**Technical Support – Work Order Specification**

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| **Title: Provision of Technical Support to the UK HPR1000 GDA Step 4 External Hazards Assessment** |
| 1. Background to the project

ONR formally commenced the Generic Design Assessment (GDA) of the UK Hua-Long Pressurised-water Reactor 1000 (UK HPR1000) in January 2017. The GDA process is a step-wise assessment of a Requesting Party's (RP) safety submissions, with the assessments increasing in detail as the project progresses. General Nuclear System LTD (GNS) is a UK-registered company that was established to implement the GDA on the UK HPR1000 reactor on behalf of three joint requesting parties comprising China General Nuclear Power Corporation (CGN), EDF Energy and General Nuclear International (GNI).Background information on the UK HPR1000 GDA can be found on the RP and ONR websites:* <http://www.ukhpr1000.co.uk/>
* http://www.onr.org.uk/new-reactors/uk-hpr1000/index.htm

ONR formally commenced the Step 3 GDA assessment in November 2018. The current Step 3 work is to assess the safety arguments of the External Hazards safety case submissions, which support the existing safety claims. The Step 3 assessment is due for completion by February 2020, with the project then continuing into Step 4. During Step 4, ONR will undertake a detailed assessment of the External Hazards’ safety case submissions by conducting both “broad brush” and “deep dive” assessments, on a sampling basis. The aim of this sampling is to confirm that the claims and arguments made by the RP are underpinned by robust evidence. This will include:* Consideration of issues identified in GDA Steps 2 and 3;
* Judge whether key claims and arguments relating to External Hazards that underpin the safety of the UK HPR1000 design are complete and reasonable.
* Judge the design against relevant good practice (RGP) including the ONR Safety Assessment Principles[[1]](#footnote-1) (SAPs) and determine whether the design reduces risks as low as reasonably practicable (ALARP);
* Perform an independent verification of analyses performed by the RP;
* Establish whether the requirements of the External Hazards protection measure’s performance criteria, safety classification and reliability are adequate, and where appropriate substantiated by evidence through liaising with relevant ONR specialist assessors;
* Judge whether significant External Hazard parameters defined in the generic site envelope (GSE) are appropriately considered in the designs; and,
* Assess proposed resolution of identified nuclear safety issues, or identify paths for resolution.

External Hazards interface with other discipline areas, such as Internal Hazards and Civil Engineering, and will continue to interface with specialist assessors in these disciplines areas during GDA Step 4.The Technical Support Contractor (TSC) shall provide a proposal to undertake the work described herein, comprising an independent technical review of the RP’s external hazards safety case. If the proposal is accepted, the work will be conducted under the terms and conditions of the existing ONR TSC Framework Agreement. |
| 1. SCOPE OF THE SERVICES REQUIRED

The scope of work involves supporting the ONR External Hazards assessor during the Step 4 by providing an independent technical review of the UK HPR1000 External Hazards’ safety case. This includes:* Familiarisation with the extant safety case as submitted by the RP during Step 3, ONR’s Step 3 assessment note, any findings made, existing Regulatory Queries (RQ) and Regulatory Observations (RO) (Appendix 1).
* An independent, detailed, technical review of the RP’s External Hazards step 4 submissions in accordance with ONR’s expectations given in the Guidance to Requesting Parties[[2]](#footnote-2), and with reference to relevant good practice and modern standards[[3]](#footnote-3). Appendix 1 presents the existing safety case submissions and Appendix 2 details the expected documentation to be submitted during Step 4.
* The technical review should confirm:
	+ The safety claims, arguments and supporting evidence have a clear structure and hierarchy so that the generic design basis is set out logically in specific and measurable statements that show that the External Hazard aspects of the UK HPR1000 GDA PCSR meet the expectations of relevant SAPs.
	+ The data used to define the External Hazards contribution to the safety case is demonstrably conservative (where appropriate) and that appropriate studies have been performed by the RP to determine the sensitivity of analytical results to the assumptions made, data used and the methods of calculation.
	+ Internationally recognised standards and relevant good practice have been adopted, where applicable.
* A number of topics have been identified for in-depth assessment during Step 4. These include, but are not limited to:
	+ Air temperatures and the adequacy of the safety and performance requirements of the heating, ventilation and air conditioning (HVAC) systems
	+ Lightning peak current definition and design implications
	+ Hazard combinations
	+ Adequacy of the proposed protection measure’s safety and performance requirements, and where applicable the adequacy of their design substantiation through liaising with other ONR specialist assessors
	+ Review of beyond design basis events and confirming the absence of cliff-edge effects for External Hazards
	+ Adequacy of the deterministic analysis performed for the reference design
* The TSC will interface with other ONR specialist assessors[[4]](#footnote-4), as required, to determine the adequacy of the safety case and ensure consistency with external hazard definitions including but not limited to:
	+ Internal Hazards: the TSC will ensure all relevant hazard combinations are considered and that the external hazards definitions are consistent with the external hazards safety case.
	+ Engineering disciplines: the TSC will ensure the use of external hazards design and beyond design basis load functions used in the design are consistent with their definition. The TSC will also support as necessary the engineering assessors in their assessment of the substantiation of the protection measures.

**Note:** aircraft impact analysis is excluded from this contract as it is included in a separate civil engineering technical support – work order specification. * + PSA: liaise with the PSA specialist assessor to ensure the adequacy of the external hazard definitions considered, and to understand the design’s beyond design basis capability.

The following bullets provide more detail on the scope of work, and provide planning assumptions to inform the tender submissions:* Familiarisation with the available baseline information (Appendix 1) and independently assess any new or revised reports delivered during the contract period (i.e. Step 4). For reports revised during the step, only the changes and their consequences should be reviewed.
	+ For tendering purposes approximate page numbers for extant submissions are provided in Appendix 1.
	+ For forthcoming Step 4 documentation it should be assumed that for each document in Appendix 2 an additional two supporting references will be requested for an approximate total of 60 documents for review by the TSC.
	+ Assume for tendering purposes that a PCSR Chapter is up to 120 pages long, supporting documents, bases of safety case and basis of design are up to 50 pages long.
* Identify shortfalls in the external hazards safety case and highlight these to the ONR external hazards assessor for consideration.
* Recommend potential ‘deep-dive’ sampling areas to the ONR external hazards assessor for consideration based on findings of the independent technical review.
* Identify any necessary UK HPR1000 information from the RP including a review of the available Fangchenggang 3 reference design documentation (which will be provided to the winning tenderer). ONR will formally submit these requests to the RP as RQs, but the contractor is expected to identify the information required.
* Assess RP submissions and where necessary prepare a RQ for ONR to formally submit to the RP. The TSC would then review the adequacy of the RP’s responses.
	+ For tendering purposes it should be assumed that a RQ will be raised for each report assessed during Step 4; therefore assume production and review of 60 RQs.
* Provision of support to the ONR external hazards assessor during technical meetings with the RP. For tendering purposes assume the following meetings:
	+ Two, five day meetings with the RP in Shenzhen (China), expected to occur April 2020 and January 2021. Assume one individual from the TSC organisation will support the ONR project officer.
	+ Ten, one day meetings with the RP in the UK (assume London)
	+ Five, half-day video-conference meetings with the RP staff to discuss emerging technical issues (assume Liverpool)
	+ A half-day progress meeting once per month (inclusive of one kick-off meeting) with the ONR External Hazards assessor and other ONR topic leads in the UK. For tendering purposes assume Bootle for the kick-off meeting and then Bootle, contractor office or by phone for subsequent progress meetings. Assume progress meetings occur March 2020 through April 2021
* Provision of call-off support to the ONR project officer following submission of contractor report (see Deliverable 2)
	+ For tendering purposes assume a total of 2 days per month from April 2021 to January 2022
* The proposal should provide a Limit of Liability price for assessing the PCSR

There is a wide range of external hazards considered in the GDA PCSR. Adequacy of the GDA PCSR depends on both the quality of the underpinning hazard analyses and the way in which this information is used to support design basis analysis, beyond design basis analysis and PSA. While the objective of this work is firmly focussed on the External Hazard aspects, the contractor must be able to demonstrate a familiarity with the use of such information in both deterministic and probabilistic safety analyses of the plant. The TSC must also have a good understanding of the most common External Hazards relevant to UK nuclear safety cases or be able to source expertise to aid review of the more esoteric hazards if required. The following external hazard types will be considered: * Seismic (strong ground motion and geotechnical)
* Meteorological (i.e. air temperature, lightning, rainfall, wind and tornado)
* Flooding
* Space weather
* Man-made (e.g. external explosion)
* Fault conditions associated with external hazards (e.g. loss of ultimate heat sink)

The TSC is expected, where applicable, to incorporate any work performed by other ONR assessors into their review and provide a technical review of all remaining External Hazards. It is therefore important that the TSC has familiarity with nuclear safety case construction and documentation, not just the underpinning technical analysis work. Familiarity with the claims, evidence and argument approach to safety case construction is expected.Documents for ReviewExternal Hazards safety case documentation for familiarisation are given in Appendix 1. External Hazards safety case documentation to be submitted by the RP and assessed during Step 4 are given in Appendix 2. A document map showing the Requesting Party’s External Hazards safety case is provided in Appendix 3 for information purposes. It may be necessary for the RP to produce additional documentation during the step to address ONR queries. The safety case is supported by design documentation for the Fangchenggang 3 reference plant. These documents are categorised as Tier 3b and are likely to require translation by the RQ. ONR will request Tier 3b documentation from the RP where necessary to support its deep-dive sampling. The TSC would be expected as part of their independent technical review to identify documents required for sampling. TasksThe following tasks are to be completed as part of the project:* **Task 1:** Familiarisation with the extant safety case, the ONR’s Step 3 external hazards assessment note (including findings, recommendations and RQs & ROs) and key safety case documentation already submitted to ONR – see appendix 1 for details. The TSC is also expected tohighlight other potential areas for sampling and to identify additional reference plant documentation required to support the Step 4 external hazards assessment.
* **Task 2:** Support the ONR external hazards assessment by providing an independent technical review of UK HPR1000 PCSR submissions and supporting documentation that form the external hazards safety case, and advise the ONR External Hazards assessor of their technical adequacy.
* **Task 3:** Support the ONR assessor at technical meetings with the RP and interface with other ONR specialists as required.
* **Task 4:** Provision of call-off support to the ONR project officer following submission of contractor report (see Deliverable 2).

DeliverablesThe following deliverables are required:* **Deliverable 1:** Based on familiarisation with the external hazards safety case submissions in Task 1 the TSC would provide a short proposal identifying potential sampling areas and reference documentation needed to support the independent technical review.
* **Deliverable 2:** A written report (or reports) presenting the work undertaken for Task 2 on the adequacy of the external hazards safety case and any findings / recommendations to be considered by the ONR External Hazards assessor.
* **Deliverable 3:** Meeting notes/presentations required for the meetings in Tasks 3 and 4.
* **Deliverable 4:** Monthly progress report and invoice for the duration of the contract.

ExclusionsThe following aspects of work are excluded from this technical specification:* Assessment of aircraft impact is being undertaken by the incumbent Civil Engineering TSC including review of the threat definitions and associated load-time functions, and is excluded from this contract.
* External Hazards PSA work is being undertaken by the incumbent PSA TSC.

TimescalesThe following timescales are to be met for the project:* Project commences March 2020
* Review period March 2020 – January 2021
* Final GDA submissions January 2021
* Draft TSC reports delivered to ONR March 2021
* Final TSC reports delivered to ONR April 2021
* Call off support ONR April 2021 – January 2022
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| 1. OBJECTIVES

The overall project objectives are as follows:* **Objective 1:** Independent technical review of the UK HPR10000 GDA PCSR safety case submissions relevant to External Hazards described herein, to determine the adequacy of the External Hazards safety case.
* **Objective 2:** provide support to the ONR assessor with their assessment of the external hazards safety case.
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| 1. CONSTRAINTS

Project constraints are identified in the following section:* The work is expected to start and conclude in accordance with the overall timescales given below, and a project programme will be agreed with the contractor upon contract award. The External Hazards work package is assumed to be approximately 23 months in duration. This will be agreed and fixed when the contract is awarded, as will key project milestones and delivery dates for the various reports. Assumed dates for GDA Step 4 are provided below.
	+ Step 4 commences February 2020
	+ Kick-off meeting with ONR Within 10 days of award
	+ Final RP deliverables (with exceptions) January 2021
	+ Draft TSC report March 2021
	+ Final TSC report April 2021
	+ Call-off support to ONR April 2021 – January 2022
	+ End of TSC contact end January 2022
	+ End of GDA Step 4 / issue of DAC or iDAC February 2022
* ONR will provide the latest versions of relevant documentation submitted by the RP. Further information will need to be identified and requested by the contractor through regulatory queries (via ONR). The timescales for both of these processes are largely outside of ONR’s direct control and therefore delays to the receipt of information may occur. The TSC should also be aware that in some limited cases, the information requested may only be available in Chinese and translation into English (undertaken by the RP) may be required. Similarly, the quality of any response cannot be guaranteed. A pragmatic and flexible approach will need to be adopted by the contractor to deal with these circumstances, both technically and contractually, should they arise.
* It is expected that the successful contractor will also draw upon their experience, resources and publicly available information to perform this work. The TSCs undertaking the work will be expected to have demonstrable experience in relation to the scope of this contract.
* All information received from the RP will need to be treated in accordance with the ONR Technical Support Contact Framework agreement and non-disclosure agreement. The information or a certificate of destruction will need to be returned to ONR at the end of the contract.
* A minimum security vetting of SC is expected
* Information in this contract will not contain protectively marked information. Most information will contain proprietary markings.
* Information in this contract will not contain Sensitive Nuclear Information (SNI).
* The contractor will need to provide assurances that it has all necessary export control licences to exchange information with ONR.
* The transmittal of all documents between ONR and the contractor will be through ONR's Joint Programme Office (JPO). This will use the egress system, regardless of the security marking (unless the documents are publicly available on the internet).
* The contractor may be asked to sign Export Control End User Undertakings (EUU) to receive controlled technology.
* The contractor will be required to work in accordance with ONR’s Export Control Instruction in order to facilitate engagement with the GDA RP. The Contractor will be expected to apply for an export licence with CGNPC and CNPDC via the Department for International Trade’s, Export Control Organisation (https://www.spire.trade.gov.uk/spire/fox/espire/LOGIN/login).
* The contractor shall not utilise any additional third party support not named in the bid documentation without ONR’s prior written consent.
* Any conflict of interest should be declared. The TSC should either not have previously supported the RP (directly or indirectly), in developing or reviewing the UK or Chinese HPR1000 External Hazard safety case or should be capable of demonstrating that there is sufficient separation between the proposed project team and those working for the RP that there is no conflict of interest. Where a potential conflict exists, the contractor should describe how this will be managed by completion and submission of the Potential Conflicts of Interest Declaration form attached at Schedule C.
* The aim of this work package is to inform and advise ONR. However, it is ONR’s intention to brief the RP on the conclusions of the work. The RP will be provided with copies of any reports produced for information and will be invited to comment on their factual accuracy.
* It is not ONR’s intention to publish the reports produced through this contract. However, it is likely they will be referenced in publicly available reports and therefore subject to freedom of information requests. This should not constrain or limit the produced reports but should be taken into account with the style and format.
* The contractor shall ensure they have the relevant permissions for all codes, standards, technology, software and/or information required to deliver the scope of work.
* The contractor should identify any constraints that may impact delivery of the intended scope of work. ONR expects that the TSC will be required at a number of level 4 meetings with the RP (e.g. those meetings outlined in Section 2). A pragmatic and flexible approach will need to be adopted by the TSC to deal with the project needs in terms of meeting dates, attendance and attendees.
* The contractor is responsible for making all arrangements required to support meetings in China. However, ONR will facilitate the provision of Invitation letters.
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| 1. CONTRACT MANAGEMENT

On award of the contract the TSC will be expected to obtain ONR acceptance of the technical review scope, supporting programme and project costs. This will occur during the project kick-off meeting. Following acceptance the TSC will be expected to deliver the defined scope as set out in the programme and to the project cost.ONR will require to be kept updated about progress and delivery of the required work via monthly meetings, to include a contract start-up meeting at ONR’s offices at Bootle. Subsequent progress meeting should be arranged with the ONR Project Officer and can be held at ONR’s office in Bootle, or the contractor’s premises.As part of the project the TSC will be expected to routinely review the programme scope, deliverables, milestones, timeframes, project costs and indicative invoice forecast via monthly reporting. |
| **TECHNICAL RESPONSE** |
| 1. Response

The Technical Response should demonstrate a clear understanding of the work required.Please provide: * a description of how you will deliver the scope of work (methodology);
* the proposed delivery team you will use including CVs, clearly signposting to relevant sections within your Capability Prospectus where appropriate/relevant. A statement of suitability for each individual should be provided that justifies why they are competent for their proposed project role;
* a description of proposed deliverables and/or outputs;
* details of proposed cost and associated effort assumptions for the external hazards work described herein including Tasks 1-4 and Deliverables 1-4;
* a planned invoice schedule;
* a project delivery plan showing activities and milestones described herein including Tasks 1-4 and Deliverables 1-4;
* an outline of anticipated engagement (project meetings & management);
* arrangements for managing delivery of the work and dealing with disputes (including details of the liaison project manager, who will act as point of contact with the ONR project officer);
* a proven track record of undertaking similar external hazards work for ONR;
* knowledge and experience of the ONR Generic Design Assessment process
* demonstrable knowledge of PWR technology, whilst knowledge of HPR1000 technology would be beneficial; and,
* details of any assumptions or constraints.

It is expected that the project information required for the work will not include any Sensitive Nuclear Information (something the TSC should confirm with the Project Officer). However, it would be prudent to demonstrate that appropriate IT and Security Vetting measures are in place, as previously communicated to all TSCs.One of the means used by ONR to select the TSC will be by evaluation of submitted CVs. Tenderers for this work should submit the CVs of the specialist personnel who shall be employed on the review work together with the charge rate applicable to the specialist(s). Specialists whose CVs are submitted at tender shall only be substituted by prior agreement with ONR. Similarly, any changes in role / responsibility during the project should be discussed and agreed with the ONR project officer.  |

**Appendix 1 – GDA safety case documentation relevant to the external hazards topic submitted by GNS during Steps 1-3**

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|  | **Title** | **Identifier** | **Revision** | **Tier** | **Pages** | **Reference** |
| **1** | GDA Step 3 Assessment of External Hazards for the UK HPR1000 Reactor | ONR-NR-AN-19-003 | Revision 0 | - | c. 30 | 2019/283863 |
| **2** | External Hazards Step 4 Assessment Plan | ONR-GDA-AP-19-nnn (To be confirmed)  | Revision 0 | - | c. 10 | To be complete January 2020 |
| **3** | Demonstration that the UK HPR1000 Design is Suitably Aligned with the Generic Site | RO-UKHPR1000-0002 | - | - | 4 | http://www.onr.org.uk/new-reactors/uk-hpr1000/ro-res-plan.htm |
| **4** | *Various Regulatory Queries pertaining to the UK HPR1000 external hazards safety case and associated Structures, Systems and Components* | RQ-UKHPR1000-nnn (31 total) | - | - | Variable, assume 5 per RQ | - |
| **5** | Pre-Construction Safety Report Chapter 2 General Plant Description | HPR/GDA/PCSR/0002 | Revision 002 | 1 | c.60 | Due 01/2020 |
| **6** | Pre-Construction Safety Report Chapter 3 Generic Site Characteristics. General Nuclear Systems Ltd. | HPR/GDA/PCSR/0003  | Revision 001 | 1 | c. 30 | Due 01/2020 |
| **7** | Pre Construction Safety Report Chapter 7 Safety Systems  | HPR/GDA/PCSR/0007 | Revision 001 | 1 | c. 250 | Due 01/2020 |
| **8** | Pre-Construction Safety Report Chapter 18 External Hazards. General Nuclear Systems Ltd. | HPR/GDA/PCSR/0018  | Revision 001 | 1 | c. 100 | Due 01/2020 |
| **9** | UK HPR1000 Generic Site Report. General Nuclear Services Ltd. | HPR/GDA/REPO/0015 | Revision 002 | 2 | c. 90 | Due 11/2019 |
| **10** | Generic Site Related Design Values. CGN. | GHXNIX10016DWJG42GN  | Revision C | 2 | c. 40 | Due 11/2019 |
| **11** | The General Requirements of Protection Design against Internal and External Hazard. CGN.  | GHX00100028DOZJ03GN | Revision D | 2 | 41 | 2018/373238 |
| **12** | The Identification and Screening Process of Internal and External Hazards. CGN.  | GHX00100037DOZJ03GN | Revision D | 2 | 44 | 2018/373240 |
| **13** | Suitability Analysis of Codes and Standards in External Hazards. CGN.  | - | Revision B | 2 | c. 40 | Due 11/2019 |
| **14** | Compliance Analysis of Codes and Standards in External Hazards. CGN. | GHX00800021DOZJ02GN | Revision A | 2 | 80 | 2019/250916  |
| **15** | Earthquake Safety Evaluation Methodology Report. CGN. | GHX00100053DOZJ03GN | Revision B | 2 | 16 | 2018/181233 |
| **16** | Earthquake Safety Evaluation Report for Reactor Building (BRX). CGN. | GHX86000005DOZJ03GN | Revision B | 2 | 30 | 2019/90439 |
| **17** | Earthquake Safety Evaluation Report for Fuel Building (BFX). CGN. | GHX86000006DOZJ03GN | Revision A | 2 | 21 | 2019/122535 |
| **18** | Earthquake Safety Evaluation Report for Safeguard Buildings (BSA/B/C). CGN. | GHX86000007DOZJ03GN | Revision A | 2 | 20 | 2019/184004 |
| **19** | External Flooding Safety Evaluation Methodology Report. CGN. | GHX00100038DOZJ03GN | Revision C | 2 | 10 | 2018/178938 |
| **20** | External Flooding Safety Evaluation Report. CGN. | GHX86000002DOZJ03GN | Revision A | 2 | 23 | 2019/57183 |
| **21** | Tornado Safety Evaluation Methodology Report. CGN. | GHX00100034DOZJ03GN | Revision C | 2 | 10 | 2018/181250 |
| **22** | Tornado Safety Evaluation Report. CGN. | GHX86000003DOZJ03GN | Revision A | 2 | 33 | 2019/90438 |
| **23** | Meteorological Hazards Safety Evaluation Report. CGN. | GHX86000013DOZJ03GN  | Revision A | 2 | 24 | 2019/155397 |
| **24** | Lightning, Electromagnetic Interference and Space Weather Safety Evaluation Report. CGN. | GHX86000012DOZJ03GN | Revision B | 2 | 20 | 2019/250852  |
| **25** | External Explosion Safety Evaluation Methodology Report. CGN. | GHX00100031DOZJ03GN | Revision C | 3 | 9 | 2018/181240 |
| **26** | External Explosion Safety Evaluation Report. CGN. | GHX86000004DOZJ03GN  | Revision A | 2 | 35 | 2019/148574  |
| **27** | Heat Sink Specific Safety Evaluation Report. CGN. | GHX86000014DOZJ03GN  | Revision B | 2 | 16 | 2019/90440 |
| **28** | External Hazards Schedule Report. CGN. | GHX86000015DOZJ03GN | Revision C | 2 | c. 20 | 2019/250929 |
| **29** | Combined Hazards Safety Evaluation Methodology Report. CGN. | GHX00100067DOZJ03GN | Revision A | 2 | 23 | 2018/325476 |
| **30** | ALARP Demonstration Report for External Hazards. CGN. | GHX00100061KPGB03GN | Revision B | 2 | 35 | 2019/250903 |
| **31** | External Hazards Gap Identification and Evaluation Report. CGN. | GHX00100055DOZJ03GN | Revision A | 3 | 16 | 2018/300556 |
| **32** | External Hazards Gap Resolution Strategy Report. CGN. | GHX00100056DOZJ03GN | Revision 1 | 3 | 16 | 2018/359834 |
| **33** | HVAC Systems Analysis Report. CGN. | GHX08000001DCNT03TR | Revision A | 3 | 38 | 2019/129647 |
| **34** | SEC\*/RRI\*\* System Analysis Report. CGN.\* Essential Service Water System [ESWS]\*\* Component Cooling Water System [CCWS] | GHX00800001DCSG02GN  | Revision B | 3 | 23 | 2019/11292 |
| **35** | Control & Instrumentation System Protection Design against Space Weather Report. CGN. | GHX00100057DOZJ03GN | Revision A | 3 | 15 | 2019/4570 |
| **36** | Electrical Power System Protection Design against Space Weather Report. CGN. | GHX05000013DEDQ45GN | Revision A | 3 | 12 | 2019/122766  |
| **37** | Modification on UK HPR1000 Design for External Hazards Summary Report. CGN. | GHX00100058DOZJ03GN | Revision A | 3 | 16 | 2019/250949  |
| **38** | Production Strategy for External Hazards. CGN. | GHX00100031KPGB03GN | Revision C | 4 | 76 | 2019/255270 |

Plus any supporting references to the above documentation that the TSC considers necessary to review.

**Appendix 2 – Documentation to be submitted by GNS in Step 4**

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|  | **Title** | **Identifier** | **Submission Date** | **Revision** | **Tier** |
| **1** | Pre-Construction Safety Report Chapter 3 Generic Site Characteristics. General Nuclear Systems Ltd. | HPR/GDA/PCSR/0003  | January 2020 | Update – Version 1 | 1 |
| **2** | Pre-Construction Safety Report Chapter 18 External Hazards. General Nuclear Systems Ltd. | HPR/GDA/PCSR/0018  | January 2020 | Update – Version 1 | 1 |
| **3** | The General Requirements of Protection Design Against Internal and External Hazard. CGN. | GHX00100028DOZJ03GN | February 2020 | Update | 2 |
| **4** | External Flooding Safety Evaluation Report. CGN. | GHX86000002DOZJ03GN | February 2020 | Update | 2 |
| **5** | Tornado Safety Evaluation Report. CGN. | GHX86000003DOZJ03GN | June 2020 | Update | 2 |
| **6** | External Explosion Safety Evaluation Report. CGN. | GHX86000004DOZJ03GN | May 2020 | Update | 2 |
| **7** | Lightning, Electromagnetic Interference and Space Weather Safety Evaluation Report. CGN. | GHX86000012DOZJ03GN | April 2020 | Update | 2 |
| **8** | Meteorological Hazards Safety Evaluation Report. CGN. | GHX86000013DOZJ03GN | May 2020 | Update | 2 |
| **9** | External Hazard Schedule Report. CGN. | GHX86000015DOZJ03GN | April 2020 | Update – Revision D | 2 |
| **10** | External Hazard Schedule Report. CGN. | GHX86000015DOZJ03GN | December 2020 | Update – Revision E | 2 |
| **11** | ALARP Demonstration Report for External Hazards. CGN.  | GHX00100061KPGB03GN | March 2020 | Update – Revision B | 2 |
| **12** | ALARP Demonstration Report for External Hazards. CGN.  | GHX00100061KPGB03GN | December 2020 | Update – Revision C | 2 |
| **13** | Generic Site Report. CGN. | HPR/GDA/REPO/0015 | May 2020 | Update | 2 |
| **14** | Compliance Analysis of Codes and Standards in External Hazards (updated) | GHX00800021DOZJ02GN | June 2020 | Update | 2 |
| **15** | Pre-Construction Safety Report Chapter 3 Generic Site Characteristics. General Nuclear Systems Ltd. | HPR/GDA/PCSR/0003  | January 2021 | Update – Version 2 | 1 |
| **16** | Pre-Construction Safety Report Chapter 18 External Hazards. General Nuclear Systems Ltd. | HPR/GDA/PCSR/0018  | January 2021 | Update – Version 2 | 1 |
| **17** | Production Strategy for External Hazards. CGN. | GHX00100031KPGB03GN |  | Update | 4 |
| **18** | Modification of the lightning protection system to withstand the revised UK generic site envelope lightning peak current. CGN. |  |  | New |  |
| **19** | Modification of the Secondary Passive Heat Removal System (ASP) against the UK GSE low air temperature hazard. CGN.  |  |  | New |  |
| **20** | Modification of over-pressure relief openings against the tornado and external explosion hazards to protect the Main Steam System (VVP) and Main Feedwater Flow Control System (ARE) pipelines. CGN. |  |  | New |  |
| **21** | Modification of the VDA silencers against the tornado and external explosion hazards. CGN. |  |  | New |  |

Plus any other reactive documentation needed to address design modifications and ONR regulatory queries, observations and/or issues. The TSC may also identify reports in interfacing technical areas that may require review and/or discussions with the ONR External Hazards assessor.

**Appendix 3 – External Hazards Safety Case Document Map**



1. ONR, Safety Assessment Principles for Nuclear Facilities, 2014 Edition Revision 0. http://www.onr.org.uk/saps/saps2014.pdf [↑](#footnote-ref-1)
2. ONR, New nuclear reactors: Generic Design Assessment Guidance to Requesting Parties for the UK HPR1000, ONR-GDA-GD-001 Revision 4, October 2019 [↑](#footnote-ref-2)
3. This includes, but is not limited to IAEA guidance, WENRA Issue T, and the ONR Safety Assessment Principles and technical assessment guide for External Hazards NS-TAST-GD-013 Revision 7 [↑](#footnote-ref-3)
4. Via telephone, email and meetings as most appropriate [↑](#footnote-ref-4)