



BANNG
Blackwater Against New Nuclear Group



Sizewell C Proposed Nuclear Development Stage 2 Pre-Application Consultation Consultation Document

Response from the Blackwater Against New Nuclear Group (BANNG)

(BANNG PAPER NO. 32)

Introduction – the nature of this response

The Blackwater Against New Nuclear Group (BANNG), founded in 2008, is primarily concerned with proposals for new nuclear development at the Bradwell site in Essex. We also have an interest in generic and specific processes and proposals for new nuclear developments which may have implications or relevance for Bradwell. There are also issues encountered at Bradwell which, we believe, equally apply to other sites. In particular, there are some common concerns with both the Sizewell and Bradwell sites. They are neighbouring sites on the east coast and are the subject of proposals by the EDF/CGN partnership. Although they are at different stages of development and with different reactor technologies (Sizewell with two UK EPR reactors and Bradwell with an undisclosed number of Hualong 1 reactors) both are in areas with high levels of environmental protection, on coasts liable to erosion, coastal processes, storm surges and, in the long run, climate change and sea-level rise. These issues pose considerable threats to environments and human health especially in the long-term (that is, over 100 years). It is the unsuitability of the site for new nuclear power reactors and spent fuel and radioactive waste facilities that has led to our campaign to prevent new nuclear development at Bradwell which we have pursued in various ways, including detailed and informed consultation responses (see especially BANNG papers 1,2,4,9 in Appendix 1). For similar reasons we are opposed to the proposals for Sizewell 'C'.

BANNG responded to the Initial Proposals and Options Consultation Documents that comprised the Stage 1 Pre-Application Consultation in 2013 (See BANNG Paper No. 18 starting on p. 7 of this document). The arguments we put then are equally relevant now and, if anything, are reinforced. Consequently, we wish to submit our previous paper as an integral part of BANNG's response to the present consultation. In particular, we wish to reaffirm our position that 'Sizewell C should not proceed unless and until it can be conclusively demonstrated that impacts can be minimised, precious environments restored or replaced and ecological disruption prevented' (BANNG, 2013, p.9). We consider that no such demonstration has been achieved in the interim. Indeed, the risks posed to the environment and the vulnerability of the site to degradation and destruction in the far future are manifested in the consultation document despite its attempts at reassurance. And the measures indicated to prevent degradation and to protect the site appear far too fragile in the face of the

overwhelming force of natural processes which are possible during the proposed lifetime of the facilities, which stretches far into the next century. In the absence of any coherent, convincing or capable strategy for prevention or mitigation of the severe impacts likely to occur, BANNG reaffirms its view that there are fundamental reasons **sufficient to preclude development of the site for a new nuclear power station and, therefore, that either EDF withdraws its proposals or the Secretary of State intervenes to prevent the development.**

In our submission on Stage 1 (see below), we emphasised four main issues of concern, three of which are fundamental to this submission. They were: the vulnerability of the site to erosion and flooding; the problem of managing dangerous nuclear wastes in the long-term; and the scale of environmental damage involved. These remain our key concerns. In responding to the Stage 2 Pre-application consultation, BANNG has not considered the detailed environmental impacts and proposals for mitigation which constitute the bulk of the document. These are obviously matters of great concern to the local population who must live with the project in construction, production and clean-up. We neither have the knowledge nor the competence to deal with these essentially local matters. What we can do is to identify the strategic reasons why this project, put forward more than a decade ago, is no longer needed or justified. We wish, first, to question the basic assumptions of the need for a new nuclear power station and demonstrate how these are no longer valid. It follows that if need cannot be demonstrated then the project must fail. Second, we will argue that the claims for security and safety of the reactors and radioactive waste facilities are based on favourable assumptions and probabilities unlikely to be sustained beyond the relatively short time-scales assumed for the project. And, thirdly, we will argue that the proposals will result in impacts which cannot effectively be ameliorated or mitigated. **Our view remains that Sizewell C, if developed, will be a monstrous invasion with devastating consequences leaving a dangerous legacy on a vulnerable coast for generations to come.**

1. Sizewell C is no longer needed and, therefore, cannot be justified

It is stated at the outset (p.1) that the need for the project is established in NPS EN-6 in which Sizewell is listed as one of the eight sites (Bradwell, incidentally, being another) 'potentially suitable' for deployment of new nuclear power stations by 2025 (DECC, 2010). This was a very ambitious assumption when it was first indicated; a decade or so later it is in the vicinity of the heroic. The delays to Hinkley Point C, the first of the sites up for development, have put back its completion to around 2025 and even if it achieves that it will surely be the only one of the proposed new power stations to do so. The idea that there could be new reactors on six of the eight sites with a combined generating capacity of 18 GW by 2025 (or for that matter any other indicative date) was always in the realms of fantasy.

Given that the objective of deployment by 2025 will not be reached, the strategy of eight sites, and only eight sites, being available must surely be reviewed. If the policy of nuclear contributing as much as possible to the UK's needs for generating capacity is still to be pursued beyond 2025 (a policy which BANNG continues firmly to oppose), then a revision of the siting strategy is necessary. It is acknowledged that the impacts of Sizewell C will be harmful to environments and cannot be fully mitigated and it is clear that over time the precarious nature of this exposed coastal site will

cause the safety and security of the power station and its associated waste stores to be compromised. We have discussed these issues in our earlier submission below. The idea that this ‘development can nevertheless be acceptable given the urgent and important national need for new nuclear generation and the established lack of alternative sites’ (EDDF, 2016, p.14) is no longer tenable. **Given the severe environmental impacts and the long-term vulnerability of the site, BANNG considers Sizewell should be withdrawn from the list of sites for new nuclear power. The Sizewell C project cannot be delivered within the NPS timetable for deployable sites by 2025.**

In any event the context in which the NPSs were conceived has profoundly changed to the point where the original assumptions are invalid and a revision has become imperative. During the period since 2011 a number of trends, technological and economic, have become clear. These are well-known, established and documented elsewhere but may be briefly summarised as:

- a rapid increase in the deployment of renewable technologies, notably onshore and offshore wind and solar energy;
- the development of emerging renewable technologies (tidal, wave, battery storage) to the point of potential deployment;
- the increasing competitiveness of these technologies;
- a trend towards small-scale and distributed system;
- a shift away from large-scale generating plant towards smaller and more flexible systems such as small modular nuclear reactors.

In short, the energy market is now far more varied, flexible, localised and competitive. It is no longer evident that nuclear power is needed for the supply of base-load capacity in the longer term. Indeed, it is conceivable that large-scale nuclear stations (in the order of 3.3GW as is envisaged for Sizewell C) will become uncompetitive financially and technologically inflexible, hindering the development of more flexible and cheaper methods of producing electricity. Instead of an energy transition towards a more varied mix in which there is ultimately no place for nuclear power, the UK could be locked in to an expensive, dangerous and unreliable technology placing an unwanted economic burden on the future.

In this increasingly likely and rapidly emerging scenario the need for new nuclear power stations on the scale of Hinkley Point C or Sizewell C is questionable and further grounds for a review of the NPS. **BANNG concludes that in the light of developing trends in energy markets, the need for new nuclear power on the scale currently envisaged cannot be justified. The development of Sizewell C is unnecessary and there are no public interest grounds that can possibly justify the environmental detriment and risk that its development would cause.**

The need for developing Sizewell C is enshrined in NPS EN-1 and NPS EN-6 which are said to ‘provide the primary basis for decisions on applications for development

consent' (EDF, 2016, p.1) and that these prevail. However, it is clear, for the reasons set out above, that it is no longer true that the need persists; rather that Sizewell would be increasingly and embarrassingly surplus to requirements. Moreover, the policy is ambiguous as to the extent of its reliance on nuclear energy merely stating that 'it should contribute as much as possible to the UK's need for new capacity'. Consequently, **BANNG believes that the basis for developing Sizewell C has been fatally undermined by the course of events since the NPSs were enacted and that the scale of nuclear development if it continues to be pursued would be against the public interest.**

2. *The Sizewell C site is vulnerable and cannot be effectively sustained in the long-term*

There is a tendency in parts of the document to make optimistic assumptions about conditions in the far future which, combined with a limited appreciation of the time-scales involved, tends towards a perverse expectation that all will be right on the night. It is recognised that 'coastal change is likely to increase coastal flood risk over the lifetime of the Project through rising sea levels, changes in the surge tide levels and changes to the near shore wave regime' (EDF, 2016, p.296). However, it is clear that 'reasonably foreseeable' climate changes have only been assessed up to 2110 (*Ibid*, p. 121, 123) which is taken to be approximately the end of decommissioning. This appears to exclude the possibility of changes that, while not foreseeable, are potentially possible through extreme if improbable events, especially as climate change forecasts are revised upwards as has been the tendency thus far. Moreover, it is difficult to believe that decommissioning will end by 2110 given a sixty year operating life of the station, taking it to near the end of the century before decommissioning commences. Reasonable expectation indicates that the post-operational period during which there will still be highly radioactive facilities and wastes on site is likely to extend well into the next century. It is estimated that spent fuel will need fifty years cooling time before removal. We argued in our Stage 1 submission (see 'Flooding and Coastal Processes' pp. 8-10 below) that modelling and forecasting of possible scenarios should take into account the possibility of sea-level rises and associated climatic changes well beyond the range of the estimates on which the plans for coastal management and mitigation are presently based. Therefore, **BANNG believes it is unsafe to limit assessments of climate change and its impacts to the period up to 2110. Beyond that, however, forecasting becomes increasingly indeterminate. Nevertheless, we urge that the most recent forecasts or maximum credible scenarios of climate change and associated coastal events beyond 2110 and the potential consequences be modelled and examined.**

This has obvious implications for the management of the site once production has ended towards the end of this century. EDF claim that they will ensure that the management of spent fuel and radioactive waste will protect people and the environment. In EDF's view it will be possible to protect the site through sea defences with an embankment to the required standards of 10m. AOD for the period up to 2110 claiming that it could be adapted to rise to 14m. if trends in sea-level rise and nearshore waves suggest this is necessary. It is stated that decommissioning could be achieved within approximately 20 years after the end of generation (i.e. 2110 following 60 years of generation from 2030). Yet a major, if not the major, element of decommissioning is dealing with the ILW and spent fuel. And on these the document

is quite clear in its statement that the interim spent fuel store and the ILW interim storage facility will be designed for a life of 100 years and could be extended if necessary. In other words there is a clear expectation that these most highly radioactive facilities will still be present on the site at a time when any forecasts of coastal processes and sea-level change are in the area of indeterminacy. **BANNG suggests that EDF provide much more detail on whether and how it believes it is possible to protect the site in the increasingly uncertain conditions likely to be experienced in the period beyond 2110.**

It is suggested, rather implausibly, that a combination of sea defences, intervention in coastal processes and coastal retreat will provide adequate protection in the long-term. These proposals must be scrutinised very carefully. It is difficult to envisage how spent fuel and ILW could be managed safely, indefinitely, on such a vulnerable site. EDF's proposal is for spent fuel initially to be stored in the reactor pool, then transferred to the on-site interim store 'until a UK Geological Disposal Facility is available'. It will be the same for ILW. It is noticeable that no prospective date is offered for the availability of the GDF. Despite Government assurances that 'it is satisfied that effective arrangements will exist to manage and dispose of the waste that will be produced from new nuclear power stations' (DECC, 2011, p.15) there is as yet no design concept nor an acceptable site volunteered by a willing community. Even if one were to be developed, it might not have sufficient capacity for new build wastes in addition to the legacy wastes which will be the first priority for disposal. It is unlikely that the early spent fuel from new build at Sizewell could be admitted to a GDF before around 2135 and the later spent fuel arising at the end of this century would not be available for disposal until towards the second half of the next century. And all this presupposes that a repository will be built at all and on this point there is considerable uncertainty.

We believe the statement that spent fuel and ILW would be safely stored on the Sizewell site until a GDF is available for final disposal is unsound for the following reasons:

there is no indication of the time-scales potentially involved for storage on site

conditions on the site in the face of uncertainties of the incidence and impacts of climate change on this vulnerable coastline are indeterminable and, therefore, unknowable

a GDF will not (and may never) be available to take Sizewell wastes until well into the next century indicating that the wastes will remain on site for an indefinite period

Consequently, on the grounds that the consultation document reveals that it will be impossible for the project to meet acceptable standards of safety and sustainability in the management of its spent fuel and waste we conclude that the proposal as currently presented should not proceed. Further, we urge that any Sustainability Appraisal indicates clearly that the project's performance will inevitably weaken as site conditions inevitably deteriorate over time.

3. The scale of the development will result in harmful and destructive impacts on environments throughout the lifetime of the project

In our response to the first consultation (reproduced below from p. 7) we indicated the destructive impacts that a new nuclear power plant at Sizewell would have. The sections on 'Flooding and Coastal Processes' (pp. 8-10) and 'Environmental and Ecological Impacts' (pp. 13-15) provide our comments and we have no need to rehearse them here, if only because we detect little has changed in EDF's presentation of the impacts and proposed actions of adaptation and mitigation in the four years that have elapsed since. Thus, we wish to reaffirm most strongly the conclusions that we put forward in our previous submission. We are, to put it bluntly, astonished that so little detailed work has been done on such fundamental issues as Flood Risk Assessment, Environmental Impact Assessment and Sustainability. These issues are relegated to a chapter (chapter 12) at the end of the consultation document and much of the content therein is indicative, speculative or rhetorical. The vast bulk of the document is taken up by detailed appraisals of socio-economics and transport including rail, alternative park and ride schemes and highway improvements. Doubtless this is intended to respond to the strength of reaction from the local communities who are naturally concerned with the potential benefits of jobs, improved transport and localised environmental impacts. The absence of any equivalent detailed appraisal of the long-term impacts and threats to the integrity of the site itself indicates a gross neglect of the long-term scale of the project and the implications for intergenerational equity where presumed benefits and real detriments are unevenly distributed across the generations. Therefore, **BANNG is concerned at the lack of in-depth analysis of the potential threats to the integrity of the site in the long-term and the burden of environmental risk this will impose on future generations.**

The new station will occupy an area of 300ha. more than the total of Sizewell A and B combined. It is situated on a coast covered by several environmental designations. The power station will be situated close to the shore, subject to dynamic longshore drift, current, wave and tidal processes. It is also subject to storm surges and, over the longer term, sea-level rise. While these processes are briefly acknowledged and there is some reference to modelling being undertaken it is simply asserted that climate change allowances indicated by the ONR and the Environment Agency cover the lifetime of the site and cater for reasonable foreseeable climate change effects as well as 'credible maximum scenarios' (EDF, 2016, p.296). To meet the potential challenges a managed adaptive approach is taken through sea defences. It is also recognised that flooding may affect neighbouring environmentally significant areas for which inadequate mitigation measures are proposed. Overall the understanding of processes or projections into the future beyond the end of the century betokens a complacent and disingenuous attitude to the real possibility of catastrophic destruction of environments along this coast as we move into the farther future. **BANNG recommends that in its response to this consultation EDF provides detailed evidence of the coastal processes at the site and a thorough analysis of the threat to its integrity into the second half of the next century or indefinitely.**

Written on behalf of the Blackwater Against New Nuclear Group (BANNG) by

Sizewell C Proposed Nuclear Development Stage 1 Pre-Application Consultation Initial Proposals and Options Consultation Documents

Response from the Blackwater Against New Nuclear Group (BANNG)

BANNG PAPER No. 18

Introduction – Main Concerns

The Blackwater Against New Nuclear Group is a Citizens' Based Organisation established in 2008 to oppose any proposals to develop a new nuclear power station on land neighbouring the former Bradwell Magnox NPS on the Essex coast. It draws its support mainly from around the Blackwater but also has supporters from further afield in Essex and elsewhere. BANNG's purpose is to raise public awareness through the media and campaigns and to respond to consultations and other reports and to consult with government, local authorities and MPs, NGOs, the nuclear industry, regulators and other bodies involved in new nuclear development. BANNG has produced 17 detailed response papers (see attached list – Appendix 1), contributed papers to journals and newspapers, held several demonstrations and public meetings and delivered a petition containing 10,000 signatures collected face-to-face to the Minister of State for Energy in Whitehall.

BANNG is concerned about the prospective development of Sizewell C for several reasons. One, is that the Sizewell project is directly linked to Bradwell as a result of a condition entered into by EDF, the owner of both sites. Under this condition EDF is obliged to sell the Bradwell site to another operator. However, the sale would only need to occur after EDF achieves planning approval to build two reactors at Sizewell in Suffolk. This means that effectively Bradwell is a back up for EDF in the event the company does not get permission to build its planned four reactors (two at Hinkley Point and two at Sizewell) in the UK. It appears that the present situation is that the Bradwell land is available for sale but that no purchaser has come forward. As things stand, if Sizewell is given permission to go ahead this would potentially leave the way clear for an operator to apply to develop at Bradwell. To be clear, BANNG is opposed to both Sizewell and Bradwell as sites for new nuclear power stations. **Given the implications for Bradwell of a decision on Sizewell, BANNG urges EDF to declare its present intentions for the Essex site.**

BANNG's main concerns about the Sizewell site are similar to those it has for Bradwell. There are four main issues which we believe should preclude consideration of both these sites. First, is the issue of flooding and coastal processes. The precarious location of the proposed Sizewell C on a coast vulnerable to erosion will be of increasing concern as climate change impacts on sea-level rise and coastal processes. Our second issue is the long-term management of highly radioactive wastes and spent fuel. We do not believe management of such wastes on site into the far future and perhaps indefinitely has been sufficiently understood or considered. Thirdly, we are concerned about the arrangements for emergency planning. We believe that emergency planning procedures and implementation need far more considered attention than they receive in the documents. Finally, our fourth issue, is

the massive environmental impact both in the short- and long-term arising from the imposition of a major industrial activity on a primarily rural area of important habitat conservation, landscape protection and recreation. The scale of development will, in our judgement, provide environmental insult that will utterly transform the area of east Suffolk between Aldeburgh and Southwold.

BANNG identifies four main issues of concern in the development of Sizewell C. These are: the vulnerability of the site to erosion and flooding resulting from coastal processes and sea-level rise; the problem of managing dangerous nuclear wastes on the site in the long-term; the absence of effective emergency planning procedures; and the scale of environmental damage arising from a massive industrial complex in a rural area. We consider each of these reasons sufficient to preclude development of the site for a new nuclear power station and we urge EDF to withdraw its proposals.

BANNG is also concerned at the very limited and biased nature of this consultation by EDF. Some of the key issues have already been determined by Government and are not open for discussion. These include the issue of whether the UK needs a new nuclear power station and the specific choice of Sizewell as one of eight sites. BANNG has opposed both the policy and the siting strategy in earlier consultations and reluctantly accepts that these are not open for review at present. Similarly, we are concerned that policy for long-term management of radioactive wastes is not open for debate. We believe the policy is unclear and undetermined. We recognise that site-specific planning issues are open for discussion though it is difficult to disinter these from wider policy considerations. Overall, whether Sizewell goes ahead very much depends on how acceptable it is in terms of ecological impact, coastal degradation, liability to flooding and safety, all issues with regional, local and site-specific implications.

The emphasis and tone of the documents presents a very positive and optimistic view of the development of Sizewell C. There is considerable emphasis on the purported economic benefits and environmental mitigation and enhancements that will be undertaken including transport improvements. The problems of radioactive waste management and the inadequacies of emergency planning are overlooked or minimised. Although Sizewell C is described as ‘one of the biggest and most technologically complex projects ever built in the UK’ (EDF, 2012a, p.36) the overall impression is of a benign intruder settling comfortably into the local landscape and economy bringing jobs and wealth and environmental enhancements. Sizewell C might equally be portrayed as a monstrous invasion bringing disruption, congestion and pollution and leaving a dangerous legacy on a vulnerable coast for generations to come.

BANNG is concerned at the limited nature of EDF’s consultation and its tendency to emphasise the benefits while minimising the detriments that will accompany such a major development for generations to come.

Flooding and Coastal Processes

A particular concern for BANNG is that the proposals are based on forecasts of sea-level change only up to 2100. Furthermore, they appear to rely on the central

estimates reported by the UK Climate Impacts Programme which range from a 6cm. rise to 0.9m. over a 2009 baseline. It is acknowledged that even these changes will affect water depth, wave heights and storm levels (EDF, 2012b,p.80). In terms of coastal processes the documents are rather vague referring to longshore movements, cliff erosion and sediment deposition resulting from the complex interaction of tidal flows, waves and storm surges with cliffs, shoreline and sand banks. The impression conveyed is of great uncertainty as to the future development of the shoreline and the need for far more information which needs to be gathered as part of the Water Framework Directive. On the basis of assessments of flood risk, EDF indicate they will make 'suitable mitigation measures and possible allowance for future flood defence adaptation' (EDF, 2012a, p.23).

In BANNG's view much more investigation and far more robust planning is required. In the first instance EDF should identify the range of forecasts of future sea-level rise under climate change. Forecasts have been continuously revised upwards and further higher forecasts are likely to be made. Some studies have also indicated much higher sea-level rise than is forecast in the EDF submission. For instance, Wilby *et. al.* (2011) give an upper end scenario under the most extreme conditions of up to 4.3m. rise by 2100. It would seem prudent for EDF to recognise the possibility of much higher rises than their forecast and to indicate the adaptation and mitigation strategies they might need to deploy. EDF might well conclude that it is impossible for both technical and economic reasons to provide defence against the improbable eventuality of extreme sea-level rise. At the very least EDF will need to demonstrate that the site can be protected up to 2100 on the basis of current projections of the credible maximum scenario in the most recent projections and that it has made adequate provision to ensure that this is so. At this point there is little indication that EDF has grasped the necessity of doing so.

Beyond 2100 the situation becomes more speculative although there are several scenarios giving various projections of possible changes in sea-levels and associated storm surges and coastal processes. BANNG has little confidence that the potential situation on the coast beyond 2100 has been thoughtfully considered if it has been considered at all. In the first place predictions (which are really speculations) of sea-level rise vary considerably. Predictions of a rise of 2m and beyond have been made and even a 2 metre rise would have devastating consequences on a low-lying coast. The paper cited earlier indicates a possible rise of 5.8m. by 2200. The post 2100 period when there will still be activity on the site relies on periodic reviews of the situation. The intention is that operators may be required to implement further measures if projections show they are needed though it must be doubted if, at that distance in time, any reassurance can be given that there will be the resources, commitment and technology to develop the heroic defence measures that may be necessary.

Continuation of global carbon emissions at current levels (which, surely, must be included as a worst case scenario) could lead to a rise in temperature of 6⁰C and consequently high sea-level rise by the end of the century. This would make extreme weather events such as floods and droughts more frequent. According to the Government's National Policy Statement on Energy the aims of policy are 'to direct development away from areas at highest risk' (DECC, 2009, p. 67) and, where new energy infrastructure is 'exceptionally, necessary in such areas, policy aims to make it

safe without increasing flood risk elsewhere and where possible, reducing flood risk overall'. In the circumstances of Sizewell we conclude it would be folly to develop in the face of increasing uncertainty about climatic and coastal conditions and without credible plans for mitigation, adaptation and site management in the decades beyond 2100.

BANNG considers that EDF should not go ahead with its proposed new nuclear power station at Sizewell unless there is convincing and substantiated evidence that it is possible to undertake, manage and fund the mitigation measures that may be necessary to protect the site and neighbouring coastline together with protection of the population and environment under the maximum credible scenarios of sea-level change in the years up to the end of the next century.

Management of Spent Fuel and Radioactive Wastes

The management for the long-term of highly active radioactive wastes and spent fuel is a problem without at present a publically acceptable or scientifically credible solution. Government declares that 'it is satisfied that effective arrangements will exist to manage and dispose of the wastes that will be produced from new nuclear power stations' (DECC, 201, p.15). Therefore, the question is not an issue in the development of individual sites. In BANNG's view the Government's statement is no more than an aspiration that may not come to fruition. There is as yet no site for the presumed geological repository nor an agreed scientific concept for disposal of new build wastes and there may never be. The search for a site is presently focused on West Cumbria and the local communities have recently decided not to proceed in the search for a suitable site. The long-term strategy for waste management has been cast into great uncertainty and it is far from clear that either local communities will be found to volunteer or that, if they do, there is viable geology in the area to accommodate a colossal underground repository. Nor is it clear what wastes will be accommodated since the inventory must be defined and could be restricted to legacy wastes (such as the spent fuel from Sizewell B) and not take new build high burn up wastes of an indefinite quantity accumulating over an unforeseeable period.

We believe that the lack of an agreed management policy impinges on the implementation of new build and is an issue that must be taken into account by EDF in planning the development of the site. The Consultation Document provides only very general information on its plans and is virtually silent on the management of wastes beyond the end of this century. The power station, if it goes ahead, is likely to operate for sixty years but spent fuel and wastes will continue to be stored well after that 'until a UK Geological Disposal Facility is available and the spent fuel is suitable for final disposal' (EDF, 2012a, p.14). The interim spent fuel store (ISFS) would 'be designed for a life of at least 100 years which could be extended if necessary' (*Ibid*, p.16). The same process would also be available for ILW although the Document claims (wrongly it would seem) that the site could be cleared apart from the ISFS within 20 years of shut down (*Ibid*, p.15). Clearly, considerable volumes of highly active wastes will be on site until well into the next century and, if the repository does not materialise or is unavailable for new build wastes, they may be stored on the Suffolk coast indefinitely in what may become very difficult circumstances.

What is hardly mentioned in the documents is that, for all intents and purposes, a long-term waste management facility will be created vastly increasing the volumes and radioactivity already present on the site arising from the shut down Sizewell A and the operation of Sizewell B. Along with the stores may come encapsulation plants, waste management processing and packaging facilities. There may be a need for repackaging and replacement of the facilities over such long time-scales. It seems to us disingenuous of EDF to make so little mention of the prospect of waste management operations on the site stretching into the far future. It is imperative that EDF provides detailed plans for the management of these wastes and of the measures it envisages to protect the facilities from natural and human processes.

The safe management of stores for the indefinite future places a considerable burden of cost, risk and effort on future generations. There is an implied expectation that there will be the resources, the skilled workforce, the commitment and resolution that will be needed to manage the wastes safely and securely on site in what may be almost intolerable conditions of inundation and storm surges. This puts a blind faith in institutional continuity and social stability which is at odds with the chaotic possibilities that may be envisioned. The point is that the future state of the coast and of society in the far future is unknowable and, therefore, we should proceed cautiously on the basis that the worst might happen and plan for that rather than casually allow the future to look after itself. It is irresponsible to consider leaving spent fuel and other highly dangerous radioactive wastes on a site which might prove impossible to defend from natural forces.

On the issue of managing radioactive wastes, BANNG concludes:

- it is not necessarily the case that effective arrangements will exist to manage highly radioactive wastes in the long-term;
- arrangements for the long-term storage of wastes on site are unclear;
- the time-scale for the long-term management of wastes on site is unknown;
- it is unrealistic and irresponsible to assume institutional continuity and social stability will persist into the far future;
- it is unethical to place burdens of cost, effort and risk on future generations to cope with the continuing management of wastes in deteriorating conditions.

In BANNG's view it would be difficult, if not impossible, to maintain long-term, interim stores into the far future in conditions which are progressively deteriorating. In our judgement it is inconceivable that indefinite long-term interim storage is viable in such a location.

On the issue of radioactive wastes, BANNG concludes that EDF has not provided sufficient information or detail to justify its claim that wastes can be safely stored well into the next century and, in the absence of a long-term solution, possibly indefinitely. BANNG considers it irresponsible and unethical to impose unknowable risks on future generations by placing highly active wastes on such a

vulnerable coastal site. We consider EDF should not proceed with its proposals for development unless and until it can provide robust and credible plans for the long-term management of these wastes on the Sizewell site.

Emergency Planning

The accident at Fukushima in 2011 drew attention to the issue of emergency planning during a major crisis. The whole area within 20km. of the plant was evacuated and a sheltering area was declared up to 30km. The population evacuated has not returned. The dislocation caused by the earthquake and the flooding by the following tsunami resulted in partial melt down of three reactors, hydrogen explosions, exposure of spent fuel ponds and consequent release of radioactivity into the terrestrial and marine environments (ONR, 2011). Subsequently across the world there were safety checks, reviews and some shut downs and ‘stress tests’ were applied to reactors in the EU. The specific circumstances of the Fukushima accident arising from natural forces and inadequate design and protection systems are unlikely ever to be replicated. However, accidents resulting from a combination of natural forces and technical failings in complex systems are possible and have occurred repeatedly over the years (see Sovacool, 2011 and Perrow, 1999).

It is important to have adequate procedures in the unlikely event of a major accident. The Consultation Document provides sparse information on ‘Emergency Preparedness’ beyond the ritual declaration that safety is the overriding priority’ and the following general statement: ‘At all our operating power stations we have well-developed plans to deal with emergencies, including contingency plans in the extremely unlikely event of an unplanned release of radioactive material off-site’ (EDF, 2012a, p.14). EDF is committed to working with the local authorities to ensure there would be appropriate emergency plans. It would be helpful to have more detailed information of EDF’s ‘well-developed plans’ in order to provide some reassurance to the local population.

We understand that the emergency planning authorities in Suffolk through the Suffolk Resilience Forum are currently consulting the public on proposed changes in the procedures. It is proposed to increase the Detailed Emergency Planning Zone to 4km. radius from Sizewell B to include all of Leiston and to define a Precautionary EPZ of 15km. Proposals also include increasing the capacity for accommodation in the event of evacuation, monitoring and precautionary protection arrangements. BANNG considers these are all changes to be welcomed. However, we have observations on some aspects of emergency planning which we feel should be taken into consideration.

On the issue of emergency planning zones we consider the Precautionary Zone of 15km. to be inadequate. We suggest it should be at least 20km. as at Fukushima or possibly as wide as 30km. Within this zone it is important to detail the countermeasures that are envisaged. In terms of public information it should be made clear to those living within the EPZs under what circumstances and over what distance radioactive contamination is possible. It should also be stated that there will be situations in which evacuation will be necessary to safeguard the population from radioactivity. This is not intended to alarm the population but to recognise the common public perception of the low probability but high consequence of a major

nuclear emergency.

A further issue is how the public will be informed about what to do in case of an emergency. It is scarcely credible that in conditions of emergency the public will behave in an orderly, disciplined and rational way; there may be panic, bewilderment and misunderstanding. Getting timely and useful information to the public is of the essence. The Revised Draft NPS (EN-6) has something to say on this for the Bradwell site but curiously not for Sizewell. According to the Bradwell information within the DEPZ the public will be informed by an automated telephone messaging system while in the extendibility zone it 'will be alerted by the local media'. It cannot be assumed that everyone will have immediate access to these warning systems or that they will operate with efficiency and swift timing or that they will be fully comprehended in conditions of elevated anxiety. In any event the rise of new social media adds a further complication in that it facilitates very rapid communication among those who use it but carries the possibility of misinformation, conflicting information and inappropriate instructions. Hence, the warning system indicated in the NPS seems to be supremely inadequate.

Substantial populations may have to be evacuated in a major emergency. Around 100,000 people were removed from the area within 20km. of the Fukushima Dai-ichi plant in the period following the earthquake and tsunami. The logistics of moving such large numbers in terms of route capacity, organisation and control, reception centres and recovery procedures all require detailed, credible and robust planning and resources. Furthermore, the plans and procedures that may come into operation need to be explained to the public and exercises undertaken to demonstrate they are implementable.

On the issues of emergency planning BANNG believes that in the interests of protecting present and future populations EDF and the local emergency planning authorities need to ensure that that effective measures are in place so that the Government's objective 'to limit the radiological consequences to the public in the unlikely event of a serious nuclear accident' can be met.

EDF should provide adequate and intelligible information for the general public and the relevant authorities should develop a plan of coordinated rapid response together with an implementation plan.

Methods of informing, warning and organising the public in the event of an emergency need to be capable of ensuring as far as possible a swift and orderly response.

We expect that a credible and implementable statement from the emergency planning authorities on emergency planning will be in place before proceeding to develop a new nuclear power station at Sizewell.

Environmental and Ecological Impacts

The scale of this project, if carried forward, would be utterly transformative in its environmental impacts. The Consultation Document states that 'Sizewell C would be one of the biggest and most technologically complex construction projects ever built

in the UK' (EDFa, 2012, p.36). Throughout the documents the proposer emphasises the economic benefits such a massive development would bring and is relatively silent on the massive environmental degradation, disruption and disbenefits that will inevitably follow.

EDF relies on its statement of sustainability to demonstrate a commitment to balance economic and environmental objectives. It states,

'Sustainability leadership means responding courageously and constructively to the world's most critical ecological and economic challenges. It means enhancing life today without compromising life tomorrow. It means operating our business in a genuinely sustainable way' (EDF, 2012a, p.14).

This seems to us a weak definition which elides the basic contradiction between short-term economic development and long-term environmental destruction. This is evident in EDF's assessment of the positive impacts which 'include new jobs and making local economies more viable' as against the negatives which could 'include impacts on biodiversity and on the surrounding Area of Outstanding Natural Beauty' (EDF, 2012a, p.12). But EDF's main social commitment seems to be to deliver jobs, wealth and some infrastructure. It should be noted that jobs might peak at around 5000 falling back post-construction to around 1000. If Sizewell C proceeds it will bring with it a period of continuing economic adjustment and uncertainty which may not create economic stability and sustainability in the long-term. In the long run the environmental deficit is likely to prove permanent, a loss that has to be balanced against the putative short-term gains. Certainly in terms of the far future Sizewell C is likely to leave a legacy of radioactive wastes and a degraded environment on an unsustainable coastline. **BANNG believes the long-term environmental degradation and continuing radioactive legacy resulting from Sizewell C will impose a detrimental burden on future generations which will far exceed any short-term economic benefits.**

The Environmental Report provides some insight into the potential impacts on wildlife, habitats and landscape that will occur but is not very reassuring about the potential mitigation since much further work has to be done. For example, with reference to local coastal impacts the Environmental Report observes that 'possible effects on the habitats present in these sites will be considered with regard to the potential changes in coastal processes' (EDF, 2012b, p.38). Relatively little is known about these processes especially in the long-term and consequently it cannot be concluded that mitigation is possible. Although it is recognised that there will be adverse impacts, it is considered that disruption and disturbance to important habitats and ecosystems can be potentially ameliorated or lessened through mitigation measures. No matter what the impacts, the need for nuclear power as determined by Government policy, is seen as sufficient in itself to override the desirability of conserving environment and ecology. It is only necessary to invoke Imperative Reasons of Overriding Public Interest (IROPI) to justify development. **We believe that in the case of Sizewell C the environmental impacts will be damaging and irreversible to the extent that efforts at adaptation or mitigation would have no more than marginal and, over time, diminishing impact. The destructive impacts on habitats, marine life and visual amenity would be of such magnitude that it**

should be a matter of Imperative Reasons Of Public Interest (IROPI) to avoid them.

We support the view expressed in DECC's consultation on its National Policy Statement for Energy (EN-1) that development should not normally proceed where the proposal 'could inhibit sediment flow or have an adverse impact on coastal processes at other locations' (DECC, 2009, p.63). **We conclude that the impacts of such a major project on the coastal environment and marine ecology are likely to be both extensive and permanent and that Sizewell C should not proceed unless and until it can be conclusively demonstrated that impacts can be minimised, precious environments restored or replaced and ecological disruption prevented**

**Prepared on behalf of the Blackwater Against New Nuclear Group (BANNG) by
Professor Andrew Blowers, OBE, Chair**

2 February 2013

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APPENDIX 1

LIST OF RESPONSES MADE BY THE BLACKWATER AGAINST NEW NUCLEAR GROUP (BANNG) TO GOVERNMENT AND OTHER CONSULTATIONS ON NEW NUCLEAR BUILD AND STORAGE OF WASTES ON SITES

BANNG (2008) Consultation on the Strategic Siting Assessment Process and Siting Criteria for New Nuclear Power Stations in the UK, Response on behalf of BANNG, November (BANNG Paper No.1)

BANNG (2009a) 'Have Your Say' Government Consultation on Nomination of Sites for New Nuclear Power Stations, Response to the Consultation by BANNG, May (BANNG Paper No.2)

BANNG (2009b) The Justification of Practices Involving Ionising Radiation Regulations 2004, Consultation on the Nuclear Industry Association's Application to Justify New Nuclear Power Stations, Response to the Consultation from Blackwater Against New Nuclear Group (BANNG), March (BANNG Paper No.3)

BANNG (2010a) Consultation on Draft National Policy Statements for Energy Infrastructure: Draft Overarching National Policy Statement for Energy (EN-1); Draft National Policy Statement for Nuclear Power Generation (EN-6) and Associated Documents, Response of the Blackwater Against New Nuclear Group (BANNG), February (BANNG Paper No.4)

BANNG (2010b) House of Commons Energy and Climate Change Committee, Inquiry into Energy National Policy Statements, Evidence on Behalf of the Blackwater Against New Nuclear Group (BANNG), January (BANNG Paper No.5)

BANNG (2010c) Environment Agency Generic Design Assessment AP1000 Nuclear Power Plant Design by Westinghouse Electric Company LLC: UK EPR Nuclear Power Plant Design by Areva NP SAS EDF; Consultation Document, Response by Blackwater Against New Nuclear Group (BANNG), October (BANNG Paper No.6)

BANNG (2010d) The Justification of Practices Involving Ionising Radiation Regulations 2004. Consultation on the Secretary of State's Proposed Decisions as Justifying Authority on the Regulatory Justification of the New Nuclear Power Station Designs Currently Known as the AP1000 and the EPR, response

to the Consultation by the Blackwater Against New Nuclear Group, February
(BANNG Paper No.7)

BANNG (2010e) The Energy Act 2008, Consultation on the Financing of Nuclear Decommissioning and Waste Handling Regulations, Consultation on a Methodology to Determine a Fixed Unit Price for Waste Disposal and Updated Cost Estimates for Nuclear Decommissioning, Waste Management and Waste Disposal, Response of the Blackwater Against New Nuclear Group (BANNG), June
(BANNG Paper No.8)

BANNG (2011a) Planning for New Energy Infrastructure, Consultation on Revised Draft National Policy Statements for Energy Infrastructure, Response of the Blackwater Against New Nuclear Group (BANNG), January
(BANNG Paper No.9)

BANNG (2011b) The Energy Act 2008, Consultation on Revised Funded Decommissioning Programme Guidance for New Nuclear Power Stations and Consultation on an Updated Waste Transfer Pricing Methodology for the Disposal of Higher Activity Waste from New Nuclear Power Stations, Response from the Blackwater Against New Nuclear Group (BANNG), March
(BANNG Paper, No. 10)

BANNG (2011 c) Management of the UK's Plutonium Stocks, Consultation on the long-term management of the UK-owned Separated Civil Plutonium, Response from the Blackwater Against New Nuclear Group (BANNG), May
(BANNG Paper No. 11)

BANNG (2011d) Japanese Earthquake and Tsunami: implications for the UK nuclear industry interim report by HM Inspector of Nuclear Installations May 2011, Comment on Behalf of the Blackwater Against New Nuclear Group (BANNG), August
(BANNG Paper No. 12)

BANNG (2011e) Managing Radioactive Waste Safely: desk-based identification and assessment of potential candidate sites for geological disposal, Public Consultation, Response of the Blackwater Against New Nuclear Group (BANNG), September
(BANNG Paper No. 13)

BANNG (2012a) Essex County Council's Waste Disposal Document: Preferred Approach, Public Consultation, Response of the Blackwater Against New Nuclear Group (BANNG), January
(BANNG Paper No. 14)

BANNG (2012b) Geological Disposal of Radioactive Waste In West Cumbria? Public Consultation, Response of the Blackwater Against New Nuclear Group (BANNG), March
(BANNG Paper No. 15)

BANNG (2012c) Application for Development Consent by NNB Genco (EDF Energy) for Hinkley Point C Nuclear Generating Station and Associated Development, Written Representation on behalf of the Blackwater Against New Nuclear Group (BANNG), May
(BANNG Paper No. 16)

BANNG (2012d) Paper presented to the DECC/NGO Nuclear Forum, 'Radioactive Waste Management and New Build – Problems and Policies', October (BANNG Paper No. 17)

BANNG (2013) Sizewell C Proposed Nuclear Development Stage 1 Pre-Application Consultation, Initial Proposals and Options Consultation Documents, Response of the Blackwater Against New Nuclear Group (BANNG), February (BANNG Paper No. 18)

BANNG (2013) Call for Evidence on Managing Radioactive Waste Safely – Review of the Siting Process for a Geological Disposal Facility, Response by the Blackwater Against New Nuclear Group (BANNG), June (BANNG Paper No. 19)

BANNG (2013) Optimising the Number and Location of FED Treatment (Dissolution) Facilities in Magnox Limited – Credible Options. Nuclear Decommissioning Authority, May, 2013. Response of the Blackwater Against New Nuclear Group (BANNG), June (BANNG Paper No. 20)

BANNG (2013) Optimising the Number and Location of Interim Intermediate Level Waste (ILW) Storage Facilities on Magnox Limited and EDF Energy Sites in England and Wales – Credible Options. Nuclear Decommissioning Authority, May, 2013. Response from the Blackwater Against New Nuclear Group (BANNG), June (BANNG Paper No. 21)

(There is no Paper No. 22)

BANNG (2013) Review of the Siting Process for a Geological Disposal Facility. Response from the Blackwater Against New Nuclear Group (BANNG), December (BANNG Paper No. 23)

BANNG (2014) Comment paper on the preferred option of the Nuclear Decommissioning Authority (NDA) for optimising the number and location of: Interim intermediate level waste (ILW) storage facilities on Magnox Limited and EDF Energy sites; and FED treatment (dissolution) facilities in Magnox Limited, Comments from the Blackwater Against New Nuclear Group (BANNG), January (BANNG Paper No. 24)

BANNG (2015) Manifestoes and Briefing documents on new nuclear build at Bradwell, FED dissolution and transfer of ILW to Bradwell from Dungeness and Sizewell February (BANNG Paper No. 25)

BANNG (2015) Application by Magnox for an extension to the timescale for the discharging of liquid effluent from the fuel element debris treatment process (FED) into the estuary from 12 months to a further 24 months; Application by Magnox for an option to switch the existing discharges to a new outfall structure when it becomes necessary due to blockages caused by siltation in the existing structure; A radioactive substances application to allow the switch to the new outfall structure when necessary. Response from the Blackwater Against New Nuclear Group (BANNG), September

(BANNG Paper No. 26)

BANNG (2015) Call for Evidence – Implementing Geological Disposal: working with communities. Response from the Blackwater Against New Nuclear Group (BANNG), September (BANNG Paper No. 27)

BANNG (2016) NDA Draft Strategy January 2016. Response from the Blackwater Against New Nuclear Group (BANNG), February (BANNG Paper No. 28)

BANNG (2016) Draft Magnox: Socio-Economic Plan, 2016 – 18. Response from the Blackwater Against New Nuclear Group (BANNG), February (BANNG Paper No. 29)

BANNG (2016) Planning Application Ref. No. ESS/15/16/MAL from Magnox (to vary condition 3 (restriction on importation) of planning permission ESS/43/12/MAL to temporarily suspend condition 3 to allow the importation of packaged intermediate-level waste from Magnox sites Sizewell A and Dungeness A into the Bradwell site's existing interim storage facility for the period up to 2023). Objections to the Planning Application from the Blackwater Against New Nuclear Group (BANNG), September (BANNG Paper No. 30)

BANNG (2016) Requests by Magnox for: an extension to continue discharging liquid effluent, from the fuel element debris treatment process (FED) at Bradwell, into the Blackwater estuary; an option to switch the existing discharges to a new outfall structure in case the existing outfall becomes blocked by siltation; a Radioactive Substances application to allow the switch to the new outfall structure when necessary. Response from the Blackwater Against New Nuclear Group (BANNG), December (BANNG Paper No. 31)