Pond 22 is 0.48 and its suitability for Great Crested Newts is considered to be **poor**. The pond is located ca. 575 m south of the south-eastern corner of the Douglas West & Dalquhandy DP site, which also constitutes the Hagshaw Hill Wind Farm access track. It is furthermore located ca. 1 km from the nearest turbine (T15). As such, effects of the Douglas West & Dalquhandy DP site on any newts present in this pond are highly unlikely.

Pond 23 - NS 81732 30455

Rectangular, fenced pond, which was dug ca. 1.5 m into the surrounding ground. There is fringing vegetation of rushes, Water Horsetail (*Equisetum fluviatile*), floating leafy liverworts and ferns along some of the steep banks. Pondweeds cover about a quarter of the water surface with Water Horsetail present throughout but still leaving a reasonably open area. The pond is surrounded in its immediate vicinity by a strip of heavily grazed, improved grassland beyond which there is a vast expanse of acid grassland. A Smooth/Palmate Newt was caught during netting.



The HSI score for Pond 23 is 0.67 and its suitability for Great Crested Newts is considered to be **average**. The pond is located ca. 625 m south of the south-eastern corner of the Douglas West & Dalquhandy DP site, which also constitutes the Hagshaw Hill Wind Farm access track. It is furthermore located ca. 1 km from the nearest turbine (T15). As such, effects of the Douglas West & Dalquhandy DP site on any newts present in this pond are highly unlikely.

Pond 24 - NS 81968 30864

Some OS maps show a pond in this location, adjacent to a small Scots Pine plantation, ca. 200 m south of the south-eastern corner of the Douglas West & Dalquhandy DP site. The area consists of rushes and Tufted Hair-grass (*Deschampsia cespitosa*) with no open water and is unsuitable as breeding habitat for Great Crested Newts.



Pond 25 - NS 82803 33580

There is a pond not shown on the OS maps at Craigend, at ca. 400 north of the north-eastern corner of the Douglas West site & Dalquhandy DP. No access permission was available at the time of survey. This pond was not included in the HSI assessment and its habitat suitability for Great Crested Newts is therefore not known. The pond is separated from the Douglas West & Dalquhandy DP site by the Poniel Water, although there is a crossing point at the site boundary. The distance to the nearest turbine T7, as currently proposed, is ca. 840 m.

The combination of the barrier of the Poniel Water and the distance to the nearest known construction-disturbed area, which is well in excess of the 500 m core distance newts travel over, makes it highly unlikely that the proposed development will have any significant adverse effect on any newts that might be present in Pond 25.

Pond 26 - NS 82772 33480

A pond is shown on the 1:10,000 OS map at Westerhouse about 250 m north of the north-eastern corner of the site. Like for Pond 25, no access permission was available for Pond 26 at the time of survey and this pond was not included in the HSI assessment. The pond is separated from the site by the Poniel Water, although there is a crossing point at the site boundary. The distance to the nearest turbine T7, as currently proposed, is ca. 730 m.

The combination of the barrier of the Poniel Water and the distance to the nearest known construction-disturbed area, which is well in excess of the 500 m core distance newts travel over, make it unlikely that the proposed development will have any significant adverse effect on any newts that might be present in Pond 26.

6.2.2 Summary of Pond Assessment

A total of 26 ponds were included in the present assessment. A summary of the ponds and their HSI scores is presented in Table 1 below.

Two ponds, Pond 25 and Pond 26, had to be excluded from the field survey but potential effects of the proposed development on these were considered unlikely in terms of their location and distance to construction-disturbed areas.

Of the 24 other ponds, six - Ponds 1, 4, 5, 7, 14 and 24 - did no longer support open water habitat and are unsuitable as breeding habitat for Great Crested Newts.

Of the remaining 18 ponds, six ponds - Ponds 16 to 21 - are separated from the development site by the Poniel Water and direct pathways between the ponds and the site are in excess of the 500 m core dispersal distance of Great Crested Newts. In addition Pond 16 is heavily polluted. Two further ponds, - Ponds 22 and 23 - are in excess of 1 km from the nearest currently proposed turbine 15. None of the above ponds are therefore likely to be affected by the proposed development in terms of any Great Crested Newts they may support.

Nine of the remaining 10 ponds - Ponds 2, 3, 6 and 8 to 13 - are located within the site. Pond 15 is located just north of the site but separated from the latter by the Poniel Water, except for a nearby underground section over which newts could gain access to construction-disturbed areas.

Of these 10 ponds, Pond 3 is of poor habitat suitability for Great Crested Newts and was scoped out of further assessment. Pond 2 has a score of 0.50, putting it marginally into the below average category, is very shallow, ephemeral and does not support any submerged plants for egg laying. For these reasons Pond 2 was also excluded from further assessment.

The remaining eight ponds fall into the average (Ponds 9 to 11 and 13), good (Ponds 6, 8 and 12) and below average (Pond 15) habitat suitability categories. Since the latter pond supported Palmate Newts, it could be suitable for Great Crested Newts as well.

7. Discussion and Conclusions

The desk study established the presence of Smooth Newts in the same 10 km square as the Douglas West & Dalquhandy DP site prior to 1959 and in the 10 km square to the south-west during the period 1960-1985.

Palmate Newt was found to be present, also in the 10 km square to the south-west during the latter period.

Unspecified newt records (either Palmate, Smooth or Great Crested) were recorded in 1991 at the site, albeit in a waterbody believed to no longer be extant, and at the Pineapple (Mid Rig) at ca. 6 km to the south-east of the site. The present survey recorded Palmate Newt in Pond 15 and Palmate/Smooth Newt in Pond 10.

There are thus no known confirmed records of Great Crested Newts on site or in the surrounding 500 m buffer zone. This notwithstanding, of the 26 ponds assessed as part of this exercise and which can be

adversely affected by the proposed development, the habitat is considered to be potentially suitable for breeding Great Crested Newts in seven ponds located either side of the tarmac road within the Douglas West & Dalquhandy DP site - Ponds 6 and 8 to 13 - and in a small pond just outside the central-northern boundary - Pond 15.

Since Great Crested Newts are a European Protected Species, they are specially protected, amongst others, from capture, injury, killing and disturbance and damage or destruction of their breeding ponds, even when not occupied.

In order to establish whether these ponds support Great Crested Newts and get a measure of population size, further survey work should be carried out involving either e-DNA sampling (pending SNH approval for the acceptability of this method) or three methods selected from netting, torch surveys, egg searches and bottle trapping over six visits in suitable weather conditions during the period mid-March to mid-June (Natural England, undated) to avoid unintentionally committing an offence during the construction and operation phases of the proposed development and so that appropriate mitigation measures can be taken, should Great Crested Newts be present at the site.

Table 1 - Summary of the HSI scores and suitability assessments for each of the 26 ponds considered as part of this assessment

Pond Nber.	Location	HSI score	Suitability for Great Crested Newts	Recommended for further assessment	Newts recorded	Comments
1	north-east of site	-	unsuitable	No		no open water
2	north-east of site	0.50	below average	No		
3	north-east of site	0.43	poor	No		
4	north-east of site	-	unsuitable	No		no open water
5	adjacent to eastern site boundary	-	unsuitable	No		no open water
6	eastern section of site	0.72	good	Yes		
7	eastern section of site	-	unsuitable	No		no open water
8	eastern section of site	0.70	good	Yes		
9	central section of site	0.61	average	Yes		
10	central section, straddling western boundary	0.63	average	Yes	√	supports Palmate/Smooth Newt
11	north-western section of site	0.68	average	Yes		
12	north-western section of site	0.72	good	Yes		
13	north-western section of site	0.68	average	Yes		
14	north-western section of site	-	unsuitable	No		no open water
15	north of northern boundary	0.58	below average	Yes	√	due to presence of Palmate Newts and pathway into site with distance to nearest turbine ca. 450 m

Pond Nber.	Location	HSI score	Suitability for Great Crested Newts	Recommended for further assessment	Newts recorded	Comments
16	on western site boundary	-	unsuitable	No		polluted and separated from the site by the Poniel Water
17	north of north-western section of site and ca. 700 m outside of site boundary	0.62	average	No		outside main dispersal distance of 500 m
18	north of north-western section of site and ca. 800 m outside of site boundary	0.66	average	No		Poniel Water constitutes barrier to dispersal and more than 500 m from any likely construction-disturbed areas
19	west of the north-western section of the site and ca. 375 m outside the site boundary	0.73	good	No		Poniel Water constitutes barrier to dispersal and ca. 750 m from any likely construction-disturbed areas
20	outside the north-western section of the site and ca. 325 m outside the site boundary	0.66	average	No		Poniel Water constitutes barrier to dispersal and ca. 750 m from any construction-disturbed areas
21	west of the north-western section of the site and ca. 450 m outside the site boundary	0.50	below average	No		below average habitat suitability; Poniel Water constitutes barrier to dispersal and > 750 m from any construction-disturbed areas

Pond Nber.	Location	HSI score	Suitability for Great Crested Newts	Recommended for further assessment	Newts recorded	Comments
22	south of south-eastern corner of site and ca. 575 m outside the site boundary	0.48	poor	No		poor habitat suitability and ca. 1 km from nearest construction -disturbed area
23	south of south-eastern corner of site and ca. 625 m outside the site boundary	0.67	average	No	√	young Palmate/Smooth Newt caught during netting; ca. 1 km from nearest construction -disturbed area
24	ca. 200 m south of south-east corner of site	-	unsuitable	No		no open water
25	ca. 400 m north of the north-eastern boundary of the site	-	no access permission	No		Poniel Water constitutes barrier to dispersal and ca. 840 m from nearest known construction-disturbed areas
26	ca. 250 m north of north-eastern boundary of site	-	no access permission	No		Poniel Water constitutes barrier to dispersal and ca. 730 m from nearest known construction-disturbed areas

8. References

ARG UK (2010) *Great Crested Newt Habitat Suitability Index*. Amphibian and Reptile Groups of the United Kingdom Advice Note 5.

English Nature (2001) *Great Crested Newt Mitigation Guidelines*. English Nature: Peterborough.

Natural England (undated) *Standing Advice Species Sheet: Great Crested Newt*. Natural England: Peterborough.

Langton, T., Becket, C. & Foster, J. (2001) *Great Crested Newt Conservation Handbook*. Froglife: Halesworth.

Appendix 1 - HSI Calculations

Pond 2

Index	Description	Category	Score
S11 - Location	marginal	Zone B	0.50
S12 - Pond area	-	70 m ²	0.14
S13 - Permanence	very shallow and cracked mud at bottom	dries annually	0.10
S14 - Water quality	no aquatic invertebrates seen and no submerged plants present	poor	0.33
S15 - Shade	-	none	1.00
S16 - Waterfowl	two Snipe but too shallow for other waterfowl	absent	1.00
S17 - Fish	too shallow and ephemeral	absent	1.00
S18 - Pond count within 1 km	5 (excluding two ponds to north due to Poniel Water acting as barrier)	1.27 ponds/km ²	0.72
S19 - Terrestrial habitat	surrounded by rough grassland, except in immediate vicinity	good	1.00
S110 - Macrophytes	cover of pond surface	25%	0.55

$$\begin{aligned}
 \text{HSI} &= (\text{S11} \times \text{S12} \times \text{S13} \times \text{S14} \times \text{S15} \times \text{S16} \times \text{S17} \times \text{S18} \times \text{S19} \times \text{S110})^{1/10} \\
 &= (0.50 \times 0.14 \times 0.10 \times 0.33 \times 1.00 \times 1.00 \times 1.00 \times 0.72 \times 1.00 \times 0.55)^{1/10} \\
 &= 0.0009^{1/10} \\
 &= 0.50
 \end{aligned}$$

The habitat suitability of Pond 2 is therefore considered to be **below average**.

Pond 3

Index	Description	Category	Score
S11 - Location	marginal	Zone B	0.50
S12 - Pond area	-	24 m ²	0.05
S13 - Permanence	very shallow and cracked mud at bottom	dries annually	0.10
S14 - Water quality	one water beetle seen but no submerged plants present	poor	0.33
S15 - Shade	-	none	1.00
S16 - Waterfowl	too small and shallow for waterfowl	absent	1.00
S17 - Fish	too shallow and ephemeral	absent	1.00
S18 - Pond count within 1 km	4 (excluding two ponds to north due to Poniel Water acting as barrier)	1.27 ponds/km ²	0.72
S19 - Terrestrial habitat	surrounded by rough grassland, except in immediate vicinity	good	1.00
S110 - Macrophytes	cover of pond surface	0%	0.30

$$\begin{aligned}
 \text{HSI} &= (\text{S11} \times \text{S12} \times \text{S13} \times \text{S14} \times \text{S15} \times \text{S16} \times \text{S17} \times \text{S18} \times \text{S19} \times \text{S110})^{1/10} \\
 &= (0.50 \times 0.05 \times 0.10 \times 0.33 \times 1.00 \times 1.00 \times 1.00 \times 0.72 \times 1.00 \times 0.30)^{1/10} \\
 &= 0.0002^{1/10} \\
 &= 0.43
 \end{aligned}$$

The habitat suitability of Pond 3 is therefore considered to be **poor**.

Pond 6

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area	-	1,100 m ²	0.93
SI3 - Permanence	deep	never dries	0.90
SI4 - Water quality	good invertebrate diversity, including shrimps, water boatmen, snails	good	1.00
SI5 - Shade	from bank	10%	1.00
SI6 - Waterfowl	ducks seen previously on this pond but little evidence of impact	minor	0.67
SI7 - Fish	fish seen breaking the surface during the survey; 2 small fish caught during netting; numbers likely to be small	minor	0.33
SI8 - Pond count within 1 km	4 ponds	1.27 ponds/km ²	0.72
SI9 - Terrestrial habitat	surrounded by rough grassland and narrow track	good	1.00
SI10 - Macrophytes	cover of pond surface	25%	0.55

$$\begin{aligned}
 \text{HSI} &= (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10} \\
 &= (0.50 \times 0.93 \times 0.90 \times 1.00 \times 1.00 \times 0.67 \times 0.33 \times 0.72 \times 1.00 \times 0.55)^{1/10} \\
 &= 0.0366^{1/10} \\
 &= 0.72
 \end{aligned}$$

The habitat suitability of Pond 6 is therefore considered to be **good**.

Pond 8

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area	-	613 m ²	1.00
SI3 - Permanence	deep	never dries	0.90
SI4 - Water quality	good invertebrate diversity, several species caught during netting	good	1.00
SI5 - Shade	from bank	< 5%	1.00
SI6 - Waterfowl	ducks likely to be present (Black-headed Gull seen on 19/10/2014) but little impact	minor	0.67
SI7 - Fish	fish seen breaking the surface during the survey; numbers likely to be small	minor	0.33
SI8 - Pond count within 1 km	5 ponds	1.59 ponds/km ²	0.76
SI9 - Terrestrial habitat	surrounded by rough grassland and narrow track	good	1.00
SI10 - Macrophytes	cover of pond surface	< 5%	0.35

$$\text{HSI} = (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10}$$

$$\begin{aligned}
 &= (0.50 \times 1.00 \times 0.90 \times 1.00 \times 1.00 \times 0.67 \times 0.33 \times 0.76 \times 1.00 \times 0.35)^{1/10} \\
 &= 0.0265^{1/10} \\
 &= 0.70
 \end{aligned}$$

The habitat suitability of Pond 8 is therefore considered to be **good**.

Pond 9

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area	-	4,000 m ²	*
SI3 - Permanence	was significantly drawn down on 23/09/2014 but on day of survey was still at least 30 cm deep and is thought never to dry out	never dries	0.90
SI4 - Water quality	good invertebrate diversity but few species caught during netting	poor	0.33
SI5 - Shade	fringe of trees and located in a dip	20-25%	1.00
SI6 - Waterfowl	24 Mallard, 22 Wigeon, 10 Teal, 19 Canada Geese, 1 Mute Swan; even larger numbers seen in the past; nonetheless impact considered minor	minor	0.67
SI7 - Fish	likely present due to regular presence of waterfowl	minor	0.33
SI8 - Pond count within 1 km	8 ponds (Pond 15 excluded due to barrier effect of Poniel Water)	2.55 ponds/km ²	0.87
SI9 - Terrestrial habitat	surrounded by rough grassland, heath and narrow track	good	1.00
SI10 - Macrophytes	cover of pond surface	ca. 10%	0.40

* There are no data for ponds greater than 2,000 m² and the methodology therefore recommends dropping this element from the calculation.

$$\begin{aligned}
 \text{HSI} &= (\text{SI1} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/9} \\
 &= (0.50 \times 0.90 \times 0.33 \times 1.00 \times 0.67 \times 0.33 \times 0.87 \times 1.00 \times 0.40)^{1/9} \\
 &= 0.0114^{1/9} \\
 &= 0.61
 \end{aligned}$$

The habitat suitability of Pond 9 is therefore considered to be **average**.

Pond 10

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area	-	500 m ²	0.10
SI3 - Permanence	deep	never dries	0.90
SI4 - Water quality	a few species of aquatic invertebrate and a Palmate/Smooth newt larva	moderate	0.67
SI5 - Shade	from adjacent conifers	85%	0.50

SI6 - Waterfowl	due to small size and being sandwiched between the plantation and the track unlikely to support waterfowl	absent	1.00
SI7 - Fish	given size and location likely absent; none during netting	absent	1.00
SI8 - Pond count within 1 km	6 (Pond 15 excluded due to barrier effect from Poniel Water)	1.91 ponds/km ²	0.82
SI9 - Terrestrial habitat	surrounded by coniferous plantation, rough grassland and track	good	1.00
SI10 - Macrophytes	cover of pond surface	50%	0.80

$$\begin{aligned}
 \text{HSI} &= (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10} \\
 &= (0.50 \times 0.10 \times 0.90 \times 0.67 \times 0.50 \times 1.00 \times 1.00 \times 0.82 \times 1.00 \times 0.80)^{1/10} \\
 &= 0.0099^{1/10} \\
 &= 0.63
 \end{aligned}$$

The habitat suitability of Pond 10 is therefore considered to be **average**.

Pond 11

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area		ca. 150 m ²	0.30
SI3 - Permanence	no indication of drawdown, deep; shown in two different aerial photos	never dries	0.90
SI4 - Water quality	bottom of pond full of <i>Sphagna</i> ; only 3-4 invertebrates recorded during netting	very poor	0.33
SI5 - Shade	none	0%	1.00
SI6 - Waterfowl	occasional ducks could visit but too small generally; no impact likely	absent	1.00
SI7 - Fish	unlikely	absent	1.00
SI8 - Pond count within 1 km	4 ponds (Pond 15 excluded due to barrier effect of Poniel Water)	1.27 ponds/km ²	0.72
SI9 - Terrestrial habitat	excellent to south: wet heath, rough grassland and coniferous plantation; track to north	good	1.00
SI10 - Macrophytes	ca. 40% covered by pondweeds with bottom of accessible area of pond covered in <i>Sphagna</i>	ca. 35%	0.65

$$\begin{aligned}
 \text{HSI} &= (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10} \\
 &= (0.50 \times 0.30 \times 0.90 \times 0.33 \times 1.00 \times 1.00 \times 1.00 \times 0.72 \times 1.00 \times 0.65)^{1/10} \\
 &= 0.0208^{1/10} \\
 &= 0.68
 \end{aligned}$$

The habitat suitability of Pond 11 is therefore considered to be in the upper range of the **average** category.

Pond 12

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area		ca. 250 m ²	0.50
SI3 - Permanence	no indication of drawdown, deep; shown in two different aerial photos	never dries	0.90
SI4 - Water quality	bottom of pond full of <i>Sphagna</i> ; only 3-4 invertebrates recorded during netting	very poor	0.33
SI5 - Shade	none	0%	1.00
SI6 - Waterfowl	occasional ducks could visit but too small generally; no impact likely	absent	1.00
SI7 - Fish	unlikely	absent	1.00
SI8 - Pond count within 1 km	4 ponds (Pond 15 excluded due to barrier effect of Poniel Water)	1.27 ponds/km ²	0.72
SI9 - Terrestrial habitat	excellent to south: wet heath, rough grassland and coniferous plantation; track to north	good	1.00
SI10 - Macrophytes	ca. 40% covered by pondweeds with bottom of accessible area of pond covered in <i>Sphagna</i>	ca. 40%	0.70

$$\begin{aligned}
 \text{HSI} &= (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10} \\
 &= (0.50 \times 0.50 \times 0.90 \times 0.33 \times 1.00 \times 1.00 \times 1.00 \times 0.72 \times 1.00 \times 0.70)^{1/10} \\
 &= 0.0374^{1/10} \\
 &= 0.72
 \end{aligned}$$

The habitat suitability of Pond 12 is therefore considered to be in the **good** category.

Pond 13

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area		ca. 1,000 m ²	0.95
SI3 - Permanence	although deep, it is shown as dried out on an aerial photo	rarely dries	1.00
SI4 - Water quality	very few invertebrates caught during netting	very poor	0.33
SI5 - Shade		ca. 20%	1.00
SI6 - Waterfowl	6 Mallards & 1 Teal; several ducks recorded on previous occasions; few submerged plants; impact on bank due to sheep	minor	0.67
SI7 - Fish	possible due to regular presence of waterfowl	possible	0.67
SI8 - Pond count within 1 km	4 ponds (Pond 15 excluded due to barrier effect of Poniel Water)	1.27 ponds/km ²	0.72
SI9 - Terrestrial habitat	surrounded by grassland, wet heath and coniferous woodland	good	1.00
SI10 - Macrophytes	sedge bed	ca. 10%	0.40

$$\begin{aligned}
 \text{HSI} &= (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10} \\
 &= (0.50 \times 0.95 \times 1.00 \times 0.33 \times 1.00 \times 0.67 \times 0.67 \times 0.72 \times 1.00 \times 0.40)^{1/10} \\
 &= 0.0203^{1/10}
 \end{aligned}$$

= 0.68

The habitat suitability of Pond 13 is therefore considered to be in the very range of the **average** category.

Pond 15

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area		ca. 110 m ²	0.22
SI3 - Permanence	rather deep and unlikely to dry out	never dries	0.90
SI4 - Water quality	low diversity but adult and juvenile Palmate Newts caught during netting	poor	0.33
SI5 - Shade	from bank	< 10 %	1.00
SI6 - Waterfowl	none seen but occasional small numbers possible; however no evidence of impact	absent	1.00
SI7 - Fish	looks like it could be stocked	possible	0.67
SI8 - Pond count within 1 km	2 ponds (Ponds 9-13 excluded due to barrier effect of Poniel Water)	0.64 ponds/km ²	0.52
SI9 - Terrestrial habitat	rough grassland, heath	good	1.00
SI10 - Macrophytes	cover of pond surface	ca. 5%	0.35

$$\begin{aligned}
 \text{HSI} &= (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10} \\
 &= (0.50 \times 0.22 \times 0.90 \times 0.33 \times 1.00 \times 1.00 \times 0.67 \times 0.52 \times 1.00 \times 0.35)^{1/10} \\
 &= 0.0040^{1/10} \\
 &= 0.58
 \end{aligned}$$

The habitat suitability of Pond 10 is therefore considered to be **below average**. However, the presence of newts indicates that they can subsist in this pond.

Pond 17

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area		ca. 1,000 m ²	0.95
SI3 - Permanence	probably doesn't dry out completely	never dries	0.90
SI4 - Water quality	low diversity of aquatic invertebrates netted ; lots of shrimps, like at Pond 20	poor	0.33
SI5 - Shade	from bank	ca.15 %	1.00
SI6 - Waterfowl	none seen but possible; however, impact likely to be minor	minor	0.67
SI7 - Fish	small numbers possible	minor	0.33
SI8 - Pond count within 1 km	7 ponds, all to north of the Poniel Water; ponds to the south which could be reached via the tarmac track excluded due to distance (> 1 km)	2.2 ponds/km ²	0.84
SI9 - Terrestrial habitat	rough grassland	good	1.00
SI10 - Macrophytes	no macrophytes, no fringing vegetation	0%	0.30

$$\begin{aligned}
 \text{HSI} &= (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10} \\
 &= (0.50 \times 0.95 \times 0.90 \times 0.33 \times 1.00 \times 0.67 \times 0.33 \times 0.84 \times 1.00 \times 0.30)^{1/10}
 \end{aligned}$$

$$= 0.0079^{1/10}$$

$$= 0.62$$

The habitat suitability of Pond 17 is therefore considered to be **average**.

Pond 18

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area	half drawn down, even after spells of heavy rain prior to survey	ca. 6,000 m ²	*
SI3 - Permanence	probably doesn't fully dry out	never dries	0.90
SI4 - Water quality	low diversity of invertebrates caught during netting	poor	0.33
SI5 - Shade	due to shallow bowl	ca. 10%	1.00
SI6 - Waterfowl	several recorded regularly; vegetation still well developed	minor	0.67
SI7 - Fish	possible due to regular presence of waterfowl	possible	0.67
SI8 - Pond count within 1 km	8 ponds (ponds 20 and 21 counted as one unit; Pond 16 (polluted) and ponds to the south of the Poniel Water (barrier effect) excluded)	2.55 ponds/km ²	0.89
SI9 - Terrestrial habitat	surrounded by seeded grassland, small areas of moorland	good	1.00
SI10 - Macrophytes	wide zone around south-western edge	< 10%	0.40

* There are no data for ponds greater than 2,000 m² and the methodology therefore recommends dropping this element from the calculation.

$$\text{HSI} = (\text{SI1} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/9}$$

$$= (0.50 \times 0.90 \times 0.33 \times 1.00 \times 0.67 \times 0.67 \times 0.89 \times 1.00 \times 0.40)^{1/9}$$

$$= 0.0237^{1/9}$$

$$= 0.66$$

The habitat suitability of Pond 18 is therefore considered to be **average**.

Pond 19

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area		ca. 600 m ²	1.00
SI3 - Permanence	very shallow edges but deeper further in	may dry rarely	1.00
SI4 - Water quality	no submerged plants; substrate shale-like with thick mud; few invertebrates caught during netting	poor	0.33
SI5 - Shade	from bank	10-15 %	1.00
SI6 - Waterfowl	none seen, unlikely; impact unlikely	absent	1.00
SI7 - Fish	artificial pond; poor substrate; none likely	absent	1.00

SI8 - Pond count within 1 km	4 ponds (ponds 20 and 21 counted as one unit, former Dalquhandy opencast void and polluted pond excluded)	1.27 ponds/km ²	0.67
SI9 - Terrestrial habitat	rough grassland all around	good	1.00
SI10 - Macrophytes	cover of pond surface	ca. 10%	0.40

$$\begin{aligned}
 \text{HSI} &= (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10} \\
 &= (0.50 \times 1.00 \times 1.00 \times 0.33 \times 1.00 \times 1.00 \times 1.00 \times 0.67 \times 1.00 \times 0.40)^{1/10} \\
 &= 0.0442^{1/10} \\
 &= 0.73
 \end{aligned}$$

The habitat suitability of Pond 19 is therefore considered to be **good**.

Pond 20

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area		ca. 1,000 m ²	0.95
SI3 - Permanence	the shallow depth and an aerial photo suggests that the pond is likely to dry out, at least sometimes	may dry sometimes	0.50
SI4 - Water quality	netting revealed large numbers of shrimps but this was the only species caught; no submerged plants	poor	0.33
SI5 - Shade	none	0%	1.00
SI6 - Waterfowl	none seen, may attract small numbers on occasions; impact unlikely	absent	1.00
SI7 - Fish	shallow pond; poor substrate; more than likely absent	absent	1.00
SI8 - Pond count within 1 km	3 ponds (ponds 20 and 21 counted as one unit, former Dalquhandy opencast void and polluted pond excluded)	0.96 ponds/km ²	0.66
SI9 - Terrestrial habitat	rough grassland and heath all around	good	1.00
SI10 - Macrophytes	cover of pond surface	0%	0.30

$$\begin{aligned}
 \text{HSI} &= (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10} \\
 &= (0.50 \times 0.95 \times 0.50 \times 0.33 \times 1.00 \times 1.00 \times 1.00 \times 0.66 \times 1.00 \times 0.30)^{1/10} \\
 &= 0.0155^{1/10} \\
 &= 0.66
 \end{aligned}$$

Despite the apparent absence of plant matter, the habitat suitability of Pond 20 is therefore considered to be **average**.

Pond 21

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area	half drawn down, even after spells of heavy rain prior to survey	ca. 1,600 m ²	0.86
SI3 - Permanence	may rarely dry out	may dry sometimes	1.00
SI4 - Water quality	very low, a single invertebrate caught in netting; some pondweeds	bad	0.01
SI5 - Shade	none	0%	1.00
SI6 - Waterfowl	none seen, may attract small numbers on occasions; impact unlikely	absent	1.00
SI7 - Fish	poor substrate; more than likely absent	absent	1.00
SI8 - Pond count within 1 km	3 ponds (ponds 20 and 21 counted as one unit, former Dalquhandy opencast void and polluted pond excluded)	0.96 ponds/km ²	0.66
SI9 - Terrestrial habitat	rough grassland and heath all around	good	1.00
SI10 - Macrophytes	a few pondweeds, some rushes	< 5%	0.35

$$\begin{aligned}
 \text{HSI} &= (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10} \\
 &= (0.50 \times 0.86 \times 1.00 \times 0.01 \times 1.00 \times 1.00 \times 1.00 \times 0.66 \times 1.00 \times 0.35)^{1/10} \\
 &= 0.0010^{1/10} \\
 &= 0.50
 \end{aligned}$$

The habitat suitability of Pond 21 is therefore considered to be **below average**.

Pond 22

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area	very small	2 m ²	0.01
SI3 - Permanence	despite its depth and from knowledge of similar ponds created elsewhere can dry out due to very small size	sometimes	0.50
SI4 - Water quality	a few invertebrates caught during netting	moderate	0.67
SI5 - Shade	none	0%	1.00
SI6 - Waterfowl	too small	absent	1.00
SI7 - Fish	too small	absent	1.00
SI8 - Pond count within 1 km	1 pond	0.32 ponds/km ²	0.39
SI9 - Terrestrial habitat	surrounded by acid grassland	good	1.00
SI10 - Macrophytes	full cover by pondweeds	100%	0.80

$$\begin{aligned}
 \text{HSI} &= (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10} \\
 &= (0.50 \times 0.01 \times 0.50 \times 0.67 \times 1.00 \times 1.00 \times 1.00 \times 0.39 \times 1.00 \times 0.80)^{1/10} \\
 &= 0.0005^{1/10} \\
 &= 0.48
 \end{aligned}$$

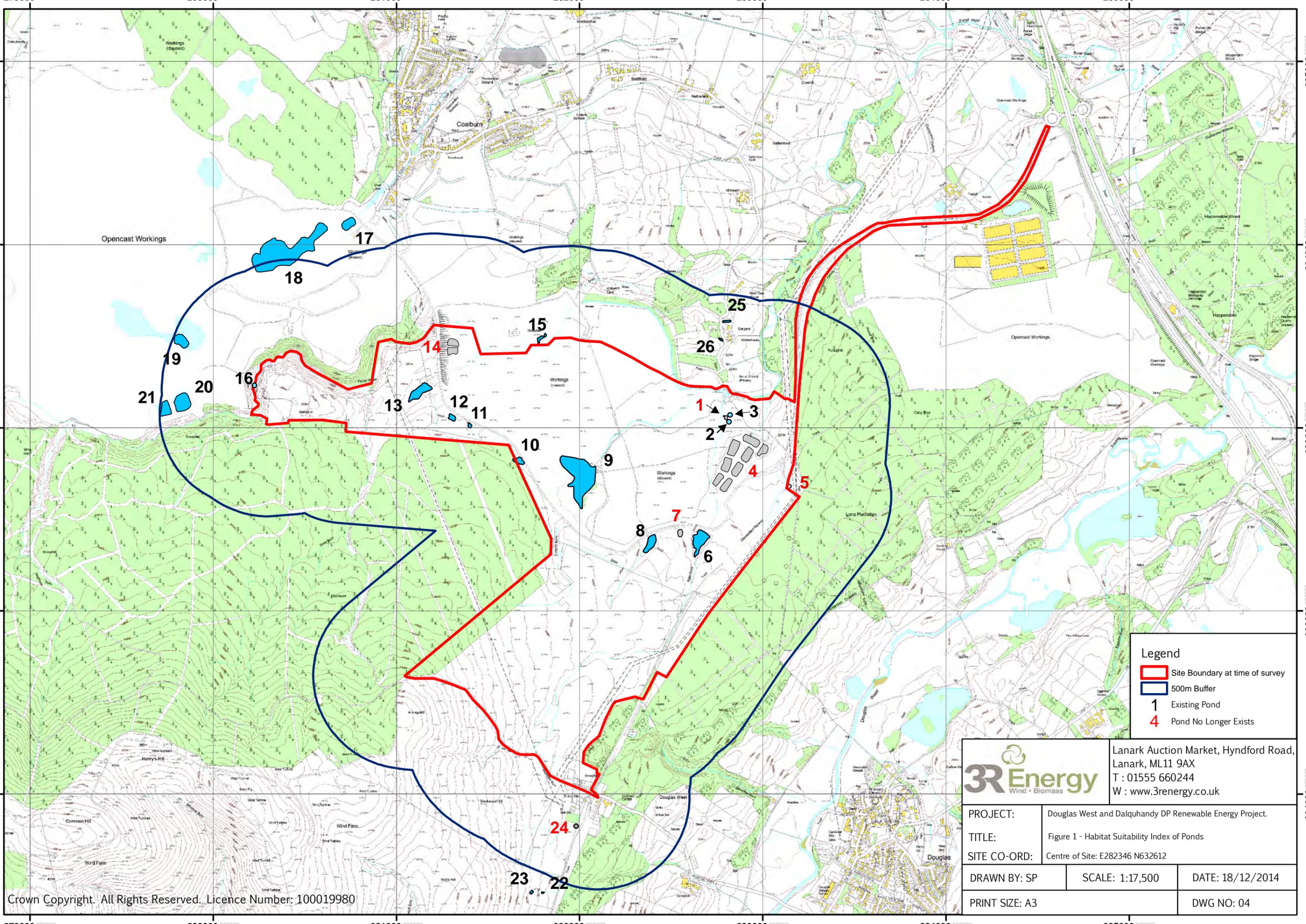
The habitat suitability of Pond 22 is therefore considered to be in the **poor** category.

Pond 23

Index	Description	Category	Score
SI1 - Location	marginal	Zone B	0.50
SI2 - Pond area	small	ca. 100 m ²	0.20
SI3 - Permanence	shown on two aerial maps; looks deep in the centre, probably never dries out	never	0.90
SI4 - Water quality	shrimps, beetle (4-5 species) and young Palmate/Smooth newt caught during netting	moderate	0.67
SI5 - Shade	very little	ca. 15%	1.00
SI6 - Waterfowl	none seen, unlikely due to small size with no impact on vegetation noticeable	absent	1.00
SI7 - Fish	unlikely	absent	1.00
SI8 - Pond count within 1 km	1 pond	0.32 ponds/km ²	0.39
SI9 - Terrestrial habitat	surrounded by acid grassland	good	1.00
SI10 - Macrophytes	Pondweeds and Water Horsetail	50%	0.80

$$\begin{aligned}
 \text{HSI} &= (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10} \\
 &= (0.50 \times 0.20 \times 0.90 \times 0.67 \times 1.00 \times 1.00 \times 1.00 \times 0.39 \times 1.00 \times 0.80)^{1/10} \\
 &= 0.0188^{1/10} \\
 &= 0.67
 \end{aligned}$$

The habitat suitability of Pond 23 is therefore considered to be in the **average** category.



- Legend**
- Site Boundary at time of survey
 - 500m Buffer
 - 1** Existing Pond
 - 4** Pond No Longer Exists



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PROJECT:	Douglas West and Dalquhandy DP Renewable Energy Project.	
TITLE:	Figure 1 - Habitat Suitability Index of Ponds	
SITE CO-ORD:	Centre of Site: E282346 N632612	
DRAWN BY: SP	SCALE: 1:17,500	DATE: 18/12/2014
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