The Sizewell C Project

9.87 Draft Water Monitoring and Management Plan - Clean Version

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Planning Act 2008
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ANNEXES

1 INTRODUCTION

1.1.1 SZC Co. is proposing to build a new nuclear power station at Sizewell in East Suffolk, known as Sizewell C. Located to the north of the existing Sizewell B power station, the Sizewell C site is located on the Suffolk coast, approximately halfway between Felixstowe and Lowestoft; to the north-east of the town of Leiston.

1.1.2 Consent to construct the development is sought through a Development Consent Order (DCO) as a Nationally Significant Infrastructure Project under the Planning Act 2008.

1.1.3 Level 1 control documents will either be certified under the DCO at grant or annexed to the Deed of Obligation (DoO). All are secured and legally enforceable. Some Level 1 documents are compliance documents and must be complied with when certain activities are carried out. Other Level 1 documents are strategies or draft plans which set the boundaries for a subsequent Level 2 document which is required to be approved by a body or governance group. The obligations in the DCO and DoO set out the status of each Level 1 document

1.1.4 This Draft **Water Monitoring and Management Plan** (WMMP) is a Level 1 document. Requirement 7 of the draft DCO requires a water monitoring plan (a Level 2 document) to be agreed with East Suffolk Council, following consultation with the Environment Agency, Royal Society for the Protection of Birds (RSPB), the relevant Statutory Nature Conservation Body, the East Suffolk Internal Drainage Board and the Local Lead Flood Authority. The water monitoring plan must be developed in general accordance with the **Main Development Site Water Monitoring and Response Strategy** (Doc. Ref. 6.14 2.14(A)A) and this draft plan.

1.1.5 Where further documents or details require approval, this document states which body or governance group is responsible for the approval and/or must be consulted. Any approvals by East Suffolk Council, Suffolk County Council or the MMO will be carried out in accordance with the procedure in Schedule 23 of the dDCO. The Deed of Obligation establishes the governance groups and sets out how these governance groups will run and, where appropriate, how decisions (including approvals) should be made. Any updates to these further documents or details must be approved by the same body or governance group and through the same consultation and procedure as the original document or details.

1.1.6 Where separate Level 1 or Level 2 control documents include measures that are relevant to the measures within this document, those measures have not been duplicated in this document, but cross-references have been

included for context. Where separate legislation, consents, permits and licences are described in this document they are set out in the **Schedule of Other Consents, Licences and Agreements** (Doc Ref. 5.11(B)).

1.1.7 For the purposes of this document the term 'SZC Co.' refers to NNB Nuclear Generation (SZC) Limited (or any other undertaker as defined by the dDCO), its appointed representatives and the appointed construction contractors.

1.1.8 This draft plan sets out the details anticipated by the Main Development Site Water Monitoring and Response Strategy (**Volume 3, Appendix 2.14.A** of the **ES Addendum** [AS-236]), relating to both groundwater and surface water. The WMMP will define the monitoring arrangements, relevant to water level, flow and water quality, along with setting out the measures or mitigation approach should monitoring identify that construction works within the main development site are leading to materially worse environmental effects on groundwater levels or quality at the site or surrounding area.

1.1.9 This is a draft of the WMMP that has been revised following Issue Specific Hearing 11 (ISH 11) on Flooding, Water and Coastal Processes. It addresses Natural England's comments on the draft Water Monitoring Plan that was submitted for Deadline 7 [REP7-075].

1.1.10 Further consultation with East Suffolk Council (ESC), Suffolk County Council, the RSPB, Suffolk Wildlife Trust (SWT) East Suffolk Internal Drainage Board (IDB), the Environment Agency and the MMO will be undertaken before a final WMMP is submitted to ESC for approval pursuant to Requirement 7 of the dDCO.

1.2 Purpose of the WMMP

1.2.1 The WMMP will provide a framework for monitoring and managing the water environment at the main development site in general accordance with the **Main Development Site Water Monitoring and Response Strategy** (Doc Ref. 6.14 2.14.A(A)).

1.2.2 The WMMP will be subject to periodic review and update so that it remains current and relevant to the works being undertaken and treated as a live document. The WMMP and any updates will be subject to agreement with ESC.

1.2.3 The WMMP relates to the monitoring and management of construction works within the main development site, i.e. the monitoring and management of those activities under the control of the contractor, and

between source and receptor, i.e. the groundwater and surface water pathway from the sources to receptors.

1.3 Principles of this plan

1.3.1 The WMMP will act as a framework to guide the control, monitoring and management of ground and surface water in so far as it relates to the Sizewell C construction works.

1.3.2 The **Water Monitoring and Response Strategy** (Doc Ref. 6.14 2.14.A(A)) states that the WMMP must be developed in accordance with the following principles:

- change from baseline conditions identified;
- plan to prepare for pre-determined action; and
- the implementation of mitigation.

1.3.3 The monitoring and management measures will therefore seek to ensure:

- mitigation is targeted appropriately throughout the construction period;
- facilitate identification of 'noisy' works, which will in turn facilitate notification of local residents and other steps required by the CoCP;
- provide a feedback mechanism for ongoing validation of construction noise and vibration predictions.

1.4 Compliance

1.4.1 SZC Co. must implement the provisions in the WMMP throughout all the construction activities on the main development site and into the operational stage pursuant to Requirement 7 of the dDCO.

1.4.2 The WMMP will incorporate a range of measures that reflect best practice techniques and SZC Co. will take all reasonable steps to avoid and minimise adverse impacts on water levels within the Sizewell Marshes SSSI. The WMMP may also provide the opportunity to enhance the current management of water levels.

2 ROLES AND RESPONSIBILITIES

2.1 Sizewell Marshes SSSI Water Level Management Plan

2.1.1 A Water Level Management Plan (WLMP) was prepared for Sizewell Marshes Site of Special Scientific Interest (SSSI) by the Environment Agency in 1998 (Ref. 1). This WLMP was prepared with reference to guidance prepared by the Ministry of Agriculture, Fisheries and Food (Ref. 2). The stated intention for the WLMP was that it "will be treated as a working document and will be reviewed on a regular basis and updated or revised if the objectives are unable to be met, or if circumstances change".

2.1.2 Many of the original WLMPs have been updated since the publication of the original Sizewell Marshes WLMP in 1998. This work has prioritised sites that are in unfavourable condition, ensuring that government spending is focused on sites that require restoration. Sizewell Marshes is in favourable condition, meaning an update has not been prioritised and no update has been carried out since 1998.

a) Land ownership and conservation management

2.1.3 Sizewell Marshes SSSI is wholly owned by EDF Energy Nuclear Generation Limited (NGL) and the site is managed under contract by Environmental Land Management Services Providers, including SWT, which is responsible for water level control and oversight of conservation grazing, amongst other duties.

Plate 1.1: Locations of SSSIs in relation to Sizewell C main development site.

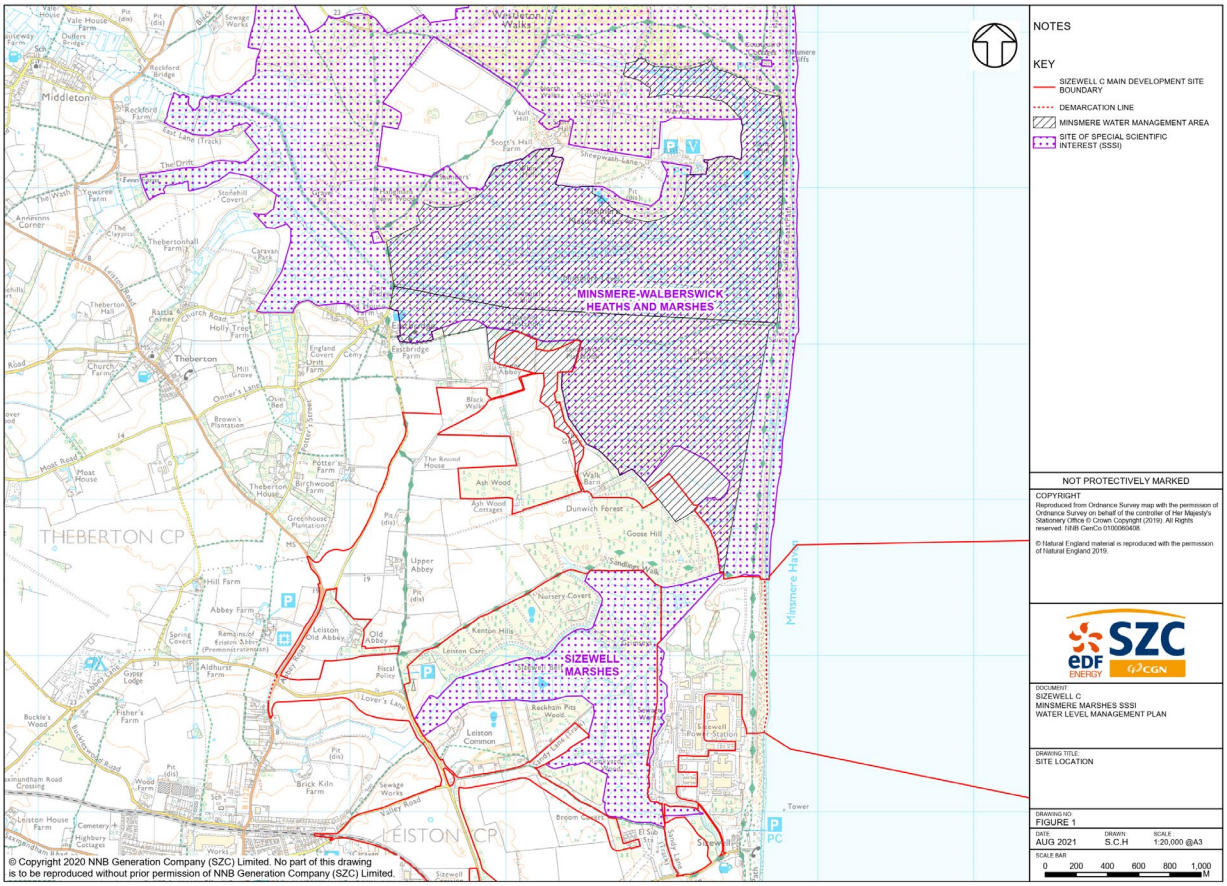
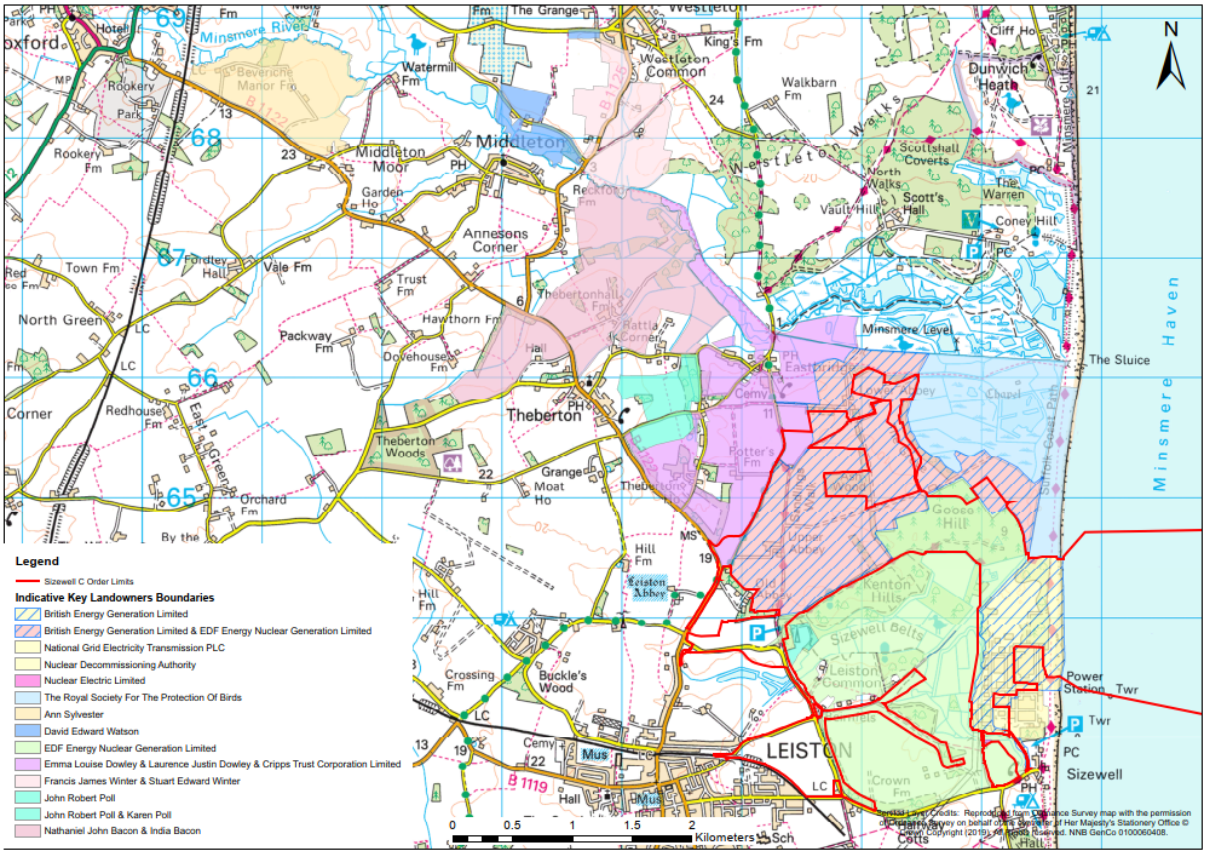


Plate 1.2: Indicative landownership boundaries



b) Water management structures and their operation

2.1.4 Water level control within the SSSI is exercised by means of small bunds, sluices and weirs distributed across the site which serve two principal aims:

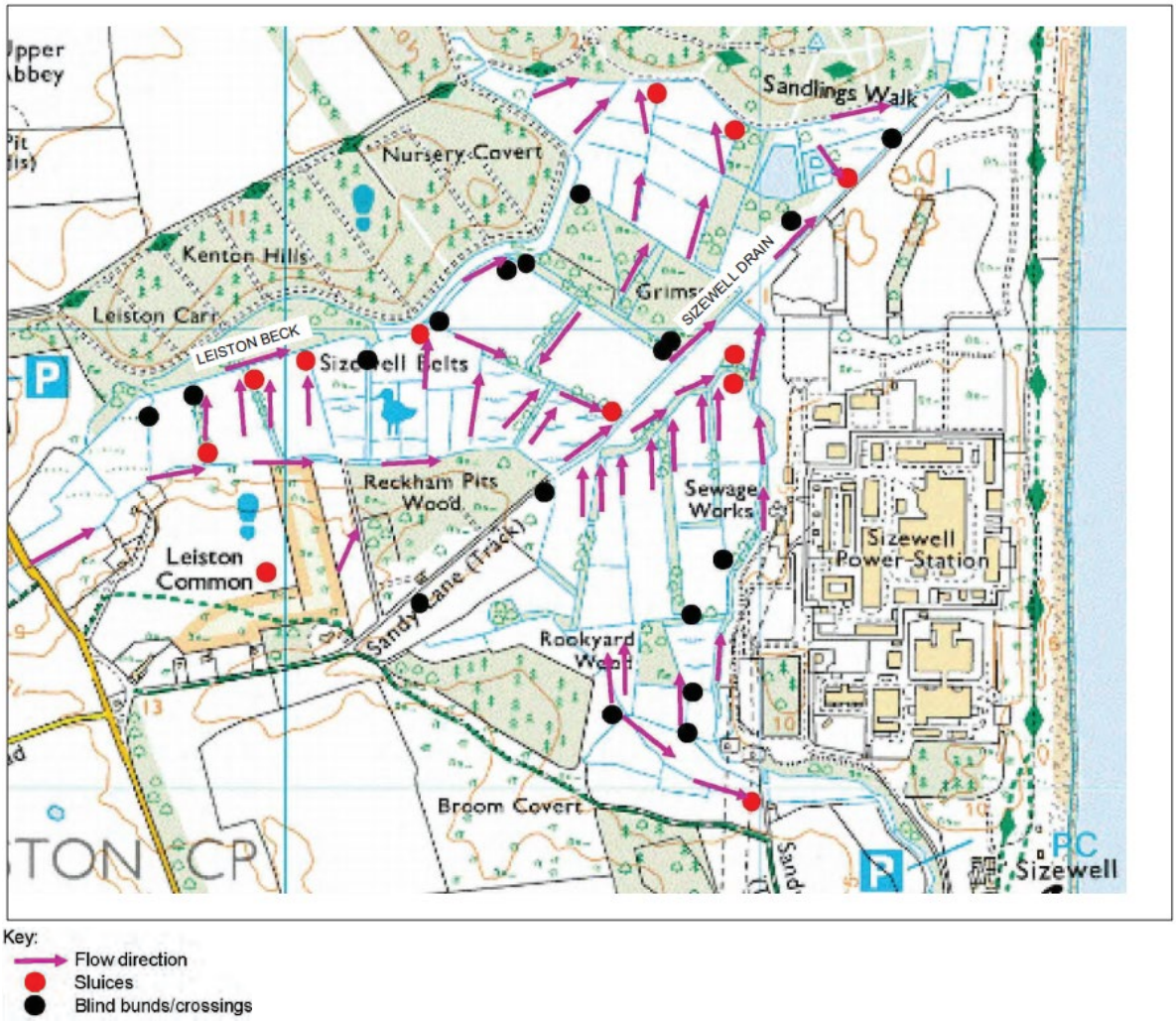
- To minimise interaction between the SSSI and Leiston Drain, since the drain receives treated sewage effluent from Leiston sewage works; and
- To maintain water levels within the fen meadow habitat within the optimal range to maintain the habitat in favourable condition. There are two aspects to this – first to maintain optimal soil moisture conditions for the target vegetation, and secondly to ensure that water levels are kept sufficiently low in the spring/summer for conservation grazing.

2.1.5 The existing arrangement of water control structures has been recorded for the Sizewell C project. There are currently 18 blind bunds, 12 sluices and

2 weirs across the SSSI. Water levels are managed by SWT using these control structures to modify the movement of water through the SSSI.

2.1.6 Drawing 5129919/SZC/009 in APP-304 shows the layout of the control structures and the direction of flow in the drains, and is extracted as Plate 1.3.

Plate 1.3: Extract from drawing 5129919/SZC/009 [APP-304] showing the layout of the control structures and the direction of flow in the drains within Sizewell Marshes SSSI



3 WATER MONITORING

3.1.1 The Environmental Statement is supported by extensive baseline monitoring. The scope of the monitoring was discussed and agreed with the Environment Agency, Natural England, ESC, Suffolk County Council, East Suffolk Internal Drainage Board, and SWT. RSPB were also party to engagement on this draft monitoring and management plan.

3.1.2 Baseline monitoring commenced in 2013 and is ongoing, the results of which are provided within **Volume 2, Chapter 19, Appendices 19B, 19B1** and **19E** of the **Environmental Statement** [APP-304 to APP-309].

3.1.3 Section 1.2 of the **Water Monitoring and Response Strategy** (Doc Ref. 6.14 2.14.A(A)) explains the current monitoring arrangements, including data collection and frequency. The **Water Monitoring and Response Strategy** (Doc Ref. 6.14 2.14.A(A))] confirms that this monitoring will be continued for the duration of construction works, unless otherwise agreed through any subsequent arrangements that may be approved in the final Water Monitoring and Management Plan that is submitted pursuant to Requirement 7 of the **draft DCO** (Doc Ref. 3.1(I)). The final Water Monitoring and Management Plan will therefore secure the monitoring and response arrangements.

3.1.4 In summary, the monitoring currently includes:

- **Groundwater monitoring**: includes 86 No. borehole locations for monitoring groundwater within the Sizewell C site and surrounding area. Locations are shown on Figure 19.3 of the **Water Monitoring and Response Strategy** (Doc Ref. 6.14 2.14.A(A)).
- **Surface water levels of the SSSI:** In order to provide further understanding of the flows and surface water levels within the SSSI, a programme of velocity and stage monitoring at seven locations is currently implemented.
- **Weather**: A weather station is currently in place at the site which monitors multiple parameters, including rainfall. The data from the weather station is downloaded as part of the monthly site visit and the batteries replaced every 6 months.

3.1.5 The **Water Monitoring and Response Strategy** (Doc Ref. 6.14 2.14.A(A)) explains the proposed water monitoring arrangements that will be undertaken to understand the effect of the proposed development on the site in comparison to baseline conditions and to validate the effectiveness of the mitigation measures implemented.

3.1.6 Requirement 7 obliges SZC Co. to prepare a Water Monitoring and Management Plan, which must be developed in accordance with the **Water Monitoring and Response Strategy** (Doc Ref. 6.14 2.14.A(A)) and this draft plan. The final WMMP must be submitted to East Suffolk Council for approval, thereby securing the monitoring and response arrangements. The WMMP will define the monitoring arrangements, such as water level, flow and water quality. It will also set out how monitoring data will be reported to East Suffolk Council, the Environment Review Group and other relevant stakeholders such as the Water Management Working Group, established by the **Deed of Obligation** (Doc. Ref. 8.17(G)).

3.1.7 The WMMP will reflect the existing baseline monitoring in terms of frequency, locations, and collection of the same data type, but rationalise the extent of monitoring in line with the findings of the assessment, as set out in **Volume 2, Chapter 19** of the **Environmental Statement** [APP-297]. The timing and frequency of reviews of the monitoring plan is expected to be on an annual basis but will be discussed and agreed with the Environment Review Group as established by Schedule 11 of the DoO.

3.1.8 The RSPB undertakes water level monitoring on Minsmere South Levels and the wider Minsmere Reserves, with manual readings taken on a monthly basis. No change to the monitoring regime or water level control are proposed for the Minsmere reserves.

3.2 Proposed Water Monitoring

3.2.1 Water monitoring will allow changes to water levels or quality to be identified, including those which may be a result from the construction or operation of Sizewell C. Changes in groundwater or surface water will be reviewed against trigger levels, which will be defined according to their sensitivity to change.

a) Existing Water Level Management

3.2.2 The Sizewell Belts Water Level Management Plan was published by the Environment Agency in 1998 and is the most recent water level management plan that relates the Sizewell Marshes SSSI. This describes the management measures that were anticipated in maintaining an appropriate hydrological regime to support the designated wetland features. Since its publication, a number of important and relevant evidence base documents have been published that relate to the ecohydrological requirements of the designated features that are present on Sizewell Marshes SSSI. These include:

- Ecohydrological guidelines for wet woodland (Barsoum *et al.*, 2005)

- Ecohydrological guidelines for lowland wetland plant communities (Wheeler *et al*., 2004)
- A wetland framework for impact assessment at statutory sites in England and Wales (Wheeler et al., 2009a)
- Wetland functional mechanisms: a synopsis of WETMECS (Wheeler *et al*., 2009a)

3.2.3 Natural England undertook a condition assessment in 2021 that indicates that Sizewell Marshes SSSI is in favourable condition. Elevated water levels across parts of the site, however, impeded Natural England's ability to complete the condition assessment for the whole site.

3.2.4 SZC Co. has coordinated site-specific surveys, investigations and analyses since 2011 to inform the Sizewell C proposals. This includes transient groundwater modelling [APP-298], surface water and groundwater monitoring [APP-304], and ecological surveys that cover the whole of Sizewell Marshes SSSI [APP-226].

3.2.5 On the basis of the above, the following observations can be made regarding the water management regime:

- water levels are not currently held within 0.15m of ground levels at all times, as was the stated target for the original WLMP (Environment Agency, 1998); and
- peak water levels are at or close to ground levels, however, minimum levels are often at greater depth than the target, even in the areas supporting the highest quality M22 communities.

3.2.6 The proposed network of monitoring locations is set out as **Plate 6.1** within Annex A of this draft WMMP.

3.2.7 Water level and water quality data will be collected at the same monitoring locations. Water levels will be monitored at all sites using a combination of automated sensors verified by manual readings. Water quality monitoring will be conducted twice a year through a combination of in-situ field sampling and laboratory analysis.

3.2.8 The proposed list of water quality determinands and parameters are set out in **Table 2.2** and will be confirmed in the final WMMP.

Table 2.1: Proposed groundwater monitoring locations

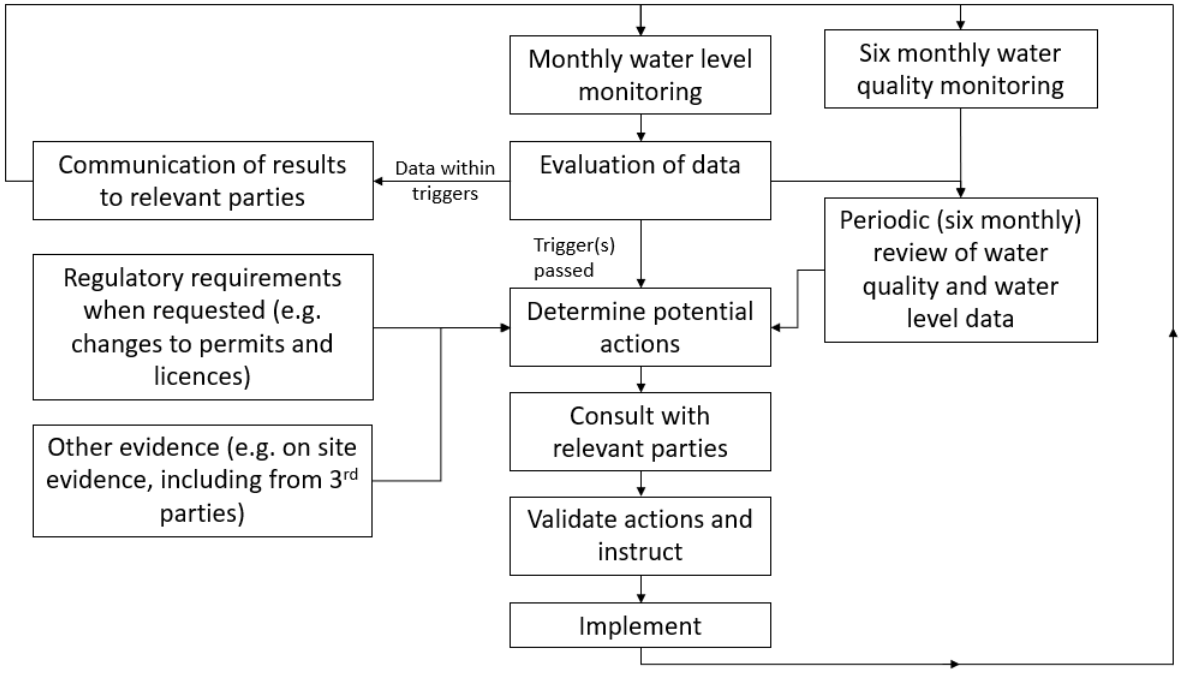
Determinand	Units	Limit of detection
pH	n/a	n/a
Electrical Conductivity	µS/cm	1
Alkalinity (Total)	mg/l	10
Chloride	mg/l	1
Ammonium	mg/l	0.05
Ammoniacal Nitrogen as NH_3 and NH_4	mg/l	0.05
Nitrite	mg/l	0.02
Nitrate	mg/l	0.5
Total Phosphorus	mg/l	0.02
Phosphate	mg/l	0.2
Sulphate	mg/l	1.0
Total Oxidised Nitrogen	mg/l	0.2
Calcium	mg/l	5.0
Potassium	mg/l	0.5
Magnesium	mg/l	0.5
Sodium	mg/l	0.5

3.3 Auditing and Reporting

3.3.1 Monitoring results, notification of triggers being reached, interpretation and proposed actions will be reported to the Water Management Working Group (as established by Schedule 11 of the **DoO**) for approval. SZC Co. will then be responsible for implementing actions as approved.

3.3.2 **Plate 3.1** outlines the process for obtaining data, reviewing it, determining action, its acceptance and implementation.

Plate 3.1: Process for monitoring and action



3.3.3 SZC Co. will download water level data and review it on a monthly basis. The passing of a trigger at a specific location will lead to a rapid review of data from the wider monitoring network, led by SZC Co. The review will determine the origins of the issue and its scale, as well as informing any required adjustment of the water control structure. This proposed adjustment will be discussed with the Water Management Working Group, and will then be implemented by SZC Co.

3.3.4 Once constructed, the proposed control structure on the realigned Sizewell Drain will be the principal means of adjusting water levels across Sizewell Marshes. When water levels are above bankfull levels or below the bed level at the location of the structure there will be no direct mechanism for controlling levels on Sizewell Marshes.

3.3.5 Water levels above bankfull levels at the location of the water control structure would ultimately be governed by the Minsmere Sluice and flow conditions along the Leiston Drain. Similarly, when water levels are below the bed level at the location of the control structure, they would ultimately be governed by the prevailing natural hydraulic gradient in the wider groundwater system.

3.3.6 SZC Co. will be committed to controlling the inputs of surface water drainage into the marshes from the construction and operation activities, as secured by Requirement 5 of the **dDCO** (Doc Ref. 3.1(I)) and subsequent

drainage consents (once applied for and approved). For the purposes of the final WMMP, as secured by Requirement 7 of the **dDCO** (Doc Ref. 3.1(I)), the trigger range for action is taken as between the 70th centile (lower level threshold) at the corresponding monitoring locations and the ground level at the location of the water control structure.

3.3.7 On a six monthly (twice yearly) basis, water quality monitoring will be undertaken which will feed into a periodic review of monitoring procedures and trigger levels as will be set out in the final WMMP. As noted by Natural England, should unanticipated changes to water quality occur then action may be required. This will be discussed and agreed with the Water Management Working Group.

3.3.8 Two broader factors may also lead to a review of monitoring procedures and potential actions. Firstly, the granting of environmental permits and licences may include conditions for water level monitoring and control. Secondly, where other evidence is presented (e.g. from the **Terrestrial Ecology Monitoring and Mitigation Plan** (TEMMP)) (Doc Ref. 9.4(B)) (secured pursuant to Requirement 4) it may be relevant to amend water management on Sizewell Marshes. Where relevant these external factors will lead to an update to the WMMP being submitted to ESC for approval pursuant to Requirement 7 of the **dDCO**.

4 TRIGGER LEVELS

4.1.1 The WMMP will set out trigger levels based on the degree of change observed such as change in level or flow, and duration of the change. Each trigger level sets out the intervention that will be implemented if those thresholds are exceeded in order to avoid or mitigate predicted significant environmental effects on groundwater or the site or surrounding area. For example, this may require altering the management arrangements for the proposed water control structures within the Sizewell Marshes SSSI to modify the movement of water through the wetland.

4.1.2 The final trigger levels will be developed to reflect the sensitivity of the receptor to the potential impact identified. The WMMP will include a mitigation toolkit which will identify the type of mitigation that will be put in place if defined trigger levels were reached.

4.1.3 It is envisaged that the principal mitigation options will relate to the new control structure to be installed at the northern end of the realigned Sizewell drain and operational practice within the Sizewell Marshes SSSI. Consequently, this approach is consistent with the existing operational management regime within the system.

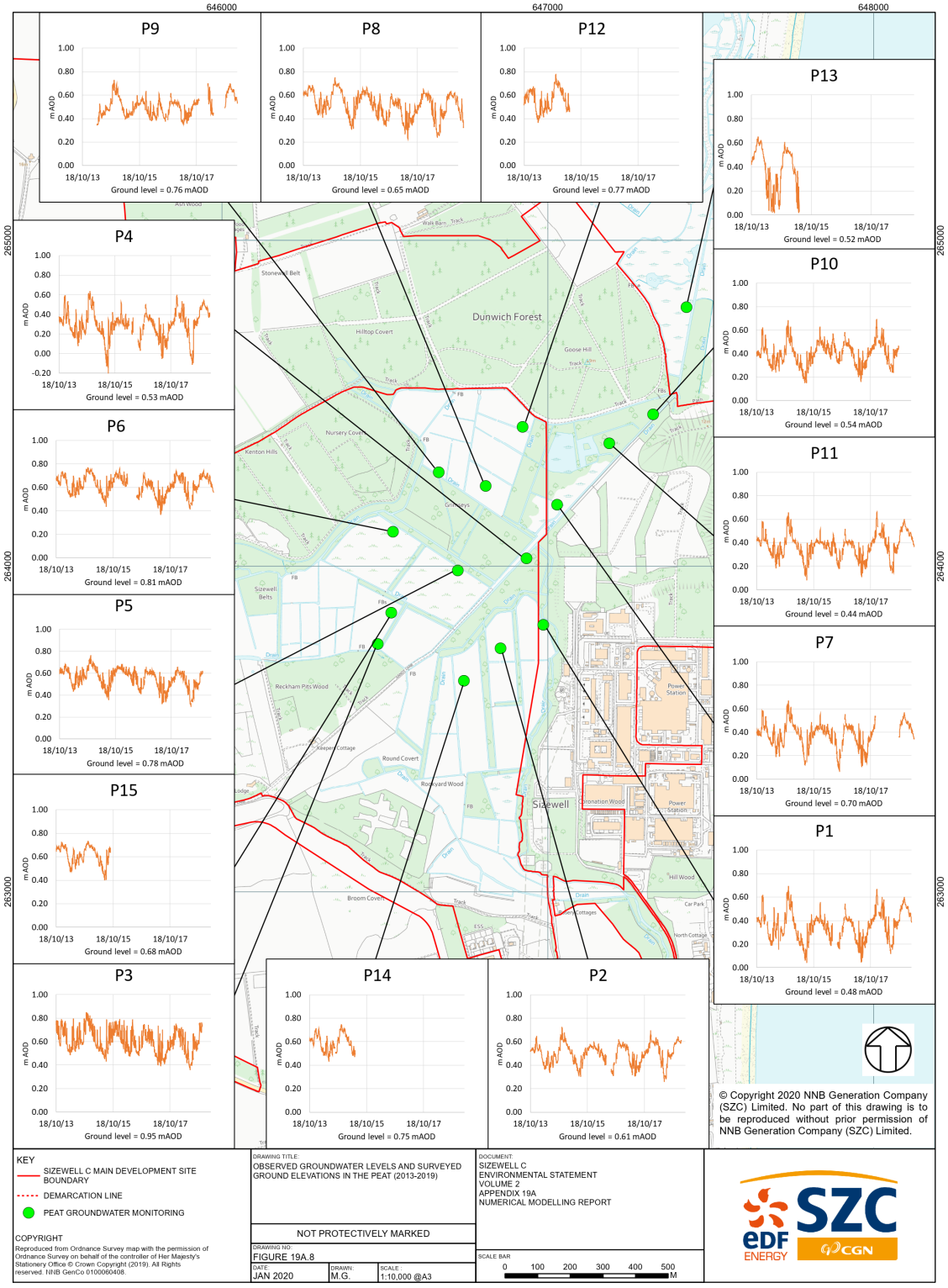
4.1.4 Where appropriate, passing of a trigger will also instigate wider stakeholder engagement and investigation. For example, where an external pressure is the potential cause of a trigger being passed, including water levels above ground level at the location of the water control structure.

4.2 Defining Triggers

4.2.1 The microtopographic variability across the site adds complexity when describing hydrological conditions for the designated communities. The difference between tussock tops and the surrounding ground surface is a key interest within the fen meadow areas. Tussocks in the SSSI range in height from 0.05m to 0.15m.

4.2.2 Validated LiDAR data are available for Sizewell Marshes, meaning that it has been feasible to describe the water management regime for each unit of the SSSI. These data are used as the basis for defining water levels triggers. High resolution water level monitoring will then be used to assess whether conditions within Sizewell Marshes are consistent with the baseline (pre-construction) period.

Plate 4.1: observed groundwater levels in peat for piezometers on Sizewell Marshes



Source: Figure 19A.8 [APP-298]

4.3 Water Management Objectives

4.3.1 The objective throughout the construction period is to maintain the existing water management regime. Baseline water level monitoring data have been analysed to define triggers, which have the following characteristics:

- the fen meadow (M22) community has exacting water management requirements.
- seasonal changes in water level requirements throughout the year mean that defined triggers for each month are needed for the peat piezometers within Sizewell Marshes.
- Between November and February the maximum water levels can be less than 0.15m below ground level. Minimum levels are defined by the 70th percentile water level from the baseline monitoring.
- Between March and October the upper and lower triggers are defined for each month, with an upper threshold defined by 30th centile values recorded from baseline monitoring and a lower threshold defined by the 70th centile values.

4.3.2 Defining triggers using these characteristics recognises the range of conditions that are observed on the site. Target water levels will be set for across the marshes will be reviewed as a whole, not simply for an individual location. Table 6.2 (Annex B) lists the proposed values triggers, based on baseline monitoring at the sites.

4.3.3 This approach is illustrated in Plate 6.2 (Annex B), which has been derived from groundwater level data collected at location P8, within the fen meadow (M22) habitat. For location P8, ground level is at 0.654mAOD. In the winter months, water levels are typically above the ground surface. The need for action would be triggered if water levels dropped below the 70th centile value (within the red shaded area). The process for taking action is described in Section 4.

4.3.4 Summer water levels show similar levels of variability to winter levels, including some periods where water levels exceed ground level. In the summer, triggers prescribed when water levels drop below the 70th centile and are higher than the 30th centile (both areas are shaded red).

4.3.5 The selection of the 30th centile and 70th centile as trigger levels in this draft WMMP is based on their position within the baseline datasets. They were proposed to constrain variability within the regime, providing a means of intervening and modifying water levels where required within the central

band of recorded baseline conditions. Should stakeholders request the adoption of alternative triggers then the implications can be assessed as the development of this draft plan progresses.

4.3.6 Routine water quality monitoring will continue but will not be used as a trigger for action. It will feed into the twice-yearly reviews of the WMMP. Should a potential impact on water levels be identified then further targeted water quality monitoring will be a potential action. Targeting may be for specific locations and determinands to investigate specific issues.

4.4 Enforcement and Reporting

4.4.1 The entire process will be subject to continued oversight by East Suffolk Council and relevant stakeholders through monitoring and reporting to the Water Management Working Group (as established by Schedule 11 of the **DoO**). This will include appropriate technical specialists, in conjunction with key stakeholders, who would provide advice on the trigger levels reached, the levels of intervention and the subsequent mitigation requirements.

4.4.2 Monitoring results will be issued to the Water Management Working Group and any necessary actions will be based on the following considerations:

- Event based triggers associated with natural hydrological variability (e.g. drought or flood) or non-development related changes (e.g. actions by others)
- Event based triggers associated with construction activities
- Other relevant changes (e.g. revisions to permits and licences, ecological survey results)
- Six monthly reviews in April and October to align with the hydrological year, enabling lessons learnt and good practice to reviewed and be drawn into an updated plan

4.5 Reviewing the WMMP

4.5.1 The WMMP will be reviewed in light of monitoring results and any updates must be in accordance with the principles listed in the **Monitoring and Response Strategy** (Doc Ref. 6.14 2.14.A(A)) and this draft WMMP. Revisions to the WMMP must be submitted pursuant to Requirement 7 to East Suffolk Council for approval, following consultation with the Environment Agency, RSPB, Natural England, Suffolk Wildlife Trust, the East Suffolk IDB and the Lead Local Flood Authority.

5 MANAGEMENT MEASURES AND ACTIONS

5.1 Overview

5.1.1 There are two mechanisms that can contribute to the slight change in water levels predicted. These predicted effects (seasonal, non-continuous and very small lowering of water levels in the first 3-4 years of construction) result from (i) the realignment and shortening of the Sizewell Drain (which increases the hydraulic gradient of the watercourse and therefore encourages a slightly higher rate of flow) and (ii) dewatering of groundwater from beneath the main construction area, within a low permeability cut-off wall.

5.1.2 The first mechanism relates to the shortening of the Sizewell Drain and increased efficiency of drainage through the watercourse as a result. The Water Monitoring Plan will define a proposed range of functions of the water control structure, which will reflect seasonality, that is designed to enable water levels that most closely match baseline conditions. The water control structure will therefore operate within an agreed level range to offset the slight increase in hydraulic efficiency introduced along the Sizewell Drain.

5.1.3 The choice and design of control structure will be agreed with stakeholders, as part of detailed design and a Discharge Consent to be approved by East Suffolk IDB, which would be designed in line with options set out in **Appendix C** to **SZC Co. Comments On Responses From Earlier Deadlines** [REP5-120].

5.1.4 Therefore, in respect of the first mechanism, the potential for failure and related remedial action can be summarised as either a failure to take readings or a failure to act upon those readings. Since both the requirement to take readings and carry out the associated action (adjustment of the water control structure) forms part of the WMMP, these activities are secured within the DCO, as set out in section 4 above.

5.1.5 In respect of the second mechanism, which relates to the dewatering of groundwater under the main construction area within a low-permeability cut-off wall, failure fundamentally relates to higher permeability rates than expected. To this end, the commissioning of the cut-off wall is a key part of the construction process. The performance of the cut-off wall is tested throughout construction by using a series of industry standard tests that enable sections of the wall to be tested, commissioned and accepted. In the event of a failure, the section of cut-off wall would either be repaired or replaced, and then subject to further commissioning tests to prove performance.

5.1.6 Consequently, the performance of the cut-off wall is achieved and proved prior to the cut-off wall being deployed for the dewatering operation. Its performance and the need for remedial action will be kept under review throughout the dewatering process.

6 ENHANCING THE WATER MANAGEMENT NETWORK

6.1 Overview

6.1.1 The network of monitoring proposed for the Sizewell Marshes SSSI provides an opportunity for the wider water environment to be managed in a more coordinated manner. SZC Co. has committed to establish a **Water Levels Management Group,** established by the **Deed of Obligation** (Doc. Ref. 8.17(G)). This will establish a forum for regular meetings between representatives of SZC Co., EDF Nuclear Generation Limited and the RSPB as the riparian landowners along the Leiston Drain. This will include other relevant bodies including ESC, the Environment Agency, East Suffolk Internal Drainage Board, Suffolk Wildlife Trust and Natural England and allow all parties to set out the shared objectives for managing water levels within Sizewell Marshes and to ensure that all parties manage water levels within their land ownership in a manner that is consistent with maximising the ecological value of the SSSI.

6.1.2 This liaison will seek to ensure that no party places additional burden on adjoining landowners without their prior approval. All parties will use reasonable endeavours to work together in managing water levels in the area and will work together constructively and proactively. This monitoring and coordination is intended to recognise SZC Co.'s new role and re-formalise the existing agreements in place or implicit in the management of the SSSI.

6.1.3 Unless agreed otherwise between the parties, the meetings will be held bi-annually.

6.1.4 It is expected that the meetings will cover the following topics:

- upcoming works;
- water monitoring reporting;
- water control measures and mitigation proposals;
- water level and quality incident and reporting;

6.1.5 The scope of the meetings can be adapted according to need, with agreement of all parties.

ANNEX 1: PROPOSED MONITORING NETWORK

A summary of the proposed monitoring locations to be included in the network and monitored by SZC Co. is provided in Plate 6.1 and Table 6.1.

Plate 6.1: Locations of proposed monitoring installations

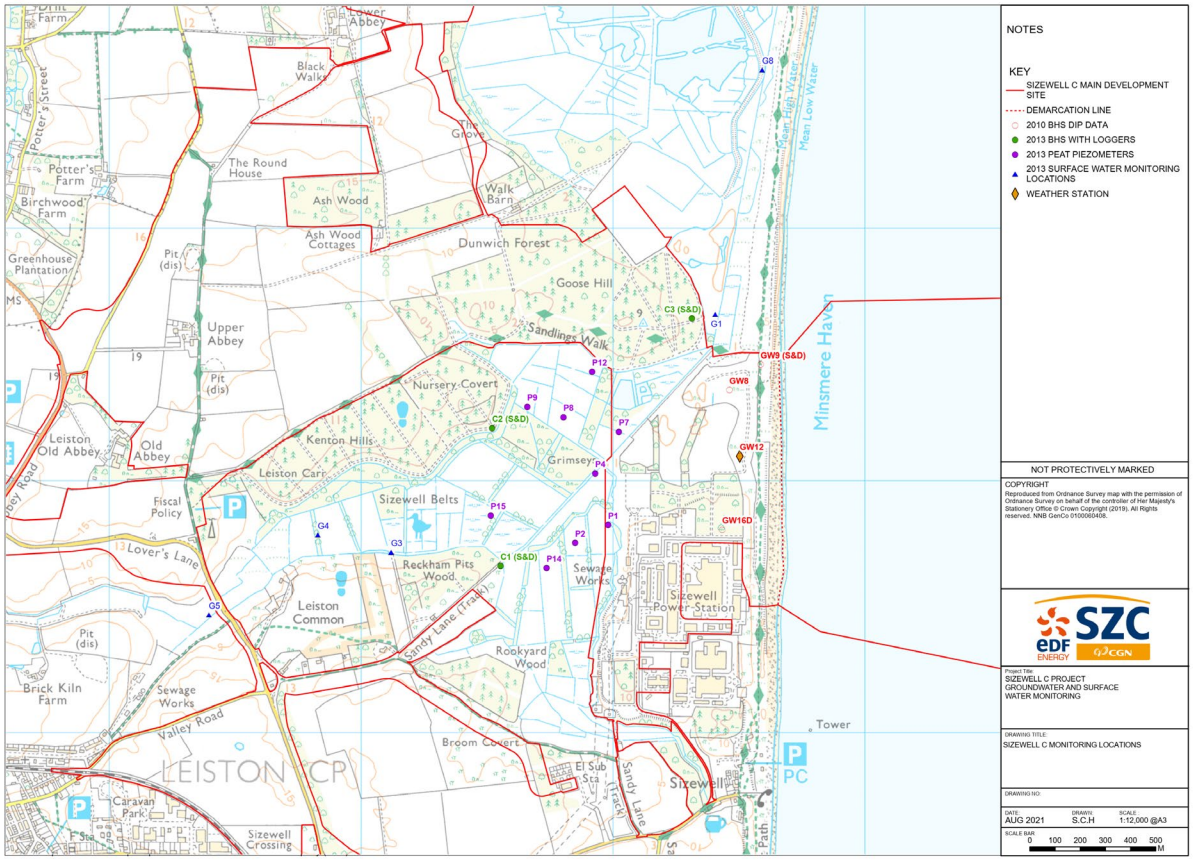


Table 6.1: Summary of the proposed water monitoring locations

Installation type and identifiers	Location	Frequency	Rationale
Piezometer P1, P4, P7	Eastern boundary of Sizewell Marshes	Automatic loggers recording water level every 15 minutes, with monthly downloads and manual measurements. Water quality twice yearly in winter and summer.	The proximity of these monitoring locations to the main construction area (MCA), the realigned Sizewell Drain (DRN163G0202 and DRN163G0201), and areas of maximum drawdown in the peat. They measure groundwater in the shallow peat, and will allow the early identification of effects that may extend further into the designated wetland. Trigger levels will be established for these locations.
Piezometer P2, P8, P9, P12, P14, P15	Within fen meadow	Automatic loggers recording water level every 15 minutes, with monthly downloads and manual measurements. Water quality twice yearly in winter and summer.	The monitoring locations sit in the nationally designated fen meadow habitats. They measure groundwater in the shallow peat and lie within the zone where drawdown of more than 0.1m is predicted in Crag. Whilst smaller effects are predicted in the peat, the monitoring locations are proposed to verify these findings. Trigger levels will be established for these locations.

Installation type and identifiers	Location	Frequency	Rationale
Borehole C1 (S&D), C2 (S&D), & C3 (S&D)	To the north and west of the MCA	Automatic loggers recording water level every 15 minutes, with monthly downloads and manual measurements. Water quality twice yearly in winter and summer.	Shallow and deep paired boreholes, monitoring groundwater levels and quality at different elevations in the strata. Provides a proximal comparison between water levels in the Crag and peat, and verifies predicted changes in the Crag.
Borehole GW8, GW9 (S&D), GW12, GW16(D)	Within the MCA	Automatic loggers recording water level every 15 minutes, with monthly downloads and manual measurements. Water quality twice yearly in winter and summer.	Boreholes in different strata within the MCA. These will ultimately be lost during construction.
Gauging station G3, G4	Western parts of Sizewell Marshes	Automatic loggers recording water level every 15 minutes, with monthly downloads and manual measurements. Water quality twice yearly in winter and summer.	Surface water monitoring to understand the distribution of the key surface water inputs to Sizewell Marshes to be measured.

Installation type and identifiers	Location	Frequency	Rationale
Gauging station G5	Aldhurst Farm	Automatic loggers recording water level every 15 minutes, with monthly downloads and manual measurements. Water quality twice yearly in winter and summer.	Surface water monitoring linked to the operation of the compensatory habitat. A condition of the permits and licences for the operation of Aldhurst Farm.
Gauging station G1, G8	Downstream of SSSI crossing	Automatic loggers recording water level every 15 minutes, with monthly downloads and manual measurements. Water quality twice yearly in winter and summer.	Surface water monitoring providing the means of demonstrating the lack of effect downstream of the MCA. The reach is influenced by tide locking at Minsmere Sluice, which can only fully be separated from the fluvial influence by using both gauges.
Surface water sampling	Topographic low points within the fen meadow habitat	Water quality twice yearly in winter and summer.	This is a new element, included to monitor water quality within the SSSI. Sampling will take place in local depressions or small topographic features within fen meadow habitats favoured by low lying and/or rarer species. See TEMMP [REP5-088] for details on the targeting of monitoring locations.

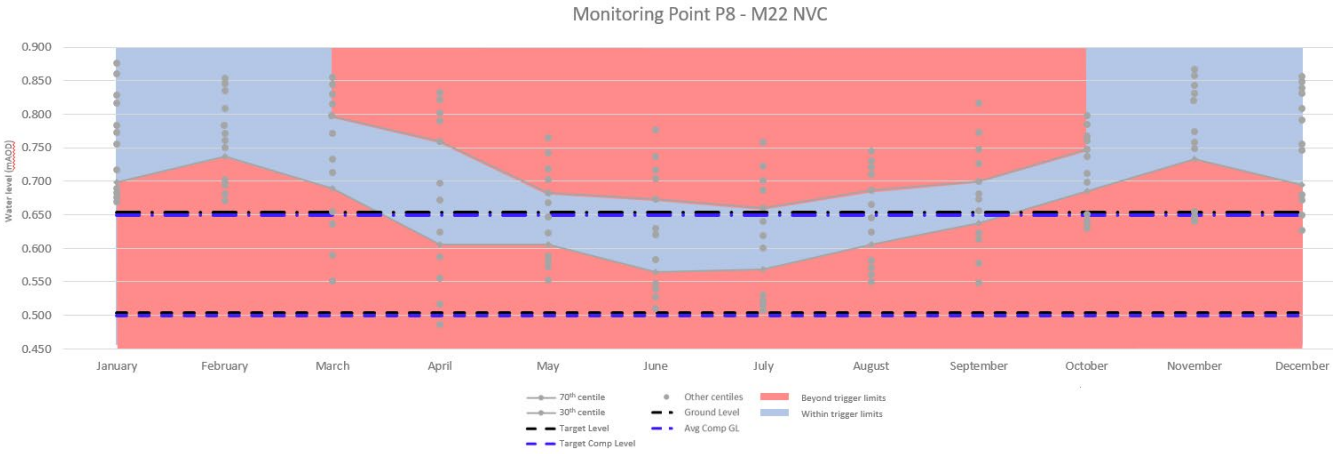
ANNEX 2: PROPOSED WATER LEVEL TRIGGERS

Table 6.2: Proposed water level triggers and supporting thresholds

Location	P1	P2	P4	P8	P9	P12	P14	P15
Ground level at piezometer	0.484	0.609	0.526	0.654	0.762	0.766	0.746	0.684
Mean ground level in compartment	-	0.550	-	0.650	0.740	0.650	0.710	0.710
Indicative summer trigger based on mean ground level in compartment	-	0.400	-	0.500	0.590	0.500	0.560	0.560
January triggers	Lower: 0.410	Lower: 0.495	Lower: 0.354	Lower: 0.699	Lower: 0.602	Lower: 0.572	Lower: 0.570	Lower: 0.653
February triggers	Lower: 0.378	Lower: 0.499	Lower: 0.308	Lower: 0.737	Lower: 0.572	Lower: 0.551	Lower: 0.550	Lower: 0.657
March triggers	Lower: 0.301	Lower: 0.504	Lower: 0.199	Lower: 0.689	Lower: 0.548	Lower: 0.518	Lower: 0.537	Lower: 0.609
April triggers	Upper: 0.327 Lower: 0.221	Upper: 0.518 Lower: 0.454	Upper: 0.410 Lower: 0.137	Upper: 0.760 Lower: 0.606	Upper: 0.592 Lower: 0.473	Upper: 0.524 Lower: 0.447	Upper: 0.548 Lower: 0.491	Upper: 0.626 Lower: 0.518
May triggers	Upper: 0.273 Lower: 0.212	Upper: 0.471 Lower: 0.400	Upper: 0.303 Lower: 0.109	Upper: 0.682 Lower: 0.605	Upper: 0.596 Lower: 0.505	Upper: 0.477 Lower: 0.386	Upper: 0.514 Lower: 0.447	Upper: 0.578 Lower: 0.489
June triggers	Upper: 0.279 Lower: 0.152	Upper: 0.416 Lower: 0.354	Upper: 0.244 Lower: 0.017	Upper: 0.673 Lower: 0.565	Upper: 0.626 Lower: 0.586	Upper: 0.508 Lower: 0.393	Upper: 0.451 Lower: 0.334	Upper: 0.548 Lower: 0.447
July triggers	Upper: 0.282 Lower: 0.153	Upper: 0.422 Lower: 0.318	Upper: 0.171 Lower: 0.042	Upper: 0.660 Lower: 0.569	Upper: 0.637 Lower: 0.595	Upper: 0.508 Lower: 0.301	Upper: 0.499 Lower: 0.377	Upper: 0.578 Lower: 0.419
August triggers	Upper: 0.324 Lower: 0.212	Upper: 0.473 Lower: 0.354	Upper: 0.308 Lower: 0.206	Upper: 0.686 Lower: 0.606	Upper: 0.673 Lower: 0.606	Upper: 0.474 Lower: 0.319	Upper: 0.531 Lower: 0.432	Upper: 0.591 Lower: 0.459
September triggers	Upper: 0.355 Lower: 0.287	Upper: 0.468 Lower: 0.418	Upper: 0.426 Lower: 0.217	Upper: 0.700 Lower: 0.637	Upper: 0.735 Lower: 0.618	Upper: 0.441 Lower: 0.316	Upper: 0.526 Lower: 0.489	Upper: 0.617 Lower: 0.505
October triggers	Upper: 0.397	Upper: 0.534	Upper: 0.436	Upper: 0.748	Upper: 0.715	Upper: 0.587	Upper: 0.577	Upper: 0.665

Location	P1	P2	P4	P8	P9	P12	P14	P15
	Lower: 0.355	Lower: 0.452	Lower: 0.315	Lower: 0.685	Lower: 0.644	Lower: 0.444	Lower: 0.479	Lower: 0.560
November triggers	Lower: 0.406	Lower: 0.496	Lower: 0.422	Lower: 0.733	Lower: 0.609	Lower: 0.572	Lower: 0.553	Lower: 0.624
December triggers	Lower: 0.412	Lower: 0.496	Lower: 0.399	Lower: 0.695	Lower: 0.604	Lower: 0.556	Lower: 0.544	Lower: 0.640

Plate 6.2: Groundwater level centiles for piezometer P8 on Sizewell Marshes



REFERENCES

1. Barsoum N, Anderson R, Broadmeadow S, Bishop H, Nisbet T (2005). Ecohydrological guidelines for wet woodland: http://publications.naturalengland.org.uk/file/91056

2. Environment Agency (1996). Water Level Management Plan for Minsmere

3. Environment Agency (1998). Water Level Management Plan for Sizewell Belts Site of Special Scientific Interest.

4. Wheeler B, Shaw S, Tanner K (2009). A wetland framework for impact assessment at statutory sites in England and Wales. Environment Agency. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291628/scho0309bpoe-e-e.pdf

5. Wheeler B, Gowing D, Shaw S, Mountford JO and Money R (2004). Ecohydrological Guidelines for Lowland Wetland Plant Communities. http://www.floodplainmeadows.org.uk/sites/www.floodplainmeadows.org.uk/files/files/Eco%20Hydrological%20Guidelines%20(1).pdf [last accessed 24/02/2020]