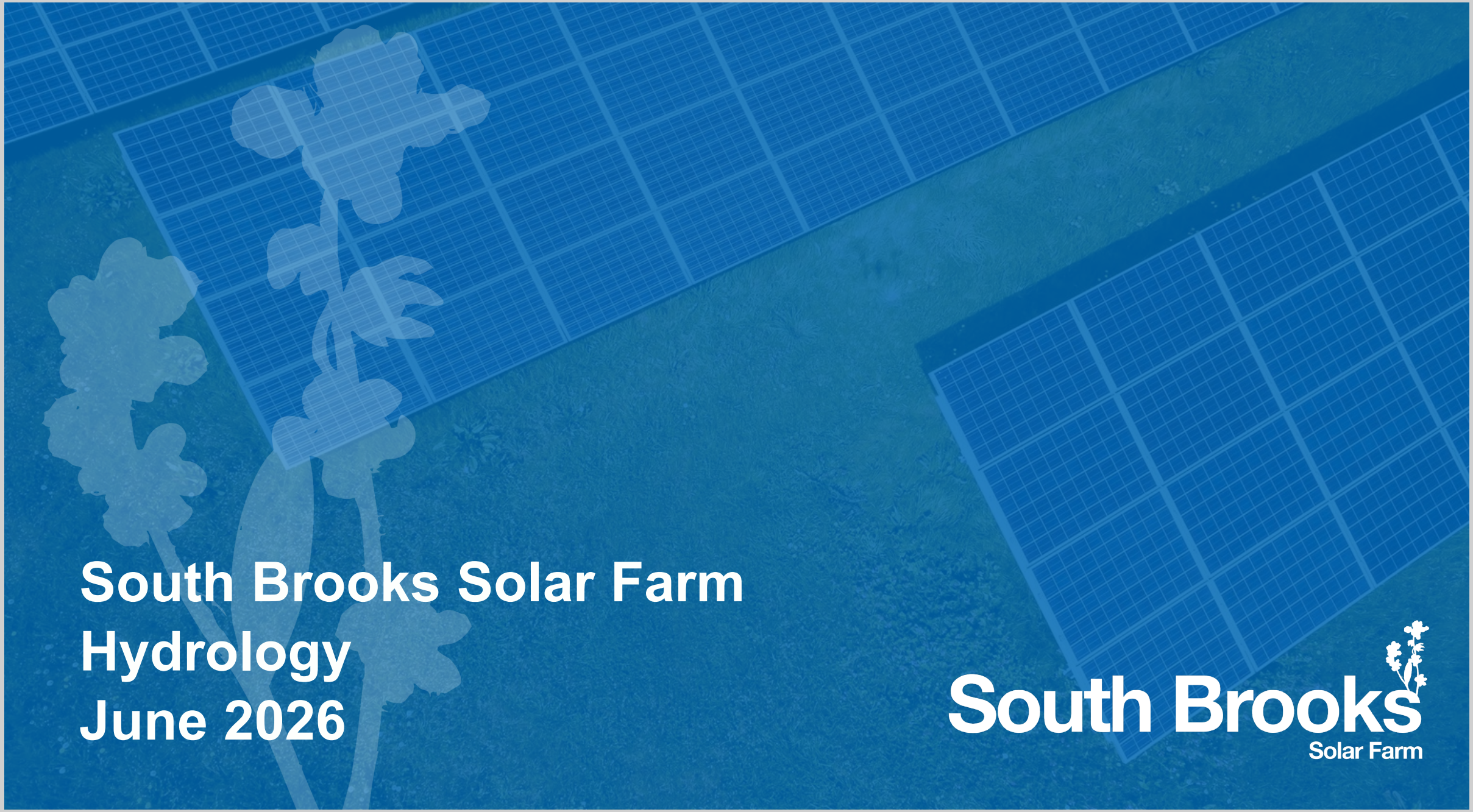

South Brooks Solar Farm
Hydrology
June 2026

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Agenda

- Introduction and housekeeping
- Feedback received to date and common misconceptions
- Approach to the assessment
- Outcomes of the assessment
- Further work needed for the Environmental Statement
- Q&A

Introduction

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Housekeeping

- All questions should be submitted via Q&A function of this webinar.
- Unless asking for a clarification, questions will be taken following the presentation in the dedicated Q&A part of the webinar. However, you are welcome to submit questions during the presentation.
- This webinar is being recorded for the purposes of reporting on the consultation and providing summaries of the Q&A discussion.
- The slides from this webinar will be available on the project website (www.southbrookssolarfarm.co.uk), along with a summary of the Q&A discussion, following the webinar.

How to use the Q&A function to ask a question

1. Click the Q&A button on the bottom toolbar.
2. Submit Question: Type your question into the text box.
3. Anonymity: Check the "Send Anonymously" box if you do not want your name attached.
4. View Answers: The Q&A window will show your question, replies, and if the moderator plans to "answer live."

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Introduction

Logika Group – Covering Flood Risk and Water Quality

- Craig Thwaites – Associate Director at Logika Group
- Masters in Civil Engineering
- 12 years experience in Hydrology Matters
- Significant experience advising on Hydrology for renewables projects, including DCO solar farms.

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What is Hydrology?

Definition

Hydrology is the study of the distribution, movement and behaviour of water both above and below the Earth's surface. This also includes the impact that human activity would have on water availability and conditions. The following key items are typically assessed:

- Flood Risk
- Surface Water Drainage (including Water Quality)
- Water Supply

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Key Terms

- Tidal Flooding - Flooding that occurs as a result of high tides or storm surge events in which water flows from the sea towards land and inundates low lying areas. This includes tidal river flooding, where they are influenced by tides.

- Fluvial Flooding - Flooding that originates from rivers as a result of heavy or prolonged periods of rain or snow melt.

- Pluvial Flooding - Flooding that occurs due to high intensity rainfall and results in water ponding or flowing overland.

- Flood Defence Breach – Flooding that could occur as a result of a breach (i.e. failure) of flood defences. Often referred to as a residual event.

- Design Flood – The flood event for which we are required to provide mitigation against. For this area, this is considered to be the 1 in 200 year tidal event plus climate change and is defined by the EA in the Planning Practice Guidance (PPG).

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Key Terms

- Climate Change Allowance – Allowances to account for predicted changes in peak river flow, rainfall intensity and sea level rise, due to climate change.

- Sequential Approach – To develop areas at little or no risk of flooding in preference to areas at higher risk.

- Sequential Test – Where it's not possible to locate development in low risk areas, the Sequential Test is required. This test essentially compares the Site against other reasonably available sites (in a defined search area and that could meet development needs) and again aims to steer development to the lower risk areas.

- Exception Test – Where the sequential test confirms that no suitable sites at lower risk of flooding are available, the exception test requires that development will provide wider sustainability benefits to the community that outweigh flood risk and that the development will be safe for is lifetime, without increasing flood risk elsewhere.

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Key Terms

In the context of tidal and fluvial flooding, the following flood zones are defined:

Flood Zone 1 – Low probability of flooding

- Less than 1 in 1,000 (0.1%) probability of river or tidal flooding

Flood Zone 2 – Medium probability of flooding

- Between 1 in 100 (1%) and 1 in 1,000 (0.1%) probability of fluvial flooding
- Between 1 in 200 (0.5%) and 1 in 1,000 (0.1%) probability of tidal flooding

Flood Zone 3 – High probability of flooding

- Greater than 1 in 100 (1%) probability of fluvial flooding
- Greater than 1 in 200 (0.5%) probability of tidal flooding

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Key Terms

- Surface Water Drainage - The management of rainfall runoff from land and developed surfaces, ensuring that flows are controlled in terms of rate, volume and quality.

- Sustainable Drainage Systems (SuDS) – Drainage features which mimic natural drainage regimes and typically manage rainfall close to where it falls. SuDS are typically designed to provide amenity, biodiversity, water quantity and water quality benefits.

- Potable Water – Water that is safe for humans to drink, cook with and for personal hygiene.

- Non-Potable Water – Water that is not safe for humans to drink. More likely used for construction processes, toilet flushing and irrigation.

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Feedback received to date and common misconceptions about Hydrology

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Feedback received to date

- Hydraulic Modelling for Fluvial/Pluvial Flood Risk
- Updated Tidal Hydraulic Modelling for Climate Change and Breach
- Flood Mitigation Measures
- Water Supply
- Impacts to Existing Agricultural Drainage
- Water Quality Impacts (inc. Water Framework Directive)

In addition to the above, we have had meetings/consultation with the EA, Kent and East Sussex Lead Local Flood Authority (LLFA) as well as Romney Marsh Internal Drainage Board (IDB) to discuss flood and drainage matters.

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Common misconceptions about Hydrology

1. Flood Map for Planning and Flood Defences

Whilst the Environment Agency's (EA) Flood Map for Planning shows Flood Zones, it does not take into account the protection that existing flood defences provide.

i.e. the mapping assumes the flood defences do not exist.

2. Probability of Flooding

Probabilities of flooding, such as greater than 1 in 100 (1%) probability for Flood Zone 3 does not mean this flood event will happen once in 100 years or that it won't happen for 100 years.

It is a 1 in 100 (1%) probability of happening in any given year (i.e. annual probability).

3. Solar Farms cannot be located in Flood Areas

National planning policy indicates that Essential Infrastructure (such as solar farms) can be located in all Flood Zones, assuming that the Exception Test is passed (for development within Flood Zone 3).

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Common misconceptions about Hydrology

4. Solar Farms increase surface water runoff/flood risk

Research* indicates that as long as vegetation cover beneath panels is maintained, no significant increase in surface water runoff is anticipated.

Vegetation + infiltration + spacing can maintain or even reduce runoff

Flood risk only increases if:

- soil is compacted
- vegetation is poor
- drainage isn't designed properly

*Cook and McCuen, 2013 *"Hydrologic Response from Solar Farms"*

5. Drainage does not equal sewers

Land drainage normally consists of open field ditch, and underground land drainage features that often discharge untreated and unattenuated to local waterbodies.

Sewers consist of public sewer assets (e.g. foul, combined sewers) that run underground to treatment works.

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Common misconceptions about Hydrology

6. Battery Energy Storage Systems will pollute water sources

Battery Energy Storage Systems (BESS) are sealed systems with very little potential for leakages.

Consideration of pollution in a BESS fire event is made within the design of the surface water drainage. This includes the use of appropriate pollution control including containment measures to prevent polluted runoff from entering the discharging to waterbodies.

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Approach to assessment

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Approach to assessment

Assessment to date of potential effects is based on professional judgement supported by available baseline information. This baseline information is informed via the following:

- Site Walkover(s)
- EA Flood Mapping
- EA Hydraulic Modelling
- Strategic Flood Risk Assessment(s)
- EA Drinking Water Protected Areas, Safeguard Zones, Source Protection Zones and Groundwater Vulnerability Mapping

In addition, a number of meetings have been held with the EA and Internal Drainage Board (IDB) to gain their inputs on modelling requirements and drainage considerations.

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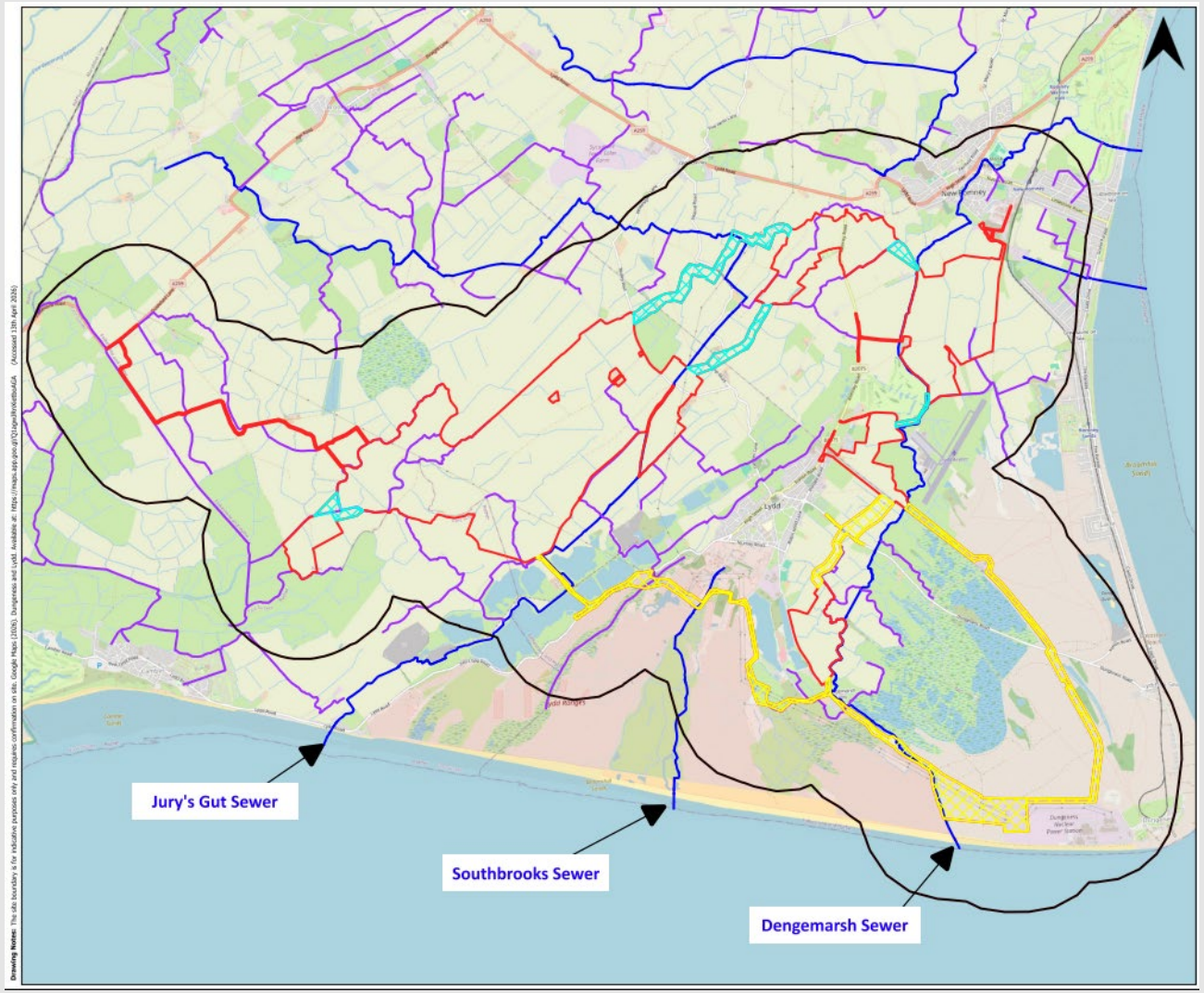
Approach to assessment – Baseline Data



Existing Watercourses

Legend

- Site Boundary
- Hydrology Study Area
- Indicative Grid Connection Cable Routes
- Indicative Interconnecting Cable Routes
- EA Main Rivers
- IDB watercourses

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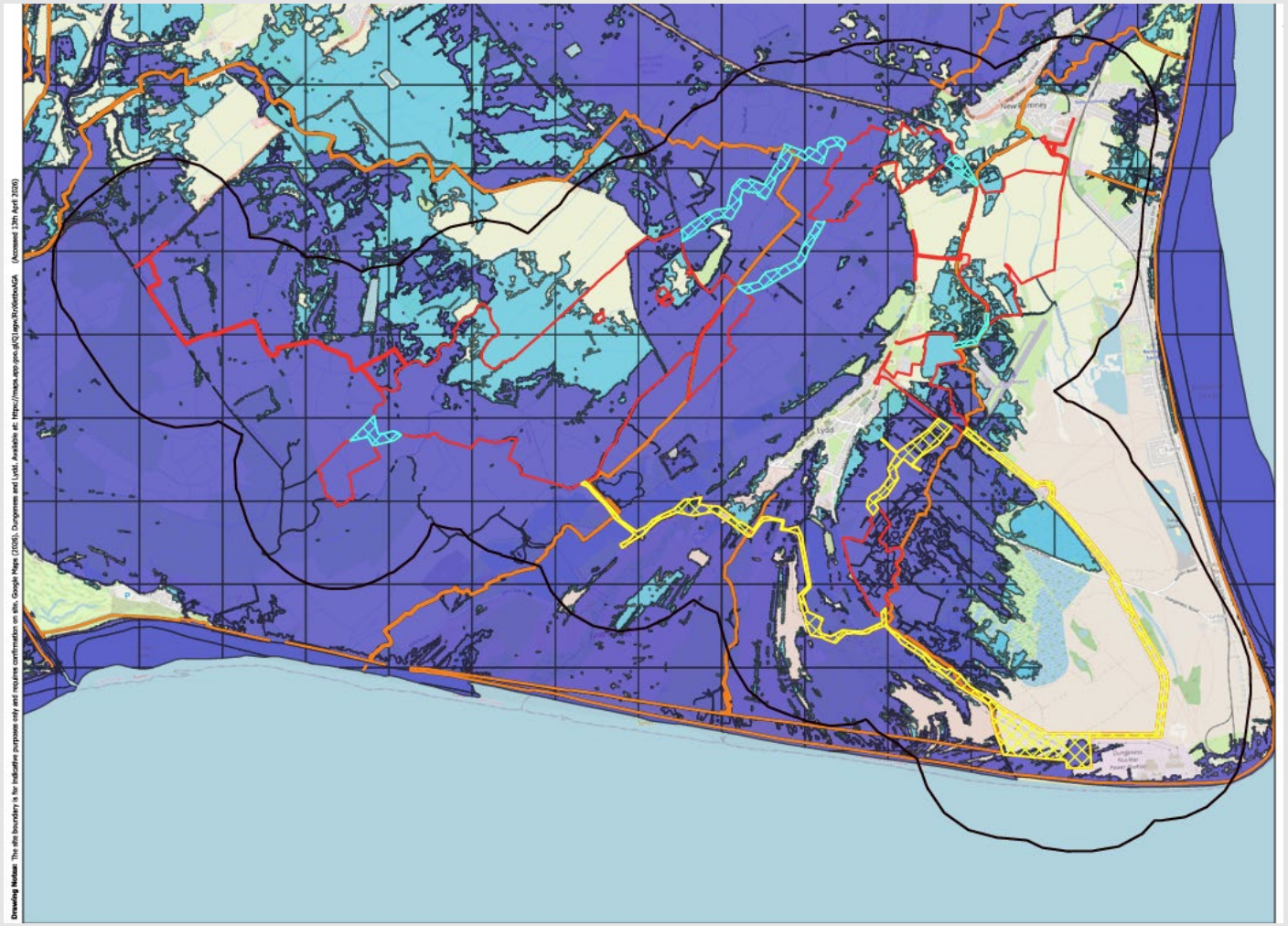
Approach to assessment – Baseline Data



EA Flood Map for Planning (Tidal Flood Risk)

Legend

- Site Boundary
- Hydrology Study Area
- Indicative Grid Connection Cable Routes
- Indicative Interconnecting Cable Routes
- Flood Zone 1
- Flood Zone 2
- Flood Zone 3
- Flood Defences

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Approach to assessment – Baseline Data

EA Tidal Hydraulic Model Results

1 in 200 year Defended Event

Legend

- Site Boundary
- Hydrology Study Area
- Tidal Defended 1 in 200 Year Flood Extent
- Indicative Grid Connection Cable Routes
- Indicative Interconnecting Cable Routes

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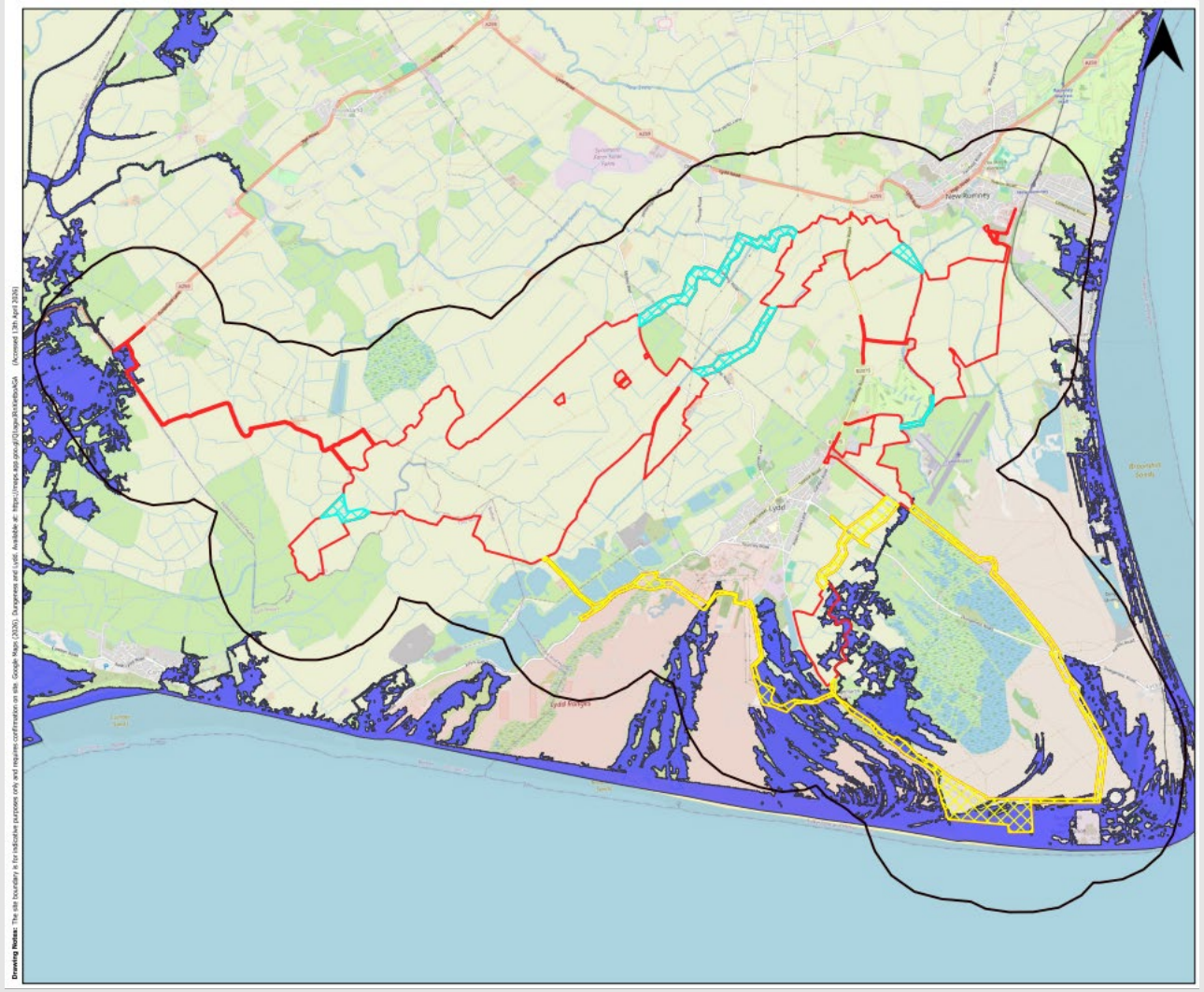
Approach to assessment – Baseline Data



EA Tidal Hydraulic Model Results

1 in 200 year + CC Defended Event (i.e. Design Tidal Event)

Legend

- Site Boundary
- Hydrology Study Area
- Tidal Defended 1 in 200 NPPF 2115 Climate Change Year Flood Extent
- Indicative Grid Connection Cable Routes
- Indicative Interconnecting Cable Routes

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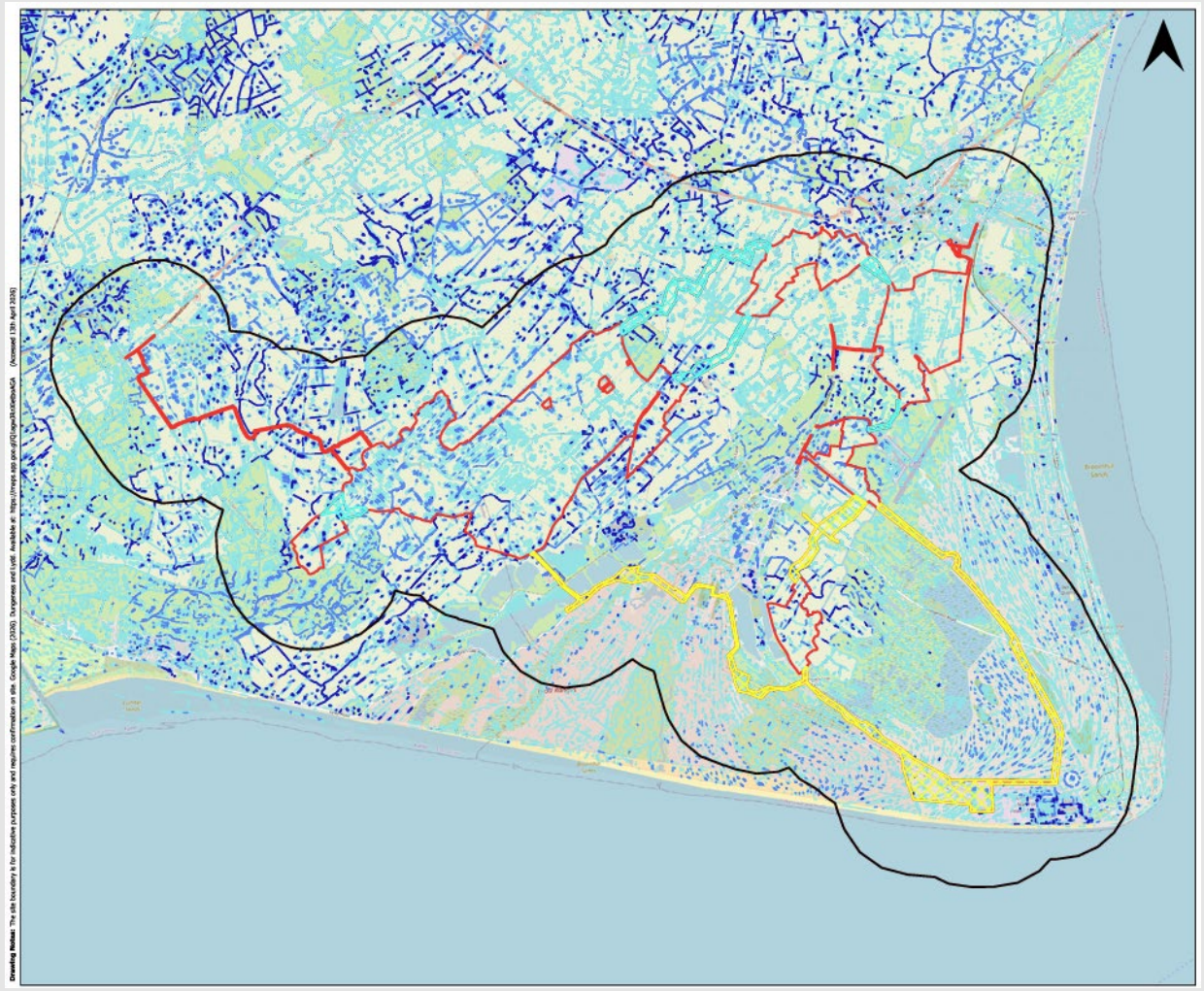
Approach to assessment – Baseline Data



EA Surface Water Flood Mapping

Future Climate Change Scenario

Legend

- Site Boundary
- Hydrology Study Area
- Indicative Grid Connection Cable Routes
- Indicative Interconnecting Cable Routes
- Very Low Risk
- Low
- Medium
- High

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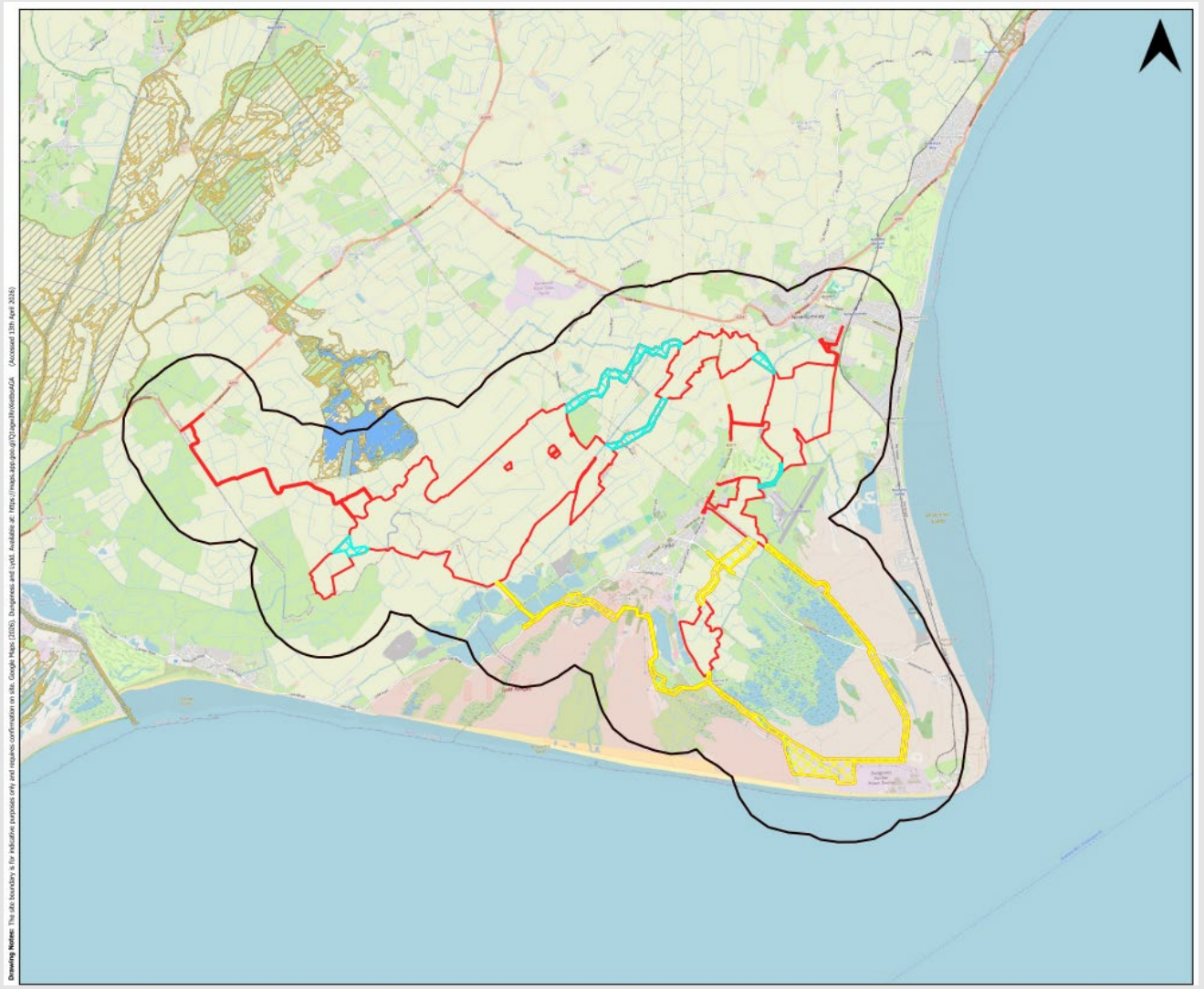
Approach to assessment – Baseline Data



EA Reservoir Flood Map

Legend

- Site Boundary
- Hydrology Study Area
- Indicative Grid Connection Cable Routes
- Indicative Interconnecting Cable Routes
- Maximum Extent of Reservoir Flooding (Normal River Levels)
- Maximum Extent of Reservoir Flooding (with Flooding from Rivers)

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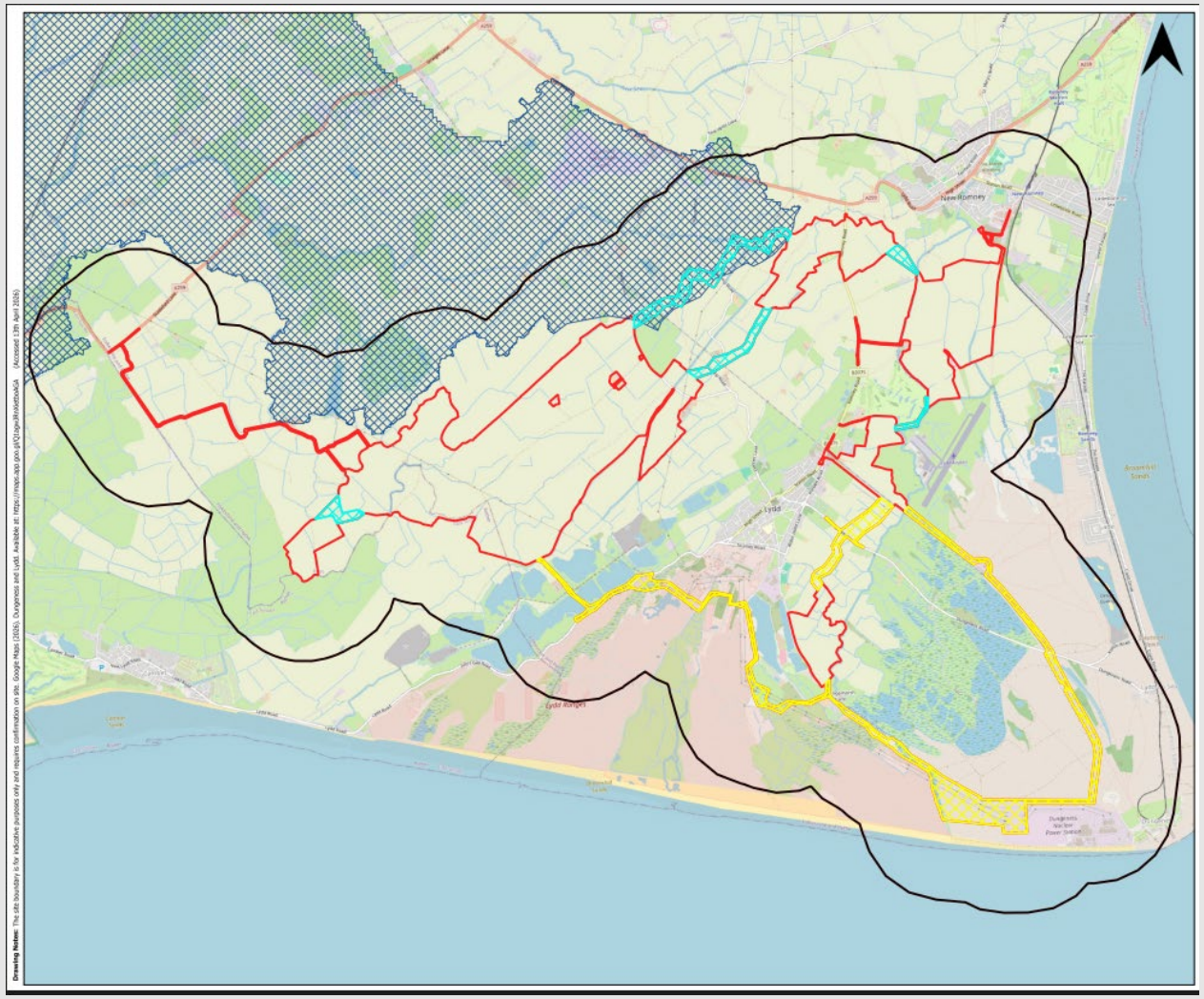
Approach to assessment – Baseline Data



Drinking Water Protected Areas (for Surface Water)

Legend

- Site Boundary
- Hydrology Study Area
- Indicative Grid Connection Cable Routes
- Indicative Interconnecting Cable Routes
- Drinking Water Protected Areas (Surface Water)

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Approach to assessment – Receptors

The following important receptors with regards to hydrology have been identified for assessment of effects:

- Users of both the construction/decommissioning site and completed development in relation to flood risk from all sources;
- Areas within the Study Area in relation to flood risk from all sources;
- Existing watercourses within the Study Area with respect to associated existing water level management infrastructure, flood defences, surface water discharge rates, volume, and quality of runoff;
- Groundwater sources and DWPA (surface water);
- Existing agricultural drainage;
- Surrounding public water mains and sewers with regards to capacity/supply;
- Water quality impacts to marine environments.

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Outcomes of the assessment

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Outcomes of the assessment

The assessment concludes that with mitigation embedded into the construction/decommissioning processes and the design of the operational development, effects to receptors with regards to hydrology are anticipated to be not significant.

Mitigation at construction/decommissioning will be set out within the Outline Construction Environmental Management Plan (oCEMP) and Outline Decommissioning Environmental Management Plan (oDEMP).

Mitigation during operation will be set out within the Outline Operational Environmental Management Plan (oOEMP) and technical reporting, such as the Flood Risk Assessment and Drainage Strategy documents.

In addition, hydrological mitigation will be embedded into the masterplan development, through design.

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Outcomes of the assessment

Hydrology in Design

- Sequential approach to masterplan layout.
- Flood Mitigation where required (such as the raising of solar panels above flood water).
- Approach to watercourses (offsets and crossings).
- The management of surface water runoff (i.e. drainage design).
- Water quality/treatment (for all phases of development, i.e. construction, operation and decommissioning).

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Further work needed for the Environmental Statement

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Further work needed for the Environmental Statement

As agreed with the EA, hydraulic modelling is currently being progressed for the following:

- Direct Rainfall Modelling – To consider the risk of flooding associated with watercourses within and in the vicinity of the scheme.
- Updated Tidal Modelling – To bring the current EA modelling up to date in terms of tidal conditions and climate change considerations.

With regards to the drainage design, the following is being progressed:

- Further drainage surveys and landowner engagement - To gain better understanding of existing drainage features.
- Development of drainage plans, including attenuation types and location, flow control methodology and pollution control – To inform the masterplan.
- Engagement with water and sewerage providers.

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Further work needed for the Environmental Statement

Meetings will continue to be held with the EA, IDB and LLFA(s) up to submission to ensure that their requirements are considered within the design. These will include continued discussions around the following items:

- Flood risk modelling and results.
- Flood risk mitigation measures.
- Watercourse crossings (both above ground for access and below ground cable routes).
- Water Framework Directive (which will include discussions around aquifers, groundwater bodies, water protected areas, water quality etc).
- Surface water and foul drainage considerations.

We will also continue to work with our internal teams to ensure that hydrological impacts on other environmental disciplines (such as ecology/biodiversity) are considered in the assessment and mitigated for, where required.

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Further work needed for the Environmental Statement

Overall, the production of the following:

- Flood Risk Assessment
- Drainage Strategy
- Water Framework Directive Assessment
- Management Plans

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Thank you and Q&A

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info@southbrookssolarfarm.co.uk

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Summary of Q&A discussion

Q: Which category of flooding would dyke flooding fall into?

A: Whether dyke flooding is fluvial or pluvial depends on its location and catchment characteristics. It is not unusual however, for flooding associated with smaller watercourses with smaller catchments (like those at South Brooks) to be more characteristic of pluvial flooding.

Q: Which category of flooding would water be used for cleaning the solar panels?

A: Water used to clean the solar panels wouldn't be considered a constitute a flood risk due to the source and likely low volumes of water required at any given time. However, in terms of water quality impacts, panels are typically cleaned with clean water with no cleaning agents used, meaning there is no resultant pollution risk from the activity.

Q: There is a flood risk in the area between Lydd Camp and the power station that needs to be considered.

A: This is noted with thanks.

Q: Could you supply the % of South Brooks within each flood zone?

A: This information is not available currently however, this can be calculated and incorporated into the Environmental Statement.

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Summary of Q&A discussion

Q: How will the vegetation grow if it is dark/shady under the panels?

A: In between the rows of solar PV (which at their lowest point would be 0.8m to the ground), there would be minimum spacing of 2.5m. Typically, we would specify a diverse mix of planting including shade tolerant species beneath the panels so that there is consistent vegetation cover for all weather conditions.

Q: You state that you plan to construct all year, but how do you propose to deal with general winter flooding that occurs?

A: Measures to ensure winter working is appropriate will be detailed in the Outline Construction Environmental Management Plan (oCEMP) to ensure the safety of operatives. An early version of this plan has been published as part of the consultation. Examples of measures include track matting around entrance points to the Site and advanced grassland planting.

Q: Construction of Sycamore Solar Farm resulted in a main ditch sewer collapsing, which was repaired by the developers. Given the much larger scale of South Brooks, how can the drainage system on Romney Marsh be protected, especially given the nature of Marsh soils in extreme wet periods when the build is up to 48 months.

A: This event has been raised in our meetings with the Romney Marsh Area IDB. While the construction period of South Brooks is longer than Sycamore Solar Farm, it should be noted that it is not concentrated in one location and is more distributed in nature. Measures in the management plans like the oCEMP will be put in place across the Site to protect sewers and watercourses during construction.

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Summary of Q&A discussion

Q: Earlier this week, there was coverage of a solar farm in Kent utilising local water supplies during a water shortage. How would you manage a similar event and where would the water supply for South Brooks come from for solar panel cleaning and BESS water supply? How much water would be needed?

A: With regards to water need on a broader scale, measures will be put in place during construction to minimise demand from public supplies (such the use of prefabricated units, use of non-potable water, etc). For solar panel cleaning demand, the volume and where this will be supplied from is an item that will be confirmed as the scheme progresses. However, EDF power solutions does not typically wash the panels during the summer months when sunny – we would generally undertake the maintenance of the washing over the winter months using techniques to minimise water extraction. We would specify in our contract with the operator/maintainers that we wouldn't extract water or seek to clean the panels when there are hosepipe bans in place or pressures on the water system that may mean residential supply is at risk. We would likely bring the de-mineralised water in from offsite and make sure that where we extract it from there was enough supply to ensure we didn't affect other supplies in the area. [Note: this answer has been extended following the webinar.]

Q: Are climate change predictions worse than what was shown on the map during the presentation?

A: Between when mapping was produced by the Environment Agency and now, climate change allowances are generally more conservative (for example sea level rise will be greater) and therefore climate change requirements are higher. Mapping shown as part of the presentation, however, applies climate change up to the year 2115, which is beyond the operational lifespan of the Project and is therefore potentially conservative. However, we are undertaking hydraulic modelling to confirm how climate change will impact flood risk at the Site during its operational lifespan and this will be included within the Technical Assessments.

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Summary of Q&A discussion

Q: Will the modelling take into account the neighbouring solar schemes for cumulative impacts, with particular reference to South Kent Energy Park?

A: All developments are required to meet the same criteria (set by national and local policy) as this Project to ensure that they would not increase flood risk elsewhere, and therefore a negligible impact across Sites is expected. We will however, review the modelling to see if any cumulative Projects fall within the smaller catchments we are looking at for direct rainfall modelling and whether any considerations need to be made. Given the proximity of the Project to the tidal coastline in relation to other Projects, we would not expect there to be any potential cumulative effects.

Q: How would soil compaction be dealt with when pluvial run off hits the same area of land beneath the panels while the other areas of the land don't get the run off? And is there a plan to harvest run off?

A: This question may refer to the dripline effect, where some areas get wet from rainwater or other sources of water and other areas (i.e. beneath the panels) do not. We would not anticipate soil compaction to occur as a result of this however, concerns are sometimes raised around potential soil erosion in the long term due more concentrated runoff. Research shows and recommends that with maintained vegetation along the dripline provides mitigation against potential erosion. Furthermore, ground levels would typically be maintained beneath the panels, meaning there is an opportunity for rainwater that lands on that dripline to continue to flow downstream beneath the panels as it normally would, with the same opportunity for ground infiltration and groundwater recharge. We are currently reviewing the potential to incorporate rainwater harvesting but this hasn't been quantified to date and may not be quantified within the application.

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Summary of Q&A discussion

Q: How will fire water from a potential BESS fire be dealt with? How much water needs to be stored near the BESS for a fire event for a BESS of this size and how would a fire be dealt with?

A: To manage firewater runoff, appropriate pollution control measures would be in place which typically include containment. This would incorporate things like penstock valves downstream of any attenuation features which are automatically linked to fire alert systems (with manual back-ups in place), to contain the firewater in that event. Discussions are ongoing with Kent Fire and Rescue Services to discuss volumes of water that would like be required in a fire event and how this needs to be considered within any containment sizing. Furthermore, there is typically a requirement to consider the potential for a fire to coincide with a rainfall event and what subsequent volumes need to be considered for this as well as the firewater runoff.

Q: What about the drinking water zone shown in blue which clashes with one of the interconnecting cable routes?

A: The proposed development which overlaps with the drinking water protection zone is one of the proposed interconnecting cable. If this cable route is selected, we would put appropriate mitigation in place (within the environmental management plans) to ensure that potential pollution is mitigated against.

Q: How would cabling trenches impact on existing land drainages?

A: We are looking to identify existing land drainage through surveys and landowner engagement which will allow us to mitigate against any impacts. Measures would be detailed in the Outline Management Plans.

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Summary of Q&A discussion

Q: Some pumps that pump water out to the sea from the Marsh are not operating well. Do the assessments take this into account, and what does the Environment Agency say about this?

A: While this hasn't been discussed with the Environment Agency to date but it has been raised by the IDB in meetings. Last week, we undertook a site walkover to assess IDB structures so that we can ensure these are represented within the modelling. While the pumps are outside of the overall catchment areas they will be considered, where appropriate, as a downstream feature to ensure allowances have been made for them.

Q: What projects have you worked on with the same hydrology as Romney Marsh?

A: Hydrology varies significantly across the country, however, Craig has worked on numerous solar projects which fall within Flood Zones 2 and 3.

Q: Why is the hydrology map frilly around the edges not going to the coast?

A: The black lines shown in the mapping outputs tends to represent where post processing has been undertaken to the outputs. This includes items such as combining different models or model scenarios on to one plan.

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Upcoming webinars

Webinar	Date
Taking part in the consultation	28 May
Water	4 June
Transport	10 June
Landscape and visual	17 June
Battery safety	18 June
Soils	25 June
Ecology	1 July

All webinars take place between 6-7pm on the above dates.
To register, please visit the project website: www.southbrookssolarfarm.co.uk.

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