



# TECHNICAL NOTE

<b>TO</b>	Jamie Baldwin - Ecotricity	<b>FROM</b>	WSP
<b>DATE</b>	11 May 2018	<b>CONFIDENTIALITY</b>	Public
<b>SUBJECT</b>	Heckington Fen Variation Application		

## 1. INTRODUCTION

WSP has been commissioned by Ecotricity to review and update the previously submitted Environmental Impact Assessment (EIA) chapter (Chapter 9 – Hydrology)<sup>1</sup> and associated Flood Risk Assessment (FRA)<sup>2</sup> for a Section 36 Consent Application (09/1067/S36) of the Heckington Fen Wind Park near East Heckington in the County of Lincolnshire. This Technical Note has been prepared to provide additional information, incorporating the following, to support the 2018 variation application:

- Summary of any guidance or policy changes that may have been implemented between the time of the original assessment (2011) and the present;
- Review of any changes to the baseline that may have occurred since the completion of the original assessment;
- Summary of changes to the assessment of effects as a result of the updated guidance and/or baseline; and
- Provide a statement demonstrating our suitability as a competent expert in line with the new EIA regulations adopted in 2017.

## 2. DETAILS OF THE VARIATION

The 2018 variation application is to amend Condition 4 and Condition 8 (2) of the original Consent Application (09/1067/S36), which relates to the timescale by which the Scheme should commence. The Applicant is currently unable to commence development within the specified timescale set out under these conditions:

- Condition 4: “The Development shall be commenced before the expiration of five years from the date of this consent [8 February 2013], or such longer period as the Secretary of State may hereafter direct in writing.”
- Condition 8 (2): “The Development hereby permitted shall be commenced before the expiration of five years from the date of this permission [8 February 2013]. The Company shall provide written confirmation of the commencement of development to the Local Planning Authority no later than one week after the event.”

## 3. CHANGES TO LEGISLATION AND PLANNING POLICY

### 3.1. National Planning Policy

The previously relevant policies, including PPS23 and PPS25 that set out the guidance on pollution control and flood risk including climate change, have been replaced by new guidance through the National Planning Policy Framework (NPPF), published in March 2012, and the National Practice Guidance (PPG), published in March 2014 and updated in April 2014. This does not have any significant implications for hydrology that are not assessed in the original EIA and FRA. However, the Environment Agency has updated the guidance on climate change in 2016, and again in February 2017, to support the NPPF. The updated climate change allowances now take into account the anticipated change for:

- Peak river flow by river basin district;

<sup>1</sup> Parsons Brinckerhoff Ltd (PB), *Heckington Fen Wind Park Environment Report: Chapter 9 – Hydrology*, July 2011

<sup>2</sup> Parsons Brinckerhoff Ltd (PB), *Heckington Fen Wind Farm Flood Risk Assessment*, July 2011

- Peak rainfall intensity;
- Sea level rise, and
- Offshore wind speed and extreme wave height.<sup>3</sup>

Based on the revised guidance, the application of climate change is dependent on the geographical location of the proposed development, the type of development to be constructed, the Flood Zone in which the development is located (in relation to allowances for river flows in England) and the design life of the development.

The updated climate change guidance will alter the allowances in which the Scheme would need to consider and the resultant implications on the development are detailed in Section 4.2 of this Technical Note.

### **3.2. The River Basin Management Plan**

River Basin Management Plans (RBMPs) are published under the Water Framework Directive (WFD) and focus on the protection, improvement and sustainable use of the water environment. The Environment Agency has used the river basin management approach to ensure the many organisations and individuals that have an impact on the water environment work together to achieve the focus.

The proposed Scheme is situated within the Anglian River Basin District. The Anglian RBMP was first published in 2009. Under the WFD, RBMPs must be reviewed and revised on a six-yearly cycle to update the status of the objectives for every waterbody, as these objectives can become legally binding and inform decision making by all public bodies. The updated reports also include economic analysis of the objectives and proposed measures, which the Environment Agency has assessed to be cost effective, technically feasible and proportionate in terms of the benefits outweighing the cost. The first update to the Anglian RBMP was undertaken in October 2014 and published in December 2015.

The current Plan describes the river basin district and the pressures that the water environment faces. It shows what this means for the current state of the water environment, and what actions will be taken to address the pressures. It sets out what improvements are possible by 2021 and how the actions will make a difference to the local environment – the catchments, the estuaries and coasts, and the groundwater. The RBMP identifies the current key issues in the Anglian River Basin as:

- Physical modifications;
- Pollution from waste water;
- Pollution from towns, cities and transport;
- Changes to the natural flow and level of water;
- Negative effects of invasive non-native species, and
- Pollution from rural areas.

The proposed Scheme is located within the South Forty Foot Drain Operational Catchment, which covers the South Forty Foot Drain and its tributaries from its headwaters at Guthram Gowt to the tidal limit in Boston. The South Forty Foot Drain helps drain the fenland areas of South Lincolnshire. The catchment is sparsely populated and the predominant land use is agriculture with high productive arable land dominating the landscape. The main issues associated with this catchment are diffuse pollution, excessive weed growth, lack of good quality riparian and in-channel habitat, over abstraction and variable water level management. The 2015 Plan identifies the key measures for the catchment, which involve undertaking river restoration work on waterbodies where the lack of riparian and in-channel habitat is affecting ecology, identifying and reducing pollution on waterbodies within the catchment, engaging communities to take ownership of their local water environment and encouraging sustainable development for the water environment to aid climate change adaptation and mitigation. The proposed Scheme will not prevent these measures from being delivered as outlined in Section 5.

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<sup>3</sup> <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

### 3.3. Local Plan

The North Kesteven Local Plan (2007) has now been replaced by the Central Lincolnshire Local Plan, adopted on 24 April 2017. The Council's policies on flood risk has not changed significantly from those outlined in the 2007 Local Plan (Policy C10 and C14), however development proposals are now required to consider the use of Sustainable Drainage Systems (SuDS) wherever possible to manage flood risk and to deliver improvements to the water environment. Furthermore, the updated Local Plan has outlined the requirements for development proposals to consider the impacts on surface or ground water with respect to the guidelines set out in the WFD.

The following policy within the 2017 Local Plan is considered most relevant to the proposed Scheme:

#### **Policy LP14: Managing Water Resources and Flood Risk**

- Flood Risk: "development proposals should demonstrate:
  - that they are informed by and take account of the best available information from all sources of flood risk and by site specific flood risk assessments where appropriate;
  - that there is no unacceptable increased risk of flooding to the development site or to existing properties;
  - that the development will be safe during its lifetime, does not affect the integrity of existing flood defences and any necessary flood mitigation measures have been agreed with the relevant bodies;
  - that the adoption, ongoing maintenance and management of any mitigation measures have been considered and any necessary agreements are in place;
  - how proposals have taken a positive approach to reducing overall flood risk and have considered the potential to contribute towards solutions for the wider area; and
  - that they have incorporated SuDS into the proposals unless they can be shown to be impractical."
- Protecting the Water Environment: "development proposals should demonstrate:
  - that development contributes positively to the water environment and its ecology where possible and does not adversely affect surface and ground water quality in line with the requirements of the WFD;
  - that development with the potential to pose a risk to groundwater resources is not located in sensitive locations to meet the requirements of the WFD;
  - how SuDS to deliver improvements to water quality, the water environment and where possible to improve amenity and biodiversity have been incorporated into the proposal unless they can be shown to be impractical;
  - that relevant site investigations, risk assessments and necessary mitigation measures for source protection zones around boreholes, wells, springs and watercourses have been agreed with the relevant bodies (e.g. the Environment Agency and relevant water companies);
  - that suitable access is safeguarded for the maintenance of water resources, flood defences and drainage infrastructure; and
  - that adequate provision is made to safeguard the future maintenance of water bodies to which surface water is discharged, preferably by an appropriate authority (e.g. Environment Agency, Internal Drainage Board, Water Company, the Canal and River Trust or local council).

## 4. CHANGES TO BASELINE CONDITIONS

The baseline conditions within and adjacent to the proposed site boundary, as set out in the original EIA and FRA, are still relevant except for the water quality and flood risk (with respect to climate change) elements, where some minor changes have been identified as a result of recent updates on policy and guidelines.

### 4.1. Water Quality

The surface water quality classification used in the original EIA was based on the Environment Agency's General Quality Assessment (GQA), which was replaced by the WFD in 2009. The current waterbody classification, which was established based on the requirements in the WFD, considers water quality not only from an ecological

perspective, but also from a physical, chemical and biological point of view. River Basin Management Plans consider the current position of different reaches of a river against these categories, but they also consider the potential in the future. Under the current classification, surface water bodies can be graded as high, good, moderate, poor or bad status. Table 1 below provides a description of each of those status classes as defined in the WFD.

The designated surface water bodies that are located on or near the proposed Scheme are identified as follow:

- Black Sluice IDB draining to the South Forty Foot Drain (GB205030051515) – this waterbody was not designated under the Environment Agency GQA classification and therefore was not assessed in the original EIA.
- The River Witham – there are two waterbodies associated with the River Witham that are located in proximity to the proposed Scheme:
  - 1) Lower Witham (GB205030062426) and
  - 2) Witham 1<sup>st</sup> and 3<sup>rd</sup> IDBs draining to the River Witham (GB205030062425).
- The River Slea (RB105030056670).

The current status and objectives (2016 Cycle 2) for the above surface water bodies are provided in Table 2.

**Table 1: Definition of status in the Water Framework Directive (information from the 2015 Anglian RBMP)**

Status	Definition
High	Near natural conditions. No restriction on the beneficial uses of the water body. No impacts on amenity, wildlife or fisheries.
Good	Slight change from natural conditions as a result of human activity. No restriction on the beneficial uses of the water body. No impact on amenity or fisheries. Protects all but the most sensitive wildlife.
Moderate	Moderate change from natural conditions as a result of human activity. Some restriction on the beneficial uses of the water body. No impact on amenity. Some impact on wildlife and fisheries.
Poor	Major change from natural conditions as a result of human activity. Some restrictions on the beneficial uses of the water body. Some impact on amenity. Moderate impact on wildlife and fisheries.
Bad	Severe change from natural conditions as a result of human activity. Significant restriction on the beneficial uses of the water body. Major impact on amenity. Major impact on wildlife and fisheries with many species not present.

**Table 2: Classification of surface water features (2016 Cycle 2) in proximity to the proposed Scheme**

Waterbody	Approx. Distance	WFD RBMP Chemical Classification	WFD RBMP Ecological Classification	Status Objective
Black Sluice IDB draining to the South Forty Foot Drain	On site	Fail	Moderate	Good chemical by 2027; Moderate ecological by 2015
Lower Witham	5km northeast of the site boundary	Good	Moderate	Good chemical by 2015; Moderate ecological by 2015

Waterbody	Approx. Distance	WFD RBMP Chemical Classification	WFD RBMP Ecological Classification	Status Objective
Witham 1 <sup>st</sup> and 3 <sup>rd</sup> IDBs draining to the River Witham	10km north of the site boundary	Good	Moderate	Good chemical by 2015; Moderate ecological by 2015
Slea	10km northwest of the site boundary	Good	Poor	Good chemical by 2015; Good ecological by 2027

#### 4.2. Flood risk and climate change

In accordance with the NPPF, the following sources of flooding should be considered as part of a FRA:

- Fluvial flood risk from nearby watercourses;
- Tidal flood risk;
- Surface water flooding from within the site and adjacent land;
- Groundwater flooding;
- Sewer flooding, and
- Artificial flood risk from canals and impounded reservoirs.

The original Heckington Fen Wind Farm FRA (2011) includes an assessment of flood risk from the sources mentioned above and therefore complies with the requirements of the NPPF.

Fluvial flood risk from the Head Dyke-Skerth Drain, which borders the north and east of the site, is still the greatest risk of flooding to the proposed development, whilst risks from other sources listed above remain low or negligible as identified in the original FRA.

Based on information provided by the Environment Agency, the FRA identifies the site to be located in the high risk Flood Zone 3a, that is land having a 1 in 100 or greater annual probability (>1%) of river flooding. Flood Zone designation for the area was defined based on the outputs from the Environment Agency's South Forty Foot Drain hydraulic model, dated May 2009. In order to demonstrate that the results from the 2009 model are still relevant to the site, a comparison of the flood map used in the 2011 FRA (Figure 1) and the current Environment Agency Flood Map for Planning (Figure 2) was carried out. The comparison shows negligible differences in flood extents (both Flood Zone 2 and 3) within the site boundary, as such it can be assumed that the outputs from the 2009 model are still applicable to the site.



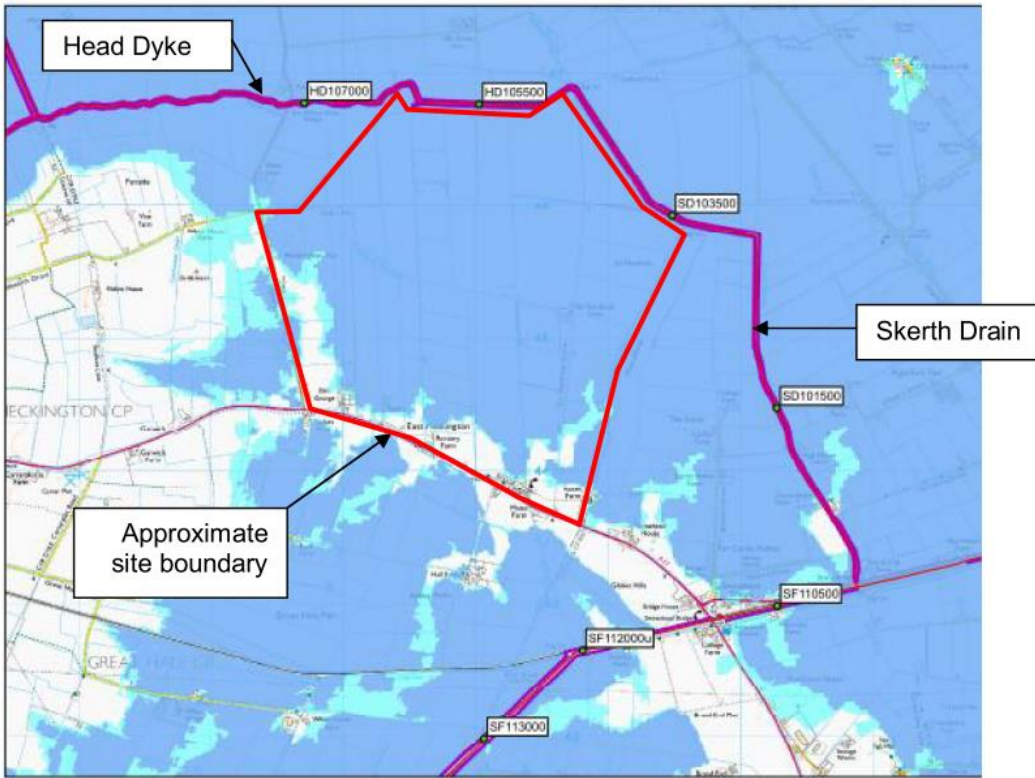


Figure 1: Environment Agency Flood Map (extract from the 2011 FRA)

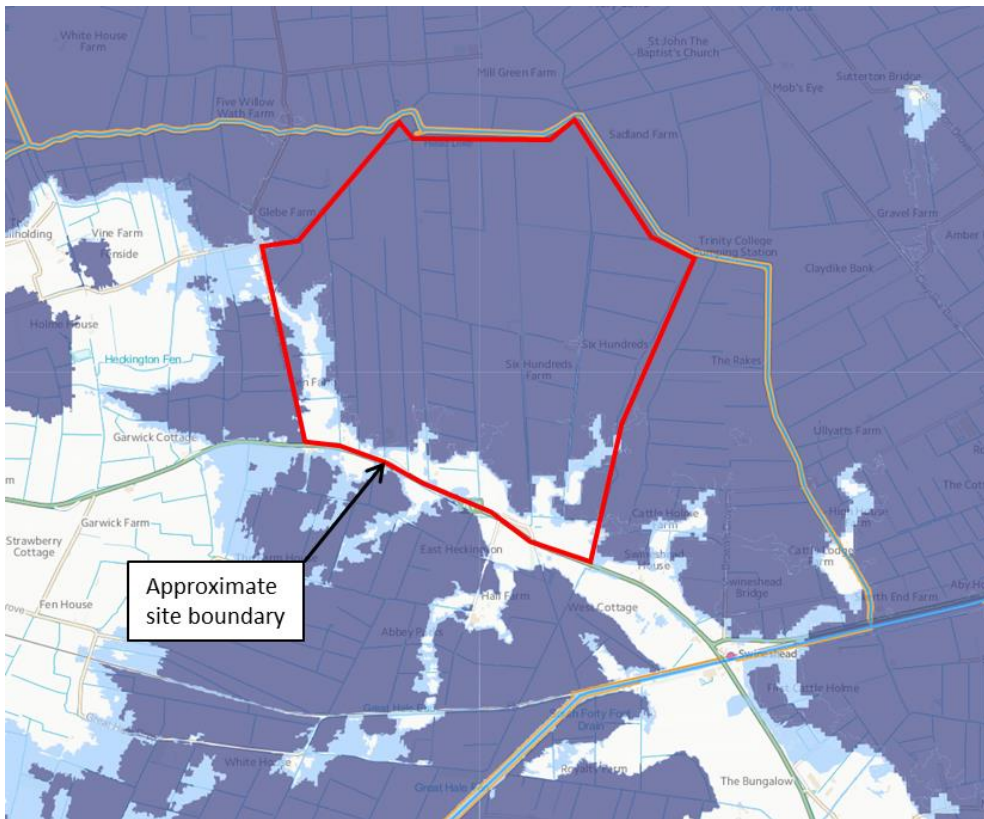


Figure 2: Environment Agency Flood Map for Planning (2018)



The original FRA also provides information on the flood levels for the site (Table 3). Based on the provided information, maximum flood depths in the lowest part of the development area (approximately 0.6mAOD in the northeast) can reach 2.2m and 2.4m for the 1 in 100 year and the 1 in 1000 year event including climate change allowance, respectively.

The Head Dyke-Skerth Drain watercourse is flanked on both sides by an earth embankment, providing flood protection to the site. Based on information provided by the Environment Agency, the FRA states that these defences, at minimum, provide protection against a 1 in 10 year flood event i.e. a minimum level of approximately 2.30mAOD.

The climate change allowance assessed at the time of the modelling was 20%, applied to the peak river flow in line with the previous Environment Agency guidelines. However, as detailed in Section 3.1 of this Technical Note, the climate change guidance has been updated, and based on the new guidance, the proposed Scheme should consider a 65% allowance for climate change (the 'upper end' estimate for peak river flow changes) applied to the 1 in 100 year event. This is based on the consideration that the site is located in the Anglian River Basin District, with a proposed land use classification of 'Essential Infrastructure' within Flood Zone 3a.

The flood level for the 1 in 100 year plus 65% climate change event has not been modelled and therefore no specific conclusions can be drawn about how changes to the climate change guidance will impact the proposed development. However, as shown in Table 3, the differences in flood levels between the 1 in 100 year and the 1 in 100 year plus 20% climate change event are very small, where the maximum difference is only 0.06m observed at model node HD107000. The difference in flood level between the 1 in 1000 year and the 1 in 1000 year plus 20% climate change event is even smaller at 0.02m at the same model node. This shows that the impacts of climate change result in smaller increases in maximum water levels for the more extreme flood events, i.e. during the 1 in 1000 year. This is likely due to the really flat nature of the fen area, meaning a significant increase in flows is unlikely to result in a large increase in water levels. Therefore the flood level for the 1 in 100 year plus 65% climate change event is unlikely to exceed the 1 in 1000 year event with a 20% allowance for climate change water level. As a precautionary approach, the design of the Scheme, including the wind turbine towers and the electrical substation, has taken into account the flood levels of the 1 in 1000 year plus climate change (20%) event. The wind turbine towers will be water resistant with access hatches raised approximately 3m above ground level and the finished floor level of the electrical substation compound will be set above the 1 in 1000 year plus climate change flood level, i.e. 3.04mAOD based on the result at model node HD107000.

The construction of the turbine masts and substation compound has the potential to displace up to approximately 1,538m<sup>3</sup> of flood storage during a 1 in 100 year event. This volume remains unchanged; as such the effects of this loss in flood storage remain insignificant in posing an increase in flood risk to the development or to third party land and properties, as stated in the original FRA.

The volume of additional surface water runoff likely to be generated on the substation building and turbine tower bases remains unchanged from the original assessment. Hence the proposed surface water drainage strategy, which involves either infiltration to surrounding grounds or discharge to nearby drains, remains the same. The original EIA has also considered the use of SuDs in the management of the additional runoff, which is in line with the requirements set out in the NPPF and in the updated Local Plan.

The original FRA provides information on Sequential Test and Exception Test. This information remains valid for the Variation Application.

**Table 3: Predicted Flood Levels for the site (Environment Agency South Forty Foot Drain Model, 2009)**

Model Node*	Maximum flood levels (mAOD)			
	1 in 100 year	1 in 100 year plus climate change**	1 in 1000 year	1 in 1000 year plus climate change**

Model Node*	Maximum flood levels (mAOD)			
	1 in 100 year	1 in 100 year plus climate change**	1 in 1000 year	1 in 1000 year plus climate change**
HD107000	2.84	2.90	3.02	3.04
HD105500	2.82	2.87	2.98	3.00
SD103500	2.79	2.83	2.92	2.95

\* locations of the model node are shown in Figure 1  
 \*\* with a 20% increase in peak river flows for climate change

## 5. ASSESSMENT OF EFFECTS

The assessment of effects presented in the original EIA has not changed discernibly as a result of the updated guidance and baseline conditions for the site. As such, the original assessment of effects, set out in paragraphs 9.74 – 9.98 of the original EIA, still applies. Similarly, the mitigation measures and subsequent residual significance as described in the original EIA are still valid for this Variation of Consent Application. Table 4 below presents the original assessment of effects with comments on the changes to policy/guidance and baseline.



Table 4: Significance of Effects (reproduced from the Original EIA chapter with comments on the effects of the changes to policy/guidance and baseline)

Stage of Development	Feature (Receptor)	Sensitivity of Receptor	Description of Potential Effect	Before Mitigation		Changes with this Variation Application	Summary of Mitigation	After Mitigation					Changes with this Variation Application	
				Magnitude of Change	Significance Before Mitigation			Magnitude of Change	Positive /Negative	Direct/Indirect/ Secondary/ Cumulative	Short/ Medium/ Long term	Permanent /Temporary		Residual Significance
<b>Geology/Groundwater</b>														
Construction/ Operation	Geology	Low	Disruption of local geological features from deep (2.85m) turbine excavations and maximum 20m piles.	Minimal change.	Negligible - Minor	No change	The excavations and piles are predicted to be within the topsoil and superficial geology. No mitigation required.	Minimal change	Negative	Direct	Long term	Permanent	Negligible - Minor	No change
Construction/ Operation	Groundwater	Low	Chemical pollution: Leaching of hydrocarbons, chemicals and cement to groundwater.	Very low - low	Minor	No change	Oil/chemicals stored in 110% bund, drip trays, refuelling within designated area. Provision of spill kits on site and trained staff. Temporary sanitation facilities maintained by licensed operators.	Minimal change	Negative	Direct	Short term	Permanent	Negligible - Minor	No change
<b>Abstractions</b>														
Construction/ Operation	Groundwater	Low	Potential for leaching of concrete. Spillages and leakages during storage or routine maintenance.	Very low - low	Minor	No change	Very small amounts of chemicals will be present on site during maintenance visits only. Operational phase will comprise small-scale routine activities.	Minimal change	Negative	Direct	Short term	Permanent	Negligible - Minor	No change
<b>Flooding</b>														
Construction/ Operation	Surrounding land	High	Development (land take) and increased hardstanding may exacerbate flooding in downstream areas.	Very low - low	Moderate	There are several changes to the policy (national and local) and guidance (e.g. climate change) on flood risk but the significance of effects on flooding remains Moderate prior to the application of mitigation measures	Land use will remain largely rural. Use of sustainable urban drainage systems (SUDS) where appropriate.	Minimal change	Negative	Indirect	Medium term	Temporary	Minor - Moderate	The mitigation measures will consider the use of SuDS, which is in line with the requirements set out in the NPPF and in the updated Local Plan. The implications of increased climate change allowance as a result of the new guidance are likely to be minimal as the design of the Scheme has taken into account the

															effects of the 1 in 1000 year plus 20% climate change event. As such, the residual significance will remain Minor – Moderate.
<b>Water quality</b>															
Operation	Local drainage channels, South Forty Foot Drain, River Witham	Low (Medium)	Spillages and leaks during storage or routine maintenance.	Very low - low	Minor (Minor-Moderate)	<i>The water quality classification has been updated since the completion of the original assessment, as such the sensitivity of the receptor (both during operation and construction), has changed from Low to Medium and the significance of effects from Minor to Minor-Moderate prior to the application of mitigation measures.</i>	Very small amounts of chemicals will be present on site during maintenance visits only. Operational phase will comprise small-scale routine activities.	Minimal change	Negative	Direct	Short term	Temporary	Negligible - Minor		<i>Although the baseline has changed as a result of the new water quality classification, the residual significance will remain Negligible-Minor with the implementation of the proposed mitigation measures.</i>
Construction	Local drainage channels, South Forty Foot Drain, River Witham	Low (Medium)	Sediment entrained runoff from excavations and infrastructure construction reaching off-site surface watercourses. Risk to downstream resources.	Very low - low	Minor (Minor-Moderate)	<i>The water quality classification has been updated since the completion of the original assessment, as such the sensitivity of the receptor (both during operation and construction), has changed from Low to Medium and the significance of effects from Minor to Minor-Moderate prior to the application of mitigation measures.</i>	During construction, use of silt traps, pumping water to natural soakaways and/or use of mobile siltbuster units, use of silt fences, mats and/or geotextiles around construction activities.	Minimal change	Negative	Direct	Short term	Temporary	Negligible - Minor		<i>Negligible-Minor with the implementation of the proposed mitigation measures.</i>
<b>Fisheries and Recreation</b>															
Operation/ Construction	Local drainage channels, South Forty Foot Drain, River Witham	Low	As water quality above	Minimal	Negligible - Minor	<i>No change</i>	As water quality above	Minimal change	Negative	Direct	Short term	Temporary	Negligible - Minor		<i>No change</i>
<b>Decommissioning</b>	Effects arising from decommissioning are anticipated to be similar to the construction effects described above.														



## 6. STATEMENT OF COMPETENCY

One of the requirements of the new EIA regulations, adopted in 2017, is for the assessment to be completed by competent experts. The industry defines this through a combination of:

- Experience – with due consideration of the number of years, number of projects, scheme size and complexity and sector experience.
- Qualifications – specifically relating to or relevant to EIA.
- Member of Institute of Environmental Management and Assessment (IEMA) EIA Quality Mark / professional memberships.

WSP are competent experts in EIA and IEMA has awarded us the EIA Quality Mark for our holistic activity around EIA. We have continued to maintain this through ongoing, annual examination in relation to our products, staff, innovation and promotion of EIA within the industry. It is a combination of our EIA Quality Mark and the experience and qualifications of our Practitioners that ensure we comply with this requirement. Table 5 below provides a list of the WSP staff, including their qualifications that have been involved in producing this Technical Note.

**Table 5: WSP staff as competent experts that have been involved in the preparation of this Technical Note**

<b>Competent Industry professional</b>	<b>Role</b>	<b>Certifications/Professional Memberships</b>
Sheena Cheng	Preparation of report	AMICE (Associate Member of ICE)
Sarah Stonehouse	Review of report	AMCIWEM (Graduate Member of CIWEM)
Doug Barker	Review of report	C.WEM (Chartered Member of CIWEM), CSci (Chartered Scientist)
Rachel Bird	Approval of report	C.WEM (Chartered Member of CIWEM), CEnv (Chartered Environmentalist)

## 7. CONCLUSION

WSP has been commissioned by Ecotricity to review the previously submitted EIA chapter (Chapter 9 – Hydrology) and associated FRA, and provide additional information to support a Variation of Consent Application for the Heckington Fen Wind Park near East Heckington in the County of Lincolnshire. This Technical Note provides a summary of the changes to policy/guidance and the baseline conditions since the completion of the original assessment in 2011 and a review of the resultant changes to the assessment of effects as presented in the original EIA.

It can be concluded that the significance of effects as described within the original EIA have not changed with the updated policy/guidance and baseline, and that they are still relevant for this Variation Application. Furthermore, no additional significant environmental effects have been identified by this review.