



North Sea  
Transition  
Authority

# Application for Production Licences Technical Guidance (Appendix B)

Version: August 2022 Rev 1.0

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Date of publication 7 October 2022

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# 1. Technical Guidance

## a. Introduction

1. The Oil and Gas Authority ('**OGA**') is now operating as the North Sea Transition Authority ('**NSTA**') and will be referred to as the NSTA in this document. The OGA remains the legal name of the company, and all licences and other legal documentation will continue to refer to the OGA.
2. When applying for a Seaward Production Licence, the Applicant presents technical information in a part of the application called **Appendix B**, which:
  - a) outlines the information used to arrive at the current understanding of the acreage
  - b) identify prospectivity and/or development options
  - c) explain the exploration and /or exploitation rationale
  - d) proposes and justifies a Work Programme for the Initial Term of a licence.
3. Technical understanding and the proposed Work Programme, as presented in the Applicant's Appendix B, will be assessed against a marks scheme which will largely form the basis of the decision as to who will be offered licences (see '*How Decisions Are Reached*' in the General Guidance). For applications where it is proposed to start the licence in **Phase C** of the Initial Term or with no Initial Term at all (i.e. **Straight to Second Term**), the Applicant also submits information demonstrating its financial capacity and the proposed Licence Operator's competence (see section e, *Licence Operator Competence*). All applications for Seaward Production Licences will also be determined against the safety and environmental capability requirements of the Offshore Safety Directive (OSD), as detailed in the guidance available at <https://www.nstauthority.co.uk/licensing-consents/licensing-system/offshore-safety-directive/>
4. The Applicant should present information (via the electronic LARRY system) in whatever form it considers best illustrates its plans for the acreage and the rationale behind such plans. The NSTA considers a fit-for-purpose application to be a report at most 50 pages long, including relevant maps and seismic sections indicating well ties, where appropriate.
5. This Guidance is designed to cater for applications in any area, the level of detail provided in an application will reflect the amount of information available and utilised by the Applicant.
6. The Appendix B is the opportunity for Applicants to describe how they have analysed the area(s) and selected the block(s) applied for and should include a brief description of that methodology. Any previously documented studies which have been utilised in the evaluation should be referred to and a short summary given. A bibliography of consultant's and/or contractor's reports utilised would be helpful. Information provided as part of the Appendix B (technical work done and Work Programme) will be marked in accordance with the Marks Scheme detailed at Annex 2.
7. Each separate application can contain up to 20 blocks or part blocks as long as the composition of Licensees in the application and the combination of Terms and Phases is the same across all blocks applied for. Separate applications should be submitted for each area where there are different Licensee or Term/Phase combinations.
8. The NSTA limits the amount of acreage that can be awarded in a single licence. In Seaward areas, the limit is ten contiguous blocks/part blocks per licence, but with no aggregate limit across several licences.

9. The Appendix B application should include:
- A brief summary of the exploration/exploitation rationale for that area, including an account of the regional geology, the overall hydrocarbon system, and potential plays.
  - A description of the data coverage (seismic, wells and any other data), with an explanation of how this was utilised in the analysis.
  - Applicants must identify and detail all available geophysical data (whether publicly or commercially available) and justify the use of the datasets chosen for the analysis from a technical perspective. The NSTA encourages the use of the best available datasets wherever possible (see Asset Stewardship Expectation SE03 available on the NSTA website<sup>1</sup>).
  - For seismic data please enclose maps showing the regional and block specific areas of seismic coverage (full fold) used in the interpretation, indicating the type of seismic, key survey acquisition and processing parameters, and whether it has been specifically acquired (whether shot or purchased) or reprocessed for the assessment.
  - Likewise, wells specifically interpreted for the assessment should be annotated on a map, listing wells where any detailed or specialist analysis was carried out.
  - The analysis performed by play (source rock and reservoir-seal pair), and the overall prospectivity potential (or lack of) identified within the block(s) and its relationship to the regional geology of the area.
  - The identity and analysis of undeveloped discoveries, prospects, leads, plays/part-plays and common risk segment analyses and/or new play concepts in the acreage, together with predicted reservoir performance, reservoir and fluid properties, and resource/reserve information (including risk/chance of success) using analogues and play statistics. Play chance (shared chance factors) should be separated from prospect chance (local chance factors), and risk dependencies identified.
  - For the main prospect/group of prospects/leads: two interpreted seismic and geological profiles in crossing directions (dip and strike lines); reservoir horizon time maps and depth maps presented at identical horizontal scales showing the position of the seismic and the geological profiles. For discoveries, the applicant should also provide reasonable detail and similar documentation to that for prospects.
  - Where appropriate, include consideration of potential commercial, infrastructure and outline economic analysis if existing discoveries and/or potential re-developments are being considered for further appraisal or development
  - For a group of blocks where there is multiple prospectivity, please provide a summary map showing the prospectivity at all levels.
  - A summary table of the identified prospectivity should also be provided as per the example below:

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<sup>1</sup> [https://www.nstauthority.co.uk/media/5896/oga\\_se3\\_use\\_of\\_subsurface\\_data\\_july\\_2019.pdf](https://www.nstauthority.co.uk/media/5896/oga_se3_use_of_subsurface_data_july_2019.pdf)

Prospect Lead Discovery Name <sup>1</sup>	P L D <sup>2</sup>	Reservoir			Unrisked Recoverable Resources (untruncated) <sup>4</sup>								Geological Chance of Success <sup>5</sup>
		Stratigraphic Level <sup>3</sup>		Reservoir Depth (m MSL)	Oil MMbbls <sup>4</sup>				Gas BCF <sup>4</sup>				
		Age	Formation		Low (P90)	Central (P50)	Mean	High (P10)	Low (P90)	Central (P50)	Mean	High (P10)	
15/27a Venus	P	Palaeocene	Forties	2640	8	12		16	90	130		160	0.45
15/27a Pluto	P	Jurassic	Piper Sst	3500	11	17		25					0.35
15/26c Mars	D	Cretaceous	Britannia Sst	3100	3	14		27					1.00
15/26c Earth	L	Devonian	ORS	4530	10	54		110					0.15

<sup>1</sup> The name is informal. Ensure the name is used consistently throughout the entire application document.

<sup>2</sup> D = Discovery; P = Prospect; L = Lead

<sup>3</sup> Formal nomenclatures should be used where they exist, both Chronostratigraphic and Lithostratigraphic.

<sup>4</sup> Calculation methods should be explained in the technical assessment. Low and high value should equate to P90 and P10. Volumes and probability need not be stated for leads.

<sup>5</sup> Estimation of the likelihood of making a discovery should be explained in the geological assessment. This should be the chance of finding a minimum flowable volume of oil or gas. The assumption offshore is that this P99 recoverable volume should approximate 1 MMboe.

## b. Submitting Information in the LARRY “Opportunities Details” Screen

10. Information submitted via licence rounds is used to populate the NSTA’s prospect inventory. This is a key national repository of the UK’s prospective resources, their geological distribution, type, and location. The inventory drives yet-to-find estimation and provides a focus for NSTA activity including licence rounds. An accurate inventory also allows the tracking of Work Programme delivery; volumes, success rates and value, and thereby allows the NSTA to facilitate continuous learning and improvement.
11. The importance of robust risk and resource estimates is reflected in the Marks Scheme ANNEX 2 and further guidance on Volumetrics and Risking is given in ANNEX 3.
12. In order to improve the data held in the inventory:
  - a) Full guidance is provided within the screens by hovering over the blue “i” buttons. It is important to read this guidance carefully.
  - b) Definitions have been provided as part of this guidance and are repeated in Annex 1 for ease of reference.
  - c) Shapefile uploads have been requested to avoid unnecessary digitising, with a centre of interest to locate the prospect in the NSTA database.
  - d) Hydrocarbon fluid cases are clearly distinguished, and provision is made for multiple cases including those with gas-caps and oil rims (mixed oil and gas).
  - e) Volumetric input and output parameters are distinguished, and the probabilities associated with each estimate made clear. Note that it is not mandatory to complete all the volumetric parameters; the options are there to cater for a variety of assessment methodologies. Please read the guidance carefully on this section.
  - f) The NSTA recognises that all volumetric permutations cannot be catered for, and a balance has been struck. Please make the submission as representative as possible and use the comments to describe the approach taken. A clear description of the methodology and distributions used in the resource estimation, should be provided in Appendix B
  - g) As general guidance, complex multi-component (multi-segment) prospects should be “rolled up” before entering the data. One exception is where multiple plays are involved, and these should be entered as separate prospects so that they can be assigned to the appropriate play in our databases.

- h) Although not mandatory, please specify P99 and P1 volumetric output estimates wherever possible, in line with good practice.
- i) Geological chance of success ('**COS**') factors have been explicitly requested, distinguishing dependent play risk, and using a widely-adopted scheme of COS elements. Note that if the play is proven, then Play COS is 100%.
- j) Supplementary information is requested for Firm E&A wells (i.e. start phase is Phase C), FDPs and field re-developments (i.e. straight to Second Term), with reference to and additional information in the Appendix B.

### c. Seaward Innovate Licences

13. The Innovate Seaward Production Licence ('Innovate Licence') structure was introduced in the 29th Offshore Licensing Round but only fully implemented in the 30th Offshore Licensing Round<sup>2</sup> and licences have been awarded in this format since. The Innovate Licence replaced the previous Seaward Production Licence types such as 'Traditional' (generally with a four-year initial term), 'Frontier', and 'Promote'.
14. The general terms and conditions (the '**model clauses**') of the Innovate Licence are set out in the *Petroleum Licensing (Production) (Seaward Areas) Regulations 2008* (as amended)<sup>3</sup> but the NSTA may offer licences on modified terms in particular cases.
15. The advantages of this single type of licence are that it applies to any offshore area, and is flexible, the Licence and Phase duration being proposed by the Applicant, with a Stage-Gate process that can be designed to accommodate the optimal Work Programme.
16. The Innovate Licence comprises three Terms:
  - **Initial Term** for carrying out the Exploration Work Programme
  - **Second Term** for appraisal and obtaining Development and Production Consent (including the submission of a Field Development Plan)
  - **Third Term** for development and production
17. The Initial Term can comprise either one, two or three Phases, each with its own Work Programme:
  - **Phase A** is a period for carrying out geotechnical and other studies, and obtaining and/or reprocessing geophysical data;
  - **Phase B** is a period for undertaking new shoot seismic surveys and acquiring other geophysical data; and
  - **Phase C** is for drilling a well
18. When applying for an Innovate Licence with an Initial Term, the applicant can elect to start the Initial Term at any Phase A, B or C and, if starting with Phase A or B, with a sequential combination of Phases A+B+C, A+C or B+C. The only requirement is that every Initial Term must include a Phase C.
19. Phase A and Phase B are not mandatory and may not be appropriate in particular circumstances, however every application must propose a Phase C for drilling a well, except where the applicant does not consider any further exploration is needed and proposes to go straight to development (i.e. '**Straight to Second Term**').

<sup>2</sup> The Licence Model clauses were modified for the 29th Round but only fully updated from the 30th Round onwards

<sup>3</sup> <https://www.legislation.gov.uk/uksi/2008/225/contents/made>

20. A firm commitment to drill a well (a “**Firm well**”) will only be considered by the NSTA where the drilling decision does not require any further work, analysis etc, and so will not be considered where there is either a Phase A or a Phase B proposed. If a firm well is to be proposed, the Work Programme would commence with Phase C, with a maximum duration of 4 years, with the first year or two solely for well planning, ordering long lead items and site surveying.
21. For the areas included in the 33rd Round, the NSTA expects that applicants will request **Initial Term** durations of no longer than 6 years as the areas offered are considered to be relatively mature.
22. There will be a maximum of four years available for any single Phase within the overall duration of the Initial Term. Applicants should note that all proposed Work Programmes must be realistic and achievable, with the target of drilling one or more exploration wells within Phase C, although shorter Work Programmes are preferred and will be preferentially rewarded by the Marks Scheme.
23. The standard duration for the **Second Term** will usually be 4 years, although up to a maximum of 6 years may be applicable for example where technical challenges apply (e.g. HPHT or Heavy Oil). Applicants should specify the length of the Second Term requested, in the Application Form in LARRY and in Appendix B.
24. For the **Third Term**, 18 years is the standard duration, but the extent can normally be varied if the Field is still in production.
25. As a consequence of this flexibility available at the time of Application, where applicants devise the lengths of each Term in accordance with their proposed programme of work within the framework of the Innovate Licence, the NSTA would not envisage having to vary (extend) the durations of individual Phases or Terms, although requests will continue to be considered on a case by case basis.
26. The durations and proposed Work Programme for each Phase should be completed on the Application Form in LARRY, with an explanation of the rationale supplied in the Appendix B.
27. If the Licensee no longer proposes to drill a well due to the findings made before Phase C, then the Licence should be relinquished, or it will determine at the end of the current Phase A or B.
28. Where a Work Programme contains more than one Phase, the Licence will provide that it will not progress from the earlier Phase to the later unless the earlier Phase’s Work Programme has been completed and the Licensee has committed to carry out the subsequent Phase Work Programme, and having demonstrated the technical and financial capacity to do so (or unless the NSTA exceptionally directs that it should continue).
29. During the Initial Term, there is no mandatory surrender of any of the licensed area when transitioning into a subsequent Phase. However, NSTA will seek to discuss the licensee’s progress at that time and may request the surrender of acreage other than that actively being worked.
30. Applicants must decide at the **LARRY Application stage** whether they require Phases A or B; or whether the application is to drill a Firm well, in which case the application should be submitted as a Phase C start phase.
31. When creating a new application in LARRY, an Applicant that proposes to move Straight to Second Term (e.g. for development of an existing discovery or re-development of an existing field where production has ceased) should select ‘Innovate with Phase C only’, but make it clear in the application that a Second Term start for the licence is being requested. If the NSTA agrees, then neither an Initial Term nor a formal Exploration and Appraisal Work Programme will be needed. Nevertheless, the applicant should propose a Work Programme to firm up its plans or analysis in case the NSTA does not agree that it is realistic to move straight to Second Term.



#### d. The Elements of a Work Programme

32. The **Work Programme** is part of any Production Licence awarded, and it consists of one or more elements of exploration/appraisal work. Its principal function is to define the minimum amount of work that the Licensee must carry out if the licence is not to expire at the end of its Initial Term.
33. Applicant must propose a separate Work Programme for each specific block applied for, but where the Applicant hopes to be awarded two or more blocks to form a single Licence, a joint Work Programme should be indicated as well.
34. The Work Programme must be appropriate to the acreage applied for. Its overall duration, the length of individual Phases (see above) and relevance to the prospectivity identified should be indicated.
35. The agreed Work Programme will form an important part of the Licence itself; the Licence will expire at the end of the Initial Term (or earlier where there are timed commitments) if the Work Programme has not been completed by then, unless the Phase or Term has been extended by agreement of the NSTA. However, note that the Supporting Obligations of the OGA Strategy<sup>4</sup>, which are legally binding on the NSTA and industry<sup>5</sup>, state in paragraph 6 that “*the licensee of an offshore licence who has made a firm commitment to carry out a work programme in respect of that licence must not surrender the licence or allow it to expire without first having completed the work programme as set out in the licence*” Further guidance on the management of offshore licence work programme commitments can be found on the NSTA Website<sup>6</sup>.
36. The Work Programme may be discussed and clarified at interview. The duration of the individual Phases should be clearly stated within Appendix B and highlighted in the comments box of the Work Programme part of the Application Form in LARRY. Work Programmes normally comprise well commitments, seismic commitments (**shoot** a new acquisition or **obtain** existing data, or reprocessing)” and ‘other’ work (electro-magnetic, gravity and magnetic, other relevant geoscientific studies, etc.).
37. Previously the elements of a Work Programme were associated with particular levels of commitment: a Firm commitment, a Contingent commitment or a Drill-or-Drop commitment. This still exists to some extent under the Innovate licence construct, but the degree of commitment is reflected to a much greater degree by the pattern of Phases that the Work Programme has been divided into.
38. The work in the first/starting Phase of the Initial Term will always be associated with a Firm work commitment of some variety, whether it is studies, reprocessing, geophysical data acquisition, a well, etc., and will be the only Phase marked under ‘**Geotechnical Work Programme**’ (see ANNEX 2). A subsequent Phase B (if proposed) will become a Firm commitment, if the licence continues into Phase B, unless the Applicant can convince the NSTA at the time of application to offer a Contingent commitment. A subsequent Phase C will only become a Firm commitment if the Licence continues into Phase C. Please see Guidance on Phase Transition in the Initial Term<sup>7</sup>.

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<sup>4</sup> <https://www.nstauthority.co.uk/media/7105/the-oga-strategy.pdf>

<sup>5</sup> Petroleum Act 1998, sections 9B and 9C

<sup>6</sup> <https://www.nstauthority.co.uk/news-publications/publications/2021/updated-guidance-on-the-management-of-offshore-licence-work-programme-commitments-rev-20/>

<sup>7</sup> <https://www.nstauthority.co.uk/news-publications/publications/2022/innovate-seaward-production-licences-guidance-on-phase-transition-in-the-initial-term/>

39. The NSTA views Firm Commitments (including, but not limited to, drilling, seismic/geophysical and geotechnical work) as a core part of the licensing regime. The NSTA reserves the right to characterise any failure to meet a Firm Commitment as poor performance, which we may take into account in future decisions; for example, in the marks awarded for commitments offered in future licensing rounds or even a refusal to consider any further applications at all, where justified.
40. A Work Programme for an Innovate Licence must contain at least one drilling commitment (with horizon and approximate depth) within the Initial Term.
41. **Seismic data:** Where applicable, the amount of seismic data (whether 2D (in full fold line kilometres) or 3D seismic (area of full fold migration, in square kilometres)) to be acquired over each block applied for should be stated, distinguishing between shooting (i.e., Phase B) of new seismic data and obtaining existing data (whether by purchase or other means). A description of any further acquisition of data outside the area should be supplied, noting how it relates to the acreage applied for and the Applicant should indicate whether the new data will be proprietary, speculative (and the degree to which underwritten), purchased or traded. An outline of any reprocessing programme should be included where relevant. For any seismic activity, an indication of the timing of the proposed activity after award of licence should be stated. Applicants should also make clear where any seismic data that has been used for the interpretation has not yet been purchased, and, if reprocessing is to be carried out, whether access rights to readable, verified or re-mastered field tapes have been secured.
42. A Contingent new shoot seismic bids in any subsequent Phase B may be considered where the starting Phase A involves a Firm work programme element to reprocess existing seismic and it is not clear whether that work will provide sufficient uplift to identify or fully evaluate prospectivity.
43. **Other Work:** A description of any other work planned such as additional surveys, research, technological development, geotechnical studies relevant to the evaluation of the block(s), or an assessment of the appraisal/development potential of existing discoveries or re-developments of decommissioned fields should be articulated in the Work Programme. This should include the Applicant's plans and approach to secure the resources needed to complete the Initial Term Work Programme, if they have not already been secured.
44. The proposed Work Programme will be a focus of the post-application interview. See General Guidance for more details on the interview process and expectations.
45. For a more detailed description of the UK's licensing framework, see our website: <https://www.nstauthority.co.uk/licensing-consents/>

## e. Interviews

46. The NSTA will normally interview all Applicants (and in all cases where there is competition for the same acreage) before deciding whether to recommend an award. The NSTA normally aims to hold the first interview within a short time following the closing date for applications (Applicants should be prepared for this) and the overall timeframe over which interviews will be conducted may depend on the number, and the nature, of applications received.
47. In practice, the NSTA will usually arrange interviews before the results of the financial evaluations are complete, so Applicants should not assume that an invitation to interview implies that those criteria have been satisfied, nor that OPRED or the HSE has completed its assessments.
48. The main purposes of the interview are to enable the Applicant to present the technical rationale for the application, review the work already carried out, and outline the proposed work programme associated with the Appraisal Term, and for the NSTA to assess the Applicant's technical capability and competence and ask questions and seek any clarifications before final evaluation. It is expected that Applicant personnel attending the interview will be

able to answer technical questions on the application i.e., persons involved in the preparation of the ‘Supporting Information’ should attend the interview.

- 49.** The interview is likely to focus on:
- The Applicant’s geotechnical data coverage (including an evaluation of all datasets that are publicly and commercially available) and work completed to date
  - Identified prospectivity at play, lead and prospect level, and how this would be explored and appraised
  - The potential for appraisal or development (exploitation) of existing discoveries and/or re-development of decommissioned fields that the Applicant has identified (this should include an evaluation of opportunities for cluster developments)
  - The project plan associated with the work programme, detail around its timing and its timely delivery within the appropriate phase of the Initial Term
  - How these opportunities relate to the Work Programme offered, and how the Work Programme supports the Central Obligation and Supporting Obligations as defined in the OGA Strategy (<https://www.nstauthority.co.uk/regulatory-framework/the-strategy/> ).
- 50.** The NSTA may request additional meetings after the interview if further clarification or understanding is necessary. The interview will not address financial aspects as this will be assessed separately through correspondence with the Applicant.
- 51.** All applications for the same area will normally be evaluated by the same NSTA technical assessors for consistency and fairness.

## **f. Operator Competence**

- 52.** For Seaward Innovate Licenses, the Licence model clauses requires that a Licence (Exploration) Operator is appointed before moving into Phase C and before moving to Second Term. For those Applicants applying for a licence with a Phase C-only Work Programme, or one that goes Straight to the Second Term, the Applicant must upload the necessary Licence Operator documentation at the Appendix B screens in LARRY. However, an Applicant need not submit any evidence of operator competence if applying for a licence starting with a Phase A and/or a Phase B at the application stage.
- 53.** In addition, the Offshore Petroleum Licensing (Offshore Safety Directive, OSD) Regulations 2015 (as amended) introduced the concept of well operators and installation operators. Further details on OSD operator appointment are available in Appendix C – Safety and Environmental Issues Licensing and Operatorship Guidance. The OSD requires operations to be carried out by such an operator, but the appointment is not a requirement for the award of a licence. The NSTA strongly recommend that successful applicants apply for well operatorship or appoint a well operator for approval as soon as practically possible on award of a licence in the Initial Term starting with Phase C with a Firm drilling work programme.
- 54.** The NSTA accepts that some elements of the Applicant’s competence may not be in place at the application stage. For example, some posts may not be filled at the time of application, which may occur months or even years ahead of any need for them. Nevertheless, the Applicant will have to demonstrate to the NSTA that it fully understands what structure and skills are needed and that it has a management team capable of delivering it. It should be noted that further regulatory consents that are required for work such as drilling will not be provided until all elements of the Applicant’s competence are proven. Please see the General Guidance for other requirements placed on Applicants.
- 55.** The Technical Competence aspects (organisation charts and Curriculum Vitae) of key personnel) should be uploaded as a separate file into the Appendix B area of LARRY if applying with an Initial Term starting with a Phase C, or Straight to Second Term. The NSTA

will hold such personal data in accordance with its Privacy statement -  
<https://www.nstauthority.co.uk/site-tools/privacy-statement/>

- 56.** For further general information on Operatorship see our Website  
<https://www.nstauthority.co.uk/licensing-consents/licensing-system/operatorship/>
- 57.** For detail requirements for the Licence (Exploration) Operatorship see  
<https://www.nstauthority.co.uk/exploration-production/exploration/exploration-operatorship/>

## ANNEX 1: DEFINITIONS

- A **prospect** is a robust structural, stratigraphic or combination trap that has been mapped with a high degree of confidence using good quality seismic and other key data.
- A **lead** is a possible structural, stratigraphic or combination trap that requires additional seismic analysis/acquisition or other key data in order to progress to a prospect.
- A **new play concept** is an unproven concept in the area (e.g. deeper potential, additional reservoirs, new source-reservoir-seal combination, etc).
- To **shoot** seismic data (in the context of a Work Programme commitment) means to carry out a new seismic survey. It must be stated whether this will be by commissioning a proprietary survey or underwriting speculative acquisition. The *total* area of the survey the Applicant proposes to participate in should be specified, but with the amount over the potential Licence highlighted for the Work Programme.
- To **obtain** seismic data (in the context of a Work Programme commitment) means purchasing or otherwise getting the use of existing data. It is for the licensee to decide how.
- The **Hydrocarbon System** includes the following evaluation:

### **Stratigraphic Interpretation:**

Including palaeogeographies, plate reconstructions, depositional environment, facies description & distribution, use of core data, use of log data, reservoir characterisation (N:G, porosity/permeability), biostratigraphy, provenance, analogues (outcrop and producing field)

### **Structural Interpretation:**

Validated geometric models, dynamic structural evolution and geomechanical models. This may include QA/QC of the interpretation using statistics, rules and analogues, 2D or 3D restoration, finite element or other modelling of discrete fracture networks

### **Charge & Migration History:**

Source rock quality and richness, Source rock thickness and distribution, thermal regime/maturation history (calibrated using Vitrinite Reflectance, Fission Track and other techniques), thermal regime, migration pathways and history

### **Seal & Preservation:**

Top Seal quality-thickness & distribution, Lateral Seal evaluation (including fault juxtaposition and fault seal, including shale gouge, clay smear and other mechanisms), Seal breach, Biodegradation, Over-Pressure and Effective Stress regime and history.

- **Hydrocarbon Risk Evaluation** (Geological Chance of Success) included the following evaluation:

### **Source Rock Presence and Maturity:**

The chance of finding mature source rock in the drainage area of the prospect of sufficient richness and volume to expel hydrocarbons associated with the P99 case

### **Source Effectiveness (migration and timing):**

The chance that viable migration pathways and distances exist, including consideration of migration losses, together with suitable timing of closure formation in relation to migration

### **Reservoir Presence:**

The chance of finding pore volume above the P99 volume case, including consideration of parameters such as thickness, facies and extent

### **Reservoir Effectiveness:**

The ability of the predicted reservoir to flow hydrocarbons to surface at a minimal rate

**Trap Presence (geometry):**

Confidence that the minimum trapping geometry exists, including consideration of factors such as seismic picking and depth-conversion

**Trap Effectiveness (seal, preservation):**

The ability of the local sealing elements to retain a minimum volume including factors such as continuity, integrity including pore-pressure/fracture-gradient, stratigraphic-trap surfaces e.g. coastal vs. marine onlap, top/bottom/side and fault seal. The ability of the trap to subsequently preserve hydrocarbons from factors such as bacterial/thermal alteration, restructuration, breaching, tilt & spill, flushing and depletion.

## ANNEX 2: THE MARK SCHEME

- The Marks Scheme is designed to reward applicants for the use of relevant, high-quality, available technical data (wells, seismic, etc), the quality of the work already done, the technical understanding demonstrated in the generation of valid prospectivity (over the whole block area and throughout the full stratigraphic column), and the proposed Work Programme.
- The Marks Scheme will be used to mark applications on a block-by-block basis. The Marks Scheme consists of multiple sections (a marks scheme summary is presented at the end):
  - **Area Plan** Marks will be awarded to applications that provide a strategic vision of the blocks applied for to achieve the OGA Strategy in the area (see footnote to the 33rd Seaward Licence Round Application Mark Scheme for further details). This will be specifically appropriate for those areas identified by the NSTA as Priority Cluster areas. Applications that include prompt evaluation of multiple opportunities, particularly discoveries, and credible pathways to development will be rewarded
  - **Geotechnical database** Marks will be available for the coverage (including newly gathered data) and use of relevant, high quality, existing geotechnical data appropriate to the prospectivity of that area. The NSTA will consider the quality of the data utilised compared with what we know to be available in the area, and applicants must demonstrate that they have evaluated all publicly and commercially available datasets that are relevant to the application, with a justification of the choice of dataset. Data from outside the block (to provide regional context) will be rewarded where it has been utilised to demonstrate improved understanding of prospectivity (or lack of potential) on the block itself. Applicants should refer to the Guide on Asset Stewardship Expectation SE03, covering Optimal Use of Subsurface data, which can be found on the NSTA website<sup>8</sup>.
  - **Geotechnical evaluation (both Regional & Block specific)** Marks will be available for the quality and understanding demonstrated in the generation and definition of realistic prospectivity and new play potential on the block or area as a whole. This work should assess the potential both by area and stratigraphically. Play fairway maps and Common Risk Segment maps should demonstrate that all aspects of a petroleum system have a reasonable chance of being present. Where appropriate, the Applicant's description of various risk elements associated with risk and volumetric assessment will be evaluated by the NSTA.  
  
Applicants should not expect to be rewarded for speculative, overly optimistic or unsupported analysis, and where appropriate they should explain the rationale for a lack of prospectivity at particular levels within the acreage applied for.
  - **Specific Technical Assessments (including existing and undeveloped discoveries).** Marks will be available for what the NSTA understand and consider as *valid leads* and *prospects* on the block(s) that will be progressed either through a technical Work Programme or which are ready to drill, or *discoveries* that can be progressed through further appraisal or through field development planning. The NSTA will categorise and mark leads and prospects within three ranges (leads, prospects, or fully evaluated prospects (drill-ready) depending on consideration of validity/de-risking and the degree to which further work is necessary before they are fully evaluated and ready to drill. Marks within the ranges will also consider the quality of interpretation and understanding demonstrated in the lead or prospect generation or definition of the discovery.

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<sup>8</sup> [https://www.nstauthority.co.uk/media/5896/oga\\_se3\\_use\\_of\\_subsurface\\_data\\_july\\_2019.pdf](https://www.nstauthority.co.uk/media/5896/oga_se3_use_of_subsurface_data_july_2019.pdf)



- **Speculative Leads.** Few, if any, marks will be awarded to leads based on speculative geotechnical arguments that are so small as to have limited commercial potential, or where the NSTA takes the view that prospectivity has been effectively disproved.
- **Leads and Prospects.** Applicants should include volumetric estimates of leads and prospects with associated risk analysis. A series of leads or prospects identified at a similar reservoir level on a block may be marked as one where information from a single well would effectively result in the other leads being unviable. Where leads or prospects straddle block boundaries, the NSTA may split marks (for both prospectivity identified and associated work programmes) between blocks in a manner that best reflects where the bulk of the lead or prospect exists, and/or in a manner that helps preserve the integrity of the lead or prospect if competed. The NSTA may split blocks depending on the geotechnical work focus of competing applications.
- **Undeveloped Discoveries or Re-Developments.** Marks will be available for work that demonstrates the quality and understanding of the appraisal/development potential of existing (undeveloped) discoveries or re-developments of decommissioned fields, including an assessment of extent and reserve potential, an economic evaluation, understanding of commercial aspects and what infrastructure would be necessary for optimal timely development or further appraisal. Evidence for appropriate infrastructure availability, ullage and access should be demonstrated if possible. A brief description of possible Improved Oil Recovery/Enhanced Oil Recovery (IOR/EOR) may be included if applicable. Forward plans with realistic, supported timelines should be presented. Conceptual development options for exploration prospects other than firm well commitments are not required and will not be marked, although potential offtake routes and dependencies with existing infrastructure should be detailed
- **Non-Original Work.** Relatively few marks will be given in situations where the technical analysis (block or specific leads/prospects) draws heavily on non-original work e.g., derived from the NSTA's Promote publications, Relinquishment Reports, or material derived from data rooms or from other company websites. New play concepts (where specific leads and prospects cannot yet be identified) will be assessed against the information used, the quality of interpretation in their evolution, and on the NSTA understanding of their potential validity.
- **Geotechnical Work Programme.** The Work Programme for an Innovate Licence is assessed on the basis of the proposed starting Phase of the Initial Term. The aim is to reward new activity (particularly drilling and new shoot seismic) at a higher level than, for example, reprocessing or desk studies. Marks will therefore only be available for the Work Programme associated with the first/starting Phase of the Initial Term, since this is the only committed Firm element of the work programme.

NOTE: Applicants should propose the timing and phasing that is most appropriate for their proposed Work Programme. The suggested timing should be realistic and attainable, to be clarified at interview as necessary, and subsequently the NSTA will offer and create a suitable licence. The NSTA is not defining specific lengths for Phases, apart from a maximum of 4 years per Phase as appropriate within the overall maximum for the Initial Term (of up to 6 years in total for better explored or more mature areas such as those included in the 33rd Round).

- **Phase A** geotechnical Work Programme can include commitments for obtaining existing seismic data, reprocessing of seismic data and other geotechnical studies relevant to the evaluation of the prospectivity of the block (s) e.g. biostratigraphy, geochemistry, petrophysics, fault seal analysis, etc. Work should be linked to identified plays and prospectivity.
- **Phase B** includes commitments for the shooting of new seismic data and/or other geophysical data types. Higher marks will be given to new shoot seismic surveys and other data acquisition methods, which are considered appropriate to de-risking and delineating the area and prospectivity applied for, and which use the most advanced techniques.
- **Phase C** should include details on the drilling commitment, including the proposed Total Depth (TVDSS) of the well and/or a minimum penetration below a certain stratigraphic marker. e.g



*Drill a well to 4500m TVDSS or 50m below Top Carboniferous, whichever is the shallower.*  
Note: all licences whether starting in Phase A, B or C should have a well commitment.

- **Straight to Second Term** where an application is for development of an undeveloped discovery or for re-development of a field, marks are also applied in the first four categories of the marks scheme (Geotechnical database used, Geotechnical evaluation, Hydrocarbon System analysis and Risk & Resource evaluation), but will not be added for specific prospectivity unless there are additional, undrilled prospects in the block(s) applied for.

## The 33<sup>rd</sup> Seaward Licence Round Application Mark Scheme\*1

### Area Plan <sup>†</sup>

Strategic vision for the area to achieve the OGA Strategy <sup>†2</sup> : .....	25 (max)
Incorporation of nearby prospectivity & discoveries (and how these could be enabled): .....	25 (max)
Collaboration with area licensees, infrastructure owners, etc: .....	20 (max)
Clear demonstration of understanding of risks and opportunities: .....	10 (max)
Realistic time bound and funded activity plans:.....	20 (max)

### Geotechnical database used

3D Seismic †: .....	40 (max)
2D Seismic †:.....	30 (max)
Seismic Reprocessing: .....	20 (max)
Well data: .....	5 (max)
Other: .....	20 (max)

### Geotechnical evaluation already performed over block (*Both Regional & Block-Specific*)

Well Interpretation/ties (eg: synthetics): .....	5 (max)
Stratigraphy & Sedimentology: .....	5 (max)
Structural Interpretation: .....	5 (max)
Depth Interpretation: .....	5 (max)
Rationale, Plans and Schedule:.....	5 (max)
Other: .....	10 (max)

### Hydrocarbon System Analysis

Stratigraphic Interpretation & Reservoir Quality: .....	5 (max)
Structural Interpretation & Validation (Trap Geometry): .....	5 (max)
Charge & Migration History: .....	5 (max)
Seal & Preservation: .....	5 (max)

### Risk and Resource Evaluation‡

Risk Assessment: .....	20 (max)
Volumetrics/Resource Assessment: .....	20 (max)

### Specific Technical Assessments

Undeveloped discoveries and redevelopments:.....	max 30 each
Fully evaluated prospects (i.e. drill-ready): .....	21-30 each
Prospects not fully evaluated:.....	11-20 each
Leads:.....	up to 10 each
Original Play and Common Risk Segment Analyses:.....	up to 20 each
New play concepts:.....	5 each

### Geotechnical Work Programme

3D seismic (Purchase/obtaining) †:.....	20 (max)
3D seismic (Shoot) †: Includes Broadband, OBC/OBN, Dual/Multi/Wide/Full-Azimuth, etc ...	60 (max)
2D seismic (Purchase/obtaining) †:.....	15 (max)
2D seismic (Shoot) †: Includes Broadband, OBC/OBN, Dual/Multi/Wide/Full-Azimuth, etc ...	40 (max)
Seismic reprocessing: Includes novel processing, e.g. Bi-Azimuth, etc .....	10 (max)
Geotechnical studies*: Includes Grav/Mag, EM .....	25 (max)

### Technology

Technology Plan § .....	10 (max)
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**Above-Ground Evaluation<sup>β</sup>**

Economics & Cost: .....	10 (max)
Commercial: .....	10 (max)
Infrastructure: .....	10 (max)

**Phase Timing Mark (Rewards Faster Work Programmes)**

<b>Phase A is Start Phase (i.e. Geotechnical Studies and/or Seismic reprocessing)</b> (Duration)	
Firm Studies, Seismic Purchase & Reprocessing: .....	Long 0
.....	Mid 5
.....	Short 10

<b>Phase B is Start Phase (New-Shoot Seismic)</b> ..... (Duration)	
Firm New-shoot Seismic.....	Long 20
<i>with Well based on new seismic (well to be drilled in Phase C):</i> .....	Mid 30
.....	Short 40

<b>Phase C is Start Phase (Firm Well)</b> ..... (Duration)	
Firm Well.....	Long 60
<i>Includes consideration of depth, technical difficulty and number of wells/sidetracks</i> .....	Mid 80
.....	Short 100

<b>Second Term is Start Term</b> ..... (Duration)	
Time to FDP submission and first production, demonstration of secure allocated funding. <i>Includes consideration of technical difficulty/complexity, dependencies that may impact delivery, organisational capability and demonstrable track-record of work-programme and project delivery.</i>	
.....	100 (max)

\*1 Where the term (max) is used, Marks will be awarded from zero up to that maximum figure.

† Marks will be awarded for five separate elements of an Area Plan:

1. The Applicant’s strategic vision for the area to secure that the maximum value of economically recoverable is recovered from the strata beneath relevant UK waters: and in doing so take appropriate steps to assist the Secretary of State in meeting the net zero target (the OGA Strategy<sup>2</sup>), which should include as a minimum:
  - a) An understanding of the interaction of multiple assets (prospects, discoveries, developments) to deliver a sustainable long-term hub and hub MER.
  - b) Framing and identification of the opportunity & interaction with the Area Plan.
  - c) High level (screening level) development scenario that delivers strategic vision – MER in the area.
2. Incorporation of nearby prospectivity and discoveries and how these could be enabled, including:
  - a) Identification of those discoveries and prospects that the application would seek to incorporate.
  - b) An explanation of why any identified discoveries and prospects are not incorporated in the application in terms of MER impact, complexity/risk to development concept, etc.
  - c) Other opportunities that the applicant sees which may not be fully matured.
3. Collaboration undertaken to include:
  - a) Linkage to potential development concepts with existing area licensees.
  - b) A clear indication whether the application has a relationship to another and description of relationship.
  - c) A clear indication of whether the applicant is willing to be ‘partnered’ with other applicants by the NSTA or whether the application is dependent on being ‘partnered’. (No such approaches will be made without explicit consent from all relevant applicants.)
  - d) A description of any pre-application discussions, which may have taken place with other interested parties.
  - e) A strategy for post award engagement with other area stakeholders.
4. Clear demonstration of understanding of risks and opportunities:
  - a) Identification of risks to delivering the applicants strategic vision for the area.
  - b) Mitigation plan to minimise these risks.
  - c) Further marks may be awarded for technical work that the applicant details, which they feel is required to mitigate risks.
5. Realistic time bound and funded activity plans comprising:
  - a) The capability that the applicant(s) have to enable delivery of their area plan vision.
  - b) an indicative timeline to deliver Applicants’ vision.

† Use of the best available/most-modern/optimum seismic datasets will attract more marks. (This will consider both processing and acquisition parameters; e.g. an Ocean Bottom Node survey will be clearly better at derisking subsalt prospectivity compared to a conventional towed streamer survey). For further information, refer to Asset Stewardship Expectation SE03 on the NSTA website. Applicants should demonstrate that they have assessed all publicly and commercially available seismic datasets, and

justify their choice/the value of this information in relation to how this data addresses the critical risks and reduces subsurface uncertainty. More advanced seismic technologies will also attract more marks.

‡ The NSTA will consider the methods and processes used by applicants to make Risk and Resource evaluations. It is expected that applicants can demonstrate use of a documented methodology (it is expected that this is broadly compliant with the methods outlined by Rose, 2001<sup>\*3</sup>) and an appropriate assurance process. Applicants should be able to clearly articulate what is being risked, the component risks that make up the overall prospect risk, dependencies at play and prospect level, how uncertainties and ranges have been quantified and reality checks, including play statistics and use of appropriate analogues. Prospects and discoveries that rely upon amplitudes/AVO for risking or definition should also demonstrate how risk modifiers have been applied and associated rock physics workflows.

<sup>\*2</sup> The "principal objective", as set out in section 9A of the Petroleum Act 1998, is the objective of maximising economic recovery of UK petroleum (MER) whilst as per the OGA Strategy taking appropriate steps to assist the Secretary of State in meeting the net zero target

<sup>\*3</sup>Peter R. Rose (2001) Risk Analysis & Management of Petroleum Exploration Ventures. ISBN (electronic): 978-1-62981-065-2.

\* It would be expected that if a Licence were to be offered, Licensees would undertake and support Higher Education Institution Research (e.g., PhDs / Postdocs) and Collaborative Regional Studies as part of the Geotechnical Studies programme in accordance with the [OGA Strategy](#)'s Central Obligation. Where Research and Studies are relevant to licence activities or furthering the understanding of petroleum plays relating to the licence area marks may be awarded for these.

- HEI Research may be via one of the Centres for Doctoral Training, such as the GeoNetZero CDT (<https://geo-net-zero.hw.ac.uk/>) or other individual, recognised, higher education institutions or bodies.
- Collaborative Regional Studies may include participation in, and contribution to, projects proposed and governed by the North Sea Transition Forum's (NSTF) Exploration Task Force (XTF).
- Applicants can also propose other appropriate study mechanisms.
  - Please indicate the type of Research and/or Project(s) you would expect to support, with appropriate funding and timing, in a separate paragraph within the Appendix B and briefly in the Comments section of the Work Programme Summary Sheet.
  - Equivalent Marks for Studies may also be available where the start Phase is Phase C, provided it is clear these studies will not be associated with the Firm well.
- Applicants should also note relevant People and Skills obligations set out in the [North Sea Transition Deal](#).

§ Applicants should make clear how all activities, studies and research it proposes (Including Technology Plans) are relevant to:

- i. the way in which the licence activities will be carried out, and/or
- ii. to the applicant's technical capability.

If the NSTA feels that such proposals are not relevant to the above, then they will not be awarded marks.

The requirements for a Technology Plan are outlined in Asset Stewardship Expectation SE-08, which is available on the NSTA website. [https://www.nstauthority.co.uk/media/5902/oga\\_se8\\_technology\\_deployment\\_july\\_2019.pdf](https://www.nstauthority.co.uk/media/5902/oga_se8_technology_deployment_july_2019.pdf)

β An 'Above-Ground Evaluation' should be provided for all applications where the Initial Term start phase is Phase C, or the Licence start term is the Second Term. Marks will be awarded per block on which the Phase C or Second Term target resides. Applicants should demonstrate that they have carried out an appropriate and proportionate economic, commercial and infrastructure assessment, and that they have considered the most viable work programme, phasing and plan, compliant with the objectives of the OGA Strategy. If not provided within the licence application, the NSTA may subsequently request cashflow model input assumptions (associated production profiles and cost schedules, to include all necessary inputs required for cashflow analysis [note: economic assumptions such as discount rate and product price are not required]), and in all cases applicants should provide the full costs associated with their committed work programme. The Applicant should not assume that the NSTA has fully verified, or in any way approved, their economic/commercial models.

## ANNEX 3: LARRY Risk and Resource “Opportunity Template” Guidance

Guidance is available in the LARRY portal by “hovering” over the blue information buttons and is repeated here as a consolidated reference.

Note that the Marking Scheme now awards points for Risk and Resource Evaluation.

### **Opportunity Type**

A ***new play or trap concept*** is defined on the basis of a speculative petroleum system and/or trapping geometry.

A ***Lead*** is a trapping feature that is associated with a volumetric and risk assessment but requires additional seismic analysis/acquisition or other key data in order to progress to a prospect.

A ***Prospect*** is a robust trap that has been mapped with a high degree of confidence using good quality seismic and other key data.

A ***Fully Evaluated Prospect (Drill-ready)*** requires no further evaluation and has an associated well location and plan.

A ***Discovery*** is a feature that has been penetrated by a well and contains evidence of a hydrocarbon-bearing reservoir.

### **Description of opportunity**

Provide a short overview description of the Opportunity. Include comments on the trap type, reservoir target and facies, analogue fields etc.

### **Key technical work required for maturation**

The technical work required should be linked directly to the bid Work Programme, and also to improving the geological chance-of-success elements etc.

### **Block number(s) starting with the key block first**

List the blocks over which the Opportunity extends, with the key block listed first on which any well is most likely to be drilled.

### **Opportunity outline shape file for the maximum case**

This will be used to locate the feature in NSTA's databases. If not available, then the map illustration below will be used.

### **Opportunity centre of interest**

This single point of reference will be used for spatial database analysis and should represent the centroid point of the opportunity.

## **Unconventional Opportunities**

For unconventional prospects, please fill in key attributes and potential resources in this comments field e.g. for coal bed methane (CBM), the anticipated number of coals and their thickness, the coal rank, and anticipated gas content and permeability. For shale gas, the attributes of the prospective shale, e.g. estimated thickness (ft), total organic carbon, average vitrinite reflectance, permeability and gas yield. Please provide more complete information in the Appendix B.

## **Conventional Opportunities- Volumetrics**

### **Hydrocarbon case**

Please provide the probability of the hydrocarbon case and populate the relevant volumetric parameter sections below.

### **Volumetric input parameters**

For Normal and Lognormal distributions please specify at least the P90, P50, P10. It is considered good practice to also specify P99 and P1. For Beta distributions (and Triangular distributions, which are not recommended for use) please specify at least the Minimum, Mode and Maximum. For rectangular please specify Minimum and Maximum, and for Constant please report the value in the Mean column. Please also specify Mean values where available, as these can be used as a quick QC of the outputs.

There is a strong preference for gross-rock-volume (GRV) and net-to-gross to be quoted, and an expectation that all other relevant rows will be populated. However, the table accommodates Area x Average Net Pay Thickness inputs, in which case GRV and net-to-gross is not required. Note that Average Net Pay includes the geometric shape factor.

Please also comment where parameters have not been used or cannot be specified. Please specify in the comments where truncations and/or dependencies have been applied.

### **Depth to hydrocarbon-water contact**

Please comment if and how degree of fill, or column-height distributions have been incorporated

### **Gross reservoir thickness**

Treat stacked reservoirs as separate prospects

### **Formation volume factor**

Higher values should be assigned to the downside cases, decreasing towards the upside

### **Associated gas-oil ratio and condensate-gas ratio, life-of-field**

Please quote life-of-field ratio

### **Oil equivalent recoverable resources**

Default assumption 5,800 scf gas = 1 boe

### **Volumetric outputs**

Please specify where possible the full range of probability values for each output parameter eg. P99, P90, Mode, P50, Mean, P10, P1

### **Additional volumetric comments**

Please comment on any additional elements that may affect the volumetric calculation e.g. use of deterministic rather than probabilistic calculations, correlation of parameters, addition of segments or sands, combination of models or complex traps etc.

## **Conventional Opportunities- Geological Chance of Success ('COS')**

### **Play**

Suggested play definition: a series of traps, some of which may already be tested, that share a common petroleum system of charge (source/timing/migration) and areal juxtaposition of regionally significant master seal and primary reservoir.

Note that if the play has been successfully proven by one well, then play chance of success is 100%.

Note that where the play is not proven, Play chance estimation should always be accompanied by play fairway mapping and definition of the play boundary.

Please include comments on knowledge level (eg. low, moderate, high) and how work programme results could impact the chance of success.

*Source* - The presence of mature source rocks within the play boundary, with a viable migration pathway to the reservoir.

*Reservoir* - The presence of reservoir rocks within the play boundary capable of sustaining a minimum flow rate to surface.

*Regional Top Seal* - The presence of a top seal lithology that is areally juxtaposed with the reservoir.

*Total play chance of success* - Chance that the hydrocarbon system works; chance of finding at least one discovery in the play or segment.

### **Prospect-specific**

The prospect-specific geological chance of success is conditional on the play success, and is defined as the chance of encountering a minimal recoverable volume (P99 used here). Hence each risk element below should be considered in relation to that minimal volume (P99). For discoveries, the geological chance of success would normally be 100% unless the reservoir is tight.

Include comments on knowledge level (eg. low, moderate, high) and how work programme results could impact the chance of success.

*Source rock presence and maturity* - The chance of finding mature source rock in the drainage area of the prospect of sufficient richness and volume to expel hydrocarbons associated with the P99 case. Note: the trapped hydrocarbon type e.g. gas vs oil is captured in the "hydrocarbon case" % quoted above.

*Source effectiveness (migration and timing)* - The chance that viable migration pathways and distances exist, including consideration of migration losses, together with suitable timing of closure formation in relation to migration.

*Reservoir presence* - The chance of finding pore volume above the P99 volume case, including consideration of parameters such as thickness, facies and extent.

*Reservoir effectiveness* - The ability of the predicted reservoir to flow hydrocarbons to surface at a minimal rate.

*Trap presence (geometry)* - Confidence that the minimum trapping geometry exists, including consideration of factors such as seismic picking and depth-conversion.

*Trap effectiveness (seal, preservation)* - The ability of the local sealing elements to retain a minimum volume including factors such as continuity, integrity including pore-pressure/fracture-gradient, stratigraphic-trap surfaces e.g. coastal vs. marine onlap, top/bottom/side and fault seal. The ability of the trap to subsequently preserve hydrocarbons from factors such as bacterial/thermal alteration, restructuration, breaching, tilt & spill, flushing and depletion.



### **Geophysical evidence**

Please describe any geophysical evidence used in the volumetric and risk assessment and refer to any additional treatment contained in the Appendix B.

### **Well location modified Chance of Success**

If the chance of success is being quoted in relation to a specific well location, please quote the modified figure here.

### **Other Information**

#### **Supplementary information for Firm well commitments, Undeveloped discoveries and Field Redevelopments**

Where Exploration & Appraisal ('**E&A**') drilling activity is being committed, please provide associated costs and high-level well plan commentary in this section.

Where E&A drilling or Field Development Plan ('**FDP**') activity is being committed, please ensure that conceptual exploration, appraisal and development plans are presented in the Appendix B, together with associated production profiles and cost schedules, to include all necessary inputs required for cashflow analysis (note: economic assumptions such as discount rate and product price are not required).

Please also comment in the Appendix B on why Discoveries remain undeveloped including factors such as limited in-place volumes, poor recovery factors and underlying issues such as poor seismic imaging, structural complexity and compartmentalisation, poor reservoir permeability and connectivity, hydrocarbon characteristics, pressure/temperature conditions, drilling/completion and field development technology, offtake routes, commercial constraints, etc.

For Discoveries and Field Redevelopments please also provide in the Appendix B information on oil and gas gravity, composition, viscosity, together with anticipated recovery mechanisms including aquifer support, secondary and enhanced recovery.

#### **Additional Information or Comments**

Please include commentary on additional factors eg HPHT, heavy oil/API, deep-water, inerts, H2S, windfarm/shipping-lane/military issues, % on-block etc.

#### **Illustration uploads**

Location summary map - Map showing the outlines of Opportunities in the bid, how they relate to one another and to fields/discoveries in the area, together with block boundaries and other relevant features such as infrastructure, bathymetry etc. Clearly annotated.

Map of Opportunity - Typically a depth structure map at Top Reservoir with legible contour labels. Clearly annotated with: Maximum outline of the Opportunity, Location of seismic lines, Latitude/longitudes and UTM's suitable for georeferencing, Title box confirming the mapped property, Appropriate scale bars and annotation.

Representative Seismic Section - Typically a reflectivity display, with well ties where available. Title box confirming the seismic property. Appropriate scale bars and annotation including polarity convention.

Geological Cross-section - Based on the seismic section, or alternatively a conceptual illustration of the petroleum system, plays and traps.