Anglian Water IED Permitting
Climate Change Risk Assessment

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A	23.03.2021	Maria Pooley	Nikki van Dijk	Anita Manns	Draft climate change risk assessment

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1 Introduction

1.1 Background and scope

This report provides an assessment of the risks and impacts arising from future climate change which would limit and constrain the operation of the permitted activities.

The risk assessment has been produced following an application for a bespoke permit and will subsequently be kept with the Management System on site.

This document assesses risks to the operations of the site in accordance with Environment Agency guidance 'Adapting to climate change: risk assessment for your environmental permit'[1]. The Environment Agency guidance includes tailored worksheets for each river basin, which include climate change projections data for that river basin. The climate change data includes projected changes in temperature and precipitation.

1.2 Assumptions and limitations

The assessment of effects has been based on information sourced from relevant and applicable legislation, guidance and websites. It is assumed that all guidance documents produced by the Environment Agency are up to date and correct at the time of writing.

[1] Available here: https://www.gov.uk/guidance/adapting-to-climate-change-risk-assessment-for-your-environmental-permit

2 Climate Change Risk Assessment

2.1 Risk Assessment

This section of the report identifies potential climate impacts to the site, arising from the changing climate variables identified by the Environment Agency in the template worksheet.

The Environment Agency templates identifies, for each river basin, the projected change in the following seven climate variables between now and the 2050s:

- Summer daily maximum temperature;
- Winter daily maximum temperature;
- Peak rainfall intensity (biggest rainfall events);
- Average winter rainfall;
- Sea level;
- Average summer rainfall; and
- Peak flow in watercourses.

The change values given are for the 2050s time period (compared to a 1961-1990 baseline period), consistent with a 4ºC rise in global mean temperature by the end of the century (a so-called 4ºC scenario). They are based on the UK Met Office climate projections 2009 (UKCP09)[2]. Overall, the climate projections indicate hotter, drier summers and warmer, wetter winters, together with an increase in storm events.

Based on the potential changing climate variables, key impacts to the site and its operation have been identified. For a wastewater treatment plant, impacts commonly identified include potential increases in odour issues associated with future warmer summer temperatures, and potential increase in the risk of fluvial or surface flooding due to changes in precipitation regime.

Following the Environment Agency guidance, once all the potential climate impacts for a site have been identified, the Likelihood and Severity of each climate impact is scored. The combination of Likelihood and Severity provides the Risk rating for each climate impact. (Risk = Likelihood x Severity). Where the risk rating for a climate impact is greater than 5, mitigation measures are identified to reduce the impact , and the residual likelihood and severity of the climate impact is re-rated after mitigation to ensure the residual risk is at an acceptable level.

The scoring criteria for severity and likelihood of impact, as set out by the Environment Agency guidance, are below:

Severity of impact:

- Severe impact: short-term, acute impact to operations resulting in permanent compliance breach(es).
- Medium impact: short-term, acute impact to operations resulting in multiple temporary compliance breaches.
- Mild impact: short-term, acute impact to operations resulting in single temporary compliance breach.
- Minor impact: short or long-term impact resulting in additional measures for compliance.

Likelihood of impact:

[2] The Environment Agency has stated it s intention to update the worksheets to take full account of the UK Climate projections 2018 (UKCP18), the latest climate projections. Meanwhile, UKCP18 is broadly consistent with UKCP09 so the worksheets are still valid for screening risk. See Adapting to climate change: risk assessment for your environmental permit - GOV.UK (www.gov.uk)

- Highly likely: event appears very likely in the short term and almost inevitable over the long term, or there is evidence of the event already happening.
- Likely: it is probable that an event will occur, or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term.
- Low likelihood: circumstances are such that an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term.
- Unlikely: circumstances are such that it is improbable the event would occur even in the long term.

Risk score calculation

	Severe impact (score= 4)	Medium impact (score = 3)	Mild impact (score = 2)	Minor impact (score = 1)
Highly likely (score = 4)	16	12	8	4
Likely (score = 3)	12	9	6	3
Low likelihood (score = 2)	8	6	4	2
Unlikely (score = 1)	4	3	2	1

Risk categories

- 12 to 16: high
- 8 to 9: moderate to high
- 4 to 6: moderate to low
- 1 to 3: low

2.2 Mitigation measures

Mitigation measures are identified, tailored to each identified climate impact. Some are specific actions which follow methods already in place at the site today – for example, implementing additional odour control measures if higher summer temperatures have been identified as potentially leading to increased odour issues in future.

In some instances, mitigation measures are not solely physical actions, they can include for example, increased monitoring, or carrying out regular reviews of existing site flood plans and ensuring these are updated in line with any new Environment Agency guidance. Mitigation actions identified should be proportionate to the risk identified.

This site has a number of existing flood protection measures already in place. After the 2006 flood incident, flood doors were installed to protect the digester MCC room and boiler house. Additionally the recent upgrade to the sludge treatment centre considered and mitigated for flood risk in the design: new MCC kiosks and plant have been installed on elevated platforms/plinths based on the flood risk assessment which was carried out prior to the project detailed design. These existing mitigation measures are taken into consideration in the initial scoring of Severity of the impact (column C) in the climate change risk assessment below.

A. Chelmsford site climate change risk assessment worksheet

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2.3 Risk assessment worksheet for the 2050s

Potential changing climate variable	A Impact	B Likelihood	C Severity	D Risk (B x C)	E Mitigation (what will you do to mitigate this risk)	F Likelihood (after mitigation)	G Severity (after mitigation)	H Residual risk (F x G)
1. Summer daily maximum temperature may be around 7°C higher compared to average summer temperatures now.	a) Increase in odour due to high temperatures. b) Overheating of the CHP unit. The unit has a maximum operating temperature of 40ºC. With a projected increase in daily maximum temperatures of up to 7ºC compared to present day, 40ºC temperatures will still be reached rarely, if at all, hence this is classed as low likelihood event. c) Increased efficiency of activated sludge processes due to slightly warmer temperatures throughout the year	a) 3 b) 2 This is a positive effect	a) 3 b) 2	a) 9 b) 4	a 1) Implement additional odour control measures. a 2) Introduce additional water to the system. b) none required.	a) 2 b) -	a) 2 b) -	b) 4 b) -
2. Winter daily maximum temperature could be 4°C more than the current average, with the potential for more extreme temperatures, both warmer and colder than present.	Colder temperatures than those experienced at present may impact as follows: a) Generators/boilers do not like starting below -15ºC. b) Whesso valves can freeze at temperatures below -5ºC. These are both low likelihood events. c) Longer growing season requiring additional vegetation management d) Staff unable to access site due to effects of cold weather (snow and/or ice blocking road access)	a) 2 b) 2 c) 3 d) 2	a) 2 b) 2 c) 1 d) 2	a) 4 b) 4 c) 3 d) 4	a) None required b) None required. c) None needed d) None needed	-	-	-

Potential changing climate variable	A Impact	B Likelihood	C Severity	D Risk (B x C)	E Mitigation (what will you do to mitigate this risk)	F Likelihood (after mitigation)	G Severity (after mitigation)	H Residual risk (F x G)
3. The biggest rainfall events are up to 20% more intense than current extremes (peak rainfall intensity).	a) Site wastewater treatment capacity exceeded due to incoming flows – risks direct discharges to the watercourses if stormwater storage is exceeded.	a) 2	a) 3	a) 6	a) 1) Ensure screening in place for any wastewater. overtopping the stormwater storage (i.e. screening on the outfall).	a) 1	a) 2	a) 2
	b) Risk of surface flooding on the site. There is anecdotal evidence suggesting surface flooding occurred at the site in 2006, following which additional mitigation measures were put in place. The East side of the site is in flood zone 3 and therefore a high risk of surface water flooding.	b) 3	b) 1	b) 3	a) 2) Alternatively increasing the stormwater storage capacity could be another option. a) 3) Site emergency plan AND site management plan to be kept up-to-date with any new data on flood risk from Environment Agency (new flood risk will be available as knowledge of future climate change progresses). b) None needed	b) -	b) -	c) -

Potential changing climate variable	A Impact	B Likelihood	C Severity	D Risk (B x C)	E Mitigation (what will you do to mitigate this risk)	F Likelihood (after mitigation)	G Severity (after mitigation)	H Residual risk (F x G)
4. Average winter rainfall may increase by 35% on today's averages.	As above, the same risks arise 1) Site wastewater treatment capacity exceeded due to incoming flows - risk of direct discharges to the watercourses if stormwater storage is exceeded. b) Risk of surface flooding on the site. There is anecdotal evidence suggesting surface flooding occurred at the site in 2006, following which additional mitigation measures were put in place. The East side of the site is in flood zone 3 and therefore a high risk of surface water flooding. c) Risk of fluvial flooding on the site	a) 3 b) 3 c) 2	a) 3 b) 1 c) 1	a) 9 b) 3 c) 2	a) 1) Ensure screening in place for any wastewater overtopping the stormwater storage (i.e. screening on the outfall). a) 2) Alternatively increasing the stormwater storage capacity could be another option. a) 3) Site emergency plan AND site management plan to be kept up-to-date with any new data on flood risk from Environment Agency (new flood risk will be available as knowledge of future climate change progresses). b) none needed c) none needed	a) 2 b) 2	a) 2 b) 2	a) 4 b) 4
5. Sea level could be as much as 0.6m higher compared to today's level.	The site is at risk of flooding from the sea, which could lead to flooding of the site, spills, outage of M&E equipment.	2	2	4	Ensure flood plan for site follows EA guidance.	2	2	4

Potential changing climate variable	A Impact	B Likelihood	C Severity	D Risk (B x C)	E Mitigation (what will you do to mitigate this risk)	F Likelihood (after mitigation)	G Severity (after mitigation)	H Residual risk (F x G)
6. Drier summers, potentially up to 39% less rain than now.	a) Increase in odour issues due to higher temperatures.	a) 3	a) 3	a) 9	a) 1) Implement additional odour control measures.	a) 2	a) 2	a) 4
	b) Site uses potable water for a number of processes (for poly make up, heat exchange, eye bath and safety showers. Also wash down hoses near digestors). If drought is severe enough to interrupt potable water supply, site operations will be disrupted / could be affected.	b) 1	b) 4	b) 4	a) 2) Introduce additional water to the systems. b) No mitigation required as very low risk. Score under 5. However, water could be supplied to site using bowsers.			
	c) Reduced rainfall can lead to issue with discharging – either cannot discharge, or discharge and risk exceeding pollution concentration thresholds.	c) 3	c) 2	c) 3	c) Additional storage on site, potential tankering to other sites.			
7. At its peak, the flow in watercourses could be 35% more than now, and at its lowest it could be 80% less than now.	Risk of additional sediment collection on site due to heavy rain following drought.	2	1	2	None needed			