

**Bentinck Tip and Void**

**Great Crested Newts  
Part A: Baseline Surveys and Assessment**



**October 2007  
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## CONTENTS

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Legislative Background.....	1
1.2	Survey Aims.....	1
1.3	Summary of Previous Surveys.....	5
<b>2.0</b>	<b>AMPHIBIAN SURVEY METHODS - 2007 .....</b>	<b>6</b>
2.1	Area of Survey, Timing and Survey Effort .....	6
2.2	Survey Personnel .....	6
2.3	Description of Survey Methods.....	6
2.3.1	<i>Torch Survey</i> .....	6
2.3.2	<i>Bottle Trapping</i> .....	6
2.3.3	<i>Egg Searches and Breeding Activity</i> .....	7
2.4	Contextual Survey Methods and Data Collection.....	7
2.4.1	<i>Identification and Survey of Local Pondscape</i> .....	7
2.4.2	<i>County Distribution of Great Crested Newts</i> .....	7
2.5	Survey Constraints .....	7
<b>3.0</b>	<b>AMPHIBIAN SURVEY RESULTS.....</b>	<b>9</b>
3.1	Contextual Survey: Local Distribution of Great Crested Newts and the Local Pondscape.....	9
3.2	Aquatic Habitats within Application Site.....	11
3.3	Results from Torch and Bottle Trap Surveys, 2007 .....	11
3.3.1	<i>Bentinck Void</i> .....	12
3.3.2	<i>Bentinck Tip</i> .....	14
3.4	Summary of Survey Results.....	15
3.5	Historical Survey Results .....	17
<b>4.0</b>	<b>DISCUSSION .....</b>	<b>18</b>
4.1	Population Dynamics.....	18
4.1.1	<i>Weather Conditions</i> .....	18
4.1.2	<i>Dispersal</i> .....	19
4.2	Distribution of Great Crested Newts.....	19
4.3	Aquatic Habitat Quality .....	19
4.4	Terrestrial Habitat Use .....	20
4.5	Bentinck Great Crested Newt Population in Context of Local Pondscape. 21	
<b>5.0</b>	<b>EVALUATION OF AMPHIBIAN ASSEMBLAGE.....</b>	<b>22</b>
5.1	Assessment of Amphibian Assemblage in Local and Regional Context....	22
5.2	Assessment of Amphibian Assemblage in National and International Context .....	22
5.3	Evaluation of Great Crested Newt Population using IEEM Criteria .....	23
<b>6.0</b>	<b>PREDICTED IMPACTS AND MITIGATION MEASURES .....</b>	<b>25</b>
6.1	Predicted Impacts .....	25
6.2	Outline Mitigation .....	25
	<b>SUMMARY .....</b>	<b>27</b>

### **DRAWINGS**

- Drawing 1 - Phase 1 Habitat Plan with Distribution of Great Crested Newts**
- Drawing 2 - Local Distribution of Breeding Habitat and Great Crested Newt Records**

### **APPENDICES**

- Appendix 1 - Water Bodies Habitat Descriptions**
- Appendix 2 - Records of Great Crested Newts in Nottinghamshire (NBGRC)**

## 1.0 INTRODUCTION

This report summarises the findings of great crested newt surveys at Bentinck Tip and Void undertaken between the period 1998 – 2007. It has been prepared by SLR Consulting Limited (SLR) on behalf of Waste Recycling Limited (WRL) to provide further information in support of the environmental impact assessment and mitigation proposals prepared by WRL in respect of planning proposals to reclaim Bentinck Tip and Void.

### 1.1 Legislative Background

Great crested newt is offered legal protection under The Conservation (Natural Habitats &c.) Regulations 1994 (amended 2007) and under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended) and as such it is an offence to:

- Intentionally kill, injure or take a great crested newt;
- Possess or control any live or dead specimen or anything derived from a great crested newt;
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a great crested newt; and
- Intentionally or recklessly disturb a great crested newt while it is occupying a structure or place which it uses for that purpose.

To undertake surveys for great crested newt it is necessary to hold an appropriate licence issued by English Nature. Recent changes to The Conservation (Natural Habitats &c.) Regulations 2007 have removed many of the defences of against these offences and provided tighter definitions for disturbance<sup>1</sup>.

### 1.2 Survey Aims

The Bentinck site is known to support populations of great crested newt and this species has been recorded during previous ecological surveys since 1998, summarised in Table 1 below. The available results of all surveys undertaken since 1998 are summarised in Table 2.

The aims of the survey work undertaken in 2007 were to:

- confirm the presence and population size class of great crested newts at the site;
- confirm the presence and distribution of other species of amphibians at the site, notably palmate newts;
- estimate the quality of aquatic habitat for great crested newts using the Habitat Suitability Index (HSI)<sup>2</sup>;
- identify which ponds great crested newts use for breeding;
- discuss trends in the data observed from previous and the current survey;

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<sup>1</sup> [www.defra.gov.uk](http://www.defra.gov.uk)

<sup>2</sup> R. S. Oldham, J. Keeble, M. J. S. Swan and M. Jeffcote (2000) Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*). *Herpetological Journal*, 10; 143-156

- estimate the extent of suitable terrestrial habitat for great crested newts and infer the likely migration routes between ponds and terrestrial habitat;
- identify suitable habitat for great crested newts within 2km of the site; and
- evaluate the population in the local, regional and national context.

This survey report does not provide details of mitigation proposals, which are described in a separate report.

**Table 1: Previous Ecological Surveys**

<b>Title</b>	<b>Date</b>	<b>Author</b>	<b>Summary of Information</b>
Environmental Statement	September 1998	MJ Carter for Midland Mining Ltd	Ecological section of application for restoration of Colliery Tip
Bentinck Void Supplementary Ecological Report	July 1999	Wessex Ecological Consultancy for Terry Adams	Ecological report, including amphibian survey
Bentinck Void Annual Ecological Report	April 1999	Wessex Ecological Consultancy for Terry Adams	Ecological report, including amphibian and water vole
Bentinck Void Ecology Status Report	May 2000	Wessex Ecological Consultancy for Terry Adams	General ecological survey, including amphibian survey and water vole survey
Bentinck Void Assessment of Nature Conservation Value	August 2001	Humphries Rowell Associates (HRA) on behalf of Nottinghamshire County Council	HRA undertook Phase 1 and Phase 2 vegetation and habitat surveys; breeding bird survey; casual amphibian, reptile and water vole survey.
Bentinck Void Ecological Management Plan Version 1 (Draft 2)	March 2002	Applied Environmental Research Centre	A draft plan for the construction, management and maintenance of protected species mitigation measures.
Bentinck Void Ecological Surveys	August 2002	Richard Kilshaw Ecological Services	General ecological surveys, including water vole, amphibians and birds.
Bentinck Void Ecological Surveys	May 2003	Richard Kilshaw Ecological Services	General ecological surveys, including water vole, amphibians and birds.
Bentinck Void Protected Species Surveys	May 2004	Applied Environmental Research Centre	Ecological surveys, including water vole, amphibians and birds.
Tip Area adjacent to Bentinck Void Phase 1 Habitat Survey	June 2004	Applied Environmental Research Centre	Ecological survey of colliery Tip area of the application site.
Protected Species Survey Bentinck Void	May 2005	Applied Environmental Research Centre	Survey of great created newts, birds, bats and water voles undertaken in 2005
Protected Species Survey The Pit Area	May 2005	Applied Environmental Research Centre	Survey of amphibians, birds, bats and water voles undertaken in 2005
Great Crested Newt Survey	2006	SLR Consulting Ltd	Survey of amphibians across the application site in 2006

From the surveys described above, a summary of the amphibian populations previously recorded has been compiled, and is shown in Table 2.

**Table 2: Summary of Previous Ecological Surveys**

	Location ( SLR Pond no - Drawing 1)	1998	1999	2000	2001	2002	2003	2004	2005	2006
Great Crested Newt	Tip Lakes (10)									
	Tip Lagoons (11-19)									
	Bogs F Lagoons (6-8)								6	10
	Main Void lake (1)									1
	Cuttail Brook (20)	✓	✓	✓	11			37	3	16
	Void Lagoons (2,3,4)		✓	✓	34	11	35	67	86	191
	Upper Ditch (21)									
	Void Slopes	✓								✓
Smooth Newt	Tip Lakes (10)									
	Tip Lagoons (11-19)									5
	Bogs F Lagoons (6-8)								3	2
	Main Void lake (1)	✓	✓		✓					1
	Cuttail Brook (20)	✓	✓	✓	7			6	1	3
	Void Lagoons (2,3,4)	✓	✓	✓	✓				9	13
	Upper Ditch (21)		✓							2
	Void Slopes									
Palmate Newt (presence unconfirmed)	Tip Lakes (10)									
	Tip Lagoons (11-19)									
	Bogs F Lagoons (6-8)									
	Main Void lake (1)									
	Cuttail Brook (20)	✓						1		
	Void Lagoons (2,3,4)		✓							
	Upper Ditch (21)									
	Void Slopes		✓							
Common Toad	Tip Lakes (10)	✓								
	Tip Lagoons (11-19)	✓			1				1	36
	Bogs F Lagoons (6-8)	✓							2	28
	Main Void lake (1)	✓	✓		✓			2		5
	Cuttail Brook (20)		✓							14
	Void Lagoons (2,3,4)	✓	✓	✓	✓	1		1	2	20
	Upper Ditch (21)									2
	Void Slopes									

	Location ( SLR Pond no - Drawing 1)	1998	1999	2000	2001	2002	2003	2004	2005	2006
Common Frog	Tip Lakes (10)	✓								
	Tip Lagoons (11-19)	✓								
	Bogs F Lagoons (6-8)	✓								8
	Main Void lake (1)	✓								
	Cuttail Brook (20)		✓		✓	4				4
	Void Lagoons (2,3,4)		✓	✓	✓			1	3	1
	Upper Ditch (21)									
	Void Slopes		✓							

Sources – SLR Consulting Ltd (October 2006) Bentinck Tip and Void Environmental Statement and references therein: MJ Carter 1998; WES 1999a, 1999b, 2000a; Kilshaw 2002; Kilshaw, 2003; AERC 2001; HRA 2001; AERC 2004a; and AERC 2004b; SLR Consulting, 2002; AERC (2005b); AERC (2005c); SLR Consulting 2006

**Key to Table 2:**

.- Amphibians surveyed but results negative

✓ - Amphibians surveyed, positive results

□ - Amphibians not surveyed or results not available

3 - Max counts from a single survey event (where data available)

NB – Not all surveys were conducted across all waterbodies within the application site. The absence of a record does not necessarily mean the absence of the species. Table 2 has summarised surveys by using the maximum count from each pond group; regardless of the survey date in that year. Therefore it is not possible to use this table to calculate the peak count for the site; which is taken for a single survey date and presented in Section 3.5.

**1.3 Summary of Previous Surveys**

Five amphibian species have been recorded from within the Bentinck site during previous ecological surveys. Surveys of great crested newts observed a maximum count of 205 individuals in one survey event on 19<sup>th</sup> April 2006. In addition to this, lower numbers of smooth newt, common toad and common frog have also been recorded from water bodies within the Bentinck site. Records for palmate newt are unconfirmed although small numbers have been reported in 1998, 1999 and 2004.

## **2.0 AMPHIBIAN SURVEY METHODS - 2007**

Amphibian surveys undertaken in 2007 followed the same protocols established by SLR in 2006. English Nature (EN) best practice guidelines<sup>3</sup> were followed for the survey and evaluation of populations of great crested newts. Following informal discussions with Natural England (NE), formerly EN<sup>4</sup> in 2006, it was agreed that the results from four survey visits were sufficient to establish the population size class of great crested newts within the Bentinck site and would provide a good baseline for monitoring.

### **2.1 Area of Survey, Timing and Survey Effort**

Four surveys of the application site were undertaken in 2007 to provide comparable survey results with 2006. As established in 2006, the application site was split into 2 parts, Bentinck Tip (ponds 10 – 19) and Bentinck Void (ponds 1 – 9; 20 – 25). Three additional ponds in the north-east corner of the site (23-25) were included in the 2007 surveys. These ponds had not previously been included in amphibian surveys, as they are more than 500m from the installation boundary of the landfill site.

Individual surveys on the Tip and Void were conducted by two experienced surveyors on dates as close together as practical. In accordance with EN guidelines, at least two visits were made prior to mid May, with the remaining visits in late May or early June. Survey methods used were torch survey and bottle trapping, which are described in detail below.

The survey visits were made on the evenings of 12<sup>th</sup> and 24<sup>th</sup> April, 3<sup>rd</sup>, 9<sup>th</sup>, 23<sup>rd</sup>, 29<sup>th</sup> and 30<sup>th</sup> May and 5<sup>th</sup> June 2007.

### **2.2 Survey Personnel**

The surveys were conducted by Bob Edmonds (Natural England Licence No. 20070759) and Rebecca Tarry (Natural England Licence No. 20070290) with the assistance of Eleanor Jones, Matthew Liston and Louise Irvine, all of whom are employees of SLR and experienced amphibian surveyors.

### **2.3 Description of Survey Methods**

#### **2.3.1 Torch Survey**

Following sunset, all water bodies within the survey area were systematically searched using a 1 000 000 candle power torch, for the presence of amphibians. Amphibians, notably newt species are easier to detect under these conditions. Accessible banks of each water body were scanned with the torch beam and any amphibians encountered counted. Survey of each “patch” was considered complete when all visible water area had been scanned and no further amphibians encountered.

#### **2.3.2 Bottle Trapping**

Traps were constructed from 2 litre plastic bottles, using standard designs<sup>5</sup>, and placed in suitable areas around the edge of surveyed water bodies at a density of approximately 1 trap per 5-10m of accessible bank, therefore using a similar or increased density of bottle traps to

<sup>3</sup> English Nature, (2001). *Great Crested Newt Mitigation Guidelines*. English Nature, Peterborough.

<sup>4</sup> Nick Tribe, Eastern Area Protected Species Officer, Telephone conversation 06 06

<sup>5</sup> Herptofauna Worker's Manual. Gent and Gibson (1998). JNCC

that used in 2006. Traps were usually set in areas which contained some aquatic vegetation, where present. Bottle traps were set and collected following standard practice guidelines as recommended by EN (2001).

### **2.3.3 Egg Searches and Breeding Activity**

Suitable egg laying vegetation in all ponds was inspected for evidence of great crested newt eggs during both torch light and bottle trap surveys. Other evidence of breeding activity, e.g. courtship and egg-laying were also recorded were observed.

## **2.4 Contextual Survey Methods and Data Collection**

### **2.4.1 Identification and Survey of Local Pondscape**

In addition to the detailed amphibian surveys carried out at the site, a survey of ponds within potential 2km of the main application site was undertaken. This survey identified ponds outside the application site through a review of Ordnance Survey maps, aerial photographs and data provided by Nottinghamshire Biological and Geological Records Centre (NBGRC), which included a review of all designated SINC site records within 2km of the site all and records of great crested newts.

Following the desk-based review, ponds within approximately 1km of the perimeter of the main application site were visited by an ecologist. It was not possible to gain direct access to all these ponds as they are privately owned and no amphibian surveys were undertaken. Where possible, each waterbody was surveyed using Habitat Suitability Index<sup>6</sup> (HSI) assessment methods.

### **2.4.2 County Distribution of Great Crested Newts**

Records of great crested newt within the county of Nottinghamshire were returned from the NBGRC to identify local habitat known to support great crested newt. In addition, results from recent amphibian surveys carried out by SLR in Nottinghamshire have also been referred to.

## **2.5 Survey Constraints**

Whilst access to the majority of the waterbodies surveyed was not a constraint, access was not possible to a proportion of banks due to the presence of steep and/or unstable slopes and great crested newt survey from the steepest banks were not conducted. Bentinck Void Lake was the least accessible, with only 30% of the total bank surveyed.

Access to some of the waterbodies identified within approximately 1km of the site was not possible, as they are located on private property. As much information as possible was gleaned public footpaths and aerial photographic sources in these instances.

Surveys conducted between 1998 - 2005 have been undertaken by different individuals, at different times of year and using different methods. Whilst every effort has been made in the current survey to minimise variations between individual surveys, any comparisons between different survey events, especially those conducted in previous years, should take this into account.

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<sup>6</sup> R. S. Oldham, J. Keeble, M. J. S. Swan and M. Jeffcote (2000) Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*). Herpetological Journal, 10; 143-156

Calculation of HSI values requires detailed knowledge of water quality, which has not yet been tested. Index values for water quality have therefore been inferred from visual observations relating to water clarity and diversity of the invertebrate assemblage. Macrophyte diversity varies between the ponds within the site but is not a variable within the HSI calculation.

It is considered that the surveys undertaken are sufficient to achieve the aims set out in Section 1 above.

### 3.0 AMPHIBIAN SURVEY RESULTS

#### 3.1 Contextual Survey: Local Distribution of Great Crested Newts and the Local Pondscape

Drawing 2 shows six waterbodies identified from aerial photography within approximately 1km of the main application site boundary and the records of great crested newts returned by NBGRC within the area of search.

Table 3 describes the six waterbodies surveyed in the local pondscape within approximately 1km of the application site boundary. HSI values obtained from three of the six ponds were within the range of values returned for ponds at the application site and are therefore considered, on the basis of habitat features, to have the potential to support great crested newt populations.

**Table 3: Waterbodies within approx. 1km of the Site**

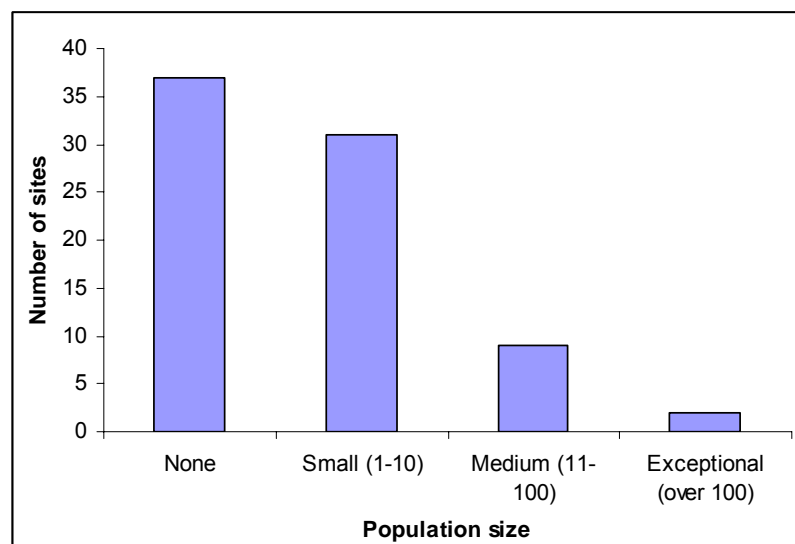
Waterbody	Location from site	Description	HSI	GCN recorded
Sherwood Park lake 1	1.2km to SE	A large rectangular lake measuring 100m x 25m with shallow grassy banks. Very little aquatic or marginal vegetation. Mallard and tadpoles.	0.71	No previous records of GCN with NBGRC
Sherwood Park lake 2	1.1km to SE	A rectangular lake of 75m x 25m with a central fountain. The banks are well-vegetated and there is some aquatic and marginal vegetation, including bulrush.	0.73	No previous records of GCN with NBGRC
Fishing lake off Mill Lane	250m to NE	Large fishing lake approximately 150m x 50m. No access possible.	Unknown but probably low, due to stocking with fish.	No previous records of GCN with NBGRC
Langton Hall pond 1	850m to NW	Approximately 70m x 30m. Banks well-shaded by trees. Private property.	Unknown.	No previous records of GCN with NBGRC
Langton Hall pond 2	900m to NW	A circular pond measuring 35m x 30m. Private property.	Unknown.	No previous records of GCN with NBGRC
Lagoon off A6019	1.4km to NW	A 6m x 4m cement-lined former settlement lagoon fed by a stream. The water is stagnant and reached a depth of 15cm at the time of survey. There is no aquatic vegetation.	0.51	No previous records of GCN with NBGRC

Drawing 2 clearly shows that ponds suitable for great crested newts are a relatively scarce resource in the local area and, with the exception of the ponds within application site, less than 1 pond per km<sup>2</sup> has been observed in the surrounding landscape. With the exception of the fishing lake off Mill Lane, none of the ponds outside the application site are within a

500m radius of known breeding ponds and therefore migration between these ponds is considered unlikely. There are numerous barriers to dispersal of great crested newts from the application site, including major roads, e.g. the M1, extensive areas of agricultural land and the River Erewash.

There are a total of 89 records of great crested newt from Nottinghamshire held by NBGRC, representing 79 discrete sites, excluding Bentinck Void. Figure 1 shows the population sizes of great crested newt sites in Nottinghamshire, where this information has been recorded. The records returned by NBGRC do not typically contain population estimates or peak count data, but populations are typically small. NBGRC records include 8 known populations of great crested newts within 10km of the application site. All these records are all a considerable distance from the application site. The closest known population is over 2.5km to the south-west of the site.

**Figure 1: The Number of Great Crested Newt Sites by Population Size (NBGRC)**



**Table 4: Records of Great Crested Newts within 10km of the Site (NBGRC)**

Square	Grid Ref.	Location	Dates	Number	Stages	Notes
4645	SK 463457	Nottingham Canal	Eastwood	06/1992	3	
4646	SK 46054646	Microlise Site, off Bailey Grove	Eastwood	01/11/2001	15	
4657	SK 465579	Nunn Brook Development, Common Lane	Huthwaite	16/04/1998	4	
4658	SK 463583	County Estate	Huthwaite	05/07/2001	Eft	Pond in coal- measures grassland
4744	SK 472440	De- acidification Plant	Awsorth	12/04/2005	Adult male	
4750	SK 476506	Freizeland Grassland	Underwood	09/05/03		Field Pond
4853	SK 4853	Bentinck Void	Ashfield	1998, 2000		Breeding in settling lagoons
5150	SK 512500	Whyburn Farm	Hucknall	13/06/1996	4	Under rubble near pond

### 3.2 Aquatic Habitats within Application Site

A variety of standing water features exist within the application site. These can be broadly classified as engineered lagoons and settling ponds, ditches and flooded topographic depressions. A description of all waterbodies surveyed is given in Appendix 1. All water bodies are illustrated on Drawing 1 – Phase 1 Habitat Plan.

### 3.3 Results from Torch and Bottle Trap Surveys, 2007

As described above, the site was split in to two survey areas surveyed on separate nights by a minimum of two surveyors. These are referred to as Bentinck Void, i.e. waterbodies 1 to 9 and 23 to 25, and Bentinck Tip, i.e. waterbodies 10 – 22. For ponds not listed in a table, no amphibians were recorded from that pond during the survey.

### 3.3.1 Bentinck Void

**Table 3A: Survey 1 - 12<sup>th</sup>/13<sup>th</sup> April**

	<b>GCN</b>	<b>Smooth Newt</b>	<b>Frog</b>	<b>Toad</b>	<b>Notes</b>
<b>2</b>	9m (T) 2m (B) 3f (T)				
<b>3</b>	2m (T) 1f (T)				
<b>4</b>	24m (T) 2m (B) 13f (T)	3m (T) 3f (T)		1 dead and diseased (B)	
<b>5</b>	2m (T) 1f (T)				
<b>24</b>			1 (T)	5 (T)	

**Table 3B: Survey 2 - 24<sup>th</sup>/25<sup>th</sup> April**

	<b>GCN</b>	<b>Smooth Newt</b>	<b>Frog</b>	<b>Toad</b>	<b>Notes</b>
<b>2</b>	16 m (T) 5 f (T) 1 f (B)	1 m (T) 3 f (T) 2 m (B) 1 f (B)			1 unidentified newt (T)
<b>3</b>	15 m (T) 8 f (T)	2 m (T) 5 f (T) 1 m (B)		2 (T)	1 unidentified newt (T)
<b>4</b>	16 m (T) 3 f (T)	4 m (T) 1 f (T)			1 unidentified newt (T)
<b>5</b>	1 m (T) 1 f (T) 1 m (B)				
<b>6</b>			1 (T)		
<b>7</b>	2 m (T)		1 (T)		
<b>8</b>	4 m (T)			1 (T)	
<b>23</b>	3 m (T) 1 f (T)				1 unidentified newt (T)
<b>24</b>			2 (T)		

**Table 3C: Survey 3 - 30<sup>th</sup>/31<sup>st</sup> May**

	<b>GCN</b>	<b>Smooth Newt</b>	<b>Frog</b>	<b>Toad</b>	<b>Notes</b>
<b>2</b>	5m (T) 5f (T) 1f (B)				
<b>4</b>	1m (T) 2f (T)	1m (B)			
<b>5</b>	1m (T) 1f (T)				
<b>23</b>	1m (T)				
<b>24</b>					Tadpoles

**Table 3D: Survey 4 - 5th/6<sup>th</sup> June**

	<b>GCN</b>	<b>Smooth Newt</b>	<b>Frog</b>	<b>Toad</b>	<b>Notes</b>
<b>1</b>					GCN egg
<b>2</b>	5m (T) 4f (T) 1f (B)	5m (B)			
<b>3</b>	6m (T) 5f (T) 1f (B)	1m (B)			GCN eggs on 1 plant
<b>4</b>	1m (T) 4f (T)	1m (B) 1f (T)			GCN eggs on 1 plant
<b>5</b>	1f (T)	1m (T)			
<b>7</b>		2f (T)			
<b>20</b>	3m (B) 1f (B)	1m (T) 2m (B) 1f (T)	1 (T)		
<b>23</b>	1m (T)	1m (T) 1m (B)			

### 3.3.2 Bentinck Tip

**Table 3E: Survey 1 - 3<sup>rd</sup>/4<sup>th</sup> May**

	GCN	Smooth Newt	Frog	Toad	Notes
<b>10d</b>	3 m (T)				

**Table 3F: Survey 2 - 9<sup>th</sup>/10<sup>th</sup> May**

	GCN	Smooth Newt	Frog	Toad	Notes
<b>14</b>	1f (T)		1(T)		Frog had unusual growth form

**Table 3G: Survey 3 - 23<sup>rd</sup>/24<sup>th</sup> May**

	GCN	Smooth Newt	Frog	Toad	Notes
<b>10d</b>	1 jm (T)				
<b>19</b>					Tadpoles (T)

**Table 3H: Survey 4 - 29<sup>th</sup>/30<sup>th</sup> May**

	GCN	Smooth Newt	Frog	Toad	Notes
<b>10b</b>	4m (T) 3f (T)				
<b>10d</b>	1f (T)				

Key:

m - male  
 f - female  
 j - juvenile  
 e - eft (larva)  
 T - torch survey  
 B - bottle trap survey

### 3.4 Summary of Survey Results

**Table 4: Summary of 2007 GCN Survey Results**

Pond No.	HSI	Max. GCN count (all years)	Max GCN count (2007)	Breeding Pond (06 and 07)	Fish present?	Other amphibian species
1	0.46	1	0 (GCN eggs)	Y	Y	SN, F, T
2	0.92	84	22	Y	N	SN, F, T
3	0.92	62	23	Y	N	SN, F, T
4	0.85	42	39	Y	N	SN, T
5	0.70	23	3	Y	Y	SN, T
6	0.68	8	0		N	SN, F, T
7	0.75	6	2		Y	SN, F, T
8	0.64	7	4		N	SN, T
10b	0.68	7	7		N	
10d	0.58	3	3		N	
14	0.75	1	1		Y	F
20	0.59	37	4		Y	SN, F, T
23	0.51	4	4		N	SN

Key to Table 4: GCN – great crested newt; SN – smooth newt; F – frog; T – toad

Great crested newts were recorded during all surveys, with a maximum torch count of 75 individuals recorded on 24th April at the Void and 8 individuals on 29th May at the Tip. The maximum count for 2007 has combined the maximum counts for Survey 2 of the Tip and the Void to give a total for the application site. As there were only five days between the two peak counts, it is considered unlikely that any individual newts were observed in both surveys.

Three other amphibian species were recorded from within the Bentinck application site. Smooth newt was recorded during all of the surveys carried out on the Void. The maximum count of 16 individuals was returned by torch survey on 24th May. No smooth newts were recorded on the Tip. Common toad was recorded during two torch counts on the Void, with a maximum of 5 individuals recorded on 12th May. Common frog was recorded during three of the torch surveys on the Void and one of the torch surveys on the Tip, with a maximum of 4 individuals recorded on the Void on 24th May.

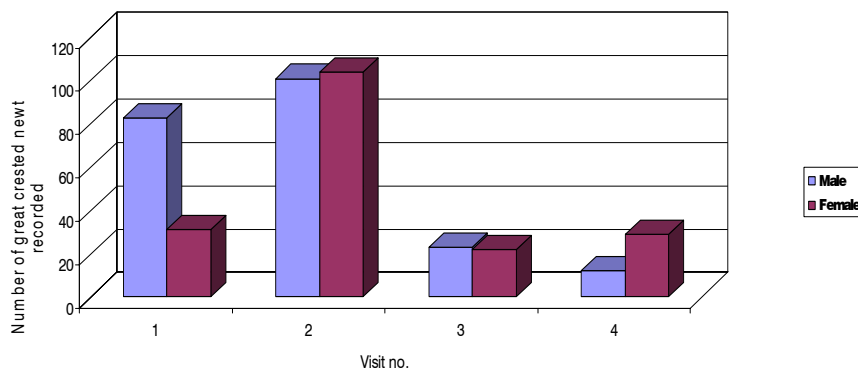
Torch survey confirmed the presence of great crested newt in a total of twelve ponds within the Bentinck site. These were ponds 1, 2, 3, 4, 5, 7, 8, 10b, 10d, 14, 20 and 23, as shown by Drawing 1. Breeding was confirmed in Ponds 1, 3 and 4 during the current survey due to the presence of eggs and/or larvae.

As in previous years, peak counts were observed within the old settlement lagoons above the Void (ponds 2 – 5). Low numbers of great crested newts were observed in ditches on this area (pond 20): this ditch and many others on the site were dry during the May surveys. Great crested newts had not previously been recorded outside the Void waterbodies, but in 2007, small numbers were observed on shallow Tip lakes (10b and 10d) and lagoons on the north-west side of the Tip (14). Great crested newts were recorded for the first time in a pond to the far north-east of the site (pond 23).

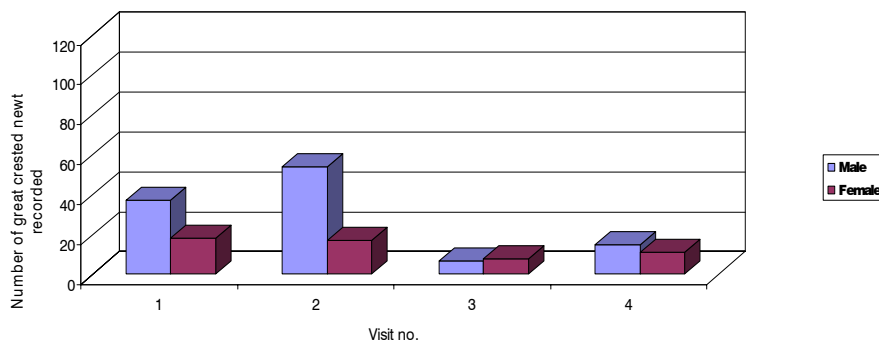
Fish have been recorded in ponds 1, 5, 7, 10a, 13, 14, 15, 16, 17, 18, 19, 20, 22 and 24. Perch of 5-7cm in length were recorded in the Void Lake (pond 1) and the remaining records were of sticklebacks. It is likely that other species of coarse fish are present in the Void Lake and evidence of discarded fishing tackle was noted along its banks. The main breeding ponds (ponds 2, 3 and 4) of the great crested newt population remain fish-free at present; although there were observations of stickleback in pond 5, which is adjacent.

Graph 1 shows total great crested newt counts in 2006 and 2007 by visit number for the Void ponds surveyed in both years, i.e. ponds 1-8 and 20. Comparison between the two years is possible, as surveys were undertaken on similar dates in both years. The graph illustrates a population peak in mid to late May in both years. This indicates that the great crested newt population is migrating to ponds within the Bentinck site to breed at a similar time each year.

**Graph 1: Total GCN counts from 2006 and 2007 surveys (Ponds 1-8, 20)**



## 2006



## 2007

Graph 1 also highlights the far smaller number of great crested newts observed at the site in 2007 than in 2006. The sex distribution for each visit in 2006 suggests that males arrived at the breeding ponds prior to females, with females remaining in the ponds for longer. In 2007, fewer newts returned to the ponds to breed, with the difference most marked in the female populations. It is possible that male newts may not have stayed as long as a result. In both years, populations in breeding ponds are shown to fall as the breeding season progresses as newts return to terrestrial habitat.

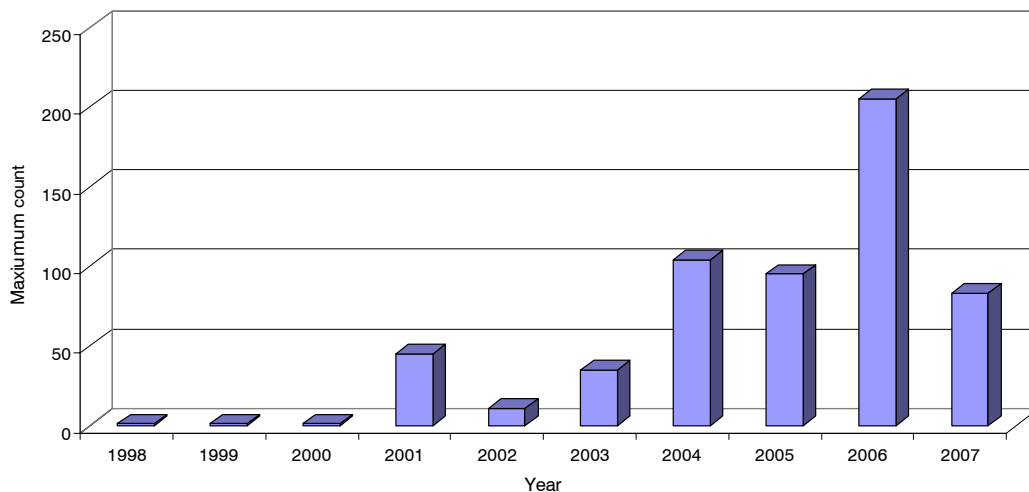
### 3.5 Historical Survey Results

Graph 2 summarises peak survey count data for great crested newts between 1998 and 2007. The 2007 peak count has combined the peak survey counts for the Void and the Tip to provide a total for the site. As the two peak counts were observed greater than one month apart, there is the possibility that up to eight individuals were counted in both surveys. However, this represents less than 10% of the total peak count for 2007.

These data show an increase in the numbers of great crested newts observed in the years 2001 to 2006. In 2007, there has been a marked decline in the numbers of great crested newts returning to breed at the ponds within the application site; with a maximum count of less than half that in 2006. Possible reasons to explain the lower numbers of great crested newts recorded in 2007 are discussed in the section below; although it is observed that the numbers of adult newts recorded in ponds in 2007 is similar to those numbers recorded in 2004 and 2005.

The four year average peak count of great crested newts at the application site is calculated as 122.

**Graph 2: Peak GCN counts from previous surveys**



NB where a survey indicated presence without quantifying population size, a value of 1 has been given to show GCN were recorded that year. Graph represents total population size for an unspecified survey area within the application site, which may not necessarily represent the same water bodies, or survey effort, for each year.

## 4.0 DISCUSSION

The results of the great crested newt survey are briefly discussed below.

### 4.1 Population Dynamics

Survey results, summarised by Graph 2, indicate that the great crested newt population at the site increased from a “good” population to an “exceptional” population between 2001 and 2006. On the basis of the survey data available in 2006 and notwithstanding the identified variations in survey techniques and survey effort, it would not have been unreasonable to conclude that the carrying capacity provided by existing habitats had not been reached and therefore that the population had capacity for further growth.

However, surveys in 2007 observed a marked decline in adult newts returning to breed and, on the basis of 2007 results in isolation, the great crested newt population would not be considered “exceptional”. Identifying the mechanisms behind the decline in numbers of breeding newts is important for understanding current and future population dynamics. If the decline in adult newts returning to breed reflects an actual population decline, and given the relative isolation of the population from other known populations or suitable waterbodies, it could indicate that the population is more vulnerable to population fluctuations than previous surveys suggest.

There are a number of hypotheses that could explain the fluctuations observed; including: weather conditions, the population has reached carrying capacity and/or aquatic or terrestrial habitat quality has declined. Each of these hypotheses are discussed in more detail below.

#### 4.1.1 Weather Conditions

Great crested newts usually migrate from terrestrial habitats to breeding ponds in March, April and May as ground temperatures increase from winter lows. Winter 2006/7 was exceptionally mild and Nottinghamshire experienced fewer frost nights than typical. Observations of great crested newts from elsewhere in the Midlands suggest that newts returned to breeding ponds as early as February. It is possible that adult newts returned and bred at Bentinck earlier than usual, reducing the height of the peak experienced in May and therefore the numbers recorded during the survey.

April 2007 was exceptionally warm and dry in the Midlands, with mean temperature 3.6°C greater than the 1961-1990 average and rainfall 16% lower<sup>7</sup>. In contrast, April 2006 saw above average rainfall and mean temperatures close to the average in the Midlands.

The lower ditch on the Void side (pond 20) was dry for the first three visits of 2007. Great crested newts were recorded in this ditch in March and April 2006, and, when wet, it is likely to be an important conduit for newts commuting from terrestrial habitat on the eastern flanks of Bentinck Void to the breeding ponds, particularly as it does not support fish.

It is therefore possible that adult newts may have decided to remain in terrestrial habitat longer, or not to return to breeding ponds at all, in order to avoid desiccation whilst returning to the breeding ponds. The uncharacteristic weather may also have affected the abundance or availability of food resources.

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<sup>7</sup> Met Office (2007). Website accessed at <http://www.metoffice.gov.uk/climate/uk/2007/april/averages1.html> on 5th July 2007.

### 4.1.2 Dispersal

It is possible that breeding habitat in Void Lagoons 2,3 and 4 reached or exceeded their carrying capacity in 2006. Water levels in these ponds was considered lower than observed in 2006, which could have contributed to a squeeze on breeding habitat availability in these ponds. These factors could have encouraged mature adult newts to migrate in search of new waterbodies in which to breed. This may explain the decline in numbers of adult newts breeding in Void Lagoons 2, 3 and 4 and the observed spread of great crested newts to new ponds across the site.

There may be other factors affecting the distribution of newts across the site which are discussed in the next section.

## 4.2 Distribution of Great Crested Newts

From 2001 to 2006, the distribution of great crested newts within the application site was broadly comparable. The population was centred on the old settlement lagoons to the east of the Void lagoon, ponds 2, 3, 4 and 5.

In 2007, great crested newts were observed in a further four ponds for the first time. These were Tip lakes 10b and 10d; Tip lagoon 14 in the far north of the site; and pond 23, one of three isolated ponds in the north-east of the site. As Table 7 shows, great crested newt numbers in 2007 were still greatest in the Void Lagoons, thus 2007 results represent an expansion of range, rather than a shift in distribution.

The presence of great crested newts in 2007 in ponds a considerable distance from the previously recorded range is of interest. The dispersal of adult great crested newts over 750m within 12 months and through the suboptimal terrestrial habitat of the sparsely vegetated Bentinck Tip would have been necessary for these individuals to have reached those ponds that are furthest from the main breeding ponds. Jehle (2000) determined that 95% of summer newt refuges are located within 63m of a breeding pond<sup>8</sup>. Trapping surveys have recovered few great crested newts at distances greater than 100m<sup>9</sup>. It is quite possible that this recent and rapid dispersal of great crested newts across the site has been aided by human intervention and therefore the notion that great crested newts are expanding their range in response to natural population drivers should be viewed with caution.

It is considered likely that despite the increased distribution of great crested newts throughout the application site the population functions as a single meta-population.

## 4.3 Aquatic Habitat Quality

The HSI values of all ponds in which great crested newts have been observed are within the range at which breeding adults have been recorded (Oldham et al, 2000), although those ponds with the highest HSI values have consistently supported the greatest numbers of great crested newts.

Notwithstanding other factors, the population size of great crested newts is likely to be effected by the suitability of the aquatic habitat. Features decreasing the suitability of ponds within the application site include:

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<sup>8</sup> Jehle, R. (2000) 'The terrestrial summer habitat of radio-tracked great crested newts (*Triturus cristatus*) and marbled newts (*Triturus marmoratus*)'. *The Herpetological Journal*, 10 (4), 137-142.

<sup>9</sup> Cresswell, W. and Whitworth, R. (2004) *An assessment of the efficiency of capture techniques and the value of different habitats for the great crested newt Triturus cristatus*. English Nature Research Reports, Number 576.

- presence of fish;
- lack of vegetation suitable for egg laying;
- lack of open un-vegetated areas for courtship;
- reduced connectivity with suitable terrestrial habitats; and
- reduced connectivity of suitable aquatic habitats.

Five of the thirteen ponds where great crested newts were recorded support fish; however, these ponds only supported small numbers of newts and breeding activity was only observed in one of these ponds, the Void Lake (pond 1).

Stickleback was recorded for the first time in pond 5, the lowest of the Void lagoons. Whilst downstream of the other three Void lagoons, this pond is connected by overflow pipes and within 10m of all three ponds. It is likely that stickleback will continue its colonisation of the waterbodies within the site, through accidental introduction, for instance by a dog or on fishing tackle or boots; or by birds, foxes etc. The continued spread of fish through aquatic habitats is considered to be a serious threat to population of great crested newts. It is recommended that human activity in the vicinity of the Void lagoons is minimised to reduce the risk of accidental introductions of fish.

#### 4.4 Terrestrial Habitat Use

Natural England<sup>10</sup> suggests that suitable terrestrial habitats up to 500m from great crested newt breeding ponds may be used by newts for foraging, resting and hibernation. This area is shown on Drawing 1.

Data from current and previous amphibian surveys and Phase 1 habitat surveys undertaken at the application site have been used to estimate the most likely areas of suitable and accessible great crested newt habitat. These habitats are also illustrated on Drawing 1.

“Good quality” terrestrial habitats have been broadly defined as lightly or ungrazed grassland, ruderal grassland habitats, damp grassland and wetlands, scattered and continuous scrub, hedgerows and semi natural woodland close to breeding ponds or connected by linear habitat features, e.g. ditches or hedgerows. The area of “good quality habitat” within 500m of the principle breeding habitats is approximately 15ha.

Low to moderate quality terrestrial foraging habitat has been broadly defined as heavily grazed grassland, sparse ruderal and bare ground habitats occurring within 500m of known breeding ponds. These habitats usually offer fewer habitat connections and fewer micro-habitats, e.g. refuges or damp hollows, suitable for great crested newts.

Great crested newt hibernation sites have been provisionally identified during amphibian surveys. These sites include:

- a 40m<sup>2</sup> partially buried rubble pile at the northern end of lagoon 4;
- the base of hedgerows marking the eastern fields and eastern boundary of the site; and
- cracks and fissures on the eastern slopes, especially ditches.

Great crested newt was recorded in 2007 from aquatic habitat more than 500m from the known breeding ponds and in habitats considered to be of low suitability, e.g. ponds 10b, 10d, but no signs of breeding were observed. The absence of signs of breeding may

represent the recent colonisation of ponds by small numbers of great crested newts or may reinforce the concept that newts were aided in their movement to these aquatic habitats via terrestrial habitats of low to moderate quality.

#### **4.5 Bentinck Great Crested Newt Population in Context of Local Pondscape**

It is unlikely that any waterbodies outside the application site are a significant part of the meta-population found at the application site. Due to the distances involved and the barriers to dispersal it is considered unlikely that there is currently significant migration between ponds on and off site and it is unlikely that migration is important for the maintenance of the population of great crested newts within the application site.

Nearest recorded population is approximately 2.5km to the south west of the site and is well beyond the distance that it is reasonable for great crested newts to be expected to colonise.

## 5.0 EVALUATION OF AMPHIBIAN ASSEMBLAGE

The current ecological survey has confirmed that the application site supports an amphibian assemblage comprising great crested newt, smooth newt, common frog and common toad. Despite previous unconfirmed records of palmate newt, the presence of this species was not confirmed during the current survey.

Taking an average of peak counts from the last four years to allow for population fluctuations, ponds within the application site support an “exceptional” population of great crested newts, as defined by Herpetofauna Workers’ Manual<sup>11</sup>. Based on these criteria, the application site also supports a “good” population of smooth newt. Population counts of common frog and common toad, based on observed adults, indicate that these populations are low.

### 5.1 Assessment of Amphibian Assemblage in Local and Regional Context

NBGRC holds the most comprehensive database of amphibian records in the county, but still consider that amphibian species are under-recorded in Nottinghamshire<sup>12</sup>. NBGRC hold a total of 89 records for great crested newts in the county with eight records of great crested newts within 10km of the application site. These records are attached in Appendix 2. Great crested newt has a scattered distribution throughout the county. Typically, records do not include peak count data, but where these data are included, they indicate that the average population size of great crested newts in the county is approximately 20 i.e. a moderate population, although this data is skewed by a small number of sites with very large populations. Of the sites where population size was recorded, 74% support small populations of great crested newts (1 to 10 individuals).

The four-year average peak count of great crested newts at the application site between 2004 and 2007 is 122. This is significantly larger than the average size of great crested newt sites in the county and is third largest recorded in Nottinghamshire. If annual peak count is considered – 205 individuals in 2006 – the population at Bentinck is the second largest recorded in the county. The population of great crested newts at Bentinck is clearly of county importance.

Informal discussions with Natural England<sup>13</sup> in 2006 suggest that the observed assemblage, in particular the population of great crested newts recorded at Bentinck would represent one of the largest recorded populations in the Eastern Area region.

### 5.2 Assessment of Amphibian Assemblage in National and International Context

Great crested newt is widespread throughout much of England and Wales, but occurs only sparsely in south-west England, mid Wales and Scotland. The total UK population is relatively large and the national population has been estimated at around 400,000 animals in 18,000 breeding sites. Many of the largest populations are centred on disused mineral-extraction sites, but lowland farmland forms the majority of great crested newt habitat in the UK.<sup>14</sup>

<sup>11</sup> Herpetofauna Workers Manual. Gent and Gibson (1998): “Exceptional” populations > 100 individuals; “Good” populations 10 – 100 individuals; “Low” populations <10 individuals recorded in a single survey event.

<sup>12</sup> Peter Action, NBGRC – pers comm..

<sup>13</sup> Nick Tribe, Eastern Area Protected Species Officer, Telephone conversation 06 06

<sup>14</sup> <http://www.jncc.gov.uk/ProtectedSites/SACselection/species.asp?FeatureIntCode=S1166>

Using the selection criteria for amphibian SSSI (as described in Herpetofauna Workers' Manual), the recorded population of great crested newts at Bentinck contributes to an exceptional amphibian assemblage; this assemblage would currently score 8 points; calculated as follows: 3 points for exceptional population of great crested newt; 2 points for good population of smooth newt; 1 point each for low populations of common frog and common toad and 1 point for an assemblage of 4 species. It should be noted that using this method frog and toad populations are estimated by spawn counts; in this case SLR has estimated population size on number of adults observed. Natural England recommends that 10 points would constitute a qualifying score for SSSI site selection.

However, SSSI guidelines also state that where a count of great crested newts exceeds 100 individuals, usually recorded over a period of a minimum of three years, a site could be considered for designation as a SSSI on the basis the great crested newt population alone. A maximum count greater than 100 was recorded in 2006 and 2004 but not in 2005 and 2007. The four year average count is 122 and therefore this criterion for SSSI selection can be met for the population of great crested newts within the application site.

Any breeding site of great crested newt adjacent to an existing SSSI should be considered for inclusion in the SSSI. Furthermore, a site with an amphibian assemblage score of 5 or more should also be considered for inclusion within an adjacent SSSI. The site satisfies both of these criteria for consideration for SSSI selection.

The selection criteria for Special Areas of Conservation (SAC) as defined by JNCC are based upon quantitative measures of habitat and population size and through the application of 'best expert judgement'. Best expert judgement is considered by JNCC to offer the most robust method of selecting statutory sites of international importance<sup>15</sup>.

There are 32 SAC's designated for their populations of great crested newts, with 22 of these sites where great crested newt is the primary designated feature. SACs have been selected where there is evidence of a relatively large and robust population of great crested newts and the SAC series represents the wide range of habitat types used by the species, including pastoral and arable farmland, woodland, grassland, coastal habitats and disused mineral-extraction sites. Geographical representation of different areas within the species' range has also been taken into account."<sup>16</sup> JNCC states that for widely distributed species and habitats, including great crested newts, "*only a proportion of the total national and Community resource will be protected within SACs*"<sup>17</sup>

The recorded population of great crested newts within the application site is within the population ranges recorded for this species at SAC designated sites<sup>18</sup>.

### 5.3 Evaluation of Great Crested Newt Population using IEEM Criteria

The IEEM<sup>19</sup> states that the value or potential value of an ecological resource or feature should be determined within a defined geographical context. The guidelines also state that where areas are not currently designated, but that they are considered to meet the criteria for designation and the relevant designating authority agrees that the site merits a different

<sup>15</sup> <http://www.jncc.gov.uk/page-1474>

<sup>16</sup> <http://www.jncc.gov.uk/ProtectedSites/SACselection/species.asp?FeatureIntCode=S1166>

<sup>17</sup> <http://www.jncc.gov.uk/page-1483>

<sup>18</sup> <http://www.jncc.gov.uk/ProtectedSites/SACselection/species.asp?FeatureIntCode=S1166>

<sup>19</sup> Institute of Ecology and Environmental Management (July 2006) *Guidelines for Ecological Impact Assessment*.

designation, this should be reflected in the assessment. Where there is doubt, a conservative approach should be taken and the current designated value used<sup>20</sup>.

Bentinck Void is designated SINC by Nottinghamshire County Council, at least in part due to the population of great crested newts present, it is therefore assessed that the amphibian assemblage is valuable at a county level.

SLR's review of the county records for great crested newts; the assessment of Natural England that the population is likely to be one of the largest in the Eastern Area region; and the assessment using selection criteria for amphibian SSSI above all indicate that the amphibian assemblage at the application site is conservatively assessed as of at least regional value.

Great crested newt is acknowledged as under-recorded in the county; although nationally it is a relatively well-recorded species that is widespread in lowland England. Population counts similar to those recorded at the application site are not uncommon in suitable lowland England habitats.

The amphibian assemblage should only be considered of national or international significance following either designation as a SSSI or SAC or through the best expert judgement of Natural England.

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<sup>20</sup> Institute of Ecology and Environmental Management (July 2006) *Guidelines for Ecological Impact Assessment*. Page 22; Para 3.15

## 6.0 PREDICTED IMPACTS AND MITIGATION MEASURES

### 6.1 Predicted Impacts

Amphibian populations including an “exceptional” breeding colony of great crested newts, are concentrated upon the well-vegetated lagoons 2, 3, 4, 5 and the lower ditch of the Cuttail Brook within Bentinck Void. As a result of this proposed development the terrestrial and breeding habitats of this assemblage. In the absence of mitigation, this effect is considered to be a significant impact upon an ecological receptor of Regional value.

Notwithstanding legal protection, the loss of other ponds where small numbers of great crested newts have recently been recorded, but are not breeding, i.e. lagoons 6, 7, 8 and the Bentinck Tip Lakes 10b and d and Lagoon 14 are not considered significant in terms of the maintenance of this population and the predicted impact of the loss of these waterbodies is not significant.

### 6.2 Outline Mitigation

Mitigation measures for great crested newt are discussed more fully in the Ecological Mitigation Management and Monitoring Plan (Annex 13/12). A diverse range of habitats will be created for great crested newts within the development. It is proposed that four new mitigation areas will be created, whilst some existing habitats will be retained and enhanced. It is currently proposed to only translocate amphibians to the largest of these four areas, the Eastern Area. Proposed habitat creation in the Eastern Area includes a maximum of 4775m<sup>2</sup> of aquatic, marginal and wetland habitats, which will include the following features:

- large open areas suitable for courtship;
- extensive areas of marginal vegetation, including reedbeds;
- shallow aquatic habitats and drawdown areas; and
- deep, up to 2m, areas of water.

The other three areas are considered to be sufficiently close and connected by suitable habitats to allow natural migration from this main area once the population is established. In addition, mitigation for great crested newts will include:

- Creation of artificial hibernacula, maintenance and enhancement of adjoining of semi-improved grassland to provide suitable terrestrial habitat;
- Erection of amphibian-proof fencing prior to landfill construction to separate great crested newts from the construction disturbance and the operational landfill area.
- Maintenance of amphibian-proof fencing to prevent translocated newts from entering operational landfill areas for the duration of the development.
- Monitoring and maintenance of replacement habitats and great crested newt populations for 25 years with the aim of maximising the quality of the replacement amphibian habitats.
- Exclusion and translocation of great crested newts from their habitats within the development area, including known breeding ponds (no's 2, 3, 4 & 5), other ponds and terrestrial habitats, to the established replacement ponds under an EPS licence.

- Continued monitoring and maintenance of translocated habitat throughout life of development and 5 year aftercare period.

These mitigation measures would also be applied to other amphibian species; ensuring that all species within the amphibian assemblage are maintained in a favourable conservation status.

## SUMMARY

Previous surveys have recorded great crested newts from the application site. The current survey was commissioned to:

- confirm the presence and population size class of great crested newts at the site;
- confirm the presence and distribution of other species of amphibians at the site, notably palmate newts;
- estimate the quality of aquatic habitat for great crested newts using the Habitat Suitability Index (HSI);
- identify which ponds great crested newts use for breeding;
- discuss trends in the data observed from previous and the current survey;
- estimate the extent of suitable terrestrial habitat for great crested newts and infer the likely migration routes between ponds and terrestrial habitat;
- identify suitable habitat for great crested newts within 2km of the site; and
- evaluate the population in the local, regional and national context.

The 2007 survey observed that the great crested newt population remains centred on the Void Lagoons, ponds 2, 3 and 4; with these three ponds supporting the greatest numbers of adult newts. Great crested newts were observed to be more widely distributed than in 2006, with new records of small numbers of non-breeding newts from ponds 10b, 10d and 14. The reasons for this apparently rapid dispersal are discussed and include changes in weather conditions, other habitats reaching carrying capacity and human intervention. Ponds 21, 22 and 23, which are at the north-east extremity of the application site were surveyed for the first time and a small population of great crested newts was observed in pond 23.

It is considered likely that despite the increased distribution of great crested newts throughout the application site the population functions as a single meta-population. It is unlikely that any waterbodies outside the application site are a significant part of the meta-population found at the application site.

The 2007 survey observed a maximum count of 75 adult great crested newts at the Void and 8 at the Tip during single torch counts. Whilst this result alone does not meet the criterion of an “exceptional”<sup>21</sup> population of this species, the four year mean peak count of 122 confirms that the application site supports an “exceptional” population of great crested newts. The application site also supports populations of common toad, common frog and smooth newt.

Part of the application site, which includes the majority of great crested newt habitat, is designated at a county level, i.e. Bentinck Void SINC, and is considered to be of ecological value in a county context. The results of the 2007 survey have confirmed SLR’s opinion that the amphibian assemblage is conservatively assessed as of at least regional ecological value.

The amphibian assemblage meets some of the criteria for the selection of biological SSSIs and can be compared to populations recorded at sites designated as SAC. However, ecological value at the national and international level is determined by a wide range of other factors, not simply population size. Both IEEM and JNCC consider that ‘best expert opinion’ is the most appropriate method of determining value of ecological features at this scale. At

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<sup>21</sup> based on criteria in the Herpetofauna Workers’ Manual (1998)

present, the amphibian assemblage at the application site has not been designated SSSI. It is therefore considered that at present this assemblage cannot be assessed as being of national or international value.

It is predicted that the proposed development would have a significant effect upon this population of great crested newts in the absence of mitigation. The Ecology chapter of the Environmental Statement fully describes the predicted impacts upon this population (see Annex 13/1). Outline mitigation measures are presented in this report and more fully in the Ecological Mitigation, Management and Monitoring Plan.

## **APPENDICES**

## Water Body Habitat Descriptions

Pond No.	Name	Description	HSI (2 d.p.)
1	Void Lake	The margins of the flooded void are steep with a narrow margin of reed mace ( <i>Typha latifolia</i> ), soft-rush ( <i>Juncus effusus</i> ), tufted hair-grass, alder, yellow sedge (cf. <i>Carex demissa</i> - not in flower), gypsywort ( <i>Lycopus europaea</i> ), brooklime ( <i>Veronica becabunga</i> ). The void drains to the north via a 50m long channel dominated by dense goat willow.	0.46
2	Old Settlement Lagoon	Supports a fringing margin of reed mace and soft-rush with broad-leaved pondweed an occasional aquatic plant. The lagoon is surrounded by unmanaged grassland.	0.92
3	Old Settlement Lagoon	Supports a fringe of reed mace, soft-rush and great willowherb with occasional aquatic broad-leaved pondweed ( <i>Potamogeton</i> sp.). Evidence of brown rat ( <i>Rattus norvegicus</i> ) and water vole burrows and latrines.	0.92
4	Old Settlement Lagoon	Supports a broad margin of reed mace with soft-rush, hard-rush, willowherb and frequent broad-leaved pondweed and occasional water forget-me-not ( <i>Myosotis scorpioides</i> ). Occasional scattered scrub of goat willow, birch ( <i>Betula pendula</i> ) and alder. To the north is an extensive rubble mound, partially vegetated by rough grassland that could act as a herptile hibernaculum	0.85
5	Old Settlement Lagoon	This lower lagoon is completely dominated by reed mace and hard-rush. Surrounded by species-rich, unmanaged secondary calcareous grassland.	0.70
6	Ephemeral Pond	Ephemeral pond above western bank of main lagoon, vegetated with reed mace and rushes. The banks surrounding this pond are sparsely vegetated and slope steeply south-west to north east.	0.68
7	Bog's Farm Lagoon	Lagoon at Bog's Farm currently holding water, although with a sparse marginal vegetation of reed mace, tufted hair-grass and soft-rush.	0.75
8	Bog's Farm Lagoon	Lagoon at Bog's Farm currently holding water, although with a sparse marginal vegetation of reed mace, tufted hair-grass and soft-rush. Lagoon 8 was dry	0.64
9	Ephemeral Woodland Pond	This woodland pond is heavily shaded by surrounding trees and in a wider context is surrounded by grazed pasture. Due to the presence of cattle, the banks are heavily poached and do not support any significant aquatic vegetation.	0.44

# APPENDIX 1

Pond No.	Name	Description	HSI (2 d.p.)
10a	Tip Lake	A large lagoon formed in the coal tip which measures approximately 100m by 40m. Vegetation is sparse with flote grass along much of the margins and occasional soft rush, common reed and great reedmace	0.52
10b	Tip Lake	A dog leg shape lagoon of varying depth. To the west is a shallow scrape with deeper water to the east. Vegetation is limited to the perimeter of the water body and scrape are, with greater reedmace and jointed rush ( <i>Juncus articularis</i> )	0.68
10c	Tip Lake	A lagoon measuring approximately 15m by 5m with shallow scrape margins at the perimeter. Vegetation comprises greater reedmace, jointed rush and common club-rush ( <i>Schoenoplectus lacustris</i> ).	0.51
10d	Tip Lake	A small lagoon, measuring 8m by 4m, with shallow margins and maximum depth of 2m. Vegetation comprises soft rush, greater reedmace and flote grass.	0.58
10e	Tip Lake	A shallow scrape measuring 80m by 20m with a single stand of greater reedmace	0.61
10f	Tip Lake	A large lagoon measuring approximately 150m by 90m, with obvious significant depth. The lagoon is sparsely vegetated with only a few stands of common reed present along the south western margin.	0.56
10g	Tip Lake	The largest of the tip lakes, measuring approximately 100m by 90m, with obvious significant depths past the marginal shelf. Vegetation is sparse with only a scattered few stands of common reed present.	0.65
11	Tip Lagoon	A square lagoon which although has steep deep sides, contains little water and has a dumped motorcycle in it.	0.42
12	Tip Lagoon	A small lagoon which is largely choked by greater reedmace. This lagoon is fed by an inflow pipe which is maintaining a water level of approximately 15cm.	0.67
13	Tip Lagoon	A rectangular lagoon measuring 15m by 10m with very no emergent vegetation. A water depth of 30cm maximum.	0.68
14	Tip Lagoon	A small square lagoon measuring approximately 12m x 8m which is choked by greater reedmace.	0.75
15	Tip Lagoon	A small rectangular lagoon with very steep sides. There is no emergent vegetation and it is over shaded by the surrounding trees.	0.71
16	Tip Lagoon	A rectangular lagoon of varying depth. One end is dry and supports stands of greater reedmace. The other end holds water and stands of greater reedmace, with the waters surface covered in algae.	0.77
17	Tip Lagoon	A broadly rectangular lagoon connected to pond 18 by an inflow pipe. There is no emergent vegetation and the surface is covered in a thick layer of algae.	0.64

# APPENDIX 1

Pond No.	Name	Description	HSI (2 d.p.)
18	Tip Lagoon	A broadly rectangular lagoon connected to pond 18 by an inflow pipe. There is no emergent vegetation and the surface is covered in a thick layer of algae.	0.69
19	Tip Lagoon	A steep sided rectangular lagoon measuring 50m by 30m. Vegetation is sparse with only a few stands of soft rush present.	0.76
20	Lower Ditch	This lower ditch has scattered alder ( <i>Alnus glutinosa</i> ), great willowherb, hard-rush. The southern end appears more permanently wet, whilst the northern end is ephemeral.	0.59
21	Upper Ditch	The upper ditch had a low flow at the time of survey and supported abundant hard and soft-rush, with lesser reed mace, tufted hair-grass, Yorkshire fog and colt's-foot.	0.52
22	Western Ditch	This ditch was flowing at the time of survey and drained water from ponds 7 and 8 before entering the main ditch at the southern end of the application site.	0.58
23	NW Lagoon	A small lagoon of 2m x 1m with fly-tipped rubbish.	0.51
24	NW Pond	A steep-sides rectangular lagoon with much rubbish (tyres, fridges etc). Well-vegetated on southern bank by trees. Approximately 10m x 4m.	0.58
25	NW Pond	A small, sprawling ephemeral pond measuring approximately 4m x 1.5m. It has dense aquatic vegetation.	0.55

## APPENDIX 2

Thank you for consulting Nottinghamshire Biological and Geological Records Centre (NBGRC). Having carried out a search of our records I can provide you with the following information.

Square	Grid Ref.	Location	Dates	No.	Stages	Notes
4645	SK 463457	Nottingham Canal Eastwood	Jun-92	3		
4646	4605 4646	Microlise Site off Bailey Grove Eastwood	01/11/2001	15		1 found dead then 3 live on site 15 found under rubble Nov 2001
4657	SK 465579	Nunn Brook Development, Common Lane Huthwaite	16/04/1998	4		
4658	SK 463583	County Estate Huthwaite	05.07.2001		Efts	Pond in coal-measures grassland
4743	SK 4743	Bennerley Marsh	2000			Follow up
4743	SK 474439	De-acidification ponds Awsworth	11.06.03			
4743	SK 474439	De-acidification Plant Awsworth	10.06.04		Adults	
4743	SK 474439	De-acidification Plant Awsworth	12.04.05		Breeding	
4744	SK 472440	De-acidification Plant Awsworth	12.04.05		Adult male	
4750	SK 476506	Freizeland Grassland Underwood	09.05.03			
4853	SK 4853	Bentinck Void Ashfield	1998, 2000			Breeding in settling lagoons
4935	SK 497350	Toton Beeston	Jul-95			Unconfirmed
4936	SK 494366	Toton Lane Allotments Beeston	17/03/1991	17		Population relocated 1992. Housing development

## APPENDIX 2

4938	SK 497386	36, Mayfield Drive Beeston	1993	1		Seen in 1993 but not 1994 - 95
4941	SK 491419	Concrete Tank East of Robinettes Arm Cossall	1995			
4941	SK 491419	Pond West of Oldmoor Wood Cossall	05/05/1989			May be same pond as 491 419/1
5039	SK 506395	Flood pool by Ballon Woods Nottingham	27/06/1988	2		
5041	SK 5041	Kennels Farm Strelley	1995			Unconfirmed
5135	SK 510358	3, Westbury Close, Chilwell Beeston	1997	2		
5150	SK 512500	Whyburn Farm Hucknall	13/06/1996	4		Under rubble near pond
5240	SK 522402	8, Ewell Road, Wollaton Nottingham	1993			Allotments nearby. 500m west of Martin's Pond.
5240	SK 525402	Martin's Pond Local Nature Reserve, Wollaton Nottingham	1975, 1998			
5428	SK 549282	Holme Close, 375 Leake Road Gotham	1989, 23/07/1996	7		Pond in old orchard. Installed 1986. 7 1989; 60 1993; 7 1996.
5459	SK 541594	263, Nottingham Road Mansfield	07/05/1995	2		Unconfirmed

## APPENDIX 2

5523	SK 558238	Stanford Hall Stanford on Soar	1989			
5527	SK 555278	Water Storage Pond East Leake	1985	29		British Gypsum Works
5679	SK 564796	Lady Lee Quarry Nature Reserve Rhodesia	1989			
5728	SK 5728	Bunny Wood Bunny	1992	1		Found hibernating in wood
5728	SK 574283	Ash Lane Bunny Hill	2004			
5732	SK 575320	MOD Depot (now Ruddington Country Park) Ruddington	1984			Concrete water storage tanks. Relocated as tanks being filled in
5843	SK 5843	Tunstall Road, Woodthorpe Nottingham	2000	5		Put in when another pond was infilled
5929	SK 596296	Bunny Hall Park Keyworth	Jul-89			
5935	SK 596352	Hollywell', Wellin Close Edwalton	1989			
5938	SK 5938	Pinder's Pond, Simpkins Farm, Adbolton holme Pierrepont	1993	50		
6027	SK 603278	Pond Wysall	May-95			
6027	SK 608272	Old Vicarage Wysall	1998			

## APPENDIX 2

6031	SK 609317	27, Rancliffe Avenue Keyworth	30/06/1989	-40		In foundations of garage being demolished. Relocated to Wilwell/Keyworth N.R.'s
6129	SK 610290	Keyworth Meadow Nature Reserve No.3 Keyworth	1998			
6129	SK 612291	Keyworth	1987	6		
6134	SK 6134	83, Tollerton Lane tollerton	Mar-97	20/30		
6225	SK 624257	Home Farm Willoughby-on-the- Wolds	08/04/1992			
6229	SK 622291	North Lodge Farm Widmerpool	1987	5		Amphibian Survey 1987 (pre NWT/NBRC)
6324	SK 639249	Willoughby-on-the- Wolds	1977			Site visit SW/CP/JO 23/07/1995. Pond dry and surrounded by trees
6325	SK 6325	121, Main St Willoughby-on-the- Wolds	22/02/1999			Found on lawn
6373	SK 632737	Little Oak Pond, Clumber Park worksop	18/08/1988 , 27/07/1991			20+ ad. 1988

## APPENDIX 2

6373	SK 634739	DeerLay, Clumber Park Worksop	18/08/1988	1		Pond in Woodland surrounded by Heathland
6473	SK 644732	Blythe Corner Pond, Clumber Park Worksop	2000(?)			Unconfirmed
6478	SK 645785	Gorse Whin Covert Osberton	2003		Breeding unconfirmed	
6530	SK 651307	Stanton-on-the-Wolds	1987	23		Amphibian survey pre NWT/NBRC
6538	SK 6538	Barn Farm Cottage Radcliffe-on-Trent	1993			Introduced from Keyworth Nature Reserve. Not seen since introduction up to Aug., 1995
6539	SK 655396	93, Clumber Drive Radcliffe-on-Trent	Jun-89	15		Night counts
6539	SK 6539	32, Newstead Avenue Radcliffe-on-Trent	2001			
6560	SK 656606	Bilsthorpe Landfill Bilsthorpe	13.04.04			
6560	SK 654604	Bilsthorpe Landfill Bilsthorpe	13.04.04			
6625	SK 666258	Vicarage Pond Willoughby-on-the-Wolds	23/07/1995	1		
6751	SK 678514	Picnic Site Pond Halloughton	29/04/1993	4		
6751	SK 672518	Halloughton Wood Halloughton	5.2004			
6751	SK 678514	Picnic Site Halloughton	01.04.04		3 Adult Female and 1 1st year	Only small area of pond surveyed by torch

## APPENDIX 2

6839	SK 680398	Manor Farm Saxondale	1994			Unconfirmed.
6851	SK 685514	Halloughton	01.04.04		Male	
6873	SK 688734	Bevercotes Colliery Bothamsall	2004		Adults	
6929	SK 692293	Hickling	1992			Unconfirmed.
6943	SK 692432	6A, Kneeton Road East Bridgford	29/10/1998			Found in foundations of bungalow during work on extention.
6952	SK 696523	Brackenhurst Agricultural College Southwell	1999	100+		
6952	SK 696523	Brackenhurst Southwell	30.03.05		Adults breeding. 300 + seen earlier in month (est pop of 3000+ 2005)	
6952	SK 694522	Brackenhurst Southwell	30.03.05		Breeding adults	In concrete pond
7033	SK 701330	Bunnison Lane Colston Basset	1994	1		Dug up by owners when Gardening. Male
7179	SK 7179	28, Rutland Road Retford	1994			Pond 3yrs old
7196	SK 716962	Marsh area adjacent Idle Stop Ponds Misson	08/07/1987	1		Adult male
7197	SK 712971	Misson Carr Misson	Apr-92	4		Night count
7197	SK 714974	Misson Carr Misson	13/04/1992	1		
7197	SK 711975	Misson Carr Misson	22.04.05			Drain in centre ride

## APPENDIX 2

7283	SK 7283	Sunnymede, Smeath Lane Hayton	2002	10		Found when taking blanket weed out of pond
7334	SK 7334	Barnstone Limestone Pits (ex cement works) Langar cum Barnstone	2001			
7334	SK 732342	Naturescape Langar	04.04.04		Many eggs	In pond by tearoom
7334	SK 732342	Naturescape Langar	12.04.04		Adult male and eggs	
7363	SK 7363	High Wood Ossington	1994			David Wood
7379	SK 739799	2, New Cottages Grove	1993, 02/02/1998			Several in Garden. 1998 - 2pr breeding in pond.
7380	SK 738805	Castlehill Wood Grove	1993			Unconfirmed. Large numbers of larvae; many adults in pond
7640	SK 762402	Orston Plaster Ponds Orston	3/05/1998, 19/07/1998	2		Small pond, no fish. 1m + 1fem; July1998 - efts
7679	SK 764793	Treswell Wood No.2 Treswell	1990	7		Night count
7694	SK 764948	GroveWood Terrace Misterton	Jul-94	8		2 ponds now drying out in summer due to housing development. 4m + 4fem

## APPENDIX 2

7884	SK 786843	Cross Street Cottage Sturton-le- Steeple	03/05/1993	6+		Temp. pond in permanent pasture c.250m from Garden.
7985	SK 7985	West Burton Power Station West Burton	03/05/1988	135		Live trapping for relocation. 25/10/87 - 17 in hibernaculum (DW).
8043	SK 806436	"The Elms" Staunton	03/04/1993	1		Unconfirmed. Pond in paddock. Male
8076	SK 8076	Main Street, Laneham	1991			
8252	SK 821527	Rowan Cottage, Barnby Road Balderton	04/06/2003	6		Adult
8354	SK 832541	Moat Coddington	Apr-00			
8354	SK 836544	Old Manor Farm Coddington				Unconfirmed sightings in pond on farm and hibernating under the Dovecote
8672	SK 860728	Thorney Lakes Thorney	1977			

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