Thurrock Flexible Generation Plant

Environmental Statement Volume 6
Appendix 9.3: Biodiversity Net Gain Assessment

Date: ~~February~~ December 2020

Environmental Impact Assessment

Environmental Statement

Volume 6

Appendix 9.3

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This report is also downloadable from the Thurrock Flexible Generation Plant website at:
http://www.thurrockpower.co.uk

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Summary

This document provides a development-specific Biodiversity Net Gain (BNG) Assessment in accordance with the requirements of the National Planning Policy Framework (NPPF, 2019) and recognised industry guidance (CIEEM et al, 2019) for the proposed Thurrock Flexible Generation Plant.

Qualifications

This document has been prepared by Louisa Medland CEcol MCIEEM, a Principal Consultant, who has 12 years' experience of environmental impact assessment.

It has been checked by Matt Fasham CEnv MCIEEM, a Technical Director, with over 20 years' professional experience in consultancy in the UK.

1. Introduction

1.1 Background

1.1.1 A site-specific Biodiversity Net Gain (BNG) Assessment has been prepared for Thurrock Flexible Generation Plant (the proposed development).

1.1.2 Volume 3, Chapter 9 of the Environmental Statement provides a full assessment of the effects of the project on ecology and nature conservation and includes the results of ecological surveys previously undertaken on the site and used to provide a baseline for the BNG Assessment.

1.1.3 This report provides:

- Results of the on-site assessment of biodiversity value prior to development;
- Results of the on-site assessment of biodiversity value following development taking into consideration landscaping and habitat creation designed into the project.
- Results of the overall net gain assessment demonstrating whether net gain of >10% is achieved.

1.1.4 A net gain target of 10% is chosen because this is the level of net gain set out in the Environment Bill that is currently going through Parliament. Nationally Significant Infrastructure Projects such as Thurrock Flexible Generation Plant are exempt from the requirement to achieve mandatory net gain, as will be required for other development types when the Environment Bill passes. However, seeking net gain insofar as possible with the goal of achieving around +10% has been voluntarily adopted as a principle guiding the outline design of ecological mitigation and enhancement (see application document A8.7) and illustrative landscaping design (application document A2.9).

1.2 Biodiversity Net Gain definition

1.2.1 Biodiversity Net Gain is defined in Baker *et al* (2019) as:

"Development that leaves biodiversity in a better state than before"

1.2.2 The requirement for developments to seek to achieve BNG arises from the National Planning Policy Framework (NPPF) (2019), which states in Para. 170 that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by … minimising impacts on and providing net gains for biodiversity."

1.3 Methodology

1.3.1 There is no single set method for quantifying the assessment of BNG but one method is the use of biodiversity calculators to assess the biodiversity value of habitats pre- and post-development based on habitat type, distinctiveness and condition.

1.3.2 A biodiversity index is derived for the baseline and for the proposed development, and BNG is considered to be achieved where an increase in value is delivered (on or offsite), and where habitats of a higher value are not replaced exclusively with habitats of a lower value.

1.3.3 Defra made available its beta test update of its BNG assessment tool in July 2019, which was subsequently updated in December 2019. This tool has been used for the updated assessment in this report. The tool and associated documents were downloaded from:
http://publications.naturalengland.org.uk/publication/5850908674228224

1.4 Report structure

1.4.1 This report has the following structure:

- Section 2 provides the results of the BNG assessment;
- Section 3 provides a summary of the biodiversity net gain that would be achieved.

2. Biodiversity Net Gain Assessment

2.1 Baseline

2.1.1 The baseline for assessment of BNG used the Phase 1 habitat map for the application site produced for the Preliminary Ecological Appraisal (Volume 6, Appendix 9.1). The extent, distinctiveness and condition of the habitats currently present on site is provided in Table 2.1 and Table 2.2, together with the extent of losses of each habitat type resulting from the proposed development.

Table 2.1~~2.1~~: Baseline assessment of biodiversity value (nonlinear habitats)

Habitat type	Approx. area (ha)	Distinctive-ness score	Condition score	Ecological connectivity score	Strategic significance score	Value (biodiversity units) *	Area of habitat retained	Area of habitat enhanced	Baseline value of retained habitats	Baseline value of enhanced habitats	Area of habitat lost (ha)	Value of habitats lost
Woodland and forest - Lowland mixed deciduous woodland	0.174	High	Fairly Good	Medium	NILS*	2.871	0.174	0	2.87	0	0	0
Heathland and shrub - Mixed scrub	0.8931	Medium	Moderate	Low	NILS	7.145	0.18	0.0014	1.44	0.01	0.7117	5.69
Grassland - Other neutral grassland	11.8826	Medium	Moderate	Low	NILS	95.061	0.003	3.6769	0.02	29.42	8.2027	65.62
Grassland - Modified grassland	2.3967	Low	Poor	Low	NILS	4.793	0.52	0.0913	1.04	0.18	1.79	3.57
Grassland - Modified grassland	2.365	Low	Fairly Poor	Low	NILS	7.095	1.18	0.01	3.54	0.03	1.175	3.53
Sparsely vegetated land - Ruderal/Ephemeral	1.026	Low	Fairly Poor	Low	NILS	3.078	0.6	0	1.8	0	0.426	1.28
Wetland - Reedbeds	0.076	High	Moderate	Medium	NILS	1.003	0.0004	0	0.01	0	0.08	1
Lakes - Ditches	0.9357	Medium	Moderate	Low	NILS	7.486	0.5	0.3724	4	2.98	0.06	0.506
Urban - Developed land; sealed surface	2.0302	V. Low	N/A	N/A	NILS	0	2.02	0	0	0	0.01	0
Cropland - Cereal crops	46.9822	Low	N/A	N/A	NILS	93.964	15.7306	0	31.46	0	31.25	62.5
Urban - Vacant/derelict land/ bare ground	0.9025	Low	Poor	Low	NILS	1.805	0	0	0	0	0.9	1.805
Rocky shore - Artificial low energy littoral rock	0.0961	Low	Moderate	High	NILS	0.442	0.0961	0	0.44	0	0	0
Rocky shore - Artificial low energy littoral rock	0.1465	Low	Fairly Good	High	NILS	0.842	0.1465	0	0.842	0	0	0
Coastal Saltmarsh -saltmarshes and saline reedbeds	0.5855	High	Fairly Good	High	NILS	10.099875	0.5274	0	9.098	0	0.0581	1.002
Intertidal sediment - Littoral sand and muddy sand	0.0911	High	Fairly Good	High	NILS	1.571475	0.0776	0	1.3386	0	0.0135	0.233
Intertidal sediment - Littoral mud	5.2131	High	Fairly Good	High	NILS	89.926	3.4137	0	58.886	0	1.7994	31.03965
Urban - Artificial unvegetated, unsealed surface	0.6459	V. Low	N/A	N/A	NILS	0	0.0643	0	0	0	0.58	0
Total	**76.442**					**327.182**	**25.237**	**4.152**	**116.785**	**32.62**	**47.056**	**177.776**

***** Calculated as: area x distinctiveness x condition x connectivity x strategic significance

* NILS = Area / compensation not in local strategy / no local strategy

Table 2.2~~2.2~~: Baseline assessment of biodiversity value (linear habitats; hedgerows)

Habitat type	Approx. length (km)	Distinctiveness score	Condition score	Ecological connectivity score	Strategic significance score	Value	Length retained (ha)	Length enhanced (ha)	Baseline value of retained habitats	Baseline value of enhanced habitats	Length of habitat lost (ha)	Value of habitat lost
Line of Trees	0.306	Low	Moderate	Low	Area/compensation not in local strategy/ no local strategy	1.224	0.002	0.125	0.008	0.5	0.179	0.716
Native Species Rich Hedgerow with trees - Associated with bank or ditch	0.457	High	Moderate	Medium	Area/compensation not in local strategy/ no local strategy	6.0324	0.104	0.324	1.3728	4.2768	0.029	0.3828
Native Hedgerow	0.773	Low	Moderate	Low	Area/compensation not in local strategy/ no local strategy	3.092	0.035	0.686	0.14	2.744	0.052	0.208
Total	**1.536**					**10.3484**	**0.141**	**1.14**	**1.52**	**7.52**	**0.26**	**1.3068**

2.2 Post-development habitats

2.2.1 The post-development habitats have been calculated using details of the habitat creation proposed, as shown in the Outline Ecological Management Plan (application document A8.7) and the Illustrative Landscaping Plan (application document A2.9). It should be noted that final landscape proposals have not been developed for all areas of the site and where this is case draft calculations of the general habitat types likely to be included have been used.

2.2.2 Areas of new habitats proposed for the site and the biodiversity value as derived from the Defra calculation tool are provided in Table 2.3 and Table 2.4.

2.2.3 Areas of habitats proposed for enhancement and their biodiversity value are provided in Table 2.5 and Table 2.6.

2.2.4 The design produces a net gain score of +~~32.52~~45.13 area habitat units on site, a gain of ~~9.3~~13.79% on the baseline.

2.2.5 The design produces a net gain score of +1.29 hedgerow units on site, a gain of 12.44% on the baseline.

2.2.6 The net gain target is set at baseline value +10%, which has been achieved for both hedgerow units ~~but not for~~and area habitat units.

2.2.7 The illustrative landscape design has not been finalised within all parts of the site~~ and therefore there is scope to design in higher scoring habitats than those that have been assumed within the calculations. The be conservative, the current calculations assume the landscaping would be mostly amenity grassland (a low scoring habitat) with a reasonable amount of native shrub planting (a moderate scoring habitat). The inclusion in the final design of other higher scoring habitats would ensure the project achieved a 10% gain in biodiversity~~. The BNG calculations will be revisited to confirm the final score when detailed landscaping designs are produced prior to commencement.

2.2.8 The principles of ecological mitigation are set out in the Outline Environmental Management Plan (OEMP), and full details of habitat creation, enhancement and management proposals will be formalised via the production of a Landscape and Ecological Management Plan (LEMP) prior to commencement.

Table 2.3~~2.3~~: Assessment of post-construction biodiversity value from habitat creation (nonlinear habitats)

Habitat type	Approx. area (ha)	Distinctive-ness score	Target Condition score	Ecological connectivity score	Strategic significance score*	Time until target condition achieved (years)	Temporal multiplier	Difficulty of creation or enhancement multiplier	Value of created habitats[1]
Urban - Developed land; sealed surface	10.3734	V. Low	N/A - Other	N/A	NILS	0	1	1	0
Grassland - Other neutral grassland	12.9016	Medium	Fairly Good	Low	NILS	12	0.652	1	84.13
Grassland - Modified grassland	0.4703	Low	Fairly Poor	Low	NILS	5	0.837	1	1.18
Grassland - Modified grassland	2.9376	Low	Poor	Low	NILS	1	0.965	1	5.67
Heathland and shrub - Mixed scrub	1.7338	Medium	Good	Low	NILS	7	0.779	1	16.21
Grassland - Other neutral grassland	2.1261	Medium	Good	Low	NILS	15	0.586	1	14.95
Cropland - Cereal crops	5.312	Low	N/A -Agricultural	N/A	NILS	1	0.965	1	10.25
Urban - Artificial unvegetated, unsealed surface	0.4646	V. Low	N/A - Other	N/A	NILS	0	1	1	0
Urban - Vacant/derelict land/ bare ground	0.192	Low	Poor	Low	NILS	1	0.965	1	0.37
Wetland - Reedbeds	0.039	High	Fairly Good	Medium	NILS	12	0.652	0.67	0.28
Lakes - Ditches	0.2157	Medium	Good	Low	NILS	10	0.7	1	1.81
Heathland and shrub - Mixed scrub	0.9698	Medium	Good	Low	NILS	7	0.779	1	9.07
Grassland - Other neutral grassland	5.7627	Medium	Fairly Good	Low	NILS	12	0.652	1	37.58
Intertidal sediment - Littoral mud	1.4289	High	Fairly good	high	NILS	4	4	0.67	14.32
Lakes – ponds (non-priority habitat)	0.2814	High	Fairly good	Medium	NILS	4	0.867	1	4.03
Heathland and shrub - Mixed scrub	1.6744	Medium	Good	Low	NILS	7	0.779	1	15.66
Wetland - Reedbeds	0.1733	High	Fairly Good	Medium	NILS	12	0.652	0.67	1.25
Total	**47.057**	-	-	-	-	-	-	-	**216.76**

1: Value calculated as: area x distinctiveness x condition x connectivity x time x difficulty)

* NILS = Area / compensation not in local strategy / no local strategy

Table 2.4~~2.4~~: Assessment of post-construction biodiversity value from habitat creation (linear habitats)

Habitat type	Approx. length (km)	Distinctiveness score	Target Condition score	Ecological connectivity score	Strategic significance	Time until target condition achieved (years)	Temporal multiplier	Difficulty of creation or enhancement multiplier	Value (area x distinctiveness x condition / time / difficulty)
Native Species-rich hedge	0.15	Medium (4)	Good (3)	Low (1)	Low (1)	10	0.70	0.67	0.84
Total	**0.15**								**0.84**

Table 2.5~~2.5~~: Assessment of post-construction biodiversity value from habitat enhancement (nonlinear habitats)

Baseline habitat	Total habitat area	Baseline habitat units	Proposed habitat	Distinctiveness change	Condition change	Area enhanced (ha)	Distinctiveness score	Condition score	Ecological connect-ivity score	Years to target condition	Time to target multiplier	Difficulty of enhance-ment category	Difficulty of enhance-ment multiplier	Habitat units delivered
Heathland and shrub - Mixed scrub	0.8931	7.1448	Heathland and shrub - Mixed scrub	Medium - Medium	Moderate - Good	0.0014	Medium	Good	Low	3	0.899	Low	1	0.02
Grassland - Other neutral grassland	11.8826	95.0608	Grassland - Other neutral grassland	Medium - Medium	Moderate - Fairly Good	3.6769	Medium	Fairly Good	Low	10	0.7	Low	1	34.56
Grassland - Modified grassland	2.3967	4.7934	Grassland - Other neutral grassland	Low - Medium	Lower Distinctiveness Habitat - Fairly Good	0.0913	Medium	Fairly Good	Low	12	0.652	Low	1	0.66
Grassland - Modified grassland	2.365	7.095	Grassland - Other neutral grassland	Low - Medium	Lower Distinctiveness Habitat - Fairly Good	0.01	Medium	Fairly Good	Low	12	0.652	Low	1	0.08
Lakes - Ditches	0.9357	7.4856	Lakes - Ditches	Medium - Medium	Moderate - Fairly Good	0.3724	Medium	Fairly Good	Low	2	0.931	Medium	0.67	3.44
Total						**4.152**								**38.76**

Table 2.6~~2.6~~: Assessment of post-construction biodiversity value from habitat enhancement (linear habitats)

Baseline habitat	Approx. length (km)~~Total habitat area~~	Baseline habitat units	Proposed habitat	Distinctive-ness change	Condition change	Area (ha)	Distinctiveness score	Condition score	Ecological connect-ivity score	Years to target condition	Time to target multiplier	Difficulty of enhance-ment category	Difficulty of enhance-ment multiplier	Habitat units delivered
Line of Trees	0.306	1.224	Line of Trees	Low - Low	Moderate - Good	0.125	Low	Good	Low	30	0.343415	Low	1	0.59
Native Species Rich Hedgerow with trees - Associated with bank or ditch	0.457	6.0324	Native Species Rich Hedgerow with trees - Associated with bank or ditch	High - High	Moderate - Good	0.324	High	Good	Medium	20	0.490395	Medium	0.67	4.98
Native Hedgerow	0.773	3.092	Native Hedgerow	Low - Low	Moderate - Good	0.686	Low	Good	Low	10	0.700282	Low	1	3.7
Total	**1.536**	**10.3484**	-	-	-	-	-	-	-	-	-	-	-	**9.27**

3. Summary

~~3.1.1~~ A summary screenshot from the calculator tool is provided below.

3.1.1

On-site baseline	*Habitat units*	327.18
	Hedgerow units	10.35
	River units	0.00
On-site post-intervention (Including habitat retention, creation, enhancement & succession)	*Habitat units*	372.32
	Hedgerow units	11.64
	River units	0.00
Off-site baseline	*Habitat units*	0.00
	Hedgerow units	0.00
	River units	0.00
Off-site post-intervention (Including habitat retention, creation, enhancement &	*Habitat units*	0.00
	Hedgerow units	0.00
	River units	0.00
Total net unit change (including all on-site & off-site habitat retention/creation)	*Habitat units*	45.13
	Hedgerow units	1.29
	River units	0.00
Total net % change (including all on-site & off-site habitat creation + retained habitats)	*Habitat units*	13.79%
	Hedgerow units	12.44%
	River units	0.00%

4. Effect of mudlflat – saltmarsh accretion on net gain

4.1.1 Following feedback from consultees on the saltmarsh creation plan, Thurrock Power intends to withdraw this as has been explained in consultation letters in November 2020. The updated assessment of BNG presented in Section 2 above therefore does not therefore include managed saltmarsh creation as this would no longer be part of the secured mitigation and enhancement package for the proposed development.

4.1.2 Nevertheless, over the lifetime of the causeway its presence is likely to cause accretion of sediment in the shelter of the causeway and over time there may be some 'natural' colonisation of this accretion area by saltmarsh species, as described in ES Chapter 17: Marine Environment. It is estimated that the maximum amount of accreted mudflat that might develop into saltmarsh over the lifetime of the causeway is no greater than would have occurred with the formerly proposed managed saltmarsh creation, i.e. 1.1 ha.

4.1.3 A further response during consultation asked for information on the potential effect of this 'natural' saltmarsh accretion on the net gain calculations. As the process of sediment accretion would be the result of natural processes, the precise location and extent of saltmarsh development cannot in this case be specified in advance. For the purposes of the BNG assessment, it has been assumed that the maximum 1.1 ha of saltmarsh accretion would occur in an area east of the causeway and south of the existing saltmarsh, i.e. in the shelter of the causeway. In practical terms, for the purposes of the BNG calculations, the precise extent of different mudflat communities affected does not affect the overall numbers because the three mudflat communities known to be present in this area are all of equal ecological value in the Defra BNG calculator.

4.1.4 The results of including this potential maximum 1.1 ha of mudflat - saltmarsh conversion within the net gain calculations are shown in Table 4.1 and Table 4.2.

4.1.5 If the 1.1 ha of mudflat is added to the habitat baseline and is treated in the calculator as being 'habitat lost', it has the effect of reducing the overall BNG percentage for the proposed development from c. 13.79% to c. 9.09%. Approximately 19 additional units of mudflat habitat value are 'lost' while the saltmarsh colonisation provides 3.69 units of gain. However, this apparent net loss of biodiversity units is due to limitations in the Defra BNG calculator, which is designed for assessment of managed habitat replacement or creation rather than gradual habitat succession of intertidal communities. While this calculation has been included for completeness in response to a consultee request, we do not consider that it offers an accurate assessment of the environmental effects of habitat change that may occur. The assessment of these effects is given in Chapter 17: Marine Environment.

4.1.6 Including this gradual process of mudflat to saltmarsh accretion within the 'habitat lost' column within the calculator exaggerates an adverse effect on overall biodiversity value, because habitat loss in this context implies the prompt and complete destruction of a habitat followed by creation of new habitat over time – meaning that in the calculator there is a period of high biodiversity value loss in the period between initial habitat loss and the eventual maturation of new habitats implied by this assessment. This leads to a high value of habitat units lost but a small value for units gained, because the gain value is being discounted in the calculation.

4.1.7 However, in the case of gradual 'natural' saltmarsh colonisation of accreting mudflat as a result of the presence of the causeway, this high initial loss of habitat would not occur. Sediment accretion and any saltmarsh colonisation of the mudflat that does occur would be a successional process and there would be a gradual transition from one habitat to another that would not result in a high initial loss of biodiversity.

4.1.8 The Defra BNG calculator does not allow for this successional process to be represented in the assessment. For the purposes of a typical net gain assessment from direct and immediate habitat loss (which the calculator is designed to assess), this is understandable because replacement of immediately lost mudflat with saltmarsh in that scenario would not be considered a like-for-like replacement. When applied to a gradual succession process, however, a much larger net loss of value is presented than would actually be the case.

4.1.9 Furthermore, the 1.1 ha is a maximum estimate for the area of existing mudflat over which some accretion in the causeway lee will occur and where there is the possibility of natural saltmarsh colonisation. There may in practice be less or no colonisation.

~~3.1.1~~4.1.10 In the longer term, when the causeway is decommissioned (which would occur if a viable road alternative for Abnormal Indivisible Load delivery becomes available or otherwise at the end of the flexible generation plant's operating lifetime), then the process of sediment accretion would be reversed. Once the previous flow regime is restored by the removal of the causeway, accreted sediment would start to erode and eventually the condition of the habitats in the vicinity of the causeway would revert to the existing baseline.

Table 4.1. Changed rows of BNG baseline habitat table when 1.1 ha of mudflat-saltmarsh accretion is included

Habitat type	Approx. area (ha)	Distinctive-ness score	Condition score	Ecological connectivity score	Strategic significance score	Value (biodiversity units) *	Area of habitat retained	Area of habitat enhanced	Baseline value of retained habitats	Baseline value of enhanced habitats	Area of habitat lost (ha)	Value of habitats lost
Intertidal sediment - Littoral sand and muddy sand	0.0911	High	Fairly Good	High	NILS	1.571475	0	0	0	0	0.0911	1.57
Intertidal sediment - Littoral mud	5.2131	High	Fairly Good	High	NILS	89.926	2.384	0	41.124	0	2.82910	48.8
New total (inc. unchanged rows)	**76.442**					**327.182**	**24.1263**	**4.152**	**97.6862**	**32.62**	**48.1637**	**196.873**

Table 4.2. Additional and changed rows of BNG habitat creation table when 1.1 ha of mudflat-saltmarsh accretion is included

Habitat type	Approx. area (ha)	Distinctive-ness score	Target Condition score	Ecological connectivity score	Strategic significance score*	Time until target condition achieved (years)	Temporal multiplier	Difficulty of creation or enhancement multiplier	Value of created habitats
Coastal Saltmarsh -saltmarshes and saline reedbeds	1.1073	High	Fairly Good	High	NILS	15	0.33	0.67	3.694
New total (inc. unchanged rows)	**48.1639**								**220.454**

~~4.~~5. References

Baker, J., Hoskins, R. & Butterworth, T. (2019). *Biodiversity Net Gain – good practice principles for development.* Ciria, London